Cerulean Winds Aspen Project Limited

Aspen Offshore Wind Farm

Offshore Environmental Impact Assessment Report

Volume 3, Appendix 12.6: Offshore Ornithology Population Viability Analysis Technical Annex

August 2025

COMMERCIAL IN CONFIDENCE

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Defined Terms

Term	Definition
Applicant	Cerulean Winds Aspen Project Limited.
Aspen Array Area	The area in which the generation infrastructure for Aspen Offshore Wind Farm (OWF), including Wind Turbine Generators (WTGs) and Offshore Substation Platforms (OSPs) will be located.
Aspen Lease Area	The site for which Cerulean Winds (UKCS) Ltd was awarded an Exclusivity Agreement. The Aspen Lease Area totals 333 km^2 in which the Aspen Array Area will be sited.
Landfall	The area between Mean Low Water Spring (MLWS) and Mean High Water Spring (MHWS) where the Offshore Transmission Cables (OTCs) will connect onshore to offshore.
Offshore Transmission Cable Corridor (OTC Corridor)	The area within which the Offshore Transmission Cables (OTCs) will be installed.
Offshore Transmission Cables (OTCs)	The subsea electricity cables running from Landfall in the region of Stonehaven to the Offshore Substation Platform(s) (OSP(s)) in Aspen Array Area. The OTCs will act as both a demand and supply cable. The OTCs will provide both traditional supply of power to grid but also ensures robust secure power supply to oil and gas assets when the Aspen Array Area is not generating sufficient renewable power to support their demand.
Offshore Wind Farm (OWF)	The proposed generation infrastructure comprising of Wind Turbine Generators (WTGs) and associated, Offshore Substation Platform(s) (OSP(s)), foundations and substructures and Inter-array Cables (IACs).
Project	Aspen Offshore Wind Farm (OWF) - 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 (OTCs).

Acronyms

Term	Definition
BDMPS	Biologically Defined Maximum Population Size
BioSS	Biomathematics and Statistics Scotland
CGR	Counterfactual of Population Growth Rate
CPS	Counterfactual of Population Size
EIA	Environmental Impact Assessment
HRA	Habitat Regulation Assessment
JNCC	Joint Nature Conservation Committee
Km	Kilometres
MHWS	Mean High Water Spring
MLWS	Mean Low Water Springs
MMFR	Mean Max Foraging Range
OSP	Offshore Substation Platform
OTC	Offshore Transmission Cable
OWF	Offshore Wind Farm
PVA	Population Viability Analysis
SD	Standard Deviation
SMP	Seabird Monitoring Programme
SPA	Special Protection Area
UKCEH	UK Centre for Ecology and Hydrology
WTG	Wind Turbine Generator

1 Introduction

1.1 Background

1.1.1 Cerulean Winds Aspen Project Limited (hereafter referred to as the 'Applicant') is proposing to develop the Aspen Offshore Wind Farm (hereafter referred to as 'the Project'). The Project is made up of both offshore and onshore components. The subject of the Offshore Environmental Impact Assessment Report (Offshore EIAR) is the offshore infrastructure of the Project seaward of Mean High Water Springs (MHWS) which is hereafter referred to as 'the Proposed Development'.

1.1.2 The Aspen Array Area covers an area of approximately 333 km^2 and is located approximately 84 km east of Peterhead on the east coast of Scotland. 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-array Cables (IACs), Inter-link Cables, Offshore Transmission Cables (OTCs) and Landfall.

1.1.3 This Report is an Appendix to **Volume 2, Chapter 12: Offshore and Intertidal Ornithology** and the **Report to Inform Appropriate Assessment (RIAA)**. Results pertain only to seabird species identified as requiring consideration, comprising of those that travel or rest within the Proposed Development Array Area (hereafter referred to as the 'Array Area') plus a 2 km buffer.

1.2 Population Viability Analysis

1.2.1 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 Assessment (HRA) includes the assessment of these potential effects with respect to individual Special Protection Area (SPA) colonies and the wider population.

1.2.2 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.

1.2.3 PVA has been carried out for both EIA and HRA, assessing the predicted mortalities on a regional scale and at impacted SPAs. The EIA results are presented in Section 3.1 (EIA Results) and SPA specific assessments are presented in Section 3.2 (HRA Results). Methods for both assessments are presented alongside each other in Section 2.

2 Methodology

2.1 PVA Model

2.1.1 The NatureScot (2023) Guidance Note 11 was followed to undertake PVA. Based on this guidance, PVA was undertaken using the Seabird PVA Tool developed by UK Centre for Ecology and Hydrology (UKCEH) and Biomathematics and Statistics Scotland (BioSS), under contract to Natural England and JNCC (Searle *et al.*, 2019). The Seabird PVA Tool was accessed via the 'Shiny App' interface, which acts as user-friendly graphical user interface for using the functions built within the nepva r package v 2.0 (nepva R package: v 4.18 Interface: v 1.7).

2.2 Modelling Approach

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

2.2.2 Stochastic models produce probabilistic outputs to account for the impact of environmental and demographic stochasticity. Environmental stochasticity describes the effect that random variation in factors such as weather can have on a population and is modelled by the incorporation of generating random survival values (from a probability distribution) from one-time step to the next. Demographic stochasticity refers to random variation in the outcomes of survival and reproduction at the individual level, even when the underlying rates remain constant. In the NE PVA model, this is captured using a binomial process—for example, if each individual has a 90% chance of surviving, the actual number of survivors will vary between simulation runs due to chance alone. Demographic stochasticity can usually be ignored for populations greater than 100 individuals but will not alter the model outputs when simulating larger populations (WWT Consulting 2012).

2.2.3 All PVA modelling in this report was undertaken with environmental and demographic stochasticity. The number of simulations runs were set to 5,000 and were ran for the expected lifespan of the Proposed Development (35 years). As per NatureScot guidance, outputs for the PVAs for 25 years and 50 years are also presented in Annex A and Annex B of this report.

2.2.4 Additional "burn-in" time of ten years were included in each model. Burn-in allows the population structure to stabilise prior to applying impacts (i.e. form a stable balance of immatures to adult birds). This is informed by internal model parameterisation during the burn-in period. To note - due to the relatively small population size used in the PVA run for razorbill breeding season, the burn-in was set to five years.

2.2.5 The demographic parameters used for PVA are presented in Table 2.1 and Table 2.3. The input log and outputs from the Shiny App can be found in Annex A and Annex B of this report.

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

2.2.7 Density dependence is self-evident in the natural environment, as without it, populations would grow exponentially. For seabird populations, although there is evidence that density dependence acts on populations, the mechanisms as to how this operates are largely uncertain (Horswill *et al.,* 2016). If density dependence is mis-specified in a PVA, the modelled predictions may be unreliable. Therefore, it is more typical to use density independent models for seabird assessments, despite the lack of biologically necessary density dependence. As such, density independent models lack any means by which a population can recover once it has been reduced beyond a certain point, they are therefore appropriate for impact assessment purposes on the grounds of precaution (i.e., another source of precaution in the assessment process) (Ridge *et al* 2019). Conversely, this also means that population projections can trend exponentially with no effective carrying capacity.

2.2.8 The species considered for analysis are:

- Black-legged kittiwake (*Rissa tridactyla*), hereafter 'kittiwake';
- Common guillemot (*Uria aalge*), hereafter 'guillemot';
- Razorbill (*Alca torda*);
- Atlantic puffin (*Fratercula arctica*), hereafter 'puffin';
- Herring gull (*Larus argentatus*);
- Great black-backed gull (*Larus marinus*); and
- Northern gannet (*Morus bassanus*); hereafter 'gannet'.

2.3 Model Parameters

Demographic Rates and Reference Populations

Environmental Impact Assessment

2.3.1 Survival and productivity rates for each species were derived from Horswill and Robinson (2015). These rates are provided in Table 2.1 with further details provided in the following paragraphs. For great blacked-back gull, the adult juvenile survival rates from 1-2 to 4-5 have been taken from herring gull, as suggested by the author, due to a limited data for this species.

2.3.2 Survival rates vary between age classes, with 0-1 representing birds under the age of one year, class 1-2 representing birds under the age of two, class 2-3 includes birds at age 2 etc. Adults are grouped as survival rates tend to be consistent at maturity despite age. The age at first breeding and maximum brood size per pair were selected from the pre-formulated values within the PVA Tool (Searle *et al*., 2019).

2.3.3 The method for calculating both the seasonal and regional population estimates is detailed in **Volume 3, Appendix 12.1: Offshore and Intertidal Ornithology Technical Baseline Report.**

2.3.4 The initial population size used to calculate the impact on adult annual survival for each scenario is presented in Table 2.2. Due to the smaller population size used in the seasonal and regional assessment of guillemots, an additional scenario was run using the Biologically Defined Maximum Population Size (BDMPS) for the UK North Sea and Channel (Furness, 2015). Further explanation for this scenario is provided within **Volume 2, Chapter 12: Offshore and Intertidal Ornithology.**

Table 2.1 Summary Of Demographic Rates for PVA Species. Source: Horswill And Robinson (2015), Unless Described in Text as Separate Calculation.

Species	Adult Survival Rate (SD)	Productivity (SD) (per pair)	Age of recruitment	Brood size (per pair)	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	0.939 (0.015)	0.672 (0.147)	6	1	0.560 (0.001)	0.792 (0.001)	0.917 (0.001)	0.917 (0.001)	0.939 (0.001)	0.939 (0.001)
Razorbill	0.895 (0.067)	0.570 (0.247)	5	1	0.630 (0.209)	0.630 (0.209)	0.630 (0.209)	0.895 (0.067)	0.895 (0.067)	-
Puffin	0.906 (0.083)	0.617 (0.151)	5	1	0.709 (0.001)	0.790 (0.001)	0.790 (0.001)	0.760 (0.001)	0.805 (0.001)	-
Gannet	0.919 (0.042)	0.700 (0.082)	5	1	0.424 (0.045)	0.829 (0.026)	0.891 (0.019)	0.895 (0.019)	0.895 (0.042)	-
Kittiwake	0.854 (0.051)	0.690 (0.296)	4	2	0.790 (0.051)	0.790 (0.051)	0.854 (0.051)	0.854 (0.051)	-	-
Great black-backed gull	0.930 (0.0001)	1.139 (0.533)	5	3	0.798 (0.092)	0.834 (0.034)	0.854 (0.034)	0.854 (0.034)	0.854 (0.034)	-
Herring gull	0.834 (0.034)	0.920 (0.477)	5	3	0.798 (0.092)	0.834 (0.034)	0.854 (0.034)	0.854 (0.034)	0.854 (0.034)	-

Table 2.2 Season Specific Population Estimates Used in PVA

Species	Season	Population Estimate
Guillemot	Breeding	52,931
	Non-breeding	52,931
	Annual (regional)	52,931
	Annual (BDMPS)	1,617,306
	Annual (biogeographic)	4,125,000
Razorbill	Breeding	22,267
	Non-breeding	591,874
	Annual (regional)	591,874
	Annual (biogeographic)	1,707,000
Puffin	Breeding	492,189
	Non-breeding	231,957
	Annual (regional)	492,189
Gannet	Breeding	795,294
	Non-breeding	456,298
	Annual (regional)	795,294
	Annual (biogeographic)	1,180,000
Kittiwake	Breeding	422,742
	Non-breeding	829,937
	Annual (regional)	829,937
	Annual (biogeographic)	5,100,000
Great black-backed gull	Annual (regional)	91,399
	Annual (biogeographic)	235,000
Herring gull	Annual (regional)	466,511
	Annual (biogeographic)	1,098,000

Habitats Regulation Appraisal

2.3.5 Similarly to the PVA methodology for the EIA (see Section 2.3 (E) above for further details) the demographic parameters obtained from Horswill and Robinson (2015) were used, where SPA-specific productivity rates were not available. For specific SPAs where breeding success and colony count data were available these were used to calculate average productivity rates (and associated standard deviations).

2.3.6 Only the most recent robust population count was considered, extracted from the SMP online database, 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. Where an estimated reduction in annual survival rate was greater than 0.02%, PVA was undertaken.

Table 2.3 Summary of SPA Demographic Parameters Selected for PVA Species. Source: Horswill and Robinson (2015) and SMP Colony Counts.

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	27,094	0.854 (0.051)	0.599 (0.328)	0.790 (0.051)	0.790 (0.051)	0.854 (0.051)	0.854 (0.051)	-	-
Guillemot	Buchan Ness to Collieston Coast SPA	30,420	0.939 (0.015)	0.646 (0.175)	0.560 (0.058)	0.792 (0.152)	0.917 (0.098)	0.917 (0.098)	0.939 (0.015)	0.939 (0.015)
Puffin	Farne Islands SPA	100,206	0.906 (0.083)	0.769 (0.175)	0.709 (0.108)	0.709 (0.108)	0.709 (0.108)	0.760 (0.093)	0.805 (0.083)	-
	Forth Islands SPA	117,932	0.906 (0.083)	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	Forth Islands SPA	150,518	0.919 (0.042)	0.722 (0.084)	0.424 (0.045)	0.829 (0.026)	0.891 (0.019)	0.895 (0.019)	0.895 (0.042)	-
	Noss SPA	24,670	0.919 (0.042)	0.719 (0.053)	0.424 (0.045)	0.829 (0.026)	0.891 (0.019)	0.895 (0.019)	0.895 (0.042)	-
	Hermaness, Saxa Vord and Valla Field SPA	39,606	0.919 (0.042)	0.658 (0.056)	0.424 (0.045)	0.829 (0.026)	0.891 (0.019)	0.895 (0.019)	0.895 (0.042)	-
	Flamborough and Filey Coast SPA	31,588	0.919 (0.042)	0.798 (0.066)	0.424 (0.045)	0.829 (0.026)	0.891 (0.019)	0.895 (0.019)	0.895 (0.042)	-

2.3.7 The outputs from the PVA tool focus on the counterfactual of population growth rate (CGR) and counterfactual of population size (CPS) (Searle *et al.*, 2019). These metrics compare impacted and unimpacted scenarios, enabling interpretation of the predicted impact on the population (Cook and Robinson, 2016). CPS represents the median ratio of the final size of the impacted population to the baseline (unimpacted) population. CGR represents the median ratio of the annual growth rate of the impacted population to that of the unimpacted population. Both metrics are expressed as proportions.

2.3.8 When assessing population impacts using density-independent models, it is recommended to use CGR as the preferred metric. This is because, in the absence of density-dependent regulation, using CPS can lead to unrealistic outcomes. Therefore, within the assessment conclusions more wight has been given to the CGR, while accounting for the long- and short-term population trends. A general rule of thumb has been used, whereby impact scenarios with a CGR remaining above 0.995 (equivalent to a reduction in population growth rate of less than 0.5%) is typically considered to fall within the range of natural variation in population growth rates. In such cases, the effect is likely to be undetectable against background environmental and demographic fluctuations, and therefore not biologically meaningful.

3 Population Viability Analysis Results

3.1 Environmental Impact Assessment

3.1.1 The results of the PVA have been presented below for each species using the median CGR and the median CPS (Table 3.1 to Table 3.27). The PVA results are presented from 25 to 50 years, with the operation time of 35 years included. The parameter log reports are presented in Annex A for each species. The Applicant has chosen not to present output graphs from PVA, as graphical trends can be misleading in this context. Instead of focusing on visual trends over time, the analysis is better understood by examining the differences between impact scenarios. Interpreting these results within the context of actual population trends is also important, as it contextualises outputs in real-world dynamics. The comparisons can provide more meaningful insights into the relative effects of each scenario on population viability, which is the primary objective of the assessment.

Kittiwake

Breeding

Table 3.1 Kittiwake 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 approach	2.80	0.000007	1.000 (<0.001)	1.000 (0.006)	1.000 (<0.001)	1.000 (0.006)	1.000 (<0.001)	0.999 (0.007)
Guidance Low Approach	7.17	0.000017	1.000 (<0.001)	1.000 (0.006)	1.000 (<0.001)	0.999 (0.006)	1.000 (<0.001)	0.999 (0.008)
Guidance High Approach	8.49	0.000020	1.000 (<0.001)	0.999 (0.006)	1.000 (<0.001)	0.999 (0.007)	1.000 (<0.001)	0.999 (0.007)
Cumulative								
Applicant approach	1,064.26	0.002518	0.997 (<0.001)	0.925 (0.005)	0.997 (<0.001)	0.897 (0.006)	0.997 (<0.001)	0.858 (0.007)
Guidance Low Approach	1,069.17	0.002529	0.997 (<0.001)	0.924 (0.005)	0.997 (<0.001)	0.897 (0.006)	0.997 (<0.001)	0.857 (0.007)
Guidance High Approach	1,406.39	0.003327	0.996 (<0.001)	0.902 (0.005)	0.996 (<0.001)	0.866 (0.006)	0.996 (<0.001)	0.816 (0.006)

Table 3.2 Kittiwake 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 approach	1.58	0.000002	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.006)
Guidance Low Approach	4.06	0.000005	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.006)
Guidance High Approach	4.83	0.000006	1.000 (<0.001)	1.000 (0.004)	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.006)
Cumulative								
Applicant approach	2,143.63	0.002583	0.997 (<0.001)	0.923 (0.004)	0.997 (<0.001)	0.895 (0.005)	0.997 (<0.001)	0.854 (0.005)
Guidance Low Approach	2,146.11	0.002586	0.997 (<0.001)	0.923 (0.004)	0.997 (<0.001)	0.895 (0.004)	0.997 (<0.001)	0.854 (0.005)
Guidance High Approach	2,413.71	0.002908	0.997 (<0.001)	0.914 (0.004)	0.997 (<0.001)	0.882 (0.004)	0.997 (<0.001)	0.838 (0.005)

Table 3.3 Kittiwake 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 approach	4.38	0.000005	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.006)
Guidance Low Approach	11.78	0.000014	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	0.999 (0.005)	1.000 (<0.001)	0.999 (0.006)
Guidance High Approach	13.32	0.000016	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	0.999 (0.005)	1.000 (<0.001)	0.999 (0.006)
Cumulative								
Applicant approach	3,207.89	0.003865	0.995 (<0.001)	0.887 (0.004)	0.995 (<0.001)	0.847 (0.004)	0.995 (<0.001)	0.790 (0.005)
Guidance Low Approach	3,214.15	0.003873	0.995 (<0.001)	0.887 (0.004)	0.995 (<0.001)	0.846 (0.004)	0.995 (<0.001)	0.790 (0.005)
Guidance High Approach	3,818.97	0.004602	0.995 (<0.001)	0.867 (0.004)	0.995 (<0.001)	0.820 (0.004)	0.995 (<0.001)	0.755 (0.005)

Table 3.4 Kittiwake Annual Total PVA Results Using the Biogeographic 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)
Cumulative								
Applicant approach	3,207.89	0.000629	0.999 (<0.001)	0.981 (0.002)	0.999 (<0.001)	0.973 (0.002)	0.999 (<0.001)	0.962 (0.002)
Guidance Low Approach	3,214.15	0.000630	0.999 (<0.001)	0.981 (0.002)	0.999 (<0.001)	0.973 (0.002)	0.999 (<0.001)	0.962 (0.002)
Guidance High Approach	3,818.97	0.000749	0.999 (<0.001)	0.977 (0.002)	0.999 (<0.001)	0.968 (0.002)	0.999 (<0.001)	0.955 (0.002)

Guillemot

Breeding

Table 3.5 Guillemot 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 approach	2.32	0.000044	1.000 (<0.001)	0.999 (0.009)	1.000 (<0.001)	0.998 (0.010)	1.000 (<0.001)	0.997 (0.010)
Guidance Low Approach	8.35	0.000158	1.000 (<0.001)	0.995 (0.009)	1.000 (<0.001)	0.994 (0.010)	1.000 (<0.001)	0.991 (0.010)
Guidance High Approach	13.92	0.000263	1.000 (<0.001)	0.992 (0.009)	1.000 (<0.001)	0.990 (0.010)	1.000 (<0.001)	0.985 (0.010)
Cumulative								
Applicant approach	245.64	0.004641	0.995 (<0.001)	0.873 (0.008)	0.995 (<0.001)	0.828 (0.008)	0.995 (<0.001)	0.766 (0.008)
Guidance Low Approach	884.29	0.016707	0.981 (<0.001)	0.610 (0.006)	0.981 (<0.001)	0.505 (0.006)	0.981 (<0.001)	0.380 (0.005)
Guidance High Approach	1,473.82	0.027844	0.969 (<0.001)	0.437 (0.005)	0.969 (<0.001)	0.318 (0.004)	0.969 (<0.001)	0.197 (0.003)

Table 3.6 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 approach	25.20	0.000476	0.999 (<0.001)	0.986 (0.009)	0.999 (<0.001)	0.981 (0.010)	0.999 (<0.001)	0.973 (0.010)
Guidance Low Approach	30.24	0.000571	0.999 (<0.001)	0.984 (0.009)	0.999 (<0.001)	0.977 (0.010)	0.999 (<0.001)	0.968 (0.010)
Guidance High Approach	90.71	0.001714	0.998 (<0.001)	0.951 (0.009)	0.998 (<0.001)	0.933 (0.009)	0.998 (<0.001)	0.906 (0.010)
Cumulative								
Applicant approach	476.31	0.008999	0.990 (<0.001)	0.768 (0.007)	0.990 (<0.001)	0.693 (0.007)	0.990 (<0.001)	0.595 (0.007)
Guidance Low Approach	571.57	0.010798	0.988 (<0.001)	0.727 (0.007)	0.988 (<0.001)	0.644 (0.007)	0.988 (<0.001)	0.536 (0.006)
Guidance High Approach	1,714.71	0.032395	0.964 (<0.001)	0.381 (0.004)	0.964 (<0.001)	0.262 (0.003)	0.964 (<0.001)	0.150 (0.002)

Table 3.7 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 approach	27.52	0.000520	0.999 (<0.001)	0.985 (0.009)	0.999 (<0.001)	0.979 (0.010)	0.999 (<0.001)	0.971 (0.010)
Guidance Low Approach	38.59	0.000729	0.999 (<0.001)	0.979 (0.009)	0.999 (<0.001)	0.971 (0.009)	0.999 (<0.001)	0.959 (0.010)
Guidance High Approach	104.63	0.001977	0.998 (<0.001)	0.944 (0.008)	0.998 (<0.001)	0.923 (0.009)	0.998 (<0.001)	0.893 (0.009)
Cumulative								
Applicant approach	721.95	0.013639	0.985 (<0.001)	0.669 (0.007)	0.985 (<0.001)	0.573 (0.006)	0.985 (<0.001)	0.454 (0.005)
Guidance Low Approach	1,455.86	0.027505	0.969 (<0.001)	0.441 (0.005)	0.969 (<0.001)	0.322 (0.004)	0.969 (<0.001)	0.201 (0.003)
Guidance High Approach	3,188.53	0.060240	0.932 (<0.001)	0.161 (0.002)	0.932 (<0.001)	0.080 (0.001)	0.932 (<0.001)	0.028 (<0.001)

Table 3.8 Guillemot Annual Total PVA Results Using the Biogeographic 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)
Alone								
Applicant approach	27.52	0.000007	0.999 (<0.001)	0.985 (0.001)	0.999 (<0.001)	0.979 (0.001)	0.999 (<0.001)	0.971 (0.001)
Guidance Low Approach	38.59	0.000009	0.999 (<0.001)	0.979 (0.001)	0.999 (<0.001)	0.971 (0.001)	0.999 (<0.001)	0.959 (0.001)
Guidance High Approach	104.63	0.000025	0.998 (<0.001)	0.944 (0.001)	0.998 (<0.001)	0.923 (0.001)	0.998 (<0.001)	0.893 (0.001)
Cumulative								
Applicant approach	721.95	0.000175	0.985 (<0.001)	0.669 (0.001)	0.985 (<0.001)	0.573 (0.001)	0.985 (<0.001)	0.454 (<0.001)
Guidance Low Approach	1,455.86	0.000353	0.969 (<0.001)	0.441 (0.001)	0.969 (<0.001)	0.322 (<0.001)	0.969 (<0.001)	0.201 (<0.001)
Guidance High Approach	3,188.53	0.000773	0.932 (<0.001)	0.161 (<0.001)	0.932 (<0.001)	0.080 (<0.001)	0.932 (<0.001)	0.028 (<0.001)

Table 3.9 Guillemot Annual Total PVA Results Using the BDMPS 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)
Alone								
Applicant approach	27.52	0.000017	1.000 (<0.001)	1.000 (0.002)	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)
Guidance Low Approach	38.59	0.000024	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)
Guidance High Approach	104.63	0.000065	1.000 (<0.001)	0.998 (0.002)	1.000 (<0.001)	0.997 (0.002)	1.000 (<0.001)	0.996 (0.002)
Cumulative								
Applicant approach	721.95	0.000446	0.999 (<0.001)	0.987 (0.002)	0.999 (<0.001)	0.982 (0.002)	0.999 (<0.001)	0.975 (0.002)
Guidance Low Approach	1,455.86	0.000900	0.999 (<0.001)	0.974 (0.002)	0.999 (<0.001)	0.964 (0.002)	0.999 (<0.001)	0.950 (0.002)
Guidance High Approach	3,188.53	0.001972	0.998 (<0.001)	0.944 (0.002)	0.998 (<0.001)	0.923 (0.002)	0.998 (<0.001)	0.893 (0.002)

Table 3.10 Guillemot Annual Total PVA Results Using the BDMPS 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)
Alone								
Applicant approach	29.27	0.000018	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)
Guidance Low Approach	44.90	0.000028	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.998 (0.002)
Guidance High Approach	115.15	0.000071	1.000 (<0.001)	0.998 (0.002)	1.000 (<0.001)	0.997 (0.002)	1.000 (<0.001)	0.995 (0.002)
Cumulative								
Applicant approach	723.70	0.000447	0.999 (<0.001)	0.983 (0.002)	0.999 (<0.001)	0.976 (0.002)	0.999 (<0.001)	0.967 (0.002)
Guidance Low Approach	1,462.18	0.000904	0.999 (<0.001)	0.966 (0.002)	0.999 (<0.001)	0.953 (0.002)	0.999 (<0.001)	0.934 (0.002)
Guidance High Approach	3,199.06	0.001978	0.997 (<0.001)	0.926 (0.002)	0.997 (<0.001)	0.900 (0.002)	0.997 (<0.001)	0.861 (0.002)

Table 3.11 Guillemot Non-Breeding Season Evidence Led BDMPS 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 approach	25.20	0.000021	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)
Guidance Low Approach	30.24	0.000025	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)
Guidance High Approach	90.71	0.000074	1.000 (<0.001)	0.998 (0.002)	1.000 (<0.001)	0.997 (0.002)	1.000 (<0.001)	0.996 (0.002)
Cumulative								
Applicant approach	1043.90	0.000853	0.999 (<0.001)	0.975 (0.002)	0.999 (<0.001)	0.966 (0.002)	0.999 (<0.001)	0.952 (0.002)
Guidance Low Approach	1252.6	0.001023	0.999 (<0.001)	0.971 (0.002)	0.999 (<0.001)	0.959 (0.002)	0.999 (<0.001)	0.943 (0.002)
Guidance High Approach	3758.04	0.003070	0.996 (<0.001)	0.912 (0.002)	0.996 (<0.001)	0.880 (0.002)	0.996 (<0.001)	0.834 (0.002)

Table 3.12 Guillemot Annual Total Evidence Led BDMPS 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 approach	27.52	0.000022	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)
Guidance Low Approach	38.59	0.000032	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.999 (0.002)	1.000 (<0.001)	0.998 (0.002)
Guidance High Approach	104.63	0.000085	1.000 (<0.001)	0.998 (0.002)	1.000 (<0.001)	0.997 (0.002)	1.000 (<0.001)	0.995 (0.002)
Cumulative								
Applicant approach	1289.54	0.001054	0.999 (<0.001)	0.970 (0.002)	0.999 (<0.001)	0.958 (0.002)	0.999 (<0.001)	0.941 (0.002)
Guidance Low Approach	2136.97	0.001746	0.998 (<0.001)	0.950 (0.002)	0.998 (<0.001)	0.932 (0.002)	0.998 (<0.001)	0.905 (0.002)
Guidance High Approach	5231.86	0.004274	0.995 (<0.001)	0.882 (0.002)	0.995 (<0.001)	0.841 (0.002)	0.995 (<0.001)	0.782 (0.002)

Table 3.13 Guillemot Annual Evidence Led Biogeographic 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 approach	27.52	0.000022	1.000 (<0.001)	1.000 (0.001)	1.000 (<0.001)	1.000 (0.001)	1.000 (<0.001)	1.000 (0.001)
Guidance Low Approach	38.59	0.000032	1.000 (<0.001)	1.000 (0.001)	1.000 (<0.001)	1.000 (0.001)	1.000 (<0.001)	0.999 (0.001)
Guidance High Approach	104.63	0.000085	1.000 (<0.001)	0.999 (0.001)	1.000 (<0.001)	0.999 (0.001)	1.000 (<0.001)	0.999 (0.001)
Cumulative								
Applicant approach	1289.54	0.001054	1.000 (<0.001)	0.991 (0.001)	1.000 (<0.001)	0.987 (0.001)	1.000 (<0.001)	0.982 (0.001)
Guidance Low Approach	2136.97	0.001746	0.999 (<0.001)	0.985 (0.001)	0.999 (<0.001)	0.979 (0.001)	0.999 (<0.001)	0.971 (0.001)
Guidance High Approach	5231.86	0.004274	0.999 (<0.001)	0.964 (0.001)	0.999 (<0.001)	0.950 (0.001)	0.999 (<0.001)	0.930 (0.001)

Breeding

Table 3.14 Razorbill 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 approach	0.40	0.000018	1.000 (0.001)	0.999 (0.032)	1.000 (0.001)	0.999 (0.043)	1.000 (0.001)	1.000 (0.063)
Guidance Low Approach	1.42	0.000064	1.000 (0.001)	0.998 (0.033)	1.000 (0.001)	0.997 (0.043)	1.000 (0.001)	0.996 (0.063)
Guidance High Approach	2.37	0.000106	1.000 (0.001)	0.996 (0.033)	1.000 (0.001)	0.994 (0.043)	1.000 (0.001)	0.994 (0.063)
Cumulative								
Applicant approach	142.64	0.006406	0.992 (0.001)	0.818 (0.028)	0.992 (0.001)	0.758 (0.035)	0.992 (0.001)	0.675 (0.046)
Guidance Low Approach	513.49	0.023060	0.972 (0.001)	0.483 (0.019)	0.972 (0.001)	0.365 (0.020)	0.972 (0.002)	0.240 (0.022)
Guidance High Approach	855.81	0.038434	0.954 (0.002)	0.293 (0.014)	0.954 (0.002)	0.183 (0.013)	0.954 (0.003)	0.090 (0.012)

Non-breeding

Table 3.15 Razorbill 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 approach	0.31	0.000001	1.000 (<0.001)	1.000 (0.008)	1.000 (<0.001)	1.000 (0.010)	1.000 (<0.001)	1.000 (0.015)
Guidance Low Approach	0.37	0.000001	1.000 (<0.001)	1.000 (0.008)	1.000 (<0.001)	1.000 (0.010)	1.000 (<0.001)	1.000 (0.015)
Guidance High Approach	1.10	0.000002	1.000 (<0.001)	1.000 (0.008)	1.000 (<0.001)	1.000 (0.010)	1.000 (<0.001)	1.000 (0.015)
Cumulative								
Applicant approach	846.80	0.001431	0.998 (<0.001)	0.956 (0.008)	0.998 (<0.001)	0.940 (0.010)	0.998 (<0.001)	0.916 (0.014)
Guidance Low Approach	1,016.16	0.001717	0.998 (<0.001)	0.948 (0.008)	0.998 (<0.001)	0.929 (0.010)	0.998 (<0.001)	0.900 (0.014)
Guidance High Approach	3,048.47	0.005151	0.994 (<0.001)	0.851 (0.007)	0.994 (<0.001)	0.800 (0.009)	0.994 (<0.001)	0.729 (0.012)

Table 3.16 Razorbill 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 approach	0.70	0.000001	1.000 (<0.001)	1.000 (0.008)	1.000 (<0.001)	1.000 (0.010)	1.000 (<0.001)	1.000 (0.015)
Guidance Low Approach	1.79	0.000003	1.000 (<0.001)	1.000 (0.008)	1.000 (<0.001)	1.000 (0.010)	1.000 (<0.001)	1.000 (0.015)
Guidance High Approach	3.47	0.000006	1.000 (<0.001)	1.000 (0.008)	1.000 (<0.001)	1.000 (0.010)	1.000 (<0.001)	0.999 (0.015)
Cumulative								
Applicant approach	989.43	0.001672	0.998 (<0.001)	0.949 (0.008)	0.998 (<0.001)	0.931 (0.010)	0.998 (<0.001)	0.903 (0.014)
Guidance Low Approach	1,529.64	0.002584	0.997 (<0.001)	0.923 (0.008)	0.997 (<0.001)	0.894 (0.010)	0.997 (<0.001)	0.854 (0.013)
Guidance High Approach	3,904.28	0.006596	0.992 (<0.001)	0.814 (0.007)	0.992 (<0.001)	0.752 (0.009)	0.992 (<0.001)	0.667 (0.011)

Table 3.17 Razorbill Annual Total PVA Results Using the Biogeographic 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)
Cumulative								
Applicant approach	989.43	0.000580	0.999 (<0.001)	0.982 (0.005)	0.999 (<0.001)	0.975 (0.006)	0.999 (<0.001)	0.965 (0.009)
Guidance Low Approach	1,529.64	0.000896	0.999 (<0.001)	0.972 (0.005)	0.999 (<0.001)	0.962 (0.006)	0.999 (<0.001)	0.947 (0.008)
Guidance High Approach	3,904.28	0.002287	0.997 (<0.001)	0.931 (0.005)	0.997 (<0.001)	0.906 (0.006)	0.997 (<0.001)	0.869 (0.008)

Puffin

Breeding

Table 3.18 Puffin 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 approach	1.77	0.000004	1.000 (<0.001)	1.000 (0.006)	1.000 (<0.001)	1.000 (0.007)	1.000 (<0.001)	1.000 (0.010)
Guidance Low Approach	6.38	0.000013	1.000 (<0.001)	1.000 (0.006)	1.000 (<0.001)	1.000 (0.007)	1.000 (<0.001)	0.999 (0.010)
Guidance High Approach	10.64	0.000022	1.000 (<0.001)	0.999 (0.006)	1.000 (<0.001)	0.999 (0.007)	1.000 (<0.001)	0.999 (0.009)
Cumulative								
Applicant approach	209.93	0.000427	1.000 (<0.001)	0.987 (0.006)	0.999 (<0.001)	0.982 (0.007)	0.999 (<0.001)	0.975 (0.009)
Guidance Low Approach	755.74	0.001535	0.998 (<0.001)	0.954 (0.006)	0.998 (<0.001)	0.937 (0.007)	0.998 (<0.001)	0.912 (0.009)
Guidance High Approach	1,259.56	0.002559	0.997 (<0.001)	0.924 (0.006)	0.997 (<0.001)	0.897 (0.007)	0.997 (<0.001)	0.857 (0.009)

Non-breeding

Table 3.19 Puffin 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 approach	0.56	0.000002	1.000 (<0.001)	1.000 (0.011)	1.000 (<0.001)	1.000 (0.013)	1.000 (<0.001)	1.000 (0.016)
Guidance Low Approach	0.67	0.000003	1.000 (<0.001)	1.000 (0.010)	1.000 (<0.001)	1.000 (0.012)	1.000 (<0.001)	1.000 (0.016)
Guidance High Approach	2.01	0.000009	1.000 (<0.001)	1.000 (0.010)	1.000 (<0.001)	1.000 (0.013)	1.000 (<0.001)	1.000 (0.016)
Cumulative								
Applicant approach	155.66	0.000671	0.999 (<0.001)	0.980 (0.010)	0.999 (<0.001)	0.972 (0.012)	0.999 (<0.001)	0.961 (0.016)
Guidance Low Approach	186.79	0.000805	0.999 (<0.001)	0.976 (0.010)	0.999 (<0.001)	0.966 (0.012)	0.999 (<0.001)	0.953 (0.016)
Guidance High Approach	560.38	0.002416	0.997 (<0.001)	0.929 (0.010)	0.997 (<0.001)	0.902 (0.012)	0.997 (<0.001)	0.865 (0.015)

Table 3.20 Puffin 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 approach	2.33	0.000005	1.000 (<0.001)	1.000 (0.006)	1.000 (<0.001)	1.000 (0.007)	1.000 (<0.001)	1.000 (0.009)
Guidance Low Approach	2.68	0.000005	1.000 (<0.001)	1.000 (0.006)	1.000 (<0.001)	1.000 (0.007)	1.000 (<0.001)	1.000 (0.009)
Guidance High Approach	17.02	0.000035	1.000 (<0.001)	0.999 (0.006)	1.000 (<0.001)	0.998 (0.007)	1.000 (<0.001)	0.998 (0.009)
Cumulative								
Applicant approach	365.59	0.000743	0.999 (<0.001)	0.977 (0.006)	0.999 (<0.001)	0.969 (0.007)	0.999 (<0.001)	0.956 (0.009)
Guidance Low Approach	942.53	0.001915	0.998 (<0.001)	0.943 (0.006)	0.998 (<0.001)	0.922 (0.007)	0.998 (<0.001)	0.891 (0.009)
Guidance High Approach	1,819.95	0.003698	0.996 (<0.001)	0.892 (0.006)	0.996 (<0.001)	0.854 (0.007)	0.996 (<0.001)	0.800 (0.008)

Breeding

Table 3.21 Gannet 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 approach	7.10	0.000009	1.000 (<0.001)	1.000 (0.003)	1.000 (<0.001)	1.000 (0.004)	1.000 (<0.001)	0.999 (0.004)
Guidance Low Approach	18.42	0.000023	1.000 (<0.001)	0.999 (0.003)	1.000 (<0.001)	0.999 (0.004)	1.000 (<0.001)	0.999 (0.004)
Guidance High Approach	24.08	0.000030	1.000 (<0.001)	0.999 (0.003)	1.000 (<0.001)	0.999 (0.004)	1.000 (<0.001)	0.998 (0.004)
Cumulative								
Applicant approach	500.51	0.000629	0.999 (<0.001)	0.981 (0.003)	0.999 (<0.001)	0.973 (0.004)	0.999 (<0.001)	0.963 (0.004)
Guidance Low Approach	1,087.77	0.001368	0.998 (<0.001)	0.959 (0.003)	0.998 (<0.001)	0.943 (0.004)	0.998 (<0.001)	0.921 (0.004)
Guidance High Approach	1,517.85	0.001909	0.998 (<0.001)	0.943 (0.003)	0.998 (<0.001)	0.922 (0.004)	0.998 (<0.001)	0.891 (0.004)

Table 3.22 Gannet 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 approach	4.20	0.000009	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	0.999 (0.005)	1.000 (<0.001)	0.999 (0.006)
Guidance Low Approach	4.28	0.000009	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.006)
Guidance High Approach	9.68	0.000021	1.000 (<0.001)	0.999 (0.005)	1.000 (<0.001)	0.999 (0.005)	1.000 (<0.001)	0.999 (0.006)
Cumulative								
Applicant approach	232.52	0.000510	0.999 (<0.001)	0.984 (0.005)	0.999 (<0.001)	0.978 (0.005)	0.999 (<0.001)	0.970 (0.006)
Guidance Low Approach	493.31	0.001081	0.999 (<0.001)	0.967 (0.005)	0.999 (<0.001)	0.955 (0.005)	0.999 (<0.001)	0.937 (0.006)
Guidance High Approach	1,014.72	0.002224	0.997 (<0.001)	0.934 (0.005)	0.997 (<0.001)	0.909 (0.005)	0.997 (<0.001)	0.874 (0.005)

Table 3.23 Gannet 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 approach	11.30	0.000014	1.000 (<0.001)	1.000 (0.004)	1.000 (<0.001)	0.999 (0.004)	1.000 (<0.001)	0.999 (0.005)
Guidance Low Approach	22.70	0.000029	1.000 (<0.001)	0.999 (0.004)	1.000 (<0.001)	0.999 (0.004)	1.000 (<0.001)	0.998 (0.005)
Guidance High Approach	33.77	0.000042	1.000 (<0.001)	0.999 (0.004)	1.000 (<0.001)	0.998 (0.004)	1.000 (<0.001)	0.997 (0.005)
Cumulative								
Applicant approach	733.03	0.000922	0.999 (<0.001)	0.972 (0.004)	0.999 (<0.001)	0.961 (0.004)	0.999 (<0.001)	0.946 (0.004)
Guidance Low Approach	1,581.08	0.001988	0.998 (<0.001)	0.940 (0.003)	0.998 (<0.001)	0.919 (0.004)	0.998 (<0.001)	0.887 (0.004)
Guidance High Approach	2,532.57	0.003184	0.996 (<0.001)	0.906 (0.003)	0.996 (<0.001)	0.873 (0.004)	0.996 (<0.001)	0.825 (0.004)

Table 3.24 Gannet Annual Total PVA Results Using the Biogeographic 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)
Cumulative								
Applicant approach	733.03	0.000621	0.999 (<0.001)	0.981 (0.003)	0.999 (<0.001)	0.974 (0.003)	0.999 (<0.001)	0.963 (0.004)
Guidance Low Approach	1,581.08	0.001340	0.998 (<0.001)	0.960 (0.003)	0.998 (<0.001)	0.944 (0.003)	0.998 (<0.001)	0.922 (0.004)
Guidance High Approach	2,532.57	0.002146	0.997 (<0.001)	0.936 (0.003)	0.997 (<0.001)	0.912 (0.003)	0.997 (<0.001)	0.878 (0.003)

Herring gull - Regional

Annual Total

Table 3.25 Herring Gull Annual Total PVA Results Using the Regional Population Estimates

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)
Alone								
Applicant approach	2.31	0.000005	1.000 (<0.001)	1.000 (0.006)	1.000 (<0.001)	1.000 (0.007)	1.000 (<0.001)	1.000 (0.008)
Guidance Approach	3.84	0.000008	1.000 (<0.001)	1.000 (0.006)	1.000 (<0.001)	1.000 (0.007)	1.000 (<0.001)	0.999 (0.008)
Cumulative								
Applicant approach	496.62	0.001065	0.999 (<0.001)	0.967 (0.006)	0.999 (<0.001)	0.955 (0.007)	0.999 (<0.001)	0.937 (0.007)
Guidance Approach	498.16	0.001068	0.999 (<0.001)	0.967 (0.006)	0.999 (<0.001)	0.955 (0.007)	0.999 (<0.001)	0.936 (0.008)

Herring gull - Biogeographic

Annual Total

Table 3.26 Herring Gull Annual Total PVA Results Using the Biogeographic Population Estimates

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)
Alone								
Applicant approach	2.31	0.000002	1.000 (<0.001)	1.000 (0.004)	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.005)
Guidance Approach	3.84	0.000003	1.000 (<0.001)	1.000 (0.004)	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.005)
Cumulative								
Applicant approach	496.62	0.000452	0.999 (<0.001)	0.986 (0.004)	0.999 (<0.001)	0.981 (0.005)	0.999 (<0.001)	0.973 (0.005)
Guidance Approach	498.16	0.000454	0.999 (<0.001)	0.986 (0.004)	0.999 (<0.001)	0.981 (0.005)	0.999 (<0.001)	0.973 (0.005)

Great black-backed gull

Annual Total - Regional

Table 3.27 Great Black-Backed Gull Annual Total PVA Results Using the Regional Population Estimates

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)
Alone								
Applicant approach	1.02	0.000011	1.000 (<0.001)	1.000 (0.004)	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.005)
Guidance Approach	9.72	0.000106	1.000 (<0.001)	1.000 (0.004)	1.000 (<0.001)	1.000 (0.005)	1.000 (<0.001)	1.000 (0.005)
Cumulative								
Applicant approach	1,135.48	0.012423	0.999 (<0.001)	0.986 (0.004)	0.999 (<0.001)	0.981 (0.005)	0.999 (<0.001)	0.973 (0.005)
Guidance Approach	1,144.19	0.012519	0.999 (<0.001)	0.986 (0.004)	0.999 (<0.001)	0.981 (0.005)	0.999 (<0.001)	0.973 (0.005)

Table 3.28 Great Black-Backed Gull Annual Total PVA Results Using the Biogeographic Population Estimates

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)
Alone								
Applicant approach	1.02	0.000004	1.000 (<0.001)	1.000 (0.004)	1.000 (<0.001)	1.000 (0.004)	1.000 (<0.001)	1.000 (0.004)
Guidance Approach	9.72	0.000041	1.000 (<0.001)	0.999 (0.004)	1.000 (<0.001)	0.998 (0.004)	1.000 (<0.001)	0.998 (0.004)
Cumulative								
Applicant approach	1,135.48	0.004832	0.995 (<0.001)	0.867 (0.004)	0.995 (<0.001)	0.820 (0.003)	0.995 (<0.001)	0.755 (0.003)
Guidance Approach	1,144.19	0.004869	0.994 (<0.001)	0.866 (0.004)	0.994 (<0.001)	0.819 (0.003)	0.994 (<0.001)	0.754 (0.003)

3.2 Habitats Regulation Appraisal

3.2.1 The results of the PVA have been presented below for each species using the median CGR and the median CPS (Table 3.29 to Table 3.37). The PVA results are presented from 25 to 50 years, with the operation time of 35 years included. The parameter log reports are presented in Annex B for each species. The Applicant has chosen not to present output graphs from PVA, as graphical trends can be misleading in this context. Instead of focusing on visual trends over time, the analysis is better understood by examining the differences between impact scenarios. Interpreting these results within the context of actual population trends is also important, as it contextualises outputs in real-world dynamics. The comparisons can provide more meaningful insights into the relative effects of each scenario on population viability, which is the primary objective of the assessment.

Buchan Ness to Collieston Coast SPA

Table 3.29 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								
Applicant Low approach	0.43	0.000016	1.000 (<0.001)	0.999 (0.025)	1.000 (<0.001)	0.999 (0.030)	1.000 (<0.001)	0.999 (0.036)
Guidance Low Approach	1.18	0.000044	1.000 (<0.001)	0.999 (0.025)	1.000 (<0.001)	0.998 (0.030)	1.000 (<0.001)	0.999 (0.036)
Guidance High Approach	1.31	0.000048	1.000 (<0.001)	0.999 (0.025)	1.000 (<0.001)	0.998 (0.030)	1.000 (<0.001)	0.997 (0.037)
In-combination								
Applicant Low approach	110.99	0.004097	0.995 (<0.001)	0.881 (0.023)	0.995 (<0.001)	0.838 (0.026)	0.995 (<0.001)	0.779 (0.030)
Applicant Low approach – Minus BB	99.33	0.003666	0.996 (<0.001)	0.893 (0.023)	0.996 (<0.001)	0.854 (0.026)	0.996 (<0.001)	0.800 (0.030)
Guidance Low Approach	111.75	0.004124	0.995 (<0.001)	0.880 (0.023)	0.995 (<0.001)	0.838 (0.026)	0.995 (<0.001)	0.779 (0.030)
Guidance High Approach	158.84	0.005863	0.993 (<0.001)	0.834 (0.022)	0.993 (<0.001)	0.778 (0.024)	0.993 (<0.001)	0.700 (0.027)
Guidance Low approach – Minus BB	100.09	0.003694	0.996 (<0.001)	0.892 (0.023)	0.996 (<0.001)	0.853 (0.026)	0.996 (<0.001)	0.799 (0.030)
Guidance High approach – Minus BB	140.67	0.005192	0.994 (<0.001)	0.851 (0.022)	0.994 (<0.001)	0.800 (0.025)	0.994 (<0.001)	0.729 (0.028)

Table 3.30 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								
Applicant Low Approach	0.38	0.000009	1.000 (<0.001)	1.000 (0.017)	1.000 (<0.001)	1.000 (0.018)	1.000 (<0.001)	0.999 (0.020)
Guidance Low Approach	1.03	0.000026	1.000 (<0.001)	1.000 (0.017)	1.000 (<0.001)	0.999 (0.019)	1.000 (<0.001)	0.999 (0.020)
Guidance High Approach	1.14	0.000028	1.000 (<0.001)	0.999 (0.018)	1.000 (<0.001)	0.999 (0.019)	1.000 (<0.001)	0.999 (0.021)
In-combination								
Applicant Low Approach	187.30	0.004664	0.994 (<0.001)	0.864 (0.014)	0.994 (<0.001)	0.818 (0.015)	0.994 (<0.001)	0.752 (0.015)
Applicant Low Approach – Minus BB	112.29	0.002796	0.997 (<0.001)	0.917 (0.015)	0.997 (<0.001)	0.887 (0.016)	0.997 (<0.001)	0.844 (0.017)
Guidance Low Approach	187.95	0.004681	0.994 (<0.001)	0.864 (0.016)	0.994 (<0.001)	0.817 (0.016)	0.994 (<0.001)	0.752 (0.016)
Guidance High Approach	314.97	0.007844	0.991 (<0.001)	0.784 (0.014)	0.991 (<0.001)	0.713 (0.014)	0.991 (<0.001)	0.619 (0.013)
Guidance Low Approach – Minus BB	112.95	0.002813	0.997 (<0.001)	0.916 (0.016)	0.997 (<0.001)	0.886 (0.017)	0.997 (<0.001)	0.842 (0.018)
Guidance High Approach – Minus BB	189.99	0.004731	0.994 (<0.001)	0.864 (0.015)	0.994 (<0.001)	0.816 (0.016)	0.994 (<0.001)	0.749 (0.016)

Buchan Ness to Collieston Coast SPA

Table 3.31 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								
Applicant approach	12.92	0.000425	1.000 (<0.001)	0.987 (0.012)	1.000 (<0.001)	0.983 (0.013)	1.000 (<0.001)	0.976 (0.014)
Guidance Low Approach	21.99	0.000723	0.999 (<0.001)	0.979 (0.012)	0.999 (<0.001)	0.971 (0.013)	0.999 (<0.001)	0.959 (0.014)
Guidance High Approach	59.64	0.001961	0.998 (<0.001)	0.944 (0.011)	0.998 (<0.001)	0.924 (0.012)	0.998 (<0.001)	0.893 (0.013)
In-combination								
Applicant Approach	87.23	0.002867	0.997 (<0.001)	0.919 (0.011)	0.997 (<0.001)	0.890 (0.012)	0.997 (<0.001)	0.848 (0.012)
Applicant Approach – Minus BB	82.39	0.002709	0.997 (<0.001)	0.923 (0.011)	0.997 (<0.001)	0.896 (0.012)	0.997 (<0.001)	0.856 (0.012)
Guidance Low Approach	163.97	0.005390	0.994 (<0.001)	0.854 (0.010)	0.994 (<0.001)	0.803 (0.011)	0.994 (<0.001)	0.733 (0.011)
Guidance High Approach	379.95	0.012490	0.986 (<0.001)	0.692 (0.009)	0.986 (<0.001)	0.601 (0.008)	0.986 (<0.001)	0.486 (0.008)
Guidance Low approach – Minus BB	154.40	0.005076	0.994 (<0.001)	0.862 (0.011)	0.994 (<0.001)	0.814 (0.011)	0.994 (<0.001)	0.747 (0.011)
Guidance High approach – Minus BB	358.78	0.011794	0.987 (<0.001)	0.707 (0.009)	0.987 (<0.001)	0.618 (0.009)	0.987 (<0.001)	0.506 (0.008)

Puffin

Farne Islands SPA

Table 3.32 Puffin PVA Results for Farne 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								
Applicant approach	0.39	0.000004	1.000 (<0.001)	1.000 (0.014)	1.000 (<0.001)	1.000 (0.016)	1.000 (<0.001)	1.000 (0.019)
Guidance Low Approach	1.19	0.000012	1.000 (<0.001)	1.000 (0.014)	1.000 (<0.001)	0.999 (0.016)	1.000 (<0.001)	0.999 (0.019)
Guidance High Approach	2.13	0.000021	1.000 (<0.001)	0.999 (0.014)	1.000 (<0.001)	0.999 (0.016)	1.000 (<0.001)	0.999 (0.019)
In-combination								
Applicant Approach	15.43	0.000154	1.000 (<0.001)	0.996 (0.014)	1.000 (<0.001)	0.994 (0.016)	1.000 (<0.001)	0.991 (0.019)
Applicant Approach – Minus BB	36.73	0.000367	1.000 (<0.001)	0.989 (0.014)	1.000 (<0.001)	0.985 (0.016)	1.000 (<0.001)	0.978 (0.019)
Guidance Low Approach	63.68	0.000635	0.999 (<0.001)	0.981 (0.014)	0.999 (<0.001)	0.973 (0.016)	0.999 (<0.001)	0.963 (0.019)
Guidance High Approach	11.87	0.000118	1.000 (<0.001)	0.997 (0.014)	1.000 (<0.001)	0.996 (0.016)	1.000 (<0.001)	0.994 (0.019)
Guidance Low approach – Minus BB	23.89	0.000238	1.000 (<0.001)	0.993 (0.014)	1.000 (<0.001)	0.990 (0.016)	1.000 (<0.001)	0.986 (0.019)
Guidance High approach – Minus BB	42.29	0.000422	0.999 (<0.001)	0.987 (0.014)	0.999 (<0.001)	0.982 (0.016)	0.999 (<0.001)	0.975 (0.018)

Table 3.33 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								
Applicant approach	0.67	0.000006	1.000 (<0.001)	1.000 (0.012)	1.000 (<0.001)	1.000 (0.014)	1.000 (<0.001)	1.000 (0.019)
Guidance Low Approach	2.05	0.000017	1.000 (<0.001)	0.999 (0.012)	1.000 (<0.001)	0.999 (0.015)	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								
Applicant Approach	63.27	0.000537	0.999 (<0.001)	0.983 (0.012)	0.999 (<0.001)	0.977 (0.014)	0.999 (<0.001)	0.968 (0.018)
Applicant Approach – Minus BB	58.24	0.000494	0.999 (<0.001)	0.985 (0.012)	0.999 (<0.001)	0.979 (0.014)	0.999 (<0.001)	0.971 (0.018)
Guidance Low Approach	188.37	0.001597	0.998 (<0.001)	0.952 (0.011)	0.998 (<0.001)	0.935 (0.014)	0.998 (<0.001)	0.908 (0.018)
Guidance High Approach	315.74	0.002677	0.997 (<0.001)	0.921 (0.011)	0.997 (<0.001)	0.893 (0.013)	0.997 (<0.001)	0.851 (0.017)
Guidance Low approach – Minus BB	170.25	0.001444	0.998 (<0.001)	0.957 (0.011)	0.998 (<0.001)	0.941 (0.014)	0.998 (<0.001)	0.917 (0.018)
Guidance High approach – Minus BB	285.54	0.002421	0.997 (<0.001)	0.928 (0.011)	0.997 (<0.001)	0.902 (0.014)	0.997 (<0.001)	0.864 (0.017)

Forth Islands SPA

Table 3.34 Gannet 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								
Applicant Low approach	3.60	0.000024	1.000 (<0.001)	0.999 (0.008)	1.000 (<0.001)	0.999 (0.009)	1.000 (<0.001)	0.999 (0.010)
Applicant High approach	7.07	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	7.52	0.000050	1.000 (<0.001)	0.998 (0.008)	1.000 (<0.001)	0.998 (0.009)	1.000 (<0.001)	0.997 (0.010)
Guidance High Approach	10.98	0.000073	1.000 (<0.001)	0.998 (0.008)	1.000 (<0.001)	0.997 (0.009)	1.000 (<0.001)	0.995 (0.010)
In-combination								
Applicant Low approach	844.57	0.005611	0.993 (<0.001)	0.842 (0.007)	0.993 (<0.001)	0.788 (0.008)	0.993 (<0.001)	0.713 (0.008)
Applicant High approach	1,176.15	0.007814	0.991 (<0.001)	0.787 (0.007)	0.991 (<0.001)	0.717 (0.007)	0.991 (<0.001)	0.624 (0.007)
Applicant Low approach – Minus BB	716.51	0.004760	0.994 (<0.001)	0.865 (0.007)	0.994 (<0.001)	0.817 (0.008)	0.994 (<0.001)	0.750 (0.008)
Applicant High approach – Minus BB	985.76	0.006549	0.993 (<0.001)	0.842 (0.007)	0.993 (<0.001)	0.787 (0.008)	0.993 (<0.001)	0.712 (0.008)
Guidance Low Approach	848.49	0.005637	0.991 (<0.001)	0.786 (0.007)	0.991 (<0.001)	0.716 (0.007)	0.991 (<0.001)	0.623 (0.007)

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)
Guidance High Approach	1,180.07	0.007840	0.994 (<0.001)	0.864 (0.007)	0.994 (<0.001)	0.816 (0.008)	0.994 (<0.001)	0.749 (0.008)
Guidance Low approach – Minus BB	720.43	0.004786	0.992 (<0.001)	0.818 (0.007)	0.992 (<0.001)	0.756 (0.007)	0.992 (<0.001)	0.672 (0.007)
Guidance High approach – Minus BB	989.68	0.006575	0.993 (<0.001)	0.842 (0.007)	0.993 (<0.001)	0.787 (0.008)	0.993 (<0.001)	0.712 (0.008)

Table 3.35 Gannet PVA Results for Noss 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								
Applicant Low approach	0.35	0.000002	1.000 (<0.001)	1.000 (0.019)	1.000 (<0.001)	0.999 (0.021)	1.000 (<0.001)	0.999 (0.024)
Applicant High approach	0.73	0.000005	1.000 (<0.001)	1.000 (0.018)	1.000 (<0.001)	1.000 (0.021)	1.000 (<0.001)	1.000 (0.024)
Guidance Low Approach	0.62	0.000004	1.000 (<0.001)	0.999 (0.018)	1.000 (<0.001)	0.999 (0.021)	1.000 (<0.001)	0.999 (0.023)
Guidance High Approach	1.00	0.000007	1.000 (<0.001)	0.999 (0.018)	1.000 (<0.001)	1.000 (0.020)	1.000 (<0.001)	0.999 (0.023)
In-combination								
Applicant Low approach	44.11	0.000293	1.000 (<0.001)	0.991 (0.018)	1.000 (<0.001)	0.987 (0.021)	1.000 (<0.001)	0.982 (0.023)
Applicant High approach	64.95	0.000432	0.999 (<0.001)	0.987 (0.018)	0.999 (<0.001)	0.982 (0.021)	0.999 (<0.001)	0.974 (0.023)
Applicant Low approach – Minus BB	43.15	0.000287	1.000 (<0.001)	0.991 (0.018)	1.000 (<0.001)	0.988 (0.021)	1.000 (<0.001)	0.982 (0.023)
Applicant High approach – Minus BB	63.07	0.000419	1.000 (<0.001)	0.987 (0.018)	1.000 (<0.001)	0.983 (0.020)	1.000 (<0.001)	0.975 (0.023)
Guidance Low Approach	44.38	0.000295	1.000 (<0.001)	0.990 (0.018)	1.000 (<0.001)	0.987 (0.021)	1.000 (<0.001)	0.981 (0.023)
Guidance High Approach	65.22	0.000433	1.000 (<0.001)	0.987 (0.018)	1.000 (<0.001)	0.982 (0.020)	0.999 (<0.001)	0.974 (0.023)

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)
Guidance Low approach – Minus BB	43.42	0.000288	1.000 (<0.001)	0.991 (0.018)	1.000 (<0.001)	0.988 (0.021)	1.000 (<0.001)	0.982 (0.023)
Guidance High approach – Minus BB	63.34	0.000421	0.999 (<0.001)	0.987 (0.018)	0.999 (<0.001)	0.982 (0.020)	0.999 (<0.001)	0.975 (0.023)

Table 3.36 Gannet PVA Results for Hermaness, Saxa Vord and Valla Field 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								
Applicant Low approach	0.62	0.000004	1.000 (<0.001)	1.000 (0.015)	1.000 (<0.001)	1.000 (0.017)	1.000 (<0.001)	1.000 (0.020)
Applicant High approach	1.35	0.000009	1.000 (<0.001)	1.000 (0.015)	1.000 (<0.001)	1.000 (0.017)	1.000 (<0.001)	1.000 (0.020)
Guidance Low Approach	0.88	0.000006	1.000 (<0.001)	1.000 (0.015)	1.000 (<0.001)	1.000 (0.017)	1.000 (<0.001)	1.000 (0.020)
Guidance High Approach	1.61	0.000011	1.000 (<0.001)	1.000 (0.015)	1.000 (<0.001)	1.000 (0.017)	1.000 (<0.001)	1.000 (0.020)
In-combination								
Applicant Low approach	83.95	0.000558	0.999 (<0.001)	0.984 (0.015)	0.999 (<0.001)	0.978 (0.017)	0.999 (<0.001)	0.968 (0.019)
Applicant High approach	122.26	0.000812	0.999 (<0.001)	0.975 (0.014)	0.999 (<0.001)	0.966 (0.016)	0.999 (<0.001)	0.952 (0.019)
Applicant Low approach – Minus BB	82.49	0.000548	0.999 (<0.001)	0.984 (0.014)	0.999 (<0.001)	0.977 (0.017)	0.999 (<0.001)	0.968 (0.019)
Applicant High approach – Minus BB	119.27	0.000792	0.999 (<0.001)	0.977 (0.015)	0.999 (<0.001)	0.968 (0.017)	0.999 (<0.001)	0.954 (0.019)
Guidance Low Approach	84.21	0.000559	0.999 (<0.001)	0.984 (0.015)	0.999 (<0.001)	0.978 (0.017)	0.999 (<0.001)	0.968 (0.019)
Guidance High Approach	122.52	0.000814	0.999 (<0.001)	0.975 (0.014)	0.999 (<0.001)	0.966 (0.016)	0.999 (<0.001)	0.952 (0.019)

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)
Guidance Low approach – Minus BB	82.75	0.000550	0.999 (<0.001)	0.984 (0.014)	0.999 (<0.001)	0.977 (0.017)	0.999 (<0.001)	0.968 (0.019)
Guidance High approach – Minus BB	119.54	0.000794	0.999 (<0.001)	0.977 (0.015)	0.999 (<0.001)	0.968 (0.017)	0.999 (<0.001)	0.954 (0.019)

Table 3.37 Gannet PVA Results for Flamborough and Filey 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								
Applicant Low approach	0.42	0.000003	1.000 (<0.001)	1.000 (0.016)	1.000 (<0.001)	1.000 (0.017)	1.000 (<0.001)	1.000 (0.019)
Applicant High approach	0.87	0.000006	1.000 (<0.001)	1.000 (0.016)	1.000 (<0.001)	1.000 (0.017)	1.000 (<0.001)	1.000 (0.019)
Guidance Low Approach	0.72	0.000005	1.000 (<0.001)	1.000 (0.015)	1.000 (<0.001)	1.000 (0.017)	1.000 (<0.001)	1.000 (0.019)
Guidance High Approach	1.18	0.000008	1.000 (<0.001)	1.000 (0.015)	1.000 (<0.001)	0.999 (0.017)	1.000 (<0.001)	0.999 (0.019)
In-combination								
Applicant Low approach	387.87	0.002577	0.997 (<0.001)	0.924 (0.014)	0.997 (<0.001)	0.896 (0.015)	0.997 (<0.001)	0.856 (0.017)
Applicant High approach	567.27	0.003769	0.996 (<0.001)	0.891 (0.014)	0.996 (<0.001)	0.852 (0.015)	0.996 (<0.001)	0.796 (0.016)
Applicant Low approach – Minus BB	385.80	0.002563	0.997 (<0.001)	0.924 (0.014)	0.997 (<0.001)	0.897 (0.015)	0.997 (<0.001)	0.856 (0.017)
Applicant High approach – Minus BB	563.86	0.003746	0.996 (<0.001)	0.892 (0.014)	0.996 (<0.001)	0.852 (0.015)	0.996 (<0.001)	0.797 (0.016)
Guidance Low Approach	388.17	0.002579	0.997 (<0.001)	0.924 (0.014)	0.997 (<0.001)	0.895 (0.016)	0.997 (<0.001)	0.855 (0.017)
Guidance High Approach	567.57	0.003771	0.996 (<0.001)	0.891 (0.014)	0.996 (<0.001)	0.851 (0.015)	0.996 (<0.001)	0.796 (0.016)

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)
Guidance Low approach – Minus BB	386.10	0.002565	0.997 (<0.001)	0.925 (0.014)	0.997 (<0.001)	0.897 (0.016)	0.997 (<0.001)	0.857 (0.017)
Guidance High approach – Minus BB	564.17	0.003748	0.996 (<0.001)	0.891 (0.014)	0.996 (<0.001)	0.853 (0.015)	0.996 (<0.001)	0.797 (0.016)

4 References

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Annex A EIA Parameter Logs

A EIA Parameter Logs

A.1 Kittiwake

Breeding

Set up

The log file was created on: 2025-06-24 09:56:45.713183 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.9.1"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

Basic information

This run had reference name “Kittiwake_Combined_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: 3126.

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: MSFD.

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

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 422742 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: 0.79 , 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: 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?: Yes

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: 5e-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: 1.7e-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: 2e-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: 0.00187 , 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: 0.002529 , 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: 0.003327 , 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

Applicant's breeding

Set up

The log file was created on: 2025-07-16 12:05:19.864209 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"           "1.11.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.3"
## shinyWidgets   "shinyWidgets"    "0.9.0"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.11.0"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name "Kittiwake_Combined_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: Black-Legged Kittiwake.

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: 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 422742 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: 0.79 , 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: 2.

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: 7e-06 , se: NA

Scenario B - Name: Applicant project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002518 , 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: 2025-06-24 10:39:30.378748 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Kittiwake_Combined_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: 3126.

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: MSFD.

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

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 829937 in 2015

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: 0.79 , 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: 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?: Yes

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-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: 5e-06 , 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: 6e-06 , se: NA

Scenario D - Name: Applicant project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001853 , 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: 0.002586 , 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: 0.002908 , 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

Applicant's non-breeding

Set up

The log file was created on: 2025-07-16 12:45:07.128244 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"           "1.11.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.3"
## shinyWidgets   "shinyWidgets"    "0.9.0"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.11.0"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name "Kittiwake_Combined_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: 1234.

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: MSFD.

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

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 829937 in 2015

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: 0.79 , 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: 2.

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: 2e-06 , se: NA

Scenario B - Name: Applicant project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002583 , 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: 2025-06-24 10:52:34.072985 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Kittiwake_Combined_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: 3126.

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: MSFD.

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

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 829937 in 2015

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: 0.79 , 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: 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?: Yes

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: 4e-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: 1.4e-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: 1.6e-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: 0.002816 , 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: 0.003873 , 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: 0.004602 , 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

Applicant's Annual Total (regional)

Set up

The log file was created on: 2025-06-24 10:52:34.072985 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.9.1"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

Basic information

This run had reference name "Kittiwake_Combined_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: 3126.

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: MSFD.

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

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 829937 in 2015

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: 0.79 , 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: 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?: Yes

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: 4e-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: 1.4e-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: 1.6e-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: 0.002816 , 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: 0.003873 , 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: 0.004602 , 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 (biogeographic)

Set up

The log file was created on: 2025-06-24 11:01:08.072927 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.9.1"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

Basic information

This run had reference name “Kittiwake_Combined_Annual_Biogeographic”.

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: 3126.

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: MSFD.

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

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 5100000 in 2015

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: 0.79 , 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: 3.

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?: Yes

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 Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000458 , se: NA

Scenario B - Name: NS Low project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00063 , se: NA

Scenario C - Name: NS High project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000749 , 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

Applicant's Annual Total (biogeographic)

Set up

The log file was created on: 2025-06-24 11:01:08.072927 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Kittiwake_Combined_Annual_Biogeographic”.

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: 3126.

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: MSFD.

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

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 5100000 in 2015

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: 0.79 , 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: 3.

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?: Yes

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 Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000458 , se: NA

Scenario B - Name: NS Low project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00063 , se: NA

Scenario C - Name: NS High project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000749 , 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

A.2 Guillemot

Breeding

Set up

The log file was created on: 2025-07-07 21:59:10.802447 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.9.1"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

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: 1.

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 52931 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: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.001 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.001 , 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?: Yes

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: 4.4e-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: 0.000158 , 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: 0.000263 , se: NA

Scenario D - Name: Applicant project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004641 , 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: 0.016707 , 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: 0.027844 , 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: 2025-07-07 22:17:36.207293 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

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: 1.

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 52931 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: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.001 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.001 , 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?: Yes

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: 0.000476 , 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: 0.000571 , 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: 0.001714 , se: NA

Scenario D - Name: Applicant project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.008999 , 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: 0.010798 , 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: 0.032395 , 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: 2025-07-07 22:32:14.060145 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

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: 1.

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 52931 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: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.001 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.001 , 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?: Yes

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: 0.00052 , 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: 0.000729 , 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: 0.001977 , se: NA

Scenario D - Name: Applicant project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.013639 , 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: 0.027505 , 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: 0.06024 , 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 (BDMPS)

Set up

The log file was created on: 2025-07-08 09:41:07.812195 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Guillemot_annual_BDMPS”.

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: 1992.

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 1617306 in 2015

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: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.001 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.001 , 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?: Yes

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: 1.7e-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: 2.4e-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: 6.5e-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: 0.000446 , 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: 9e-04 , 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: 0.001972 , 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 (Reduced BDMPS)

Set up

The log file was created on: 2025-07-08 10:16:12.674277 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Guillemot_Annual_Reduced_BDMPS”.

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: 1992.

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 1223989 in 2015

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: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.001 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.001 , 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?: Yes

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: 2.2e-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: 3.2e-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: 8.5e-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: 0.00059 , 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: 0.001189 , 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: 0.002605 , 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 (biogeographic)

Set up

The log file was created on: 2025-07-08 09:19:29.661938 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Guillemot_Annual_Biogeographic”.

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: 1992.

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 4125000 in 2015

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: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.001 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.001 , 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?: Yes

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: 0.00052 , 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: 0.000729 , 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: 0.001977 , se: NA

Scenario D - Name: Applicant project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.013639 , 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: 0.027505 , 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: 0.06024 , 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

Evidence led non-breeding

Set up

The log file was created on: 2025-07-16 16:15:23.621866 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"           "1.11.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.3"
## shinyWidgets   "shinyWidgets"    "0.9.0"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.11.0"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Guillemot_Nonbreeding_Evidence Led_BDMPS”.

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 1223989 in 2015

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: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.001 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.001 , 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: 2.1e-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: 2.5e-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: 7.4e-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: 0.000853 , 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: 0.001023 , se: NA

Scenario F - Name: NS High project Cumulative

All subpopulations

Impact on productivity rate mean: 0.001 , se: NA

Impact on adult survival rate mean: 0.00307 , 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

Evidence led Annual Total BDMPS

Set up

The log file was created on: 2025-07-16 16:44:48.792103 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"           "1.11.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.3"
## shinyWidgets   "shinyWidgets"    "0.9.0"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.11.0"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Guillemot_Annual_Evidence Led_BDMPS”.

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 1223989 in 2015

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: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.001 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.001 , 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: 2.2e-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: 3.2e-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: 8.5e-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: 0.001054 , 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: 0.001746 , 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: 0.004274 , 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

Evidence led Annual Total Biogeographic

Set up

The log file was created on: 2025-07-16 17:07:16.37115 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"           "1.11.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.3"
## shinyWidgets   "shinyWidgets"    "0.9.0"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.11.0"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Guillemot_Annual_Evidence Led_Biogeographic”.

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 4125000 in 2015

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: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 0.001 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 0.001 , 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: 7e-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: 9e-06 , 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: 2.5e-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: 0.000313 , 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: 0.000518 , 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: 0.001268 , 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

Razorbill

Breeding

Set up

The log file was created on: 2025-06-06 09:33:04.508106 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Razorbill_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: 2864.

Years for burn-in: 5.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.

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: 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 22267 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: 0.63 , sd: 0.209 , 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: 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?: Yes

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: 1.8e-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: 6.4e-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: 0.000106 , se: NA

Scenario D - Name: Applicant project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006406 , 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: 0.02306 , 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: 0.038434 , 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: 2025-05-29 11:09:58.421934 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Razorbill_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: 9639.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.

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: 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 591874 in 2015

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: 0.63 , sd: 0.209 , 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: 1.

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?: Yes

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 High project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005151 , 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: 2025-06-06 10:19:06.442809 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.9.1"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

Basic information

This run had reference name “Razorbill_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: 2864.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.

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: 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 591874 in 2015

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: 0.63 , sd: 0.209 , 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: 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?: Yes

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-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-06 , 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: 6e-06 , se: NA

Scenario D - Name: Applicant project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001672 , 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: 0.002584 , 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: 0.006596 , 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 (biogeographic)

Set up

The log file was created on: 2025-06-06 10:30:11.22065 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Razorbill_Annual_Biogeographic”.

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: 2864.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.

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: 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 1707000 in 2015

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: 0.63 , sd: 0.209 , 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: 3.

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?: Yes

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 Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00058 , se: NA

Scenario B - Name: NS Low project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000896 , se: NA

Scenario C - Name: NS High project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002287 , 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

A.3 Puffin

Set up

The log file was created on: 2025-06-06 10:59:09.208106 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Puffin_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: 861.

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: MSFD.

Available colony-specific survival rate: National. Sector to use within breeding success region: Greater 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 492189 in 2024

Productivity rate per pair: mean: 0.617 , sd: 0.151

Adult survival rate: mean: 0.906 , sd: 0.083

Immatures survival rates:

Age class 0 to 1 - mean: 0.709 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 0.001 , 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?: Yes

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: 4e-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: 1.3e-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: 2.2e-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: 0.000427 , 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: 0.001535 , 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: 0.002559 , 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: 2025-06-06 11:15:33.063107 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.9.1"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

Basic information

This run had reference name “Puffin_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: 861.

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: MSFD.

Available colony-specific survival rate: National. Sector to use within breeding success region: Greater 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 231957 in 2015

Productivity rate per pair: mean: 0.617 , sd: 0.151

Adult survival rate: mean: 0.906 , sd: 0.083

Immatures survival rates:

Age class 0 to 1 - mean: 0.709 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 0.001 , 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?: Yes

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: 2e-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-06 , 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: 9e-06 , se: NA

Scenario D - Name: Applicant project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000671 , 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: 0.000805 , 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: 0.002416 , 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: 2025-06-06 12:42:08.613292 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.9.1"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

Basic information

This run had reference name “Puffin_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: 1941.

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: MSFD.

Available colony-specific survival rate: National. Sector to use within breeding success region: Greater 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 492189 in 2024

Productivity rate per pair: mean: 0.617 , sd: 0.151

Adult survival rate: mean: 0.906 , sd: 0.083

Immatures survival rates:

Age class 0 to 1 - mean: 0.709 , sd: 0.001 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 0.001 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 0.001 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 0.001 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 0.001 , 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?: Yes

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: 5e-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: 5e-06 , 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: 3.5e-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: 0.000743 , 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: 0.001915 , 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: 0.003698 , 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

A.4 Herring Gull

Annual Total (regional)

Set up

The log file was created on: 2025-06-20 16:49:40.685893 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.9.1"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

Basic information

This run had reference name “HG_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: 4350.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Herring Gull.

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: 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 466511 in 2015

Productivity rate per pair: mean: 0.92 , sd: 0.477

Adult survival rate: mean: 0.834 , sd: 0.034

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: 0.834 , sd: 0.034 , DD: NA

Age class 3 to 4 - mean: 0.834 , sd: 0.034 , DD: NA

Age class 4 to 5 - mean: 0.834 , 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?: Yes

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: 5e-06 , se: NA

Scenario B - Name: NS project Alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 8e-06 , se: NA

Scenario C - Name: Project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001065 , se: NA

Scenario D - Name: NS Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001068 , 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 (biogeographic)

Set up

The log file was created on: 2025-06-20 16:32:06.276833 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.9.1"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

Basic information

This run had reference name “HG_Annual_Biogeographic”.

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: 4350.

Years for burn-in: 10.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Herring Gull.

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: 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 1098000 in 2015

Productivity rate per pair: mean: 0.92 , sd: 0.477

Adult survival rate: mean: 0.834 , sd: 0.034

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: 0.834 , sd: 0.034 , DD: NA

Age class 3 to 4 - mean: 0.834 , sd: 0.034 , DD: NA

Age class 4 to 5 - mean: 0.834 , 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?: Yes

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: 2e-06 , se: NA

Scenario B - Name: NS project Alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 3e-06 , se: NA

Scenario C - Name: Project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000452 , se: NA

Scenario D - Name: NS Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000454 , 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

A.5 Great black-backed gull

Annual Total (regional)

Set up

The log file was created on: 2025-06-20 13:30:43.120177 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “GBBG_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: 5543.

Years for burn-in: 10.

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: MSFD.

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

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 91399 in 2015

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: 0.834 , sd: 0.034 , DD: NA

Age class 3 to 4 - mean: 0.834 , sd: 0.034 , DD: NA

Age class 4 to 5 - mean: 0.834 , 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?: Yes

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: 1.1e-05 , se: NA

Scenario B - Name: NS project Alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000106 , se: NA

Scenario C - Name: Project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.012423 , se: NA

Scenario D - Name: NS Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.012519 , 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 (biogeographic)

Set up

The log file was created on: 2025-06-20 14:47:54.165047 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.9.1"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

Basic information

This run had reference name “GBBG_Annual_Biogeographic”.

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: 5543.

Years for burn-in: 10.

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: MSFD.

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

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 235000 in 2015

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: 0.834 , sd: 0.034 , DD: NA

Age class 3 to 4 - mean: 0.834 , sd: 0.034 , DD: NA

Age class 4 to 5 - mean: 0.834 , 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?: Yes

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: 4e-06 , se: NA

Scenario B - Name: NS project Alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 4.1e-05 , se: NA

Scenario C - Name: Project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004832 , se: NA

Scenario D - Name: NS Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004869 , 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

A.6 Gannet

Breeding

Set up

The log file was created on: 2025-06-20 10:39:57.335643 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Gannet_Combined_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: 5880.

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: MSFD.

Available colony-specific survival rate: National. Sector to use within breeding success region: Greater 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 795294 in 2024

Productivity rate per pair: mean: 0.7 , sd: 0.082

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , 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?: Yes

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: 9e-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: 2.3e-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: 3e-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: 0.000629 , 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: 0.001368 , 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: 0.001909 , 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: 2025-06-20 11:04:31.581304 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.9.1"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

Basic information

This run had reference name “Gannet_Combined_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: 5880.

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: MSFD.

Available colony-specific survival rate: National. Sector to use within breeding success region: Greater 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 456298 in 2015

Productivity rate per pair: mean: 0.7 , sd: 0.082

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , 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?: Yes

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: 9e-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: 9e-06 , 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: 2.1e-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: 0.00051 , 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: 0.001081 , 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: 0.002224 , 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: 2025-06-20 11:21:13.615937 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Gannet_Combined_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: 5880.

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: MSFD.

Available colony-specific survival rate: National. Sector to use within breeding success region: Greater 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 795294 in 2015

Productivity rate per pair: mean: 0.7 , sd: 0.082

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , 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?: Yes

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: 1.4e-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: 2.9e-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: 4.2e-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: 0.000922 , 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: 0.001988 , 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: 0.003184 , 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 (biogeographic)

Set up

The log file was created on: 2025-06-20 11:50:10.486205 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Gannet_Combined_Annual_Biogeographic”.

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: 5880.

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: MSFD.

Available colony-specific survival rate: National. Sector to use within breeding success region: Greater 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 1180000 in 2015

Productivity rate per pair: mean: 0.7 , sd: 0.082

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , DD: NA

Impacts

Number of impact scenarios: 3.

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?: Yes

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 Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000621 , se: NA

Scenario B - Name: NS Low project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00134 , se: NA

Scenario C - Name: NS High project Cumulative

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002146 , 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

4.1.1 Quasi-extinction threshold to use in calculating impact metrics: NA

Annex B HRA Parameter Logs

B HRA Parameter Logs

B.1 Kittiwake

Buchan Ness to Collieston Coast SPA

Guidance Approach

Set up

The log file was created on: 2025-06-23 14:21:34.130957 using Tool version 2, with R version 4.3.1, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.10.0"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Kittiwake_Buchan_Guidance_CRM”.

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: 7.

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 27094 in 2023

Productivity rate per pair: mean: 0.5986364 , sd: 0.3275638

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: 0.79 , 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: 6.

Are impacts applied separately to each subpopulation?: Yes

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: Low Disp. scenario alone

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 4.4e-05 , se: NA

Scenario B - Name: High Disp. Scenario alone

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 4.8e-05 , se: NA

Scenario C - Name: Low Disp. scenario incombo

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004124 , se: NA

Scenario D - Name: High Disp. Scenario incombo

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005863 , se: NA

Scenario E - Name: Low Disp. scenario incombo - minus BB

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003694 , se: NA

Scenario F - Name: High Disp. Scenario alone - minus BB

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005192 , 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

Applicant Approach

Set up

The log file was created on: 2025-07-16 14:19:22.460198 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"           "1.11.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.3"
## shinyWidgets   "shinyWidgets"    "0.9.0"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.11.0"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Kittiwake_Buchanness_Applicant_CRM”.

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: 6.

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 27094 in 2023

Productivity rate per pair: mean: 0.599 , sd: 0.328

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: 0.79 , 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: 3.

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: Low Disp. scenario alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 1.6e-05 , se: NA

Scenario B - Name: Low Disp. scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004097 , se: NA

Scenario C - Name: Low Disp. scenario incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003666 , 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

Fowlsheugh SPA

Applicant's Approach

Set up

The log file was created on: 2025-07-16 13:42:20.420557 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"           "1.11.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.3"
## shinyWidgets   "shinyWidgets"    "0.9.0"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.11.0"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name "Kittiwake_Fowlsheugh_Applicant_CRM".

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: 10.

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 40156 in 2023

Productivity rate per pair: mean: 0.798 , sd: 0.325

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: 0.79 , 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: 3.

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: Low Disp. scenario alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 9e-06 , se: NA

Scenario B - Name: Low Disp. scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004664 , se: NA

Scenario C - Name: Low Disp. scenario incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002796 , 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

B.2 Guillemot

Set up

The log file was created on: 2025-07-07 21:39:24.370821 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.10.0"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

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: 1.

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 30420 in 2023

Productivity rate per pair: mean: 0.646 , sd: 0.175

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 0.058 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 0.152 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 0.098 , DD: NA

Age class 3 to 4 - mean: 0.917 , sd: 0.098 , 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: 9.

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?: Yes

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: 0.000425 , 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: 0.000723 , 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: 0.001961 , se: NA

Scenario D - Name: Applicant project Incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002867 , se: NA

Scenario E - Name: NS Low project Incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00539 , se: NA

Scenario F - Name: NS High project Incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.01249 , se: NA

Scenario G - Name: Applicant project Incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002709 , se: NA

Scenario H - Name: NS Low project Incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005076 , se: NA

Scenario I - Name: NS High project Incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.011794 , 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

B.3 Puffin

Farne Islands SPA

Set up

The log file was created on: 2025-06-27 15:05:58.29119 using Tool version 2, with R version 4.3.1, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.10.0"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Puffin_Farne”.

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: 2.

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: Site.

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

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 100206 in 2015

Productivity rate per pair: mean: 0.7690909 , sd: 0.1753611

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: 9.

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: 4e-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: 1.2e-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: 2.1e-05 , se: NA

Scenario D - Name: Applicant project Incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000154 , se: NA

Scenario E - Name: NS Low project Incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000367 , se: NA

Scenario F - Name: NS High project Incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000635 , se: NA

Scenario G - Name: Applicant project Incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000118 , se: NA

Scenario H - Name: NS Low project Incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000238 , se: NA

Scenario I - Name: NS High project Incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000422 , 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: 2025-06-23 09:34:19.854531 using Tool version 2, with R version 4.3.1, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.10.0"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

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: 3.

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: 9.

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: 6e-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: 1.7e-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: 3.1e-05 , se: NA

Scenario D - Name: Applicant project Incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000537 , se: NA

Scenario E - Name: NS Low project Incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001597 , se: NA

Scenario F - Name: NS High project Incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002677 , se: NA

Scenario G - Name: Applicant project Incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000494 , se: NA

Scenario H - Name: NS Low project Incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001444 , se: NA

Scenario I - Name: NS High project Incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002421 , 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

B.4 Gannet

Forth Islands SPA

Guidance Approach

Set up

The log file was created on: 2025-06-18 17:21:26.82193 using Tool version 2, with R version 4.3.1, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.10.0"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Gannet_Forth_Guidance_CRM”.

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: 5.

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: 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 150518 in 2014

Productivity rate per pair: mean: 0.722 , sd: 0.084

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , DD: NA

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: Yes

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: Low Disp. scenario alone

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 5e-05 , se: NA

Scenario B - Name: High Disp. Scenario alone

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 7.3e-05 , se: NA

Scenario C - Name: Low Disp. scenario incombo

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001101 , se: NA

Scenario D - Name: High Disp. Scenario incombo

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003304 , se: NA

Scenario E - Name: Low Disp. scenario incombo - minus BB

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000894 , se: NA

Scenario F - Name: High Disp. Scenario alone - minus BB

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002683 , 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

Guidance In-combo

Set up

The log file was created on: 2025-07-22 14:07:53.267404 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"           "1.11.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.3"
## shinyWidgets   "shinyWidgets"    "0.9.0"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.11.0"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Gannet_Forth_Guidance”.

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: 9.

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: 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 150518 in 2014

Productivity rate per pair: mean: 0.722 , sd: 0.084

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , 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: Low Scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005637 , se: NA

Scenario B - Name: High Scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00784 , se: NA

Scenario C - Name: Low Scenario incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004786 , se: NA

Scenario D - Name: High Scenario incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006575 , 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

Applicant Approach

Set up

The log file was created on: 2025-06-18 16:59:31.246113 using Tool version 2, with R version 4.3.1, PVA package version: 4.18 (with UI version 1.7)

```
##                Package          Version
## popbio         "popbio"         "2.8"
## shiny          "shiny"          "1.10.0"
## shinyjs        "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"   "0.8.7"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.10.4"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

Basic information

This run had reference name “Gannet_Forth_Applicant_CRM”.

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: 4.

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: 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 150518 in 2014

Productivity rate per pair: mean: 0.722 , sd: 0.084

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , DD: NA

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: Yes

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: Low Disp. scenario alone

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 2.4e-05 , se: NA

Scenario B - Name: High Disp. Scenario alone

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 4.7e-05 , se: NA

Scenario C - Name: Low Disp. scenario incombo

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001101 , se: NA

Scenario D - Name: High Disp. Scenario incombo

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003304 , se: NA

Scenario E - Name: Low Disp. scenario incombo - minus BB

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000894 , se: NA

Scenario F - Name: High Disp. Scenario alone - minus BB

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002683 , 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

Applicant In-combo

Set up

The log file was created on: 2025-07-22 13:43:01.326578 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"          "1.11.1"
## shinyjs        "shinyjs"        "2.1.0"
```

```
## shinydashboard "shinydashboard" "0.7.3"
## shinyWidgets   "shinyWidgets"   "0.9.0"
## DT             "DT"             "0.33"
## plotly         "plotly"         "4.11.0"
## rmarkdown      "rmarkdown"      "2.29"
## dplyr          "dplyr"          "1.1.4"
## tidyr          "tidyr"          "1.3.1"
```

Basic information

This run had reference name “Gannet_Forth_Applicant”.

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: 8.

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: 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 150518 in 2014

Productivity rate per pair: mean: 0.722 , sd: 0.083

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , 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: Low Scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005611 , se: NA

Scenario B - Name: High Scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.007814 , se: NA

Scenario C - Name: Low Scenario incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00476 , se: NA

Scenario D - Name: High Scenario incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006549 , 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

Noss SPA

Guidance Approach

Set up

The log file was created on: 2025-06-24 17:09:57.017804 using Tool version 2, with R version 4.3.1, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.10.0"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Gannet_Noss_Guidance_CRM”.

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: 13.

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: 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 24670 in 2023

Productivity rate per pair: mean: 0.719375 , sd: 0.05387785

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , DD: NA

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: Yes

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: Low Disp. scenario alone

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 4e-06 , se: NA

Scenario B - Name: High Disp. Scenario alone

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 7e-06 , se: NA

Scenario C - Name: Low Disp. scenario incombo

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000295 , se: NA

Scenario D - Name: High Disp. Scenario incombo

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000433 , se: NA

Scenario E - Name: Low Disp. scenario incombo - minus BB

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000288 , se: NA

Scenario F - Name: High Disp. Scenario alone - minus BB

Population 1

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000421 , 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

Applicant Approach

Set up

The log file was created on: 2025-06-24 16:43:36.737645 using Tool version 2, with R version 4.3.1, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.10.0"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Gannet_Noss_Applicant_CRM”.

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: 12.

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: 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 24670 in 2023

Productivity rate per pair: mean: 0.719375 , sd: 0.05387785

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , 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: Low Disp. scenario alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 2e-06 , se: NA

Scenario B - Name: High Disp. Scenario alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 5e-06 , se: NA

Scenario C - Name: Low Disp. scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000293 , se: NA

Scenario D - Name: High Disp. Scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000432 , se: NA

Scenario E - Name: Low Disp. scenario incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000287 , se: NA

Scenario F - Name: High Disp. Scenario alone - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000419 , 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

Hermaness, Saxa Vord and Valla Field SPA

Guidance Approach

Set up

The log file was created on: 2025-06-25 10:03:19.317827 using Tool version 2, with R version 4.3.1, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.10.0"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Gannet_Hermaness_Applicant_CRM”.

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: 14.

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: 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 39606 in 2024

Productivity rate per pair: mean: 0.6575862 , sd: 0.05565552

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , 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: Low Disp. scenario alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 4e-06 , se: NA

Scenario B - Name: High Disp. Scenario alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 9e-06 , se: NA

Scenario C - Name: Low Disp. scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000558 , se: NA

Scenario D - Name: High Disp. Scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000812 , se: NA

Scenario E - Name: Low Disp. scenario incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000548 , se: NA

Scenario F - Name: High Disp. Scenario alone - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000792 , 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

Applicant Approach

Set up

The log file was created on: 2025-06-25 10:03:19.317827 using Tool version 2, with R version 4.3.1, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.10.0"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Gannet_Hermaness_Applicant_CRM”.

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: 14.

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: 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 39606 in 2024

Productivity rate per pair: mean: 0.6575862 , sd: 0.05565552

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , 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: Low Disp. scenario alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 4e-06 , se: NA

Scenario B - Name: High Disp. Scenario alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 9e-06 , se: NA

Scenario C - Name: Low Disp. scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000558 , se: NA

Scenario D - Name: High Disp. Scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000812 , se: NA

Scenario E - Name: Low Disp. scenario incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000548 , se: NA

Scenario F - Name: High Disp. Scenario alone - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000792 , 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

Flamborough and Filey Coast SPA

Guidance Approach

Set up

The log file was created on: 2025-06-25 09:58:56.233089 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Gannet_Flamborough_Guidance_CRM”.

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: 16.

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: 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 31588 in 2024

Productivity rate per pair: mean: 0.7975 , sd: 0.06632258

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , 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?: Yes

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: Low Disp. scenario alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 5e-06 , se: NA

Scenario B - Name: High Disp. Scenario alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 8e-06 , se: NA

Scenario C - Name: Low Disp. scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002579 , se: NA

Scenario D - Name: High Disp. Scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003771 , se: NA

Scenario E - Name: Low Disp. scenario incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002565 , se: NA

Scenario F - Name: High Disp. Scenario alone - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003748 , 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

Applicant Approach

Set up

The log file was created on: 2025-06-25 10:25:11.570116 using Tool version 2, with R version 4.3.0, PVA package version: 4.18 (with UI version 1.7)

```
##                Package           Version
## popbio         "popbio"          "2.8"
## shiny          "shiny"           "1.9.1"
## shinyjs        "shinyjs"         "2.1.0"
## shinydashboard "shinydashboard" "0.7.2"
## shinyWidgets   "shinyWidgets"    "0.8.7"
## DT             "DT"              "0.33"
## plotly         "plotly"          "4.10.4"
## rmarkdown      "rmarkdown"       "2.29"
## dplyr          "dplyr"           "1.1.4"
## tidyr          "tidyr"           "1.3.1"
```

Basic information

This run had reference name “Gannet_Flamborough_Applicant_CRM”.

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: 17.

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: 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 31588 in 2024

Productivity rate per pair: mean: 0.7975 , sd: 0.06632258

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 0.045 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 0.026 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 0.019 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 0.019 , DD: NA

Age class 4 to 5 - mean: 0.895 , sd: 0.042 , 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?: Yes

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: Low Disp. scenario alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 3e-06 , se: NA

Scenario B - Name: High Disp. Scenario alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 6e-06 , se: NA

Scenario C - Name: Low Disp. scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002577 , se: NA

Scenario D - Name: High Disp. Scenario incombo

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003769 , se: NA

Scenario E - Name: Low Disp. scenario incombo - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002563 , se: NA

Scenario F - Name: High Disp. Scenario alone - minus BB

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003746 , 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

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