Report to Inform Appropriate Assessment:
Appendix D HRA Population Viability Analysis Report

MarramWind Offshore Wind Farm

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MarramWind

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1. Introduction

1.1 Project background

1.1.1.1 MarramWind Limited (hereafter referred to as ‘the Applicant’) is a company wholly owned by ScottishPower Renewables Ltd.

1.1.1.2 The Applicant is proposing to develop the MarramWind Offshore Wind Farm (hereafter, referred to as ‘the Project’) as a floating offshore wind development. The Project is located approximately 75 kilometres (km) offshore from the Aberdeenshire coast in northeast Scotland at its closest point, with the Option Agreement Area (OAA) covering an area of approximately 684km^2 will comprise both offshore and onshore infrastructure (see **Volume 1, Chapter 4: Project Description** of the **Environmental Impact Assessment (EIA) Report** for full details on the project design).

1.1.1.3 The following Appendix has been created to provide background information, display the methodology used for, and present the results of Population Viability Analysis (PVA) for the Project.

1.2 Population Viability Analysis

1.2.1.1 Marine renewable energy developments, including offshore wind farms, have the potential to affect seabirds through pathways such as distributional responses and collision risk with turbine blades. These impacts occur at the individual level but may also influence population-level dynamics by reducing productivity or increasing baseline mortality. As part of the EIA process, these potential effects are evaluated across various population scales. Additionally, the Habitat Regulations Assessment (HRA) considers these impacts in relation to individual Special Protection Area (SPA) colonies and the wider population context.

1.2.1.2 For species predicted to experience elevated mortality due to distributional changes and / or collision risk, it is necessary to assess the potential population-level consequences. PVA is used to estimate these effects, either in isolation or cumulatively with other developments. PVA provides a robust and accessible framework for projecting future population trends using demographic parameters. The approach involves comparing a baseline scenario, representing natural population growth under assumed conditions, with one or more impact scenarios, where demographic parameters such as survival or productivity are adjusted to reflect predicted offshore wind farm related effects.

1.2.1.3 PVA was carried out for both EIA and HRA, assessing the predicted mortalities on a regional scale and at impacted SPAs. The SPA specific results are presented in **Section 3** and the EIA assessment is presented in **Volume 3, Appendix 12.4: Offshore EIA Population Viability Analysis Report** of the **EIA Report**.

2. Method

2.1 Overview

2.1.1.1 PVA was carried out in accordance with NatureScot Guidance Note 11 (2023). The guidance threshold recommended for use of PVA is a predicted change of 0.02% in the adult survival rate of each species scoped in for assessment. Following this guidance, the analysis was conducted using the Seabird PVA Tool developed by the UK Centre for Ecology and Hydrology (UKCEH) and Biomathematics and Statistics Scotland (BioSS), under contract to Natural England and Joint Nature Conservation Committee (JNCC) (Searle *et al.*, 2019). The code required to run the tool was obtained from the Natural England GitHub repository, which is publicly accessible to download (Natural England, 2025). The tool was run via the 'Shiny App' interface, which provides a user-friendly graphical interface for the underlying functions of the NEPVA R package (tool v2.0, code v4.18, interface v1.7).

2.2 Modelling approach

2.2.1.1 All PVA models were conducted using the 'Simulation' run type. This approach simulates population trajectories based on defined demographic parameters, initial population sizes, and scenario-specific conditions.

2.2.1.2 Stochastic modelling was employed to incorporate probabilistic variation arising from environmental and demographic stochasticity. Environmental stochasticity reflects random fluctuations in external factors such as weather and is represented in the model by generating random survival values from a probability distribution across time steps. Demographic stochasticity accounts for random variation in individual survival and reproduction outcomes, even when average rates remain constant. In the NEPVA model, this is implemented using a binomial process. For example, if individuals have a 90% survival probability, the actual number surviving will vary between simulations due to chance. While demographic stochasticity has minimal influence on populations exceeding 100 individuals, it does not affect model outputs for larger populations (Wildfowl and Wetlands Trust (Consulting) Limited, 2012).

2.2.1.3 All PVA simulations in this report incorporated both environmental and demographic stochasticity. Each model was run for 5,000 iterations, focussing on the anticipated 35-year operational lifespan of the Project. In line with NatureScot guidance, results for 50-year timeframes are also presented.

2.2.1.4 A ten-year "burn-in" period was included in each model, where applicable, to allow the population structure to stabilise prior to the application of development-related impacts. This stabilisation reflects internal model parameterisation, ensuring a balanced age structure (for example, immature to adult ratios). For species with small population sizes that are likely to cause an error to the PVA model, no burn-in was applied in that specific PVA run.

2.2.1.5 The demographic parameters used in the PVA are detailed in **Table 2.1** Input log files and other outputs generated via the Shiny App interface were stored and are presented in **Appendix D.1**.

2.2.1.6 Demographic processes such as survival, productivity, recruitment, and growth are influenced by population density. These density-dependent effects can be either compensatory or depensatory (Begon *et al.*, 2005). Compensatory mechanisms tend to stabilise population size over time, while depensatory effects reduce population growth rates in already declining populations, often delaying recovery. Depensation typically occurs in small or depleted populations due to reduced benefits from conspecific interactions.

2.2.1.7 Density dependence is a fundamental ecological principle, preventing unchecked population growth. Although evidence suggests that seabird populations are subject to density-dependent regulation, the specific mechanisms remain poorly understood (Horswill *et al*., 2016). Misspecification of density dependence in PVA models can lead to unreliable predictions. Consequently, density-independent models are commonly used in seabird impact assessments to maintain a precautionary approach. These models do not allow for population recovery once a decline has occurred, making them suitable for assessing potential impacts. However, they may also produce projections of exponential growth in the absence of a defined carrying capacity (Ridge *et al*., 2019).

2.2.1.8 The species included in the PVA analysis are:

- black-legged kittiwake (*Rissa tridactyla*), hereafter 'kittiwake';
- Northern gannet (*Morus bassanus*), hereafter 'gannet';
- common guillemot (*Uria aalge*), hereafter 'guillemot';
- razorbill (*Alca torda*); and
- Atlantic puffin (*Fratercula arctica*), hereafter 'puffin'.

2.2.1.9 The above species were selected for PVA due to impact predictions from the Project alone or in-combination exceeding a 0.02% change in survival rate, which is the threshold recommended within NatureScot's Guidance Note 11 (NatureScot, 2023) for requiring PVA. For great black-backed gull, given that the predicted impact is a fraction of a bird (0.04 breeding adult collisions per annum at most) such an impact can be confidently concluded as in-tangible without running PVA (despite the percentage point change in survival rate exceeding a 0.02% change in adult survival rate).

2.3 PVA demographic parameters

2.3.1.1 Species-specific survival and productivity rates were sourced from Horswill and Robinson (2015) and are summarised in **Table 2.1**, with further detail provided in the following subsections.

2.3.1.2 Survival rates differ across age classes. Age class zero to one represents birds less than one year old, one to two includes birds under two years, and two to three includes birds aged two, and so on. Adult birds are grouped together, as survival rates tend to stabilise once maturity is reached. Age at first breeding and maximum brood size per pair were selected from the predefined values available within the PVA Tool (Searle *et al*., 2019).

2.3.1.3 The methodology used to calculate both seasonal and regional population estimates is described in **Volume 3, Appendix 12.1: Offshore and Intertidal Ornithology Baseline Report** of the **EIA Report**. Initial population sizes used to assess impacts on adult annual survival under each scenario are presented in **Table 2.2**.

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)
Kittiwake	0.854 (0.051)	0.690 (0.296)	4	2	0.790 (0.0001	0.854 (0.051)	0.854 (0.051)	0.854 (0.051)	-	-
Gannet	0.919 (0.042)	0.700 (0.082)	5	1	0.424 (0.007)	0.829 (0.004)	0.891 (0.003)	0.895 (0.003)	0.919 (0.042)	-
Guillemot	0.939 (0.015)	0.672 (0.147)	6	1	0.560 (0.001)	0.792 (0.001)	0.917 (0.001)	0.939 (0.015)	0.939 (0.015)	0.939 (0.015)
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)	-
Razorbill	0.895 (0.067)	0.570 (0.247)	5	1	0.630 (0.209)	0.630 (0.209)	0.895 (0.067)	0.895 (0.067)	0.895 (0.067)	-

Table 2.2 Site specific population estimates used in PVA

Site	Species	Population Estimate
Buchan Ness to Collieston Coast SPA	Guillemot	33,225
	Kittiwake	31,406
Calf of Eday SPA	Guillemot	4,681
Copinsay SPA	Guillemot	10,991
	Kittiwake	670
East Caithness Cliffs SPA	Kittiwake	36,562
	Razorbill	33,023
Fair Isle SPA	Gannet	11,184
	Guillemot	24,515
	Puffin	13,332
	Razorbill	2,580
Forth Islands SPA	Gannet	92,090
	Kittiwake	14,216
	Puffin	117,960
Foula SPA	Puffin	8,468
Fowlsheugh SPA	Kittiwake	30,966
Hermaness, Saxa Vord and Valla Field SPA	Gannet	39,606
North Caithness Cliffs SPA	Kittiwake	18,608
	Puffin	6,766
North Rona and Sula Sgeir SPA	Gannet	18,990
Noss SPA	Gannet	24,670
St Abb's Head to Fast Castle SPA	Kittiwake	11,992
Sule Skerry and Sule Stack SPA	Gannet	15,648
	Puffin	95,484
Troup, Pennan and Lion's Heads SPA	Guillemot	47,719
	Kittiwake	27,344

Site	Species	Population Estimate
	Razorbill	8,801
West Westray SPA	Kittiwake	4,838

2.4 PVA outputs

2.4.1.1 The PVA Tool outputs focus on two key metrics: the Counterfactual of Population Growth Rate (CGR) and the Counterfactual of Population Size (CPS) (Searle *et al*., 2019). These metrics compare projected outcomes under impact scenarios with those under baseline (unimpacted) conditions, allowing interpretation of potential population-level effects (Cook and Robinson, 2016). CPS represents the median ratio of the final population size under the impact scenario relative to the baseline scenario. CGR reflects the median ratio of the annual population growth rate under the impact scenario compared to the baseline. Both metrics are expressed as proportions.

2.4.1.2 For assessments using density-independent models, CGR is considered the more appropriate metric. This is because CPS can produce unrealistic projections in the absence of density-dependent regulation. Accordingly, greater emphasis has been placed on CGR within the assessment conclusions, while also considering both short- and long-term population trends.

3. Results

3.1 Overview

3.1.1.1 PVA results for each species are presented below, using the median values for both the CGR and CPS, as shown in **Table 3.1** to **Table 3.59**. Outputs are provided for 35-year and 50-year timeframes. Detailed log files for each species are available in **Appendix D.1**.

3.2 Buchan Ness to Collieston Coast SPA: alone

3.2.1 Guillemot

Table 3.1 Guillemot apportioned to Buchan Ness to Collieston Coast SPA PVA results alone (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
50% displacement; 1% mortality	25.9	0.000780	0.999	0.09	0.969	3.12	0.999	0.09	0.956	4.40

Table 3.2 Guillemot apportioned to Buchan Ness to Collieston Coast SPA PVA results alone (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
60% displacement; 3% mortality (breeding), 1% mortality (non-breeding)	79.0	0.002376	0.997	0.27	0.908	9.19	0.997	0.27	0.872	12.77
60% displacement; 5% mortality (breeding), 3% mortality (non-breeding)	141.2	0.004248	0.995	0.48	0.842	15.85	0.995	0.48	0.783	21.67

3.3 Buchan Ness to Collieston Coast SPA: in-combination

3.3.1 Kittiwake

Table 3.3 Kittiwake apportioned to Buchan Ness to Collieston Coast SPA PVA results in-combination

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR (SD)	Decrease in CGR (%)	Median CPS (SD)	Decrease in CPS (%)	Median CGR (SD)	Decrease in CGR (%)	Median CPS (SD)	Decrease in CPS (%)
Collision – all projects	95.4	0.003037	0.996	0.36	0.878	12.16	0.996	0.36	0.832	16.78
Collision – all projects excluding the Project	92.4	0.002941	0.997	0.35	0.882	11.77	0.997	0.35	0.837	16.26
Collision – all projects excluding consented projects with a commitment to compensation	78.3	0.002494	0.997	0.29	0.899	10.05	0.997	0.30	0.860	13.98
Collision – All projects excluding consented projects with a commitment to	75.3	0.002398	0.997	0.28	0.903	9.71	0.997	0.28	0.865	13.48

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR (SD)	Decrease in CGR (%)	Median CPS (SD)	Decrease in CPS (%)	Median CGR (SD)	Decrease in CGR (%)	Median CPS (SD)	Decrease in CPS (%)
compensation and the Project										
Displacement – 30% displacement; 1% mortality for all projects	20.7	0.000660	0.999	0.08	0.972	2.79	0.999	0.08	0.961	3.92
Displacement – 30% displacement; 3% mortality for all projects	50.4	0.001605	0.998	0.19	0.934	6.61	0.998	0.19	0.908	9.21
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	20.4	0.000650	0.999	0.08	0.973	2.74	0.999	0.08	0.961	3.85
Displacement - 30% displacement; 3% mortality for all projects excluding the Project	49.4	0.001574	0.998	0.19	0.935	6.49	0.998	0.19	0.909	9.05

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR (SD)	Decrease in CGR (%)	Median CPS (SD)	Decrease in CPS (%)	Median CGR (SD)	Decrease in CGR (%)	Median CPS (SD)	Decrease in CPS (%)
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	14.2	0.000453	0.999	0.05	0.980	1.95	0.999	0.05	0.973	2.72
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	31.1	0.000991	0.999	0.12	0.958	4.17	0.999	0.12	0.942	5.81
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to	13.9	0.000443	0.999	0.05	0.981	1.87	0.999	0.05	0.974	2.64

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR (SD)	Decrease in CGR (%)	Median CPS (SD)	Decrease in CPS (%)	Median CGR (SD)	Decrease in CGR (%)	Median CPS (SD)	Decrease in CPS (%)
compensation and the Project										
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	30.1	0.000960	0.999	0.11	0.960	4.01	0.999	0.11	0.944	5.63
Combined effects - 30% displacement; 1% mortality for all projects	116.1	0.003697	0.996	0.44	0.854	14.60	0.996	0.44	0.800	20.03
Combined effects - 30% displacement; 3% mortality for all projects	145.8	0.004642	0.995	0.55	0.820	17.97	0.995	0.55	0.755	24.46
Combined effects - 30% displacement; 1% mortality for all	112.8	0.003591	0.996	0.42	0.858	14.20	0.996	0.42	0.805	19.53

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR (SD)	Decrease in CGR (%)	Median CPS (SD)	Decrease in CPS (%)	Median CGR (SD)	Decrease in CGR (%)	Median CPS (SD)	Decrease in CPS (%)
projects excluding the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	141.8	0.004515	0.995	0.53	0.825	17.54	0.995	0.53	0.761	23.88
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	92.6	0.002948	0.997	0.35	0.882	11.81	0.997	0.35	0.837	16.28
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a	109.4	0.003485	0.996	0.41	0.862	13.76	0.996	0.41	0.810	18.95

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR (SD)	Decrease in CGR (%)	Median CPS (SD)	Decrease in CPS (%)	Median CGR (SD)	Decrease in CGR (%)	Median CPS (SD)	Decrease in CPS (%)
commitment to compensation										
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	89.2	0.002841	0.997	0.34	0.885	11.46	0.997	0.34	0.842	15.80
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	105.5	0.003358	0.996	0.40	0.867	13.31	0.996	0.40	0.817	18.33

3.3.2 Guillemot

Table 3.4 Guillemot apportioned to Buchan Ness to Collieston Coast SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	90.5	0.002724	0.997	0.31	0.896	10.43	0.997	0.31	0.855	14.47
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	64.6	0.001944	0.998	0.22	0.924	7.58	0.998	0.22	0.894	10.55
Displacement - 50% displacement; 1% mortality for all projects excluding consented	63.9	0.001922	0.998	0.22	0.925	7.50	0.998	0.22	0.895	10.45

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects with a commitment to compensation										
Displacement - 50% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	38.0	0.001142	0.999	0.13	0.955	4.51	0.999	0.13	0.937	6.32

Table 3.5 Guillemot apportioned to Buchan Ness to Collieston Coast SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	227.4	0.006845	0.992	0.77	0.757	24.30	0.992	0.77	0.674	32.59
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	465.5	0.014011	0.984	1.58	0.564	43.55	0.984	1.58	0.445	55.52
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	148.5	0.004469	0.995	0.50	0.834	16.60	0.995	0.50	0.773	22.67

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	324.4	0.009763	0.989	1.10	0.672	32.82	0.989	1.10	0.569	43.07
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects excluding consented projects with a	143.1	0.004307	0.995	0.48	0.840	16.04	0.995	0.48	0.781	21.94

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size 50 years (%)
commitment to compensation										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding consented projects with a commitment to compensation	296.2	0.008914	0.990	1.00	0.696	30.42	0.990	1.00	0.598	40.18
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects excluding consented	64.2	0.001931	0.998	0.22	0.925	7.52	0.998	0.22	0.895	10.50

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects with a commitment to compensation and the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding consented projects with a commitment to compensation and the Project	155.0	0.004665	0.995	0.52	0.827	17.26	0.995	0.52	0.765	23.53

3.4 Calf of Eday SPA: alone

3.4.1 Guillemot

Table 3.6 Guillemot apportioned to Calf of Eday SPA PVA results alone (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
50% displacement; 1% mortality	1.0	0.000213	1.000	0.02	0.991	0.90	1.000	0.02	0.987	1.26

Table 3.7 Guillemot apportioned to Calf of Eday SPA PVA results alone (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
60% displacement; 3% mortality (breeding), 1% mortality (non-breeding)	3.0	0.000648	0.999	0.07	0.974	2.64	0.999	0.07	0.964	3.60
60% displacement; 5% mortality (breeding), 3% mortality (non-breeding)	5.4	0.001159	0.999	0.13	0.954	4.61	0.999	0.13	0.935	6.46

3.5 Calf of Eday SPA: in-combination

3.5.1 Guillemot

Table 3.8 Guillemot apportioned to Calf of Eday SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	3.3	0.000702	0.999	0.08	0.972	2.81	0.999	0.08	0.960	3.98
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	2.3	0.000489	0.999	0.06	0.980	1.98	0.999	0.06	0.972	2.79

Table 3.9 Guillemot apportioned to Calf of Eday SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	7.1	0.001527	0.998	0.17	0.940	5.98	0.998	0.17	0.916	8.39
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	15.0	0.003213	0.996	0.36	0.878	12.17	0.996	0.36	0.832	16.82
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	4.1	0.000879	0.999	0.10	0.966	3.44	0.999	0.10	0.951	4.87

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	9.6	0.002054	0.998	0.23	0.921	7.94	0.998	0.23	0.889	11.07

3.6 Copinsay SPA: alone

3.6.1 Kittiwake

Table 3.10 Kittiwake apportioned to Copinsay SPA PVA results alone

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 3% mortality	0.2	0.000236	1.000	0.03	0.992	0.81	1.000	0.03	0.988	1.21

3.6.2 Guillemot

Table 3.11 Guillemot apportioned to Copinsay SPA PVA results alone (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
50% displacement; 1% mortality	8.0	0.000729	0.999	0.08	0.971	2.94	0.999	0.08	0.959	4.12

Table 3.12 Guillemot apportioned to Copinsay SPA PVA results alone (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
60% displacement; 3%	24.4	0.002221	0.998	0.25	0.914	8.62	0.998	0.25	0.880	11.95

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
mortality (breeding), 1% mortality (non-breeding)										
60% displacement; 5% mortality (breeding), 3% mortality (non-breeding)	28.8	0.002625	0.997	0.30	0.899	10.10	0.997	0.30	0.860	14.00

3.7 Copinsay SPA: in-combination

3.7.1 Guillemot

Table 3.13 Guillemot apportioned to Copinsay SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	17.2	0.001569	0.998	0.18	0.938	6.18	0.998	0.18	0.914	8.64
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	9.2	0.000840	0.999	0.09	0.966	3.36	0.999	0.09	0.953	4.72
Displacement - 50% displacement; 1% mortality for all	16.7	0.001515	0.998	0.17	0.940	5.99	0.998	0.17	0.916	8.36

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding consented projects with a commitment to compensation										
Displacement - 50% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	8.6	0.000786	0.999	0.09	0.969	3.14	0.999	0.09	0.956	4.42

Table 3.14 Guillemot apportioned to Copinsay SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	36.4	0.003308	0.996	0.37	0.874	12.59	0.996	0.37	0.827	17.34
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	66.0	0.006003	0.993	0.68	0.783	21.67	0.993	0.68	0.708	29.25
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	11.9	0.001087	0.999	0.12	0.957	4.29	0.999	0.12	0.940	6.01

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	22.3	0.002032	0.998	0.23	0.921	7.95	0.998	0.23	0.890	11.04
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects excluding consented projects with a	35.7	0.003244	0.996	0.37	0.876	12.36	0.996	0.37	0.830	17.04

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
commitment to compensation										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding consented projects with a commitment to compensation	63.9	0.005810	0.993	0.65	0.790	21.01	0.993	0.65	0.716	28.44
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects excluding consented	11.2	0.001022	0.999	0.11	0.959	4.07	0.999	0.11	0.943	5.69

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects with a commitment to compensation and the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding consented projects with a commitment to compensation and the Project	20.2	0.001839	0.998	0.21	0.928	7.20	0.998	0.21	0.899	10.05

3.8 East Caithness Cliffs: in-combination

3.8.1 Kittiwake

Table 3.15 Kittiwake apportioned to East Caithness Cliffs SPA PVA results in-combination

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	269.6	0.007375	0.991	0.87	0.730	27.01	0.991	0.87	0.640	36.02
Collision – all projects excluding the Project	265.2	0.007255	0.991	0.86	0.734	26.63	0.991	0.86	0.645	35.52
Collision – all projects excluding consented projects with a commitment to compensation	245.0	0.006712	0.992	0.79	0.751	24.94	0.992	0.79	0.666	33.39
Collision – all projects excluding	240.6	0.006592	0.992	0.78	0.754	24.56	0.992	0.78	0.671	32.92

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
consented projects with a commitment to compensation and the Project										
Displacement – 30% displacement; 1% mortality for all projects	68.4	0.001870	0.998	0.22	0.923	7.68	0.998	0.22	0.893	10.66
Displacement – 30% displacement; 3% mortality for all projects	195.8	0.005356	0.994	0.63	0.796	20.43	0.994	0.63	0.723	27.67
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	68.0	0.001859	0.998	0.22	0.924	7.62	0.998	0.22	0.894	10.60
Displacement - 30%	194.6	0.005321	0.994	0.63	0.796	20.37	0.994	0.63	0.725	27.53

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
displacement; 3% mortality for all projects excluding the Project										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	61.8	0.001690	0.998	0.20	0.930	6.95	0.998	0.20	0.903	9.69
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	175.8	0.004809	0.994	0.57	0.814	18.57	0.994	0.57	0.748	25.24

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	61.4	0.001678	0.998	0.20	0.931	6.89	0.998	0.20	0.904	9.61
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	174.6	0.004774	0.994	0.56	0.816	18.43	0.994	0.56	0.749	25.05
Combined effects - 30% displacement; 1%	337.6	0.009245	0.989	1.09	0.673	32.68	0.989	1.09	0.571	42.90

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
mortality for all projects										
Combined effects - 30% displacement; 3% mortality for all projects	465.0	0.012730	0.985	1.51	0.579	42.09	0.985	1.51	0.461	53.88
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	338.0	0.009245	0.989	1.09	0.673	32.68	0.989	1.09	0.571	42.90
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	465.5	0.012730	0.985	1.51	0.579	42.09	0.985	1.51	0.461	53.88
Combined effects - 30% displacement; 1%	333.2	0.009113	0.989	1.08	0.677	32.32	0.989	1.08	0.575	42.48

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
mortality for all projects excluding consented projects with a commitment to compensation										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	459.8	0.012576	0.985	1.49	0.583	41.69	0.985	1.49	0.466	53.42
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to	307.2	0.008401	0.990	0.99	0.698	30.18	0.990	0.99	0.601	39.90

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
compensation and the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	421.2	0.011521	0.986	1.36	0.610	38.99	0.986	1.36	0.497	50.35

3.8.2 Razorbill

Table 3.16 Razorbill apportioned to East Caithness Cliffs Coast SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	69.4	0.002100	0.998	0.25	0.915	8.49	0.998	0.25	0.882	11.83
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	69.2	0.002094	0.998	0.25	0.915	8.50	0.998	0.25	0.881	11.88
Displacement - 50% displacement; 1% mortality for all projects excluding consented	64.7	0.001958	0.998	0.23	0.920	8.03	0.998	0.23	0.889	11.10

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects with a commitment to compensation										
Displacement - 50% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	64.4	0.001952	0.998	0.23	0.920	8.04	0.998	0.23	0.888	11.18

Table 3.17 Razorbill apportioned to East Caithness Cliffs SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	147.2	0.004457	0.995	0.53	0.827	17.32	0.995	0.53	0.764	23.60
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	291.0	0.008812	0.990	1.04	0.686	31.42	0.990	1.04	0.586	41.37
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	146.9	0.004449	0.995	0.53	0.827	17.33	0.995	0.53	0.764	23.62

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	290.2	0.008789	0.990	1.04	0.687	31.34	0.990	1.04	0.587	41.29
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects excluding consented projects with a	139.2	0.004216	0.995	0.50	0.836	16.44	0.995	0.50	0.775	22.49

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
commitment to compensation										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding consented projects with a commitment to compensation	271.7	0.008226	0.990	0.97	0.703	29.66	0.990	0.97	0.608	39.25
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects excluding consented	139.0	0.004209	0.995	0.50	0.836	16.44	0.995	0.50	0.776	22.44

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects with a commitment to compensation and the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding consented projects with a commitment to compensation and the Project	270.9	0.008203	0.990	0.97	0.704	29.61	0.990	0.97	0.608	39.18

3.9 Fair Isle SPA: alone

3.9.1 Guillemot

Table 3.18 Guillemot apportioned to Fair Isle SPA PVA results alone (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
50% displacement; 1% mortality	5.6	0.000228	1.000	0.03	0.991	0.93	1.000	0.03	0.987	1.33

Table 3.19 Guillemot apportioned to Fair Isle SPA PVA results alone (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
60% displacement; 3% mortality (breeding), 1% mortality (non-breeding)	17.1	0.000696	0.999	0.08	0.972	2.77	0.999	0.08	0.961	3.91
60% displacement; 5% mortality (breeding), 3% mortality (non-breeding)	30.5	0.001244	0.999	0.14	0.951	4.92	0.999	0.14	0.931	6.89

3.10 Fair Isle SPA: in-combination

3.10.1 Gannet

Table 3.20 Gannet apportioned to Fair Isle SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	11.7	0.001048	0.999	0.12	0.956	4.36	0.999	0.12	0.939	6.10
Collision – all projects excluding the Project	10.4	0.000930	0.999	0.11	0.962	3.84	0.999	0.11	0.945	5.49
Collision – all projects excluding consented projects with a commitment to compensation	11.5	0.001027	0.999	0.12	0.958	4.24	0.999	0.12	0.940	5.98
Collision – all projects	10.2	0.000909	0.999	0.11	0.962	3.76	0.999	0.11	0.946	5.37

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
excluding consented projects with a commitment to compensation and the Project										
Displacement – 30% displacement; 1% mortality for all projects	2.8	0.000251	1.000	0.03	0.989	1.09	1.000	0.03	0.985	1.51
Displacement – 30% displacement; 3% mortality for all projects	3.7	0.000334	1.000	0.04	0.986	1.45	1.000	0.04	0.980	1.99
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	2.7	0.000238	1.000	0.03	0.989	1.06	1.000	0.03	0.986	1.44

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 3% mortality for all projects excluding the Project	3.5	0.000317	1.000	0.04	0.986	1.39	1.000	0.04	0.981	1.93
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	2.7	0.000241	1.000	0.03	0.990	0.99	1.000	0.03	0.986	1.35
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a	3.6	0.000321	1.000	0.04	0.986	1.37	1.000	0.04	0.981	1.94

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
commitment to compensation										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	2.5	0.000228	1.000	0.03	0.991	0.94	1.000	0.03	0.986	1.35
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to	3.4	0.000303	1.000	0.04	0.987	1.32	1.000	0.04	0.982	1.83

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
compensation and the Project										
Combined effects - 30% displacement; 1% mortality for all projects	14.5	0.001299	0.998	0.15	0.946	5.39	0.998	0.15	0.925	7.52
Combined effects - 30% displacement; 3% mortality for all projects	15.5	0.001383	0.998	0.16	0.943	5.73	0.998	0.16	0.920	7.98
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	13.1	0.001168	0.999	0.14	0.951	4.86	0.999	0.14	0.932	6.80
Combined effects - 30% displacement; 3% mortality	13.9	0.001247	0.999	0.15	0.949	5.15	0.999	0.15	0.928	7.21

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
for all projects excluding the Project										
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	14.2	0.001268	0.999	0.15	0.947	5.25	0.999	0.15	0.926	7.36
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	15.1	0.001348	0.998	0.16	0.944	5.62	0.998	0.16	0.921	7.85

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	12.7	0.001137	0.999	0.13	0.953	4.74	0.999	0.13	0.934	6.60
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	13.6	0.001213	0.999	0.14	0.949	5.06	0.999	0.14	0.929	7.07

Table 3.21 Gannet apportioned to Fair Isle SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	11.7	0.001048	0.999	0.12	0.956	4.36	0.999	0.12	0.939	6.10
Collision – all projects excluding the Project	10.4	0.000930	0.999	0.11	0.962	3.84	0.999	0.11	0.945	5.49
Collision – all projects excluding consented projects with a commitment to compensation	11.5	0.001027	0.999	0.12	0.958	4.24	0.999	0.12	0.940	5.98
Collision – all projects excluding consented projects with a commitment to compensation	10.2	0.000909	0.999	0.11	0.962	3.76	0.999	0.11	0.946	5.37

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
and the Project										
Displacement – 30% displacement; 1% mortality for all projects	3.3	0.000295	0.998	0.22	0.923	7.70	0.998	0.22	0.893	10.74
Displacement – 30% displacement; 3% mortality for all projects	9.7	0.000871	0.993	0.67	0.785	21.53	0.993	0.67	0.709	29.06
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	3.1	0.000279	0.998	0.22	0.924	7.60	0.998	0.22	0.894	10.62
Displacement - 30% displacement; 3% mortality for all projects	9.2	0.000825	0.993	0.66	0.787	21.29	0.993	0.66	0.712	28.77

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
excluding the Project										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	3.1	0.000277	0.998	0.18	0.939	6.14	0.998	0.18	0.914	8.61
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	9.3	0.000836	0.995	0.53	0.825	17.54	0.995	0.53	0.761	23.92

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	2.9	0.000261	1.000	0.05	0.983	1.70	1.000	0.05	0.976	2.40
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	8.8	0.000789	0.999	0.06	0.977	2.25	0.999	0.06	0.968	3.20

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 1% mortality for all projects	15.0	0.001343	0.998	0.16	0.945	5.51	0.998	0.16	0.922	7.81
Combined effects - 30% displacement; 3% mortality for all projects	21.5	0.001920	0.998	0.23	0.922	7.83	0.998	0.23	0.891	10.93
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	13.5	0.001209	0.999	0.14	0.950	5.00	0.999	0.14	0.930	7.03
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	19.6	0.001755	0.998	0.21	0.928	7.17	0.998	0.21	0.899	10.07

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	14.6	0.001304	0.998	0.15	0.946	5.43	0.998	0.15	0.925	7.54
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	20.8	0.001863	0.998	0.22	0.923	7.65	0.998	0.22	0.893	10.66
Combined effects - 30% displacement; 1% mortality	13.1	0.001171	0.999	0.14	0.952	4.85	0.999	0.14	0.932	6.83

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
for all projects excluding consented projects with a commitment to compensation and the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	19.0	0.001699	0.998	0.20	0.930	6.97	0.998	0.20	0.902	9.78

3.10.2 Guillemot

Table 3.22 Guillemot apportioned to Fair Isle SPA pva results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	12.1	0.000493	0.999	0.06	0.980	1.98	0.999	0.06	0.972	2.79
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	6.5	0.000264	1.000	0.03	0.989	1.08	1.000	0.03	0.985	1.51

Table 3.23 Guillemot apportioned to Fair Isle SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	25.0	0.001022	0.999	0.11	0.959	4.07	0.999	0.11	0.943	5.72
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	50.4	0.002057	0.998	0.23	0.920	8.01	0.998	0.23	0.889	11.13
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	8.0	0.000326	1.000	0.04	0.987	1.33	1.000	0.04	0.981	1.87

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	19.9	0.000812	0.999	0.09	0.968	3.24	0.999	0.09	0.954	4.57

3.10.3 Puffin

Table 3.24 Puffin apportioned to Fair Isle SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	1.3	0.000098	1.000	0.01	0.995	0.51	1.000	0.01	0.994	0.58
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	1.1	0.000084	1.000	0.01	0.996	0.42	1.000	0.01	0.995	0.48

Table 3.25 Puffin apportioned to Fair Isle SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	3.6	0.000268	1.000	0.03	0.989	1.10	1.000	0.03	0.985	1.52
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	6.7	0.000502	0.999	0.06	0.979	2.15	0.999	0.06	0.970	2.96
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	2.9	0.000218	1.000	0.03	0.991	0.95	1.000	0.03	0.986	1.38

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	5.6	0.000419	1.000	0.05	0.982	1.79	1.000	0.05	0.975	2.49

3.10.4 Razorbill

Table 3.26 Razorbill apportioned to Fair Isle SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	2.1	0.000807	0.999	0.09	0.969	3.11	0.999	0.09	0.953	4.75
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	2.0	0.000784	0.999	0.09	0.970	3.05	0.999	0.09	0.957	4.33

Table 3.27 Razorbill apportioned to Fair Isle SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	3.0	0.001144	0.999	0.13	0.954	4.62	0.999	0.13	0.934	6.56
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	7.9	0.003076	0.996	0.36	0.878	12.22	0.996	0.36	0.832	16.81
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	2.8	0.001074	0.999	0.12	0.957	4.32	0.999	0.12	0.940	6.03

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	7.6	0.002951	0.997	0.34	0.882	11.77	0.997	0.35	0.837	16.29

3.11 Forth Islands SPA: alone

3.11.1 Gannet

Table 3.28 Gannet apportioned to Forth Islands SPA PVA results alone

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 3% mortality	20.7	0.000225	1.000	0.03	0.991	0.94	1.000	0.03	0.987	1.32

3.12 Forth Islands SPA: in-combination

3.12.1 Gannet

Table 3.29 Gannet apportioned to Forth Islands SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	701.0	0.007613	0.991	0.90	0.722	27.79	0.991	0.90	0.630	36.96
Collision – all projects excluding the Project	686.5	0.007455	0.991	0.88	0.727	27.31	0.991	0.88	0.636	36.35
Collision – all projects excluding consented projects with a commitment to compensation	591.0	0.006418	0.992	0.76	0.760	23.99	0.992	0.76	0.678	32.21
Collision – all projects	576.5	0.006260	0.993	0.74	0.765	23.47	0.993	0.74	0.684	31.56

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
excluding consented projects with a commitment to compensation and the Project										
Displacement – 30% displacement; 1% mortality for all projects	147.6	0.001603	0.998	0.19	0.934	6.63	0.998	0.19	0.908	9.24
Displacement – 30% displacement; 3% mortality for all projects	196.8	0.002137	0.997	0.25	0.913	8.73	0.997	0.25	0.879	12.13
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	145.8	0.001583	0.998	0.19	0.935	6.52	0.998	0.19	0.909	9.12

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 3% mortality for all projects excluding the Project	194.4	0.002111	0.998	0.25	0.914	8.61	0.998	0.25	0.880	11.97
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	117.4	0.001275	0.998	0.15	0.947	5.29	0.998	0.15	0.926	7.41
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a	156.6	0.001700	0.998	0.20	0.930	7.01	0.998	0.20	0.902	9.79

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
commitment to compensation										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	115.7	0.001256	0.999	0.15	0.948	5.23	0.999	0.15	0.927	7.31
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to	154.2	0.001675	0.998	0.20	0.931	6.92	0.998	0.20	0.903	9.66

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
compensation and the Project										
Combined effects - 30% displacement; 1% mortality for all projects	848.6	0.009215	0.989	1.09	0.674	32.60	0.989	1.09	0.572	42.82
Combined effects - 30% displacement; 3% mortality for all projects	897.8	0.009749	0.988	1.15	0.659	34.12	0.988	1.15	0.553	44.66
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	832.3	0.009038	0.989	1.07	0.679	32.10	0.989	1.07	0.578	42.20
Combined effects - 30% displacement; 3% mortality	880.9	0.009566	0.989	1.13	0.664	33.61	0.989	1.13	0.560	44.04

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
for all projects excluding the Project										
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	708.5	0.007693	0.991	0.91	0.720	28.04	0.991	0.91	0.627	37.27
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	747.6	0.008119	0.990	0.96	0.706	29.36	0.990	0.96	0.611	38.89

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	692.2	0.007516	0.991	0.89	0.725	27.49	0.991	0.89	0.634	36.60
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	730.7	0.007935	0.991	0.94	0.712	28.79	0.991	0.94	0.618	38.19

3.12.1.1

Table 3.30 Gannet apportioned to Forth Islands SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement – 30% displacement; 1% mortality for all projects	173.0	0.001879	0.998	0.22	0.923	7.70	0.998	0.22	0.893	10.74
Displacement – 30% displacement; 3% mortality for all projects	522.0	0.005668	0.993	0.67	0.785	21.53	0.993	0.67	0.709	29.06
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	171.0	0.001857	0.998	0.22	0.924	7.60	0.998	0.22	0.894	10.62
Displacement - 30% displacement; 3% mortality for all projects	515.8	0.005601	0.993	0.66	0.787	21.29	0.993	0.66	0.712	28.77

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
excluding the Project										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	137.0	0.001487	0.998	0.18	0.939	6.14	0.998	0.18	0.914	8.61
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	415.8	0.004515	0.995	0.53	0.825	17.54	0.995	0.53	0.761	23.92

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	134.9	0.001465	1.000	0.05	0.983	1.70	1.000	0.05	0.976	2.40
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	409.6	0.004448	0.999	0.06	0.977	2.25	0.999	0.06	0.968	3.20

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 1% mortality for all projects	874.1	0.009492	0.989	1.12	0.666	33.41	0.989	1.12	0.562	43.79
Combined effects - 30% displacement; 3% mortality for all projects	1223.0	0.013281	0.984	1.57	0.565	43.46	0.984	1.57	0.446	55.41
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	857.5	0.009312	0.989	1.10	0.671	32.89	0.989	1.10	0.568	43.16
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	1202.3	0.013056	0.985	1.54	0.571	42.90	0.985	1.54	0.452	54.78

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	728.0	0.007905	0.991	0.94	0.713	28.70	0.991	0.94	0.619	38.07
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	1006.8	0.010933	0.987	1.29	0.626	37.42	0.987	1.29	0.515	48.52
Combined effects - 30% displacement; 1% mortality	711.4	0.007725	0.991	0.91	0.719	28.12	0.991	0.91	0.626	37.39

Scenario modelled	**Estimated mortalities**	**Impact on adult survival**	**Density independent counterfactual metric (35 years)**				**Density independent counterfactual metric (50 years)**			
			Median CGR	**Reduction in annual growth rate (%)**	**Median CPS**	**Reduction in final population size after 35 years (%)**	**Median CGR**	**Reduction in annual growth rate (%)**	**Median CPS**	**Reduction in final population size after 50 years (%)**
for all projects excluding consented projects with a commitment to compensation and the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	986.1	0.010708	0.987	1.27	0.632	36.80	0.987	1.27	0.522	47.82

3.12.2 Kittiwake

Table 3.31 Kittiwake apportioned to Forth Islands SPA PVA results in-combination

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	53.6	0.003768	0.996	0.44	0.854	14.58	0.996	0.44	0.800	20.02
Collision – all projects excluding the Project	53.1	0.003737	0.996	0.43	0.856	14.45	0.996	0.43	0.801	19.87
Collision – all projects excluding consented projects with a commitment to compensation	30.5	0.002144	0.998	0.24	0.915	8.51	0.998	0.24	0.882	11.79
Collision – all projects excluding consented projects with a commitment to	30.0	0.002113	0.998	0.24	0.917	8.32	0.998	0.24	0.884	11.60

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
compensation and the Project										
Displacement – 30% displacement; 1% mortality for all projects	12.6	0.000886	0.999	0.10	0.963	3.70	0.999	0.10	0.949	5.13
Displacement – 30% displacement; 3% mortality for all projects	35.7	0.002510	0.997	0.30	0.899	10.14	0.997	0.30	0.860	14.00
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	12.6	0.000883	0.999	0.10	0.963	3.71	0.999	0.10	0.948	5.18
Displacement - 30% displacement; 3% mortality for all projects	35.6	0.002501	0.997	0.30	0.899	10.10	0.997	0.29	0.860	14.00

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
excluding the Project										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	8.9	0.000626	0.999	0.07	0.974	2.61	0.999	0.07	0.963	3.69
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	24.6	0.001729	0.998	0.20	0.930	7.00	0.998	0.20	0.902	9.77
Displacement - 30% displacement; 1%	8.9	0.000623	0.999	0.07	0.974	2.61	0.999	0.07	0.963	3.68

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
mortality for all projects excluding consented projects with a commitment to compensation and the Project										
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	24.5	0.001720	0.998	0.20	0.930	7.02	0.998	0.20	0.902	9.83
Combined effects - 30% displacement; 1% mortality for all projects	65.2	0.004584	0.995	0.54	0.822	17.77	0.995	0.54	0.758	24.24

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 3% mortality for all projects	88.3	0.006209	0.993	0.73	0.767	23.28	0.993	0.74	0.687	31.34
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	64.7	0.004550	0.995	0.54	0.824	17.60	0.995	0.54	0.760	24.03
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	87.7	0.006168	0.993	0.73	0.769	23.12	0.993	0.73	0.689	31.11
Combined effects - 30% displacement; 1% mortality for all projects excluding	38.4	0.002700	0.997	0.32	0.891	10.91	0.997	0.32	0.849	15.10

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
consented projects with a commitment to compensation										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	54.1	0.003804	0.996	0.45	0.850	14.96	0.996	0.45	0.795	20.53
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	37.9	0.002666	0.997	0.31	0.892	10.75	0.997	0.32	0.851	14.85

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	53.5	0.003763	0.996	0.45	0.852	14.79	0.996	0.45	0.797	20.30

3.12.3 Puffin

Table 3.32 Puffin apportioned to Forth Islands SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	65.6	0.000556	0.999	0.07	0.977	2.31	0.999	0.07	0.967	3.26
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	64.4	0.000546	0.999	0.06	0.977	2.29	0.999	0.06	0.968	3.22
Displacement - 50% displacement; 1% mortality for all projects excluding consented	56.9	0.000482	0.999	0.06	0.980	2.03	0.999	0.06	0.971	2.87

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects with a commitment to compensation										
Displacement - 50% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	55.7	0.000472	0.999	0.06	0.980	2.00	0.999	0.06	0.972	2.81

Table 3.33 Puffin apportioned to Forth Islands PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	194.0	0.001645	0.998	0.19	0.933	6.75	0.998	0.19	0.906	9.45
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	326.8	0.002771	0.997	0.33	0.889	11.13	0.997	0.33	0.846	15.40
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	189.9	0.001610	0.998	0.19	0.934	6.61	0.998	0.19	0.907	9.27

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	319.8	0.002711	0.997	0.32	0.891	10.91	0.997	0.32	0.849	15.07
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects excluding consented projects with a	169.7	0.001438	0.998	0.17	0.941	5.93	0.998	0.17	0.917	8.29

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
commitment to compensation										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding consented projects with a commitment to compensation	281.7	0.002388	0.997	0.28	0.903	9.68	0.997	0.28	0.866	13.42
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects excluding consented	165.5	0.001403	0.998	0.17	0.942	5.78	0.998	0.17	0.919	8.13

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects with a commitment to compensation and the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding consented projects with a commitment to compensation and the Project	274.7	0.002329	0.997	0.28	0.905	9.47	0.997	0.28	0.869	13.13

3.13 Foula SPA: in-combination

3.13.1 Puffin

Table 3.34 Puffin apportioned to Foula SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	1.2	0.000144	1.000	0.02	0.993	0.65	1.000	0.02	0.992	0.81
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	1.2	0.000137	1.000	0.02	0.994	0.63	1.000	0.02	0.992	0.84

Table 3.35 Puffin apportioned to Foula PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	2.1	0.000248	1.000	0.03	0.988	1.20	1.000	0.03	0.984	1.65
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	4.9	0.000581	0.999	0.07	0.976	2.43	0.999	0.07	0.966	3.39
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	1.9	0.000224	1.000	0.03	0.991	0.85	1.000	0.03	0.987	1.32

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	4.6	0.000539	0.999	0.06	0.976	2.42	0.999	0.07	0.966	3.44

3.14 Fowlsheugh SPA: in-combination

3.14.1 Kittiwake

Table 3.36 Kittiwake apportioned to Fowlsheugh SPA PVA results in-combination

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	169.2	0.005464	0.994	0.65	0.792	20.79	0.994	0.65	0.719	28.12
Collision – all projects excluding the Project	167.2	0.005399	0.994	0.64	0.794	20.60	0.994	0.64	0.722	27.85
Collision – all projects excluding consented projects with a commitment to compensation	98.0	0.003165	0.996	0.38	0.873	12.66	0.996	0.37	0.826	17.44
Collision – all projects	96.0	0.003099	0.996	0.37	0.876	12.38	0.996	0.37	0.829	17.07

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
excluding consented projects with a commitment to compensation and the Project										
Displacement – 30% displacement; 1% mortality for all projects	31.1	0.001003	0.999	0.12	0.958	4.17	0.999	0.12	0.941	5.86
Displacement – 30% displacement; 3% mortality for all projects	89.6	0.002892	0.997	0.34	0.884	11.58	0.997	0.34	0.840	16.04
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	30.8	0.000996	0.999	0.12	0.959	4.14	0.999	0.12	0.942	5.79

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 3% mortality for all projects excluding the Project	88.9	0.002871	0.997	0.34	0.885	11.51	0.997	0.34	0.841	15.90
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	19.3	0.000622	0.999	0.07	0.974	2.61	0.999	0.07	0.963	3.69
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a	54.5	0.001758	0.998	0.21	0.928	7.22	0.998	0.21	0.899	10.08

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
commitment to compensation										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	19.0	0.000615	0.999	0.07	0.974	2.57	0.999	0.07	0.964	3.60
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	53.8	0.001737	0.998	0.21	0.929	7.13	0.998	0.21	0.901	9.92

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 1% mortality for all projects	200.3	0.006467	0.992	0.77	0.759	24.15	0.992	0.76	0.676	32.42
Combined effects - 30% displacement; 3% mortality for all projects	258.8	0.008356	0.990	0.99	0.700	30.04	0.990	0.99	0.602	39.76
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	198.0	0.006394	0.992	0.76	0.761	23.89	0.992	0.76	0.679	32.09
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	256.1	0.008270	0.990	0.98	0.702	29.79	0.990	0.98	0.606	39.40

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	117.3	0.003787	0.996	0.45	0.851	14.93	0.996	0.45	0.795	20.46
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	152.5	0.004923	0.994	0.58	0.810	18.96	0.994	0.58	0.742	25.75
Combined effects - 30% displacement; 1% mortality for all projects excluding	115.0	0.003714	0.996	0.44	0.853	14.67	0.996	0.44	0.799	20.10

Scenario modelled	**Estimated mortalities**	**Impact on adult survival**	**Density independent counterfactual metric (35 years)**				**Density independent counterfactual metric (50 years)**			
			Median CGR	**Reduction in annual growth rate (%)**	**Median CPS**	**Reduction in final population size after 35 years (%)**	**Median CGR**	**Reduction in annual growth rate (%)**	**Median CPS**	**Reduction in final population size after 50 years (%)**
consented projects with a commitment to compensation and the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	149.8	0.004837	0.994	0.57	0.814	18.63	0.994	0.57	0.747	25.35

3.15 Hermaness, Saxa Vord and Valla Field SPA: in-combination

3.15.1 Gannet

Table 3.37 Gannet apportioned to Hermaness, Saxa Vord and Valla Field SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	66.8	0.001687	0.998	0.20	0.931	6.91	0.998	0.20	0.903	9.66
Collision – all projects excluding the Project	64.4	0.001626	0.998	0.19	0.933	6.70	0.998	0.19	0.907	9.33
Collision – all projects excluding consented projects with a commitment to compensation	65.8	0.001660	0.998	0.20	0.932	6.81	0.998	0.20	0.905	9.52
Collision – all projects excluding	63.3	0.001599	0.998	0.19	0.934	6.56	0.998	0.19	0.908	9.20

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
consented projects with a commitment to compensation and the Project										
Displacement – 30% displacement; 1% mortality for all projects	11.1	0.000280	1.000	0.03	0.988	1.18	1.000	0.03	0.984	1.64
Displacement – 30% displacement; 3% mortality for all projects	14.8	0.000373	1.000	0.04	0.984	1.57	1.000	0.04	0.978	2.21
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	10.7	0.000271	1.000	0.03	0.989	1.13	1.000	0.03	0.984	1.59
Displacement - 30% displacement;	14.3	0.000361	1.000	0.04	0.985	1.50	1.000	0.04	0.979	2.13

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
3% mortality for all projects excluding the Project										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	16.2	0.000410	1.000	0.05	0.983	1.72	1.000	0.05	0.976	2.41
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	21.6	0.000546	0.999	0.06	0.977	2.29	0.999	0.06	0.968	3.23
Displacement - 30%	15.9	0.000401	1.000	0.05	0.983	1.69	1.000	0.05	0.976	2.37

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project										
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	21.2	0.000534	0.999	0.06	0.978	2.23	0.999	0.06	0.969	3.13
Combined effects - 30% displacement; 1% mortality for all projects	77.9	0.001966	0.998	0.23	0.920	8.05	0.998	0.23	0.888	11.18

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 3% mortality for all projects	81.6	0.002060	0.998	0.24	0.916	8.44	0.998	0.24	0.883	11.72
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	75.1	0.001896	0.998	0.22	0.922	7.76	0.998	0.22	0.892	10.81
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	78.7	0.001986	0.998	0.23	0.919	8.11	0.998	0.23	0.887	11.31
Combined effects - 30% displacement; 1% mortality for all projects excluding consented	82.0	0.002070	0.998	0.25	0.915	8.48	0.998	0.25	0.882	11.78

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects with a commitment to compensation										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	87.4	0.002207	0.997	0.26	0.910	9.01	0.997	0.26	0.875	12.52
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	79.2	0.002000	0.998	0.24	0.918	8.19	0.998	0.24	0.886	11.38
Combined effects - 30%	84.5	0.002133	0.997	0.25	0.913	8.69	0.997	0.25	0.879	12.11

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project										

Table 3.38 Gannet apportioned to Hermaness, Saxa Vord and Valla Field SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	66.8	0.001687	0.998	0.20	0.931	6.91	0.998	0.20	0.903	9.66
Collision – all projects excluding the Project	64.4	0.001626	0.998	0.19	0.933	6.70	0.998	0.19	0.907	9.33
Collision – all projects excluding consented projects with a commitment to compensation	65.8	0.001660	0.998	0.20	0.932	6.81	0.998	0.20	0.905	9.52
Collision – all projects excluding consented projects with a commitment to	63.3	0.001599	0.998	0.19	0.934	6.56	0.998	0.19	0.908	9.20

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
compensation and the Project										
Displacement – 30% displacement; 1% mortality for all projects	20.7	0.000523	0.999	0.06	0.978	2.21	0.999	0.06	0.969	3.11
Displacement – 30% displacement; 3% mortality for all projects	63.8	0.001610	0.998	0.19	0.934	6.59	0.998	0.19	0.908	9.24
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	20.3	0.000512	0.999	0.06	0.978	2.17	0.999	0.06	0.970	3.04
Displacement - 30% displacement; 3% mortality	62.5	0.001578	0.998	0.19	0.935	6.49	0.998	0.19	0.909	9.06

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
for all projects excluding the Project										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	19.0	0.000479	0.999	0.06	0.980	2.04	0.999	0.06	0.972	2.84
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	58.6	0.001480	0.998	0.17	0.939	6.10	0.998	0.17	0.915	8.53

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	18.5	0.000468	0.999	0.05	0.980	1.96	0.999	0.05	0.972	2.76
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	57.3	0.001448	0.998	0.17	0.940	5.97	0.998	0.17	0.917	8.34

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 1% mortality for all projects	87.5	0.002210	0.997	0.26	0.910	8.96	0.997	0.26	0.875	12.49
Combined effects - 30% displacement; 3% mortality for all projects	130.6	0.003297	0.996	0.39	0.869	13.12	0.996	0.39	0.819	18.07
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	84.7	0.002138	0.997	0.25	0.913	8.70	0.997	0.25	0.879	12.09
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	126.9	0.003204	0.996	0.38	0.872	12.77	0.996	0.38	0.824	17.57

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	84.7	0.002139	0.997	0.25	0.913	8.70	0.997	0.25	0.879	12.11
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	124.4	0.003140	0.996	0.37	0.875	12.51	0.996	0.37	0.827	17.26
Combined effects - 30% displacement; 1% mortality	81.9	0.002067	0.998	0.24	0.916	8.42	0.998	0.24	0.883	11.72

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
for all projects excluding consented projects with a commitment to compensation and the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	120.7	0.003047	0.996	0.36	0.878	12.15	0.996	0.36	0.832	16.79

3.16 North Caithness Cliffs SPA: in-combination

3.16.1 Kittiwake

Table 3.39 Kittiwake apportioned to North Caithness Cliffs SPA PVA results in-combination

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	53.8	0.002893	0.997	0.34	0.883	11.66	0.997	0.34	0.839	16.08
Collision – all projects excluding the Project	53.1	0.002853	0.997	0.34	0.886	11.44	0.997	0.34	0.842	15.82
Collision – all projects excluding consented projects with a commitment to compensation	42.4	0.002460	0.997	0.29	0.900	9.96	0.997	0.29	0.862	13.78
Collision – all projects excluding	41.7	0.002420	0.997	0.29	0.902	9.79	0.997	0.29	0.864	13.59

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
consented projects with a commitment to compensation and the Project										
Displacement – 30% displacement; 1% mortality for all projects	14.6	0.000783	0.999	0.09	0.967	3.27	0.999	0.09	0.954	4.60
Displacement – 30% displacement; 3% mortality for all projects	32.4	0.001740	0.998	0.21	0.929	7.12	0.998	0.21	0.901	9.91
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	14.5	0.000780	0.999	0.09	0.968	3.22	0.999	0.09	0.954	4.55
Displacement - 30%	32.2	0.001730	0.998	0.20	0.929	7.10	0.998	0.21	0.901	9.94

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
displacement; 3% mortality for all projects excluding the Project										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	12.6	0.000676	0.999	0.08	0.971	2.85	0.999	0.08	0.960	3.99
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	26.3	0.001412	0.998	0.17	0.942	5.82	0.998	0.17	0.918	8.20

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	12.5	0.000673	0.999	0.08	0.972	2.84	0.999	0.08	0.960	4.04
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	26.1	0.001402	0.998	0.17	0.942	5.77	0.998	0.17	0.919	8.08
Combined effects - 30% displacement; 1%	65.0	0.003677	0.996	0.43	0.855	14.47	0.996	0.43	0.801	19.88

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
mortality for all projects										
Combined effects - 30% displacement; 3% mortality for all projects	82.9	0.004634	0.995	0.55	0.820	17.96	0.995	0.55	0.756	24.44
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	64.2	0.003633	0.996	0.43	0.856	14.41	0.996	0.43	0.803	19.75
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	81.9	0.004583	0.995	0.54	0.822	17.76	0.995	0.54	0.758	24.21
Combined effects - 30% displacement; 1%	55.0	0.003136	0.996	0.37	0.875	12.52	0.996	0.37	0.828	17.24

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
mortality for all projects excluding consented projects with a commitment to compensation										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	68.7	0.003872	0.995	0.46	0.847	15.28	0.995	0.46	0.791	20.88
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to	54.2	0.003092	0.996	0.37	0.876	12.36	0.996	0.37	0.830	17.04

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
compensation and the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	67.7	0.003822	0.995	0.45	0.849	15.07	0.995	0.45	0.794	20.61

3.16.2 Puffin

Table 3.40 Puffin apportioned to North Caithness Cliffs SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	10.8	0.001601	0.998	0.19	0.935	6.52	0.998	0.19	0.909	9.09
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	10.7	0.001587	0.998	0.19	0.935	6.46	0.998	0.19	0.908	9.20

Table 3.41 Puffin apportioned to North Caithness Cliffs PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	33.2	0.004914	0.994	0.58	0.810	18.95	0.994	0.58	0.743	25.75
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	54.4	0.008046	0.990	0.95	0.708	29.16	0.990	0.95	0.613	38.73
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	32.9	0.004864	0.994	0.58	0.813	18.75	0.994	0.58	0.744	25.62

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	53.9	0.007963	0.991	0.94	0.712	28.84	0.991	0.94	0.617	38.26

3.17 North Rona and Sula Sgeir SPA: in-combination

3.17.1 Gannet

Table 3.42 Gannet apportioned to North Rona and Sula Sgeir SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	5.1	0.000266	1.000	0.03	0.989	1.11	1.000	0.03	0.984	1.59
Collision – all projects excluding the Project	4.3	0.000228	1.000	0.03	0.990	1.02	1.000	0.03	0.986	1.41
Displacement – 30% displacement; 1% mortality for all projects	1.3	0.000069	1.000	0.01	0.997	0.30	1.000	0.01	0.996	0.43
Displacement – 30% displacement; 3% mortality for all projects	1.7	0.000091	1.000	0.01	0.997	0.34	1.000	0.01	0.995	0.49

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	1.2	0.000065	1.000	0.01	0.997	0.25	1.000	0.01	0.997	0.33
Displacement - 30% displacement; 3% mortality for all projects excluding the Project	1.6	0.000086	1.000	0.01	0.996	0.36	1.000	0.01	0.995	0.49
Combined effects - 30% displacement; 1% mortality for all projects	6.4	0.000335	1.000	0.04	0.986	1.36	1.000	0.04	0.980	1.99
Combined effects - 30% displacement; 3% mortality for all projects	6.8	0.000358	1.000	0.04	0.985	1.52	1.000	0.04	0.979	2.13

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	5.6	0.000293	1.000	0.04	0.988	1.23	1.000	0.04	0.982	1.76
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	6.0	0.000314	1.000	0.04	0.987	1.32	1.000	0.04	0.981	1.87

Table 3.43 Gannet apportioned to North Rona and Sula Sgeir SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	5.1	0.000266	1.000	0.03	0.989	1.11	1.000	0.03	0.984	1.59
Collision – all projects excluding the Project	4.3	0.000228	1.000	0.03	0.990	1.02	1.000	0.03	0.986	1.41
Displacement – 30% displacement; 1% mortality for all projects	1.5	0.000080	1.000	0.01	0.997	0.29	1.000	0.01	0.995	0.46
Displacement – 30% displacement; 3% mortality for all projects	4.6	0.000240	1.000	0.03	0.990	1.01	1.000	0.03	0.986	1.43
Displacement - 30% displacement; 1% mortality for all projects	1.4	0.000075	1.000	0.01	0.997	0.30	1.000	0.01	0.995	0.45

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
excluding the Project										
Displacement - 30% displacement; 3% mortality for all projects excluding the Project	4.3	0.000226	1.000	0.03	0.991	0.94	1.000	0.03	0.987	1.33
Combined effects - 30% displacement; 1% mortality for all projects	6.6	0.000346	1.000	0.04	0.985	1.45	1.000	0.04	0.980	2.02
Combined effects - 30% displacement; 3% mortality for all projects	9.6	0.000507	0.999	0.06	0.978	2.21	0.999	0.06	0.969	3.08
Combined effects - 30% displacement; 1% mortality for all projects	5.8	0.000304	1.000	0.04	0.987	1.27	1.000	0.04	0.982	1.83

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
excluding the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	8.8	0.000463	0.999	0.05	0.980	1.97	0.999	0.06	0.972	2.80

3.18 Noss SPA: in-combination

3.18.1 Gannet

Table 3.44 Gannet apportioned to Noss SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	33.4	0.001353	0.998	0.16	0.944	5.60	0.998	0.16	0.922	7.83
Collision – all projects excluding the Project	31.3	0.001270	0.998	0.15	0.947	5.30	0.998	0.15	0.926	7.39
Displacement – 30% displacement; 1% mortality for all projects	8.4	0.000340	1.000	0.04	0.986	1.42	1.000	0.04	0.980	2.02
Displacement – 30% displacement; 3% mortality for all projects	11.2	0.000453	0.999	0.05	0.981	1.89	0.999	0.05	0.973	2.71

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	8.1	0.000330	1.000	0.04	0.986	1.37	1.000	0.04	0.980	1.99
Displacement - 30% displacement; 3% mortality for all projects excluding the Project	10.8	0.000440	0.999	0.05	0.982	1.84	0.999	0.05	0.974	2.61
Combined effects - 30% displacement; 1% mortality for all projects	41.8	0.001693	0.998	0.20	0.931	6.93	0.998	0.20	0.903	9.69
Combined effects - 30% displacement; 3% mortality for all projects	44.5	0.001806	0.998	0.21	0.926	7.42	0.998	0.21	0.897	10.29

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	39.5	0.001599	0.998	0.19	0.934	6.59	0.998	0.19	0.908	9.16
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	42.2	0.001709	0.998	0.20	0.930	7.01	0.998	0.20	0.903	9.75

Table 3.45 Gannet apportioned to Noss SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	33.4	0.001353	0.998	0.16	0.944	5.60	0.998	0.16	0.922	7.83
Collision – all projects excluding the Project	31.3	0.001270	0.998	0.15	0.947	5.30	0.998	0.15	0.926	7.39
Displacement – 30% displacement; 1% mortality for all projects	9.9	0.000400	1.000	0.05	0.983	1.69	1.000	0.05	0.976	2.35
Displacement – 30% displacement; 3% mortality for all projects	30.0	0.001217	0.999	0.14	0.949	5.05	0.999	0.14	0.929	7.12
Displacement - 30% displacement; 1% mortality for all projects	9.6	0.000388	1.000	0.05	0.983	1.68	1.000	0.05	0.976	2.36

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
excluding the Project										
Displacement - 30% displacement; 3% mortality for all projects excluding the Project	29.2	0.001182	0.999	0.14	0.950	4.96	0.999	0.14	0.931	6.90
Combined effects - 30% displacement; 1% mortality for all projects	43.2	0.001753	0.998	0.21	0.928	7.19	0.998	0.21	0.899	10.05
Combined effects - 30% displacement; 3% mortality for all projects	63.4	0.002570	0.997	0.31	0.896	10.44	0.997	0.31	0.856	14.45
Combined effects - 30% displacement; 1% mortality for all projects	40.9	0.001658	0.998	0.20	0.932	6.85	0.998	0.20	0.904	9.58

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
excluding the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	60.5	0.002451	0.997	0.29	0.900	9.96	0.997	0.29	0.862	13.77

3.19 St Abb's Head to Fast Castle SPA: in-combination

3.19.1 Kittiwake

Table 3.46 Kittiwake apportioned to St Abb's Head to Fast Castle SPA PVA Results In-combination

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	222.2	0.018532	0.978	2.19	0.450	54.98	0.978	2.19	0.323	67.72
Collision – all projects excluding the Project	221.8	0.018498	0.978	2.19	0.451	54.90	0.978	2.19	0.324	67.62
Collision – all projects excluding consented projects with a commitment to compensation	24.0	0.001998	0.998	0.24	0.918	8.22	0.998	0.24	0.886	11.43
Collision – all projects excluding	23.6	0.001964	0.998	0.23	0.920	8.02	0.998	0.23	0.889	11.12

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
consented projects with a commitment to compensation and the Project										
Displacement – 30% displacement; 1% mortality for all projects	35.1	0.002926	0.997	0.35	0.882	11.77	0.997	0.35	0.838	16.20
Displacement – 30% displacement; 3% mortality for all projects	105.1	0.008762	0.990	1.04	0.687	31.27	0.990	1.04	0.588	41.22
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	35.1	0.002923	0.997	0.35	0.883	11.73	0.997	0.34	0.838	16.18
Displacement - 30%	105.0	0.008752	0.990	1.03	0.688	31.22	0.990	1.03	0.588	41.16

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
displacement; 3% mortality for all projects excluding the Project										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	5.4	0.000449	0.999	0.05	0.981	1.89	0.999	0.05	0.973	2.66
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	16.4	0.001365	0.998	0.16	0.944	5.64	0.998	0.16	0.921	7.94

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	5.4	0.000446	0.999	0.05	0.982	1.83	0.999	0.05	0.974	2.61
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	16.3	0.001355	0.998	0.16	0.944	5.64	0.998	0.16	0.921	7.86
Combined effects - 30% displacement; 1%	257.3	0.021459	0.975	2.54	0.396	60.39	0.975	2.54	0.269	73.07

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
mortality for all projects										
Combined effects - 30% displacement; 3% mortality for all projects	327.3	0.027294	0.968	3.23	0.307	69.32	0.968	3.23	0.188	81.24
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	256.9	0.021421	0.975	2.53	0.397	60.27	0.975	2.53	0.270	72.96
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	326.8	0.027250	0.968	3.22	0.307	69.27	0.968	3.22	0.188	81.20
Combined effects - 30% displacement; 1%	29.4	0.002448	0.997	0.29	0.901	9.94	0.997	0.29	0.862	13.75

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
mortality for all projects excluding consented projects with a commitment to compensation										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	40.3	0.003363	0.996	0.40	0.867	13.35	0.996	0.40	0.816	18.39
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to	28.9	0.002410	0.997	0.28	0.903	9.72	0.997	0.28	0.865	13.52

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
compensation and the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	39.8	0.003319	0.996	0.39	0.868	13.16	0.996	0.39	0.818	18.16

3.20 Sule Skerry and Sule Stack SPA: in-combination

3.20.1 Gannet

Table 3.47 Gannet apportioned to Sule Skerry and Sule Stack SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	22.6	0.001444	0.998	0.17	0.940	6.02	0.998	0.17	0.916	8.39
Collision – all projects excluding the Project	21.6	0.001382	0.998	0.16	0.943	5.72	0.998	0.16	0.920	8.02
Displacement – 30% displacement; 1% mortality for all projects	4.1	0.000263	1.000	0.03	0.989	1.11	1.000	0.03	0.985	1.54
Displacement – 30% displacement;	5.5	0.000350	1.000	0.04	0.986	1.44	1.000	0.04	0.980	2.00

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
3% mortality for all projects										
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	4.0	0.000256	1.000	0.03	0.990	1.02	1.000	0.03	0.985	1.51
Displacement - 30% displacement; 3% mortality for all projects excluding the Project	5.4	0.000342	1.000	0.04	0.986	1.45	1.000	0.04	0.980	2.03
Combined effects - 30% displacement; 1% mortality for all projects	26.7	0.001707	0.998	0.20	0.930	6.99	0.998	0.20	0.902	9.77
Combined effects - 30% displacement;	28.1	0.001795	0.998	0.21	0.927	7.33	0.998	0.21	0.897	10.27

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
3% mortality for all projects										
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	25.6	0.001638	0.998	0.19	0.933	6.74	0.998	0.19	0.906	9.39
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	27.0	0.001724	0.998	0.20	0.929	7.09	0.998	0.20	0.901	9.86

Table 3.48 Gannet apportioned to Sule Skerry and Sule Stack SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	22.6	0.001444	0.998	0.17	0.940	6.02	0.998	0.17	0.916	8.39
Collision – all projects excluding the Project	21.6	0.001382	0.998	0.16	0.943	5.72	0.998	0.16	0.920	8.02
Displacement – 30% displacement; 1% mortality for all projects	4.8	0.000307	1.000	0.03	0.987	1.25	1.000	0.04	0.982	1.82
Displacement – 30% displacement; 3% mortality for all projects	14.4	0.000920	0.999	0.11	0.962	3.82	0.999	0.11	0.946	5.41
Displacement - 30% displacement; 1% mortality for all projects	4.7	0.000299	1.000	0.04	0.987	1.25	1.000	0.04	0.982	1.79

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
excluding the Project										
Displacement - 30% displacement; 3% mortality for all projects excluding the Project	14.0	0.000898	0.999	0.10	0.963	3.70	0.999	0.10	0.948	5.21
Combined effects - 30% displacement; 1% mortality for all projects	27.4	0.001751	0.998	0.21	0.927	7.26	0.998	0.21	0.899	10.07
Combined effects - 30% displacement; 3% mortality for all projects	37.0	0.002364	0.997	0.28	0.904	9.60	0.997	0.28	0.867	13.31
Combined effects - 30% displacement; 1% mortality for all projects	26.3	0.001681	0.998	0.20	0.931	6.90	0.998	0.20	0.904	9.65

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
excluding the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	35.7	0.002279	0.997	0.27	0.907	9.29	0.997	0.27	0.871	12.89

3.20.2 Puffin

Table 3.49 Puffin apportioned to Sule Skerry and Sule Stack SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	14.1	0.000148	1.000	0.02	0.994	0.64	1.000	0.02	0.992	0.82
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	13.5	0.000141	1.000	0.02	0.994	0.57	1.000	0.02	0.992	0.81

Table 3.50 Puffin apportioned to Sule Skerry and Sule Stack PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	99.4	0.001041	0.999	0.12	0.956	4.35	0.999	0.12	0.939	6.09
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	165.7	0.001736	0.998	0.20	0.929	7.13	0.998	0.20	0.900	9.95
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	97.1	0.001017	0.999	0.12	0.958	4.22	0.999	0.12	0.940	5.95

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	161.8	0.001695	0.998	0.20	0.930	6.97	0.998	0.20	0.903	9.71

3.21 Troup, Pennan and Lion’s Heads SPA: alone

3.21.1 Guillemot

Table 3.51 Guillemot apportioned to Troup, Pennan and Lion’s Head SPA PVA results alone (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality	90.5	0.002724	0.997	0.31	0.896	10.43	0.997	0.31	0.855	14.47

Table 3.52 Guillemot apportioned to Troup, Pennan and Lion's Head SPA PVA results alone (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding)	227.4	0.006845	0.992	0.77	0.757	24.30	0.992	0.77	0.674	32.59
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding)	465.5	0.014011	0.984	1.58	0.564	43.55	0.984	1.58	0.445	55.52

3.21.2 Razorbill

Table 3.53 Razorbill apportioned to Troup, Pennan and Lion's Head SPA PVA results alone (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding)	1.4	0.000156	1.000	0.02	0.993	0.67	1.000	0.02	0.990	1.00
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding)	2.3	0.000265	1.000	0.04	0.988	1.16	1.000	0.03	0.983	1.65

3.22 Troup, Pennan and Lion's Heads SPA: in-combination

3.22.1 Kittiwake

Table 3.54 Kittiwake apportioned to Troup, Pennan and Lion's Heads SPA PVA results in-combination

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	81.7	0.003312	0.996	0.35	0.880	11.97	0.996	0.35	0.880	11.97
Collision – all projects excluding the Project	78.7	0.003191	0.997	0.34	0.884	11.59	0.997	0.34	0.884	11.59
Collision – all projects excluding consented projects with a commitment to compensation	69.8	0.002828	0.997	0.30	0.897	10.28	0.997	0.30	0.897	10.28
Collision – All projects excluding	66.8	0.002707	0.997	0.29	0.901	9.89	0.997	0.29	0.901	9.89

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
consented projects with a commitment to compensation and the Project										
Displacement – 30% displacement; 1% mortality for all projects	23.0	0.000840	0.999	0.10	0.965	3.52	0.999	0.10	0.951	4.93
Displacement – 30% displacement; 3% mortality for all projects	56.3	0.002058	0.998	0.24	0.916	8.43	0.998	0.24	0.883	11.68
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	22.6	0.000828	0.999	0.10	0.966	3.41	0.999	0.10	0.952	4.84
Displacement - 30%	55.3	0.002024	0.998	0.24	0.918	8.25	0.998	0.24	0.885	11.52

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
displacement; 3% mortality for all projects excluding the Project										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	19.4	0.000708	0.999	0.08	0.970	2.99	0.999	0.08	0.958	4.18
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	45.8	0.001674	0.998	0.20	0.931	6.87	0.998	0.20	0.904	9.60

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	19.0	0.000696	0.999	0.08	0.971	2.95	0.999	0.08	0.959	4.10
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	44.8	0.001640	0.998	0.19	0.933	6.75	0.998	0.19	0.906	9.41
Combined effects - 30% displacement; 1%	104.7	0.003828	0.995	0.45	0.850	15.05	0.995	0.45	0.794	20.63

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
mortality for all projects										
Combined effects - 30% displacement; 3% mortality for all projects	138.0	0.005046	0.994	0.60	0.807	19.34	0.994	0.60	0.737	26.30
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	101.4	0.003707	0.996	0.44	0.854	14.61	0.996	0.44	0.799	20.07
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	134.1	0.004902	0.994	0.58	0.811	18.87	0.994	0.58	0.744	25.63
Combined effects - 30% displacement; 1%	89.1	0.003260	0.996	0.39	0.870	12.99	0.996	0.39	0.821	17.85

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
mortality for all projects excluding consented projects with a commitment to compensation										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	115.6	0.004226	0.995	0.50	0.835	16.49	0.995	0.50	0.775	22.53
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to	85.8	0.003139	0.996	0.37	0.875	12.51	0.996	0.37	0.827	17.28

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
compensation and the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	111.6	0.004082	0.995	0.48	0.840	15.97	0.995	0.48	0.781	21.87

3.22.2 Guillemot

Table 3.55 Guillemot apportioned to Troup, Pennan and Lion's Heads SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	75.5	0.001583	0.998	0.18	0.938	6.20	0.998	0.18	0.913	8.68
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	53.3	0.001116	0.999	0.13	0.956	4.42	0.999	0.13	0.938	6.21
Displacement - 50% displacement; 1% mortality for all projects excluding consented	60.9	0.001277	0.999	0.14	0.950	5.02	0.999	0.14	0.929	7.06

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects with a commitment to compensation										
Displacement - 50% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	38.7	0.000810	0.999	0.09	0.967	3.25	0.999	0.09	0.954	4.56

Table 3.56 Guillemot apportioned to Troup, Pennan and Lion's Heads SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated Mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	167.0	0.003500	0.996	0.39	0.868	13.23	0.996	0.39	0.818	18.23
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	347.9	0.007290	0.992	0.82	0.743	25.65	0.992	0.82	0.657	34.29
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	99.2	0.002078	0.998	0.23	0.919	8.08	0.998	0.23	0.888	11.24

Scenario modelled	Estimated Mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	226.6	0.004748	0.995	0.53	0.825	17.53	0.995	0.53	0.761	23.90
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects excluding consented projects with a	139.7	0.002927	0.997	0.33	0.888	11.19	0.997	0.33	0.845	15.46

Scenario modelled	**Estimated Mortalities**	**Impact on adult survival**	**Density independent counterfactual metric (35 years)**				**Density independent counterfactual metric (50 years)**			
			Median CGR	**Reduction in annual growth rate (%)**	**Median CPS**	**Reduction in final population size after 35 years (%)**	**Median CGR**	**Reduction in annual growth rate (%)**	**Median CPS**	**Reduction in final population size after 50 years (%)**
commitment to compensation										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding consented projects with a commitment to compensation	285.5	0.005983	0.993	0.67	0.784	21.57	0.993	0.67	0.709	29.13
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects excluding consented	71.8	0.001505	0.998	0.17	0.941	5.91	0.998	0.17	0.917	8.28

Scenario modelled	Estimated Mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects with a commitment to compensation and the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding consented projects with a commitment to compensation and the Project	164.2	0.003441	0.996	0.39	0.870	13.02	0.996	0.39	0.821	17.94

3.22.3 Razorbill

Table 3.57 Razorbill apportioned to Troup, Pennan and Lion's Heads SPA PVA results in-combination (developer approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 50% displacement; 1% mortality for all projects	8.1	0.000920	0.999	0.11	0.960	3.99	0.999	0.11	0.945	5.49
Displacement - 50% displacement; 1% mortality for all projects excluding the Project	7.7	0.000874	0.999	0.10	0.963	3.70	0.999	0.10	0.948	5.24
Displacement - 50% displacement; 1% mortality for all projects excluding consented	7.8	0.000889	0.999	0.11	0.964	3.64	0.999	0.10	0.948	5.21

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects with a commitment to compensation										
Displacement - 50% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	7.4	0.000843	0.999	0.10	0.964	3.60	0.999	0.10	0.951	4.94

Table 3.58 Razorbill apportioned to Troup, Pennan and Lion's Heads SPA PVA results in-combination (guidance approach)

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects	13.9	0.001579	0.998	0.18	0.935	6.50	0.998	0.19	0.910	8.97
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects	29.8	0.003391	0.996	0.40	0.865	13.50	0.996	0.40	0.814	18.64
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all	12.5	0.001423	0.998	0.17	0.941	5.93	0.998	0.17	0.919	8.13

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
projects excluding the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding the Project	27.5	0.003125	0.996	0.37	0.875	12.47	0.996	0.37	0.828	17.21
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects excluding consented projects with a	12.9	0.001471	0.998	0.18	0.939	6.11	0.998	0.17	0.914	8.55

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
commitment to compensation										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding consented projects with a commitment to compensation	28.2	0.003210	0.996	0.38	0.872	12.76	0.996	0.38	0.824	17.55
Displacement - 60% displacement; 3% mortality (breeding), 1% mortality (non-breeding) for all projects excluding consented	11.6	0.001315	0.998	0.16	0.945	5.53	0.998	0.15	0.924	7.56

Scenario modelled	**Estimated mortalities**	**Impact on adult survival**	**Density independent counterfactual metric (35 years)**				**Density independent counterfactual metric (50 years)**			
			Median CGR	**Reduction in annual growth rate (%)**	**Median CPS**	**Reduction in final population size after 35 years (%)**	**Median CGR**	**Reduction in annual growth rate (%)**	**Median CPS**	**Reduction in final population size after 50 years (%)**
projects with a commitment to compensation and the Project										
Displacement - 60% displacement; 5% mortality (breeding), 3% mortality (non-breeding) for all projects excluding consented projects with a commitment to compensation and the Project	25.9	0.002943	0.997	0.35	0.882	11.76	0.997	0.35	0.838	16.24

3.23 West Westray SPA: alone

Table 3.59 Kittiwake apportioned to West Westray SPA PVA results alone

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision	0.5	0.000104	1.000	0.01	0.995	0.53	1.000	0.01	0.994	0.65
Combined effects - 30% displacement; 1% mortality	0.5	0.000110	1.000	0.01	0.996	0.44	1.000	0.01	0.993	0.66
Combined effects - 30% displacement; 3% mortality	0.6	0.000122	1.000	0.01	0.995	0.49	1.000	0.01	0.992	0.76

3.24 West Westray SPA: in-combination

3.24.1 Kittiwake

Table 3.60 Kittiwake apportioned to West Westray SPA PVA results in-combination

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Collision – all projects	45.4	0.009384	0.989	1.11	0.670	33.05	0.989	1.11	0.566	43.38
Collision – all projects excluding the Project	44.9	0.009281	0.989	1.10	0.672	32.80	0.989	1.10	0.570	43.05
Collision – all projects excluding consented projects with a commitment to compensation	38.8	0.008090	0.990	0.96	0.708	29.24	0.990	0.96	0.613	38.71
Collision – all projects excluding	38.3	0.007987	0.991	0.94	0.711	28.93	0.991	0.94	0.616	38.37

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
consented projects with a commitment to compensation and the Project										
Displacement – 30% displacement; 1% mortality for all projects	8.3	0.001706	0.998	0.20	0.929	7.10	0.998	0.20	0.902	9.79
Displacement – 30% displacement; 3% mortality for all projects	24.7	0.005110	0.994	0.60	0.804	19.62	0.994	0.60	0.734	26.63
Displacement - 30% displacement; 1% mortality for all projects excluding the Project	8.2	0.001700	0.998	0.20	0.930	6.95	0.998	0.20	0.902	9.77
Displacement - 30%	24.6	0.005092	0.994	0.60	0.805	19.50	0.994	0.60	0.735	26.47

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
displacement; 3% mortality for all projects excluding the Project										
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation	6.6	0.001359	0.998	0.16	0.943	5.65	0.998	0.16	0.921	7.86
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	19.6	0.004056	0.995	0.48	0.841	15.88	0.995	0.48	0.782	21.76

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
Displacement - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to compensation and the Project	6.5	0.001353	0.998	0.16	0.944	5.64	0.998	0.16	0.921	7.86
Displacement - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	19.5	0.004038	0.995	0.48	0.841	15.89	0.995	0.48	0.783	21.71
Combined effects - 30% displacement; 1%	53.3	0.011091	0.987	1.31	0.621	37.88	0.987	1.31	0.510	49.01

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
mortality for all projects										
Combined effects - 30% displacement; 3% mortality for all projects	69.8	0.014495	0.983	1.72	0.536	46.42	0.983	1.72	0.413	58.67
Combined effects - 30% displacement; 1% mortality for all projects excluding the Project	52.8	0.010981	0.987	1.30	0.624	37.62	0.987	1.30	0.513	48.69
Combined effects - 30% displacement; 3% mortality for all projects excluding the Project	69.2	0.014373	0.983	1.70	0.539	46.11	0.983	1.70	0.416	58.42
Combined effects - 30% displacement; 1%	45.4	0.009449	0.989	1.12	0.668	33.20	0.989	1.12	0.565	43.52

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
mortality for all projects excluding consented projects with a commitment to compensation										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation	58.5	0.012147	0.986	1.44	0.594	40.63	0.986	1.44	0.478	52.24
Combined effects - 30% displacement; 1% mortality for all projects excluding consented projects with a commitment to	44.9	0.009340	0.989	1.10	0.670	32.95	0.989	1.11	0.568	43.22

Scenario modelled	Estimated mortalities	Impact on adult survival	Density independent counterfactual metric (35 years)				Density independent counterfactual metric (50 years)			
			Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35 years (%)	Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 50 years (%)
compensation and the Project										
Combined effects - 30% displacement; 3% mortality for all projects excluding consented projects with a commitment to compensation and the Project	57.9	0.012025	0.986	1.42	0.597	40.31	0.986	1.42	0.481	51.86

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5. Glossary of Terms and Abbreviations

5.1 Abbreviations

Acronym	Definition
BioSS	Biomathematics and Statistics Scotland
CGR	Counterfactual of Population Growth Rate
CPS	Counterfactual of Population Size
EIA	Environmental Impact Assessment
HRA	Habitat Regulations Assessment
JNCC	Joint Nature Conservation Committee
PVA	Population Viability Analysis
SPA	Special Protection Area
SD	Survival Rate
UKCEH	UK Centre for Ecology and Hydrology

5.2 Glossary of terms

Term	Definition
Counterfactual of population growth rate (CGR)	The ratio of median impacted to un-impacted growth rate.
Counterfactual of population size (CPS)	The ratio of median impacted to un-impacted population size.
Effect	An effect is the consequence of an impact when considered in combination with the receptor's sensitivity / value / importance, defined in terms of significance.
Environmental Impact Assessment	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline').
Impact	A change resulting from an activity associated with the Project, defined in terms of magnitude.
Impact on adult survival	The proportion to which the additional predicted impact (mortality) is calculated to reduce a known population's baseline survival rate.
In-combination Effects	In-combination effects relate to when a species is assessed for more than one impact that may occur simultaneously and interact. For example, when a species is assessed for both collision risk and displacement impacts.

Term	Definition
The Project	MarramWind Offshore Windfarm

Appendix D.1
Log Files

Buchan Ness to Collieston Coast SPA: alone

Guillemot

Set up

The log file was created on: 2025-10-10 14:10:15.085833 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 _Buchan_Alone”.

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: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 33225 in 2025

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

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_Alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00078 , se: NA

Scenario B - Name: Guidance_Alone_NSlow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002376 , se: NA

Scenario C - Name: Guidance_Alone_NShigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004248 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

How should outputs be produced, in terms of ages?: whole.population

Target population size to use in calculating impact metrics: NA

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

Buchan Ness to Collieston Coast SPA: in-combination

Kittiwake

Collision

Set up

The log file was created on: 2025-10-13 16:19:20.582049 using Tool version 2, with R version 4.4.2, 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_Buchan_Incombo_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: 1257.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 31406 in 2025

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

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003037 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002941 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002494 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002398 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Displacement

Set up

The log file was created on: 2025-10-13 16:23:11.405341 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_Buchan_Incombo_Disp”.

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: 1264.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 31406 in 2025

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

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00066 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001605 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00065 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001574 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000453 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000991 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000443 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00096 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-14 10:34:36.757197 using Tool version 2, with R version 4.4.2, 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_Buchan_Incombo_Combined”.

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: 1272.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 31406 in 2025

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

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003697 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004642 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003591 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004515 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002948 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003485 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002841 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003358 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Guillemot (developer approach)

Set up

The log file was created on: 2025-10-10 14:44:33.956486 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 _Buchan__Incombo_Developer”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1235.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 33225 in 2025

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

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002724 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001944 , se: NA

Scenario C - Name: Developer_incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001922 , se: NA

Scenario D - Name: Developer_incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001142 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Guillemot (guidance approach)

Set up

The log file was created on: 2025-10-10 15:24:31.515632 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 _Buchan_Incombo_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: 1236.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 33225 in 2025

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

Adult survival rate: mean: 0.939 , sd: 0.015

Immatures survival rates:

Age class 0 to 1 - mean: 0.56 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006845 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.014011 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004469 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009763 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004307 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.008914 , se: NA

Scenario G - Name: Guidance_incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001931 , se: NA

Scenario H - Name: Guidance_incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004665 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Calf of Eday SPA: alone

Guillemot

Set up

The log file was created on: 2025-10-13 10:53:08.67189 using Tool version 2, with R version 4.4.2, 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 _CalfofE_Alone”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1246.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 4681 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_Alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000213 , se: NA

Scenario B - Name: Guidance_Alone_NSlow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000648 , se: NA

Scenario C - Name: Guidance_Alone_NShigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001159 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Calf of Eday SPA: in-combination

Guillemot (developer approach)

Set up

The log file was created on: 2025-10-13 10:19:13.992817 using Tool version 2, with R version 4.4.2, 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 _CalfofE__Incombo_Developer”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1247.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 4681 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000702 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000489 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Guillemot (guidance approach)

Set up

The log file was created on: 2025-10-13 10:04:13.572135 using Tool version 2, with R version 4.4.2, 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 _CalfofE_Incombo_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: 1242.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 4681 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001527 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003213 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000879 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002054 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Copinsay SPA: alone

Kittiwake

Combined

Set up

The log file was created on: 2025-10-14 14:27:27.095781 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_Copinsay_Alone_Combined”.

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: 1280.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 670 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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Alone_NSlow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000236 , se: NA

Scenario B - Name: Alone_NShigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000199 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Guillemot

Set up

The log file was created on: 2025-10-10 16:33:49.672444 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 _Copinsay_Alone”.

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: 1240.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 10991 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_Alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000729 , se: NA

Scenario B - Name: Guidance_Alone_NSlow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002221 , se: NA

Scenario C - Name: Guidance_Alone_NShigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002625 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Copinsay SPA: in-combination

Guillemot (developer approach)

Set up

The log file was created on: 2025-10-10 16:48:50.222991 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 _Copinsay__Incombo_Developer”.

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: 1241.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 10991 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001569 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00084 , se: NA

Scenario C - Name: Developer_incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001515 , se: NA

Scenario D - Name: Developer_incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000786 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Guillemot (guidance approach)

Set up

The log file was created on: 2025-10-13 08:54:26.222429 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 _Copinsay_Incombo_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: 1242.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 10991 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003308 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006003 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001087 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002032 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003244 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00581 , se: NA

Scenario G - Name: Guidance_incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001022 , se: NA

Scenario H - Name: Guidance_incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001839 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

East Caithness Cliffs: in-combination

Kittiwake

Collision

Set up

The log file was created on: 2025-10-20 11:49:40.581114 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_ECC_Incombo_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: 1260.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 36562 in 2024

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

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.007375 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.007255 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006712 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006592 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Displacement

Set up

The log file was created on: 2025-10-17 11:44:21.802019 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_ECC_Incombo_Disp”.

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: 1267.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 36562 in 2024

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

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00187 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005356 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001859 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005321 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00169 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004809 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001678 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004774 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-21 15:45:13.073452 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_ECC_Incombo_Combined”.

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: 1277.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 36562 in 2024

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

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009245 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.01273 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009113 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.012576 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.008401 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.011521 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00827 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.011366 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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 (developer approach)

Set up

The log file was created on: 2025-10-13 11:58:48.642702 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 “Razorbill _ECC__Incombo_Developer”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1260.

Years for burn-in: 0.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.

Region type to use for breeding success data: Global.

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

Age at first breeding: 5.

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

Number of subpopulations: 1.

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

Units for initial population size: breeding.adults

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

Population 1

Initial population values: Initial population 33023 in 2024

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

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

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

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

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0021 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002094 , se: NA

Scenario C - Name: Developer_incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001958 , se: NA

Scenario D - Name: Developer_incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001952 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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 (guidance approach)

Set up

The log file was created on: 2025-10-13 12:22:54.724871 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 “Razorbill _ECC_Incombo_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: 1261.

Years for burn-in: 0.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.

Region type to use for breeding success data: Global.

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

Age at first breeding: 5.

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

Number of subpopulations: 1.

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

Units for initial population size: breeding.adults

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

Population 1

Initial population values: Initial population 33023 in 2024

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

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

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

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

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004457 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.008812 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004449 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.008789 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004216 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.008226 , se: NA

Scenario G - Name: Guidance_incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004209 , se: NA

Scenario H - Name: Guidance_incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.008203 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Fair Isle SPA: alone

Guillemot

Set up

The log file was created on: 2025-10-13 09:17:16.541413 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 _FairIsle_Alone”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1243.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 24515 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_Alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000228 , se: NA

Scenario B - Name: Guidance_Alone_NSlow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000696 , se: NA

Scenario C - Name: Guidance_Alone_NShigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001244 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Fair Isle SPA: in-combination

Gannet (developer approach)

Collision

Set up

The log file was created on: 2025-10-16 15:47:45.191256 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_FairIsle_Incombo_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: 1291.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 11184 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001048 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00093 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001027 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000909 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Displacement

Set up

The log file was created on: 2025-10-17 09:27:33.747607 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_FairIsle_Incombo_Disp_DA”.

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: 1297.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 11184 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000251 , se: NA

Scenario B - Name: Developer_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000334 , se: NA

Scenario C - Name: Developer_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario D - Name: Developer_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000317 , se: NA

Scenario E - Name: Developer_incombo_excludcomp_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000241 , se: NA

Scenario F - Name: Developer_incombo_excludcomp_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000321 , se: NA

Scenario G - Name: Developer_incombo_excludcomp-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000228 , se: NA

Scenario H - Name: Developer_incombo_excludcomp-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000303 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-20 09:01:09.788192 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_FairIsle_Incombo_Combi_DA”.

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: 1309.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 11184 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001299 , se: NA

Scenario B - Name: Developer_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001383 , se: NA

Scenario C - Name: Developer_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001168 , se: NA

Scenario D - Name: Developer_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001247 , se: NA

Scenario E - Name: Developer_incombo_excludcomp_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001268 , se: NA

Scenario F - Name: Developer_incombo_excludcomp_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001348 , se: NA

Scenario G - Name: Developer_incombo_excludcomp-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001137 , se: NA

Scenario H - Name: Developer_incombo_excludcomp-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001213 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Gannet (guidance approach)

Displacement

Set up

The log file was created on: 2025-10-17 15:16:18.710834 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_FairIsle_Incombo_Disp_GA”.

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: 1297.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 11184 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000871 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000279 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000825 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000277 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000836 , se: NA

Scenario G - Name: Developer_incombo_excludcomp-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000261 , se: NA

Scenario H - Name: Developer_incombo_excludcomp-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000789 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-17 12:22:53.131096 using Tool version 2, with R version 4.4.2, 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_FairIsle_Incombo_Combi_GA”.

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: 1303.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 11184 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001343 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00192 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001209 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001755 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001304 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001863 , se: NA

Scenario G - Name: Guidance_incombo_excludcomp-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001171 , se: NA

Scenario H - Name: Guidance_incombo_excludcomp-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001699 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Guillemot (developer approach)

Set up

The log file was created on: 2025-10-13 09:38:49.056342 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 _FairIsle__Incombo_Developer”.

PVA model run type: simplescenarios.

Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.

Include demographic stochasticity in model?: Yes.

Number of simulations: 5000.

Random seed: 1244.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 24515 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000493 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000264 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Guillemot (guidance approach)

Set up

The log file was created on: 2025-10-13 10:05:07.871936 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 _FairIsle_Incombo_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: 1245.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 24515 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001022 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002057 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000326 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Puffin (developer approach)

Set up

The log file was created on: 2025-10-14 16:17:08.85165 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 “Puffin_FairIsle_Incombo_Developer”.

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: 1285.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 13332 in 2023

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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 9.8e-05 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 8.4e-05 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Puffin (guidance approach)

Set up

The log file was created on: 2025-10-14 16:31:07.056532 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 “Puffin_FairIsle_Incombo_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: 1286.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 13332 in 2023

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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000268 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000502 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000218 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

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: 2035

Final year to include in outputs: 2085

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 (developer approach)

Set up

The log file was created on: 2025-10-13 13:09:23.218289 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 “Razorbill _FairIsle__Incombo_Developer”.

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: 1255.

Years for burn-in: 0.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.

Region type to use for breeding success data: Global.

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

Age at first breeding: 5.

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

Number of subpopulations: 1.

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

Units for initial population size: breeding.adults

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

Population 1

Initial population values: Initial population 2580 in 2023

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

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

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

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

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000807 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000784 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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 (guidance approach)

Set up

The log file was created on: 2025-10-13 11:31:15.704196 using Tool version 2, with R version 4.4.2, 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 “Razorbill _FairIsle_Incombo_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: 1256.

Years for burn-in: 0.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.

Region type to use for breeding success data: Global.

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

Age at first breeding: 5.

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

Number of subpopulations: 1.

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

Units for initial population size: breeding.adults

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

Population 1

Initial population values: Initial population 2580 in 2023

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

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

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

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

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001144 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003076 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001074 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002951 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Forth Islands SPA: alone

Gannet

Combined

Set up

The log file was created on: 2025-10-16 10:30:20.735599 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_Alone_Combi”.

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: 1289.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 92090 in 2024

Productivity rate per pair: mean: 0.6971315 , sd: 0.08576701

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , sd: 0.042 , 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?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Alone_NShigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000225 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Forth Islands SPA: in-combination

Gannet (developer approach)

Collision

Set up

The log file was created on: 2025-10-16 15:26:23.379797 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_Incombo_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: 1290.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 92090 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.007613 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.007455 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006418 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00626 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Displacement

Set up

The log file was created on: 2025-10-16 16:58:51.843395 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_Incombo_Disp_DA”.

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: 1296.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 92090 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001603 , se: NA

Scenario B - Name: Developer_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002137 , se: NA

Scenario C - Name: Developer_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001583 , se: NA

Scenario D - Name: Developer_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002111 , se: NA

Scenario E - Name: Developer_incombo_excludcomp_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001275 , se: NA

Scenario F - Name: Developer_incombo_excludcomp_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0017 , se: NA

Scenario G - Name: Developer_incombo_excludcomp-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001256 , se: NA

Scenario H - Name: Developer_incombo_excludcomp-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001675 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-20 08:35:10.168445 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_Incombo_Combi_DA”.

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: 1308.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 92090 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009215 , se: NA

Scenario B - Name: Developer_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009749 , se: NA

Scenario C - Name: Developer_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009038 , se: NA

Scenario D - Name: Developer_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009566 , se: NA

Scenario E - Name: Developer_incombo_excludcomp_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.007693 , se: NA

Scenario F - Name: Developer_incombo_excludcomp_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.008119 , se: NA

Scenario G - Name: Developer_incombo_excludcomp-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.007516 , se: NA

Scenario H - Name: Developer_incombo_excludcomp-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.007935 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Gannet (guidance approach)

Displacement

Set up

The log file was created on: 2025-10-17 14:33:14.107447 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_Incombo_Disp_GA”.

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: 1296.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 92090 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001879 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005668 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001857 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005601 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001487 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004515 , se: NA

Scenario G - Name: Developer_incombo_excludcomp-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000401 , se: NA

Scenario H - Name: Developer_incombo_excludcomp-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000534 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-17 13:36:54.897304 using Tool version 2, with R version 4.4.2, 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_Incombo_Combi_GA”.

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: 1302.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 92090 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009492 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.013281 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009312 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.013056 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.007905 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.010933 , se: NA

Scenario G - Name: Guidance_incombo_excludcomp-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.007725 , se: NA

Scenario H - Name: Guidance_incombo_excludcomp-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.010708 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Kittiwake

Collision

Set up

The log file was created on: 2025-10-13 13:44:40.584913 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_Forth_Incombo_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: 1262.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 14216 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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003698 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003667 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002074 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002043 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Displacement

Set up

The log file was created on: 2025-10-14 10:57:08.608616 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_Forth_Incombo_Disp”.

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: 1262.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 14216 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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000886 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00251 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000883 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002501 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000626 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001729 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000623 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00172 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-14 15:10:41.481972 using Tool version 2, with R version 4.4.2, 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_Forth_Incombo_Combined”.

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: 1277.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 14216 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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004584 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006209 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00455 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006168 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0027 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003804 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002666 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003763 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Puffin (developer approach)

Set up

The log file was created on: 2025-10-14 15:34:44.700008 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 “Puffin_Forth_Incombo_Developer”.

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: 1283.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 117960 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000556 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000546 , se: NA

Scenario C - Name: Developer_incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000482 , se: NA

Scenario D - Name: Developer_incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000472 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Puffin (guidance approach)

Set up

The log file was created on: 2025-10-14 16:04:03.266608 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 “Puffin_Forth_Incombo_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: 1284.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 117960 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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 1e-07 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001645 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002771 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00161 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002711 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001438 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002388 , se: NA

Scenario G - Name: Guidance_incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001403 , se: NA

Scenario H - Name: Guidance_incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002329 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Foula SPA: in-combination

Puffin (developer approach)

Set up

The log file was created on: 2025-10-14 15:58:14.397651 using Tool version 2, with R version 4.4.2, 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 “Puffin_Foula_Incombo_Developer”.

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: 1285.

Years for burn-in: 0.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Atlantic Puffin.

Region type to use for breeding success data: .

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

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: breeding.adults

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

Population 1

Initial population values: Initial population 8468 in 2023

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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000144 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000137 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Puffin (guidance approach)

Set up

The log file was created on: 2025-10-14 15:44:21.20332 using Tool version 2, with R version 4.4.2, 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 “Puffin_Foula_Incombo_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: 1286.

Years for burn-in: 0.

Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Atlantic Puffin.

Region type to use for breeding success data: .

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

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: breeding.adults

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

Population 1

Initial population values: Initial population 8468 in 2023

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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000248 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000581 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000224 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000539 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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: in-combination

Kittiwake

Collision

Set up

The log file was created on: 2025-10-13 16:45:42.960436 using Tool version 2, with R version 4.4.2, 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_Fowlsh_Incombo_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: 1259.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 30966 in 2023

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

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005464 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005399 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003165 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003099 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Displacement

Set up

The log file was created on: 2025-10-14 09:42:23.710796 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_Fowlsh_Incombo_Disp”.

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: 1259.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 30966 in 2023

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

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001003 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002892 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000996 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002871 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000622 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001758 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000615 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001737 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-14 11:59:44.524908 using Tool version 2, with R version 4.4.2, 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_Fowlsh_Incombo_Combined”.

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: 1274.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 30966 in 2023

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

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006467 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.008356 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006394 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00827 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003787 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004923 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003714 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004837 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Hermaness, Saxa Vord and Valla Field SPA: in-combination

Gannet (developer approach)

Collision

Set up

The log file was created on: 2025-10-16 16:35:25.644223 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_Hermaness_Incombo_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: 1295.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 39606 in 2024

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001687 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001626 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00166 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001599 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Displacement

Set up

The log file was created on: 2025-10-17 13:31:07.461246 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_Hermaness_Incombo_Disp_DA”.

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: 1301.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 39606 in 2024

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00028 , se: NA

Scenario B - Name: Developer_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000373 , se: NA

Scenario C - Name: Developer_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000271 , se: NA

Scenario D - Name: Developer_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000361 , se: NA

Scenario E - Name: Developer_incombo_excludcomp_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00041 , se: NA

Scenario F - Name: Developer_incombo_excludcomp_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000546 , se: NA

Scenario G - Name: Developer_incombo_excludcomp-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000401 , se: NA

Scenario H - Name: Developer_incombo_excludcomp-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000534 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-17 15:09:35.913812 using Tool version 2, with R version 4.4.2, 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_Hermaness_Incombo_Combi_DA”.

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: 1313.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 39606 in 2024

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001966 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00206 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001896 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001986 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00207 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002207 , se: NA

Scenario G - Name: Guidance_incombo_excludcomp-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002 , se: NA

Scenario H - Name: Guidance_incombo_excludcomp-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002133 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Gannet (guidance approach)

Displacement

Set up

The log file was created on: 2025-10-17 17:13:09.783174 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_Hermaness_Incombo_Disp_GA”.

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: 1301.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 39606 in 2024

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000523 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00161 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000512 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001578 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000479 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00148 , se: NA

Scenario G - Name: Developer_incombo_excludcomp-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000468 , se: NA

Scenario H - Name: Developer_incombo_excludcomp-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001448 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-16 17:13:04.877836 using Tool version 2, with R version 4.4.2, 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_Hermaness_Incombo_Combi_GA”.

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: 1307.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 39606 in 2024

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00221 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003297 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002138 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003204 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002139 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00314 , se: NA

Scenario G - Name: Guidance_incombo_excludcomp-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002067 , se: NA

Scenario H - Name: Guidance_incombo_excludcomp-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003047 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

North Caithness Cliffs SPA: in-combination

Kittiwake

Collision

Set up

The log file was created on: 2025-10-20 12:46:21.641463 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_NCC_Incombo_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: 1261.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 18608 in 2023

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

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002893 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002853 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00246 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00242 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Displacement

Set up

The log file was created on: 2025-10-14 10:34:45.523978 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_NCC_Incombo_Disp”.

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: 1261.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 18608 in 2023

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

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000783 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00174 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00078 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00173 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000676 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001412 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000673 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001402 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-16 12:45:46.488755 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_NCC_Incombo_Combined”.

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: 1276.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 18608 in 2023

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

Adult survival rate: mean: 0.854 , sd: 0.051

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003677 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004634 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003633 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004583 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003136 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003872 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003092 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003822 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Puffin (developer approach)

Set up

The log file was created on: 2025-10-14 14:48:59.020382 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 “Puffin_NCC_Incombo_Developer”.

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: 1281.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 6766 in 2016

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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001601 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001587 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Puffin (guidance approach)

Set up

The log file was created on: 2025-10-14 15:10:52.723885 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

```
## 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 “Puffin_NCC_Incombo_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: 1282.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 6766 in 2016

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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004914 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.008046 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004864 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.007963 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

North Rona and Sula Sgeir SPA: in-combination

Gannet (developer approach)

Collision

Set up

The log file was created on: 2025-10-16 16:19:16.22604 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

```
## 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_NorthRona_Incombo_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: 1294.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 18990 in 2023

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , sd: 0.042 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000266 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000228 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Displacement

Set up

The log file was created on: 2025-10-17 10:56:38.093144 using Tool version 2, with R version 4.5.1, PVA package version: 4.18 (with UI version 1.7)

```
## 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_NorthRona_Incombo_Disp_DA”.

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: 1300.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 18990 in 2023

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 6.9e-05 , se: NA

Scenario B - Name: Developer_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 9.1e-05 , se: NA

Scenario C - Name: Developer_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 6.5e-05 , se: NA

Scenario D - Name: Developer_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 8.6e-05 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-17 15:33:55.790686 using Tool version 2, with R version 4.4.2, PVA package version: 4.18 (with UI version 1.7)

```
## 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_NorthRona_Incombo_Combi_DA”.

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: 1312.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 18990 in 2023

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000335 , se: NA

Scenario B - Name: Developer_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000358 , se: NA

Scenario C - Name: Developer_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario D - Name: Developer_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000314 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Gannet (guidance approach)

Displacement

Set up

The log file was created on: 2025-10-17 16:31:07.302341 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_NorthRona_Incombo_Disp_GA".

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: 1300.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 18990 in 2023

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 8e-05 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00024 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 7.5e-05 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000226 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-17 10:28:01.390145 using Tool version 2, with R version 4.4.2, PVA package version: 4.18 (with UI version 1.7)

```
## 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_NorthRona_Incombo_Combi_GA”.

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: 1306.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 18990 in 2023

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000346 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000507 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000304 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000463 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Noss SPA: in-combination

Gannet (developer approach)

Displacement

Set up

The log file was created on: 2025-10-17 10:28:24.697368 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_Noss_Incombo_Disp_DA”.

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: 1299.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 24670 in 2023

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00034 , se: NA

Scenario B - Name: Developer_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000453 , se: NA

Scenario C - Name: Developer_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00033 , se: NA

Scenario D - Name: Developer_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00044 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-17 16:03:46.886559 using Tool version 2, with R version 4.4.2, 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" "0.7.3"
## shinyWidgets   "shinyWidgets"  "0.9.0"
## 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_Incombo_Combi_DA”.

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: 1311.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 24670 in 2023

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001693 , se: NA

Scenario B - Name: Developer_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001806 , se: NA

Scenario C - Name: Developer_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001599 , se: NA

Scenario D - Name: Developer_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001709 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Gannet (guidance approach)

Collision

Set up

The log file was created on: 2025-10-16 16:08:53.85455 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_Noss_Incombo_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: 1293.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 24670 in 2023

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , sd: 0.042 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001353 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00127 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Displacement

Set up

The log file was created on: 2025-10-17 16:00:45.960708 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_Noss_Incombo_Disp_GA”.
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: 1299.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 24670 in 2023

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 4e-04 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001217 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000388 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001182 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Combined

Set up

The log file was created on: 2025-10-17 10:55:02.102335 using Tool version 2, with R version 4.4.2, 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" "0.7.3"
## shinyWidgets    "shinyWidgets"   "0.9.0"
## 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_Incombo_Combi_GA”.
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: 1305.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 24670 in 2023

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001753 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00257 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001658 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002451 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

5.2.1.1

St Abb's Head to Fast Castle SPA: in-combination

Kittiwake

Collision

Set up

The log file was created on: 2025-10-13 15:15:47.949511 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_StAbbs_Incombo_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: 1263.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 11992 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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.018532 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.018498 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001998 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001964 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Displacement

Set up

The log file was created on: 2025-10-14 11:50:13.957111 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_StAbbs_Incombo_Disp”.
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: 1263.

Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 11992 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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002926 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.008762 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002923 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.008752 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000449 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001365 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000446 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001355 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Combined

Set up

The log file was created on: 2025-10-14 13:41:21.994574 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_StAbbs_Incombo_Combined”.
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: 1278.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 11992 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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.021459 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.027294 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.021421 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.02725 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002448 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003363 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00241 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003319 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Sule Skerry and Sule Stack SPA: in-combination

Gannet (developer approach)

Displacement

Set up

The log file was created on: 2025-10-17 09:58:04.574502 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_SuleSkerry_Incombo_Disp_DA”.
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: 1298.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 15648 in 2024

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000263 , se: NA

Scenario B - Name: Developer_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00035 , se: NA

Scenario C - Name: Developer_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000256 , se: NA

Scenario D - Name: Developer_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000342 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Combined

Set up

The log file was created on: 2025-10-20 09:20:42.883061 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_SuleSkerry_Incombo_Combi_DA”.
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: 1310.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 15648 in 2024

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001707 , se: NA

Scenario B - Name: Developer_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001795 , se: NA

Scenario C - Name: Developer_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001638 , se: NA

Scenario D - Name: Developer_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001724 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Gannet (guidance approach)

Collision

Set up

The log file was created on: 2025-10-16 15:59:42.306421 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_SuleSkerry_Incombo_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: 1292.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 15648 in 2024

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , sd: 0.042 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001382 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Displacement

Set up

The log file was created on: 2025-10-17 15:42:56.14118 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_SuleSkerry_Incombo_Disp_GA”.
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: 1298.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 15648 in 2024

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000307 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00092 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000299 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000898 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Combined

Set up

The log file was created on: 2025-10-17 11:25:48.499998 using Tool version 2, with R version 4.4.2, 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" "0.7.3"
## shinyWidgets   "shinyWidgets"  "0.9.0"
## 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_SuleSkerry_Incombo_Combi_GA”.
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: 1304.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 15648 in 2024

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

Age class 0 to 1 - mean: 0.424 , sd: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.829 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.891 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.895 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.919 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001751 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002364 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Low

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001681 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_High

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002279 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Puffin (developer approach)

Set up

The log file was created on: 2025-10-14 16:32:18.113506 using Tool version 2, with R version 4.4.2, 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" "0.7.3" 
## shinyWidgets   "shinyWidgets"  "0.9.0" 
## 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_SuleSkerry_Incombo_Developer”.
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: 1287.
Years for burn-in: 0.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Atlantic Puffin.
Region type to use for breeding success data: .
Available colony-specific survival rate: . Sector to use within breeding success region: .
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 95484 in 2023

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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000148 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000141 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Puffin (guidance approach)

Set up

The log file was created on: 2025-10-14 16:14:43.830005 using Tool version 2, with R version 4.4.2, 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" "0.7.3"
## shinyWidgets   "shinyWidgets"   "0.9.0"
## 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_SuleSkerry_Incombo_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: 1288.
Years for burn-in: 0.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Atlantic Puffin.
Region type to use for breeding success data: .
Available colony-specific survival rate: . Sector to use within breeding success region: .
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 95484 in 2023

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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.709 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.76 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.805 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001041 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001736 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001017 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001695 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

5.2.1.2

Troup, Pennan and Lion's Heads SPA: alone

Guillemot

Set up

The log file was created on: 2025-10-10 15:37:15.053428 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 _Troup_Alone".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 1237.
Years for burn-in: 0.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: 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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 47719 in 2017

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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_Alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000467 , se: NA

Scenario B - Name: Guidance_Alone_NSlow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001422 , se: NA

Scenario C - Name: Guidance_Alone_NShigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002542 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Set up

The log file was created on: 2025-10-13 10:25:21.055227 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 “Razorbill_Troup_Alone”.
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 1249.
Years for burn-in: 0.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.
Region type to use for breeding success data: Global.
Available colony-specific survival rate: National. Sector to use within breeding success region: Global.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 8801 in 2017

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

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

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

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

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_Alone_NSlow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000156 , se: NA

Scenario B - Name: Guidance_Alone_NShigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000265 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

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

Kittiwake

Collision

Set up

The log file was created on: 2025-10-21 14:54:23.228926 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_Troup_Incombo_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: 1258.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 27344 in 2017

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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002988 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002879 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002552 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002443 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Displacement

Set up

The log file was created on: 2025-10-13 16:56:42.711448 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_Troup_Incombo_Disp”.
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: 1265.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 27344 in 2017

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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00084 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002058 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000828 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002024 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000708 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001674 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000696 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00164 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Combined

Set up

The log file was created on: 2025-10-21 16:07:07.534354 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"          "1.10.0"
## shinyjs          "shinyjs"        "2.1.0"
## shinydashboard "shinydashboard"  "0.7.3"
## shinyWidgets     "shinyWidgets"   "0.9.0"
## 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_Troup_Incombo_Combined”.

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: 1273.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 27344 in 2017

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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003828 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005046 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003707 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004902 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00326 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004226 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003139 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004082 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Guillemot (developer approach)

Set up

The log file was created on: 2025-10-10 15:55:03.840783 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 _Troup__Incombo_Developer”.
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.

Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 1238.
Years for burn-in: 0.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: 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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 47719 in 2017

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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001583 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001116 , se: NA

Scenario C - Name: Developer_incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001277 , se: NA

Scenario D - Name: Developer_incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00081 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Guillemot (guidance approach)

Set up

The log file was created on: 2025-10-10 16:19:27.325305 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 _Troup_Incombo_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: 1239.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 47719 in 2017

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: 1e-07 , DD: NA

Age class 1 to 2 - mean: 0.792 , sd: 1e-07 , DD: NA

Age class 2 to 3 - mean: 0.917 , sd: 1e-07 , DD: NA

Age class 3 to 4 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 4 to 5 - mean: 0.939 , sd: 1e-07 , DD: NA

Age class 5 to 6 - mean: 0.939 , sd: 1e-07 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0035 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00729 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002078 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004748 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002927 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005983 , se: NA

Scenario G - Name: Guidance_incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001505 , se: NA

Scenario H - Name: Guidance_incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003441 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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 (developer approach)

Set up

The log file was created on: 2025-10-13 10:51:54.097456 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 “Razorbill _Troup__Incombo_Developer”.
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: 1250.
Years for burn-in: 0.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.
Region type to use for breeding success data: Global.
Available colony-specific survival rate: National. Sector to use within breeding success region: Global.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 8801 in 2017

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

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

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

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

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Developer_incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00092 , se: NA

Scenario B - Name: Developer_incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000874 , se: NA

Scenario C - Name: Developer_incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000889 , se: NA

Scenario D - Name: Developer_incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000843 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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 (guidance approach)

Set up

The log file was created on: 2025-10-13 11:35:14.695034 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 "Razorbill _Troup_Incombo_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: 1251.
Years for burn-in: 0.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.
Region type to use for breeding success data: Global.
Available colony-specific survival rate: National. Sector to use within breeding success region: Global.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 8801 in 2017

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

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

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

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

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Guidance_incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001579 , se: NA

Scenario B - Name: Guidance_incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003391 , se: NA

Scenario C - Name: Guidance_incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001423 , se: NA

Scenario D - Name: Guidance_incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003125 , se: NA

Scenario E - Name: Guidance_incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001471 , se: NA

Scenario F - Name: Guidance_incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00321 , se: NA

Scenario G - Name: Guidance_incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001315 , se: NA

Scenario H - Name: Guidance_incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002943 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

West Westray SPA: alone

Kittiwake

Collision

Set up

The log file was created on: 2025-10-22 11:23:09.14203 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_WestWestray_CRM_Alone”.

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: 1313.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 4838 in 2017

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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 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?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Alone

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000104 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

Combined

Set up

The log file was created on: 2025-10-22 11:39:48.924687 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_WestWestray_Combined_Alone”.

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: 1314.

Years for burn-in: 0.

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: breeding.adults

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

Population 1

Initial population values: Initial population 4838 in 2017

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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Alone_NsLow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00011 , se: NA

Scenario B - Name: Alone_NsHigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000122 , se: NA

Output:

First year to include in outputs: 2035

Final year to include in outputs: 2085

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

West Westray SPA: in-combination

Kittiwake

Collision

Set up

The log file was created on: 2025-10-20 13:09:26.365796 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_WestWe_Incombo_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: 1263.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 4838 in 2017

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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 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: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009384 , se: NA

Scenario B - Name: Incombo_Allproject-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009281 , se: NA

Scenario C - Name: Incombo_excludcomp

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00809 , se: NA

Scenario D - Name: Incombo_excludcomp-minusMarram

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.007987 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Displacement

Set up

The log file was created on: 2025-10-14 12:26:25.251026 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_WestWe_Incombo_Disp”.
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: 1264.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 4838 in 2017

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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001706 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00511 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0017 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005092 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001359 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004056 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001353 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.004038 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

Combined

Set up

The log file was created on: 2025-10-16 11:33:55.409652 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_WestWe_Incombo_Combined”.
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: 1279.
Years for burn-in: 0.
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: breeding.adults
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 4838 in 2017

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: 1e-07 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

Are impacts specified as a relative value or absolute harvest?: relative

Years in which impacts are assumed to begin and end: 2035 to 2085

Impact on Demographic Rates

Scenario A - Name: Incombo_Allproject_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.011091 , se: NA

Scenario B - Name: Incombo_Allproject_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.014495 , se: NA

Scenario C - Name: Incombo_Allproject-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.010981 , se: NA

Scenario D - Name: Incombo_Allproject-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.014373 , se: NA

Scenario E - Name: Incombo_excludcomp_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009449 , se: NA

Scenario F - Name: Incombo_excludcomp_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.012147 , se: NA

Scenario G - Name: Incombo_excludcomp-minusMarram_Nslow

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00934 , se: NA

Scenario H - Name: Incombo_excludcomp-minusMarram_Nshigh

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.012025 , se: NA

Output:

First year to include in outputs: 2035
Final year to include in outputs: 2085
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

MarramWind