BERWICK BANK WIND FARM

OFFSHORE ENVIRONMENTAL IMPACT ASSESSMENT

APPENDIX 11.6: ORNITHOLOGY POPULATION VIABILITY ANALYSIS TECHNICAL REPORT

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Prepared by:	**DMP Stats / HiDef Aerial Surveying Ltd.**
Prepared for:	**SSE Renewables**
Checked by:	**Emily Nelson**
Accepted by:	**Andrew Logie**
Approved by:	**Sarah Edwards**

Compiled by DMPS Stats Ltd. and HiDef Aerial Surveying Ltd.

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1 INTRODUCTION

1. This report presents the method for, and results obtained from, modelling the population consequences of potential impacts to the protected seabird features of Special Protection Areas (SPAs) arising from the proposed Berwick Bank Offshore Development. The modelling informs the assessments and conclusions presented in the Offshore Environmental Impact Assessment Report (EIAR) (volume 2) chapter 11: Marine Ornithology, and in the Report to Inform Appropriate Assessment (RIAA).
2. The modelling was performed using Population Viability Analysis (PVA) for breeding colonies of seven species of seabirds within multiple SPAs. Stochastic, density independent, age-structured matrix models were used to simulate population trends over time for a range of impacts scenarios.
3. Collision and displacement / barrier effects are the key impacts on seabird species from the proposed Development and have been quantified in Technical Appendix 11.3: Ornithology Collision Risk Modelling Report and Technical Appendix 11.4: Ornithology Displacement Report. The estimated mortalities for each species were apportioned by age-class and season to relevant SPAs using the methods and weightings set out in Technical Appendix 11.5: Ornithology Apportioning Report and presented in Annex D: Apportioned Mortality.
4. The species/ SPA combinations modelled were chosen using a threshold approach advised in the Scoping Opinion (MS-LOT, 2022) and confirmed through the Ornithology Roadmap process (Meeting 6, 10th May, 2022) (see Section 2).
5. Full details of the species and SPAs modelled and the analysis undertaken, including model specifications and demographic rates used, are provided (see Section 2)
6. In addition, regional calculations are provided for each of the seven species (Section 2.5). In these cases, PVAs for multiple SPAs under a range of impact scenarios were combined to estimate effects on regional population sizes.

2 METHODS

7. PVA modelling here is performed using the Natural England nepva tools (Searle et al. 2019; Mobbs et al. 2020). This software has broadly two implementations, one with a user-friendly GUI, the other a series of code tools for direct use. Both are written in R and are intended to give the same fundamental calculations. Here we have used bespoke R-code directly, with nevpa version 2 tools as a basis (Mobbs et al. 2020) (tool v 2.0, nepva R package: v 4.17), as found within the associated Natural England github repository: https://github.com/naturalengland/Seabird_PVA_Tool). All analysis was conducted using R version 4.1 for Windows (R Core Team, 2021),
8. Notably one function from the nepva package was modified (inits.burned) to allow a burn-in period for establishing an initial population age-structure, but also to fix adult numbers as known at the start of simulation. This is not currently catered for within the nepva tools.
9. While this offers a standardised toolset for PVAs, the underpinnings are projections using commonplace population matrix models. Documentation detailing these models can be found within the repository indicated and are summarised in Section 2.2.

2.1 MODELS AND SCENARIOS

10. The potential impacts of the proposed Berwick Bank wind farm on the population growth and size of seabird species inhabiting SPAs were predicted using PVA.
11. Additional annual mortality (combined breeding and non-breeding season mortality estimates) was derived by summing the apportioned collision and/or displacement mortality estimates combined for each species / SPA combination. This was done by age class (adult and immature) based on the age class information from the site-specific surveys for gannets, kittiwake and gulls, and asymptotic age distributions for auks. The age-class apportioned total mortality estimates are provided in Annex D of Technical Appendix 11.5: Ornithology Apportioning Report. The complete suite of seasonal apportioned mortality estimates for each species, colony, age class and by impact type (collision or displacement or both) are available electronically as Excel Files: Annex A (breeding season mortalities) and Annex B (non-breeding season mortalities).
12. Following the advice received through the Ornithology Roadmap Process (meeting 4; Technical Appendix 11.8) breeding season mortality was adjusted downward to account for sabbatical birds: 7% for auks and 10% kittiwakes. For other species, the rates used were as those revised designs in Forth and Tay: 10% for gannet and 35% for herring gull and lesser black-backed gull.
13. These mortality estimates constituted a number of “Project alone” (i.e., potential additional mortality from the proposed Development) PVA model scenarios (Table 2.1).
14. Estimates of displacement mortality under the Developer Approach were based on the Applicants review of existing evidence to underpin the use of single species-specific seasonal displacement and mortality rates to identify the mortality estimates from the displacement matrices. The Scoping Approach followed the advice in Scoping Opinion (MS-LOT, 2022) and the displacement and mortality rates advised by NatureScot in their scoping advice (7th December 2021). NatureScot advised two mortality rates (e.g. 3% and 5%) and the lower rate is represented as “Scoping Approach a” and the higher rates as “Scoping Approach b”. Full details are provided in (Technical Appendix 11.4: Ornithology Displacement Report).
15. Estimates of potential collision mortality under the Developer Approach were based on mean monthly flying seabird densities, whereas maximum monthly flying seabird densities were used for the Scoping Approach. For species only assessed for collision, Scoping Approach a and b are identical. Full details are provided in Technical Appendix 11.3: Ornithology Collision Risk Modelling Report.
16. PVAs were run for populations where the predicted wind farm associated mortality increased the baseline mortality rate by at least 0.02 percentage point (NatureScot Scoping Advice, 14th December 2021). This was calculated as the predicted additional annual mortality (in terms of the number of adult birds) expressed as a percentage of the number of adult birds in the SPA population (confirmed at meeting 5, Appendix 11.8: Ornithology Roadmap Process). The assessment of annual adult mortality against the threshold is given in Annex C.
17. The final list of species and SPAs modelled using Project alone mortality estimates are given in Table 2.2. Note that the estimated mortality for some species and SPAs only exceeded the threshold for the Scoping Approach but a Developer Approach model was run for comparative purposes. The estimated mortalities modelled associated with each of the scenarios are given in Section 3.1

Table 2.1: Summary of three Project-alone scenarios used in the PVA models, identifying the causes of mortality for each species and the seasons in which they were assessed; B = breeding season and NBS = non-breeding season

	Developer approach		Scoping Approach a		Scoping Approach b	
	Collision	Displacement	Collision	Displacement	Collision	Displacement
Gannet	B + NBS	B + NBS	B + NBS	B + NBS	B + NBS	B + NBS
Guillemot		B + NBS		B + NBS		B + NBS
Herring gull *	B + NBS		B + NBS		B + NBS	
Kittiwake	B + NBS	B	B + NBS	B + NBS	B + NBS	B + NBS
Lesser black-backed gull*	B + NBS		B + NBS		B + NBS	
Puffin		B		B		B
Razorbill		B + NBS		B + NBS		B + NBS

Table 2.2: Project alone species and SPA combinations modelled. Green = threshold was exceeded for both the Developer and Scoping Approach; Orange = threshold was exceeded only for the Scoping Approach

SPA	Species						
	Gannet	Guillemot	Herring gull	Kittiwake	Lesser black-backed gull	Puffin	Razorbill
Buchan Ness to Collieston Coast							
Coquet Island							
East Caithness Cliffs							
Farne Islands							
Flamborough and Filey Coast							
Forth Islands							
Fowlsheugh							
North Caithness Cliffs							
St Abb's Head to Fast Castle							
Troup, Pennan and Lion's Heads							
West Westray							

18. PVA models and scenarios were also run for in-combination additional mortality. A summary of the approach taken to collation of mortality estimates for in-combination assessment is provided in Annex E.
19. Mortality estimates were collated and assigned to each of the three approaches for each of the in-combination scenarios (Table 2.3).
20. The mortality totals are given in Annex D.
21. Mortality estimates for the in-combination models were identified for plans/projects for two regions: i) Forth and Tay and ii) North Sea. Estimated mortality totals were collated for consented and as-built designs, where available, for each region. The scenarios considered were:
    - Forth and Tay: Consented – Developer Approach; Consented – Scoping Approach A; Consented – Scoping Approach B
    - North Sea: Consented – Developer Approach; Consented – Scoping Approach A; Consented – Scoping Approach B
    - North Sea: As-built – Developer Approach; As-built – Scoping Approach A; As-built – Scoping Approach B
22. In the Forth and Tay, there were no differences between the consented and as-built mortality totals for any species and therefore, only consented mortality estimates were modelled.
23. In the UK North Sea, mortality totals for as-built and consented projects were compared, and where the difference between estimates was greater than 5%, then both were modelled. When less than 5%, consented totals only were modelled.
24. The estimated Project alone mortalities were added to the in-combination estimated mortalities under each scenario for each species/SPA combination.
25. There were no in-combination totals available for lesser black-backed gull. The SPA populations screened in are the Forth Islands, Farne Islands and Coquet Islands SPA and Project effects are limited to breeding season. No existing/consented/in-planning projects are considered to have effects on Farne Islands and Coquet Island SPA populations during the breeding season. For Forth Islands SPA population there is potential for breeding season effects from the consented Forth & Tay projects. However, no estimates of effects are available from the assessments of the 2017 revised designs of these projects because the respective scoping opinion excluded consideration of the species. The most relevant information pertaining to effects on the Forth Islands SPA population derives from the 2014 MS AA for the Forth & Tay projects. This states that a predicted effect of < -0.1% decline in adult survival was identified on this SPA population as a result of the NnG project and concludes no adverse effect on site integrity. Therefore, it is assumed that existing in-combination effects are inconsequential and can be ignored.
26. In total, PVA models were run for 40 species/SPA combinations and given the scenarios identified below, this resulted in 234 model runs. The mortality estimates for each are provided in the summary tables in section 3.

Table 2.3: Summary of the species and SPAs that were modelled using in-combination mortality estimates from as-built and/or consented projects in the Forth and Tay and UK North Sea

Species	SPA	Forth and Tay	UK North Sea	
		Consented	As-built	Consented
Gannet	Forth islands	Y		Y
	Flamborough and Filey Coast	N/A	Y	Y
	North Rona & Sula Sgeir	N/A		Y
	Fair Isle	N/A		Y
	Noss	N/A		Y
	Hermaness, Saxa Vord & Valla Field	N/A		Y
Kittiwake	Forth Islands	Y		Y
	Fowlsheugh	Y		Y
	St Abb's Head to Fastcastle	Y		Y
	Buchan Ness to Collieston Coast	Y	Y	Y
	East Caithness Cliffs	N/A	Y	Y
	North Caithness Cliffs	N/A	Y	Y
	Troup, Pennan & Lion's Head	N/A	Y	Y
	Farne Islands	N/A		Y
	Coquet Island	N/A		Y
	Flamborough and Filey Coast	N/A	Y	Y

Species	SPA	Forth and Tay	UK North Sea	
		Consented	As-built	Consented
	West Westray	N/A	Y	Y
Herring gull	Forth Islands			Y
	Fowlsheugh	Y		Y
	St Abb's Head to Fastcastle			Y
Guillemot	Forth Islands		N/A	Y
	Fowlsheugh		N/A	Y
	St Abb's Head to Fastcastle		N/A	Y
	Buchan Ness to Collieston Coast	Y	N/A	Y
	Troup, Pennan & Lion's Head	N/A	N/A	Y
	East Caithness Cliffs	N/A	N/A	Y
	Farne Islands	N/A	N/A	Y
Razorbill	Forth Islands	Y	N/A	Y
	Fowlsheugh	Y	N/A	Y
	St Abb's Head to Fastcastle	Y	N/A	Y
	Troup, Pennan & Lion's Head	N/A	N/A	Y
	East Caithness Cliffs	N/A	N/A	Y
	Farne Islands	N/A	N/A	Y
	Flamborough and Filey Coast	N/A	N/A	Y
Puffin	Forth Islands		N/A	Y
	North Caithness Cliffs	N/A	N/A	Y
	Farne Islands	N/A	N/A	Y

2.2 MATRIX MODEL PROJECTIONS

27. For each species, an age-structured matrix model (Caswell, 2001) simulates the population's progress through time in terms of abundance and age distribution, based on species-specific demographic rates and count estimates. The model assumes individuals to be grouped into discrete year age-classes, and all members of an age-class are considered equal with respect to their demographic vital rates (i.e., survival, growth and reproduction). The model dynamics involves predicting the population numbers at age in the next year given its previous year's numbers and vital rates.

28. The generic population model can be written in compact form as:

$$\mathbf{n}_{y+1} = \mathbf{L}\mathbf{n}_y$$

29. where $\mathbf{n}_y$ is the population vector with elements $n_{a,y}$ denoting the number of individuals at each age-class $a = 1, \ldots, A$ at year y, $\mathbf{n}_{y+1}$ is the numbers at age-class in the following year, and $\mathbf{L}$ represents the $A \times A$ projection matrix (also known as the Leslie matrix). The projection matrix $\mathbf{L}$ defines the expected contribution of individuals in each age-class in a given year to each age-class in the subsequent year.

30. Models used in this analysis were built under the following assumptions, for all considered species:

- Models represent an annual post-breeding census over a period of $y = 1, \ldots, Y$ year steps. Therefore, the model annual cycle comprises a census immediately after fledging on the first day of the biological year, with the first age-class ($a = 1$) containing newly hatched birds, followed by a 12-month period of survival. Then, on the first day of the subsequent year, surviving animals increment in age, adult age-classes reproduce and resultant chicks fledge, and the next census is carried out.
- Reproduction is considered to be confined to adult birds, with age of first breeding being species-specific.
- Population size is density independent, and therefore projections will either increase to infinity or decrease to extinction, given sufficient time, which is biological unrealistic.
- Density dependent regulation in seabirds is through two mechanisms, either compensatory or depensatory. Adopting a density independent model will over- and underestimate potential impacts if compensatory or depensatory processes are occurring, respectively (Horswill and Robinson 2015). Currently there are insufficient data to include density dependence into the population modelling framework since its effect within populations is a complex interaction between resource availability, colony size and other local factors, such as predation (Horswill and Robinson 2015).
- Population is considered a closed system, i.e., age distributions are not affected by migration exchanges between neighbouring colonies.
- The final age-class A is an aggregated age group, representing A years-old birds and older. This implies the absence of senescence, i.e., the survival and reproductive performances of the oldest individuals remain constant over time. The value of A, and hence the size of the projection matrix, of each species is determined by either the age of first breeding or the oldest adult age-class for which survival data was available (the largest of the two values).

31. Based on the above assumptions, the expanded version of the generic population model used in this analysis can be expressed as:

$$\begin{bmatrix} n_{1,t+1} \\ n_{2,t+1} \\ n_{3,t+1} \\ \vdots \\ n_{A,t+1} \end{bmatrix} = \begin{bmatrix} 0 & \cdots & 0 & P_{A-1}(0.5)S_{A-1\to A} & P_A(0.5)S_A \\ S_{1\to 2} & 0 & 0 & \cdots & 0 \\ 0 & S_{2\to 3} & 0 & \cdots & 0 \\ \vdots & \vdots & \ddots & \ddots & \vdots \\ 0 & 0 & 0 & S_{A-1\to A} & S_A \end{bmatrix} \times \begin{bmatrix} n_{1,t} \\ n_{2,t} \\ n_{3,t} \\ \vdots \\ n_{A,t} \end{bmatrix}$$

where P_A denotes the annual productivity rate of age-class A, expressed as the annual average number of fledged young per breeding pair; and $S_{a\to a+1}$ represents the annual survival transition rate of animals of age-

class a, i.e. the average proportion of birds in age-class a that will survive the whole year and transition to age-class $a+1$. Elements in the top row of the projection matrix $\mathbf{L}$ (i.e. half of the productivity rate multiplied by the survival rate) reflect the annual fecundity rate per capita of each adult age-class. The population age ratios for each species from Forth Islands SPA is shown in Table 2.4.

32. Stochasticity can be simply added by Monte-Carlo simulation if input parameters consist of estimates and associated measures of uncertainty. Variability can be provided by repeated simulations of population trajectories, where parameter values fluctuate as random draws from appropriate distributions.

Table 2.4: Population age ratios for species at the Forth Islands SPA and modelled using PVA

Species	0-1	1-2	2-3	3-4	4-5	5-6	Adult
Gannet	0.184	0.096	0.074	0.061	0.049	-	0.536
Guillemot	0.17	0.092	0.074	0.06	0.058	0.052	0.494
Herring gull	0.186	0.138	0.118	0.1	0.08	-	0.378
Kittiwake	0.184	0.104	0.093	0.079	-	-	0.54
Lesser black-backed gull	0.199	0.1	0.089	0.079	0.067	-	0.466
Puffin	0.145	0.128	0.115	0.099	0.072	-	0.442
Razorbill	0.148	0.109	0.089	0.08	0.066	-	0.508

2.3 MODEL PARAMETERISATION

33. Input demographic parameters use SPA-specific estimates when available. In cases where local estimates were unavailable, preference was given to broader scale estimates based on combined independent studies collated in Horswill and Robinson (2015), as advised in NatureScot's Scoping advice (7th December 2021). In the absence of local estimates, combined regional and national level estimates are believed to generate parameter values that express more accurately the underlying degree of uncertainty in model simulations. Parameters for the models are given in sections 2.7, along with sources.

34. The colony counts for each of the SPAs were provided from JNCC as two validated datasheets of all colony count data for the UK and Ireland within the Seabird Monitoring Programme (SMP) database for 1998 – 2019 and 1998-2021 to HiDef on 10th January 2022. For the species of interest here, the database summarised counts by subsites and whole SPAs; "counts" are recorded as individuals or Apparently Occupied Nests (AON) or Apparently Occupied Sites (AOS). For guillemot and razorbill, counts of individuals were converted to estimates of the population size by multiplying by the correction factor 1.34. Where counts were provided as AON/AOS, these were treated as equivalent to pairs and therefore doubled to arrive at a number of individuals and then multiplied by the correction factor of 1.34, which is an Isle of May specific correction factor but which has been applied in previous applications to guillemot and razorbill. The colony population sizes used in the models, and the year of the counts from which they are derived, are given in Table 2.6. Ideally, counts should be concurrent across breeding colonies of interest. However, for many SPAs, counts are divided by subsite and not all subsites are censused every year. Entire counts for SPAs comprising multiple subsites are often only achieved over a period of years.

2.4 SIMULATION PARAMETERISATION

35. Models were run from starting year to 50 years post-impact (assumed to be 2027), simulated 5,000 times to obtain indicative population trends and estimates of uncertainty surrounding those trends. Outputs from the models were extracted at both 35-year and 50-year post impact time points to reflect the lifetime of the Project (35 years) and beyond. Models were run for each species/SPA combination separately taking the associated adult population size estimate as a starting condition (Table 2.6).

36. The starting year for simulations of each species/SPA combination corresponds to the most recent year of their population size estimate and is assumed to be without error in the simulations. Specific mortality scenarios are presented, with differential impacts for adults and immature age-classes for species with immature-specific additional deaths. These specific mortality scenarios are adjusted for sabbatical birds (i.e., fraction of adults skipping breeding in a given year) *a priori*.

37. Additionally, a range of absolute additional adult mortalities per annum, from 0 to a species-specific maximum value by incremental steps (section 2.8), were used as impact scenarios. Although impacts are only reported with respect to the adult numbers, impacts within the simulations were also applied proportionally to immature age-classes classes (based upon the stable age distribution from eigen-decomposition of the Leslie matrix. No density dependence or demographic stochasticity (as defined by the nepva tool) was assumed, whereas environmental stochasticity (as per the nepva) was specified via beta distributions on survival and productivity rates. Species-specific maximum brood sizes were assumed.

38. Impacted vs unimpacted comparisons were based on a matched runs approach, whereby stochasticity is applied to the population before impacts are applied, i.e., survival and productivity rates simulated at each time step are the same for the unimpacted and impacted populations, before additional impact mortalities are deducted from simulated survivals for the impacted populations. Productivity rates were assumed to be unaffected by wind farm effects.

2.5 REGIONAL PROJECTIONS

39. Calculations were made on a regional basis for seven species. Regions were defined as consisting of the SPAs within Table 2.5 i.e within breeding season foraging range (mean max distance +-1sd; Woodward et al. 2019).

40. For each of these SPAs, the specific mortality scenarios used within each of the individual species PVAs were assumed. Regional estimates are in essence a sum of projected population sizes, at each timepoint, for each of the constituent SPAs.

41. In detail 5000 simulated population projections were run for each species, SPA and impact scenario. These were summed over SPAs for each projection year, within each species and impact scenario. This provides 5000 regional population simulations for each species and impact scenario. The summary statistics and counterfactuals are calculated thereafter in the standard fashion.

42. For SPAs not deemed to be impacted under a regional scenario, but who are included in the regional population definition (not all scenarios are deemed to impact the same set of SPAs), are included in the regional population through their baseline/unimpacted population traces. All individual SPA projections are treated as independent.

Table 2.5: Special Protection Areas (SPAs) included in the regional assessment

Species	Site
Gannet	Forth Islands SPA
	Flamborough and Filey Coast
	North Rona and Sula Sgeir
	Fair Isle
	Noss
	Hermaness, Saxa Vord and Valla Field
Guillemot	Forth Islands SPA
	St Abb's Head to Fast Castle SPA
	Fowlsheugh SPA
	Farne Islands SPA
	Buchan Ness to Collieston Coast
	Troup, Pennan and Lion's Heads
	East Caithness cliffs
Kittiwake	Forth Islands SPA
	Fowlsheugh SPA
	St Abb's Head to Fast Castle SPA
	Farne Islands SPA
	Buchan Ness to Collieston Coast
	Troup, Pennan & Lions Head
	East Caithness cliffs
	North Caithness cliffs
	Coquet island
	Flamborough and Filey Coast
Puffin	Forth Islands SPA
	Farne Islands
	North Caithness cliffs
Razorbill	Forth Islands SPA
	St Abb's Head to Fast Castle SPA
	Fowlsheugh SPA
	Troup, Pennan and Lion's Heads
	Farne Islands
	East Caithness cliffs
	Flamborough and Filey Coast
Herring gull	Forth Islands SPA
	Fowlsheugh SPA
	Farne Islands SPA
	St Abb's Head to Fast Castle SPA
Lesser-Black Back gull	Forth Islands SPA
	Farne Islands SPA
	Coquet Island

2.6 STARTING POPULATION SIZES

Table 2.6: Population counts for SPAs in terms of numbers of breeding adults

Species	SPA	Population Size (Breeding Adults)	Year(s) of Counts
Gannet	Forth Islands	150,518	2014
	Flamborough and Filey Coast	26,784	2017
	North Rona and Sula Sgeir	22,460	2013
	Fair Isle	9,942	2021
	Noss	27,530	2019
	Hermaness, Saxa Vord and Valla Field	51,160	2014
Guillemot	Forth Islands	34,580	2018 + 2021
	Farne Islands	85,816	2019
	St Abb's Head to Fast Castle	61,408	2016 - 2018
	Fowlsheugh	91,358	2018
	Buchan Ness to Collieston Coast	39,553	2019
	Troup, Pennan and Lion's Heads	31,893	2017
Herring gull	Forth Islands	11,868	2019 - 2021
	Farne Islands	1,496	2019
	St Abb's Head to Fast Castle	612	2016 - 2020
	Fowlsheugh	1,414	2018
Kittiwake	Forth Islands	9,034	2021
	Farne Islands	8,804	2019
	Flamborough and Filey Coast	91,008	2017
	Coquet Island	932	2021
	St Abb's Head to Fast Castle	10,904	2020
	Fowlsheugh	26,542	2018
	Buchan Ness to Collieston Coast	22,590	2019
	Troup, Pennan and Lion's Heads	21,232	2017
	East Caithness Cliffs	48,920	2015
	North Caithness Cliffs	7,712	2015/2016
	West Westray	5,486	2017
Lesser-Black Back gull	Forth Islands	4,006	2018 - 2021
	Farne Islands	1,362	2019
	Coquet Island	40	2019
Puffin	Forth Islands	87,240	2017 - 2021
	Farne Islands	87,504	2019
	North Caithness Cliffs	3,034	2019
Razorbill	Forth Islands	7,878	2015/2016
	Farne Islands	572	2017
	Flamborough and Filey Coast	37,476	2015-2018
	St Abb's Head to Fast Castle	3,928	2017 - 2021
	Fowlsheugh	17,817	2016 - 2018
	Troup, Pennan and Lion's Heads	6,054	2018
	East Caithness Cliffs	40,117	2019

**'These data were extracted from the Seabird Monitoring Programme Database (https://app.bto.org/seabirds). Data have been provided to the SMP by the generous contributions of nature conservation and research organisations, and many volunteers throughout Britain and Ireland.' There is no requirement for individuals or organisations to acknowledge the SMP when they use data they have collected themselves.*

2.7 DEMOGRAPHIC RATES

2.7.1 GANNET

Table 2.7: Demographic rates for the Gannet PVA models

SPA		Survivals					Productivity	
		$S_{0->1}$	$S_{1->2}$	$S_{2->3}$	$S_{3->4}$	$S_{4->5}$	S_A	P_A
Forth Islands	Mean	0.542	0.779	0.859	0.863	0.954	0.954	0.698
	SD	0.084	0.045	0.032	0.039	0.050	0.050	0.071
Flamborough and Filey Coast	Mean	0.542	0.779	0.859	0.863	0.954	0.954	0.795
	SD	0.084	0.045	0.032	0.039	0.050	0.050	0.064
North Rona and Sula Sgeir	Mean	0.542	0.779	0.859	0.863	0.954	0.954	0.662
	SD	0.084	0.045	0.032	0.039	0.050	0.050	0.082
Fair Isle	Mean	0.542	0.779	0.859	0.863	0.954	0.954	0.695
	SD	0.084	0.045	0.032	0.039	0.050	0.050	0.079
Noss	Mean	0.542	0.779	0.859	0.863	0.954	0.954	0.712
	SD	0.084	0.045	0.032	0.039	0.050	0.050	0.060
Hermaness, Saxa Vord and Valla Field	Mean	0.542	0.779	0.859	0.863	0.954	0.954	0.661
	SD	0.084	0.045	0.032	0.039	0.050	0.050	0.055
Eggs/pair: 1 (Snow and Perrins, 1998)								
Age at first breeding: 5 (Horswill and Robinson, 2015)								

Table 2.8: References and comments on demographic rates specified for Gannet PVA models. 'SE' and 'SD' refer to standard error and standard deviation, respectively; "H&R" refers to Horswill and Robinson (2015)

SPA	Demographic parameter	Source	Comments
Forth Islands	P_A	Horswill and Robinson (2015)	SPA-specific estimates not available. Eastern UK figures adopted.
	$S_{0->1}$, …, $S_{3->4}$	Wanless *et al.* (2006)	Survival estimates for the Bass Rock colony (time-series: 1959 - 2001). SEs from original reference converted to SDs, following the same approach as Mobbs et al. (2020).
	$S_{4->5}$, …, S_A	Deakin *et al.* (2019)	Mean and SD derived from averaging over sex-specific adult survival estimates for the Bass Rock colony (time-series: 2010 - 2018).
Flamborough and Filey Coast	P_A	SMP (2022)	Annual breeding success data from Flamborough and Filey Coast SPA (1991 - 1998; 2009 - 2019).
	$S_{0->1}$, …, $S_{3->4}$	Wanless *et al.* (2006)	SPA-specific estimates not available. Adopted the same parameter values as Gannet in Forth Islands.
	$S_{4->5}$, …, S_A	Deakin *et al.* (2019)	
Sule Skerry and Sule Stack	P_A	Cook and Robinson (2010)	SPA-specific estimates not available. Adopted figures based on data gathered from NW Scotland (Orkney and Shetland), as provided by the NEPVA Tool (Mobbs et al., 2020)
	$S_{0->1}$, …, $S_{3->4}$	Wanless *et al.* (2006)	SPA-specific estimates not available. Adopted the same parameter values as Gannet in Forth Islands.
	$S_{4->5}$, …, S_A	Deakin *et al.* (2019)	

SPA	Demographic parameter	Source	Comments
North Rona and Sula Sgeir	P_A	Cook and Robinson (2010)	SPA-specific estimates not available. Adopted figures based on data gathered from NW Scotland (Orkney and Shetland), as provided by the NEPVA Tool (Mobbs et al., 2020)
	$S_{0->1}$, …, $S_{3->4}$	Wanless *et al.* (2006)	SPA-specific estimates not available. Adopted the same parameter values as Gannet in Forth Islands.
	$S_{4->5}$, …, S_A	Deakin *et al.* (2019)	
Fair Isle	P_A	SMP (2022)	Annual breeding success data from Fair Isle SPA (1986 - 2021).
	$S_{0->1}$, …, $S_{3->4}$	Wanless *et al.* (2006)	SPA-specific estimates not available. Adopted the same parameter values as Gannet in Forth Islands.
	$S_{4->5}$, …, S_A	Deakin *et al.* (2019)	
Noss	P_A	SMP (2022)	Annual breeding success data from Noss SPA (1986 - 2021).
	$S_{0->1}$, …, $S_{3->4}$	Wanless *et al.* (2006)	SPA-specific estimates not available. Adopted the same parameter values as Gannet in Forth Islands.
	$S_{4->5}$, …, S_A	Deakin *et al.* (2019)	
Hermaness, Saxa Vord and Valla Field	P_A	SMP (2022)	Annual breeding success data from Hermaness, Saxa Vord and Valla Field SPA (1989 - 2019).
	$S_{0->1}$, …, $S_{3->4}$	Wanless *et al.* (2006)	SPA-specific estimates not available. Adopted the same parameter values as Gannet in Forth Islands.
	$S_{4->5}$, …, S_A	Deakin *et al.* (2019)	

2.7.2 GUILLEMOT

Table 2.9: Demographic rates for the guillemot PVA models

SPA		Survivals						Productivity
		$S_{0->1}$	$S_{1->2}$	$S_{2->3}$	$S_{3->4}$	$S_{4->5}$	S_A	P_A
Forth Islands	Mean	0.560	0.792	0.917	0.938	0.927	0.927	0.681
	SD	0.058	0.152	0.098	0.107	0.045	0.045	0.152
Farne Islands	Mean	0.560	0.792	0.917	0.938	0.927	0.927	0.787
	SD	0.058	0.152	0.098	0.107	0.045	0.045	0.141
St Abb's Head to Fast Castle	Mean	0.560	0.792	0.917	0.938	0.927	0.927	0.681
	SD	0.058	0.152	0.098	0.107	0.045	0.045	0.152
Fowlsheugh	Mean	0.560	0.792	0.917	0.938	0.927	0.927	0.681
	SD	0.058	0.152	0.098	0.107	0.045	0.045	0.152
Buchan Ness to Collieston Coast	Mean	0.560	0.792	0.917	0.938	0.927	0.927	0.681
	SD	0.058	0.152	0.098	0.107	0.045	0.045	0.152
Troup, Pennan and Lion's Heads	Mean	0.560	0.792	0.917	0.938	0.940	0.940	0.629
	SD	0.058	0.152	0.098	0.107	0.025	0.025	0.174
Eggs/pair: 1 (Snow and Perrins, 1998)								
Age at first breeding: 6 (Horswill and Robinson, 2015)								

Table 2.10: References and comments on demographic rates specified for Guillemot PVA models. 'SE' and 'SD' refer to standard error and standard deviation, respectively; "H&R" refers to Horswill and Robinson (2015)

SPA	Demographic parameter	Source	Comments
Forth Islands	P_A	CEH (2018)	Annual breeding success data from Isle of May (2007 - 2016). Historically low productivity in 2007 attributed to difficult feeding conditions and severe weather. Despite being extreme, estimate was deemed

SPA	Demographic parameter	Source	Comments
			accurate and thus used for inter-annual mean and sd calculations
	$S_{0->1}$, …, $S_{3->4}$	Harris *et al.* (2007)	Isle of May survival estimates (time series: 1983 - 2002). SDs converted from SEs presented in the original paper, following the same approach as Mobbs et al. (2020).
	$S_{4->5}$, …, S_A	Jitlal *et al.* (2017)	Adult survival estimates for the Isle of May colony.
Farne Islands	P_A	SMP (2022)	Annual breeding success data from Farne Islands (1986 - 2010).
	$S_{0->1}$, …, $S_{3->4}$	Harris *et al.* (2007)	SPA-specific estimates not available. Adopted the same parameters as Guillemot in Forth Islands.
	$S_{4->5}$, …, S_A	Jitlal *et al.* (2017)	SPA-specific estimates not available. Used the same parameters as Guillemot in Forth Islands.
St Abb's Head to Fast Castle	P_A	CEH (2018)	Used the same parameter values as Guillemot in Forth Islands. Productivity estimates available in SMP for Guillemot in St Abbs, but for a very short time-series (2015 - 2018). The annual average (0.784) is within values observed in nearby colonies (Isle of May, 0.681; and Farne Islands, 0.787). However, 4 data-points was deemed insufficient to produce a realistic measure of inter-annual variability. Precautionary approach taken by using the lower, and more recent, estimates from Isle of May.
	$S_{0->1}$, …, $S_{3->4}$	Harris *et al.* (2007)	SPA-specific estimates not available. Adopted the same parameters as Guillemot in Forth Islands.
	$S_{4->5}$, …, S_A	Jitlal *et al.* (2017)	SPA-specific estimates not available. Used the same parameters as Guillemot in Forth Islands.
Fowlsheugh	P_A	CEH (2018)	SPA-specific estimates not available. Used the same parameter values as Guillemot in Forth Islands.
	$S_{0->1}$, …, $S_{3->4}$	Harris *et al.* (2007)	SPA-specific estimates not available. Adopted the same parameters as Guillemot in Forth Islands.
	$S_{4->5}$, …, S_A	Jitlal *et al.* (2017)	SPA-specific estimates not available. Used the same parameters as Guillemot in Forth Islands.
Buchan Ness to Collieston Coast	P_A	CEH (2018)	SPA-specific estimates not available. Used the same parameter values as Guillemot in Forth Islands.
	$S_{0->1}$, …, $S_{3->4}$	Harris *et al.* (2007)	SPA-specific estimates not available. Adopted the same parameters as Guillemot in Forth Islands.
	$S_{4->5}$, …, S_A	Jitlal *et al.* (2017)	SPA-specific estimates not available. Used the same parameters as Guillemot in Forth Islands.
Troup, Pennan and Lion's Heads	P_A	Horswill and Robinson (2015)	SPA-specific estimates not available. Northern UK figures used instead.
	$S_{0->1}$, …, $S_{3->4}$	Harris *et al.* (2007)	SPA-specific estimates not available. Adopted the same parameters as Guillemot in Forth Islands.
	$S_{4->5}$, …, S_A	Horswill and Robinson (2015)	SPA-specific estimates not available. National-level adult survival estimates adopted. SD value taken from the NEPVA tool (Mobbs et al. 2020), which addresses error in value reported by H&R (2015).

2.7.3 HERRING GULL

Table 2.11: Demographic rates for the guillemot PVA models

SPA		Survivals						Productivity
		$S_{0->1}$	$S_{1->2}$	$S_{2->3}$	$S_{3->4}$	$S_{4->5}$	S_A	P_A
Forth Islands	Mean	0.777	0.878	0.878	0.878	0.878	0.878	0.978
	SD	0.092	0.034	0.034	0.034	0.034	0.034	0.307
Farne Islands	Mean	0.777	0.878	0.878	0.878	0.878	0.878	0.978
	SD	0.092	0.034	0.034	0.034	0.034	0.034	0.307
St Abb's Head to Fast Castle	Mean	0.777	0.878	0.878	0.878	0.878	0.878	0.978
	SD	0.092	0.034	0.034	0.034	0.034	0.034	0.307
Fowlsheugh	Mean	0.777	0.878	0.878	0.878	0.878	0.878	0.978
	SD	0.092	0.034	0.034	0.034	0.034	0.034	0.307
Eggs/pair: 3 (Snow and Perrins, 1998)								
Age at first breeding: 5 (Horswill and Robinson, 2015)								

Table 2.12: References and comments on demographic rates specified for Herring Gull PVA models. 'SE' and 'SD' refer to standard error and standard deviation, respectively; "H&R" refers to Horswill and Robinson (2015)

SPA	Demographic parameter	Source	Comments
Forth Islands	P_A	SMP (2022)	Annual breeding success data from Isle of May (1989 - 2007).
	$S_{0->1}$	Chabrzyk and Coulson (1976)	Isle of May immature survival estimates (time-series: 1966 - 1968).
	$S_{1->2}$, …, S_A	Wanless *et al.* (1996)	Isle of May adult survival estimates (time-series: 1989 - 1992).
Farne Islands	P_A	SMP (2022)	Used the same parameter values as Herring Gull in Forth Islands. No breeding success data available on the SMP database for Farne Islands. H&R provides productivity estimates for Farne Islands, but the study reference points to an analysis on Canna .
	$S_{0->1}$	Chabrzyk and Coulson (1976)	SPA-specific survival estimates not available. Used the same parameter values as Herring Gull in Forth Islands.
	$S_{1->2}$, …, S_A	Wanless *et al.* (1996)	
St Abb's Head to Fast Castle	P_A	SMP (2022)	SPA-specific estimates not available. Used the same parameter values as Herring Gull in Forth Islands.
	$S_{0->1}$	Chabrzyk and Coulson (1976)	SPA-specific survival estimates not available. Used the same parameter values as Herring Gull in Forth Islands.
	$S_{1->2}$, …, S_A	Wanless *et al.* (1996)	
Fowlsheugh	P_A	SMP (2022)	Used the same parameter values as Herring Gull in Forth Islands. SPA-specific breeding success data available on SMP database, but for a very short time-series (2013-2016) and therefore likely to misrepresent inter-annual variability in colony. Preference given to longer time-series from the Isle of May.
	$S_{0->1}$	Chabrzyk and Coulson (1976)	SPA-specific survival estimates not available. Used the same parameter values as Herring Gull in Forth Islands.
	$S_{1->2}$, …, S_A	Wanless *et al.* (1996)	

2.7.4 KITTIWAKE

Table 2.13: Demographic rates for kittiwake PVA models

SPA		Survivals					Productivity
		$S_{0->1}$	$S_{1->2}$	$S_{2->3}$	$S_{3->4}$	S_A	P_A
Forth Islands	Mean	0.79	0.855	0.855	0.855	0.855	0.674
	SD	0	0.067	0.067	0.067	0.067	0.357
Farne Islands	Mean	0.79	0.855	0.855	0.855	0.855	0.824
	SD	0	0.067	0.067	0.067	0.067	0.316
Flamborough and Filey Coast	Mean	0.79	0.854	0.854	0.854	0.854	0.855
	SD	0	0.077	0.077	0.077	0.077	0.331
Coquet Island	Mean	0.79	0.855	0.855	0.855	0.855	1.121
	SD	0	0.067	0.067	0.067	0.067	0.277
St Abb's Head to Fast Castle	Mean	0.79	0.855	0.855	0.855	0.855	0.667
	SD	0	0.067	0.067	0.067	0.067	0.334
Fowlsheugh	Mean	0.79	0.855	0.855	0.855	0.855	0.813
	SD	0	0.067	0.067	0.067	0.067	0.336
Buchan Ness to Collieston Coast	Mean	0.79	0.855	0.855	0.855	0.855	0.632
	SD	0	0.067	0.067	0.067	0.067	0.333
Troup, Pennan and Lion's Heads	Mean	0.79	0.855	0.855	0.855	0.855	1.068
	SD	0	0.067	0.067	0.067	0.067	0.228
East Caithness Cliffs	Mean	0.79	0.854	0.854	0.854	0.854	1.043
	SD	0	0.077	0.077	0.077	0.077	0.41
North Caithness Cliffs	Mean	0.79	0.854	0.854	0.854	0.854	0.89
	SD	0	0.077	0.077	0.077	0.077	0.412
West Westray	Mean	0.79	0.812	0.812	0.812	0.812	0.537
	SD	0	0.131	0.131	0.131	0.131	0.468
Eggs/pair: 2 (Snow and Perrins, 1998)							
Age at first breeding: 4 (Horswill and Robinson, 2015)							

Table 2.14: References and comments on demographic rates specified for Kittiwake PVA models. 'SE' and 'SD' refer to standard error and standard deviation, respectively; "H&R" refers to Horswill and Robinson (2015)

SPA	Demographic parameter	Source	Comments
Forth Islands	P_A	CEH (2018)	Annual breeding success data from Isle of May (2007 - 2016).
	$S_{0->1}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. National-level figure used (with SD fixed over time).
	$S_{1->2}$, …, S_A	Jitlal *et al.* (2017)	Isle of May colony adult survival estimates (updated from Frederiksen et al 2004 - time-series: 1986 - 2002).
Farne Islands	P_A	SMP (2022)	Annual breeding success data from Farne Islands (1987 - 2015).
	$S_{0->1}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameters as Kittiwake in Forth Islands.
	$S_{1->2}$, …, S_A	Jitlal *et al.* (2017)	
Flamborough and Filey Coast	P_A	SMP (2022)	Annual breeding success data from Flamborough Head and Bempton Cliffs (1986 - 2019).
	$S_{0->1}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameters as Kittiwake in Forth Islands.
	$S_{1->2}$, …, S_A	Jitlal *et al.* (2017)	
Coquet Island	P_A	SMP (2022)	Annual breeding success data from Coquet Island RSPB (1993 - 2019).

SPA	Demographic parameter	Source	Comments
	$S_{0->1}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameters as Kittiwake in Forth Islands.
	$S_{1->2}$, …, S_A	Jitlal *et al.* (2017)	
St Abb's Head to Fast Castle	P_A	SMP (2022)	Annual breeding success data from St Abb's Head NNR (1987 - 2019).
	$S_{0->1}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameters as Kittiwake in Forth Islands.
	$S_{1->2}$, …, S_A	Jitlal *et al.* (2017)	
Fowlsheugh	P_A	SMP (2022)	Annual breeding success data from Fowlsheugh RSPB (1986 - 2021).
	$S_{0->1}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameters as Kittiwake in Forth Islands.
	$S_{1->2}$, …, S_A	Jitlal *et al.* (2017)	
Buchan Ness to Collieston Coast	P_A	SMP (2022)	Annual breeding success data from Buchan Ness to Collieston (1989 - 2019).
	$S_{0->1}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameters as Kittiwake in Forth Islands.
	$S_{1->2}$, …, S_A	Jitlal *et al.* (2017)	
Troup, Pennan and Lion's Heads	P_A	SMP (2022)	Annual breeding success data from Troup & Lion's Head RSPB (Coast & Reserve) (2011 - 2019).
	$S_{0->1}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameters as Kittiwake in Forth Islands.
	$S_{1->2}$, …, S_A	Jitlal *et al.* (2017)	
East Caithness Cliffs	P_A	SMP (2022)	Annual breeding success data from Ires Geo, Rockhead, Creag na Cuinge 1 & Inver Hill (1986 - 1993; 2013). IMPORTANT NOTE: there is a 20-year gap in the time series, with the 2013 estimate being substantially lower than the average in earlier years. For now, assuming 2013 estimates are accurate and expressing breeding volatility in the region.
	$S_{0->1}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. National-level figure used (with SD fixed over time).
	$S_{1->2}$, …, S_A	Mobbs *et al.* (2020)	SPA-specific survival estimates not available. National level figures used.
North Caithness Cliffs	P_A	SMP (2022)	Annual breeding success data from Skirza Head & Sandside Head 1 (1986 - 1993; 2013). IMPORTANT NOTE: there is a 20-year gap in the time series, with the 2013 estimate being *0*. For now, assuming 2013 figure is accurate and expressing breeding volatility in the region.!
	$S_{0->1}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. National-level figure used (with SD fixed over time).
	$S_{1->2}$, …, S_A	Mobbs *et al.* (2020)	SPA-specific survival estimates not available. National level figures used.
West Westray	P_A	SMP (2022)	Annual breeding success data from West Westray SPA (2010 - 2021).
	$S_{0->1}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. National-level figure used (with SD fixed over time).
	$S_{1->2}$, …, S_A	Oro and Furness (2002)	SPA-specific survival estimates not available - Foula Island (Shetland) adult survival estimates adopted (time-series: 1987 - 1997).

2.7.5 LESSER BLACK-BACKED GULL

Table 2.15: Demographic rates for the Lesser Black-backed Gull PVA models

SPA		Survivals						Productivity
		$S_{0->1}$	$S_{1->2}$	$S_{2->3}$	$S_{3->4}$	$S_{4->5}$	S_A	P_A
Forth Islands	Mean	0.820	0.913	0.913	0.913	0.913	0.913	0.846
	SD	0.000	0.022	0.022	0.022	0.022	0.022	0.303
Farne Islands	Mean	0.820	0.913	0.913	0.913	0.913	0.913	0.846
	SD	0.000	0.022	0.022	0.022	0.022	0.022	0.303
Coquet Island	Mean	0.820	0.913	0.913	0.913	0.913	0.913	0.358
	SD	0.000	0.022	0.022	0.022	0.022	0.022	0.527
Eggs/pair: 3 (Snow and Perrins, 1998)								
Age at first breeding: 5 (Horswill and Robinson, 2015)								

Table 2.16: References and comments on demographic rates specified for Lesser Black-backed Gull PVA models. 'SE' and 'SD' refer to standard error and standard deviation, respectively; "H&R" refers to Horswill and Robinson (2015)

SPA	Demographic parameter	Source	Comments
Forth Islands	P_A	SMP (2022)	Annual breeding success data from Isle of May (1989 - 2007).
	$S_{0->1}$	Harris (1970)	SPA-specific survival estimates not available. Used Mean based on data from Skomer, Skokholm and Grassholm Islands (Wales, time-series: 1968 - 1969) as per H&R. Furthermore, no SD estimate available for s0_1, thus assumed fixed over time (i.e., SD = 0).
	$S_{1->2}$, …, S_A	Wanless *et al.* (1996)	Isle of May adult survival estimates (time-series: 1989 - 1992).
Farne Islands	P_A	SMP (2022)	SPA-specific estimates not available. Used the same parameter values as Lesser Black-backed Gull in Forth Islands.
	$S_{0->1}$	Harris (1970)	SPA-specific survival estimates not available. Adopted the same parameter values as Lesser Black-backed Gull in Forth Islands.
	$S_{1->2}$, …, S_A	Wanless *et al.* (1996)	
Coquet Island	P_A	SMP (2022)	Annual breeding success data from Coquet Island RSPB (2008 - 2019). Extremely small colony, with annual breeding success estimates based on low number of AOT counts (<30 per year). Still, estimates considered to be representative of the level and variability of annual productivity in the colony.

SPA	Demographic parameter	Source	Comments
	$S_{0->1}$	Harris (1970)	SPA-specific survival estimates not available. Adopted the same parameter values as Lesser Black-backed Gull in Forth Islands.
	$S_{1->2}$, …, S_A	Wanless *et al.* (1996)	

2.7.6 PUFFIN

Table 2.17: Demographic rates for the puffin PVA models

SPA		Survivals						Productivity
		$S_{0->1}$	$S_{1->2}$	$S_{2->3}$	$S_{3->4}$	$S_{4->5}$	S_A	P_A
Forth Islands	Mean	0.892	0.892	0.892	0.76	0.805	0.901	0.648
	SD	0.046	0.046	0.046	0.093	0.083	0.091	0.157
Farne Islands	Mean	0.892	0.892	0.892	0.76	0.805	0.901	0.77
	SD	0.046	0.046	0.046	0.093	0.083	0.091	0.176
North Caithness Cliffs	Mean	0.892	0.892	0.892	0.76	0.805	0.915	0.415
	SD	0.046	0.046	0.046	0.093	0.083	0.11	0.212
Eggs/pair: 1 (Snow and Perrins, 1998)								
Age at first breeding: 5 (Horswill and Robinson, 2015)								

Table 2.18: References and comments on demographic rates specified for Puffin PVA models. 'SE' and 'SD' refer to standard error and standard deviation, respectively; "H&R" refers to Horswill and Robinson (2015)

SPA	Demographic parameter	Source	Comments
Forth Islands	P_A	CEH (2018)	Annual breeding success data from Isle of May (2007 - 2016). Historically low productivity in 2007 attributed to difficult feeding conditions and severe weather. Despite being extreme, observation was deemed accurate and thus included in the calculations.
	$S_{0->1}$, …, $S_{2->3}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted estimates from colonies in New Brewick, Canada, as suggested by H&R. Following the original study (Breton et al., 2006), H&R provides a single mean (0.709) and SE (0.022, converted to SD = 0.108) for the first 3 age-classes. Corresponding annual mean rate computed as 0.709(1/3) = 0.892. Approximate annual SD (0.048) derived from 1000 draws from a beta distribution with mean = 0.709 and SD = 0.108
	$S_{3->4}$, …, $S_{4->5}$	Horswill and Robinson (2015)	SEs reported in H&R converted to SDs to express inter-annual variability, following the same approach as Mobbs et al. (2020).
	$S_{->A}$	Lahoz-Monfort *et al.* (2011)	Isle of May adult survival estimates.
Farne Islands	P_A	SMP (2022)	Annual breeding success data from Farne Islands (1994 - 2015).
	$S_{0->1}$, …, $S_{2->3}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameter values as Puffin in Forth Islands
	$S_{3->4}$, …, $S_{4->5}$	Horswill and Robinson (2015)	

SPA	Demographic parameter	Source	Comments
	$S_{->A}$	Lahoz-Monfort *et al.* (2011)	
	$S_{3->4}$, …, $S_{4->5}$	Horswill and Robinson (2015)	
	$S_{->A}$	Lahoz-Monfort *et al.* (2011)	
	$S_{3->4}$, …, $S_{4->5}$	Horswill and Robinson (2015)	
	$S_{->A}$	Lahoz-Monfort *et al.* (2011)	
North Caithness Cliffs	P_A	Cook and Robinson (2010)	SPA-specific estimates not available. Adopted figures based on data gathered from NW Scotland (Orkney and Shetland), as provided by the NEPVA Tool (Mobbs et al., 2020)
	$S_{0->1}$, …, $S_{4->5}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameter values as Puffin in Forth Islands
	$S_{->A}$	Harris *et al.* (2005)	SPA-specific survival estimates not available. Parameters based on estimates from the Fair Isle colony (Shetland, time-series: 1990 - 2002)

2.7.7 RAZORBILL

Table 2.19: Demographic rates for the razorbill PVA models

SPA		Survivals						Productivity
		$S_{0->1}$	$S_{1->2}$	$S_{2->3}$	$S_{3->4}$	$S_{4->5}$	S_A	P_A
Forth Islands	Mean	0.794	0.794	0.910	0.910	0.910	0.910	0.564
	SD	0.134	0.134	0.058	0.058	0.058	0.058	0.070
Farne Islands	Mean	0.794	0.794	0.910	0.910	0.910	0.910	0.679
	SD	0.134	0.134	0.058	0.058	0.058	0.058	0.108
Flamborough and Filey Coast	Mean	0.794	0.794	0.910	0.910	0.910	0.910	0.630
	SD	0.134	0.134	0.058	0.058	0.058	0.058	0.074
St Abb's Head to Fast Castle	Mean	0.794	0.794	0.910	0.910	0.910	0.910	0.679
	SD	0.134	0.134	0.058	0.058	0.058	0.058	0.108
Fowlsheugh	Mean	0.794	0.794	0.910	0.910	0.910	0.910	0.459
	SD	0.134	0.134	0.058	0.058	0.058	0.058	0.236
Troup, Pennan and Lion's Heads	Mean	0.794	0.794	0.910	0.910	0.910	0.910	0.459
	SD	0.134	0.134	0.058	0.058	0.058	0.058	0.236
East Caithness Cliffs	Mean	0.794	0.794	0.910	0.910	0.910	0.910	0.459
	SD	0.134	0.134	0.058	0.058	0.058	0.058	0.236
Eggs/pair: 1 (Snow and Perrins, 1998)								
Age at first breeding: 5 (Horswill and Robinson, 2015)								

Table 2.20: References and comments on demographic rates specified for Razorbill PVA models. 'SE' and 'SD' refer to standard error and standard deviation, respectively; "H&R" refers to Horswill and Robinson (2015)

SPA	Demographic parameter	Source	Comments
Forth Islands	P_A	CEH (2018)	Annual breeding success data from Isle of May (2007 - 2016).
	$S_{0->1}$, $S_{1->2}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Using figures from colonies in Machias Seal Island and Gannet Islands, Canada, as suggested by H&R (time-series: 1995 - 2006). H&R provides a single mean (0.630) and SD (0.209) for the first 2 age-classes. Corresponding annual mean rate computed as 0.63(1/2) = 0.794. Approximate annual SD (0.134) derived from 1000 draws from a beta distribution with mean = 0.63 and SD = 0.209.
	$S_{2->3}$, …, S_A	Jitlal *et al.* (2017)	Isle of May adult survival estimates (based on Lahoz-Monfort et al (2011, 2014).
Farne Islands	P_A	SMP (2022)	Annual breeding success data from Farne Islands (1996 - 2015).
	$S_{0->1}$, $S_{1->2}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameter values as Razorbill in Forth Islands
	$S_{2->3}$, …, S_A	Jitlal *et al.* (2017)	
Flamborough and Filey Coast	P_A	SMP (2022)	Annual breeding success data from Flamborough Head and Bempton Cliffs (2009 - 2019).
	$S_{0->1}$, $S_{1->2}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameter values as Razorbill in Forth Islands.
	$S_{2->3}$, …, S_A	Jitlal *et al.* (2017)	
St Abb's Head to Fast Castle	P_A	SMP (2022)	Used the same parameter values as Razorbill in Farne Islands. SPA-specific breeding success data available on the SMP database, but for a very sparse time-series (1992, 2008 & 2014). Preference given to the longer time-series available from the neighbouring Farne Islands colony.

SPA	Demographic parameter	Source	Comments
	$S_{0->1}$, $S_{1->2}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameter values as Razorbill in Forth Islands
	$S_{2->3}$, …, S_A	Jitlal *et al.* (2017)	
Fowlsheugh	P_A	Horswill and Robinson (2015)	SPA-specific estimates not available. Northern UK figures used.
	$S_{0->1}$, $S_{1->2}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameter values as Razorbill in Forth Islands
	$S_{2->3}$, …, S_A	Jitlal *et al.* (2017)	
	$S_{2->3}$, …, S_A	Jitlal *et al.* (2017)	
Troup, Pennan and Lion's Heads	P_A	Horswill and Robinson (2015)	SPA-specific estimates not available. Northern UK figures used instead
	$S_{0->1}$, $S_{1->2}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameter values as Razorbill in Forth Islands
	$S_{2->3}$, …, S_A	Jitlal *et al.* (2017)	
East Caithness Cliffs	P_A	Horswill and Robinson (2015)	SPA-specific estimates not available. Northern UK figures used instead
	$S_{0->1}$, $S_{1->2}$	Horswill and Robinson (2015)	SPA-specific survival estimates not available. Adopted the same parameter values as Razorbill in Forth Islands
	$S_{2->3}$, …, S_A	Jitlal *et al.* (2017)	

2.8 IMPACT SCENARIOS: INCREMENTAL ADDITIONAL DEATHS

Table 2.21: Range of impact scenarios, and respective incremental steps, evaluated under each population model, expressed in terms of additional adult deaths in the starting year. '0' additional deaths denote the baseline/unimpacted population case. The upper figure of the range of increments was selected to be markedly larger than the expected mortalities under the impact scenarios

Species	SPA	Range of additional adult deaths	Additional deaths increments
Gannet	Forth Islands	0 - 2250	250
	Flamborough and Filey Coast	0 - 1000	50
	North Rona and Sula Sgeir	0 - 20	5
	Fair Isle	0 - 50	5
	Noss	0 – 105	5
	Hermaness, Saxa Vord and Valla Field	0 – 150	10
Guillemot	Forth Islands	0 - 700	50
	Farne Islands	0 - 400	25
	St Abb's Head to Fast Castle	0 - 1500	100
	Fowlsheugh	0 - 1500	100
	Buchan Ness to Collieston Coast	0 - 200	10
	Troup, Pennan and Lion's Heads	0 - 200	10
Herring gull	Forth Islands	0 - 80	10
	Farne Islands	0 - 5	1
	St Abb's Head to Fast Castle	0 - 5	1
	Fowlsheugh	0 - 10	5
Kittiwake	Forth Islands	0 - 400	25
	Farne Islands	0 - 200	10

Species	SPA	Range of additional adult deaths	Additional deaths increments
	Flamborough and Filey Coast	0 - 1000	50
	Coquet Island	0 - 10	5
	St Abb's Head to Fast Castle	0 - 800	50
	Fowlsheugh	0 – 500	25
	Buchan Ness to Collieston Coast	0 – 400	25
	Troup, Pennan and Lion's Heads	0 – 200	10
	East Caithness Cliffs	0 – 800	50
	North Caithness Cliffs	0 – 200	10
	West Westray	0 – 300	25
Lesser black-backed gull	Forth Islands	0 – 10	2
	Farne Islands	0 – 10	2
	Coquet Island	0 – 5	1
Puffin	Forth Islands	0 – 600	50
	Farne Islands	0 – 200	10
	North Caithness Cliffs	0 – 200	10
Razorbill	Forth Islands	0 – 400	25
	Farne Islands	0 – 10	5
	Flamborough and Filey Coast	0 – 600	50
	St Abb's Head to Fast Castle	0 - 90	10
	Fowlsheugh	0 - 200	10
	Troup, Pennan and Lion's Heads	0 - 60	5
	East Caithness Cliffs	0 - 500	25

3 PVA OUTPUTS (POPULATION METRICS)

43. Outputs from PVAs can be voluminous and may be summarised in many ways. The key outputs from the PVA models are the counterfactuals of population growth rate and of population size (Searle et al., 2019). These are the ratios of the impacted to unimpacted (baseline) scenarios and allow meaningful interpretation of the predicted effects against the populations in question (Cook and Robinson, 2016). Developing guidance from the SNCBs including NS, and from MSS and RSPB Scotland, indicates that these are the metrics that will be used in making judgements on the viability of protected seabird populations.

44. Testing the sensitivities of these metrics has suggested that counterfactual of growth rate is useful to illustrate impacts regardless of population status or trend (Cook and Robinson, 2016). Cook and Robinson (2016) also found the counterfactual of population size can be used to assess the population level effects of impacts for stable or increasing populations and may also offer a useful context for the counterfactual of growth rate. The ratio metrics have also been shown to be less sensitive to misspecification of input parameters compared to probabilistic metrics (Jitlal et al. 2017).

45. The full list of outputs for the simulations run for the 40 species-SPA combinations previously listed are:

- Plots of the adult population size projections through time, 0 - 50 years. A range of impact scenarios are presented in terms of varying additional adult mortalities, ranging from 0 (unimpacted) to a species/population-specific upper limit.
- Plots comparing the 50th percentile points of the simulated impacted and unimpacted populations sizes through time.
- Plots comparing the growth rates of simulated impacted and unimpacted populations, for a range of impact sizes.
- Plots comparing the median of the impacted population size to centiles of the unimpacted, over a range of impact scenarios at the 35- and 50-year post-construction points.
- A table of growth rates under varying impact scenarios, with several reference points expressed: the 2.5%, 50% & 97.5% points of the distribution of simulated rates. These are expressed for reference years at 35 and 50 years.
- A table of metrics for specific mortality scenarios, potentially with differential adult and immature impacts, including adjustments for sabbaticals.

46. The key outputs were discussed through the Ornithology Roadmap Process (meeting 4 – Technical Appendix 11.8 and follow up email with advice from NatureScot 26th January 2022).

3.1 SUMMARIES OF SPECIFIC MORTALITY SCENARIOS

The following tables 20 & 21 present summaries of the specific mortality scenarios for each of the 40 specified species/SPA combinations. Results are distilled to the years 2062 (35-year development lifespan) and 2077 (50-year development lifespan).

Table 3.1: 2062 projection – summary of specific mortality scenarios. Suffixes of 2.5% and 97.5% give the central 95% of projected/simulated population sizes

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
Gannet	Forth Islands SPA	Forth and Tay Consented developer approach	583.34	17.75	1057020	592306	1771243	952367	533712	1596707
		Forth and Tay Consented Scoping approach a	610.70	18.93	1057020	592306	1771243	947664	531089	1588915
		Forth and Tay Consented Scoping Approach b	822.44	28.12	1057020	592306	1771243	912148	511212	1529872
		North Sea Consented developer approach	800.34	167.85	1057020	592306	1771243	900857	504410	1511404
		North Sea Consented Scoping Approach a	827.70	174.03	1057020	592306	1771243	895868	501617	1503157
		North Sea Consented Scoping Approach b	1112.84	239.72	1057020	592306	1771243	845416	473322	1419587
		(1) Project Alone: developer approach	154.14	5.55	1057020	592306	1771243	1028218	576163	1723310
		(2) Project Alone: Scoping approach a	183.04	6.73	1057020	592306	1771243	1023133	573331	1714865
		(2) Project Alone: Scoping approach b	245.17	10.82	1057020	592306	1771243	1011584	566890	1695683
Gannet	Flamborough and Filey Coast	North Sea As-built: developer approach	301.88	35.78	243127	141247	386266	178439	103642	284277

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		North Sea As built Approach a	302.03	35.90	243127	141247	386266	178400	103619	284215
		North Sea As-built: scoping approach b	438.26	48.92	243127	141247	386266	155369	90306	247696
		North Sea Consented developer approach	351.48	36.38	243127	141247	386266	170211	98863	271189
		North Sea Consented Scoping Approach a	351.99	36.51	243127	141247	386266	170114	98806	271039
		North Sea Consented Scoping Approach b	487.86	49.52	243127	141247	386266	148144	86099	236140
Gannet	North Rona and Sula Sgeir	North Sea Consented developer approach	4.25	3.10	138982	76351	233225	137942	75772	231512
		North Sea Consented Scoping Approach a	4.33	3.10	138982	76351	233225	137929	75765	231488
		North Sea Consented Scoping Approach b	6.08	4.41	138982	76351	233225	137500	75526	230782
Gannet	Fair Isle	North Sea Consented developer approach	10.57	8.42	52106	30201	81721	49925	28918	78309
		North Sea Consented Scoping Approach a	10.66	8.42	52106	30201	81721	49912	28910	78291
		North Sea Consented Scoping Approach b	14.42	11.55	52106	30201	81721	49144	28460	77092
Gannet	Noss	North Sea Consented developer approach	35.08	28.51	166390	96170	268809	158088	91277	255457
		North Sea Consented Scoping Approach a	35.37	27.72	166390	96170	268809	158122	91300	255514

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		North Sea Consented Scoping Approach b	48.68	37.93	166390	96170	268809	155137	89544	250711
Gannet	Hermaness, Saxa Vord and Valla Field	North Sea Consented developer approach	75.30	60.07	304501	169278	510148	286724	159231	480445
		North Sea Consented Scoping Approach a	76.81	60.11	304501	169278	510148	286492	159103	480063
		North Sea Consented Scoping Approach b	104.20	82.26	304501	169278	510148	280252	155580	469640
Guillemot	Forth Islands SPA	North Sea Consented developer approach	82.82	80.12	94669	56296	155126	85776	50937	140669
		North Sea Consented Scoping Approach a	200.88	200.60	94669	56296	155126	74243	44006	121879
		North Sea Consented Scoping Approach b	398.91	392.06	94669	56296	155126	58559	34573	96177
		(1) Project Alone: developer approach	37.42	36.62	94669	56296	155126	90522	53799	148393
		(2) Project Alone: Scoping approach a	91.58	91.20	94669	56296	155126	84774	50333	139040
		(2) Project Alone: Scoping approach b	180.51	178.26	94669	56296	155126	76174	45167	125045
Guillemot	St Abb's Head to Fast Castle SPA	North Sea Consented developer approach	131.01	132.85	180897	103494	296677	165373	94593	271363
		North Sea Consented Scoping Approach a	371.05	370.16	180897	103494	296677	140443	80216	230758
		North Sea Consented Scoping Approach b	695.77	688.70	180897	103494	296677	112590	64146	185318

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		(1) Project Alone: developer approach	110.84	109.62	180897	103494	296677	168035	96119	275714
		(2) Project Alone: Scoping approach a	310.95	311.66	180897	103494	296677	146287	83587	240251
		(2) Project Alone: Scoping approach b	576.12	573.96	180897	103494	296677	121918	69503	200519
Guillemot	Fowlsheugh SPA	North Sea Consented developer approach	154.10	149.42	269127	153973	441376	251032	143584	411908
		North Sea Consented Scoping Approach a	430.29	423.20	269127	153973	441376	221233	126429	363302
		North Sea Consented Scoping Approach b	800.04	781.75	269127	153973	441376	187032	106644	307532
		(1) Project Alone: developer approach	89.20	88.52	269127	153973	441376	258400	147820	423922
		(2) Project Alone: Scoping approach a	259.90	261.04	269127	153973	441376	238851	136609	391967
		(2) Project Alone: Scoping approach b	473.32	472.88	269127	153973	441376	216549	123726	355661
Guillemot	Farne Islands SPA	(1) Project Alone: developer approach	36.92	40.21	372689	220897	595801	366107	216909	585471
		(2) Project Alone: Scoping approach a	79.84	88.67	372689	220897	595801	358473	212289	573519
		(2) Project Alone: Scoping approach b	167.20	183.90	372689	220897	595801	343474	203213	549959
Guillemot	Buchan Ness to Collieston Coast	Forth and Tay Consented developer approach	6.03	6.16	113267	65202	184901	112540	64784	183731

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		Forth and Tay Consented Scoping approach a	12.57	13.30	113267	65202	184901	111733	64323	182431
		Forth and Tay Consented Scoping Approach b	27.10	28.09	113267	65202	184901	110012	63336	179665
		North Sea Consented developer approach	8.53	8.06	113267	65202	184901	112272	64630	183302
		North Sea Consented Scoping Approach a	18.77	17.91	113267	65202	184901	111079	63945	181383
		North Sea Consented Scoping Approach b	39.30	37.09	113267	65202	184901	108753	62607	177640
		(1) Project Alone: developer approach	4.93	4.76	113267	65202	184901	112686	64867	183966
		(2) Project Alone: Scoping approach a	9.57	9.40	113267	65202	184901	112133	64551	183077
		(2) Project Alone: Scoping approach b	21.40	20.79	113267	65202	184901	110758	63761	180864
Guillemot	Troup, Pennan and Lion's Heads	North Sea Consented developer approach	10.36	8.33	124264	81479	185271	122695	80441	182950
		North Sea Consented Scoping Approach a	22.34	17.61	124264	81479	185271	120932	79274	180339
		North Sea Consented Scoping Approach b	47.55	37.57	124264	81479	185271	117274	76851	174917
		(1) Project Alone: developer approach	2.47	2.19	124264	81479	185271	123648	81071	184359
		(2) Project Alone: Scoping approach a	5.19	4.70	124264	81479	185271	123153	80743	183625

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		(2) Project Alone: Scoping approach b	11.10	9.97	124264	81479	185271	121665	79757	181415
Herring gull	Forth Islands SPA	North Sea Consented developer approach	15.17	4.04	116788	66486	200969	113124	64376	194811
		North Sea Consented Scoping Approach	22.10	5.30	116788	66486	200969	111573	63478	192206
		(1) Project Alone: developer approach	10.17	1.74	116788	66486	200969	114459	65143	197071
		(2) Project Alone: Scoping approach	17.10	3.00	116788	66486	200969	112888	64237	194434
Herring gull	Fowlsheugh SPA	Forth and Tay Consented developer approach	1.11	0.50	16451	9143	28431	16097	8942	27826
		Forth and Tay Consented Scoping Approach	1.52	0.58	16451	9143	28431	15987	8879	27635
		North Sea Consented developer approach	2.91	0.50	16451	9143	28431	15676	8698	27106
		North Sea Consented Scoping Approach	3.32	0.58	16451	9143	28431	15568	8635	26926
		(1) Project Alone: developer approach	0.61	0.10	16451	9143	28431	16285	9048	28150
		(2) Project Alone: Scoping approach	1.02	0.18	16451	9143	28431	16174	8984	27957
Herring gull	St Abb's Head to Fast Castle SPA	North Sea Consented developer approach	0.74	0.27	6349	3564	10753	6148	3450	10417
		North Sea Consented Scoping Approach	1.06	0.33	6349	3564	10753	6075	3408	10294

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		(1) Project Alone: developer approach	0.44	0.07	6349	3564	10753	6243	3503	10573
		(2) Project Alone: Scoping approach	0.76	0.13	6349	3564	10753	6166	3461	10452
Herring gull	Farne Islands SPA	(1) Project Alone: developer approach	0.52	0.09	16280	9331	28159	16147	9255	27934
		(2) Project Alone: Scoping approach	0.87	0.15	16280	9331	28159	16057	9204	27787
Kittiwake	Forth Islands SPA	Forth and Tay Consented developer approach	56.22	4.23	2423	897	5771	2018	742	4831
		Forth and Tay Consented Scoping approach a	58.21	4.52	2423	897	5771	2004	737	4800
		Forth and Tay Consented Scoping Approach b	77.22	6.44	2423	897	5771	1881	690	4513
		North Sea Consented developer approach	64.82	8.33	2423	897	5771	1948	716	4667
		North Sea Consented Scoping Approach a	68.21	9.42	2423	897	5771	1923	706	4610
		North Sea Consented Scoping Approach b	89.92	12.54	2423	897	5771	1785	654	4289
		(1) Project Alone: developer approach	28.82	1.63	2423	897	5771	2208	814	5266
		(2) Project Alone: Scoping approach a	36.21	2.32	2423	897	5771	2156	794	5145

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		(2) Project Alone: Scoping approach b	43.32	2.94	2423	897	5771	2106	775	5033
Kittiwake	Fowlsheugh SPA	Forth and Tay Consented developer approach	141.70	10.80	13615	5563	31969	11720	4769	27630
		Forth and Tay Consented Scoping approach a	155.35	12.51	13615	5563	31969	11548	4697	27229
		Forth and Tay Consented Scoping Approach b	197.25	16.94	13615	5563	31969	11047	4485	26048
		North Sea Consented developer approach	183.60	24.10	13615	5563	31969	11139	4527	26268
		North Sea Consented Scoping Approach a	200.35	27.91	13615	5563	31969	10928	4438	25769
		North Sea Consented Scoping Approach b	252.35	36.24	13615	5563	31969	10313	4185	24338
		(1) Project Alone: developer approach	87.03	4.90	13615	5563	31969	12436	5068	29284
		(2) Project Alone: Scoping approach a	109.05	7.01	13615	5563	31969	12143	4946	28608
		(2) Project Alone: Scoping approach b	130.45	8.84	13615	5563	31969	11869	4831	27977
Kittiwake	St Abb's Head to Fast Castle SPA	Forth and Tay Consented developer approach	266.61	10.50	2695	1029	6567	1333	496	3312
		Forth and Tay Consented Scoping approach a	323.33	12.94	2695	1029	6567	1147	424	2866

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		Forth and Tay Consented Scoping Approach b	388.73	16.15	2695	1029	6567	964	354	2422
		North Sea Consented developer approach	275.71	15.00	2695	1029	6567	1291	480	3210
		North Sea Consented Scoping Approach a	333.83	18.24	2695	1029	6567	1105	408	2763
		North Sea Consented Scoping Approach b	402.23	22.95	2695	1029	6567	919	338	2312
		(1) Project Alone: developer approach	253.21	9.40	2695	1029	6567	1382	515	3432
		(2) Project Alone: Scoping approach a	312.63	11.94	2695	1029	6567	1181	437	2947
		(2) Project Alone: Scoping approach b	371.33	14.35	2695	1029	6567	1011	372	2538
Kittiwake	Farne Islands SPA	North Sea Consented developer approach	33.18	6.60	4867	2088	11242	4346	1863	10059
		North Sea Consented Scoping Approach a	41.13	8.21	4867	2088	11242	4229	1811	9793
		North Sea Consented Scoping Approach b	50.69	10.62	4867	2088	11242	4089	1750	9473
		(1) Project Alone: developer approach	23.18	1.50	4867	2088	11242	4527	1941	10468
		(2) Project Alone: Scoping approach a	29.33	2.21	4867	2088	11242	4437	1902	10267
		(2) Project Alone: Scoping approach b	35.19	2.82	4867	2088	11242	4354	1865	10079

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
Kittiwake	Buchan Ness to Collieston Coast	Forth and Tay Consented developer approach	14.16	4.65	4374	1680	11054	4279	1643	10820
		Forth and Tay Consented Scoping approach a	20.77	7.24	4374	1680	11054	4235	1625	10708
		Forth and Tay Consented Scoping Approach b	27.51	10.18	4374	1680	11054	4189	1607	10593
		North Sea As-built: developer approach	63.36	19.25	4374	1680	11054	3972	1521	10055
		North Sea As built Approach a	75.37	24.54	4374	1680	11054	3895	1491	9862
		North Sea As-built: scoping approach b	93.11	32.78	4374	1680	11054	3782	1448	9581
		North Sea Consented developer approach	68.16	21.75	4374	1680	11054	3940	1509	9974
		North Sea Consented Scoping Approach a	80.17	27.04	4374	1680	11054	3863	1479	9783
		North Sea Consented Scoping Approach b	97.91	35.28	4374	1680	11054	3751	1436	9504
		(1) Project Alone: developer approach	11.06	2.95	4374	1680	11054	4302	1652	10877
		(2) Project Alone: Scoping approach a	16.47	4.94	4374	1680	11054	4266	1637	10786
		(2) Project Alone: Scoping approach b	21.01	6.58	4374	1680	11054	4236	1625	10711

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
Kittiwake	Troup, Pennan and Lion's Heads	North Sea As-built: developer approach	60.06	23.44	39032	18949	77565	35748	17332	71080
		North Sea As built Approach a	69.77	29.39	39032	18949	77565	35184	17055	69972
		North Sea As-built: scoping approach b	96.82	39.79	39032	18949	77565	33826	16385	67277
		North Sea Consented developer approach	65.66	26.44	39032	18949	77565	35434	17177	70461
		North Sea Consented Scoping Approach a	75.47	32.39	39032	18949	77565	34871	16903	69354
		North Sea Consented Scoping Approach b	102.52	42.79	39032	18949	77565	33525	16237	66684
		(1) Project Alone: developer approach	9.01	3.34	39032	18949	77565	38542	18707	76598
		(2) Project Alone: Scoping approach a	14.07	5.69	39032	18949	77565	38232	18555	75985
		(2) Project Alone: Scoping approach b	18.42	7.59	39032	18949	77565	37983	18431	75496
Kittiwake	East Caithness cliffs	North Sea As-built: develper approach	276.52	74.45	73730	26112	193756	62464	22102	164899
		North Sea As built Approach a	277.61	88.37	73730	26112	193756	62125	21978	163990
		North Sea As-built: scoping approach b	395.62	120.80	73730	26112	193756	57868	20486	153026
		North Sea Consented developer approach	291.92	82.55	73730	26112	193756	61805	21869	163209

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		North Sea Consented Scoping Approach a	293.11	96.47	73730	26112	193756	61467	21745	162305
		North Sea Consented Scoping Approach b	411.12	128.90	73730	26112	193756	57257	20269	151428
		(1) Project Alone: developer approach	18.39	8.85	73730	26112	193756	72825	25786	191428
		(2) Project Alone: Scoping approach a	30.71	15.17	73730	26112	193756	72214	25567	189858
		(2) Project Alone: Scoping approach b	41.12	20.30	73730	26112	193756	71707	25386	188554
Kittiwake	North Caithness Cliffs SPA	North Sea As-built: developer approach	35.94	15.62	5333	1765	15194	4559	1504	13017
		North Sea As built Approach a	43.42	19.81	5333	1765	15194	4402	1452	12582
		North Sea As-built: scoping approach b	58.71	26.59	5333	1765	15194	4113	1356	11786
		North Sea Consented developer approach	39.84	17.62	5333	1765	15194	4478	1477	12794
		North Sea Consented Scoping Approach a	47.22	21.81	5333	1765	15194	4326	1426	12372
		North Sea Consented Scoping Approach b	62.51	28.59	5333	1765	15194	4041	1331	11588
		(1) Project Alone: developer approach	4.54	2.22	5333	1765	15194	5226	1729	14891
		(2) Project Alone: Scoping approach a	7.62	3.81	5333	1765	15194	5153	1704	14687

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		(2) Project Alone: Scoping approach b	10.21	5.09	5333	1765	15194	5094	1685	14519
Kittiwake	Coquet island	North Sea Consented developer approach	1.70	0.70	1995	960	3977	1885	906	3761
		North Sea Consented Scoping Approach a	2.09	0.80	1995	960	3977	1863	895	3718
		North Sea Consented Scoping Approach b	2.74	1.10	1995	960	3977	1822	875	3634
		(1) Project Alone: developer approach	0.30	0.00	1995	960	3977	1979	952	3947
		(2) Project Alone: Scoping approach a	0.49	0.00	1995	960	3977	1969	947	3928
		(2) Project Alone: Scoping approach b	0.64	0.00	1995	960	3977	1962	943	3911
Kittiwake	Flamborough and Filey Coast	North Sea As-built: develper approach	410.67	61.14	55022	20972	134598	48233	18362	118531
		North Sea As built Approach a	441.91	76.92	55022	20972	134598	47654	18137	117123
		North Sea As-built: scoping approach b	491.30	101.50	55022	20972	134598	46756	17789	114941
		North Sea Consented developer approach	445.57	70.34	55022	20972	134598	47665	18141	117160
		North Sea Consented Scoping Approach a	476.81	86.02	55022	20972	134598	47094	17920	115772
		North Sea Consented Scoping Approach b	526.17	110.58	55022	20972	134598	46207	17576	113615

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		(1) Project Alone: developer approach	17.05	8.24	55022	20972	134598	54665	20833	133735
		(2) Project Alone: Scoping approach a	28.51	14.12	55022	20972	134598	54422	20739	133151
		(2) Project Alone: Scoping approach b	38.17	18.88	55022	20972	134598	54220	20661	132664
Kittiwake	West Westray	North Sea As-built: developer approach	35.60	17.94	47	6	295	36	4	227
		North Sea As built Approach a	45.84	22.92	47	6	295	33	4	211
		North Sea As-built: scoping approach b	61.72	30.85	47	6	295	29	4	187
		North Sea Consented developer approach	40.20	20.34	47	6	295	35	4	219
		North Sea Consented Scoping Approach a	50.54	25.32	47	6	295	32	4	203
		North Sea Consented Scoping Approach b	66.32	33.25	47	6	295	28	3	181
		(1) Project Alone: developer approach	5.10	2.64	47	6	295	45	6	284
		(2) Project Alone: Scoping approach a	9.04	4.52	47	6	295	44	5	276
		(2) Project Alone: Scoping approach b	12.12	6.05	47	6	295	43	5	270
Lesser Black-backed gull	Forth Islands SPA	(1) Project Alone: developer approach	1.97	0.30	18768	11852	29401	18527	11697	29032

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		(2) Project Alone: Scoping approach	2.76	0.42	18768	11852	29401	18431	11635	28885
Lesser Black-backed gull	Farne Islands SPA	(1) Project Alone: developer approach	0.51	0.08	6852	4312	10828	6784	4268	10722
		(2) Project Alone: Scoping approach	0.72	0.11	6852	4312	10828	6757	4252	10683
Lesser Black-backed gull	Coquet SPA	(1) Project Alone: developer approach	0.01	0.00	13	4	43	13	4	43
		(2) Project Alone: Scoping approach	0.01	0.00	13	4	43	13	4	43
Puffin	Forth Islands SPA	North Sea Consented developer approach	44.31	51.11	243955	96523	542889	238783	94423	531535
		North Sea Consented Scoping Approach a	159.39	183.80	243955	96523	542889	225847	89177	503131
		North Sea Consented Scoping Approach b	265.10	306.16	243955	96523	542889	214574	84601	478373
		(1) Project Alone: developer approach	5.11	6.01	243955	96523	542889	243348	96276	541558
		(2) Project Alone: Scoping approach a	18.19	21.44	243955	96523	542889	241799	95648	538155
		(2) Project Alone: Scoping approach b	29.80	35.56	243955	96523	542889	240414	95085	535113
Puffin	Farne Islands SPA	North Sea Consented developer approach	4.82	6.69	483381	196815	1079847	482229	196336	1077315
		North Sea Consented Scoping Approach a	17.31	23.75	483381	196815	1079847	479280	195110	1070825

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		North Sea Consented Scoping Approach b	28.80	39.44	483381	196815	1079847	476592	193989	1064891
		(1) Project Alone: developer approach	3.62	4.89	483381	196815	1079847	482525	196462	1077968
		(2) Project Alone: Scoping approach a	12.91	17.45	483381	196815	1079847	480338	195552	1073157
		(2) Project Alone: Scoping approach b	21.40	28.94	483381	196815	1079847	478355	194725	1068778
Puffin	North Caithness Cliffs SPA	North Sea Consented developer approach	8.23	8.51	3047	779	9437	2690	685	8366
		North Sea Consented Scoping Approach a	29.48	30.67	3047	779	9437	1942	488	6123
		North Sea Consented Scoping Approach b	49.15	51.12	3047	779	9437	1436	356	4597
Razorbill	Forth Islands SPA	Forth and Tay Consented developer approach	13.56	11.86	28645	14780	51528	26690	13766	48091
		Forth and Tay Consented Scoping approach a	44.82	40.11	28645	14780	51528	22638	11654	40915
		Forth and Tay Consented Scoping Approach b	77.28	69.01	28645	14780	51528	19080	9795	34602
		North Sea Consented developer approach	17.26	14.06	28645	14780	51528	26248	13534	47305
		North Sea Consented Scoping Approach a	49.32	42.61	28645	14780	51528	22189	11419	40115

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		North Sea Consented Scoping Approach b	90.58	76.71	28645	14780	51528	17963	9215	32605
		(1) Project Alone: developer approach	3.56	3.06	28645	14780	51528	28122	14508	50610
		(2) Project Alone: Scoping approach a	10.62	9.51	28645	14780	51528	27087	13972	48794
		(2) Project Alone: Scoping approach b	18.98	17.31	28645	14780	51528	25906	13356	46708
Razorbill	St Abb's Head to Fast Castle SPA	Forth and Tay Consented developer approach	3.22	3.05	23085	12393	41063	22346	11989	39764
		Forth and Tay Consented Scoping approach a	9.69	9.70	23085	12393	41063	20883	11188	37188
		Forth and Tay Consented Scoping Approach b	17.32	16.91	23085	12393	41063	19326	10339	34451
		North Sea Consented developer approach	4.92	4.05	23085	12393	41063	22023	11814	39196
		North Sea Consented Scoping Approach a	11.79	10.90	23085	12393	41063	20512	10986	36537
		North Sea Consented Scoping Approach b	23.52	20.51	23085	12393	41063	18327	9795	32688
		(1) Project Alone: developer approach	2.62	2.65	23085	12393	41063	22466	12054	39975
		(2) Project Alone: Scoping approach a	8.29	8.70	23085	12393	41063	21150	11333	37661

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		(2) Project Alone: Scoping approach b	14.42	14.91	23085	12393	41063	19840	10618	35354
Razorbill	Fowlsheugh SPA	Forth and Tay Consented developer approach	15.64	12.85	29933	12538	65441	28834	12077	63086
		Forth and Tay Consented Scoping approach a	50.93	42.76	29933	12538	65441	26485	11086	58013
		Forth and Tay Consented Scoping Approach b	88.25	73.38	29933	12538	65441	24224	10137	53142
		North Sea Consented developer approach	20.74	15.75	29933	12538	65441	28527	11947	62426
		North Sea Consented Scoping Approach a	57.23	46.46	29933	12538	65441	26134	10938	57257
		North Sea Consented Scoping Approach b	106.70	84.18	29933	12538	65441	23293	9743	51130
		(1) Project Alone: developer approach	4.34	3.25	29933	12538	65441	29635	12412	64801
		(2) Project Alone: Scoping approach a	12.73	9.76	29933	12538	65441	29059	12170	63568
		(2) Project Alone: Scoping approach b	22.95	17.38	29933	12538	65441	28382	11887	62117
Razorbill	Troup, Pennan and Lion's Heads	North Sea Consented developer approach	4.05	2.50	10168	4258	22231	9909	4150	21679
		North Sea Consented Scoping Approach a	6.06	3.95	10168	4258	22231	9777	4094	21395

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		North Sea Consented Scoping Approach b	15.65	9.79	10168	4258	22231	9201	3851	20160
		(1) Project Alone: developer approach	0.75	0.52	10168	4258	22231	10118	4237	22125
		(2) Project Alone: Scoping approach a	1.46	1.05	10168	4258	22231	10069	4217	22021
		(2) Project Alone: Scoping approach b	3.25	2.29	10168	4258	22231	9951	4166	21768
Razorbill	Farne Islands SPA	North Sea Consented developer approach	0.50	0.20	3988	2118	7206	3884	2063	7021
		North Sea Consented Scoping Approach a	0.62	0.50	3988	2118	7206	3829	2033	6926
		North Sea Consented Scoping Approach b	1.76	1.20	3988	2118	7206	3578	1899	6474
		(1) Project Alone: developer approach	0.10	0.08	3988	2118	7206	3963	2105	7162
		(2) Project Alone: Scoping approach a	0.22	0.20	3988	2118	7206	3928	2086	7100
		(2) Project Alone: Scoping approach b	0.46	0.40	3988	2118	7206	3867	2053	6989
Razorbill	East Caithness cliffs	North Sea Consented developer approach	48.02	32.17	65650	29085	143345	62627	27723	136825
		North Sea Consented Scoping Approach a	113.00	80.21	65650	29085	143345	58617	25920	128166
		North Sea Consented Scoping Approach b	228.38	157.57	65650	29085	143345	52316	23087	114547

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		(1) Project Alone: developer approach	3.92	2.57	65650	29085	143345	65400	28972	142807
		(2) Project Alone: Scoping approach a	5.30	3.51	65650	29085	143345	65311	28932	142614
		(2) Project Alone: Scoping approach b	14.78	9.77	65650	29085	143345	64709	28661	141317
Razorbill	Flamborough and Filey Coast	North Sea Consented developer approach	41.90	12.10	192211	102337	335748	186098	99093	325181
		North Sea Consented Scoping Approach a	102.78	14.79	192211	102337	335748	178834	95189	312660
		North Sea Consented Scoping Approach b	203.34	43.94	192211	102337	335748	165511	87925	289492
		(1) Project Alone: developer approach	3.00	2.17	192211	102337	335748	191647	102033	334768
		(2) Project Alone: Scoping approach a	3.78	2.79	192211	102337	335748	191495	101951	334505
		(2) Project Alone: Scoping approach b	11.04	8.04	192211	102337	335748	190137	101221	332153

Table 3.2: 2077 projection – summary of specific mortality scenarios. Suffixes of 2.5% and 97.5% give the central 95% of projected/simulated population sizes

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
Gannet	Forth Islands SPA	Forth and Tay Consented developer approach	583.34	17.75	1946799	987991	3466133	1680845	853159	2995590
		Forth and Tay Consented Scoping approach a	610.70	18.93	1946799	987991	3466133	1669167	847258	2974995
		Forth and Tay Consented Scoping Approach b	822.44	28.12	1946799	987991	3466133	1582193	802935	2820552
		North Sea Consented developer approach	800.34	167.85	1946799	987991	3466133	1553444	787755	2771071
		North Sea Consented Scoping Approach a	827.70	174.03	1946799	987991	3466133	1541333	781611	2749721
		North Sea Consented Scoping Approach b	1112.84	239.72	1946799	987991	3466133	1420659	720170	2536132
		(1) Project Alone: developer approach	154.14	5.55	1946799	987991	3466133	1872658	950274	3334585
		(2) Project Alone: Scoping approach a	183.04	6.73	1946799	987991	3466133	1859720	943699	3311649
		(2) Project Alone: Scoping approach b	243.24	10.82	1946799	987991	3466133	1830410	928799	3259729
Gannet	Flamborough and Filey Coast	North Sea As-built: developer approach	301.88	35.78	504371	268580	871782	325679	173047	563389
		North Sea As built Approach a	302.03	35.90	504371	268580	871782	325578	172994	563218
		North Sea As-built: scoping approach b	438.26	48.92	504371	268580	871782	267979	142317	464201
		North Sea Consented developer approach	351.48	36.38	504371	268580	871782	304501	161783	526945
		North Sea Consented Scoping Approach a	351.99	36.51	504371	268580	871782	304257	161652	526526
		North Sea Consented Scoping Approach b	487.86	49.52	504371	268580	871782	250668	133096	434411

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
Gannet	North Rona and Sula Sgeir	North Sea Consented developer approach	4.25	3.10	243141	122494	437074	240562	121179	432495
		North Sea Consented Scoping Approach a	4.33	3.10	243141	122494	437074	240529	121161	432439
		North Sea Consented Scoping Approach b	6.08	4.41	243141	122494	437074	239468	120621	430554
Gannet	Fair Isle	North Sea Consented developer approach	10.57	8.42	94613	50903	161865	89022	47860	152382
		North Sea Consented Scoping Approach a	10.66	8.42	94613	50903	161865	88992	47843	152330
		North Sea Consented Scoping Approach b	14.42	11.55	94613	50903	161865	87058	46787	149040
Gannet	Noss	North Sea Consented developer approach	35.08	28.51	310428	166490	527785	288556	154569	491012
		North Sea Consented Scoping Approach a	35.37	27.72	310428	166490	527785	288655	154624	491167
		North Sea Consented Scoping Approach b	48.68	37.93	310428	166490	527785	280914	150409	478135
Gannet	Hermaness, Saxa Vord and Valla Field	North Sea Consented developer approach	75.30	60.07	533584	269654	950432	489847	247299	873091
		North Sea Consented Scoping Approach a	76.81	60.11	533584	269654	950432	489294	247025	872110
		North Sea Consented Scoping Approach b	104.20	82.26	533584	269654	950432	474217	239342	845439
Guillemot	Forth Islands SPA	North Sea Consented developer approach	82.82	80.12	136427	73734	242852	118627	63993	211129
		North Sea Consented Scoping Approach a	200.88	200.60	136427	73734	242852	96642	52016	172026
		North Sea Consented Scoping Approach b	398.91	392.06	136427	73734	242852	68929	36970	122733
		(1) Project Alone: developer approach	37.42	36.62	136427	73734	242852	128047	69144	227911

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		(2) Project Alone: Scoping approach a	91.58	91.20	136427	73734	242852	116666	62918	207626
		(2) Project Alone: Scoping approach b	180.51	178.26	136427	73734	242852	100240	53972	178429
Guillemot	St Abb's Head to Fast Castle SPA	North Sea Consented developer approach	131.01	132.85	260376	138288	454623	229270	121564	400769
		North Sea Consented Scoping Approach a	371.05	370.16	260376	138288	454623	181783	96211	318407
		North Sea Consented Scoping Approach b	695.77	688.70	260376	138288	454623	132798	70034	233282
		(1) Project Alone: developer approach	110.84	109.62	260376	138288	454623	234510	124387	409850
		(2) Project Alone: Scoping approach a	310.95	311.66	260376	138288	454623	192622	101963	337174
		(2) Project Alone: Scoping approach b	576.12	573.96	260376	138288	454623	148660	78480	261009
Guillemot	Fowlsheugh SPA	North Sea Consented developer approach	154.10	149.42	387371	205735	676360	350948	186187	613336
		North Sea Consented Scoping Approach a	430.29	423.20	387371	205735	676360	293374	155282	513429
		North Sea Consented Scoping Approach b	800.04	781.75	387371	205735	676360	231005	122019	405346
		(1) Project Alone: developer approach	89.20	88.52	387371	205735	676360	365673	194098	638795
		(2) Project Alone: Scoping approach a	259.91	261.04	387371	205735	676360	327053	173306	571916
		(2) Project Alone: Scoping approach b	473.32	472.88	387371	205735	676360	284541	150613	498105
Guillemot	Farne Islands SPA	(1) Project Alone: developer approach	36.92	40.21	620412	346131	1096507	604955	337405	1069384
		(2) Project Alone: Scoping approach a	79.84	88.67	620412	346131	1096507	587201	327374	1038311

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		(2) Project Alone: Scoping approach b	167.20	183.90	620412	346131	1096507	552745	307903	977807
Guillemot	Buchan Ness to Collieston Coast	Forth and Tay Consented developer approach	6.03	6.16	163160	89006	292409	161674	88193	289762
		Forth and Tay Consented Scoping approach a	12.57	13.30	163160	89006	292409	160031	87293	286832
		Forth and Tay Consented Scoping Approach b	27.10	28.09	163160	89006	292409	156557	85384	280621
		North Sea Consented developer approach	8.53	8.06	163160	89006	292409	161130	87895	288793
		North Sea Consented Scoping Approach a	18.77	17.91	163160	89006	292409	158710	86567	284475
		North Sea Consented Scoping Approach b	39.30	37.09	163160	89006	292409	154028	83990	276115
		(1) Project Alone: developer approach	4.93	4.76	163160	89006	292409	161973	88356	290295
		(2) Project Alone: Scoping approach a	9.57	9.40	163160	89006	292409	160847	87740	288289
		(2) Project Alone: Scoping approach b	21.40	20.79	163160	89006	292409	158060	86210	283315
Guillemot	Troup, Pennan and Lion's Heads	North Sea Consented developer approach	10.36	8.33	195445	121032	308641	191956	118866	303158
		North Sea Consented Scoping Approach a	22.34	17.61	195445	121032	308641	188049	116440	297022
		North Sea Consented Scoping Approach b	47.55	37.57	195445	121032	308641	180005	111433	284405
		(1) Project Alone: developer approach	2.47	2.19	195445	121032	308641	194072	120180	306482
		(2) Project Alone: Scoping approach a	5.19	4.7	195445	121032	308641	192971	119497	304749

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		(2) Project Alone: Scoping approach b	11.10	9.97	195445	121032	308641	189662	117445	299549
Herring gull	Forth Islands SPA	North Sea Consented developer approach	15.17	4.04	269483	142562	499062	257643	136232	477655
		North Sea Consented Scoping Approach	22.10	5.30	269483	142562	499062	252678	133568	468664
		(1) Project Alone: developer approach	10.17	1.74	269483	142562	499062	261933	138524	485465
		(2) Project Alone: Scoping approach	17.10	3.00	269483	142562	499062	256884	135813	476345
Herring gull	Fowlsheugh SPA	Forth and Tay Consented developer approach	1.11	0.50	38196	19705	70443	37054	19104	68368
		Forth and Tay Consented Scoping Approach	1.52	0.58	38196	19705	70443	36688	18913	67706
		North Sea Consented developer approach	2.91	0.50	38196	19705	70443	35695	18385	65941
		North Sea Consented Scoping Approach	3.32	0.58	38196	19705	70443	35346	18200	65315
		(1) Project Alone: developer approach	0.61	0.10	38196	19705	70443	37664	19427	69483
		(2) Project Alone: Scoping approach	1.02	0.18	38196	19705	70443	37300	19229	68825
Herring gull	St Abb's Head to Fast Castle SPA	North Sea Consented developer approach	0.74	0.27	14646	7551	27064	14001	7207	25879
		North Sea Consented Scoping Approach	1.06	0.33	14646	7551	27064	13767	7086	25456
		(1) Project Alone: developer approach	0.44	0.07	14646	7551	27064	14301	7367	26441
		(2) Project Alone: Scoping approach	0.76	0.13	14646	7551	27064	14066	7237	26005
Herring gull	Farne Islands SPA	(1) Project Alone: developer approach	0.52	0.09	37662	19971	71278	37232	19737	70489

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		(2) Project Alone: Scoping approach	0.87	0.15	37662	19971	71278	36944	19582	69960
Kittiwake	Forth Islands SPA	Forth and Tay Consented developer approach	56.22	4.23	1457	475	4100	1124	365	3185
		Forth and Tay Consented Scoping approach a	58.21	4.52	1457	475	4100	1114	361	3156
		Forth and Tay Consented Scoping Approach b	77.22	6.44	1457	475	4100	1019	329	2892
		North Sea Consented developer approach	64.82	8.33	1457	475	4100	1069	347	3032
		North Sea Consented Scoping Approach a	68.21	9.42	1457	475	4100	1050	340	2978
		North Sea Consented Scoping Approach b	89.92	12.54	1457	475	4100	946	305	2688
		(1) Project Alone: developer approach	28.82	1.63	1457	475	4100	1278	415	3608
		(2) Project Alone: Scoping approach a	36.21	2.32	1457	475	4100	1235	401	3490
		(2) Project Alone: Scoping approach b	43.32	2.94	1457	475	4100	1195	388	3379
Kittiwake	Fowlsheugh SPA	Forth and Tay Consented developer approach	141.70	10.80	10858	3858	28376	8795	3120	23127
		Forth and Tay Consented Scoping approach a	155.35	12.51	10858	3858	28376	8611	3053	22663
		Forth and Tay Consented Scoping Approach b	197.25	16.94	10858	3858	28376	8083	2863	21316
		North Sea Consented developer approach	183.60	24.10	10858	3858	28376	8182	2899	21549

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		North Sea Consented Scoping Approach a	200.35	27.91	10858	3858	28376	7961	2819	20982
		North Sea Consented Scoping Approach b	252.35	36.24	10858	3858	28376	7335	2595	19384
		(1) Project Alone: developer approach	87.03	4.90	10858	3858	28376	9561	3393	25072
		(2) Project Alone: Scoping approach a	109.05	7.01	10858	3858	28376	9245	3281	24268
		(2) Project Alone: Scoping approach b	130.45	8.84	10858	3858	28376	8953	3176	23531
Kittiwake	St Abb's Head to Fast Castle SPA	Forth and Tay Consented developer approach	266.61	10.50	1633	544	4647	605	195	1756
		Forth and Tay Consented Scoping approach a	323.33	12.94	1633	544	4647	489	157	1423
		Forth and Tay Consented Scoping Approach b	388.73	16.15	1633	544	4647	382	121	1120
		North Sea Consented developer approach	275.71	15.00	1633	544	4647	578	186	1680
		North Sea Consented Scoping Approach a	333.83	18.24	1633	544	4647	464	148	1352
		North Sea Consented Scoping Approach b	402.23	22.95	1633	544	4647	357	113	1048
		(1) Project Alone: developer approach	253.21	9.40	1633	544	4647	636	205	1848
		(2) Project Alone: Scoping approach a	312.63	11.94	1633	544	4647	510	163	1484
		(2) Project Alone: Scoping approach b	371.33	14.35	1633	544	4647	409	130	1198
Kittiwake	Farne Islands SPA	North Sea Consented developer approach	33.18	6.60	3998	1495	10192	3407	1270	8707

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		North Sea Consented Scoping Approach a	41.13	8.21	3998	1495	10192	3278	1222	8384
		North Sea Consented Scoping Approach b	50.69	10.62	3998	1495	10192	3125	1164	7999
		(1) Project Alone: developer approach	23.18	1.50	3998	1495	10192	3608	1346	9215
		(2) Project Alone: Scoping approach a	29.33	2.21	3998	1495	10192	3508	1308	8963
		(2) Project Alone: Scoping approach b	35.19	2.82	3998	1495	10192	3415	1273	8730
Kittiwake	Buchan Ness to Collieston Coast	Forth and Tay Consented developer approach	14.16	4.65	2497	831	7121	2421	806	6908
		Forth and Tay Consented Scoping approach a	20.77	7.24	2497	831	7121	2386	794	6807
		Forth and Tay Consented Scoping Approach b	27.51	10.18	2497	831	7121	2349	781	6703
		North Sea As-built: develper approach	63.36	19.25	2497	831	7121	2180	725	6227
		North Sea As built Approach a	75.37	24.54	2497	831	7121	2120	705	6058
		North Sea As-built: scoping approach b	93.11	32.78	2497	831	7121	2034	676	5815
		North Sea Consented developer approach	68.16	21.75	2497	831	7121	2155	716	6156
		North Sea Consented Scoping Approach a	80.17	27.04	2497	831	7121	2096	697	5989
		North Sea Consented Scoping Approach b	97.91	35.28	2497	831	7121	2010	668	5749
		(1) Project Alone: developer approach	11.06	2.95	2497	831	7121	2440	812	6959

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		(2) Project Alone: Scoping approach a	16.47	4.94	2497	831	7121	2411	803	6877
		(2) Project Alone: Scoping approach b	21.01	6.58	2497	831	7121	2387	794	6809
Kittiwake	Troup, Pennan and Lion's Heads	North Sea As-built: develper approach	60.06	23.44	46997	19922	104504	41516	17576	92414
		North Sea As built Approach a	69.77	29.39	46997	19922	104504	40594	17182	90384
		North Sea As-built: scoping approach b	96.82	39.79	46997	19922	104504	38391	16241	85524
		North Sea Consented developer approach	65.66	26.44	46997	19922	104504	41001	17357	91281
		North Sea Consented Scoping Approach a	75.47	32.39	46997	19922	104504	40084	16964	89260
		North Sea Consented Scoping Approach b	102.52	42.79	46997	19922	104504	37907	16035	84456
		(1) Project Alone: developer approach	8.66	3.34	46997	19922	104504	46166	19567	102670
		(2) Project Alone: Scoping approach a	14.07	5.69	46997	19922	104504	45641	19342	101518
		(2) Project Alone: Scoping approach b	18.42	7.59	46997	19922	104504	45224	19164	100595
Kittiwake	East Caithness cliffs	North Sea As-built: develper approach	276.52	74.45	84181	26789	240755	66603	21089	190803
		North Sea As built Approach a	277.61	88.37	84181	26789	240755	66103	20935	189402
		North Sea As-built: scoping approach b	395.62	120.80	84181	26789	240755	59772	18875	171411
		North Sea Consented developer approach	291.92	82.55	84181	26789	240755	65613	20768	187992
		North Sea Consented Scoping Approach a	293.11	96.47	84181	26789	240755	65110	20616	186593

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		North Sea Consented Scoping Approach b	411.12	128.90	84181	26789	240755	58878	18586	168869
		(1) Project Alone: developer approach	18.39	8.85	84181	26789	240755	82726	26321	236629
		(2) Project Alone: Scoping approach a	30.71	15.17	84181	26789	240755	81749	26008	233863
		(2) Project Alone: Scoping approach b	41.12	20.30	84181	26789	240755	80946	25748	231571
Kittiwake	North Caithness Cliffs SPA	North Sea As-built: develper approach	35.94	15.62	4768	1369	15463	3822	1092	12434
		North Sea As built Approach a	43.42	19.81	4768	1369	15463	3638	1039	11846
		North Sea As-built: scoping approach b	58.71	26.59	4768	1369	15463	3306	943	10788
		North Sea Consented developer approach	39.84	17.62	4768	1369	15463	3728	1065	12130
		North Sea Consented Scoping Approach a	47.22	21.81	4768	1369	15463	3549	1013	11561
		North Sea Consented Scoping Approach b	62.51	28.59	4768	1369	15463	3225	920	10528
		(1) Project Alone: developer approach	4.54	2.22	4768	1369	15463	4633	1329	15032
		(2) Project Alone: Scoping approach a	7.62	3.81	4768	1369	15463	4543	1303	14742
		(2) Project Alone: Scoping approach b	10.21	5.09	4768	1369	15463	4469	1282	14506
Kittiwake	Coquet island	North Sea Consented developer approach	1.70	0.70	2605	1110	5755	2406	1024	5322
		North Sea Consented Scoping Approach a	2.09	0.80	2605	1110	5755	2366	1006	5234
		North Sea Consented Scoping Approach b	2.74	1.10	2605	1110	5755	2292	974	5070

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		(1) Project Alone: developer approach	0.30	0.00	2605	1110	5755	2576	1097	5696
		(2) Project Alone: Scoping approach a	0.49	0.00	2605	1110	5755	2560	1090	5657
		(2) Project Alone: Scoping approach b	0.64	0.00	2605	1110	5755	2544	1083	5624
Kittiwake	Flamborough and Filey Coast	North Sea As-built: develper approach	410.67	61.14	45556	14847	128812	37900	12277	107535
		North Sea As built Approach a	441.91	76.92	45556	14847	128812	37255	12063	105728
		North Sea As-built: scoping approach b	491.30	101.50	45556	14847	128812	36261	11734	102944
		North Sea Consented developer approach	445.57	70.34	45556	14847	128812	37266	12066	105767
		North Sea Consented Scoping Approach a	476.81	86.02	45556	14847	128812	36633	11857	103993
		North Sea Consented Scoping Approach b	526.17	110.58	45556	14847	128812	35656	11535	101255
		(1) Project Alone: developer approach	17.05	8.24	45556	14847	128812	45137	14707	127653
		(2) Project Alone: Scoping approach a	28.51	14.12	45556	14847	128812	44854	14613	126865
		(2) Project Alone: Scoping approach b	38.17	18.88	45556	14847	128812	44618	14534	126214
Kittiwake	West Westray	North Sea As-built: develper approach	35.60	17.94	9	1	79	6	0	54
		North Sea As built Approach a	45.84	22.92	9	1	79	5	0	49
		North Sea As-built: scoping approach b	61.72	30.85	9	1	79	4	0	41
		North Sea Consented developer approach	40.20	20.34	9	1	79	6	0	51

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		North Sea Consented Scoping Approach a	50.54	25.32	9	1	79	5	0	46
		North Sea Consented Scoping Approach b	66.32	33.25	9	1	79	4	0	39
		(1) Project Alone: developer approach	5.10	2.64	9	1	79	9	0	74
		(2) Project Alone: Scoping approach a	9.04	4.52	9	1	79	8	0	72
		(2) Project Alone: Scoping approach b	12.12	6.05	9	1	79	8	0	69
Lesser Black-backed gull	Forth Islands SPA	(1) Project Alone: developer approach	1.97	0.30	33141	19500	54906	32549	19143	53933
		(2) Project Alone: Scoping approach	2.76	0.42	33141	19500	54906	32312	19001	53545
Lesser Black-backed gull	Farne Islands SPA	(1) Project Alone: developer approach	0.51	0.08	12130	7227	20323	11961	7124	20046
		(2) Project Alone: Scoping approach	0.72	0.11	12130	7227	20323	11896	7086	19943
Lesser Black-backed gull	Coquet SPA	(1) Project Alone: developer approach	0.01	0.00	9	2	35	9	2	35
		(2) Project Alone: Scoping approach	0.01	0.00	9	2	35	9	2	35
Puffin	Forth Islands SPA	North Sea Consented developer approach	44.31	51.11	351192	121139	897183	340671	117448	870888
		North Sea Consented Scoping Approach a	159.39	183.80	351192	121139	897183	314883	108374	806291
		North Sea Consented Scoping Approach b	265.10	306.16	351192	121139	897183	292804	100658	751027
		(1) Project Alone: developer approach	5.11	6.01	351192	121139	897183	349953	120705	894058
		(2) Project Alone: Scoping approach a	18.19	21.44	351192	121139	897183	346793	119596	886144

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		(2) Project Alone: Scoping approach b	29.80	35.56	351192	121139	897183	343975	118609	879136
Puffin	Farne Islands SPA	North Sea Consented developer approach	4.82	6.69	878308	312732	2183913	875343	311657	2176721
		North Sea Consented Scoping Approach a	17.31	23.75	878308	312732	2183913	867764	308909	2158295
		North Sea Consented Scoping Approach b	28.80	39.44	878308	312732	2183913	860850	306402	2141478
		(1) Project Alone: developer approach	3.62	4.89	878308	312732	2183913	876106	311933	2178566
		(2) Project Alone: Scoping approach a	12.91	17.45	878308	312732	2183913	870487	309897	2164905
		(2) Project Alone: Scoping approach b	21.40	28.94	878308	312732	2183913	865378	308046	2152482
Puffin	North Caithness Cliffs SPA	North Sea Consented developer approach	8.23	8.51	2991	614	11127	2505	511	9377
		North Sea Consented Scoping Approach a	29.48	30.67	2991	614	11127	1582	318	5998
		North Sea Consented Scoping Approach b	49.15	51.12	2991	614	11127	1029	202	3943
Razorbill	Forth Islands SPA	Forth and Tay Consented developer approach	13.56	11.86	43439	20553	86926	39308	18579	78744
		Forth and Tay Consented Scoping approach a	44.82	40.11	43439	20553	86926	31118	14659	62495
		Forth and Tay Consented Scoping Approach b	77.28	69.01	43439	20553	86926	24404	11467	49168
		North Sea Consented developer approach	17.26	14.06	43439	20553	86926	38390	18138	76913
		North Sea Consented Scoping Approach a	49.32	42.61	43439	20553	86926	30250	14246	60756

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		North Sea Consented Scoping Approach b	90.58	76.71	43439	20553	86926	22413	10520	45155
		(1) Project Alone: developer approach	3.56	3.06	43439	20553	86926	42324	20020	84718
		(2) Project Alone: Scoping approach a	10.62	9.51	43439	20553	86926	40135	18974	80398
		(2) Project Alone: Scoping approach b	18.98	17.31	43439	20553	86926	37682	17797	75500
Razorbill	St Abb's Head to Fast Castle SPA	Forth and Tay Consented developer approach	3.22	3.05	44161	21772	85831	42173	20774	81995
		Forth and Tay Consented Scoping approach a	9.69	9.70	44161	21772	85831	38300	18848	74539
		Forth and Tay Consented Scoping Approach b	17.32	16.91	44161	21772	85831	34334	16865	66874
		North Sea Consented developer approach	4.92	4.05	44161	21772	85831	41312	20347	80347
		North Sea Consented Scoping Approach a	11.79	10.90	44161	21772	85831	37349	18371	72709
		North Sea Consented Scoping Approach b	23.52	20.51	44161	21772	85831	31848	15630	62115
		(1) Project Alone: developer approach	2.62	2.65	44161	21772	85831	42492	20934	82612
		(2) Project Alone: Scoping approach a	8.29	8.70	44161	21772	85831	38997	19195	75879
		(2) Project Alone: Scoping approach b	14.42	14.91	44161	21772	85831	35627	17511	69355
Razorbill	Fowlsheugh SPA	Forth and Tay Consented developer approach	15.64	12.85	35593	13292	86312	33759	12606	81900
		Forth and Tay Consented Scoping approach a	50.93	42.76	35593	13292	86312	29914	11153	72630

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		Forth and Tay Consented Scoping Approach b	88.25	73.38	35593	13292	86312	26370	9830	64056
		North Sea Consented developer approach	20.74	15.75	35593	13292	86312	33252	12413	80679
		North Sea Consented Scoping Approach a	57.23	46.46	35593	13292	86312	29354	10941	71281
		North Sea Consented Scoping Approach b	106.70	84.18	35593	13292	86312	24940	9290	60626
		(1) Project Alone: developer approach	4.34	3.25	35593	13292	86312	35092	13105	85109
		(2) Project Alone: Scoping approach a	12.73	9.76	35593	13292	86312	34132	12745	82798
		(2) Project Alone: Scoping approach b	22.95	17.38	35593	13292	86312	33014	12323	80108
Razorbill	Troup, Pennan and Lion's Heads	North Sea Consented developer approach	4.05	2.50	12090	4515	29321	11659	4352	28284
		North Sea Consented Scoping Approach a	6.06	3.95	12090	4515	29321	11440	4269	27756
		North Sea Consented Scoping Approach b	15.65	9.79	12090	4515	29321	10500	3913	25496
		(1) Project Alone: developer approach	0.75	0.52	12090	4515	29321	12006	4483	29117
		(2) Project Alone: Scoping approach a	1.46	1.05	12090	4515	29321	11925	4452	28921
		(2) Project Alone: Scoping approach b	3.25	2.29	12090	4515	29321	11727	4378	28449
Razorbill	Farne Islands SPA	North Sea Consented developer approach	0.50	0.20	7622	3673	15272	7346	3537	14720
		North Sea Consented Scoping Approach a	0.62	0.50	7622	3673	15272	7198	3468	14429
		North Sea Consented Scoping Approach b	1.76	1.20	7622	3673	15272	6540	3147	13126

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Unimpacted median population size	Unimpacted median population size (2.5%)	Unimpacted median population size (97.5%)	Impacted median population size	Impacted median population size (2.5%)	Impacted median population size (97.5%)
		(1) Project Alone: developer approach	0.10	0.08	7622	3673	15272	7553	3640	15134
		(2) Project Alone: Scoping approach a	0.22	0.20	7622	3673	15272	7462	3595	14956
		(2) Project Alone: Scoping approach b	0.46	0.40	7622	3673	15272	7295	3515	14627
Razorbill	East Caithness cliffs	North Sea Consented developer approach	48.02	32.17	78982	30251	191307	73891	28279	179052
		North Sea Consented Scoping Approach a	113.00	80.21	78982	30251	191307	67312	25731	163150
		North Sea Consented Scoping Approach b	228.38	157.57	78982	30251	191307	57296	21867	139059
		(1) Project Alone: developer approach	3.92	2.57	78982	30251	191307	78558	30086	190285
		(2) Project Alone: Scoping approach a	5.30	3.51	78982	30251	191307	78408	30028	189920
		(2) Project Alone: Scoping approach b	14.78	9.77	78982	30251	191307	77392	29633	187468
Razorbill	Flamborough and Filey Coast	North Sea Consented developer approach	41.90	12.10	334324	161669	642843	319383	154329	614650
		North Sea Consented Scoping Approach a	102.78	14.79	334324	161669	642843	302009	145701	581857
		North Sea Consented Scoping Approach b	203.34	43.94	334324	161669	642843	270700	130460	521871
		(1) Project Alone: developer approach	3.00	2.17	334324	161669	642843	332938	160991	640202
		(2) Project Alone: Scoping approach a	3.78	2.79	334324	161669	642843	332564	160810	639493
		(2) Project Alone: Scoping approach b	11.04	8.04	334324	161669	642843	329230	159184	633161

Table 3.3: 2062 projection – summary of specific mortality scenarios, selected counterfactuals

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
Gannet	Forth Islands SPA	Forth and Tay Consented developer approach	583.34	17.75	0.901	0.997	35.6
		Forth and Tay Consented Scoping approach a	610.70	18.93	0.897	0.997	34.9
		Forth and Tay Consented Scoping Approach b	822.44	28.12	0.863	0.996	30.6
		North Sea Consented developer approach	800.34	167.85	0.853	0.996	29.0
		North Sea Consented Scoping Approach a	827.70	174.03	0.848	0.995	28.5
		North Sea Consented Scoping Approach b	1112.84	239.72	0.800	0.994	21.9
		(1) Project Alone: developer approach	154.14	5.55	0.973	0.999	46.2
		(2) Project Alone: Scoping approach a	183.04	6.73	0.968	0.999	45.6
		(2) Project Alone: Scoping approach b	245.17	10.82	0.957	0.999	44.0
Gannet	Flamborough and Filey Coast	North Sea As-built: developer approach	301.88	35.78	0.734	0.991	13.0
		North Sea As built Approach a	302.03	35.90	0.733	0.991	13.0
		North Sea As-built: scoping approach b	438.26	48.92	0.639	0.988	5.0
		North Sea Consented developer approach	351.48	36.38	0.699	0.990	9.9
		North Sea Consented Scoping Approach a	351.99	36.51	0.699	0.990	9.9
		North Sea Consented Scoping Approach b	487.86	49.52	0.609	0.986	3.5
Gannet	North Rona and Sula Sgeir	North Sea Consented developer approach	4.25	3.10	0.993	1.000	48.8
		North Sea Consented Scoping Approach a	4.33	3.10	0.992	1.000	48.8
		North Sea Consented Scoping Approach b	6.08	4.41	0.989	1.000	48.3
Gannet	Fair Isle	North Sea Consented developer approach	10.57	8.42	0.958	0.999	44.0
		North Sea Consented Scoping Approach a	10.66	8.42	0.958	0.999	44.0
		North Sea Consented Scoping Approach b	14.42	11.55	0.943	0.998	42.0
Gannet	Noss	North Sea Consented developer approach	35.08	28.51	0.950	0.999	42.8
		North Sea Consented Scoping Approach a	35.37	27.72	0.950	0.999	42.8
		North Sea Consented Scoping Approach b	48.68	37.93	0.932	0.998	39.8

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
Gannet	Hermaness, Saxa Vord and Valla Field	North Sea Consented developer approach	75.30	60.07	0.942	0.998	41.6
		North Sea Consented Scoping Approach a	76.81	60.11	0.941	0.998	41.4
		North Sea Consented Scoping Approach b	104.20	82.26	0.920	0.998	38.3
Guillemot	Forth Islands SPA	North Sea Consented developer approach	82.82	80.12	0.906	0.997	35.6
		North Sea Consented Scoping Approach a	200.88	200.60	0.784	0.993	18.0
		North Sea Consented Scoping Approach b	398.91	392.06	0.618	0.987	3.7
		(1) Project Alone: developer approach	37.42	36.62	0.956	0.999	43.3
		(2) Project Alone: Scoping approach a	91.58	91.20	0.895	0.997	33.8
		(2) Project Alone: Scoping approach b	180.51	178.26	0.804	0.994	20.6
Guillemot	St Abb's Head to Fast Castle SPA	North Sea Consented developer approach	131.01	132.85	0.914	0.998	37.4
		North Sea Consented Scoping Approach a	371.05	370.16	0.776	0.993	18.2
		North Sea Consented Scoping Approach b	695.77	688.70	0.622	0.987	4.5
		(1) Project Alone: developer approach	110.84	109.62	0.929	0.998	39.2
		(2) Project Alone: Scoping approach a	310.95	311.66	0.809	0.994	22.1
		(2) Project Alone: Scoping approach b	576.12	53.96	0.674	0.989	7.8
Guillemot	Fowlsheugh SPA	North Sea Consented developer approach	154.10	149.42	0.933	0.998	39.8
		North Sea Consented Scoping Approach a	430.29	423.20	0.822	0.995	23.7
		North Sea Consented Scoping Approach b	800.04	781.75	0.695	0.990	9.6
		(1) Project Alone: developer approach	89.20	88.52	0.960	0.999	44.3
		(2) Project Alone: Scoping approach a	259.91	261.04	0.887	0.997	33.3
		(2) Project Alone: Scoping approach b	473.32	472.88	0.805	0.994	21.7
Guillemot	Farne Islands SPA	(1) Project Alone: developer approach	36.92	40.21	0.982	1.000	47.4
		(2) Project Alone: Scoping approach a	79.84	88.67	0.962	0.999	44.0
		(2) Project Alone: Scoping approach b	167.20	183.90	0.922	0.998	37.1

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
Guillemot	Buchan Ness to Collieston Coast	Forth and Tay Consented developer approach	6.03	6.16	0.994	1.000	49.0
		Forth and Tay Consented Scoping approach a	12.57	13.30	0.986	1.000	47.7
		Forth and Tay Consented Scoping Approach b	27.10	28.09	0.971	0.999	45.6
		North Sea Consented developer approach	8.53	8.06	0.991	1.000	48.6
		North Sea Consented Scoping Approach a	18.77	17.91	0.981	0.999	46.7
		North Sea Consented Scoping Approach b	39.30	37.09	0.960	0.999	43.9
		(1) Project Alone: developer approach	4.93	4.76	0.995	1.000	49.3
		(2) Project Alone: Scoping approach a	9.57	9.40	0.990	1.000	48.4
		(2) Project Alone: Scoping approach b	21.40	20.79	0.978	0.999	46.4
Guillemot	Troup, Pennan and Lion's Heads	North Sea Consented developer approach	10.36	8.33	0.987	1.000	47.5
		North Sea Consented Scoping Approach a	22.34	17.61	0.973	0.999	44.9
		North Sea Consented Scoping Approach b	47.55	37.57	0.944	0.998	39.5
		(1) Project Alone: developer approach	2.47	2.19	0.995	1.000	49.0
		(2) Project Alone: Scoping approach a	5.19	4.70	0.991	1.000	48.3
		(2) Project Alone: Scoping approach b	11.10	9.97	0.979	0.999	46.3
Herring gull	Forth Islands SPA	North Sea Consented developer approach	15.17	4.04	0.969	0.999	45.8
		North Sea Consented Scoping Approach	22.10	5.30	0.955	0.999	44.0
		(1) Project Alone: developer approach	10.17	1.74	0.980	0.999	47.3
		(2) Project Alone: Scoping approach	17.10	3.00	0.967	0.999	45.6
Herring gull	Fowlsheugh SPA	Forth and Tay Consented developer approach	1.11	0.50	0.979	0.999	47.0
		Forth and Tay Consented Scoping Approach	1.52	0.58	0.972	0.999	46.1
		North Sea Consented developer approach	2.91	0.50	0.953	0.999	44.0
		North Sea Consented Scoping Approach	3.32	0.58	0.946	0.998	42.7
		(1) Project Alone: developer approach	0.61	0.10	0.990	1.000	48.7

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		(2) Project Alone: Scoping approach a	1.02	0.18	0.983	1.000	47.6
Herring gull	St Abb's Head to Fast Castle SPA	North Sea Consented developer approach	0.74	0.27	0.969	0.999	45.6
		North Sea Consented Scoping Approach	1.06	0.33	0.957	0.999	43.9
		(1) Project Alone: developer approach	0.44	0.07	0.983	1.000	47.5
		(2) Project Alone: Scoping approach	0.76	0.13	0.971	0.999	45.9
Herring gull	Farne Islands SPA	(1) Project Alone: developer approach	0.52	0.09	0.992	1.000	49.1
		(2) Project Alone: Scoping approach	0.87	0.15	0.986	1.000	48.2
Kittiwake	Forth Islands SPA	Forth and Tay Consented developer approach	56.22	4.23	0.833	0.995	36.1
		Forth and Tay Consented Scoping approach a	58.21	4.52	0.827	0.995	35.7
		Forth and Tay Consented Scoping Approach b	77.22	6.44	0.777	0.993	31.2
		North Sea Consented developer approach	64.82	8.33	0.804	0.994	33.7
		North Sea Consented Scoping Approach a	68.21	9.42	0.794	0.994	32.8
		North Sea Consented Scoping Approach b	89.92	12.54	0.737	0.992	27.5
		(1) Project Alone: developer approach	28.82	1.63	0.912	0.997	42.8
		(2) Project Alone: Scoping approach a	36.21	2.32	0.890	0.997	40.7
		(2) Project Alone: Scoping approach b	43.32	2.94	0.869	0.996	39.0
Kittiwake	Fowlsheugh SPA	Forth and Tay Consented developer approach	141.70	10.80	0.861	0.996	35.7
		Forth and Tay Consented Scoping approach a	155.35	12.51	0.849	0.995	34.6
		Forth and Tay Consented Scoping Approach b	197.25	16.94	0.811	0.994	30.5
		North Sea Consented developer approach	183.60	24.10	0.818	0.994	31.3
		North Sea Consented Scoping Approach a	200.35	27.91	0.803	0.994	29.6
		North Sea Consented Scoping Approach b	252.35	36.24	0.758	0.992	25.5
		(1) Project Alone: developer approach	87.03	4.90	0.914	0.997	41.0
		(2) Project Alone: Scoping approach a	109.05	7.01	0.892	0.997	38.9
		(2) Project Alone: Scoping approach b	130.45	8.84	0.872	0.996	36.8

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
Kittiwake	St Abb's Head to Fast Castle SPA	Forth and Tay Consented developer approach	266.61	10.50	0.494	0.981	7.6
		Forth and Tay Consented Scoping approach a	323.33	12.94	0.425	0.977	4.2
		Forth and Tay Consented Scoping Approach b	388.73	16.15	0.357	0.972	1.8
		North Sea Consented developer approach	275.71	15.00	0.479	0.980	7.0
		North Sea Consented Scoping Approach a	333.83	18.24	0.410	0.976	3.5
		North Sea Consented Scoping Approach b	402.23	22.95	0.341	0.971	1.3
		(1) Project Alone: developer approach	253.21	9.40	0.513	0.982	8.7
		(2) Project Alone: Scoping approach a	312.63	11.94	0.438	0.977	4.7
		(2) Project Alone: Scoping approach b	371.33	14.35	0.375	0.973	2.2
Kittiwake	Farne Islands SPA	North Sea Consented developer approach	33.18	6.60	0.893	0.997	39.2
		North Sea Consented Scoping Approach a	41.13	8.21	0.869	0.996	37.2
		North Sea Consented Scoping Approach b	50.69	10.62	0.840	0.995	34.3
		(1) Project Alone: developer approach	23.18	1.50	0.930	0.998	43.1
		(2) Project Alone: Scoping approach a	29.33	2.21	0.911	0.997	41.1
		(2) Project Alone: Scoping approach b	35.19	2.82	0.894	0.997	39.3
Kittiwake	Buchan Ness to Collieston Coast	Forth and Tay Consented developer approach	14.16	4.65	0.978	0.999	48.3
		Forth and Tay Consented Scoping approach a	20.77	7.24	0.968	0.999	47.3
		Forth and Tay Consented Scoping Approach b	27.51	10.18	0.958	0.999	46.6
		North Sea As-built: develper approach	63.36	19.25	0.908	0.997	41.9
		North Sea As built Approach a	75.37	24.54	0.891	0.997	40.6
		North Sea As-built: scoping approach b	93.11	32.78	0.865	0.996	38.5
		North Sea Consented developer approach	68.16	21.75	0.901	0.997	41.2
		North Sea Consented Scoping Approach a	80.17	27.04	0.883	0.997	40.0
		North Sea Consented Scoping Approach b	97.91	35.28	0.858	0.996	37.7
		(1) Project Alone: developer approach	11.06	2.95	0.984	1.000	48.6

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		(2) Project Alone: Scoping approach a	16.47	4.94	0.975	0.999	47.9
		(2) Project Alone: Scoping approach b	21.01	6.58	0.968	0.999	47.3
Kittiwake	Troup, Pennan and Lion's Heads	North Sea As-built: develper approach	60.06	23.44	0.916	0.998	41.0
		North Sea As built Approach a	69.77	29.39	0.902	0.997	39.4
		North Sea As-built: scoping approach b	96.82	39.79	0.867	0.996	35.2
		North Sea Consented developer approach	65.66	26.44	0.908	0.997	40.0
		North Sea Consented Scoping Approach a	75.47	32.39	0.894	0.997	38.4
		North Sea Consented Scoping Approach b	102.52	42.79	0.859	0.996	34.1
		(1) Project Alone: developer approach	9.01	3.34	0.987	1.000	48.6
		(2) Project Alone: Scoping approach a	14.07	5.69	0.980	0.999	47.9
		(2) Project Alone: Scoping approach b	18.42	7.59	0.973	0.999	47.4
Kittiwake	East Caithness cliffs	North Sea As-built: develper approach	276.52	74.45	0.847	0.995	37.3
		North Sea As built Approach a	277.61	88.37	0.843	0.995	36.8
		North Sea As-built: scoping approach b	395.62	120.80	0.785	0.993	32.3
		North Sea Consented developer approach	291.92	82.55	0.838	0.995	36.4
		North Sea Consented Scoping Approach a	293.11	96.47	0.834	0.995	36.0
		North Sea Consented Scoping Approach b	411.12	128.90	0.777	0.993	31.6
		(1) Project Alone: developer approach	18.39	8.85	0.988	1.000	49.1
		(2) Project Alone: Scoping approach a	30.71	15.17	0.980	0.999	48.5
		(2) Project Alone: Scoping approach b	41.12	20.30	0.973	0.999	47.8
Kittiwake	North Caithness Cliffs SPA	North Sea As-built: develper approach	35.94	15.62	0.855	0.996	38.2
		North Sea As built Approach a	43.42	19.81	0.826	0.995	35.5
		North Sea As-built: scoping approach b	58.71	26.59	0.772	0.993	30.8
		North Sea Consented developer approach	39.84	17.62	0.840	0.995	37.0
		North Sea Consented Scoping Approach a	47.22	21.81	0.811	0.994	34.3

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		North Sea Consented Scoping Approach b	62.51	28.59	0.759	0.992	29.8
		(1) Project Alone: developer approach	4.54	2.22	0.980	0.999	48.7
		(2) Project Alone: Scoping approach a	7.62	3.81	0.966	0.999	47.3
		(2) Project Alone: Scoping approach b	10.21	5.09	0.955	0.999	46.7
Kittiwake	Coquet island	North Sea Consented developer approach	1.70	0.70	0.945	0.998	43.4
		North Sea Consented Scoping Approach a	2.09	0.80	0.934	0.998	42.4
		North Sea Consented Scoping Approach b	2.74	1.10	0.913	0.997	40.1
		(1) Project Alone: developer approach	0.30	0.00	0.992	1.000	49.0
		(2) Project Alone: Scoping approach a	0.49	0.00	0.987	1.000	48.4
		(2) Project Alone: Scoping approach b	0.64	0.00	0.983	1.000	47.9
Kittiwake	Flamborough and Filey Coast	North Sea As-built: develper approach	410.67	61.14	0.878	0.996	39.5
		North Sea As built Approach a	441.91	76.92	0.867	0.996	38.5
		North Sea As-built: scoping approach b	491.30	101.50	0.851	0.996	37.1
		North Sea Consented developer approach	445.57	70.34	0.868	0.996	38.5
		North Sea Consented Scoping Approach a	476.81	86.02	0.857	0.996	37.6
		North Sea Consented Scoping Approach b	526.17	110.58	0.841	0.995	36.2
		(1) Project Alone: developer approach	17.05	8.24	0.994	1.000	49.6
		(2) Project Alone: Scoping approach a	28.51	14.12	0.989	1.000	49.3
		(2) Project Alone: Scoping approach b	38.17	18.88	0.985	1.000	48.9
Kittiwake	West Westray	North Sea As-built: develper approach	35.60	17.94	0.761	0.992	39.5
		North Sea As built Approach a	45.84	22.92	0.703	0.990	36.4
		North Sea As-built: scoping approach b	61.72	30.85	0.621	0.987	31.6
		North Sea Consented developer approach	40.20	20.34	0.734	0.991	38.1
		North Sea Consented Scoping Approach a	50.54	25.32	0.677	0.989	34.9
		North Sea Consented Scoping Approach b	66.32	33.25	0.599	0.986	30.6

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		(1) Project Alone: developer approach	5.10	2.64	0.962	0.999	48.5
		(2) Project Alone: Scoping approach a	9.04	4.52	0.934	0.998	47.2
		(2) Project Alone: Scoping approach b	12.12	6.05	0.912	0.997	46.2
Lesser Black-backed gull	Forth Islands SPA	(1) Project Alone: developer approach	1.97	0.30	0.987	1.000	47.7
		(2) Project Alone: Scoping approach	2.76	0.42	0.982	0.999	46.7
Lesser Black-backed gull	Farne Islands SPA	(1) Project Alone: developer approach	0.51	0.08	0.990	1.000	48.0
		(2) Project Alone: Scoping approach	0.72	0.11	0.986	1.000	47.3
Lesser Black-backed gull	Coquet SPA	(1) Project Alone: developer approach	0.01	0.00	0.996	1.000	49.6
		(2) Project Alone: Scoping approacha	0.01	0.00	0.995	1.000	49.5
Puffin	Forth Islands SPA	North Sea Consented developer approach	44.31	51.11	0.979	0.999	47.9
		North Sea Consented Scoping Approach a	159.39	183.80	0.926	0.998	43.1
		North Sea Consented Scoping Approach b	265.10	306.16	0.880	0.996	38.9
		(1) Project Alone: developer approach	5.11	6.01	0.998	1.000	49.7
		(2) Project Alone: Scoping approach a	18.19	21.44	0.991	1.000	48.9
		(2) Project Alone: Scoping approach b	29.80	35.56	0.986	1.000	48.3
Puffin	Farne Islands SPA	North Sea Consented developer approach	4.82	6.69	0.998	1.000	49.9
		North Sea Consented Scoping Approach a	17.31	23.75	0.992	1.000	49.1
		North Sea Consented Scoping Approach b	28.80	39.44	0.986	1.000	48.6
		(1) Project Alone: developer approach	3.62	4.89	0.998	1.000	49.9
		(2) Project Alone: Scoping approach a	12.91	17.45	0.994	1.000	49.3
		(2) Project Alone: Scoping approach b	21.40	28.94	0.990	1.000	48.9
Puffin	North Caithness Cliffs SPA	North Sea Consented developer approach	8.23	8.51	0.883	0.997	42.8
		North Sea Consented Scoping Approach a	29.48	30.67	0.638	0.988	26.2
		North Sea Consented Scoping Approach b	49.15	51.12	0.471	0.979	14.6
Razorbill	Forth Islands SPA	Forth and Tay Consented developer approach	13.56	11.86	0.932	0.998	41.7

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		Forth and Tay Consented Scoping approach a	44.82	40.11	0.790	0.993	23.6
		Forth and Tay Consented Scoping Approach b	77.28	69.01	0.666	0.989	11.0
		North Sea Consented developer approach	17.26	14.06	0.917	0.998	39.4
		North Sea Consented Scoping Approach a	49.32	42.61	0.775	0.993	21.9
		North Sea Consented Scoping Approach b	90.58	76.71	0.627	0.987	8.1
		(1) Project Alone: developer approach	3.56	3.06	0.982	0.999	48.0
		(2) Project Alone: Scoping approach a	10.62	9.51	0.946	0.998	43.4
		(2) Project Alone: Scoping approach b	18.98	17.31	0.905	0.997	38.2
Razorbill	St Abb's Head to Fast Castle SPA	Forth and Tay Consented developer approach	3.22	3.05	0.968	0.999	45.5
		Forth and Tay Consented Scoping approach a	9.69	9.70	0.904	0.997	37.1
		Forth and Tay Consented Scoping Approach b	17.32	16.91	0.837	0.995	27.9
		North Sea Consented developer approach	4.92	4.05	0.954	0.999	43.8
		North Sea Consented Scoping Approach a	11.79	10.90	0.889	0.997	35.0
		North Sea Consented Scoping Approach b	23.52	20.51	0.794	0.994	22.4
		(1) Project Alone: developer approach	2.62	2.65	0.973	0.999	46.2
		(2) Project Alone: Scoping approach a	8.29	8.70	0.916	0.998	38.6
		(2) Project Alone: Scoping approach b	14.42	14.91	0.859	0.996	31.1
Razorbill	Fowlsheugh SPA	Forth and Tay Consented developer approach	15.64	12.85	0.963	0.999	47.0
		Forth and Tay Consented Scoping approach a	50.93	42.76	0.885	0.997	38.8
		Forth and Tay Consented Scoping Approach b	88.25	73.38	0.809	0.994	30.9
		North Sea Consented developer approach	20.74	15.75	0.953	0.999	46.0
		North Sea Consented Scoping Approach a	57.23	46.46	0.873	0.996	37.6
		North Sea Consented Scoping Approach b	106.70	84.18	0.778	0.993	27.7
		(1) Project Alone: developer approach	4.34	3.25	0.990	1.000	48.8
		(2) Project Alone: Scoping approach a	12.73	9.76	0.971	0.999	47.5

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		(2) Project Alone: Scoping approach b	22.95	17.38	0.948	0.999	45.6
Razorbill	Troup, Pennan and Lion's Heads	North Sea Consented developer approach	4.05	2.50	0.975	0.999	47.8
		North Sea Consented Scoping Approach a	6.06	3.95	0.962	0.999	46.9
		North Sea Consented Scoping Approach b	15.65	9.79	0.905	0.997	41.1
		(1) Project Alone: developer approach	0.75	0.52	0.995	1.000	49.4
		(2) Project Alone: Scoping approach a	1.46	1.05	0.990	1.000	48.8
		(2) Project Alone: Scoping approach b	3.25	2.29	0.979	0.999	48.1
Razorbill	Farne Islands SPA	North Sea Consented developer approach	0.50	0.20	0.974	0.999	46.4
		North Sea Consented Scoping Approach a	0.62	0.50	0.960	0.999	44.8
		North Sea Consented Scoping Approach b	1.76	1.20	0.897	0.997	37.1
		(1) Project Alone: developer approach	0.10	0.08	0.994	1.000	49.2
		(2) Project Alone: Scoping approach a	0.22	0.20	0.985	1.000	47.9
		(2) Project Alone: Scoping approach b	0.46	0.40	0.970	0.999	45.8
Razorbill	East Caithness cliffs	North Sea Consented developer approach	48.02	32.17	0.954	0.999	45.6
		North Sea Consented Scoping Approach a	113.00	80.21	0.893	0.997	39.2
		North Sea Consented Scoping Approach b	228.38	157.57	0.797	0.994	29.4
		(1) Project Alone: developer approach	3.92	2.57	0.996	1.000	49.6
		(2) Project Alone: Scoping approach a	5.30	3.51	0.995	1.000	49.4
		(2) Project Alone: Scoping approach b	14.78	9.77	0.986	1.000	48.7
Razorbill	Flamborough and Filey Coast	North Sea Consented developer approach	41.90	12.10	0.968	0.999	45.7
		North Sea Consented Scoping Approach a	102.78	14.79	0.930	0.998	41.1
		North Sea Consented Scoping Approach b	203.34	43.94	0.861	0.996	32.0
		(1) Project Alone: developer approach	3.00	2.17	0.997	1.000	49.5
		(2) Project Alone: Scoping approach a	3.78	2.79	0.996	1.000	49.4
		(2) Project Alone: Scoping approach b	11.04	8.04	0.989	1.000	48.4

Table 3.4: 2077 projection – summary of specific mortality scenarios, selected counterfactuals

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
Gannet	Forth Islands SPA	Forth and Tay Consented developer approach	583.34	17.75	0.864	0.997	33.0
		Forth and Tay Consented Scoping approach a	610.70	18.93	0.858	0.997	32.3
		Forth and Tay Consented Scoping Approach b	822.44	28.12	0.813	0.996	26.9
		North Sea Consented developer approach	800.34	167.85	0.798	0.996	25.2
		North Sea Consented Scoping Approach a	827.70	174.03	0.792	0.995	24.5
		North Sea Consented Scoping Approach b	1112.84	239.72	0.730	0.994	17.4
		(1) Project Alone: developer approach	154.14	5.55	0.962	0.999	45.3
		(2) Project Alone: Scoping approach a	183.04	6.73	0.955	0.999	44.5
		(2) Project Alone: Scoping approach b	243.24	10.82	0.940	0.999	42.6
Gannet	Flamborough and Filey Coast	North Sea As-built: developer approach	301.88	35.78	0.646	0.991	8.4
		North Sea As built Approach a	302.03	35.90	0.646	0.991	8.4
		North Sea As-built: scoping approach b	438.26	48.92	0.531	0.988	2.5
		North Sea Consented developer approach	351.48	36.38	0.604	0.990	5.9
		North Sea Consented Scoping Approach a	351.99	36.51	0.603	0.990	5.9
		North Sea Consented Scoping Approach b	487.86	49.52	0.497	0.986	1.4

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
Gannet	North Rona and Sula Sgeir	North Sea Consented developer approach	4.25	3.10	0.989	1.000	48.8
		North Sea Consented Scoping Approach a	4.33	3.10	0.989	1.000	48.7
		North Sea Consented Scoping Approach b	6.08	4.41	0.985	1.000	48.3
Gannet	Fair Isle	North Sea Consented developer approach	10.57	8.42	0.941	0.999	42.1
		North Sea Consented Scoping Approach a	10.66	8.42	0.941	0.999	42.0
		North Sea Consented Scoping Approach b	14.42	11.55	0.920	0.998	39.2
Gannet	Noss	North Sea Consented developer approach	35.08	28.51	0.930	0.999	40.7
		North Sea Consented Scoping Approach a	35.37	27.72	0.930	0.999	40.8
		North Sea Consented Scoping Approach b	48.68	37.93	0.905	0.998	37.6
Gannet	Hermaness, Saxa Vord and Valla Field	North Sea Consented developer approach	75.30	60.07	0.918	0.998	40.0
		North Sea Consented Scoping Approach a	76.81	60.11	0.917	0.998	39.9
		North Sea Consented Scoping Approach b	104.20	82.26	0.889	0.998	36.3
Guillemot	Forth Islands SPA	North Sea Consented developer approach	82.82	80.12	0.869	0.997	32.5
		North Sea Consented Scoping Approach a	200.88	200.60	0.708	0.993	13.0
		North Sea Consented Scoping Approach b	398.91	392.06	0.505	0.987	1.3
		(1) Project Alone: developer approach	37.42	36.62	0.938	0.999	41.7

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		(2) Project Alone: Scoping approach a	91.58	91.20	0.855	0.997	30.3
		(2) Project Alone: Scoping approach b	180.51	178.26	0.734	0.994	15.8
Guillemot	St Abb's Head to Fast Castle SPA	North Sea Consented developer approach	131.01	132.85	0.880	0.998	33.9
		North Sea Consented Scoping Approach a	371.05	370.16	0.698	0.993	12.2
		North Sea Consented Scoping Approach b	695.77	688.70	0.510	0.987	1.7
		(1) Project Alone: developer approach	110.84	109.62	0.901	0.998	36.9
		(2) Project Alone: Scoping approach a	310.95	311.66	0.740	0.994	16.6
		(2) Project Alone: Scoping approach b	576.12	53.96	0.571	0.989	4.3
Guillemot	Fowlsheugh SPA	North Sea Consented developer approach	154.10	149.42	0.906	0.998	37.6
		North Sea Consented Scoping Approach a	430.29	423.20	0.757	0.995	18.5
		North Sea Consented Scoping Approach b	800.04	781.75	0.596	0.990	5.4
		(1) Project Alone: developer approach	89.20	88.52	0.944	0.999	42.8
		(2) Project Alone: Scoping approach a	259.91	261.04	0.844	0.997	28.8
		(2) Project Alone: Scoping approach b	473.32	472.88	0.734	0.994	16.1
Guillemot	Farne Islands SPA	(1) Project Alone: developer approach	36.92	40.21	0.975	1.000	46.9
		(2) Project Alone: Scoping approach a	79.84	88.67	0.946	0.999	42.8

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		(2) Project Alone: Scoping approach b	167.20	183.90	0.891	0.998	34.7
Guillemot	Buchan Ness to Collieston Coast	Forth and Tay Consented developer approach	6.03	6.16	0.991	1.000	48.7
		Forth and Tay Consented Scoping approach a	12.57	13.30	0.981	1.000	47.5
		Forth and Tay Consented Scoping Approach b	27.10	28.09	0.960	0.999	44.8
		North Sea Consented developer approach	8.53	8.06	0.988	1.000	48.2
		North Sea Consented Scoping Approach a	18.77	17.91	0.973	0.999	46.6
		North Sea Consented Scoping Approach b	39.30	37.09	0.944	0.999	42.5
		(1) Project Alone: developer approach	4.93	4.76	0.993	1.000	48.9
		(2) Project Alone: Scoping approach a	9.57	9.40	0.986	1.000	47.9
		(2) Project Alone: Scoping approach b	21.40	20.79	0.969	0.999	46.1
Guillemot	Troup, Pennan and Lion's Heads	North Sea Consented developer approach	10.36	8.33	0.982	1.000	47.2
		North Sea Consented Scoping Approach a	22.34	17.61	0.962	0.999	44.5
		North Sea Consented Scoping Approach b	47.55	37.57	0.921	0.998	37.3
		(1) Project Alone: developer approach	2.47	2.19	0.993	1.000	48.8
		(2) Project Alone: Scoping approach a	5.19	4.7	0.987	1.000	47.9
		(2) Project Alone: Scoping approach b	11.10	9.97	0.970	0.999	45.7

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
Herring gull	Forth Islands SPA	North Sea Consented developer approach	15.17	4.04	0.956	0.999	44.9
		North Sea Consented Scoping Approach	22.10	5.30	0.938	0.999	42.8
		(1) Project Alone: developer approach	10.17	1.74	0.972	0.999	46.7
		(2) Project Alone: Scoping approach	17.10	3.00	0.953	0.999	44.5
Herring gull	Fowlsheugh SPA	Forth and Tay Consented developer approach	1.11	0.50	0.970	0.999	46.3
		Forth and Tay Consented Scoping Approach	1.52	0.58	0.961	0.999	45.3
		North Sea Consented developer approach	2.91	0.50	0.934	0.999	42.1
		North Sea Consented Scoping Approach	3.32	0.58	0.925	0.998	41.0
		(1) Project Alone: developer approach	0.61	0.10	0.986	1.000	48.2
		(2) Project Alone: Scoping approach	1.02	0.18	0.976	1.000	46.9
Herring gull	St Abb's Head to Fast Castle SPA	North Sea Consented developer approach	0.74	0.27	0.956	0.999	44.3
		North Sea Consented Scoping Approach	1.06	0.33	0.940	0.999	42.1
		(1) Project Alone: developer approach	0.44	0.07	0.977	1.000	47.0
		(2) Project Alone: Scoping approach	0.76	0.13	0.960	0.999	44.9
Herring gull	Farne Islands SPA	(1) Project Alone: developer approach	0.52	0.09	0.989	1.000	48.7
		(2) Project Alone: Scoping approach	0.87	0.15	0.981	1.000	47.8

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
Kittiwake	Forth Islands SPA	Forth and Tay Consented developer approach	56.22	4.23	0.772	0.995	32.1
		Forth and Tay Consented Scoping approach a	58.21	4.52	0.765	0.995	31.6
		Forth and Tay Consented Scoping Approach b	77.22	6.44	0.700	0.993	25.9
		North Sea Consented developer approach	64.82	8.33	0.734	0.994	28.9
		North Sea Consented Scoping Approach a	68.21	9.42	0.721	0.994	28.0
		North Sea Consented Scoping Approach b	89.92	12.54	0.650	0.992	22.0
		(1) Project Alone: developer approach	28.82	1.63	0.877	0.997	40.9
		(2) Project Alone: Scoping approach a	36.21	2.32	0.848	0.997	38.7
		(2) Project Alone: Scoping approach b	43.32	2.94	0.820	0.996	36.3
Kittiwake	Fowlsheugh SPA	Forth and Tay Consented developer approach	141.70	10.80	0.810	0.996	33.6
		Forth and Tay Consented Scoping approach a	155.35	12.51	0.793	0.995	32.3
		Forth and Tay Consented Scoping Approach b	197.25	16.94	0.744	0.994	27.4
		North Sea Consented developer approach	183.60	24.10	0.754	0.994	28.2
		North Sea Consented Scoping Approach a	200.35	27.91	0.733	0.994	26.3
		North Sea Consented Scoping Approach b	252.35	36.24	0.676	0.992	21.2
		(1) Project Alone: developer approach	87.03	4.90	0.880	0.998	39.8

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		(2) Project Alone: Scoping approach a	109.05	7.01	0.851	0.997	37.4
		(2) Project Alone: Scoping approach b	130.45	8.84	0.825	0.996	35.0
Kittiwake	St Abb's Head to Fast Castle SPA	Forth and Tay Consented developer approach	266.61	10.50	0.370	0.981	3.8
		Forth and Tay Consented Scoping approach a	323.33	12.94	0.299	0.977	1.6
		Forth and Tay Consented Scoping Approach b	388.73	16.15	0.234	0.972	0.4
		North Sea Consented developer approach	275.71	15.00	0.354	0.980	3.3
		North Sea Consented Scoping Approach a	333.83	18.24	0.284	0.976	1.2
		North Sea Consented Scoping Approach b	402.23	22.95	0.218	0.971	0.4
		(1) Project Alone: developer approach	253.21	9.40	0.389	0.982	4.7
		(2) Project Alone: Scoping approach a	312.63	11.94	0.312	0.977	1.9
		(2) Project Alone: Scoping approach b	371.33	14.35	0.250	0.973	0.6
Kittiwake	Farne Islands SPA	North Sea Consented developer approach	33.18	6.60	0.852	0.997	37.5
		North Sea Consented Scoping Approach a	41.13	8.21	0.820	0.996	34.5
		North Sea Consented Scoping Approach b	50.69	10.62	0.782	0.995	31.3
		(1) Project Alone: developer approach	23.18	1.50	0.902	0.998	42.0
		(2) Project Alone: Scoping approach a	29.33	2.21	0.877	0.997	39.5

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		(2) Project Alone: Scoping approach b	35.19	2.82	0.854	0.997	37.6
Kittiwake	Buchan Ness to Collieston Coast	Forth and Tay Consented developer approach	14.16	4.65	0.970	0.999	47.7
		Forth and Tay Consented Scoping approach a	20.77	7.24	0.955	0.999	46.8
		Forth and Tay Consented Scoping Approach b	27.51	10.18	0.941	0.999	45.9
		North Sea As-built: developer approach	63.36	19.25	0.873	0.997	40.7
		North Sea As built Approach a	75.37	24.54	0.849	0.997	39.0
		North Sea As-built: scoping approach b	93.11	32.78	0.814	0.996	36.2
		North Sea Consented developer approach	68.16	21.75	0.863	0.997	40.0
		North Sea Consented Scoping Approach a	80.17	27.04	0.839	0.997	38.2
		North Sea Consented Scoping Approach b	97.91	35.28	0.805	0.996	35.6
		(1) Project Alone: developer approach	11.06	2.95	0.977	1.000	48.3
		(2) Project Alone: Scoping approach a	16.47	4.94	0.965	0.999	47.4
		(2) Project Alone: Scoping approach b	21.01	6.58	0.956	0.999	46.8
Kittiwake	Troup, Pennan and Lion's Heads	North Sea As-built: developer approach	60.06	23.44	0.883	0.998	38.0
		North Sea As built Approach a	69.77	29.39	0.864	0.997	36.2
		North Sea As-built: scoping approach b	96.82	39.79	0.817	0.996	31.3
		North Sea Consented developer approach	65.66	26.44	0.873	0.997	37.1

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		North Sea Consented Scoping Approach a	75.47	32.39	0.853	0.997	35.1
		North Sea Consented Scoping Approach b	102.52	42.79	0.807	0.996	30.1
		(1) Project Alone: developer approach	9.01	3.34	0.982	1.000	48.1
		(2) Project Alone: Scoping approach a	14.07	5.69	0.971	0.999	47.1
		(2) Project Alone: Scoping approach b	18.42	7.59	0.962	0.999	46.2
Kittiwake	East Caithness cliffs	North Sea As-built: developer approach	276.52	74.45	0.791	0.995	34.8
		North Sea As built Approach a	277.61	88.37	0.785	0.995	34.2
		North Sea As-built: scoping approach b	395.62	120.80	0.710	0.993	28.4
		North Sea Consented developer approach	291.92	82.55	0.780	0.995	33.9
		North Sea Consented Scoping Approach a	293.11	96.47	0.774	0.995	33.4
		North Sea Consented Scoping Approach b	411.12	128.90	0.700	0.993	27.4
		(1) Project Alone: developer approach	18.39	8.85	0.983	1.000	48.9
		(2) Project Alone: Scoping approach a	30.71	15.17	0.971	0.999	48.0
		(2) Project Alone: Scoping approach b	41.12	20.30	0.962	0.999	47.2
Kittiwake	North Caithness Cliffs SPA	North Sea As-built: developer approach	35.94	15.62	0.801	0.996	36.4
		North Sea As built Approach a	43.42	19.81	0.763	0.995	33.6
		North Sea As-built: scoping approach b	58.71	26.59	0.693	0.993	27.9

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		North Sea Consented developer approach	39.84	17.62	0.781	0.995	34.7
		North Sea Consented Scoping Approach a	47.22	21.81	0.744	0.994	31.9
		North Sea Consented Scoping Approach b	62.51	28.59	0.677	0.992	26.7
		(1) Project Alone: developer approach	4.54	2.22	0.972	0.999	48.1
		(2) Project Alone: Scoping approach a	7.62	3.81	0.953	0.999	47.0
		(2) Project Alone: Scoping approach b	10.21	5.09	0.937	0.999	45.9
Kittiwake	Coquet island	North Sea Consented developer approach	1.70	0.70	0.924	0.998	42.4
		North Sea Consented Scoping Approach a	2.09	0.80	0.908	0.998	41.1
		North Sea Consented Scoping Approach b	2.74	1.10	0.880	0.997	37.9
		(1) Project Alone: developer approach	0.30	0.00	0.989	1.000	48.9
		(2) Project Alone: Scoping approach a	0.49	0.00	0.982	1.000	48.3
		(2) Project Alone: Scoping approach b	0.64	0.00	0.977	1.000	47.8
Kittiwake	Flamborough and Filey Coast	North Sea As-built: developer approach	410.67	61.14	0.832	0.996	37.0
		North Sea As built Approach a	441.91	76.92	0.818	0.996	35.9
		North Sea As-built: scoping approach b	491.30	101.50	0.796	0.996	33.9
		North Sea Consented developer approach	445.57	70.34	0.818	0.996	35.9
		North Sea Consented Scoping Approach a	476.81	86.02	0.804	0.996	34.5

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		North Sea Consented Scoping Approach b	526.17	110.58	0.783	0.995	32.9
		(1) Project Alone: developer approach	17.05	8.24	0.991	1.000	49.1
		(2) Project Alone: Scoping approach a	28.51	14.12	0.985	1.000	48.7
		(2) Project Alone: Scoping approach b	38.17	18.88	0.979	1.000	48.2
Kittiwake	West Westray	North Sea As-built: developer approach	35.60	17.94	0.670	0.992	37.0
		North Sea As built Approach a	45.84	22.92	0.596	0.990	33.1
		North Sea As-built: scoping approach b	61.72	30.85	0.494	0.986	27.6
		North Sea Consented developer approach	40.20	20.34	0.635	0.991	35.1
		North Sea Consented Scoping Approach a	50.54	25.32	0.564	0.989	31.4
		North Sea Consented Scoping Approach b	66.32	33.25	0.467	0.985	25.9
		(1) Project Alone: developer approach	5.10	2.64	0.946	0.999	47.8
		(2) Project Alone: Scoping approach a	9.04	4.52	0.906	0.998	46.5
		(2) Project Alone: Scoping approach b	12.12	6.05	0.875	0.997	45.4
Lesser Black-backed gull	Forth Islands SPA	(1) Project Alone: developer approach	1.97	0.30	0.982	1.000	47.4
		(2) Project Alone: Scoping approach	2.76	0.42	0.975	1.000	46.2
Lesser Black-backed gull	Farne Islands SPA	(1) Project Alone: developer approach	0.51	0.08	0.986	1.000	48.2
		(2) Project Alone: Scoping approach	0.72	0.11	0.981	1.000	47.5

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
Lesser Black-backed gull	Coquet SPA	(1) Project Alone: developer approach	0.01	0.00	0.996	1.000	49.5
		(2) Project Alone: Scoping approach	0.01	0.00	0.994	1.000	49.3
Puffin	Forth Islands SPA	North Sea Consented developer approach	44.31	51.11	0.970	0.999	47.9
		North Sea Consented Scoping Approach a	159.39	183.80	0.897	0.998	41.3
		North Sea Consented Scoping Approach b	265.10	306.16	0.834	0.996	35.8
		(1) Project Alone: developer approach	5.11	6.01	0.996	1.000	49.6
		(2) Project Alone: Scoping approach a	18.19	21.44	0.988	1.000	49.1
		(2) Project Alone: Scoping approach b	29.80	35.56	0.980	1.000	48.6
Puffin	Farne Islands SPA	North Sea Consented developer approach	4.82	6.69	0.997	1.000	49.8
		North Sea Consented Scoping Approach a	17.31	23.75	0.988	1.000	49.0
		North Sea Consented Scoping Approach b	28.80	39.44	0.980	1.000	48.4
		(1) Project Alone: developer approach	3.62	4.89	0.998	1.000	49.9
		(2) Project Alone: Scoping approach a	12.91	17.45	0.991	1.000	49.3
		(2) Project Alone: Scoping approach b	21.40	28.94	0.985	1.000	48.8
Puffin	North Caithness Cliffs SPA	North Sea Consented developer approach	8.23	8.51	0.838	0.997	40.4
		North Sea Consented Scoping Approach a	29.48	30.67	0.528	0.988	21.1

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		North Sea Consented Scoping Approach b	49.15	51.12	0.344	0.979	8.7
Razorbill	Forth Islands SPA	Forth and Tay Consented developer approach	13.56	11.86	0.905	0.998	39.5
		Forth and Tay Consented Scoping approach a	44.82	40.11	0.716	0.993	18.4
		Forth and Tay Consented Scoping Approach b	77.28	69.01	0.562	0.989	5.9
		North Sea Consented developer approach	17.26	14.06	0.884	0.998	37.0
		North Sea Consented Scoping Approach a	49.32	42.61	0.696	0.993	16.4
		North Sea Consented Scoping Approach b	90.58	76.71	0.516	0.987	3.8
		(1) Project Alone: developer approach	3.56	3.06	0.974	0.999	47.2
		(2) Project Alone: Scoping approach a	10.62	9.51	0.924	0.998	41.4
		(2) Project Alone: Scoping approach b	18.98	17.31	0.868	0.997	35.3
Razorbill	St Abb's Head to Fast Castle SPA	Forth and Tay Consented developer approach	3.22	3.05	0.955	0.999	45.2
		Forth and Tay Consented Scoping approach a	9.69	9.70	0.867	0.997	34.3
		Forth and Tay Consented Scoping Approach b	17.32	16.91	0.777	0.995	23.9
		North Sea Consented developer approach	4.92	4.05	0.935	0.999	42.8
		North Sea Consented Scoping Approach a	11.79	10.90	0.846	0.997	31.4
		North Sea Consented Scoping Approach b	23.52	20.51	0.721	0.994	18.3

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		(1) Project Alone: developer approach	2.62	2.65	0.962	0.999	46.1
		(2) Project Alone: Scoping approach a	8.29	8.70	0.883	0.998	36.4
		(2) Project Alone: Scoping approach b	14.42	14.91	0.807	0.996	27.0
Razorbill	Fowlsheugh SPA	Forth and Tay Consented developer approach	15.64	12.85	0.949	0.999	45.4
		Forth and Tay Consented Scoping approach a	50.93	42.76	0.841	0.997	35.8
		Forth and Tay Consented Scoping Approach b	88.25	73.38	0.741	0.994	27.0
		North Sea Consented developer approach	20.74	15.75	0.934	0.999	44.2
		North Sea Consented Scoping Approach a	57.23	46.46	0.825	0.996	34.8
		North Sea Consented Scoping Approach b	106.70	84.18	0.701	0.993	22.9
		(1) Project Alone: developer approach	4.34	3.25	0.986	1.000	48.9
		(2) Project Alone: Scoping approach a	12.73	9.76	0.959	0.999	46.2
		(2) Project Alone: Scoping approach b	22.95	17.38	0.928	0.999	43.6
Razorbill	Troup, Pennan and Lion's Heads	North Sea Consented developer approach	4.05	2.50	0.964	0.999	46.7
		North Sea Consented Scoping Approach a	6.06	3.95	0.946	0.999	45.3
		North Sea Consented Scoping Approach b	15.65	9.79	0.868	0.997	38.2
		(1) Project Alone: developer approach	0.75	0.52	0.993	1.000	49.5

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		(2) Project Alone: Scoping approach a	1.46	1.05	0.986	1.000	48.9
		(2) Project Alone: Scoping approach b	3.25	2.29	0.970	0.999	47.2
Razorbill	Farne Islands SPA	North Sea Consented developer approach	0.50	0.20	0.964	0.999	45.8
		North Sea Consented Scoping Approach a	0.62	0.50	0.944	0.999	43.6
		North Sea Consented Scoping Approach b	1.76	1.20	0.858	0.997	34.5
		(1) Project Alone: developer approach	0.10	0.08	0.991	1.000	49.0
		(2) Project Alone: Scoping approach a	0.22	0.20	0.979	1.000	47.5
		(2) Project Alone: Scoping approach b	0.46	0.40	0.957	0.999	45.0
Razorbill	East Caithness cliffs	North Sea Consented developer approach	48.02	32.17	0.935	0.999	44.9
		North Sea Consented Scoping Approach a	113.00	80.21	0.852	0.997	38.0
		North Sea Consented Scoping Approach b	228.38	157.57	0.725	0.994	26.5
		(1) Project Alone: developer approach	3.92	2.57	0.995	1.000	49.6
		(2) Project Alone: Scoping approach a	5.30	3.51	0.993	1.000	49.4
		(2) Project Alone: Scoping approach b	14.78	9.77	0.980	1.000	48.1
Razorbill	Flamborough and Filey Coast	North Sea Consented developer approach	41.90	12.10	0.955	0.999	45.3
		North Sea Consented Scoping Approach a	102.78	14.79	0.903	0.998	38.9

Species	SPA	Scenario	Estimated adult mortality	Estimated immature mortality	Counterfactual Population Size -median	Counterfactual of population growth rate - median	Unimpacted centile at impacted 50th centile (median)
		North Sea Consented Scoping Approach b	203.34	43.94	0.809	0.996	27.8
		(1) Project Alone: developer approach	3.00	2.17	0.996	1.000	49.6
		(2) Project Alone: Scoping approach a	3.78	2.79	0.995	1.000	49.5
		(2) Project Alone: Scoping approach b	11.04	8.04	0.985	1.000	48.3

Table 3.5: 2062 projection – summary of specific mortality scenarios for regions for 7 species. Note matched-pair runs are not conducted when combining regional PVAs – counterfactuals for population growth may be marginally larger than 1 for small impacts due to simulation variability. Similarly 50th centile figures may exceed 50.

Species	Scenario	Unimpacted median population size	Impacted median population size	Counterfactual of population growth rate - median	Counterfactual Population Size - median	Unimpacted centile at impacted 50th centile (median)
Gannet	(1) Project Alone: developer approach	1986443	1964645	1.000	0.987	47.2
	(2) Project Alone: Scoping approach a	1986443	1960712	1.000	0.984	46.6
	(2) Project Alone: Scoping approach b	1986443	1948624	0.999	0.980	45.2
	Forth and Tay Consented developer approach	1986443	1886754	0.999	0.952	37.2
	Forth and Tay Consented Scoping approach a	1986443	1883882	0.998	0.946	36.9
	Forth and Tay Consented Scoping Approach b	1986443	1846353	0.998	0.927	32.1
	North Sea Consented developer approach	1986443	1729021	0.996	0.867	18.4
	North Sea Consented Scoping Approach a	1986443	1716996	0.996	0.866	17.1
	North Sea Consented Scoping Approach b	1986443	1638870	0.995	0.821	10.3
	North Sea As-built: developer approach	1986443	1920713	0.999	0.967	41.6
	North Sea As built Approach a	1986443	1919283	0.999	0.968	41.3
	North Sea As-built: scoping approach b	1986443	1894512	0.999	0.956	38.1
Guillemot	(1) Project Alone: developer approach	1177118	1144276	0.999	0.974	40.1

Species	Scenario	Unimpacted median population size	Impacted median population size	Counterfactual of population growth rate - median	Counterfactual Population Size - median	Unimpacted centile at impacted 50th centile (median)
	(2) Project Alone: Scoping approach a	1177118	1085147	0.998	0.923	24.1
	(2) Project Alone: Scoping approach b	1177118	1008205	0.996	0.855	8.7
	North Sea Consented developer approach	1177118	1131946	0.999	0.962	36.6
	North Sea Consented Scoping Approach a	1177118	1060139	0.997	0.902	18.1
	North Sea Consented Scoping Approach b	1177118	973219	0.995	0.830	4.5
	Forth and Tay Consented developer approach	1177118	1142467	0.999	0.971	39.6
	Forth and Tay Consented Scoping approach a	1177118	1081981	0.998	0.918	23.2
	Forth and Tay Consented Scoping Approach b	1177118	1007158	0.996	0.856	8.6
Herring gull	(1) Project Alone: developer approach	158405	155612	1.000	0.981	47.1
	(2) Project Alone: Scoping approach	158405	153719	0.999	0.968	44.7
	North Sea Consented developer approach	158405	153859	0.999	0.970	44.9
	North Sea Consented Scoping Approach	158405	151634	0.999	0.957	42.3
	Forth and Tay Consented developer approach	158405	154986	0.999	0.980	46.2
	Forth and Tay Consented Scoping Approach	158405	153688	0.999	0.972	44.7
Kittiwake	(1) Project Alone: developer approach	216118	212612	0.999	0.983	47.3
	(2) Project Alone: Scoping approach a	216118	209560	0.999	0.966	44.7
	(2) Project Alone: Scoping approach b	216118	207506	0.999	0.961	43.1
	Forth and Tay Consented developer approach	216118	210200	0.999	0.970	45.3
	Forth and Tay Consented Scoping approach a	216118	207876	0.999	0.963	43.4
	Forth and Tay Consented Scoping Approach b	216118	206352	0.999	0.960	42.2
	North Sea Consented developer approach	216118	185008	0.996	0.856	24.3
	North Sea Consented Scoping Approach a	216118	182965	0.995	0.846	22.5
	North Sea Consented Scoping Approach b	216118	174636	0.994	0.808	17.2
	North Sea As-built: developer approach	216118	193188	0.997	0.893	31.2
	North Sea As built Approach a	216118	191433	0.997	0.882	29.8

Species	Scenario	Unimpacted median population size	Impacted median population size	Counterfactual of population growth rate - median	Counterfactual Population Size - median	Unimpacted centile at impacted 50th centile (median)
	North Sea As-built: scoping approach b	216118	183277	0.995	0.846	22.7
Lesser Black-backed gull	(1) Project Alone: developer approach	25959	25704	1.000	0.991	47.8
	(2) Project Alone: Scoping approach	25959	25507	0.999	0.983	46.0
Puffin	(1) Project Alone: developer approach	756984	752063	1.000	0.995	49.1
	(2) Project Alone: Scoping approach a	756984	749107	1.000	0.996	48.7
	(2) Project Alone: Scoping approach b	756984	748853	1.000	0.988	48.7
	North Sea Consented developer approach	756984	749618	1.000	0.986	48.8
	North Sea Consented Scoping Approach a	756984	735327	0.999	0.968	46.1
	North Sea Consented Scoping Approach b	756984	717711	0.998	0.947	42.8
Razorbill	(1) Project Alone: developer approach	366241	363643	1.000	0.997	48.6
	(2) Project Alone: Scoping approach a	366241	360039	1.000	0.982	46.4
	(2) Project Alone: Scoping approach b	366241	355002	0.999	0.966	43.7
	Forth and Tay Consented developer approach	366241	362407	1.000	0.989	47.8
	Forth and Tay Consented Scoping approach a	366241	349935	0.999	0.956	40.4
	Forth and Tay Consented Scoping Approach b	366241	341267	0.998	0.930	35.1
	North Sea Consented developer approach	366241	350751	0.999	0.959	40.9
	North Sea Consented Scoping Approach a	366241	330434	0.997	0.903	28.7
	North Sea Consented Scoping Approach b	366241	300038	0.994	0.820	14.0

Table 3.6: 2077 projection – summary of specific mortality scenarios for regions for 7 species. Note matched-pair runs are not conducted when combining regional PVAs – counterfactuals for population growth may be marginally larger than 1 for small impacts due to simulation variability. Similarly, 50th centile figures may exceed 50.

Species	Scenario	Unimpacted median population size	Impacted median population size	Counterfactual of population growth rate - median	Counterfactual Population Size - median	Unimpacted centile at impacted 50th centile (median)
Gannet	(1) Project Alone: developer approach	3696467	3612434	1.000	0.978	44.8
	(2) Project Alone: Scoping approach a	3696467	3609880	0.999	0.974	44.7
	(2) Project Alone: Scoping approach b	3696467	3582963	0.999	0.970	43.0
	Forth and Tay Consented developer approach	3696467	3422554	0.999	0.926	33.8
	Forth and Tay Consented Scoping approach a	3696467	3412813	0.999	0.929	33.3
	Forth and Tay Consented Scoping Approach b	3696467	3327953	0.998	0.897	28.3
	North Sea Consented developer approach	3696467	3020686	0.996	0.817	12.8
	North Sea Consented Scoping Approach a	3696467	3009107	0.996	0.815	12.4
	North Sea Consented Scoping Approach b	3696467	2806166	0.995	0.757	5.6
	North Sea As-built: developer approach	3696467	3512550	0.999	0.953	39.1
	North Sea As built Approach a	3696467	3511541	0.999	0.953	39.0
	North Sea As-built: scoping approach b	3696467	3444903	0.999	0.937	35.0
Guillemot	(1) Project Alone: developer approach	1816712	1742204	0.999	0.957	37.5
	(2) Project Alone: Scoping approach a	1816712	1623758	0.998	0.893	19.8
	(2) Project Alone: Scoping approach b	1816712	1471010	0.996	0.809	5.6
	North Sea Consented developer approach	1816712	1724909	0.999	0.951	34.7
	North Sea Consented Scoping Approach a	1816712	1584525	0.997	0.874	14.8
	North Sea Consented Scoping Approach b	1816712	1426631	0.995	0.789	3.3
	Forth and Tay Consented developer approach	1816712	1735772	0.999	0.955	36.5
	Forth and Tay Consented Scoping approach a	1816712	1622214	0.998	0.891	19.6
	Forth and Tay Consented Scoping Approach b	1816712	1476651	0.996	0.811	5.9
Herring gull	(1) Project Alone: developer approach	364687	357107	1.000	0.974	46.7

Species	Scenario	Unimpacted median population size	Impacted median population size	Counterfactual of population growth rate - median	Counterfactual Population Size - median	Unimpacted centile at impacted 50th centile (median)
	(2) Project Alone: Scoping approach	364687	351727	0.999	0.957	44.5
	North Sea Consented developer approach	364687	351277	0.999	0.963	44.2
	North Sea Consented Scoping Approach	364687	346766	0.999	0.952	41.9
	Forth and Tay Consented developer approach	364687	356025	1.000	0.973	46.3
	Forth and Tay Consented Scoping Approach	364687	351792	0.999	0.962	44.5
Kittiwake	(1) Project Alone: developer approach	221068	216027	1.000	0.976	46.5
	(2) Project Alone: Scoping approach a	221068	212541	0.999	0.964	44.1
	(2) Project Alone: Scoping approach b	221068	210762	0.999	0.957	42.9
	Forth and Tay Consented developer approach	221068	215722	1.000	0.977	46.3
	Forth and Tay Consented Scoping approach a	221068	211539	0.999	0.956	43.5
	Forth and Tay Consented Scoping Approach b	221068	210895	0.999	0.952	43.0
	North Sea Consented developer approach	221068	179532	0.996	0.814	21.6
	North Sea Consented Scoping Approach a	221068	176447	0.995	0.797	19.8
	North Sea Consented Scoping Approach b	221068	165858	0.994	0.745	13.3
	North Sea As-built: developer approach	221068	188411	0.997	0.853	27.2
	North Sea As built Approach a	221068	185559	0.997	0.843	25.4
	North Sea As-built: scoping approach b	221068	174456	0.995	0.786	18.6
Lesser Black-backed gull	(1) Project Alone: developer approach	45829	45016	1.000	0.983	46.5
	(2) Project Alone: Scoping approach	45829	44800	1.000	0.977	45.5
Puffin	(1) Project Alone: developer approach	1284129	1280098	1.000	1.005	49.6
	(2) Project Alone: Scoping approach a	1284129	1263051	1.000	0.988	48.2
	(2) Project Alone: Scoping approach b	1284129	1266029	1.000	0.992	48.4
	North Sea Consented developer approach	1284129	1274867	1.000	0.996	49.2
	North Sea Consented Scoping Approach a	1284129	1232174	0.999	0.964	45.4
	North Sea Consented Scoping Approach b	1284129	1206944	0.999	0.950	43.2

Species	Scenario	Unimpacted median population size	Impacted median population size	Counterfactual of population growth rate - median	Counterfactual Population Size - median	Unimpacted centile at impacted 50th centile (median)
Razorbill	(1) Project Alone: developer approach	577073	572792	1.000	0.990	48.7
	(2) Project Alone: Scoping approach a	577073	565226	1.000	0.982	46.3
	(2) Project Alone: Scoping approach b	577073	547779	0.999	0.953	40.8
	Forth and Tay Consented developer approach	577073	565360	1.000	0.978	46.4
	Forth and Tay Consented Scoping approach a	577073	550662	0.999	0.955	41.6
	Forth and Tay Consented Scoping Approach b	577073	529784	0.998	0.919	34.9
	North Sea Consented developer approach	577073	546524	0.999	0.949	40.3
	North Sea Consented Scoping Approach a	577073	502715	0.997	0.871	26.9
	North Sea Consented Scoping Approach b	577073	441838	0.995	0.760	10.3

3.2 GANNET - FORTH ISLANDS SPA

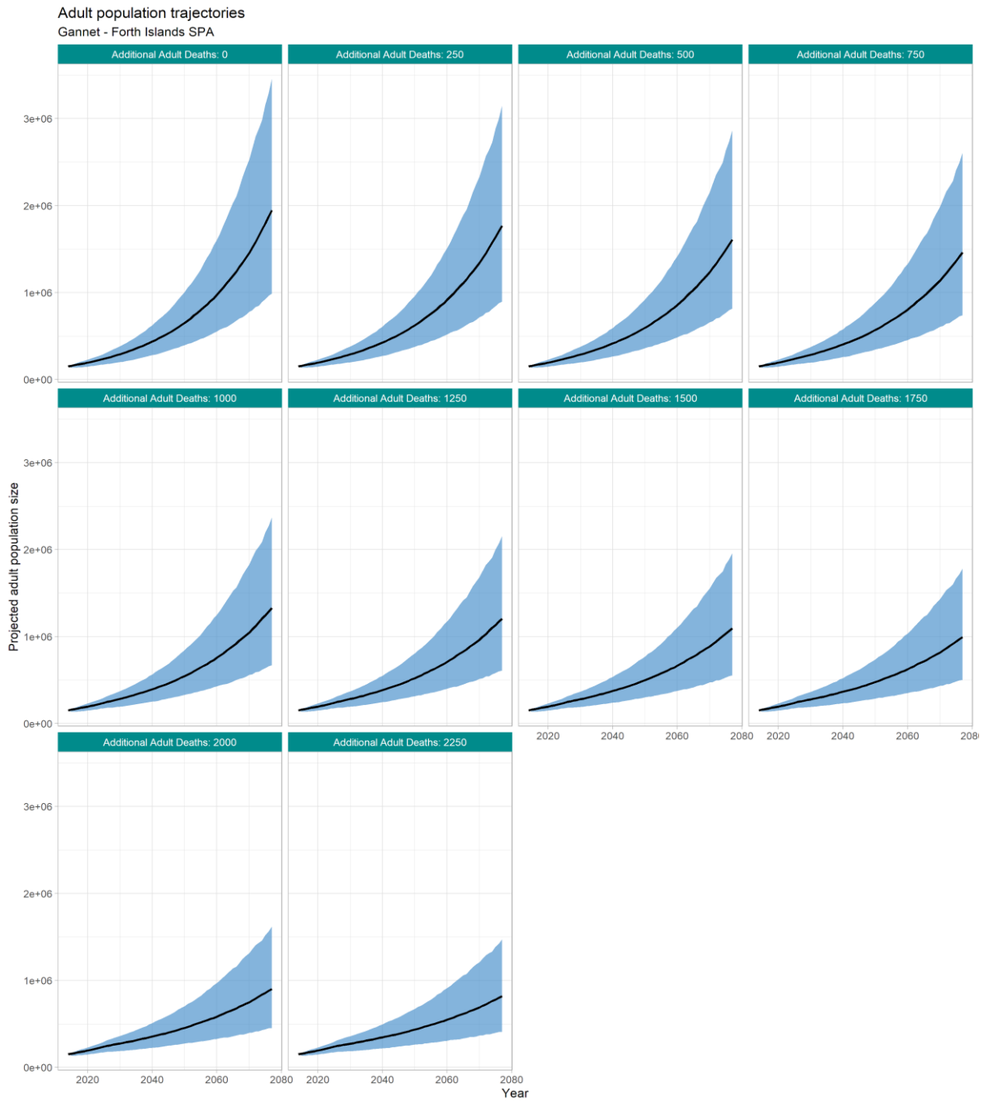

Figure 3.1: **Figure Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.**

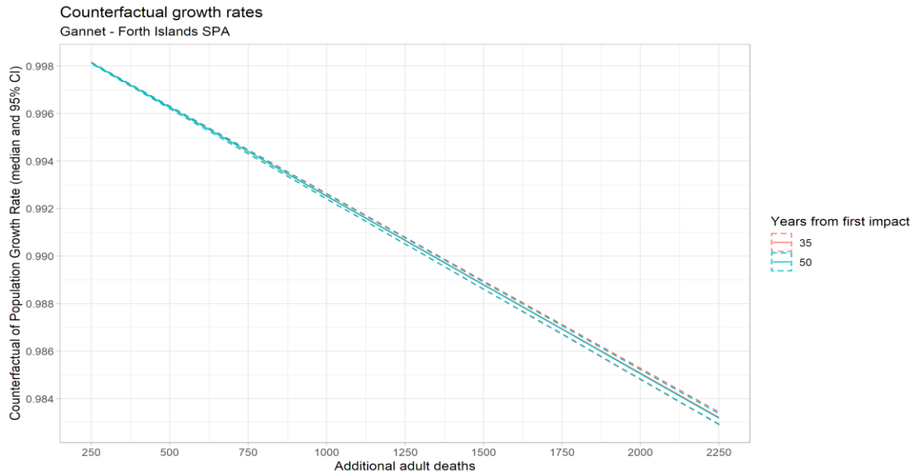

Figure 3.2: **Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).**

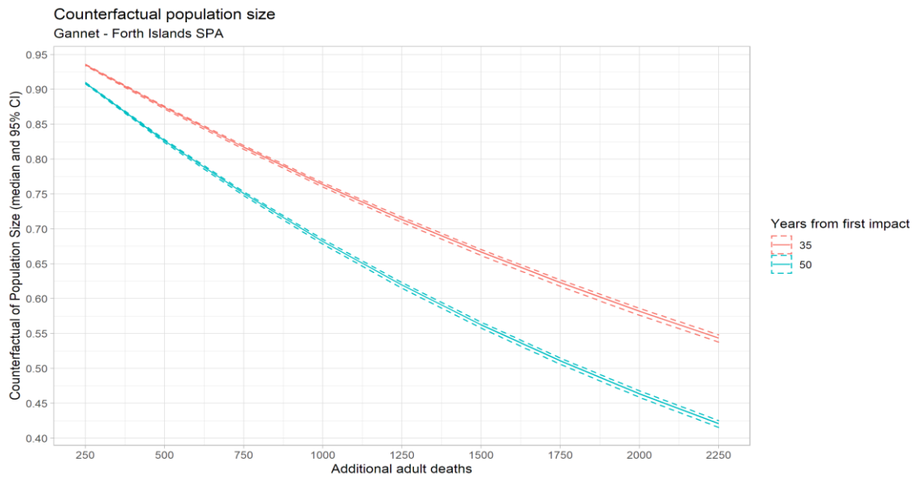

Figure 3.3: **The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).**

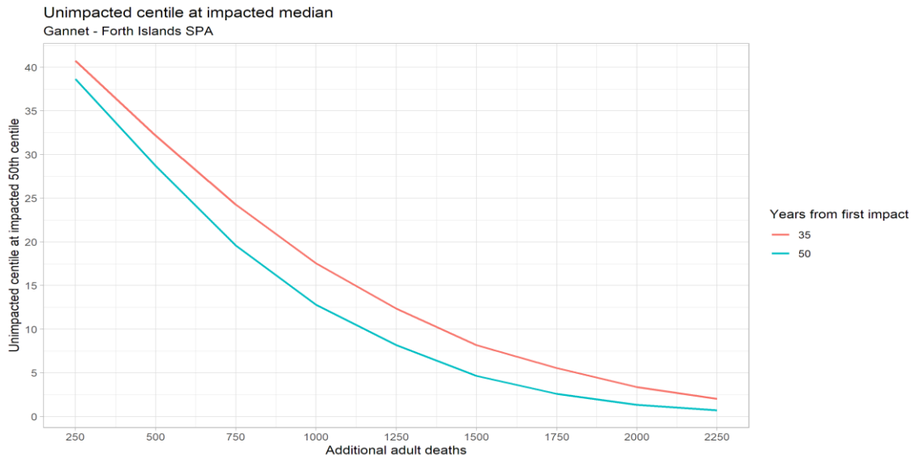

Figure 3.4 **The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).**

Table 3.7: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.042	1.027	1.054			
2062	250	1.040	1.025	1.052	0.935	0.998	40.7
2062	500	1.038	1.023	1.050	0.874	0.996	32.1
2062	750	1.036	1.021	1.048	0.817	0.994	24.3
2062	1000	1.034	1.019	1.046	0.764	0.993	17.5
2062	1250	1.032	1.017	1.044	0.714	0.991	12.3
2062	1500	1.030	1.015	1.042	0.667	0.989	8.2
2062	1750	1.028	1.013	1.041	0.623	0.987	5.5
2062	2000	1.026	1.011	1.039	0.582	0.985	3.4
2062	2250	1.024	1.009	1.037	0.544	0.983	2.0
2077	0	1.041	1.029	1.052			
2077	250	1.039	1.027	1.050	0.909	0.998	38.6
2077	500	1.037	1.025	1.048	0.826	0.996	28.7
2077	750	1.036	1.023	1.046	0.751	0.994	19.6
2077	1000	1.034	1.021	1.044	0.682	0.993	12.8
2077	1250	1.032	1.019	1.042	0.619	0.991	8.2
2077	1500	1.030	1.017	1.040	0.563	0.989	4.6
2077	1750	1.028	1.015	1.038	0.511	0.987	2.6
2077	2000	1.026	1.013	1.036	0.464	0.985	1.3
2077	2250	1.024	1.011	1.034	0.421	0.983	0.7

Table 3.8: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.00	0.00	1057020.0	592306.0	1771243
Forth and Tay Consented developer approach	0.1	583.34	17.75	952367.0	533711.7	1596707
Forth and Tay Consented Scoping approach a	0.1	610.70	18.93	947664.4	531088.5	1588915
Forth and Tay Consented Scoping Approach b	0.1	822.44	28.12	912148.0	511212.0	1529872
North Sea Consented developer approach	0.1	800.34	167.85	900856.7	504410.1	1511404
North Sea Consented Scoping Approach a	0.1	827.70	174.03	895867.8	501616.8	1503157
North Sea Consented Scoping Approach b	0.1	1112.84	239.72	845416.2	473321.9	1419587
(1) Project Alone: developer approach	0.1	154.14	5.55	1028217.7	576163.3	1723310
(2) Project Alone: Scoping approach a	0.1	183.04	6.73	1023133.4	573331.1	1714865
(2) Project Alone: Scoping approach b	0.1	245.17	10.82	1011584.4	566890.0	1695683

Table 3.9: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.00	0.00	1946799	987991.4	3466133
Forth and Tay Consented developer approach	0.1	583.34	17.75	1680845	853159.0	2995590
Forth and Tay Consented Scoping approach a	0.1	610.70	18.93	1669167	847258.0	2974995
Forth and Tay Consented Scoping Approach b	0.1	822.44	28.12	1582193	802935.0	2820552
North Sea Consented developer approach	0.1	800.34	167.85	1553444	787755.3	2771071
North Sea Consented Scoping Approach a	0.1	827.70	174.03	1541333	781610.6	2749721
North Sea Consented Scoping Approach b	0.1	1112.84	239.72	1420659	720170.0	2536132
(1) Project Alone: developer approach	0.1	154.14	5.55	1872658	950273.7	3334585
(2) Project Alone: Scoping approach a	0.1	183.04	6.73	1859720	943698.7	3311649
(2) Project Alone: Scoping approach b	0.1	245.17	10.82	1830410	928798.9	3259729

Table 3.10: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.00	0.00	1.042	1.027	1.054	1.041	1.029	1.052
Forth and Tay Consented developer approach	0.1	583.34	17.75	1.039	1.024	1.051	1.038	1.026	1.049
Forth and Tay Consented Scoping approach a	0.1	610.70	18.93	1.039	1.024	1.051	1.038	1.026	1.049
Forth and Tay Consented Scoping Approach b	0.1	822.44	28.12	1.037	1.022	1.050	1.037	1.025	1.048
North Sea Consented developer approach	0.1	800.34	167.85	1.037	1.022	1.049	1.037	1.024	1.047
North Sea Consented Scoping Approach a	0.1	827.70	174.03	1.037	1.022	1.049	1.037	1.024	1.047
North Sea Consented Scoping Approach b	0.1	1112.84	239.72	1.035	1.020	1.048	1.035	1.022	1.045
(1) Project Alone: developer approach	0.1	154.14	5.55	1.041	1.026	1.053	1.041	1.028	1.051
(2) Project Alone: Scoping approach a	0.1	183.04	6.73	1.041	1.026	1.053	1.040	1.028	1.051
(2) Project Alone: Scoping approach b	0.1	245.17	10.82	1.040	1.025	1.053	1.040	1.028	1.050

Table 3.11: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
Forth and Tay Consented developer approach	0.1	583.34	17.75	0.901	0.864	0.997	0.997
Forth and Tay Consented Scoping approach a	0.1	610.70	18.93	0.897	0.858	0.997	0.997
Forth and Tay Consented Scoping Approach b	0.1	822.44	28.12	0.863	0.813	0.996	0.996
North Sea Consented developer approach	0.1	800.34	167.85	0.853	0.798	0.996	0.996
North Sea Consented Scoping Approach a	0.1	827.70	174.03	0.848	0.792	0.995	0.995
North Sea Consented Scoping Approach b	0.1	1112.84	239.72	0.800	0.730	0.994	0.994
(1) Project Alone: developer approach	0.1	154.14	5.55	0.973	0.962	0.999	0.999
(2) Project Alone: Scoping approach a	0.1	183.04	6.73	0.968	0.955	0.999	0.999
(2) Project Alone: Scoping approach b	0.1	245.17	10.82	0.957	0.940	0.999	0.999

3.3 GANNET - FLAMBOROUGH AND FILEY COAST SPA

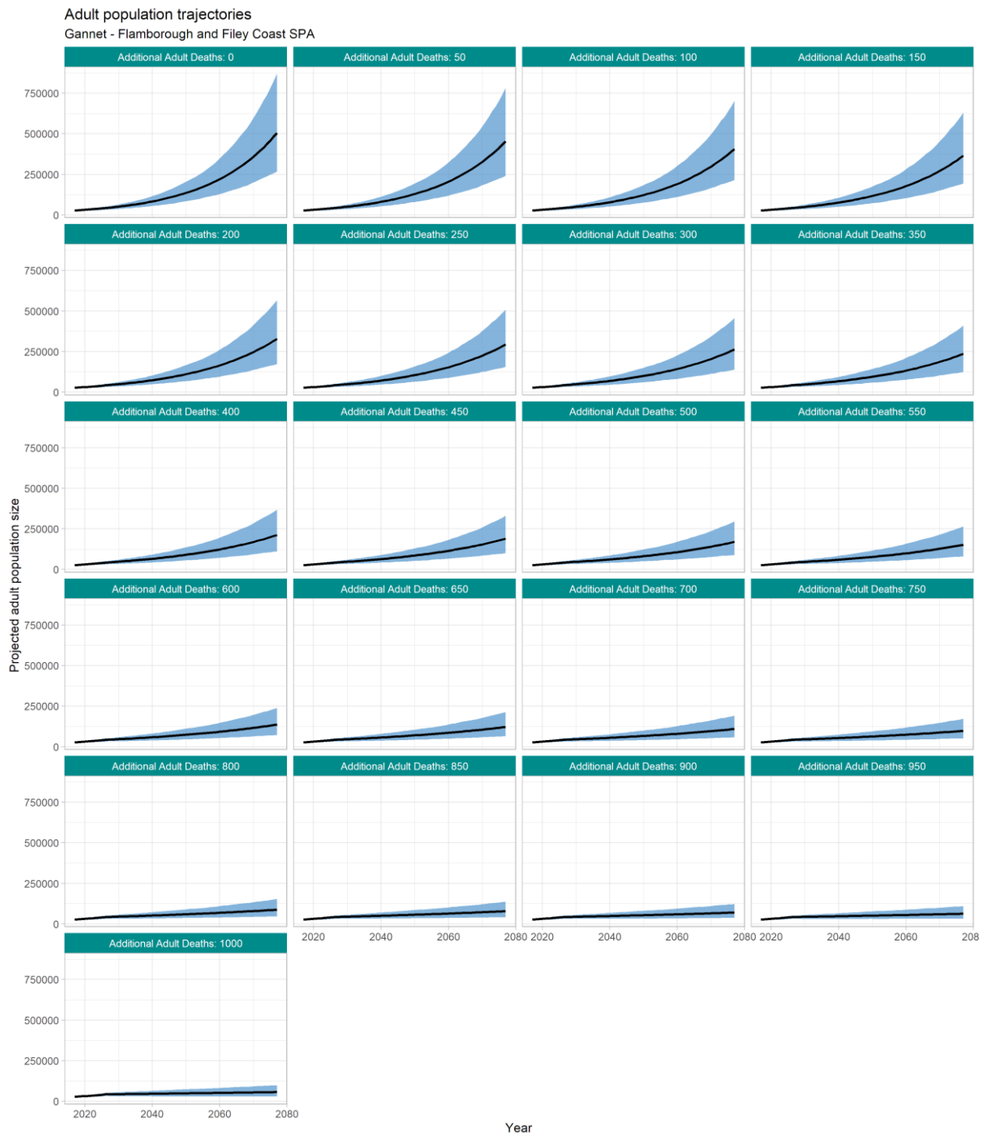

Figure 3.5: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.**

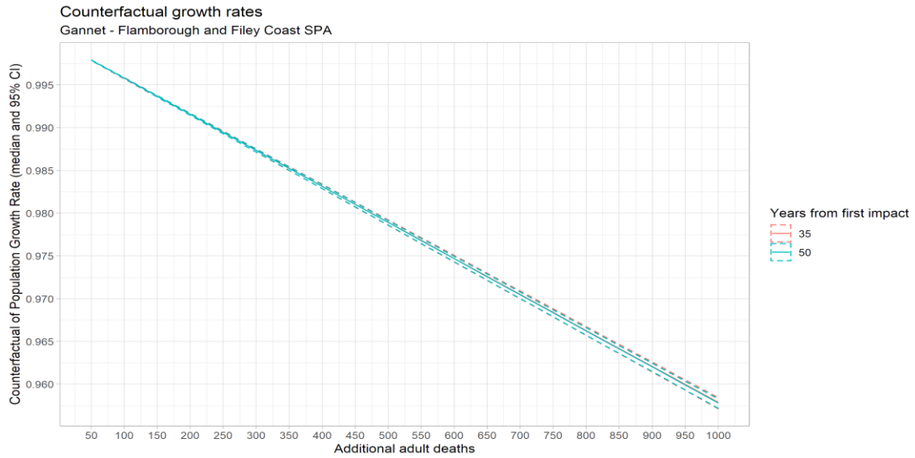

Figure 3.6: **Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).**

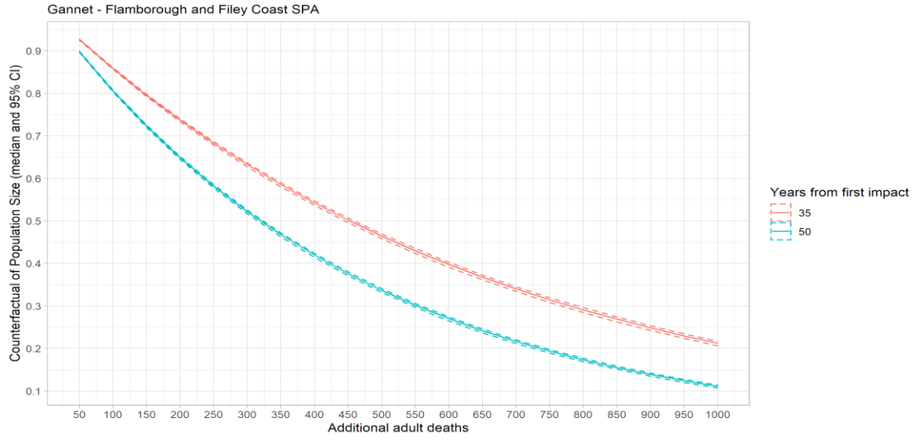

Figure 3.7: **The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).**

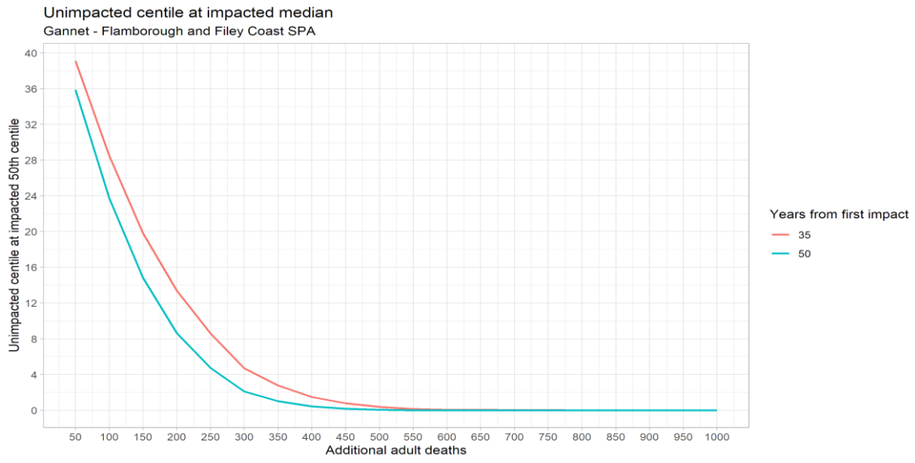

Figure 3.8: **The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).**

Table 3.12: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.050	1.036	1.063			
2062	50	1.048	1.033	1.060	0.927	0.998	39.1
2062	100	1.046	1.031	1.058	0.859	0.996	28.5
2062	150	1.044	1.029	1.056	0.796	0.994	19.8
2062	200	1.042	1.027	1.054	0.737	0.992	13.4
2062	250	1.039	1.025	1.052	0.683	0.989	8.6
2062	300	1.037	1.022	1.049	0.633	0.987	4.7
2062	350	1.035	1.020	1.047	0.586	0.985	2.8
2062	400	1.033	1.018	1.045	0.542	0.983	1.5
2062	450	1.030	1.016	1.043	0.502	0.981	0.8
2062	500	1.028	1.014	1.041	0.465	0.979	0.4
2062	550	1.026	1.011	1.038	0.430	0.977	0.1
2062	600	1.024	1.009	1.036	0.398	0.975	0.1
2062	650	1.022	1.007	1.034	0.368	0.973	0.0
2062	700	1.019	1.005	1.032	0.340	0.971	0.0
2062	750	1.017	1.002	1.029	0.315	0.968	0.0
2062	800	1.015	1.000	1.027	0.291	0.966	0.0
2062	850	1.013	0.998	1.025	0.269	0.964	0.0
2062	900	1.011	0.996	1.023	0.249	0.962	0.0
2062	950	1.008	0.994	1.021	0.230	0.960	0.0
2062	1000	1.006	0.991	1.018	0.212	0.958	0.0
2077	0	1.050	1.038	1.061			
2077	50	1.048	1.036	1.058	0.898	0.998	35.9
2077	100	1.046	1.034	1.056	0.806	0.996	23.7
2077	150	1.044	1.031	1.054	0.723	0.994	14.8
2077	200	1.041	1.029	1.052	0.649	0.992	8.6
2077	250	1.039	1.027	1.049	0.582	0.989	4.7
2077	300	1.037	1.025	1.047	0.522	0.987	2.1
2077	350	1.035	1.023	1.045	0.468	0.985	1.0
2077	400	1.032	1.020	1.043	0.420	0.983	0.4
2077	450	1.030	1.018	1.041	0.376	0.981	0.2
2077	500	1.028	1.016	1.038	0.337	0.979	0.1
2077	550	1.026	1.014	1.036	0.302	0.977	0.0
2077	600	1.024	1.011	1.034	0.270	0.975	0.0
2077	650	1.021	1.009	1.032	0.242	0.973	0.0
2077	700	1.019	1.007	1.030	0.217	0.970	0.0

2077	750	1.017	1.005	1.027	0.194	0.968	0.0
2077	800	1.015	1.003	1.025	0.173	0.966	0.0
2077	850	1.013	1.000	1.023	0.155	0.964	0.0
2077	900	1.010	0.998	1.021	0.139	0.962	0.0
2077	950	1.008	0.996	1.018	0.124	0.960	0.0
2077	1000	1.006	0.994	1.016	0.111	0.958	0.0

Table 3.13: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.00	0.00	243126.9	141247.1	386265.7
North Sea As-built: developer approach	0.1	301.88	35.78	178439.1	103641.7	284276.7
North Sea As built Approach a	0.1	302.03	35.90	178399.9	103618.7	284214.6
North Sea As-built: scoping approach b	0.1	438.26	48.92	155369.2	90305.5	247695.9
North Sea Consented developer approach	0.1	351.48	36.38	170210.6	98862.6	271188.9
North Sea Consented Scoping Approach a	0.1	351.99	36.51	170113.7	98806.2	271038.5
North Sea Consented Scoping Approach b	0.1	487.86	49.52	148144.1	86099.4	236140.1

Table 3.14: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.00	0.00	504370.9	268580.1	871781.6
North Sea As-built: developer approach	0.1	301.88	35.78	325679.4	173047.4	563389.0
North Sea As built Approach a	0.1	302.03	35.90	325578.1	172993.9	563218.0
North Sea As-built: scoping approach b	0.1	438.26	48.92	267978.8	142316.9	464201.1
North Sea Consented developer approach	0.1	351.48	36.38	304501.0	161782.7	526944.8
North Sea Consented Scoping Approach a	0.1	351.99	36.51	304256.7	161652.3	526525.9
North Sea Consented Scoping Approach b	0.1	487.86	49.52	250668.4	133095.7	434411.2

Table 3.15: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.00	0.00	1.050	1.036	1.063	1.050	1.038	1.061
North Sea As-built: developer approach	0.1	301.88	35.78	1.041	1.027	1.054	1.041	1.029	1.052
North Sea As built Approach a	0.1	302.03	35.90	1.041	1.027	1.054	1.041	1.029	1.052
North Sea As-built: scoping approach b	0.1	438.26	48.92	1.037	1.023	1.050	1.037	1.025	1.048
North Sea Consented developer approach	0.1	351.48	36.38	1.040	1.025	1.052	1.040	1.028	1.050
North Sea Consented Scoping Approach a	0.1	351.99	36.51	1.040	1.025	1.052	1.040	1.028	1.050
North Sea Consented Scoping Approach b	0.1	487.86	49.52	1.036	1.022	1.048	1.036	1.024	1.046

Table 3.16: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea As-built: developer approach	0.1	301.88	35.78	0.734	0.646	0.991	0.991
North Sea As built Approach a	0.1	302.03	35.90	0.733	0.646	0.991	0.991
North Sea As-built: scoping approach b	0.1	438.26	48.92	0.639	0.531	0.988	0.988
North Sea Consented developer approach	0.1	351.48	36.38	0.699	0.604	0.990	0.990
North Sea Consented Scoping Approach a	0.1	351.99	36.51	0.699	0.603	0.990	0.990
North Sea Consented Scoping Approach b	0.1	487.86	49.52	0.609	0.497	0.986	0.986

3.4 GANNET - NORTH RONA AND SULA SGEIR SPA

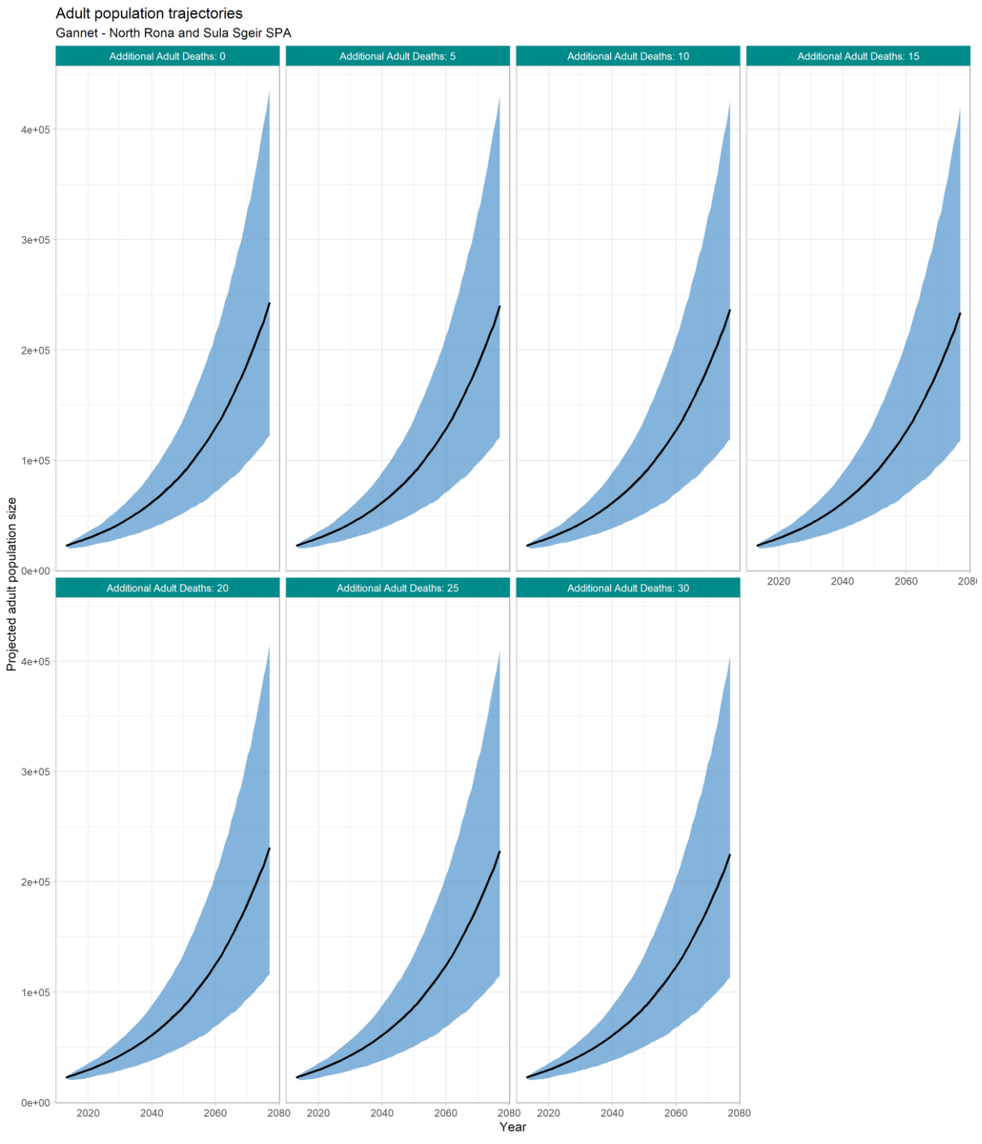

Figure 3.9: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.**

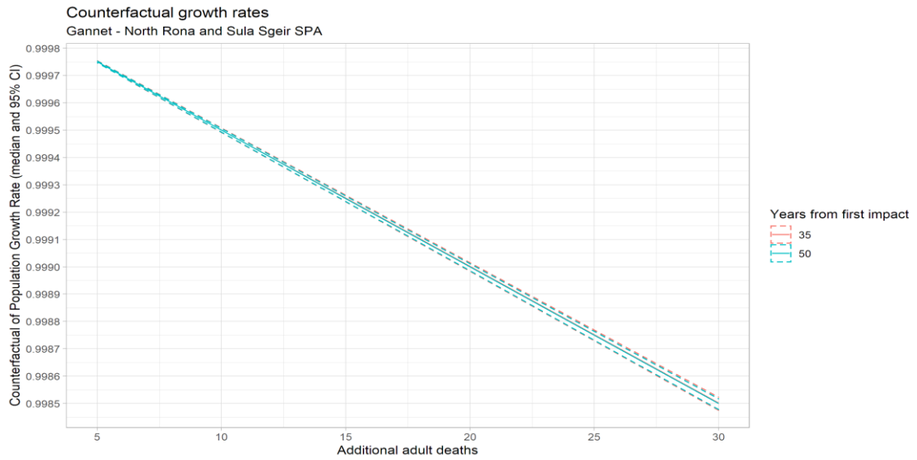

Figure 3.10: **Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).**

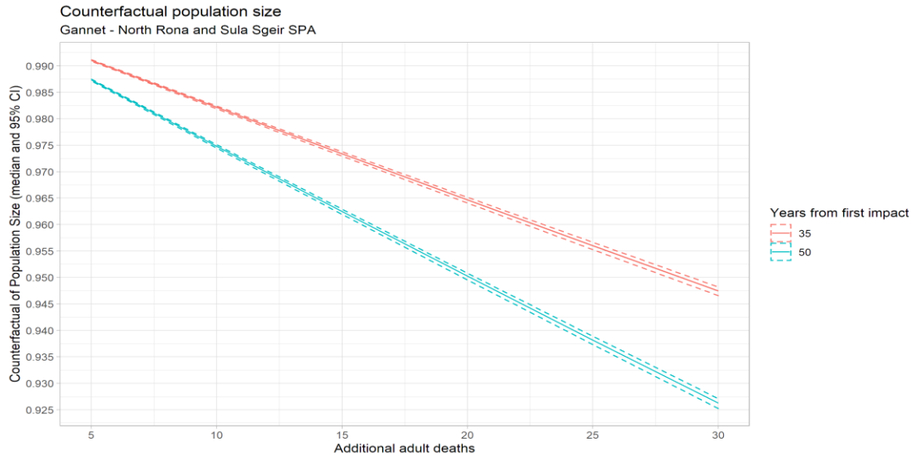

Figure 3.11: **The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).**

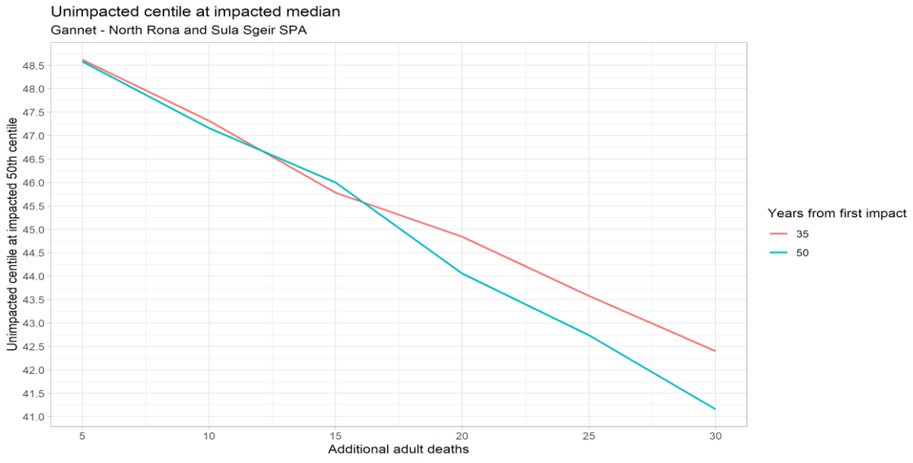

Figure 3.12: **The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).**

Table 3.17: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.038	1.023	1.051			
2062	5	1.038	1.023	1.051	0.991	1.000	48.6
2062	10	1.038	1.022	1.050	0.982	1.000	47.3
2062	15	1.037	1.022	1.050	0.973	0.999	45.8
2062	20	1.037	1.022	1.050	0.965	0.999	44.8
2062	25	1.037	1.022	1.050	0.956	0.999	43.6
2062	30	1.037	1.021	1.049	0.947	0.999	42.4
2077	0	1.038	1.025	1.049			
2077	5	1.038	1.025	1.048	0.987	1.000	48.6
2077	10	1.038	1.025	1.048	0.975	0.999	47.2
2077	15	1.037	1.025	1.048	0.962	0.999	46.0
2077	20	1.037	1.024	1.048	0.950	0.999	44.1
2077	25	1.037	1.024	1.047	0.938	0.999	42.7
2077	30	1.036	1.024	1.047	0.926	0.998	41.2

Table 3.18: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.00	0.000	138981.5	76350.6	233224.8
North Sea Consented developer approach	0.1	4.25	3.103	137941.9	75772.3	231511.8
North Sea Consented Scoping Approach a	0.1	4.33	3.104	137928.7	75764.7	231488.3
North Sea Consented Scoping Approach b	0.1	6.08	4.405	137499.9	75525.6	230782.1

Table 3.19: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.00	0.000	243141.3	122494.4	437073.9
North Sea Consented developer approach	0.1	4.25	3.103	240562.0	121178.8	432494.5
North Sea Consented Scoping Approach a	0.1	4.33	3.104	240528.6	121161.1	432438.8
North Sea Consented Scoping Approach b	0.1	6.08	4.405	239468.0	120621.0	430553.8

Table 3.20: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.00	0.000	1.038	1.023	1.051	1.038	1.025	1.049
North Sea Consented developer approach	0.1	4.25	3.103	1.038	1.023	1.051	1.038	1.025	1.048
North Sea Consented Scoping Approach a	0.1	4.33	3.104	1.038	1.023	1.051	1.038	1.025	1.048
North Sea Consented Scoping Approach b	0.1	6.08	4.405	1.038	1.023	1.051	1.038	1.025	1.048

Table 3.21: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.1	4.25	3.103	0.993	0.989	1	1
North Sea Consented Scoping Approach a	0.1	4.33	3.104	0.992	0.989	1	1
North Sea Consented Scoping Approach b	0.1	6.08	4.405	0.989	0.985	1	1

3.5 GANNET – FAIR ISLE SPA

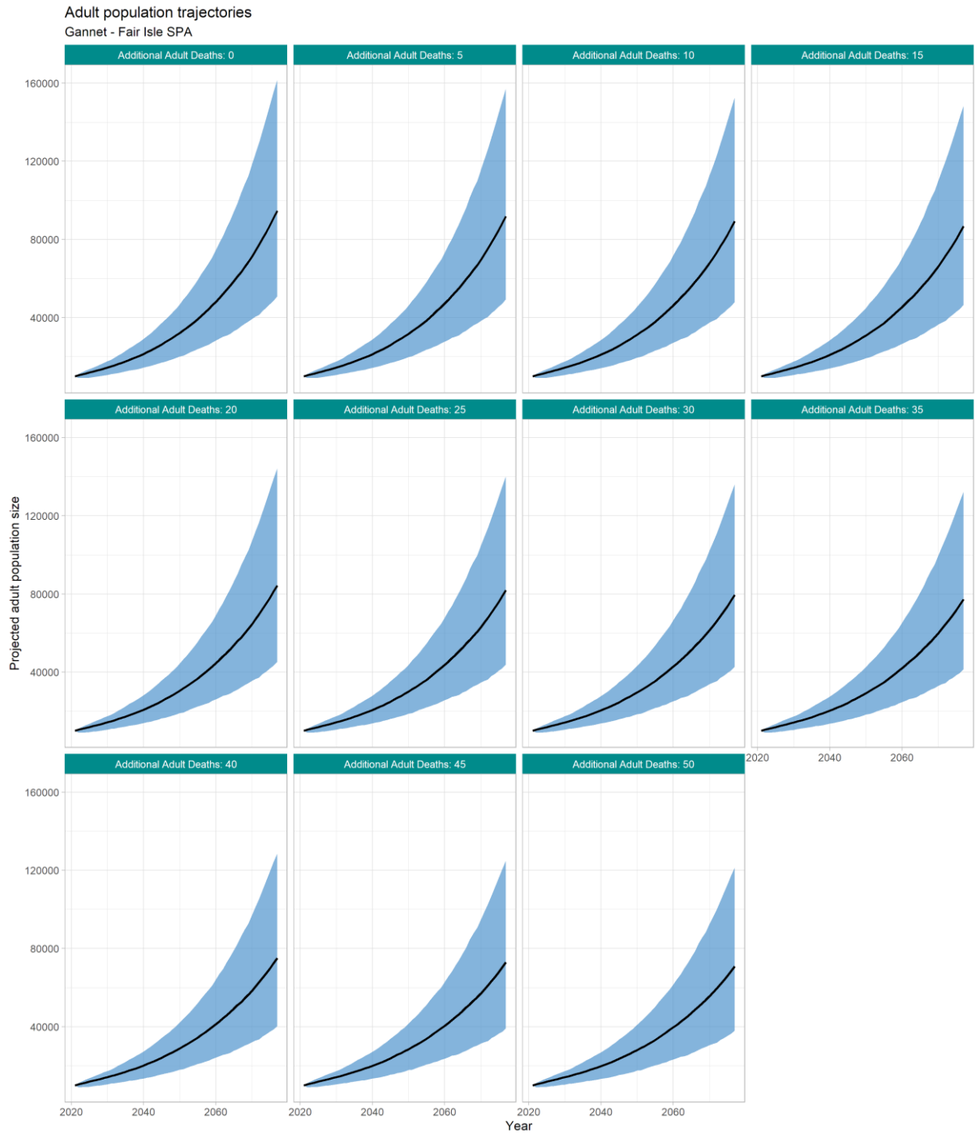

Figure 3.13: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.**

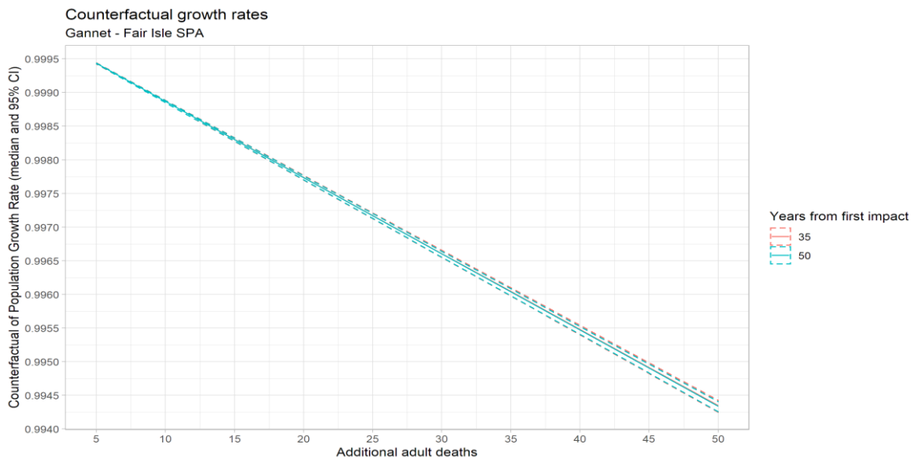

Figure 3.14: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

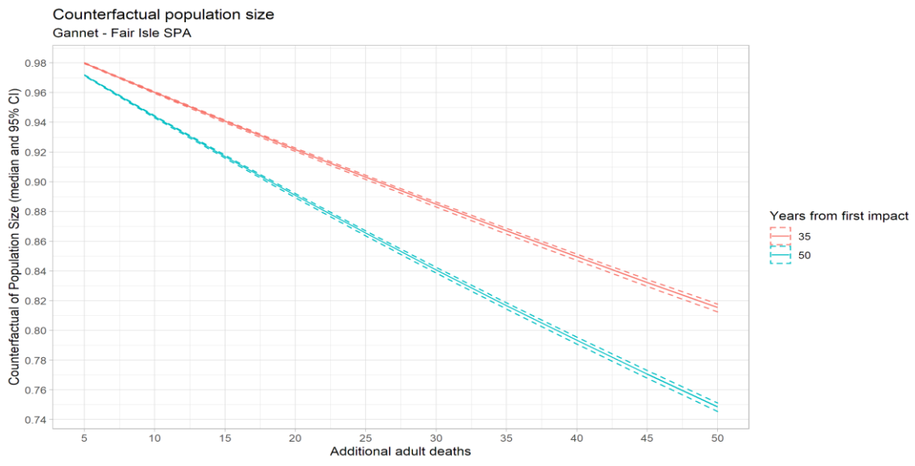

Figure 3.15: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

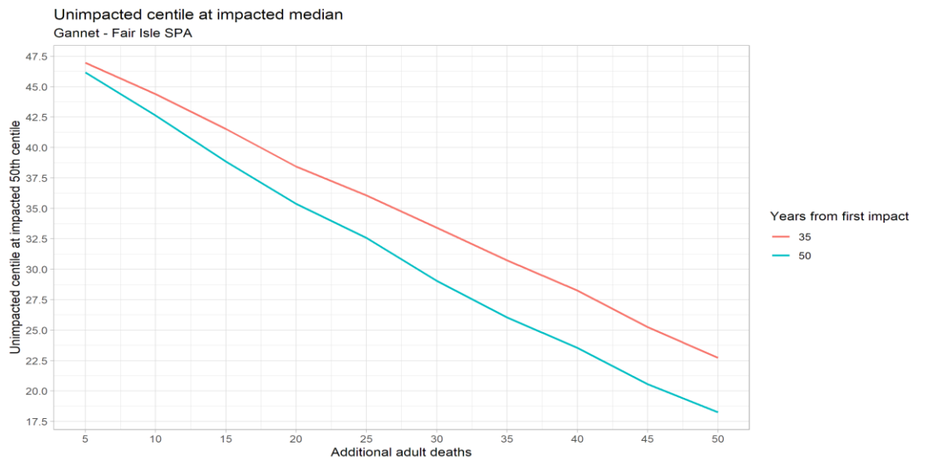

Figure 3.16: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.22: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.041	1.026	1.053			
2062	5	1.041	1.026	1.053	0.980	0.999	47.0
2062	10	1.040	1.025	1.052	0.960	0.999	44.4
2062	15	1.040	1.025	1.052	0.941	0.998	41.5
2062	20	1.039	1.024	1.051	0.922	0.998	38.4
2062	25	1.038	1.023	1.050	0.903	0.997	36.1
2062	30	1.038	1.023	1.050	0.885	0.997	33.4
2062	35	1.037	1.022	1.049	0.867	0.996	30.7
2062	40	1.037	1.022	1.049	0.850	0.995	28.2
2062	45	1.036	1.021	1.048	0.832	0.995	25.3
2062	50	1.035	1.020	1.048	0.815	0.994	22.7
2077	0	1.041	1.029	1.052			
2077	5	1.041	1.028	1.051	0.972	0.999	46.2
2077	10	1.040	1.028	1.050	0.944	0.999	42.6
2077	15	1.039	1.027	1.050	0.917	0.998	38.8
2077	20	1.039	1.026	1.049	0.891	0.998	35.4
2077	25	1.038	1.026	1.049	0.865	0.997	32.6
2077	30	1.038	1.025	1.048	0.841	0.997	29.0
2077	35	1.037	1.025	1.047	0.817	0.996	26.0
2077	40	1.036	1.024	1.047	0.793	0.995	23.5
2077	45	1.036	1.023	1.046	0.771	0.995	20.6
2077	50	1.035	1.023	1.046	0.749	0.994	18.3

Table 3.23: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. ***Med. popn size*** = Median population size, ***Med. popn size (2062) 2.5/97.5%*** = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.00	0.00	52105.6	30200.5	81720.5
North Sea Consented developer approach	0.1	10.57	8.42	49924.6	28917.8	78308.8
North Sea Consented Scoping Approach a	0.1	10.66	8.42	49912.1	28910.1	78290.7
North Sea Consented Scoping Approach b	0.1	14.42	11.55	49143.6	28459.8	77091.8

Table 3.24: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. ***Med. popn size*** = Median population size, ***Med. popn size (2077) 2.5/97.5%*** = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.00	0.00	94613.2	50903.0	161865.3
North Sea Consented developer approach	0.1	10.57	8.42	89022.4	47859.5	152381.9
North Sea Consented Scoping Approach a	0.1	10.66	8.42	88992.3	47843.4	152329.8
North Sea Consented Scoping Approach b	0.1	14.42	11.55	87058.3	46786.5	149039.7

Table 3.25: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR (2062) lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.00	0.00	1.041	1.026	1.053	1.041	1.029	1.052
North Sea Consented developer approach	0.1	10.57	8.42	1.040	1.025	1.052	1.040	1.028	1.050
North Sea Consented Scoping Approach a	0.1	10.66	8.42	1.040	1.025	1.052	1.040	1.028	1.050
North Sea Consented Scoping Approach b	0.1	14.42	11.55	1.040	1.025	1.052	1.039	1.027	1.050

Table 3.26: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.1	10.57	8.42	0.958	0.941	0.999	0.999
North Sea Consented Scoping Approach a	0.1	10.66	8.42	0.958	0.941	0.999	0.999
North Sea Consented Scoping Approach b	0.1	14.42	11.55	0.943	0.920	0.998	0.998

3.6 GANNET - NOSS SPA

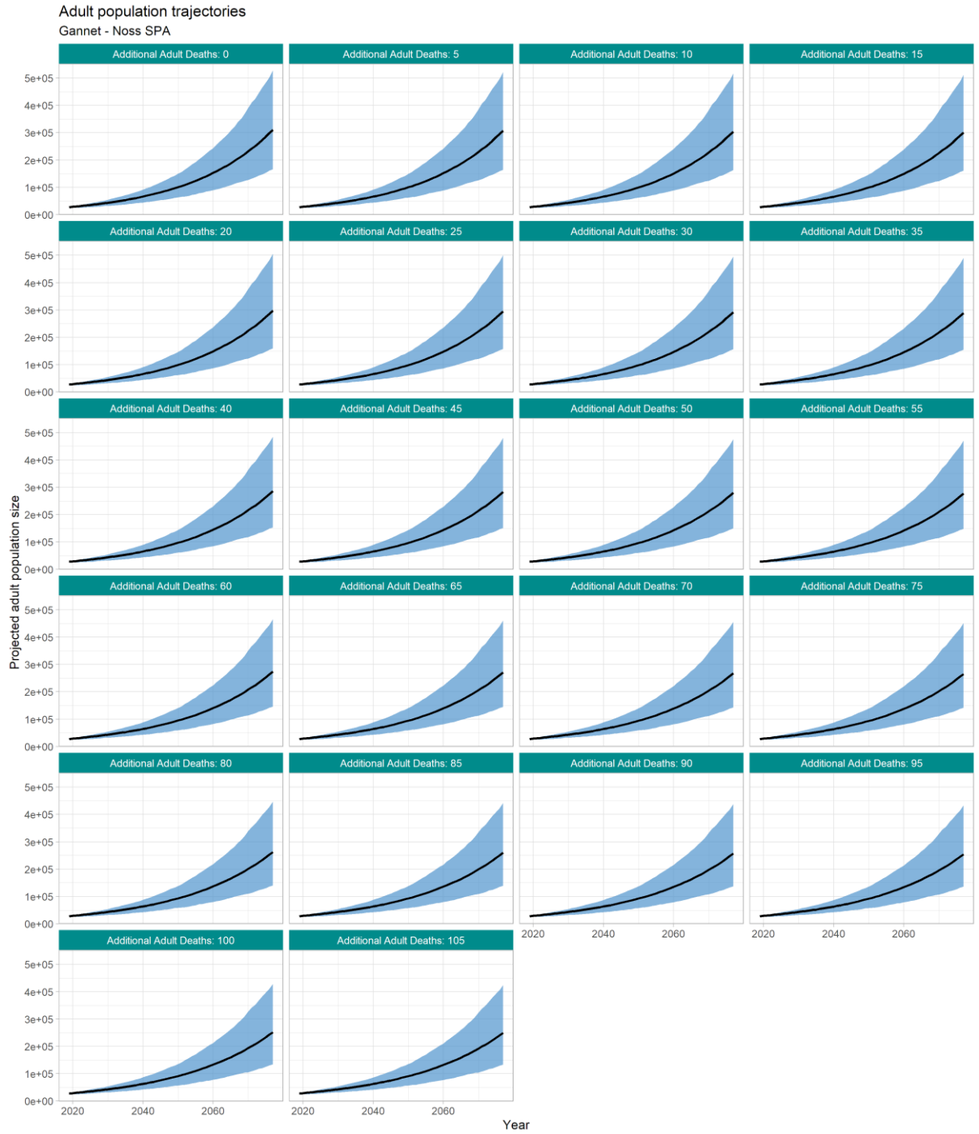

Figure 3.17: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.**

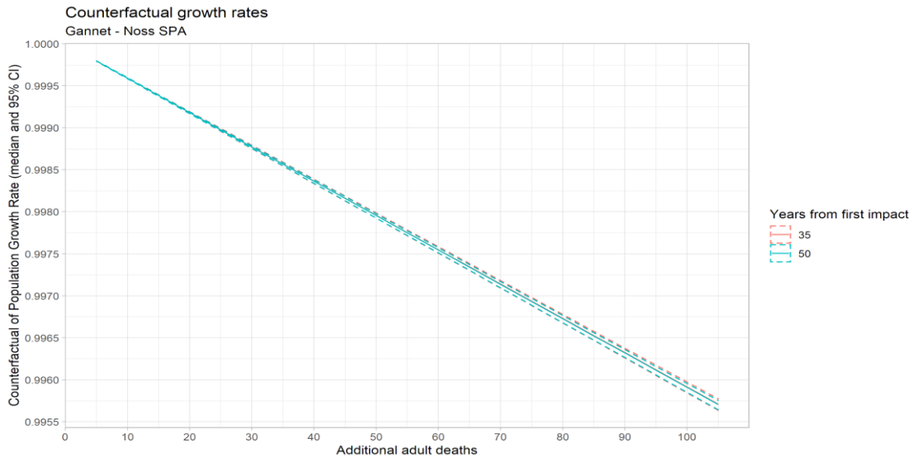

Figure 3.18: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

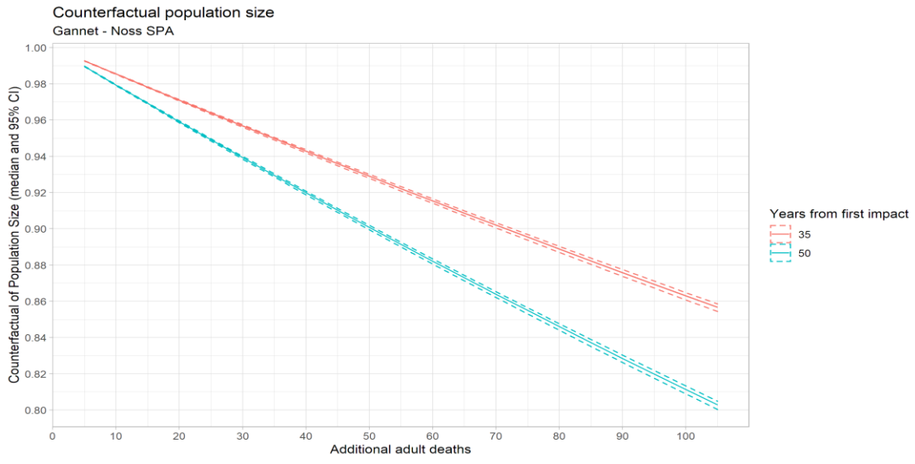

Figure 3.19: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

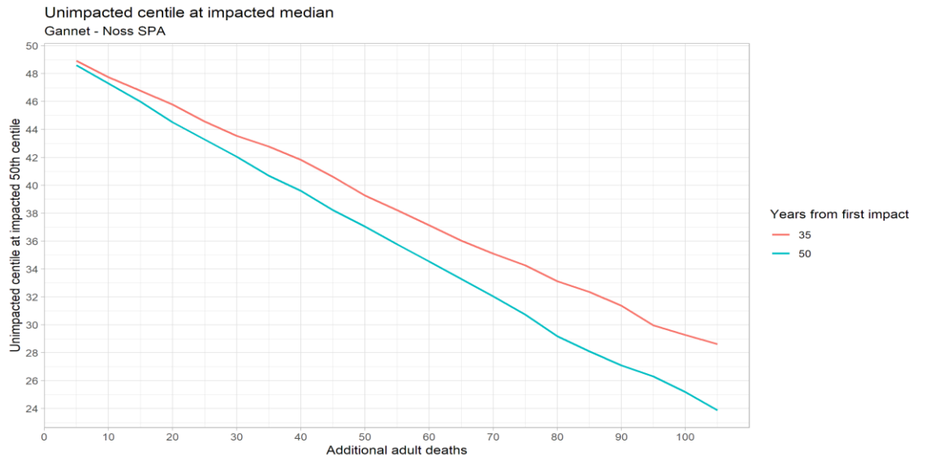

Figure 3.20: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.27: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.043	1.028	1.056			
2062	5	1.043	1.028	1.055	0.993	1.000	48.9
2062	10	1.042	1.028	1.055	0.985	1.000	47.7
2062	15	1.042	1.027	1.055	0.978	0.999	46.8
2062	20	1.042	1.027	1.055	0.971	0.999	45.8
2062	25	1.042	1.027	1.054	0.964	0.999	44.6
2062	30	1.042	1.027	1.054	0.957	0.999	43.5
2062	35	1.041	1.027	1.054	0.950	0.999	42.8
2062	40	1.041	1.026	1.054	0.943	0.998	41.8
2062	45	1.041	1.026	1.054	0.936	0.998	40.6
2062	50	1.041	1.026	1.053	0.929	0.998	39.3
2062	55	1.041	1.026	1.053	0.922	0.998	38.2
2062	60	1.040	1.026	1.053	0.915	0.998	37.1
2062	65	1.040	1.025	1.053	0.909	0.997	36.0
2062	70	1.040	1.025	1.053	0.902	0.997	35.1
2062	75	1.040	1.025	1.052	0.895	0.997	34.3
2062	80	1.039	1.025	1.052	0.889	0.997	33.1
2062	85	1.039	1.024	1.052	0.882	0.997	32.4
2062	90	1.039	1.024	1.052	0.876	0.996	31.4
2062	95	1.039	1.024	1.052	0.869	0.996	30.0
2062	100	1.039	1.024	1.051	0.863	0.996	29.3
2062	105	1.038	1.024	1.051	0.857	0.996	28.6
2077	0	1.043	1.031	1.053			
2077	5	1.042	1.030	1.053	0.990	1.000	48.6
2077	10	1.042	1.030	1.052	0.979	1.000	47.3
2077	15	1.042	1.030	1.052	0.969	0.999	46.0
2077	20	1.042	1.030	1.052	0.959	0.999	44.5
2077	25	1.042	1.029	1.052	0.949	0.999	43.3
2077	30	1.041	1.029	1.052	0.939	0.999	42.0
2077	35	1.041	1.029	1.051	0.930	0.999	40.7
2077	40	1.041	1.029	1.051	0.920	0.998	39.6
2077	45	1.041	1.029	1.051	0.910	0.998	38.2
2077	50	1.041	1.028	1.051	0.901	0.998	37.0
2077	55	1.040	1.028	1.051	0.891	0.998	35.8
2077	60	1.040	1.028	1.050	0.882	0.998	34.5
2077	65	1.040	1.028	1.050	0.873	0.997	33.3
2077	70	1.040	1.028	1.050	0.864	0.997	32.0
2077	75	1.040	1.027	1.050	0.855	0.997	30.7
2077	80	1.039	1.027	1.050	0.846	0.997	29.2
2077	85	1.039	1.027	1.049	0.837	0.997	28.1
2077	90	1.039	1.027	1.049	0.828	0.996	27.1
2077	95	1.039	1.026	1.049	0.820	0.996	26.3
2077	100	1.038	1.026	1.049	0.811	0.996	25.2
2077	105	1.038	1.026	1.048	0.803	0.996	23.9

Table 3.28: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.00	0.00	166389.5	96169.7	268809.3
North Sea Consented developer approach	0.1	35.08	28.51	158087.7	91277.0	255456.7
North Sea Consented Scoping Approach a	0.1	35.37	27.72	158121.6	91299.6	255514.0
North Sea Consented Scoping Approach b	0.1	48.68	37.93	155136.6	89543.6	250710.7

Table 3.29: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.00	0.00	310427.7	166490.0	527785.4
North Sea Consented developer approach	0.1	35.08	28.51	288556.2	154568.9	491011.8
North Sea Consented Scoping Approach a	0.1	35.37	27.72	288654.8	154624.1	491166.8
North Sea Consented Scoping Approach b	0.1	48.68	37.93	280914.1	150408.7	478134.6

Table 3.30: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.00	0.00	1.043	1.028	1.056	1.043	1.031	1.053
North Sea Consented developer approach	0.1	35.08	28.51	1.041	1.027	1.054	1.041	1.029	1.051
North Sea Consented Scoping Approach a	0.1	35.37	27.72	1.041	1.027	1.054	1.041	1.029	1.051
North Sea Consented Scoping Approach b	0.1	48.68	37.93	1.041	1.026	1.054	1.041	1.029	1.051

Table 3.31: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.1	35.08	28.51	0.950	0.930	0.999	0.999
North Sea Consented Scoping Approach a	0.1	35.37	27.72	0.950	0.930	0.999	0.999
North Sea Consented Scoping Approach b	0.1	48.68	37.93	0.932	0.905	0.998	0.998

3.7 GANNET - HERMANESS, SAXA VORD AND VALLA FIELD SPA

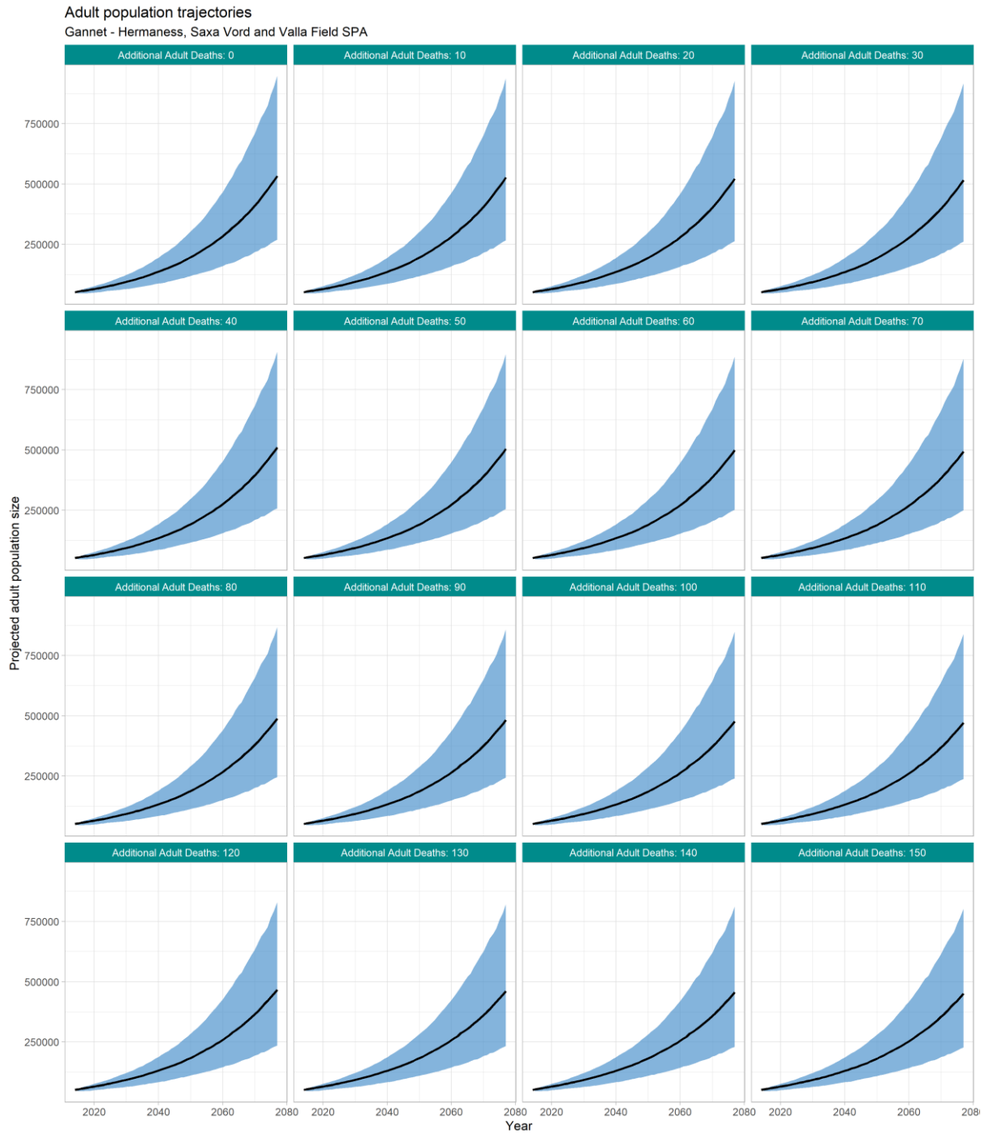

Figure 3.21: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.**

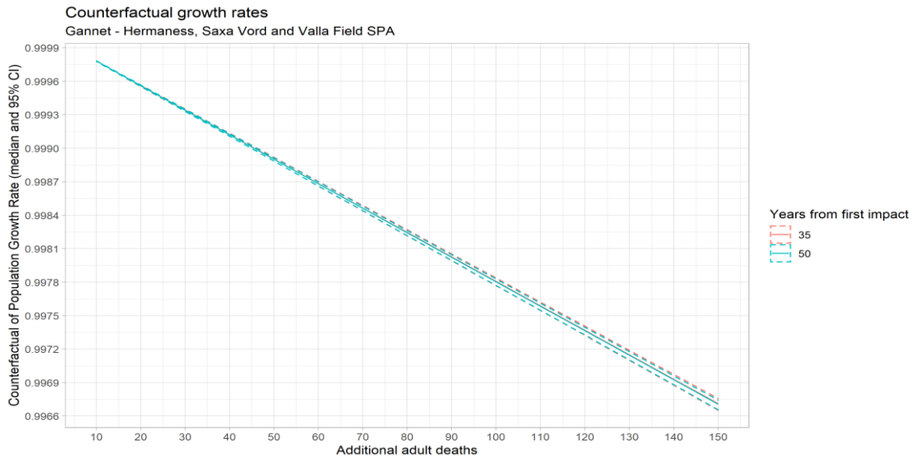

Figure 3.22: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

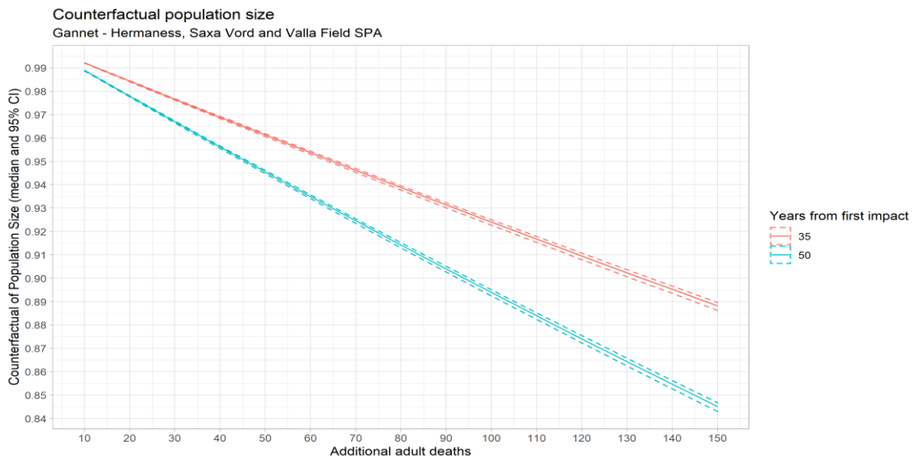

Figure 3.23: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

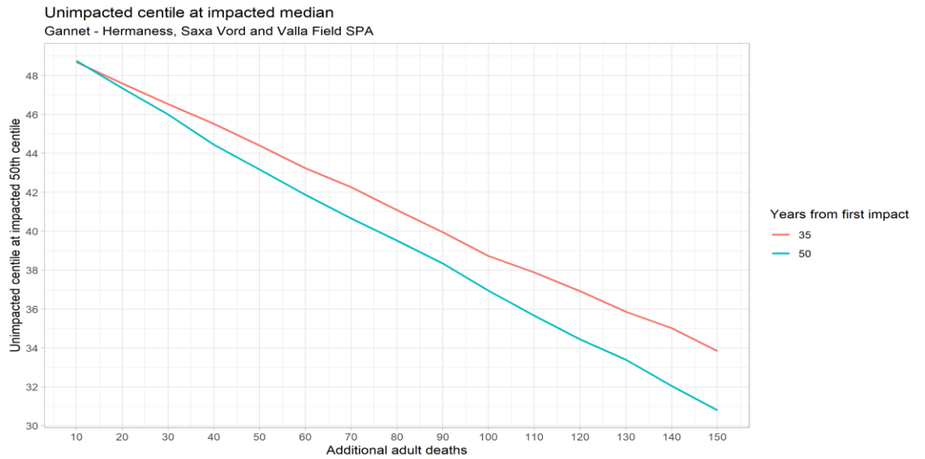

Figure 3.24: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.32: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.038	1.023	1.051			
2062	10	1.038	1.023	1.050	0.992	1.000	48.7
2062	20	1.038	1.023	1.050	0.984	1.000	47.6
2062	30	1.037	1.022	1.050	0.977	0.999	46.5
2062	40	1.037	1.022	1.050	0.969	0.999	45.5
2062	50	1.037	1.022	1.049	0.961	0.999	44.4
2062	60	1.037	1.022	1.049	0.954	0.999	43.2
2062	70	1.036	1.022	1.049	0.946	0.998	42.3
2062	80	1.036	1.021	1.049	0.939	0.998	41.1
2062	90	1.036	1.021	1.049	0.931	0.998	39.9
2062	100	1.036	1.021	1.048	0.924	0.998	38.7
2062	110	1.036	1.021	1.048	0.917	0.998	37.9
2062	120	1.035	1.020	1.048	0.910	0.997	36.9
2062	130	1.035	1.020	1.048	0.902	0.997	35.9
2062	140	1.035	1.020	1.047	0.895	0.997	35.0
2062	150	1.035	1.020	1.047	0.888	0.997	33.8
2077	0	1.038	1.025	1.048			
2077	10	1.038	1.025	1.048	0.989	1.000	48.8
2077	20	1.037	1.025	1.048	0.978	1.000	47.4
2077	30	1.037	1.025	1.048	0.967	0.999	46.0
2077	40	1.037	1.024	1.047	0.956	0.999	44.4
2077	50	1.037	1.024	1.047	0.946	0.999	43.2
2077	60	1.036	1.024	1.047	0.935	0.999	41.9
2077	70	1.036	1.024	1.047	0.925	0.998	40.7
2077	80	1.036	1.023	1.046	0.914	0.998	39.5
2077	90	1.036	1.023	1.046	0.904	0.998	38.3
2077	100	1.036	1.023	1.046	0.894	0.998	36.9
2077	110	1.035	1.023	1.046	0.884	0.998	35.7
2077	120	1.035	1.022	1.046	0.874	0.997	34.4
2077	130	1.035	1.022	1.045	0.864	0.997	33.4
2077	140	1.035	1.022	1.045	0.855	0.997	32.0
2077	150	1.034	1.022	1.045	0.845	0.997	30.8

Table 3.33: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. ***Med. popn size*** = Median population size, ***Med. popn size (2062) 2.5/97.5%*** = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.00	0.00	304501.0	169277.5	510147.8
North Sea Consented developer approach	0.1	75.30	60.07	286723.9	159231.1	480445.2
North Sea Consented Scoping Approach a	0.1	76.81	60.11	286492.1	159103.0	480063.0
North Sea Consented Scoping Approach b	0.1	104.20	82.26	280252.3	155580.2	469640.0

Table 3.34: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. ***Med. popn size*** = Median population size, ***Med. popn size (2077) 2.5/97.5%*** = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.00	0.00	533584.4	269654.1	950432.1
North Sea Consented developer approach	0.1	75.30	60.07	489847.2	247298.7	873090.5
North Sea Consented Scoping Approach a	0.1	76.81	60.11	489294.0	247024.7	872110.2
North Sea Consented Scoping Approach b	0.1	104.20	82.26	474216.8	239342.0	845438.6

Table 3.35: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.00	0.00	1.038	1.023	1.051	1.038	1.025	1.048
North Sea Consented developer approach	0.1	75.30	60.07	1.036	1.021	1.049	1.036	1.023	1.046
North Sea Consented Scoping Approach a	0.1	76.81	60.11	1.036	1.021	1.049	1.036	1.023	1.046
North Sea Consented Scoping Approach b	0.1	104.20	82.26	1.036	1.021	1.048	1.035	1.023	1.046

Table 3.36: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.1	75.30	60.07	0.942	0.918	0.998	0.998
North Sea Consented Scoping Approach a	0.1	76.81	60.11	0.941	0.917	0.998	0.998
North Sea Consented Scoping Approach b	0.1	104.20	82.26	0.920	0.889	0.998	0.998

3.8 GUILLEMOT - FORTH ISLANDS SPA

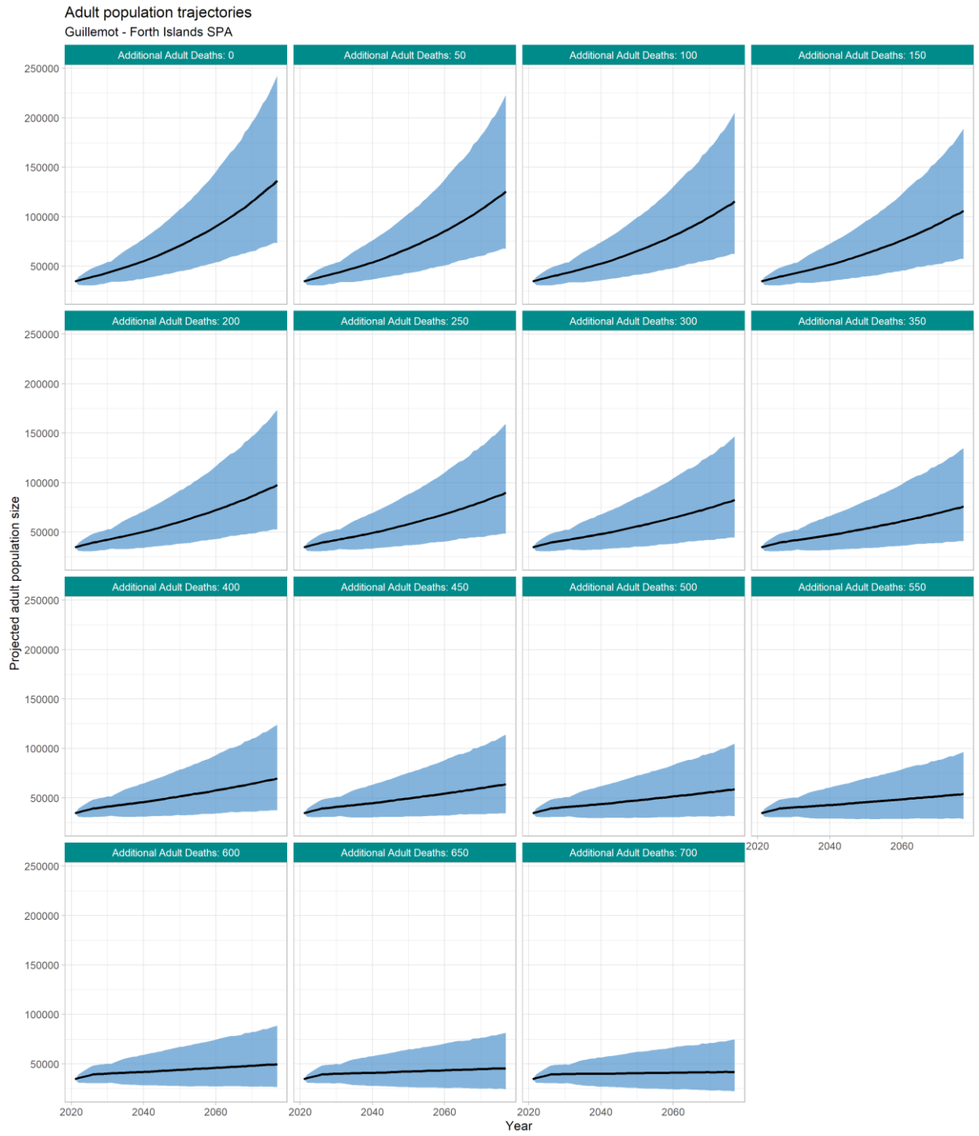

Figure 3.25: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.**

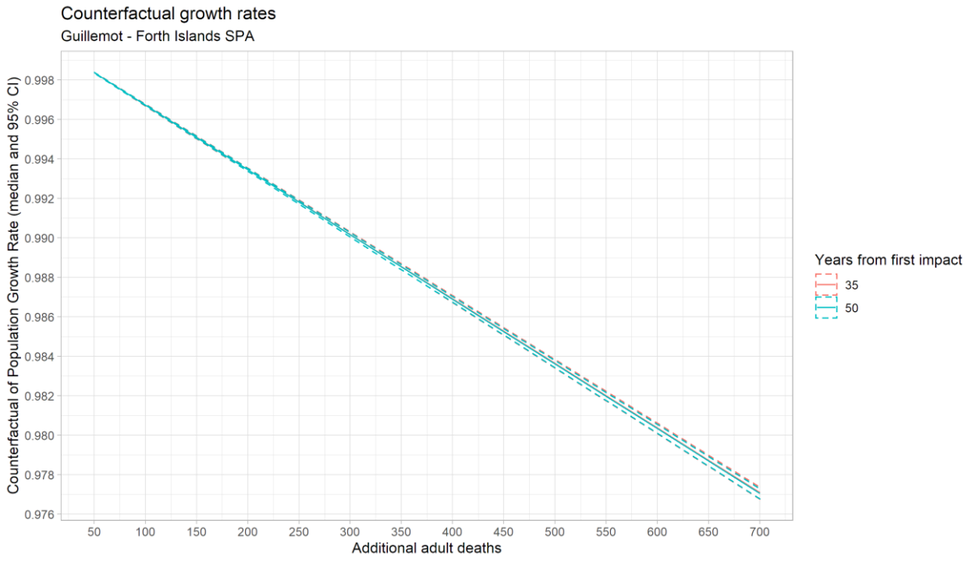

Figure 3.26: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

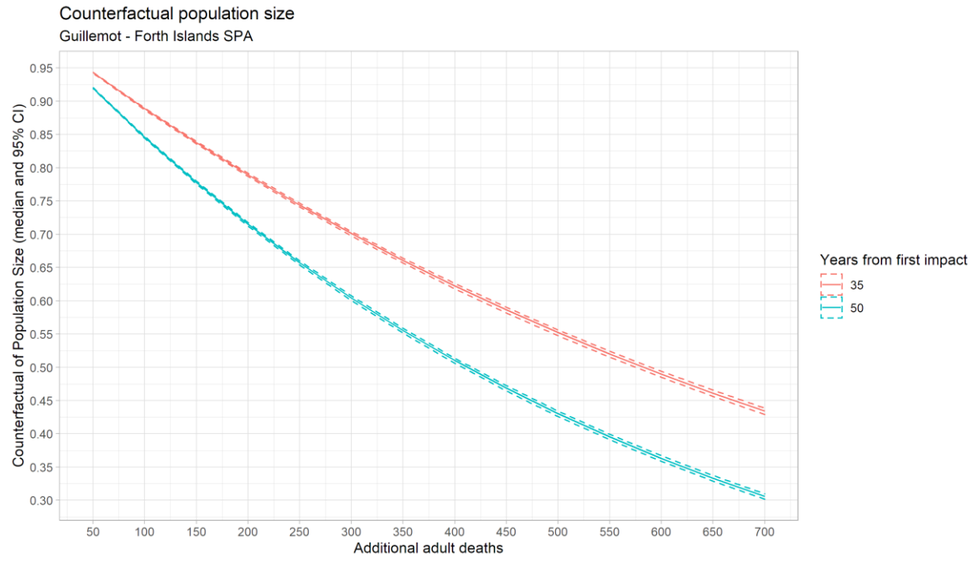

Figure 3.27: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

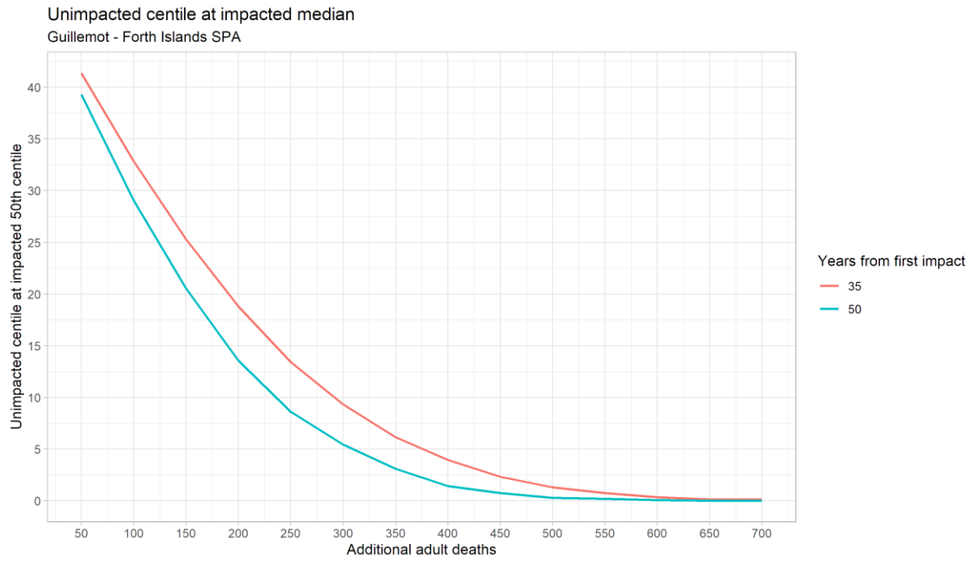

Figure 3.28: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.37: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.025	1.011	1.038			
2062	50	1.023	1.009	1.036	0.943	0.998	41.4
2062	100	1.021	1.007	1.034	0.889	0.997	32.8
2062	150	1.020	1.006	1.033	0.838	0.995	25.3
2062	200	1.018	1.004	1.031	0.789	0.993	18.8
2062	250	1.016	1.002	1.029	0.744	0.992	13.4
2062	300	1.015	1.001	1.028	0.701	0.990	9.3
2062	350	1.013	0.999	1.026	0.661	0.989	6.1
2062	400	1.011	0.997	1.024	0.622	0.987	4.0
2062	450	1.010	0.996	1.023	0.586	0.985	2.3
2062	500	1.008	0.994	1.021	0.552	0.984	1.3
2062	550	1.006	0.992	1.019	0.520	0.982	0.7
2062	600	1.005	0.991	1.017	0.490	0.980	0.3
2062	650	1.003	0.989	1.016	0.461	0.979	0.1
2062	700	1.001	0.987	1.014	0.434	0.977	0.1
2077	0	1.025	1.013	1.035			
2077	50	1.023	1.012	1.034	0.920	0.998	39.3
2077	100	1.021	1.010	1.032	0.846	0.997	29.0
2077	150	1.020	1.008	1.030	0.778	0.995	20.5
2077	200	1.018	1.007	1.029	0.715	0.993	13.6
2077	250	1.016	1.005	1.027	0.657	0.992	8.6
2077	300	1.015	1.003	1.025	0.604	0.990	5.4

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2077	350	1.013	1.002	1.024	0.555	0.989	3.1
2077	400	1.011	1.000	1.022	0.510	0.987	1.4
2077	450	1.010	0.998	1.020	0.469	0.985	0.7
2077	500	1.008	0.997	1.019	0.430	0.984	0.3
2077	550	1.006	0.995	1.017	0.395	0.982	0.2
2077	600	1.005	0.993	1.015	0.363	0.980	0.1
2077	650	1.003	0.992	1.014	0.333	0.979	0.0
2077	700	1.001	0.990	1.012	0.306	0.977	0.0

Table 3.38: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.000	0.00	94669.2	56296.1	155125.7
North Sea Consented developer approach	0.07	82.817	80.12	85775.6	50936.8	140669.3
North Sea Consented Scoping Approach a	0.07	200.880	200.60	74243.3	44005.9	121879.1
North Sea Consented Scoping Approach b	0.07	398.910	392.06	58558.6	34572.7	96176.7
(1) Project Alone: developer approach	0.07	37.417	36.62	90521.5	53798.7	148392.6
(2) Project Alone: Scoping approach a	0.07	91.576	91.20	84773.6	50333.2	139040.0
(2) Project Alone: Scoping approach b	0.07	180.510	178.26	76174.3	45167.3	125044.8

Table 3.39: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.000	0.00	136427.1	73734.0	242852.2
North Sea Consented developer approach	0.07	82.817	80.12	118627.3	63993.4	211129.0
North Sea Consented Scoping Approach a	0.07	200.880	200.60	96642.1	52015.9	172026.3

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
North Sea Consented Scoping Approach b	0.07	398.910	392.06	68929.1	36969.5	122732.8
(1) Project Alone: developer approach	0.07	37.417	36.62	128046.7	69143.5	227910.5
(2) Project Alone: Scoping approach a	0.07	91.576	91.20	116665.8	62918.3	207625.9
(2) Project Alone: Scoping approach b	0.07	180.510	178.26	100240.3	53971.7	178428.5

Table 3.40: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.000	0.00	1.025	1.011	1.038	1.025	1.013	1.035
North Sea Consented developer approach	0.07	82.817	80.12	1.022	1.008	1.035	1.022	1.011	1.033
North Sea Consented Scoping Approach a	0.07	200.880	200.60	1.018	1.004	1.031	1.018	1.007	1.028
North Sea Consented Scoping Approach b	0.07	398.910	392.06	1.011	0.997	1.024	1.011	1.000	1.022
(1) Project Alone: developer approach	0.07	37.417	36.62	1.024	1.010	1.036	1.024	1.012	1.034
(2) Project Alone: Scoping approach a	0.07	91.576	91.20	1.022	1.008	1.034	1.022	1.010	1.032
(2) Project Alone: Scoping approach b	0.07	180.510	178.26	1.019	1.005	1.031	1.019	1.007	1.029

3.9 GUILLEMOT - ST ABB'S HEAD TO FAST CASTLE SPA

Table 3.41: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.07	82.817	80.12	0.906	0.869	0.997	0.997
North Sea Consented Scoping Approach a	0.07	200.880	200.60	0.784	0.708	0.993	0.993
North Sea Consented Scoping Approach b	0.07	398.910	392.06	0.618	0.505	0.987	0.987
(1) Project Alone: developer approach	0.07	37.417	36.62	0.956	0.938	0.999	0.999
(2) Project Alone: Scoping approach a	0.07	91.576	91.20	0.895	0.855	0.997	0.997
(2) Project Alone: Scoping approach b	0.07	180.510	178.26	0.804	0.734	0.994	0.994

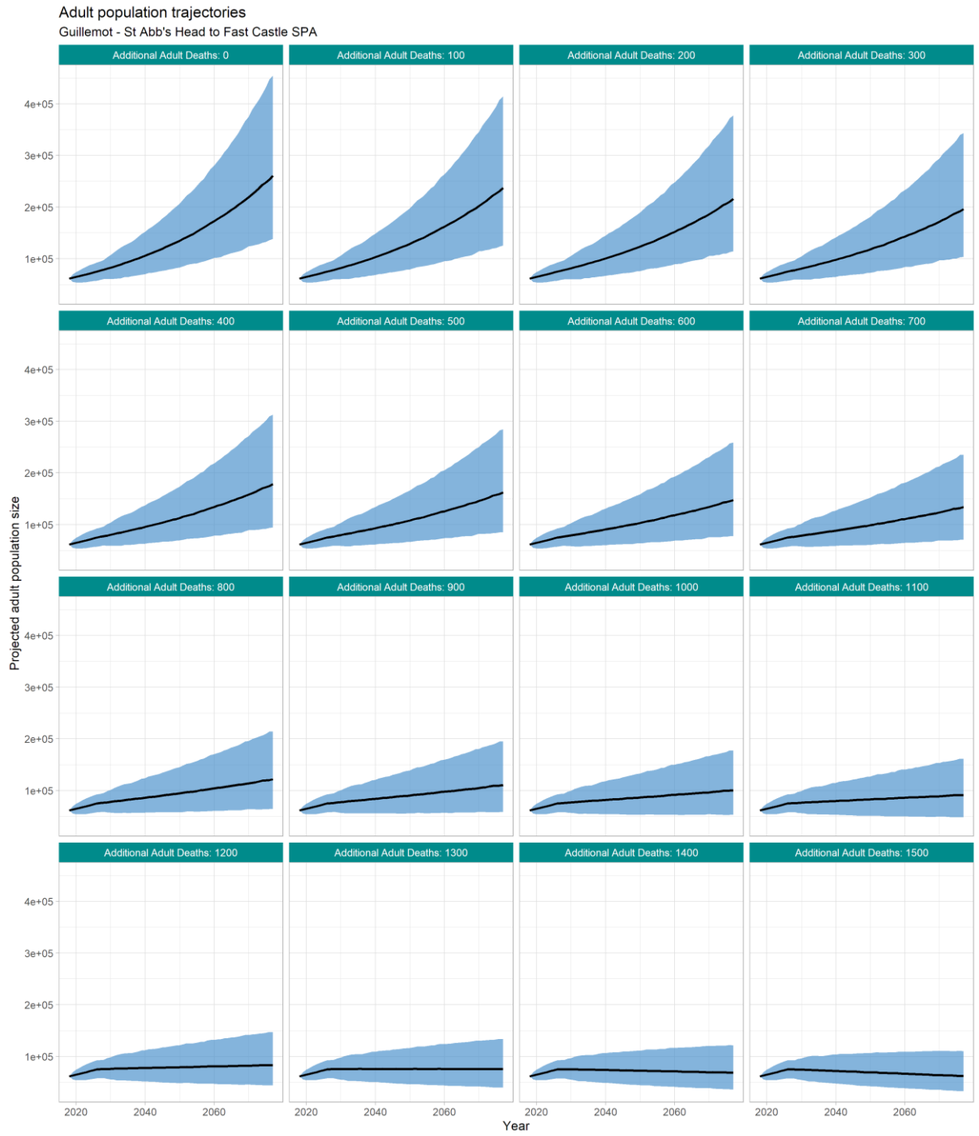

Figure 3.29: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.**

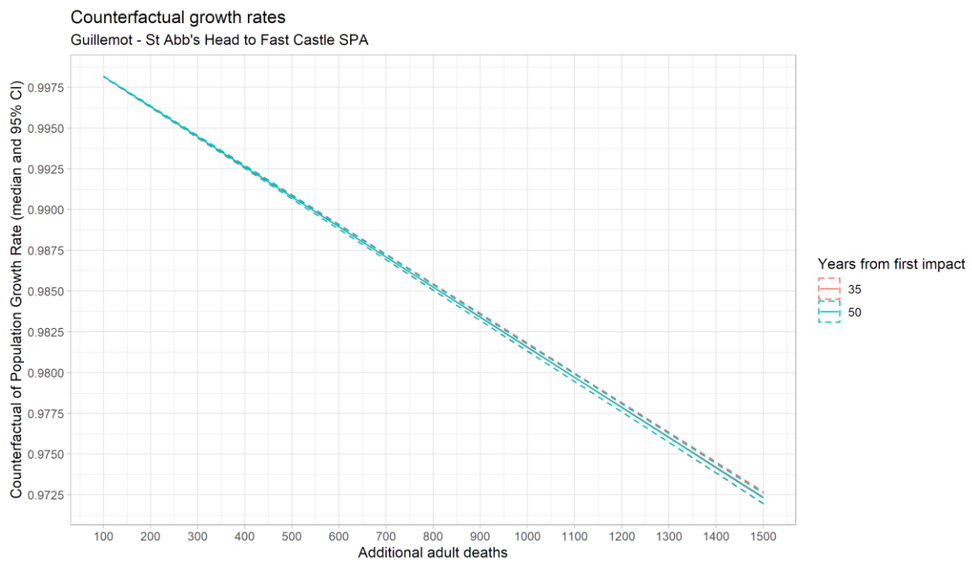

Figure 3.30: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

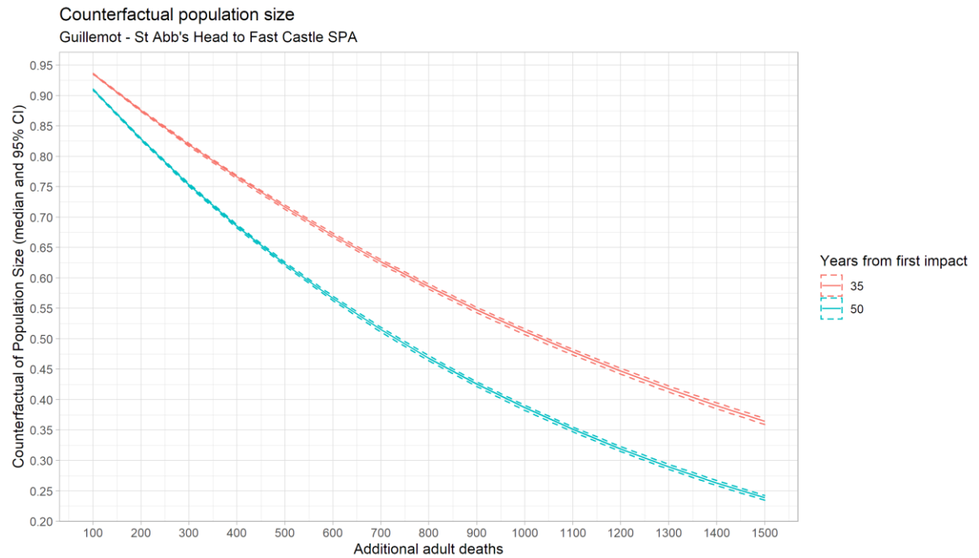

Figure 3.31: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

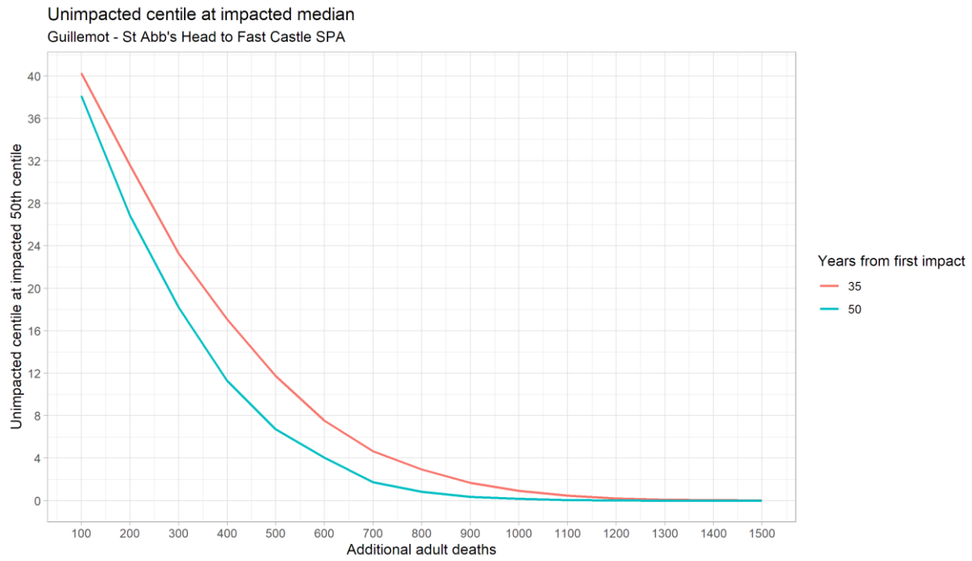

Figure 3.32: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.42: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.025	1.011	1.038			
2062	100	1.023	1.009	1.036	0.936	0.998	40.3
2062	200	1.021	1.007	1.034	0.876	0.996	31.6
2062	300	1.019	1.005	1.032	0.819	0.994	23.3
2062	400	1.017	1.003	1.030	0.766	0.993	17.1
2062	500	1.016	1.001	1.028	0.717	0.991	11.7
2062	600	1.014	0.999	1.026	0.670	0.989	7.5
2062	700	1.012	0.997	1.024	0.627	0.987	4.6
2062	800	1.010	0.995	1.022	0.586	0.985	2.9
2062	900	1.008	0.994	1.021	0.548	0.983	1.7
2062	1000	1.006	0.992	1.019	0.512	0.982	0.9
2062	1100	1.004	0.990	1.017	0.478	0.980	0.5
2062	1200	1.002	0.988	1.015	0.447	0.978	0.2
2062	1300	1.000	0.986	1.013	0.418	0.976	0.1
2062	1400	0.999	0.984	1.011	0.390	0.974	0.1
2062	1500	0.997	0.982	1.009	0.365	0.972	0.0
2077	0	1.025	1.013	1.035			
2077	100	1.023	1.011	1.034	0.910	0.998	38.1
2077	200	1.021	1.009	1.032	0.828	0.996	26.8
2077	300	1.019	1.007	1.030	0.753	0.994	18.2
2077	400	1.017	1.006	1.028	0.685	0.993	11.3
2077	500	1.015	1.004	1.026	0.623	0.991	6.7

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2077	600	1.013	1.002	1.024	0.567	0.989	4.0
2077	700	1.012	1.000	1.022	0.515	0.987	1.7
2077	800	1.010	0.998	1.020	0.468	0.985	0.8
2077	900	1.008	0.996	1.018	0.426	0.983	0.3
2077	1000	1.006	0.994	1.016	0.387	0.982	0.2
2077	1100	1.004	0.992	1.015	0.351	0.980	0.0
2077	1200	1.002	0.991	1.013	0.319	0.978	0.0
2077	1300	1.000	0.989	1.011	0.290	0.976	0.0
2077	1400	0.998	0.987	1.009	0.263	0.974	0.0
2077	1500	0.996	0.985	1.007	0.239	0.972	0.0

Table 3.43: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	180897.1	103493.6	296677.0
North Sea Consented developer approach	0.07	131.0054	132.85	165372.8	94592.5	271362.8
North Sea Consented Scoping Approach a	0.07	371.0500	370.16	140443.1	80216.1	230758.1
North Sea Consented Scoping Approach b	0.07	695.7739	688.70	112590.2	64146.2	185317.5
(1) Project Alone: developer approach	0.07	110.84	109.62	168034.6	96119.3	275713.9
(2) Project Alone: Scoping approach a	0.07	310.9482	311.66	146287.1	83586.9	240250.9
(2) Project Alone: Scoping approach b	0.07	576.12	573.96	121917.5	69502.7	200518.7

Table 3.44: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	260375.8	138288.4	454623.2
North Sea Consented developer approach	0.07	131.0054	132.85	229270.0	121563.7	400768.7
North Sea Consented Scoping Approach a	0.07	371.0500	370.16	181783.1	96210.7	318406.5

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
North Sea Consented Scoping Approach b	0.07	695.7739	688.70	132797.6	70034.1	233281.7
(1) Project Alone: developer approach	0.07	110.84	109.62	234510.0	124387.0	409849.8
(2) Project Alone: Scoping approach a	0.07	310.9482	311.66	192622.0	101962.6	337173.7
(2) Project Alone: Scoping approach b	0.07	576.12	573.96	148660.0	78479.9	261008.7

Table 3.45: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.025	1.011	1.038	1.025	1.013	1.035
North Sea Consented developer approach	0.07	131.0054	132.85	1.022	1.008	1.035	1.022	1.011	1.033
North Sea Consented Scoping Approach a	0.07	371.0500	370.16	1.018	1.003	1.030	1.018	1.006	1.028
North Sea Consented Scoping Approach b	0.07	695.7739	688.70	1.012	0.997	1.024	1.011	1.000	1.022
(1) Project Alone: developer approach	0.07	110.84	109.62	1.023	1.009	1.035	1.023	1.011	1.033
(2) Project Alone: Scoping approach a	0.07	310.9482	311.66	1.019	1.005	1.031	1.019	1.007	1.029
(2) Project Alone: Scoping approach b	0.07	576.12	573.96	1.014	0.999	1.026	1.014	1.002	1.024

Table 3.46: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.07	131.0054	132.85	0.914	0.880	0.998	0.998
North Sea Consented Scoping Approach a	0.07	371.0500	370.16	0.776	0.698	0.993	0.993
North Sea Consented Scoping Approach b	0.07	695.7739	688.70	0.622	0.510	0.987	0.987
(1) Project Alone: developer approach	0.07	110.84	109.62	0.929	0.901	0.998	0.998
(2) Project Alone: Scoping approach a	0.07	310.9482	311.66	0.809	0.740	0.994	0.994
(2) Project Alone: Scoping approach b	0.07	576.12	573.96	0.674	0.571	0.989	0.989

3.10 GUILLEMOT - FOWLSHEUGH SPA

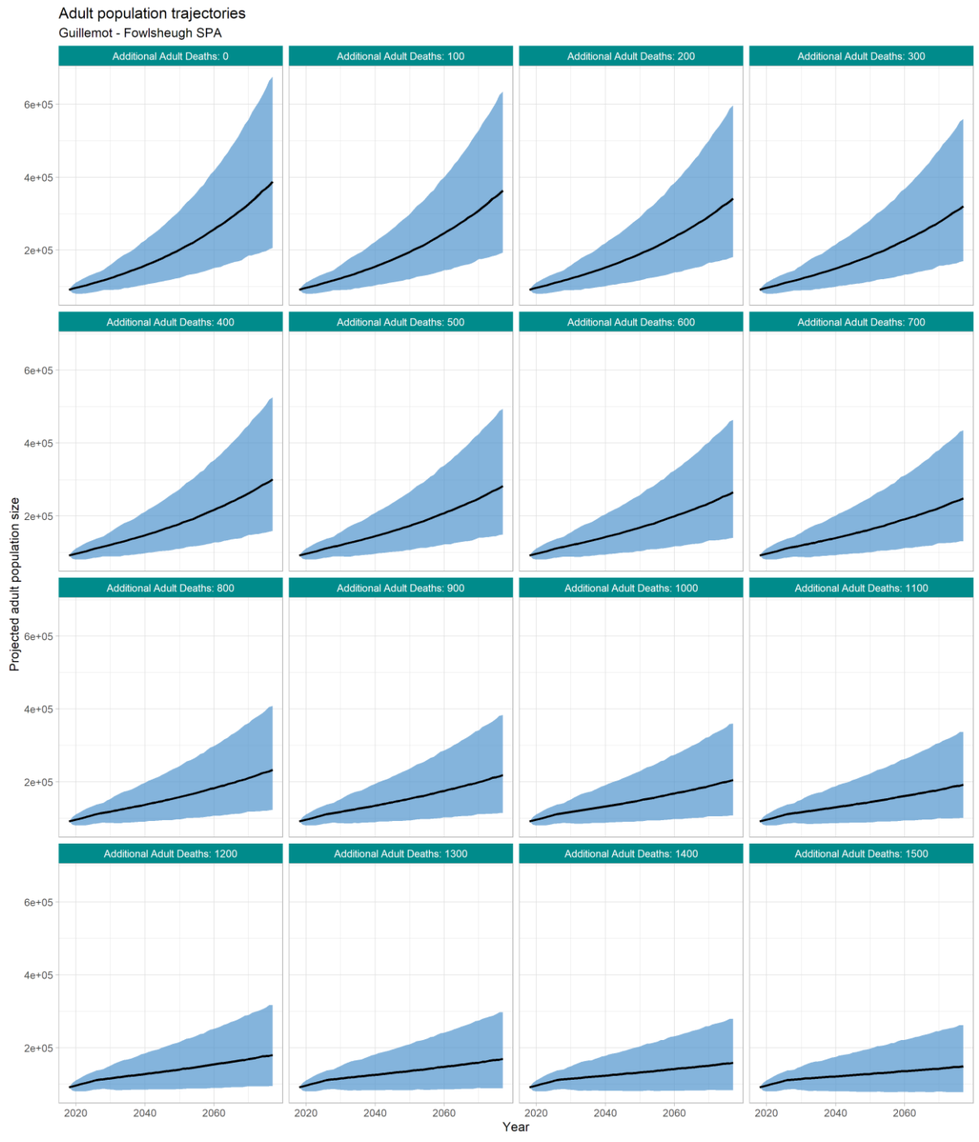

Figure 3.33: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

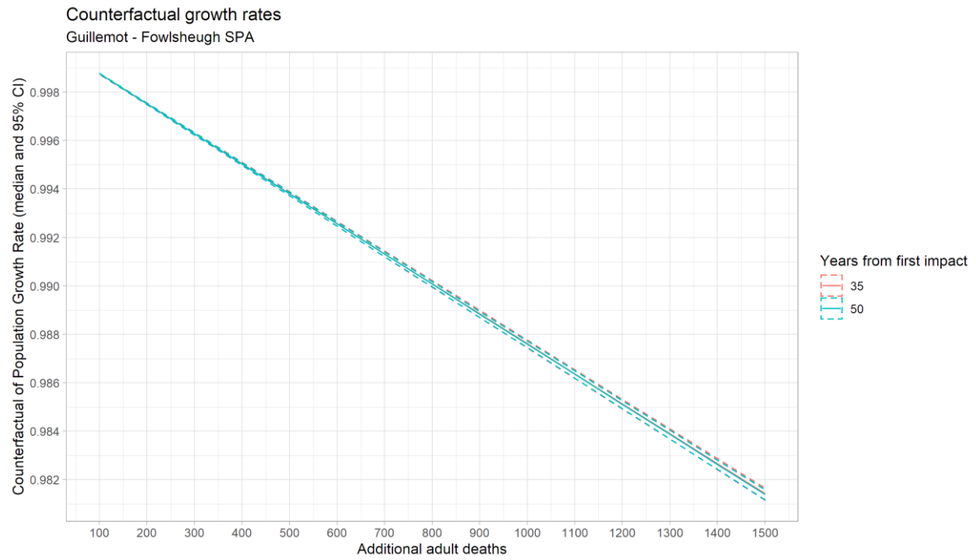

Figure 3.34: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

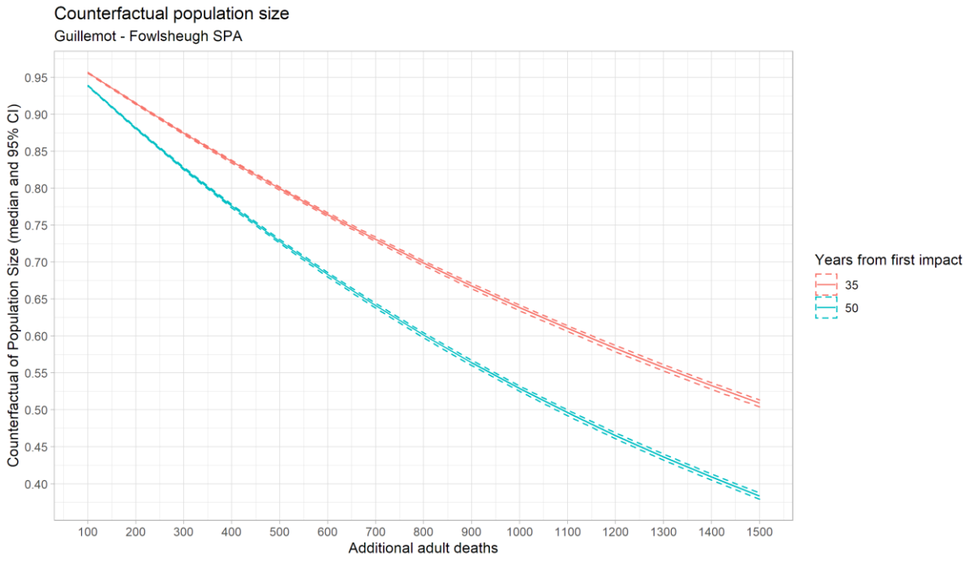

Figure 3.35: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

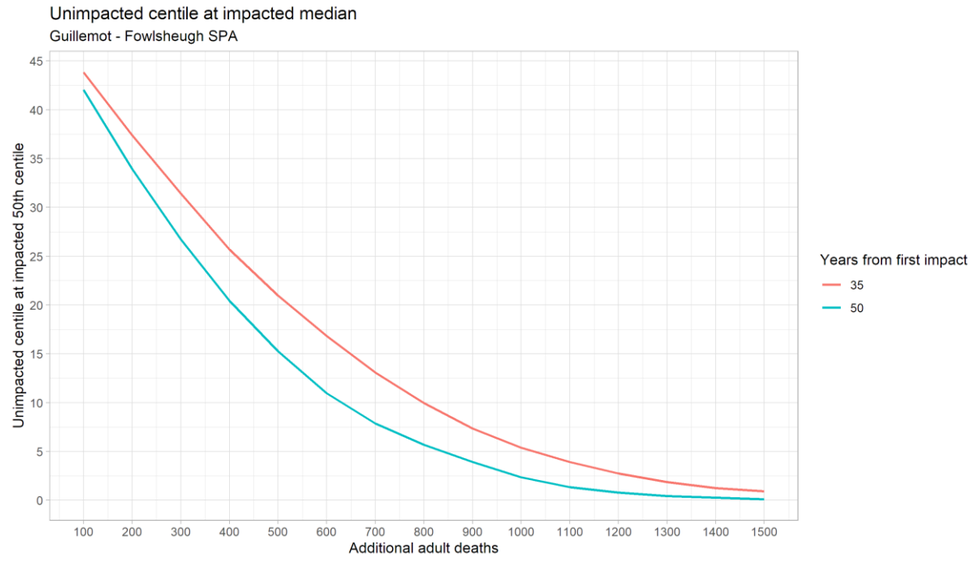

Figure 3.36: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.47: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.025	1.011	1.038			
2062	100	1.024	1.009	1.036	0.956	0.999	43.8
2062	200	1.022	1.008	1.035	0.915	0.998	37.4
2062	300	1.021	1.007	1.034	0.875	0.996	31.4
2062	400	1.020	1.006	1.032	0.836	0.995	25.7
2062	500	1.019	1.004	1.031	0.800	0.994	21.0
2062	600	1.017	1.003	1.030	0.765	0.993	16.8
2062	700	1.016	1.002	1.029	0.731	0.991	13.1
2062	800	1.015	1.000	1.027	0.699	0.990	10.0
2062	900	1.014	0.999	1.026	0.668	0.989	7.3
2062	1000	1.012	0.998	1.025	0.638	0.988	5.4
2062	1100	1.011	0.997	1.024	0.610	0.986	3.9
2062	1200	1.010	0.995	1.022	0.583	0.985	2.8
2062	1300	1.009	0.994	1.021	0.557	0.984	1.9
2062	1400	1.007	0.993	1.020	0.533	0.983	1.3
2062	1500	1.006	0.992	1.018	0.509	0.981	0.9
2077	0	1.025	1.013	1.035			
2077	100	1.024	1.012	1.034	0.939	0.999	42.1
2077	200	1.022	1.011	1.033	0.881	0.998	33.9
2077	300	1.021	1.009	1.032	0.827	0.996	26.7
2077	400	1.020	1.008	1.030	0.776	0.995	20.4
2077	500	1.018	1.007	1.029	0.728	0.994	15.3
2077	600	1.017	1.006	1.028	0.683	0.993	11.0
2077	700	1.016	1.004	1.027	0.641	0.991	7.9
2077	800	1.015	1.003	1.025	0.601	0.990	5.7
2077	900	1.013	1.002	1.024	0.564	0.989	3.9
2077	1000	1.012	1.000	1.023	0.529	0.988	2.4
2077	1100	1.011	0.999	1.021	0.496	0.986	1.4
2077	1200	1.010	0.998	1.020	0.465	0.985	0.8
2077	1300	1.008	0.997	1.019	0.436	0.984	0.4
2077	1400	1.007	0.995	1.018	0.409	0.983	0.3
2077	1500	1.006	0.994	1.016	0.384	0.981	0.1

Table 3.48: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	269126.7	153972.7	441376.4
North Sea Consented developer approach	0.07	154.0966	149.42	251032.3	143583.5	411907.8
North Sea Consented Scoping Approach a	0.07	430.2900	423.20	221233.2	126429.1	363302.0
North Sea Consented Scoping Approach b	0.07	800.0429	781.75	187031.9	106643.5	307531.5
(1) Project Alone: developer approach	0.07	89.1966	88.52	258399.9	147820.0	423922.1
(2) Project Alone: Scoping approach a	0.07	259.90	261.04	238850.5	136609.4	391967.2
(2) Project Alone: Scoping approach b	0.07	473.32	472.88	216548.6	123725.8	355660.6

Table 3.49: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	387371.3	205735.3	676360.2
North Sea Consented developer approach	0.07	154.0966	149.42	350948.3	186187.1	613335.9
North Sea Consented Scoping Approach a	0.07	430.2900	423.20	293374.4	155281.9	513428.5
North Sea Consented Scoping Approach b	0.07	800.0429	781.75	231004.7	122019.2	405345.7
(1) Project Alone: developer approach	0.07	89.1966	88.52	365673.0	194098.4	638794.8
(2) Project Alone: Scoping approach a	0.07	259.90	261.04	327053.0	173306.4	571915.9
(2) Project Alone: Scoping approach b	0.07	473.32	472.88	284540.5	150613.2	498105.1

Table 3.50: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.025	1.011	1.038	1.025	1.013	1.035
North Sea Consented developer approach	0.07	154.0966	149.42	1.023	1.009	1.036	1.023	1.011	1.033
North Sea Consented Scoping Approach a	0.07	430.2900	423.20	1.019	1.005	1.032	1.019	1.008	1.030
North Sea Consented Scoping Approach b	0.07	800.0429	781.75	1.015	1.000	1.027	1.014	1.003	1.025
(1) Project Alone: developer approach	0.07	89.1966	88.52	1.024	1.009	1.036	1.024	1.012	1.034
(2) Project Alone: Scoping approach a	0.07	259.90	261.04	1.022	1.007	1.034	1.021	1.010	1.032
(2) Project Alone: Scoping approach b	0.07	473.32	472.88	1.019	1.004	1.031	1.019	1.007	1.029

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Table 3.51: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.07	154.0966	149.42	0.933	0.906	0.998	0.998
North Sea Consented Scoping Approach a	0.07	430.2900	423.20	0.822	0.757	0.995	0.995
North Sea Consented Scoping Approach b	0.07	800.0429	781.75	0.695	0.596	0.990	0.990
(1) Project Alone: developer approach	0.07	89.1966	88.52	0.960	0.944	0.999	0.999
(2) Project Alone: Scoping approach a	0.07	259.90	261.04	0.887	0.844	0.997	0.997
(2) Project Alone: Scoping approach b	0.07	473.32	472.88	0.805	0.734	0.994	0.994

3.11 GUILLEMOT - FARNE ISLANDS SPA

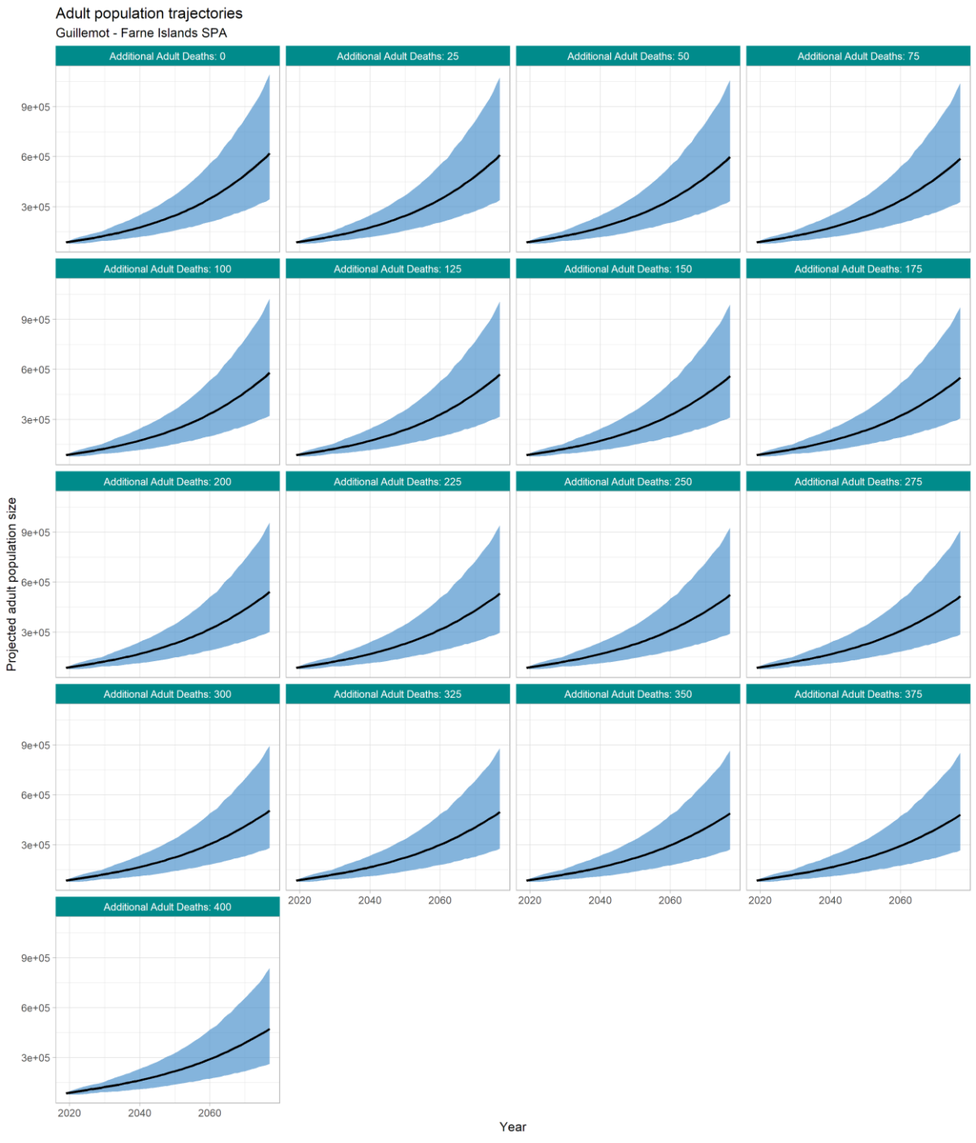

Figure 3.37: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

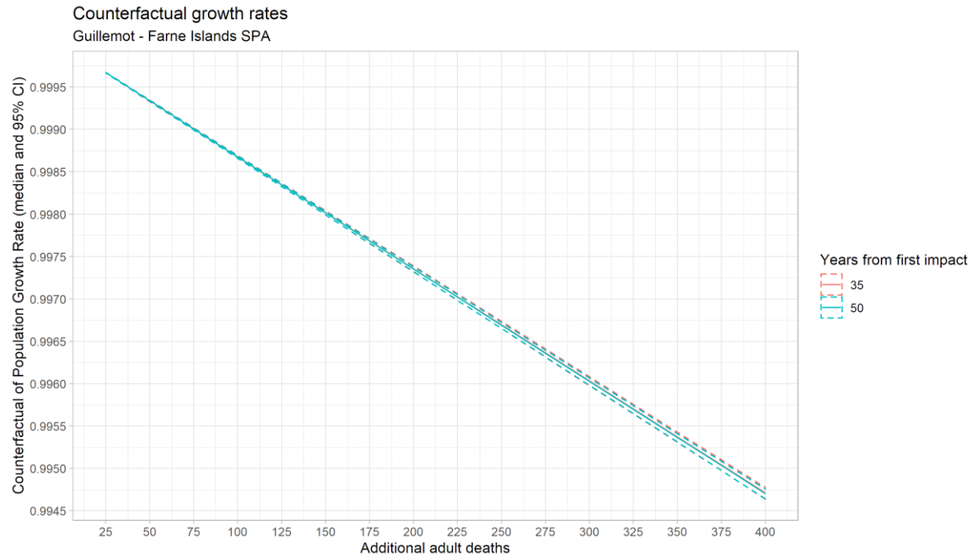

Figure 3.38: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

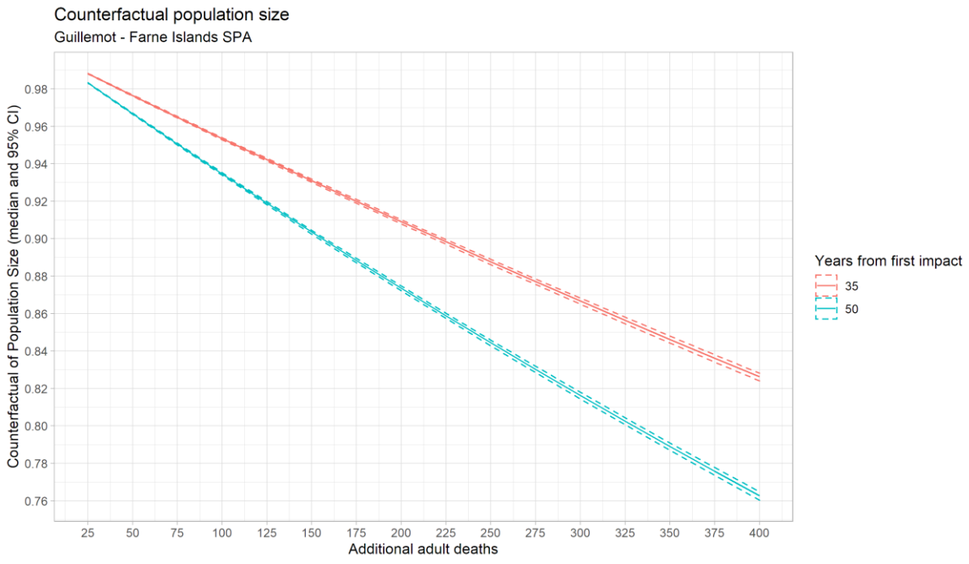

Figure 3.39: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

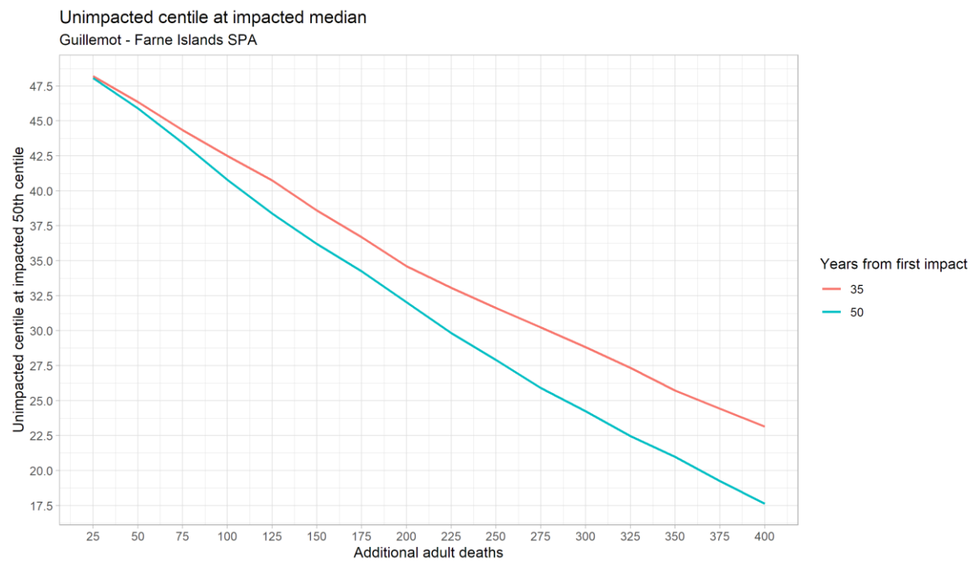

Figure 3.40: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.52: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.035	1.021	1.047			
2062	25	1.035	1.021	1.047	0.988	1.000	48.2
2062	50	1.034	1.020	1.047	0.976	0.999	46.4
2062	75	1.034	1.020	1.046	0.965	0.999	44.3
2062	100	1.034	1.020	1.046	0.953	0.999	42.5
2062	125	1.033	1.019	1.046	0.942	0.998	40.7
2062	150	1.033	1.019	1.045	0.931	0.998	38.6
2062	175	1.033	1.019	1.045	0.920	0.998	36.7
2062	200	1.032	1.018	1.045	0.909	0.997	34.6
2062	225	1.032	1.018	1.044	0.898	0.997	33.1
2062	250	1.031	1.018	1.044	0.888	0.997	31.6
2062	275	1.031	1.017	1.044	0.877	0.996	30.2
2062	300	1.031	1.017	1.043	0.867	0.996	28.8
2062	325	1.030	1.017	1.043	0.856	0.996	27.3
2062	350	1.030	1.016	1.043	0.846	0.995	25.7
2062	375	1.030	1.016	1.042	0.836	0.995	24.4
2062	400	1.029	1.016	1.042	0.826	0.995	23.1
2077	0	1.035	1.023	1.045			
2077	25	1.034	1.023	1.045	0.983	1.000	48.1
2077	50	1.034	1.023	1.045	0.967	0.999	45.9
2077	75	1.034	1.022	1.044	0.951	0.999	43.4
2077	100	1.033	1.022	1.044	0.935	0.999	40.8
2077	125	1.033	1.022	1.044	0.919	0.998	38.4
2077	150	1.033	1.021	1.043	0.904	0.998	36.2
2077	175	1.032	1.021	1.043	0.888	0.998	34.3
2077	200	1.032	1.021	1.043	0.873	0.997	32.0
2077	225	1.032	1.020	1.042	0.859	0.997	29.8
2077	250	1.031	1.020	1.042	0.844	0.997	27.9
2077	275	1.031	1.020	1.042	0.830	0.996	25.9
2077	300	1.031	1.019	1.041	0.816	0.996	24.2
2077	325	1.030	1.019	1.041	0.803	0.996	22.5
2077	350	1.030	1.019	1.041	0.789	0.995	21.0
2077	375	1.030	1.018	1.040	0.776	0.995	19.2
2077	400	1.029	1.018	1.040	0.763	0.995	17.6

Table 3.53: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	372688.9	220896.8	595800.8
(1) Project Alone: developer approach	0.07	36.9170	40.21	366106.8	216909.3	585470.6
(2) Project Alone: Scoping approach a	0.07	79.8353	88.67	358473.2	212289.0	573518.9
(2) Project Alone: Scoping approach b	0.07	167.20	183.90	343474.4	203213.2	549958.9

Table 3.54: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	620411.9	346130.5	1096506.5
(1) Project Alone: developer approach	0.07	36.9170	40.21	604955.1	337404.9	1069383.7
(2) Project Alone: Scoping approach a	0.07	79.8353	88.67	587200.9	327374.0	1038311.1
(2) Project Alone: Scoping approach b	0.07	167.20	183.90	552744.7	307902.6	977806.6

Table 3.55: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.035	1.021	1.047	1.035	1.023	1.045
(1) Project Alone: developer approach	0.07	36.9170	40.21	1.034	1.020	1.047	1.034	1.023	1.045
(2) Project Alone: Scoping approach a	0.07	79.8353	88.67	1.034	1.020	1.046	1.034	1.022	1.044
(2) Project Alone: Scoping approach b	0.07	167.20	183.90	1.033	1.019	1.045	1.032	1.021	1.043

Table 3.56: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
(1) Project Alone: developer approach	0.07	36.9170	40.21	0.982	0.975	1.000	1.000
(2) Project Alone: Scoping approach a	0.07	79.8353	88.67	0.962	0.946	0.999	0.999
(2) Project Alone: Scoping approach b	0.07	167.20	183.90	0.922	0.891	0.998	0.998

3.12 GUILLEMOT - BUCHAN NESS TO COLLIESTON COAST SPA

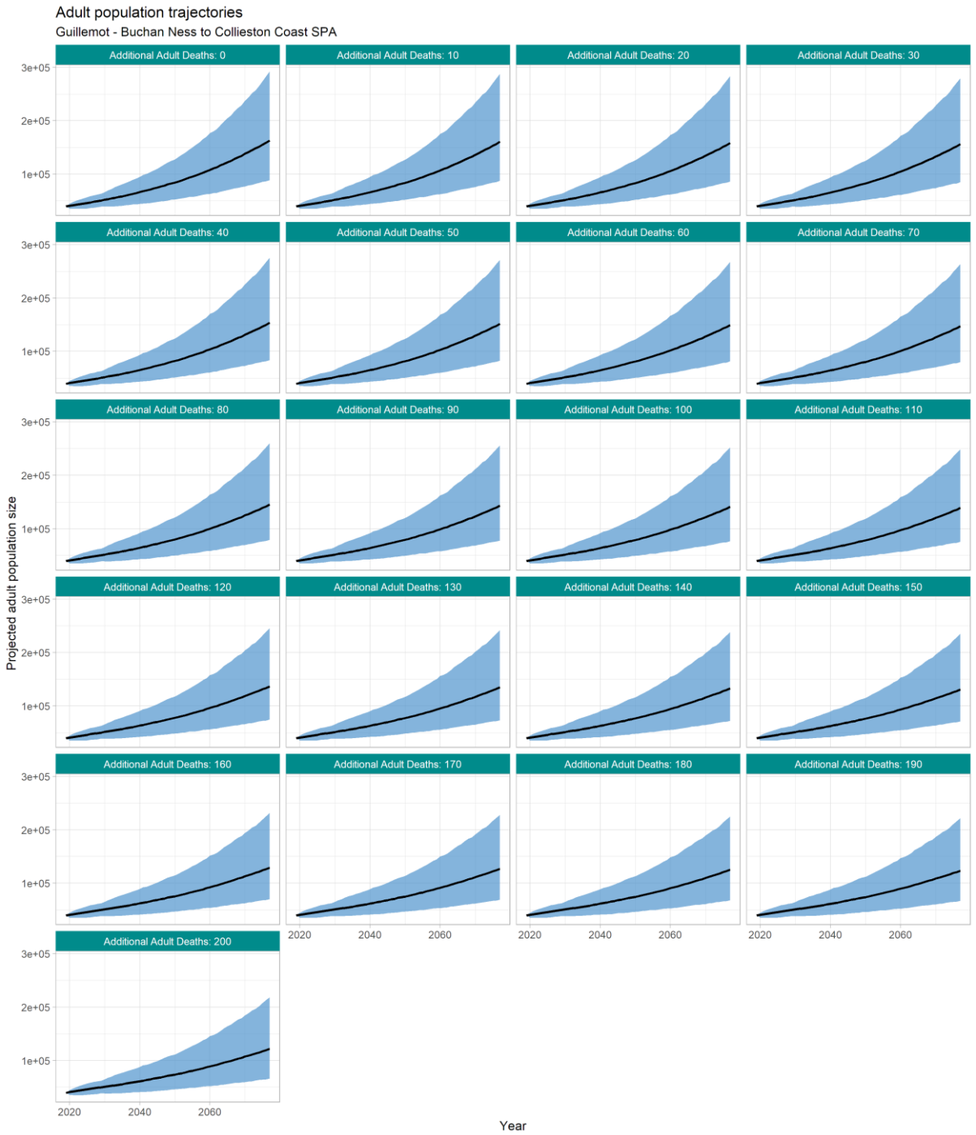

Figure 3.41: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

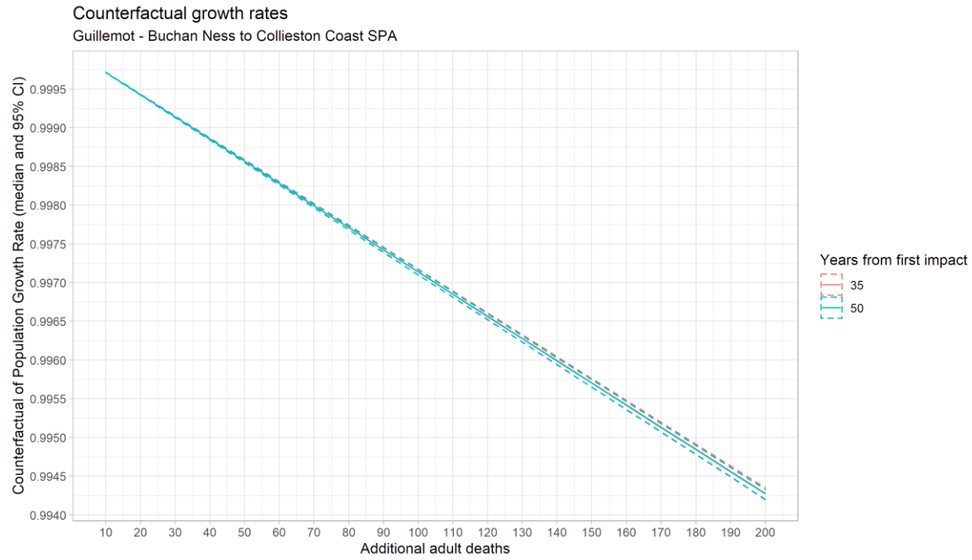

Figure 3.42: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

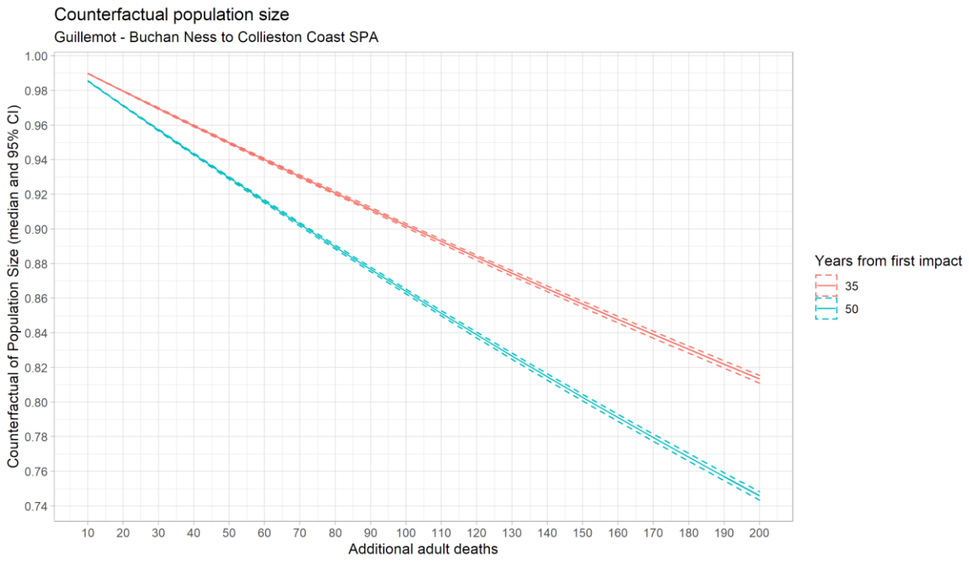

Figure 3.43: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

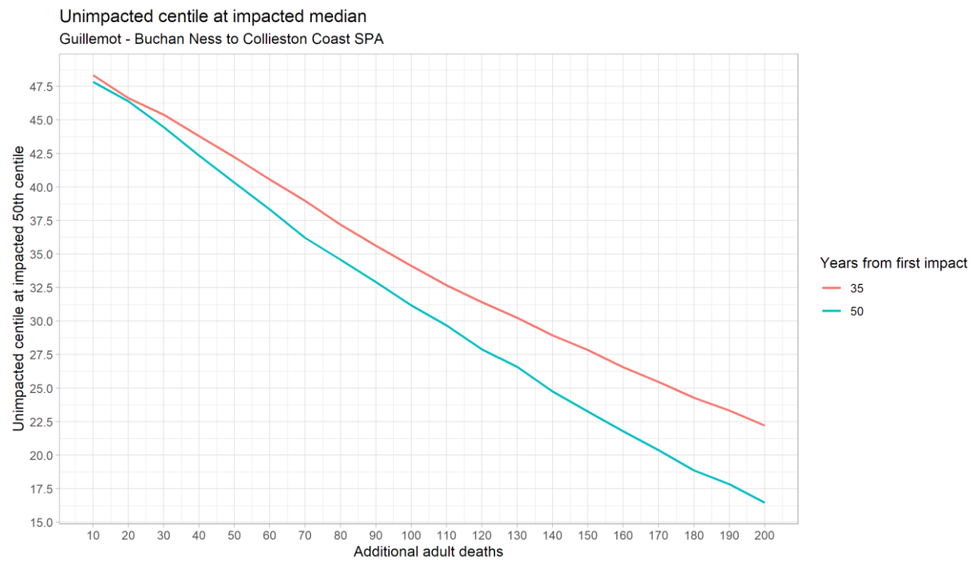

Figure 3.44: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.57: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.025	1.011	1.038			
2062	10	1.025	1.011	1.037	0.990	1.000	48.3
2062	20	1.024	1.010	1.037	0.980	0.999	46.6
2062	30	1.024	1.010	1.037	0.970	0.999	45.4
2062	40	1.024	1.010	1.036	0.960	0.999	43.8
2062	50	1.023	1.009	1.036	0.950	0.999	42.2
2062	60	1.023	1.009	1.036	0.940	0.998	40.6
2062	70	1.023	1.009	1.036	0.930	0.998	39.0
2062	80	1.023	1.008	1.035	0.921	0.998	37.2
2062	90	1.022	1.008	1.035	0.911	0.997	35.6
2062	100	1.022	1.008	1.035	0.902	0.997	34.1
2062	110	1.022	1.008	1.034	0.893	0.997	32.7
2062	120	1.021	1.007	1.034	0.884	0.997	31.4
2062	130	1.021	1.007	1.034	0.874	0.996	30.2
2062	140	1.021	1.007	1.033	0.865	0.996	28.9
2062	150	1.021	1.006	1.033	0.857	0.996	27.8
2062	160	1.020	1.006	1.033	0.848	0.995	26.6
2062	170	1.020	1.006	1.033	0.839	0.995	25.5
2062	180	1.020	1.006	1.032	0.830	0.995	24.3
2062	190	1.019	1.005	1.032	0.822	0.995	23.3
2062	200	1.019	1.005	1.032	0.813	0.994	22.2
2077	0	1.025	1.013	1.036			
2077	10	1.025	1.013	1.035	0.985	1.000	47.8
2077	20	1.024	1.013	1.035	0.971	0.999	46.4
2077	30	1.024	1.012	1.035	0.957	0.999	44.5
2077	40	1.024	1.012	1.034	0.943	0.999	42.3
2077	50	1.023	1.012	1.034	0.929	0.999	40.3
2077	60	1.023	1.012	1.034	0.916	0.998	38.3
2077	70	1.023	1.011	1.034	0.903	0.998	36.2
2077	80	1.022	1.011	1.033	0.890	0.998	34.6
2077	90	1.022	1.011	1.033	0.877	0.997	32.9
2077	100	1.022	1.010	1.033	0.864	0.997	31.2
2077	110	1.022	1.010	1.032	0.851	0.997	29.7
2077	120	1.021	1.010	1.032	0.839	0.997	27.9
2077	130	1.021	1.010	1.032	0.827	0.996	26.6
2077	140	1.021	1.009	1.031	0.815	0.996	24.8
2077	150	1.020	1.009	1.031	0.803	0.996	23.3
2077	160	1.020	1.009	1.031	0.791	0.995	21.8
2077	170	1.020	1.008	1.031	0.780	0.995	20.4
2077	180	1.020	1.008	1.030	0.768	0.995	18.9
2077	190	1.019	1.008	1.030	0.757	0.995	17.8
2077	200	1.019	1.007	1.030	0.746	0.994	16.5

Table 3.58: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	113267.4	65202.3	184901.2
Forth and Tay Consented developer approach	0.07	6.0259	6.16	112540.0	64784.4	183731.0
Forth and Tay Consented Scoping approach a	0.07	12.5691	13.30	111732.6	64322.8	182431.1
Forth and Tay Consented Scoping Approach b	0.07	27.0954	28.09	110012.0	63336.3	179664.7
North Sea Consented developer approach	0.07	8.5259	8.06	112272.4	64630.1	183301.8
North Sea Consented Scoping Approach a	0.07	18.7700	17.91	111079.2	63945.1	181382.8
North Sea Consented Scoping Approach b	0.07	39.2954	37.09	108753.3	62607.3	177639.9
(1) Project Alone: developer approach	0.07	4.9259	4.76	112686.1	64867.3	183966.1
(2) Project Alone: Scoping approach a	0.07	9.5691	9.40	112133.3	64550.8	183076.6
(2) Project Alone: Scoping approach b	0.07	21.3954	20.79	110758.1	63760.6	180864.2

Table 3.59: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	163159.6	89005.9	292409.4
Forth and Tay Consented developer approach	0.07	6.0259	6.16	161674.4	88192.9	289762.2
Forth and Tay Consented Scoping approach a	0.07	12.5691	13.30	160030.9	87293.3	286832.3
Forth and Tay Consented Scoping Approach b	0.07	27.0954	28.09	156557.3	85383.9	280621.2
North Sea Consented developer approach	0.07	8.5259	8.06	161130.4	87894.7	288793.0
North Sea Consented Scoping Approach a	0.07	18.7700	17.91	158709.5	86566.6	284475.0
North Sea Consented Scoping Approach b	0.07	39.2954	37.09	154028.2	83989.5	276114.9
(1) Project Alone: developer approach	0.07	4.9259	4.76	161973.2	88355.9	290295.1
(2) Project Alone: Scoping approach a	0.07	9.5691	9.40	160846.5	87740.1	288289.2
(2) Project Alone: Scoping approach b	0.07	21.3954	20.79	158059.5	86209.7	283315.4

Table 3.60: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.025	1.011	1.038	1.025	1.013	1.036
Forth and Tay Consented developer approach	0.07	6.0259	6.16	1.025	1.011	1.037	1.025	1.013	1.035
Forth and Tay Consented Scoping approach a	0.07	12.5691	13.30	1.025	1.010	1.037	1.024	1.013	1.035
Forth and Tay Consented Scoping Approach b	0.07	27.0954	28.09	1.024	1.010	1.037	1.024	1.013	1.035
North Sea Consented developer approach	0.07	8.5259	8.06	1.025	1.011	1.037	1.025	1.013	1.035
North Sea Consented Scoping Approach a	0.07	18.7700	17.91	1.024	1.010	1.037	1.024	1.013	1.035
North Sea Consented Scoping Approach b	0.07	39.2954	37.09	1.024	1.010	1.036	1.024	1.012	1.034
(1) Project Alone: developer approach	0.07	4.9259	4.76	1.025	1.011	1.037	1.025	1.013	1.035
(2) Project Alone: Scoping approach a	0.07	9.5691	9.40	1.025	1.011	1.037	1.025	1.013	1.035
(2) Project Alone: Scoping approach b	0.07	21.3954	20.79	1.024	1.010	1.037	1.024	1.013	1.035

Table 3.61: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
Forth and Tay Consented developer approach	0.07	6.0259	6.16	0.994	0.991	1.000	1.000
Forth and Tay Consented Scoping approach a	0.07	12.5691	13.30	0.986	0.981	1.000	1.000
Forth and Tay Consented Scoping Approach b	0.07	27.0954	28.09	0.971	0.960	0.999	0.999
North Sea Consented developer approach	0.07	8.5259	8.06	0.991	0.988	1.000	1.000
North Sea Consented Scoping Approach a	0.07	18.7700	17.91	0.981	0.973	0.999	0.999
North Sea Consented Scoping Approach b	0.07	39.2954	37.09	0.960	0.944	0.999	0.999
(1) Project Alone: developer approach	0.07	4.9259	4.76	0.995	0.993	1.000	1.000
(2) Project Alone: Scoping approach a	0.07	9.5691	9.40	0.990	0.986	1.000	1.000
(2) Project Alone: Scoping approach b	0.07	21.3954	20.79	0.978	0.969	0.999	0.999

3.13 GUILLEMOT - TROUP, PENNAN AND LION'S HEADS SPA

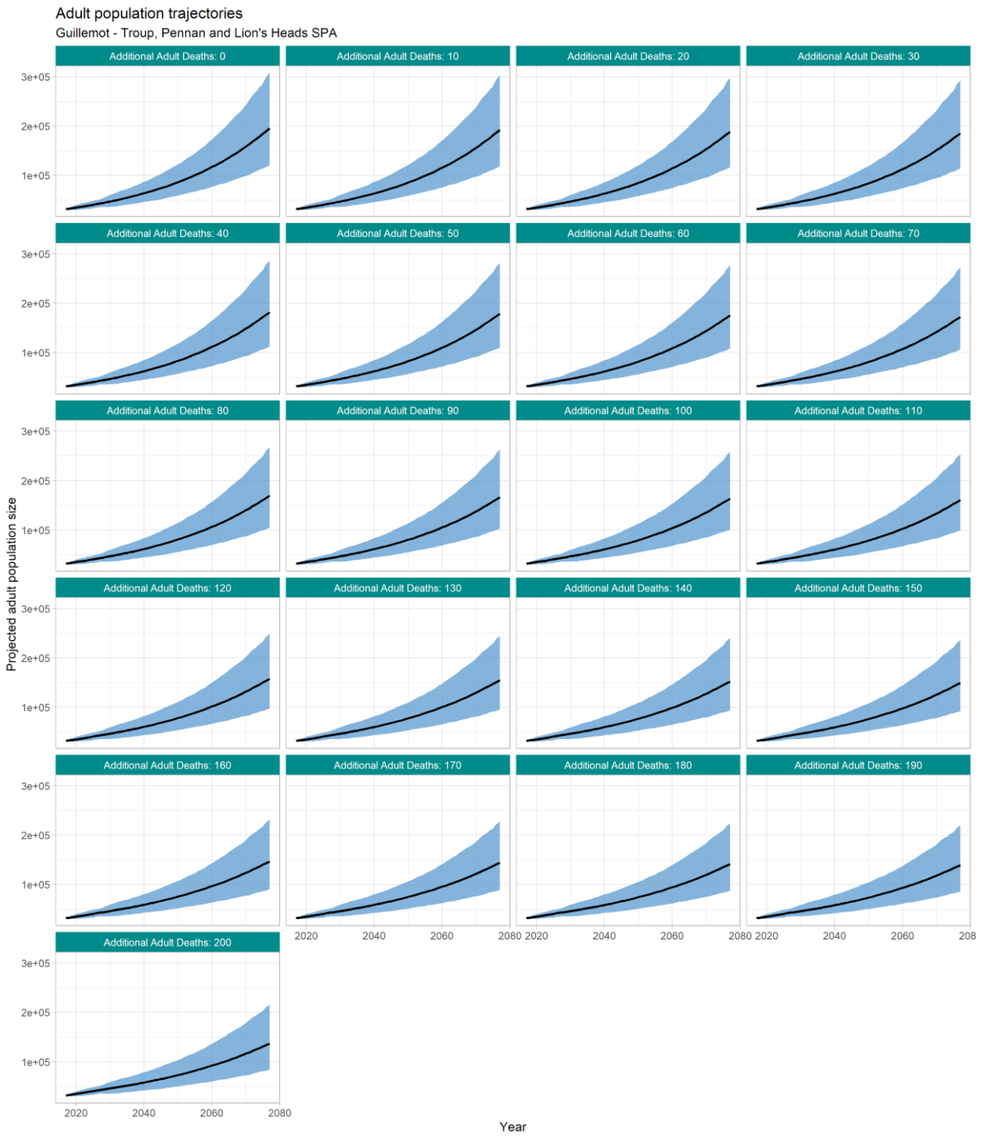

Figure 3.45: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

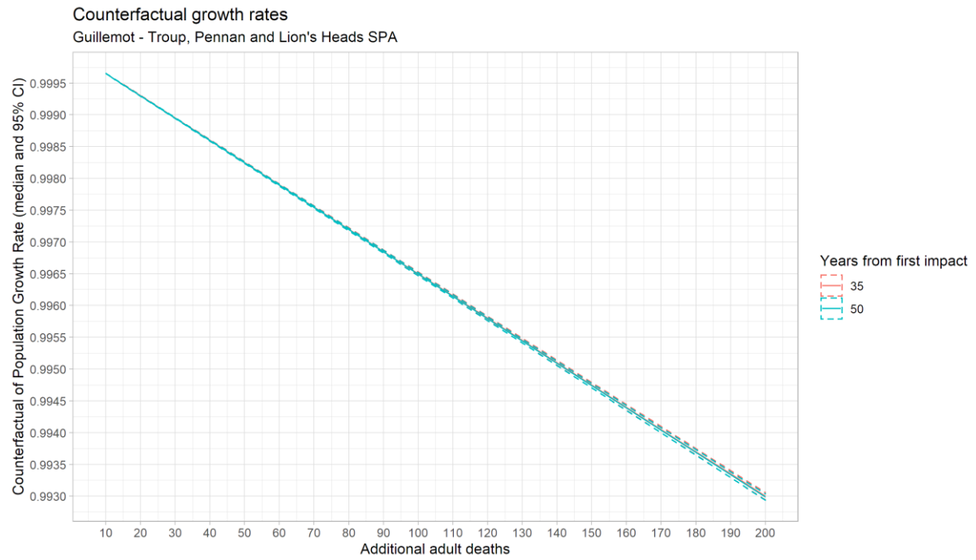

Figure 3.46: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

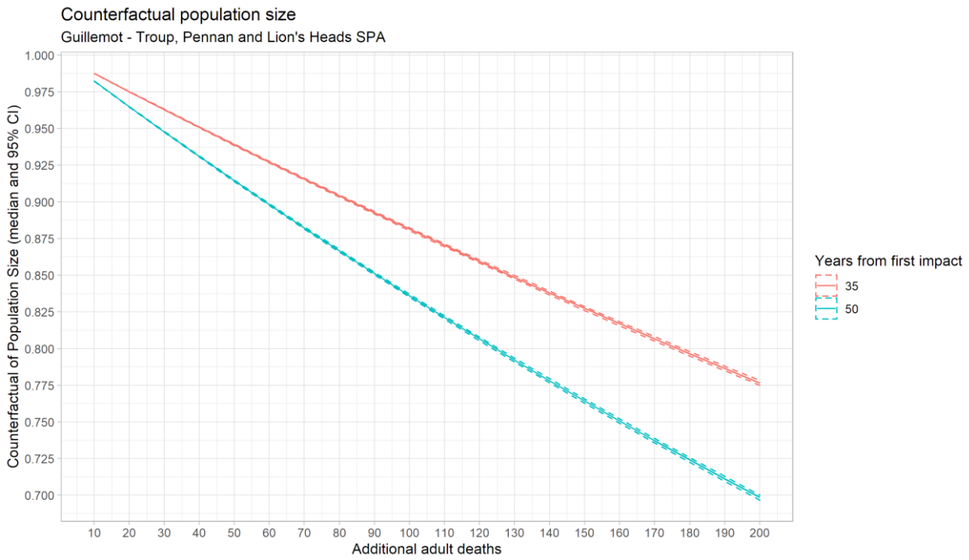

Figure 3.47: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

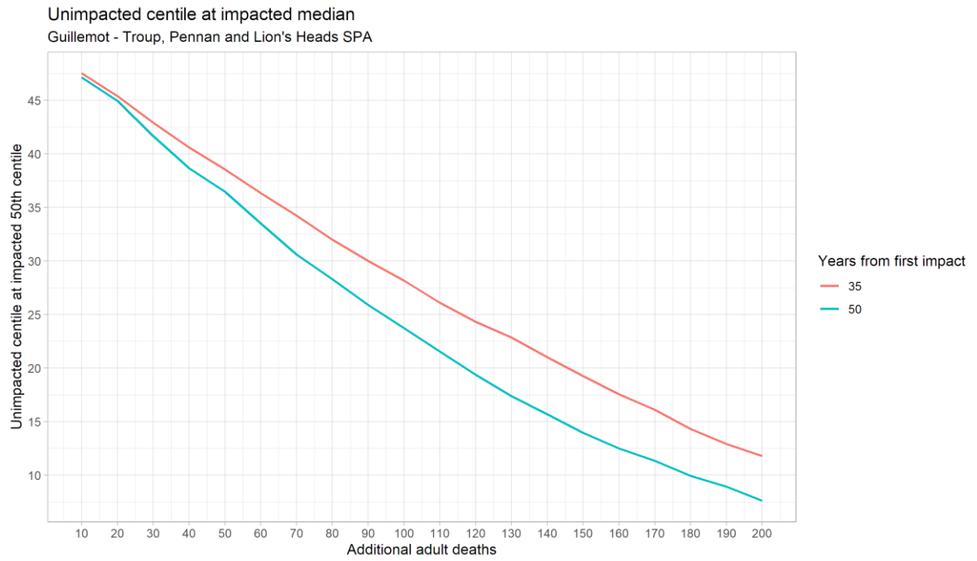

Figure 3.48: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.62: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.031	1.020	1.041			
2062	10	1.030	1.020	1.040	0.987	1.000	47.5
2062	20	1.030	1.020	1.040	0.975	0.999	45.4
2062	30	1.030	1.019	1.040	0.963	0.999	42.9
2062	40	1.029	1.019	1.039	0.951	0.999	40.6
2062	50	1.029	1.018	1.039	0.939	0.998	38.6
2062	60	1.028	1.018	1.039	0.927	0.998	36.3
2062	70	1.028	1.018	1.038	0.915	0.998	34.2
2062	80	1.028	1.017	1.038	0.904	0.997	32.0
2062	90	1.027	1.017	1.038	0.893	0.997	30.0
2062	100	1.027	1.017	1.037	0.881	0.997	28.2
2062	110	1.027	1.016	1.037	0.870	0.996	26.1
2062	120	1.026	1.016	1.036	0.859	0.996	24.3
2062	130	1.026	1.016	1.036	0.849	0.995	22.9
2062	140	1.026	1.015	1.036	0.838	0.995	21.0
2062	150	1.025	1.015	1.035	0.827	0.995	19.3
2062	160	1.025	1.015	1.035	0.817	0.994	17.6
2062	170	1.024	1.014	1.035	0.807	0.994	16.1
2062	180	1.024	1.014	1.034	0.797	0.994	14.3
2062	190	1.024	1.013	1.034	0.786	0.993	12.9
2062	200	1.023	1.013	1.034	0.777	0.993	11.8
2077	0	1.031	1.022	1.039			
2077	10	1.030	1.022	1.039	0.982	1.000	47.2
2077	20	1.030	1.021	1.039	0.965	0.999	44.9
2077	30	1.030	1.021	1.038	0.948	0.999	41.7
2077	40	1.029	1.020	1.038	0.931	0.999	38.7
2077	50	1.029	1.020	1.037	0.914	0.998	36.5
2077	60	1.028	1.020	1.037	0.898	0.998	33.5
2077	70	1.028	1.019	1.037	0.882	0.998	30.6
2077	80	1.028	1.019	1.036	0.867	0.997	28.3
2077	90	1.027	1.019	1.036	0.851	0.997	25.9
2077	100	1.027	1.018	1.036	0.836	0.996	23.7
2077	110	1.027	1.018	1.035	0.821	0.996	21.6
2077	120	1.026	1.018	1.035	0.807	0.996	19.4
2077	130	1.026	1.017	1.035	0.792	0.995	17.4
2077	140	1.026	1.017	1.034	0.778	0.995	15.7
2077	150	1.025	1.016	1.034	0.764	0.995	14.0
2077	160	1.025	1.016	1.033	0.751	0.994	12.5
2077	170	1.025	1.016	1.033	0.737	0.994	11.4
2077	180	1.024	1.015	1.033	0.724	0.994	10.0
2077	190	1.024	1.015	1.032	0.711	0.993	8.9
2077	200	1.023	1.015	1.032	0.698	0.993	7.6

Table 3.63: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	124263.6	81478.5	185270.8
North Sea Consented developer approach	0.07	10.3644	8.33	122694.6	80440.6	182950.2
North Sea Consented Scoping Approach a	0.07	22.3400	17.61	120931.7	79273.5	180339.0
North Sea Consented Scoping Approach b	0.07	47.5514	37.57	117274.3	76851.3	174917.4
(1) Project Alone: developer approach	0.07	2.47	2.19	123647.7	81070.9	184358.5
(2) Project Alone: Scoping approach a	0.07	5.19	4.70	123152.5	80742.8	183624.5
(2) Project Alone: Scoping approach b	0.07	11.10	9.97	121664.8	79757.3	181415.3

Table 3.64: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	195444.8	121031.8	308641.0
North Sea Consented developer approach	0.07	10.3644	8.33	191955.6	118866.0	303158.0
North Sea Consented Scoping Approach a	0.07	22.3400	17.61	188048.7	116439.8	297022.3
North Sea Consented Scoping Approach b	0.07	47.5514	37.57	180005.3	111433.0	284404.6
(1) Project Alone: developer approach	0.07	2.47	2.19	194072.3	120179.9	306482.1
(2) Project Alone: Scoping approach a	0.07	5.19	4.70	192970.6	119496.9	304748.5
(2) Project Alone: Scoping approach b	0.07	11.10	9.97	189662.4	117445.3	299548.8

Table 3.65: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR ,lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.031	1.020	1.041	1.031	1.022	1.039
North Sea Consented developer approach	0.07	10.3644	8.33	1.030	1.020	1.040	1.030	1.022	1.039
North Sea Consented Scoping Approach a	0.07	22.3400	17.61	1.030	1.019	1.040	1.030	1.021	1.038
North Sea Consented Scoping Approach b	0.07	47.5514	37.57	1.029	1.019	1.039	1.029	1.020	1.038
(1) Project Alone: developer approach	0.07	2.47	2.19	1.030	1.020	1.041	1.031	1.022	1.039
(2) Project Alone: Scoping approach a	0.07	5.19	4.70	1.030	1.020	1.041	1.030	1.022	1.039
(2) Project Alone: Scoping approach b	0.07	11.10	9.97	1.030	1.020	1.040	1.030	1.021	1.039

Table 3.66: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.07	10.3644	8.33	0.987	0.982	1.000	1.000
North Sea Consented Scoping Approach a	0.07	22.3400	17.61	0.973	0.962	0.999	0.999
North Sea Consented Scoping Approach b	0.07	47.5514	37.57	0.944	0.921	0.998	0.998
(1) Project Alone: developer approach	0.07	2.47	2.19	0.995	0.993	1.000	1.000
(2) Project Alone: Scoping approach a	0.07	5.19	4.70	0.991	0.987	1.000	1.000
(2) Project Alone: Scoping approach b	0.07	11.10	9.97	0.979	0.970	0.999	0.999

3.14 HERRING GULL - FORTH ISLANDS SPA

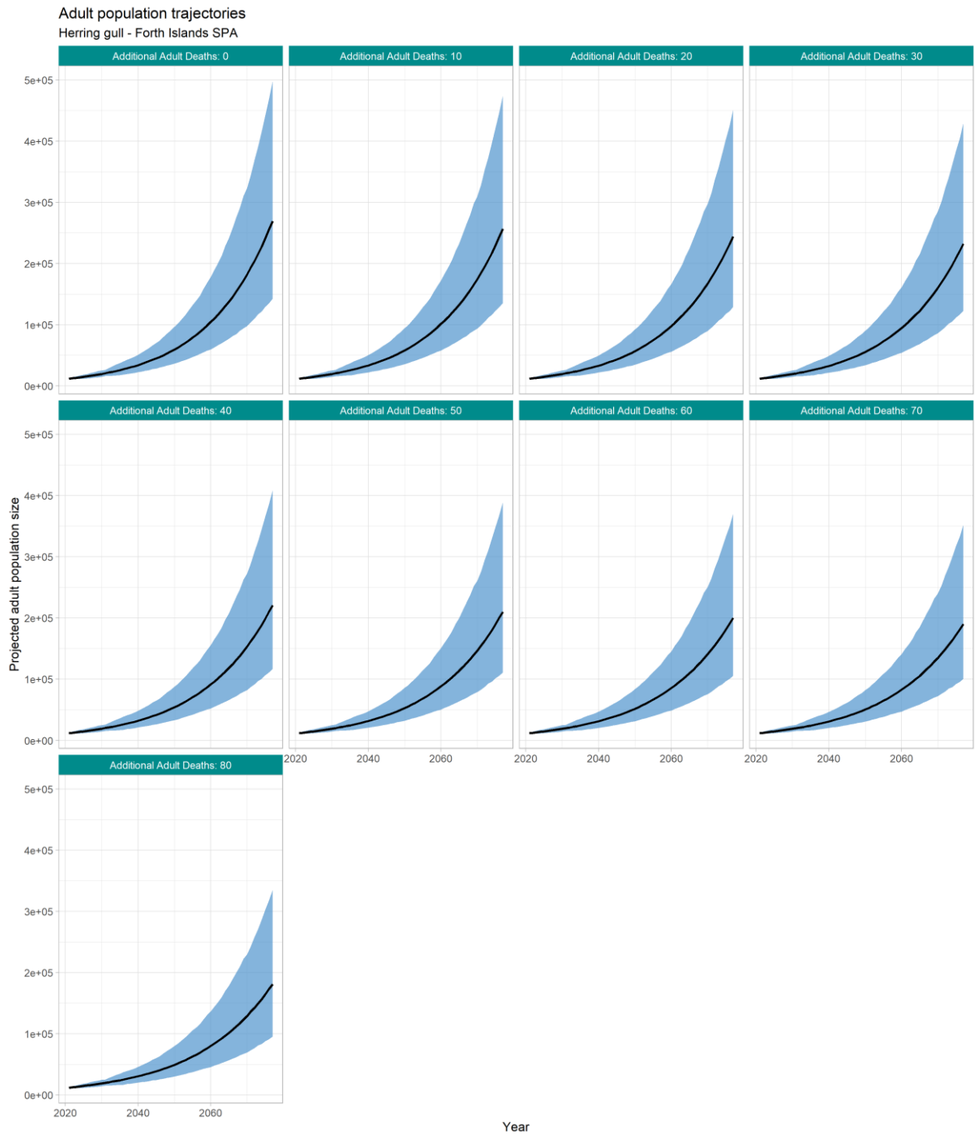

Figure 3.49: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

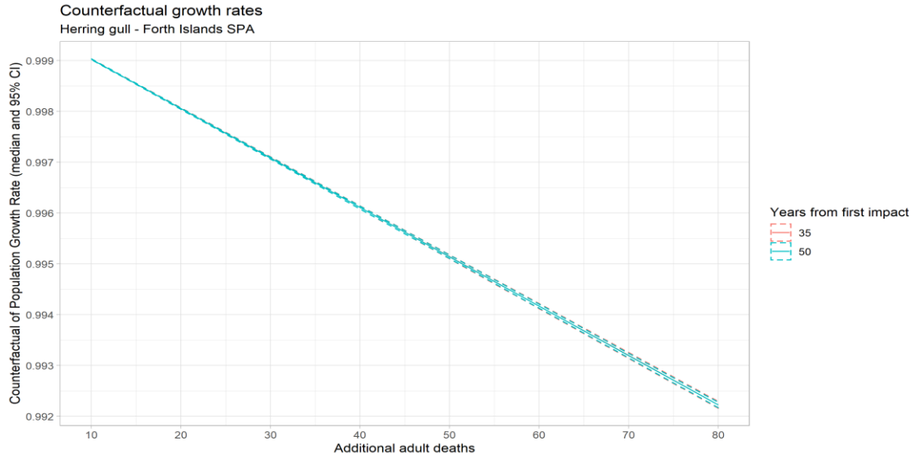

Figure 3.50: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

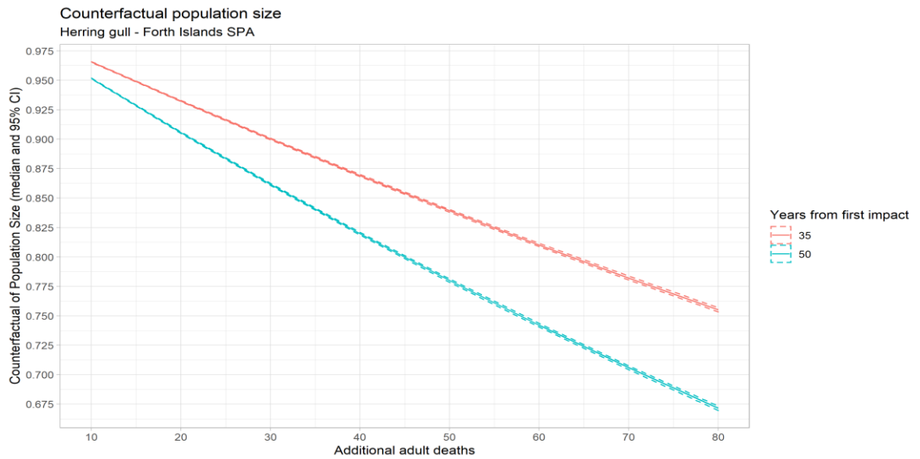

Figure 3.51: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

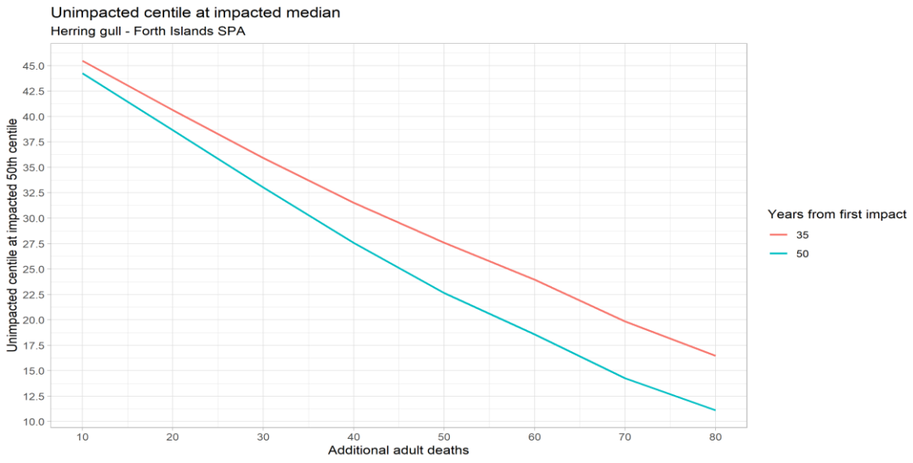

Figure 3.52: **The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).**

Table 3.67: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.057	1.043	1.071			
2062	10	1.056	1.042	1.070	0.966	0.999	45.5
2062	20	1.055	1.041	1.069	0.932	0.998	40.6
2062	30	1.054	1.040	1.068	0.900	0.997	35.9
2062	40	1.053	1.039	1.067	0.869	0.996	31.5
2062	50	1.052	1.038	1.066	0.839	0.995	27.6
2062	60	1.051	1.037	1.065	0.810	0.994	24.0
2062	70	1.050	1.036	1.064	0.782	0.993	19.9
2062	80	1.049	1.035	1.063	0.755	0.992	16.5
2077	0	1.057	1.045	1.069			
2077	10	1.056	1.044	1.068	0.952	0.999	44.3
2077	20	1.055	1.043	1.067	0.906	0.998	38.7
2077	30	1.054	1.042	1.066	0.862	0.997	33.0
2077	40	1.053	1.041	1.065	0.820	0.996	27.6
2077	50	1.052	1.040	1.064	0.780	0.995	22.6
2077	60	1.051	1.039	1.063	0.742	0.994	18.6
2077	70	1.050	1.038	1.062	0.706	0.993	14.3
2077	80	1.049	1.037	1.061	0.672	0.992	11.1

Table 3.68: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.35	0.0000	0.000	116787.7	66486.4	200968.5
North Sea Consented developer approach	0.35	15.1680	4.040	113124.3	64375.7	194811.3
North Sea Consented Scoping Approach	0.35	22.1025	5.299	111572.6	63477.5	192205.9
(1) Project Alone: developer approach	0.35	10.1680	1.740	114459.4	65142.6	197071.3
(2) Project Alone: Scoping approach	0.35	17.1025	2.999	112887.5	64236.7	194433.9

Table 3.69: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.35	0.0000	0.000	269482.7	142561.8	499062.4
North Sea Consented developer approach	0.35	15.1680	4.040	257642.6	136231.9	477654.5
North Sea Consented Scoping Approach	0.35	22.1025	5.299	252678.4	133567.6	468664.1
(1) Project Alone: developer approach	0.35	10.1680	1.740	261932.8	138524.0	485464.6
(2) Project Alone: Scoping approach	0.35	17.1025	2.999	256883.6	135812.8	476344.6

Table 3.70: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR,lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.35	0.0000	0.000	1.057	1.043	1.071	1.057	1.045	1.069
North Sea Consented developer approach	0.35	15.1680	4.040	1.056	1.042	1.070	1.056	1.044	1.068
North Sea Consented Scoping Approach	0.35	22.1025	5.299	1.056	1.042	1.070	1.056	1.044	1.068
(1) Project Alone: developer approach	0.35	10.1680	1.740	1.057	1.043	1.071	1.057	1.045	1.069
(2) Project Alone: Scoping approach	0.35	17.1025	2.999	1.056	1.042	1.070	1.056	1.044	1.068

Table 3.71: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.35	15.1680	4.040	0.969	0.956	0.999	0.999
North Sea Consented Scoping Approach	0.35	22.1025	5.299	0.955	0.938	0.999	0.999
(1) Project Alone: developer approach	0.35	10.1680	1.740	0.980	0.972	0.999	0.999

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
(2) Project Alone: Scoping approach	0.35	17.1025	2.999	0.967	0.953	0.999	0.999

3.15 HERRING GULL - FOWLSHEUGH SPA

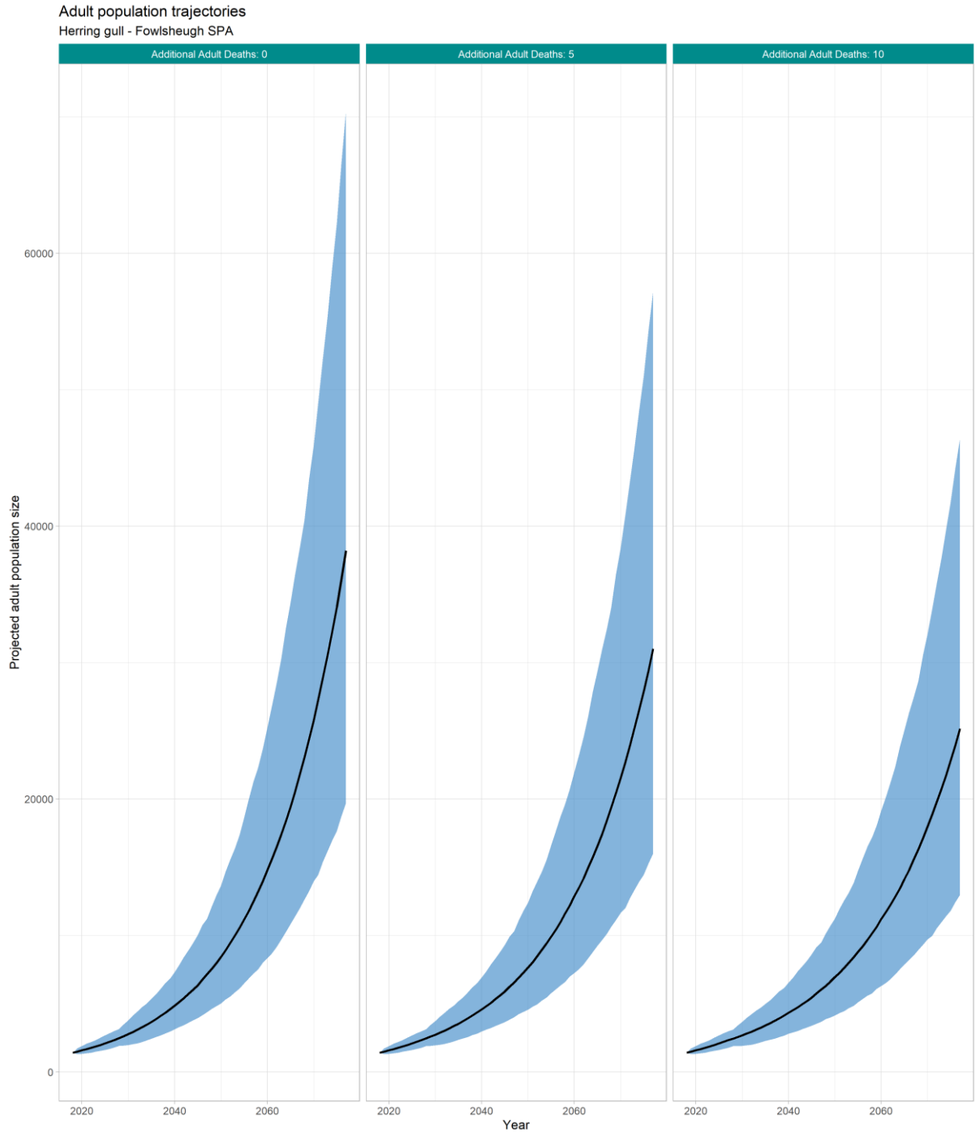

Figure 3.53: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

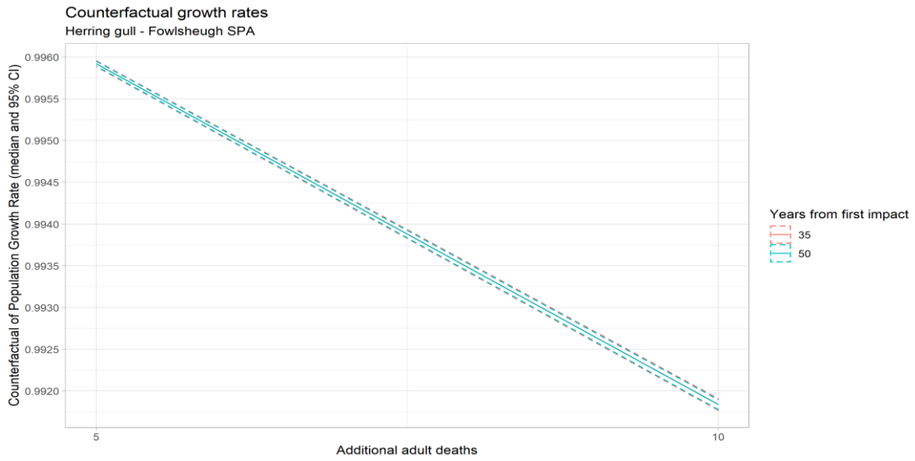

Figure 3.54: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

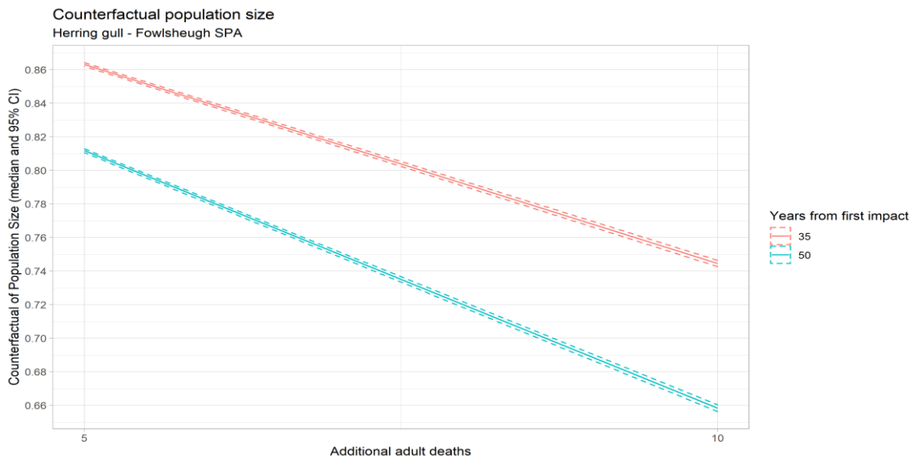

Figure 3.55: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

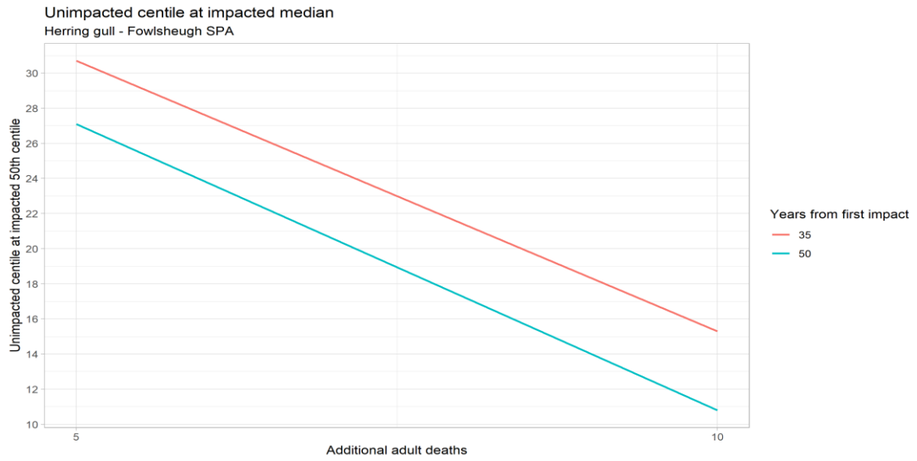

Figure 3.56: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.72: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.057	1.043	1.072			
2062	5	1.053	1.039	1.067	0.863	0.996	30.7
2062	10	1.049	1.034	1.063	0.745	0.992	15.3
2077	0	1.057	1.045	1.069			
2077	5	1.053	1.041	1.065	0.812	0.996	27.1
2077	10	1.049	1.037	1.060	0.658	0.992	10.8

Table 3.73: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.35	0.000	0.00	16450.6	9143.2	28430.8
Forth and Tay Consented developer approach	0.35	1.106	0.50	16097.3	8941.5	27826.2
Forth and Tay Consented Scoping Approach	0.35	1.520	0.58	15987.0	8878.6	27634.7
North Sea Consented developer approach	0.35	2.906	0.50	15675.7	8697.5	27106.3
North Sea Consented Scoping Approach	0.35	3.320	0.58	15567.7	8635.2	26926.3
(1) Project Alone: developer approach	0.35	0.606	0.10	16285.3	9047.6	28150.0
(2) Project Alone: Scoping approach	0.35	1.020	0.18	16174.1	8984.0	27957.2

Table 3.74: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.35	0.000	0.00	38195.9	19704.8	70443.2
Forth and Tay Consented developer approach	0.35	1.106	0.50	37054.3	19104.0	68367.6
Forth and Tay Consented Scoping Approach	0.35	1.520	0.58	36688.4	18913.1	67706.4
North Sea Consented developer approach	0.35	2.906	0.50	35695.2	18384.6	65941.3
North Sea Consented Scoping Approach	0.35	3.320	0.58	35346.2	18199.5	65315.4
(1) Project Alone: developer approach	0.35	0.606	0.10	37664.2	19426.6	69482.5
(2) Project Alone: Scoping approach	0.35	1.020	0.18	37299.8	19229.3	68824.5

Table 3.75: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.35	0.000	0.00	1.057	1.043	1.072	1.057	1.045	1.069
Forth and Tay Consented developer approach	0.35	1.106	0.50	1.057	1.042	1.071	1.057	1.045	1.068
Forth and Tay Consented Scoping Approach	0.35	1.520	0.58	1.057	1.042	1.071	1.057	1.044	1.068
North Sea Consented developer approach	0.35	2.906	0.50	1.056	1.042	1.070	1.056	1.044	1.068
North Sea Consented Scoping Approach	0.35	3.320	0.58	1.056	1.041	1.070	1.056	1.044	1.067
(1) Project Alone: developer approach	0.35	0.606	0.10	1.057	1.043	1.071	1.057	1.045	1.069
(2) Project Alone: Scoping approach	0.35	1.020	0.18	1.057	1.043	1.071	1.057	1.045	1.069

3.16 HERRING GULL - ST ABB'S HEAD TO FAST CASTLE SPA

Table 3.76: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
Forth and Tay Consented developer approach	0.35	1.106	0.50	0.979	0.970	0.999	0.999
Forth and Tay Consented Scoping Approach	0.35	1.520	0.58	0.972	0.961	0.999	0.999
North Sea Consented developer approach	0.35	2.906	0.50	0.953	0.934	0.999	0.999
North Sea Consented Scoping Approach	0.35	3.320	0.58	0.946	0.925	0.998	0.998
(1) Project Alone: developer approach	0.35	0.606	0.10	0.990	0.986	1.000	1.000
(2) Project Alone: Scoping approach	0.35	1.020	0.18	0.983	0.976	1.000	1.000

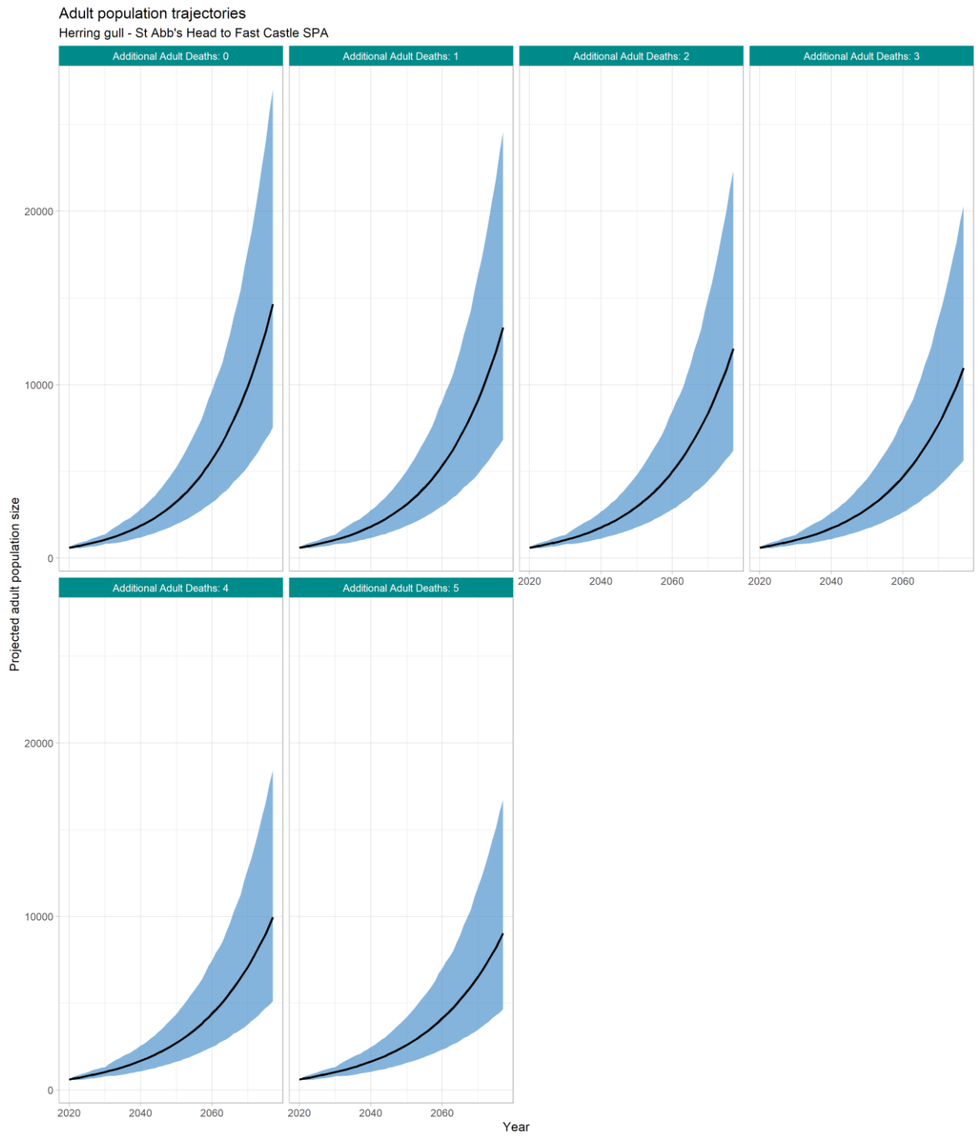

Figure 3.57: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.**

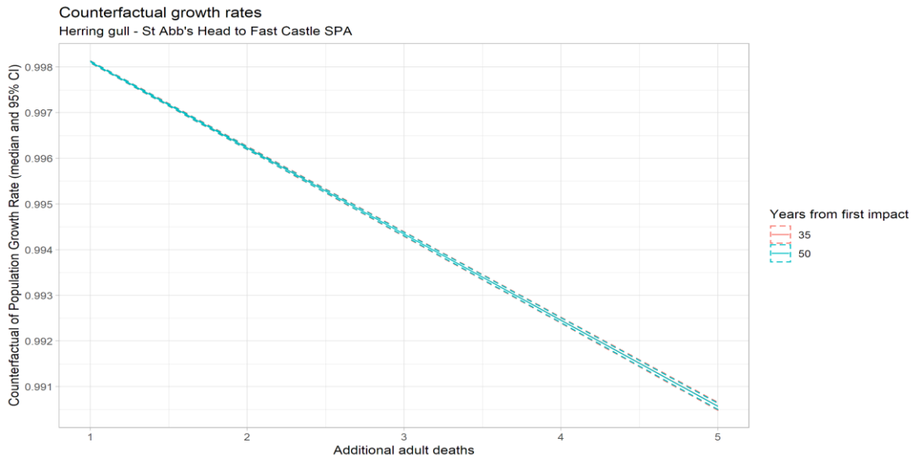

Figure 3.58: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

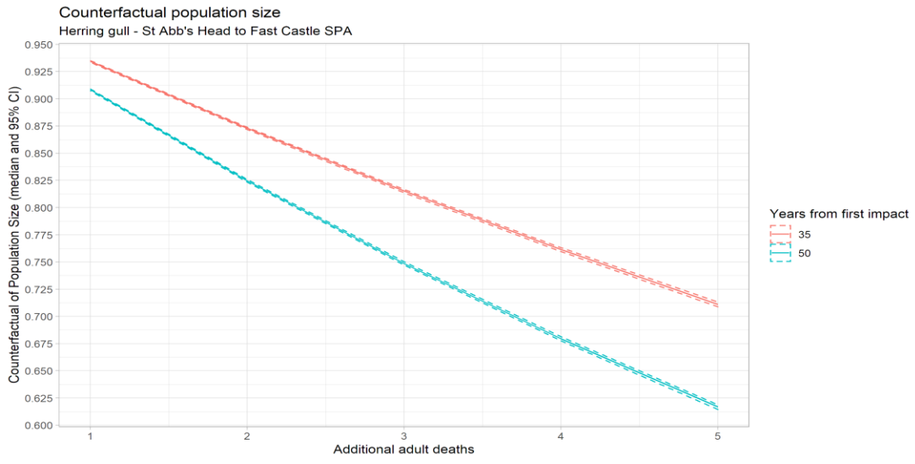

Figure 3.59 The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

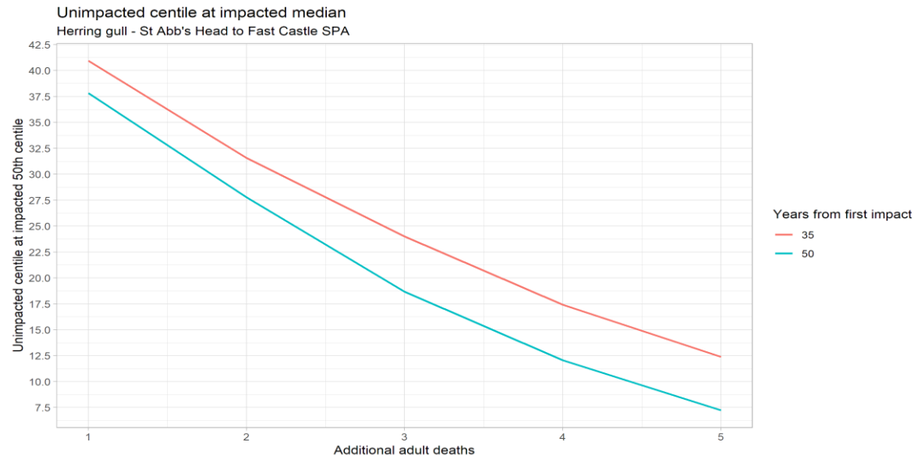

Figure 3.60: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.77: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.057	1.042	1.071			
2062	1	1.055	1.040	1.069	0.934	0.998	40.9
2062	2	1.053	1.038	1.067	0.873	0.996	31.6
2062	3	1.051	1.036	1.065	0.815	0.994	24.0
2062	4	1.049	1.034	1.063	0.761	0.992	17.4
2062	5	1.047	1.032	1.061	0.711	0.991	12.4
2077	0	1.057	1.045	1.069			
2077	1	1.055	1.043	1.067	0.908	0.998	37.8
2077	2	1.053	1.041	1.065	0.825	0.996	27.8
2077	3	1.051	1.039	1.063	0.749	0.994	18.7
2077	4	1.049	1.037	1.061	0.680	0.992	12.1
2077	5	1.047	1.035	1.059	0.617	0.991	7.2

Table 3.78: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.35	0.000	0.00	6348.7	3564.3	10752.7
North Sea Consented developer approach	0.35	0.743	0.27	6148.2	3449.5	10416.5
North Sea Consented Scoping Approach	0.35	1.056	0.33	6074.5	3407.9	10294.0
(1) Project Alone: developer approach	0.35	0.443	0.07	6242.5	3503.4	10573.2
(2) Project Alone: Scoping approach	0.35	0.756	0.13	6166.4	3460.5	10452.1

Table 3.79: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.35	0.000	0.00	14645.8	7551.2	27064.0
North Sea Consented developer approach	0.35	0.743	0.27	14001.0	7206.7	25879.0
North Sea Consented Scoping Approach	0.35	1.056	0.33	13766.6	7086.0	25455.8
(1) Project Alone: developer approach	0.35	0.443	0.07	14301.1	7367.3	26441.3
(2) Project Alone: Scoping approach	0.35	0.756	0.13	14066.2	7236.9	26005.1

Table 3.80: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.35	0.000	0.00	1.057	1.042	1.071	1.057	1.045	1.069
North Sea Consented developer approach	0.35	0.743	0.27	1.056	1.041	1.070	1.056	1.044	1.068
North Sea Consented Scoping Approach	0.35	1.056	0.33	1.056	1.041	1.070	1.056	1.044	1.068
(1) Project Alone: developer approach	0.35	0.443	0.07	1.057	1.042	1.071	1.057	1.045	1.068
(2) Project Alone: Scoping approach	0.35	0.756	0.13	1.056	1.041	1.070	1.056	1.044	1.068

Table 3.81: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.35	0.743	0.27	0.969	0.956	0.999	0.999
North Sea Consented Scoping Approach	0.35	1.056	0.33	0.957	0.940	0.999	0.999
(1) Project Alone: developer approach	0.35	0.443	0.07	0.983	0.977	1.000	1.000
(2) Project Alone: Scoping approach	0.35	0.756	0.13	0.971	0.960	0.999	0.999

3.17 HERRING GULL - FARNE ISLANDS SPA

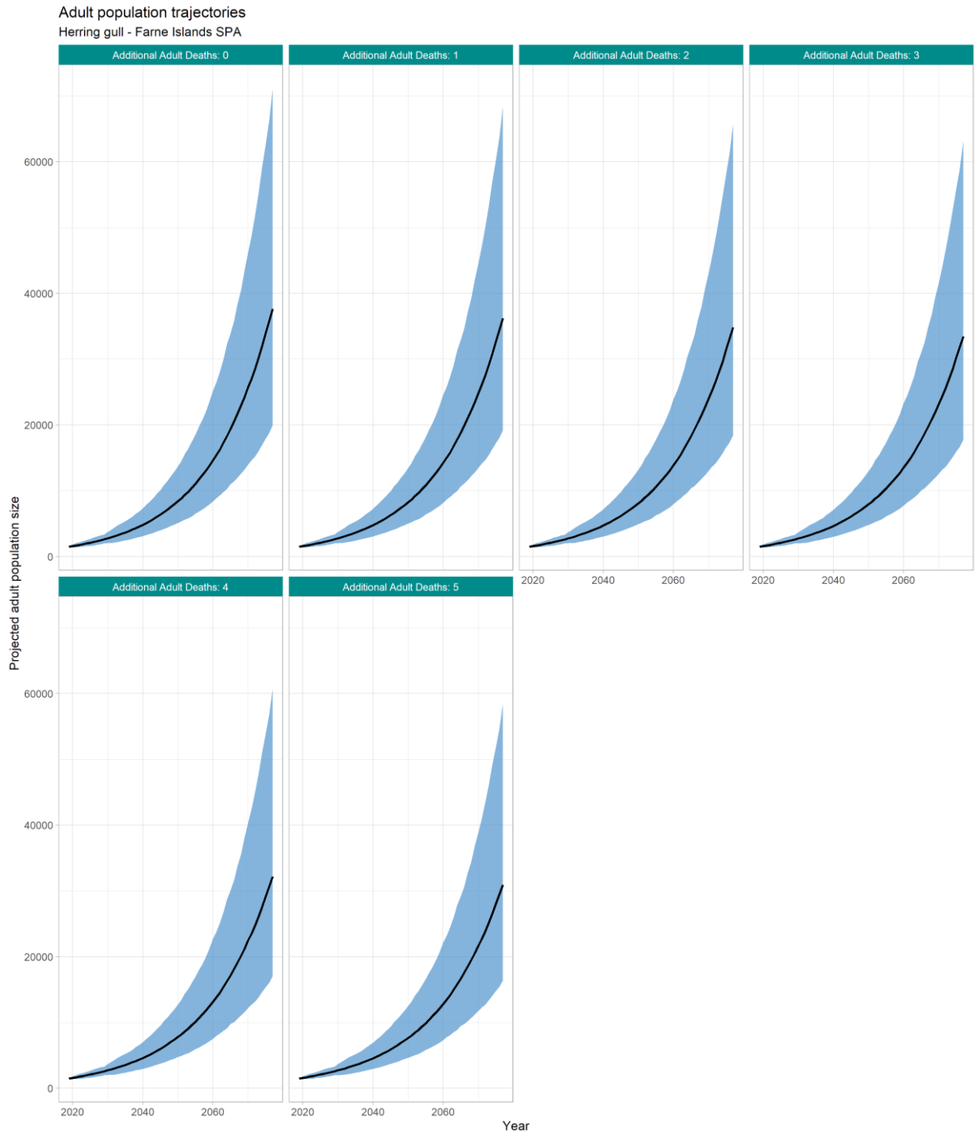

Figure 3.61: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

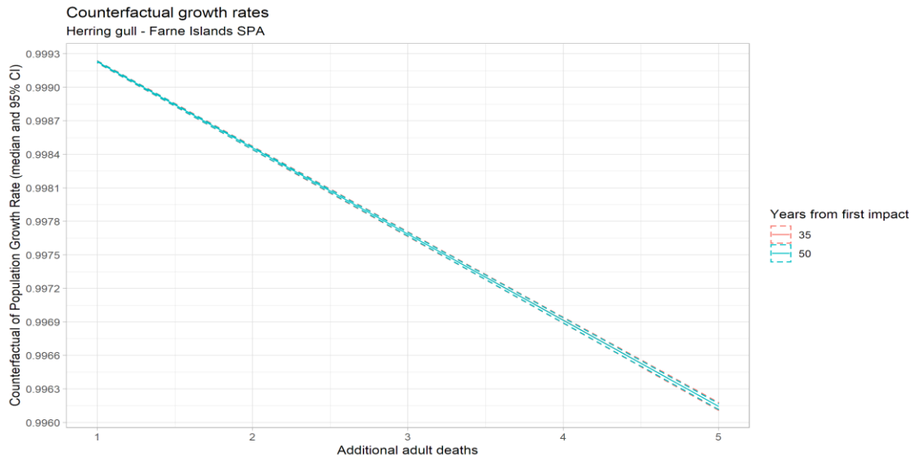

Figure 3.62: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

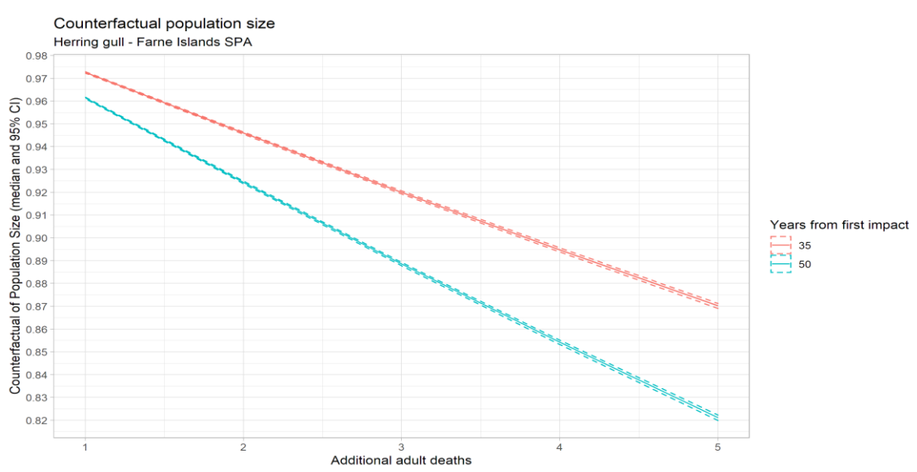

Figure 3.63; The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

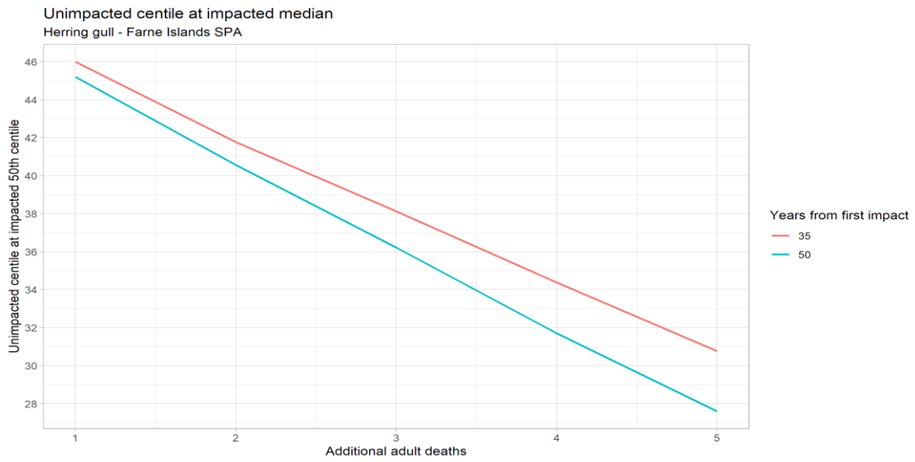

Figure 3.64: **The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).**

Table 3.82: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.057	1.043	1.071			
2062	1	1.056	1.042	1.071	0.973	0.999	46.0
2062	2	1.056	1.042	1.070	0.946	0.998	41.8
2062	3	1.055	1.041	1.069	0.920	0.998	38.1
2062	4	1.054	1.040	1.068	0.895	0.997	34.4
2062	5	1.053	1.039	1.067	0.870	0.996	30.8
2077	0	1.057	1.045	1.069			
2077	1	1.056	1.045	1.068	0.961	0.999	45.2
2077	2	1.056	1.044	1.068	0.924	0.998	40.6
2077	3	1.055	1.043	1.067	0.889	0.998	36.2
2077	4	1.054	1.042	1.066	0.854	0.997	31.7
2077	5	1.053	1.041	1.065	0.821	0.996	27.6

Table 3.83: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.35	0.000	0.00	16279.7	9331.3	28159.0
(1) Project Alone: developer approach	0.35	0.518	0.09	16147.1	9254.6	27933.5
(2) Project Alone: Scoping approach	0.35	0.870	0.15	16056.8	9203.6	27786.8

Table 3.84: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.35	0.000	0.00	37661.8	19970.7	71278.2
(1) Project Alone: developer approach	0.35	0.518	0.09	37231.8	19736.5	70488.7
(2) Project Alone: Scoping approach	0.35	0.870	0.15	36943.7	19582.4	69960.0

Table 3.85: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.35	0.000	0.00	1.057	1.043	1.071	1.057	1.045	1.069
(1) Project Alone: developer approach	0.35	0.518	0.09	1.057	1.043	1.071	1.057	1.045	1.069
(2) Project Alone: Scoping approach	0.35	0.870	0.15	1.057	1.043	1.071	1.057	1.045	1.069

Table 3.86: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
(1) Project Alone: developer approach	0.35	0.518	0.09	0.992	0.989	1	1
(2) Project Alone: Scoping approach	0.35	0.870	0.15	0.986	0.981	1	1

3.18 KITTIWAKE - FORTH ISLANDS SPA

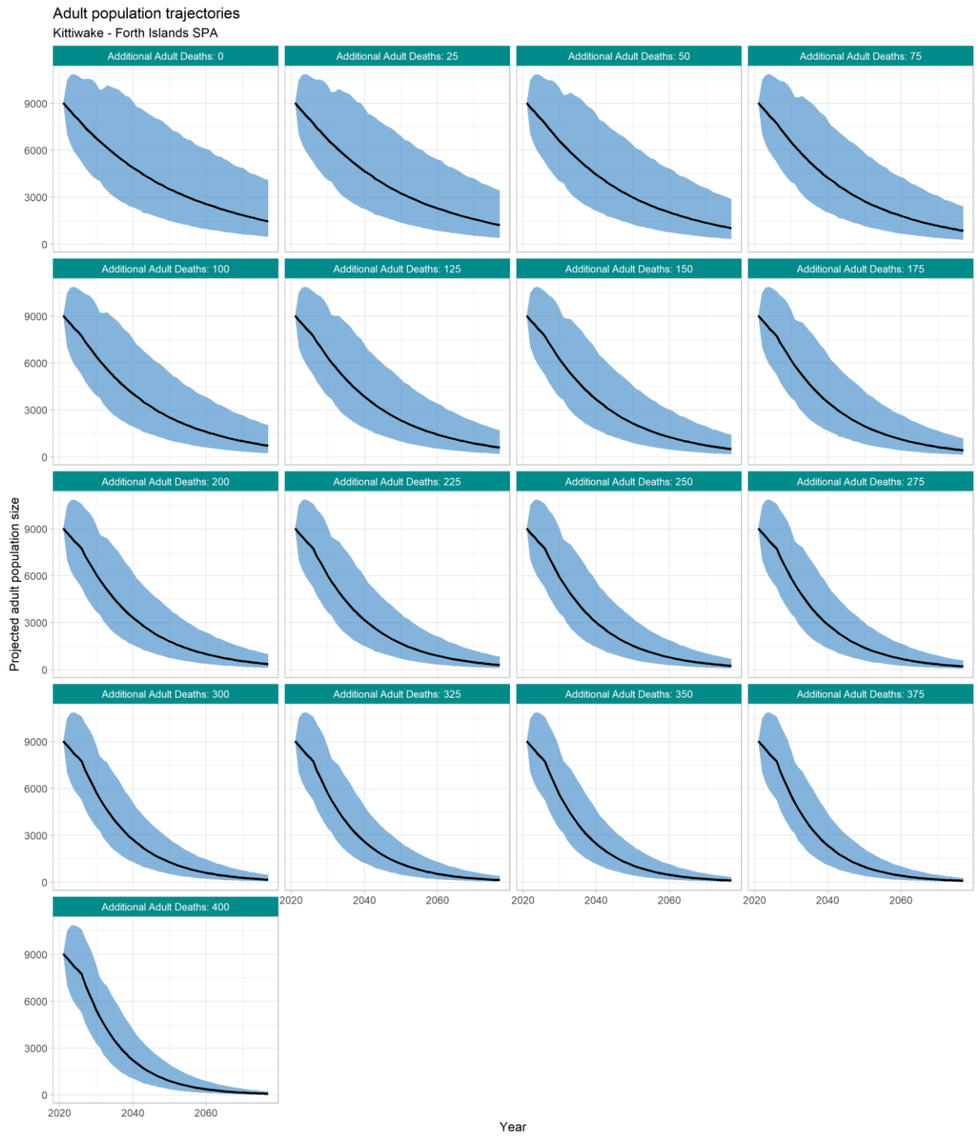

Figure 3.65: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

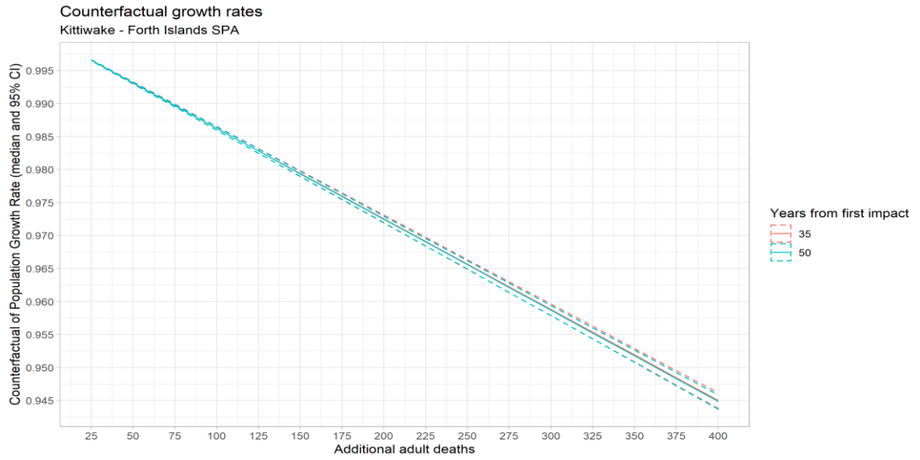

Figure 3.66: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

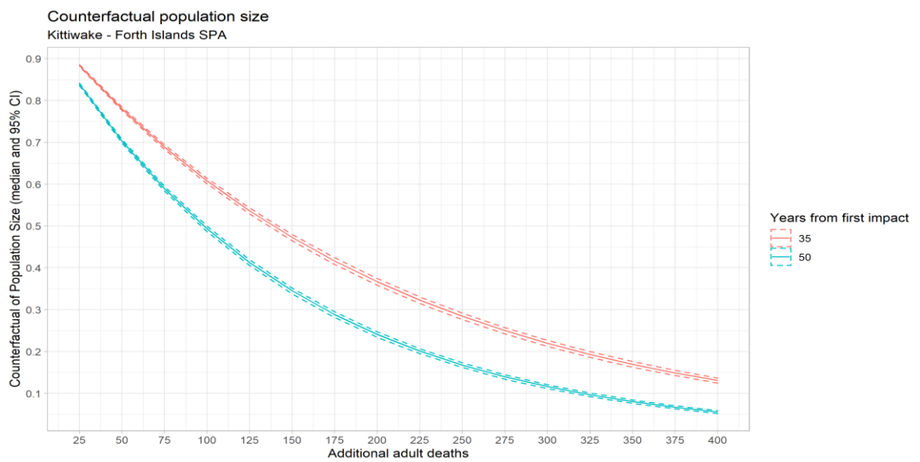

Figure 3.67: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

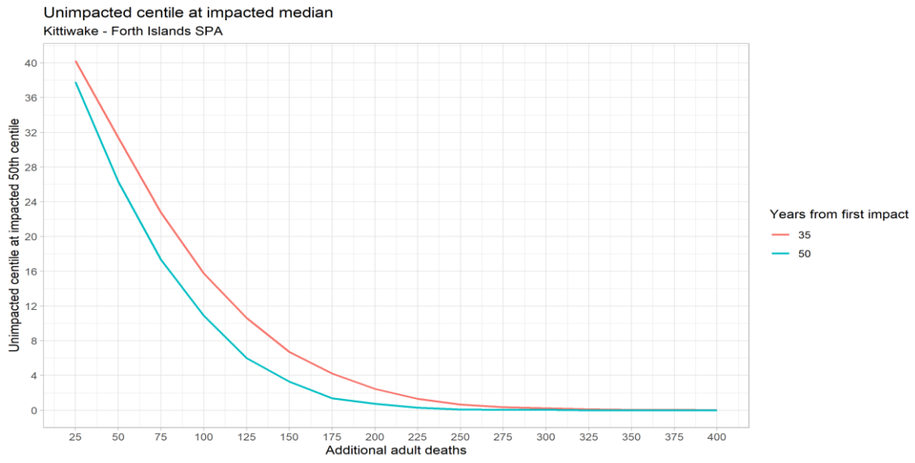

Figure 3.68: **The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).**

Table 3.87: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	0.968	0.945	0.990			
2062	25	0.965	0.941	0.987	0.884	0.997	40.2
2062	50	0.962	0.938	0.983	0.780	0.993	31.4
2062	75	0.958	0.935	0.980	0.689	0.990	22.8
2062	100	0.955	0.932	0.977	0.608	0.986	15.8
2062	125	0.952	0.928	0.973	0.536	0.983	10.6
2062	150	0.948	0.925	0.970	0.473	0.979	6.7
2062	175	0.945	0.922	0.966	0.417	0.976	4.2
2062	200	0.942	0.918	0.963	0.367	0.973	2.4
2062	225	0.938	0.915	0.960	0.323	0.969	1.3
2062	250	0.935	0.912	0.956	0.284	0.966	0.7
2062	275	0.932	0.909	0.953	0.250	0.962	0.3
2062	300	0.928	0.905	0.950	0.220	0.959	0.2
2062	325	0.925	0.902	0.946	0.193	0.955	0.1
2062	350	0.922	0.899	0.943	0.170	0.952	0.1
2062	375	0.918	0.895	0.940	0.149	0.948	0.0
2062	400	0.915	0.892	0.936	0.131	0.945	0.0
2077	0	0.968	0.948	0.986			
2077	25	0.965	0.945	0.983	0.839	0.997	37.8
2077	50	0.961	0.942	0.980	0.703	0.993	26.3
2077	75	0.958	0.939	0.976	0.589	0.990	17.3
2077	100	0.955	0.935	0.973	0.493	0.986	10.9

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2077	125	0.951	0.932	0.970	0.413	0.983	6.0
2077	150	0.948	0.929	0.966	0.345	0.979	3.3
2077	175	0.945	0.925	0.963	0.288	0.976	1.4
2077	200	0.941	0.922	0.960	0.241	0.972	0.7
2077	225	0.938	0.919	0.956	0.201	0.969	0.3
2077	250	0.935	0.915	0.953	0.168	0.966	0.1
2077	275	0.931	0.912	0.950	0.140	0.962	0.1
2077	300	0.928	0.909	0.946	0.116	0.959	0.0
2077	325	0.925	0.905	0.943	0.097	0.955	0.0
2077	350	0.921	0.902	0.940	0.080	0.952	0.0
2077	375	0.918	0.899	0.936	0.067	0.948	0.0
2077	400	0.915	0.895	0.933	0.055	0.945	0.0

Table 3.88: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.000	0.00	2422.7	897.1	5770.5
Forth and Tay Consented developer approach	0.1	56.223	4.23	2018.1	742.1	4831.2
Forth and Tay Consented Scoping approach a	0.1	58.205	4.52	2004.4	737.1	4799.7
Forth and Tay Consented Scoping Approach b	0.1	77.223	6.44	1880.5	690.4	4513.0
North Sea Consented developer approach	0.1	64.823	8.33	1948.0	715.7	4667.4
North Sea Consented Scoping Approach a	0.1	68.205	9.42	1923.1	706.3	4609.7
North Sea Consented Scoping Approach b	0.1	89.923	12.54	1784.5	654.4	4288.6
(1) Project Alone: developer approach	0.1	28.823	1.63	2208.4	814.4	5266.2
(2) Project Alone: Scoping approach a	0.1	36.205	2.32	2155.5	794.2	5145.1
(2) Project Alone: Scoping approach b	0.1	43.323	2.94	2106.3	775.3	5032.7

Table 3.89: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.000	0.00	1456.6	474.7	4100.0
Forth and Tay Consented developer approach	0.1	56.223	4.23	1124.2	364.5	3185.0
Forth and Tay Consented Scoping approach a	0.1	58.205	4.52	1113.7	360.8	3155.5
Forth and Tay Consented Scoping Approach b	0.1	77.223	6.44	1019.1	329.3	2891.9
North Sea Consented developer approach	0.1	64.823	8.33	1069.3	346.5	3031.5
North Sea Consented Scoping Approach a	0.1	68.205	9.42	1050.4	340.0	2977.5
North Sea Consented Scoping Approach b	0.1	89.923	12.54	946.2	305.4	2687.7
(1) Project Alone: developer approach	0.1	28.823	1.63	1277.8	415.2	3608.2
(2) Project Alone: Scoping approach a	0.1	36.205	2.32	1234.5	400.9	3489.6
(2) Project Alone: Scoping approach b	0.1	43.323	2.94	1194.6	387.6	3378.8

Table 3.90: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR) lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.000	0.00	0.968	0.945	0.990	0.968	0.948	0.986
Forth and Tay Consented developer approach	0.1	56.223	4.23	0.964	0.940	0.985	0.963	0.943	0.982
Forth and Tay Consented Scoping approach a	0.1	58.205	4.52	0.963	0.940	0.985	0.963	0.943	0.981
Forth and Tay Consented Scoping Approach b	0.1	77.223	6.44	0.962	0.938	0.983	0.961	0.942	0.980
North Sea Consented developer approach	0.1	64.823	8.33	0.963	0.939	0.984	0.962	0.942	0.981
North Sea Consented Scoping Approach a	0.1	68.205	9.42	0.962	0.938	0.984	0.962	0.942	0.980
North Sea Consented Scoping Approach b	0.1	89.923	12.54	0.960	0.937	0.982	0.960	0.940	0.978
(1) Project Alone: developer approach	0.1	28.823	1.63	0.966	0.942	0.988	0.965	0.946	0.984
(2) Project Alone: Scoping approach a	0.1	36.205	2.32	0.965	0.942	0.987	0.965	0.945	0.983
(2) Project Alone: Scoping approach b	0.1	43.323	2.94	0.965	0.941	0.986	0.964	0.945	0.983

Table 3.91: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
Forth and Tay Consented developer approach	0.1	56.223	4.23	0.833	0.772	0.995	0.995
Forth and Tay Consented Scoping approach a	0.1	58.205	4.52	0.827	0.765	0.995	0.995
Forth and Tay Consented Scoping Approach b	0.1	77.223	6.44	0.777	0.700	0.993	0.993
North Sea Consented developer approach	0.1	64.823	8.33	0.804	0.734	0.994	0.994
North Sea Consented Scoping Approach a	0.1	68.205	9.42	0.794	0.721	0.994	0.994
North Sea Consented Scoping Approach b	0.1	89.923	12.54	0.737	0.650	0.992	0.992
(1) Project Alone: developer approach	0.1	28.823	1.63	0.912	0.877	0.997	0.997
(2) Project Alone: Scoping approach a	0.1	36.205	2.32	0.890	0.848	0.997	0.997
(2) Project Alone: Scoping approach b	0.1	43.323	2.94	0.869	0.820	0.996	0.996

3.19 KITTIWAKE - FOWLSHEUGH SPA

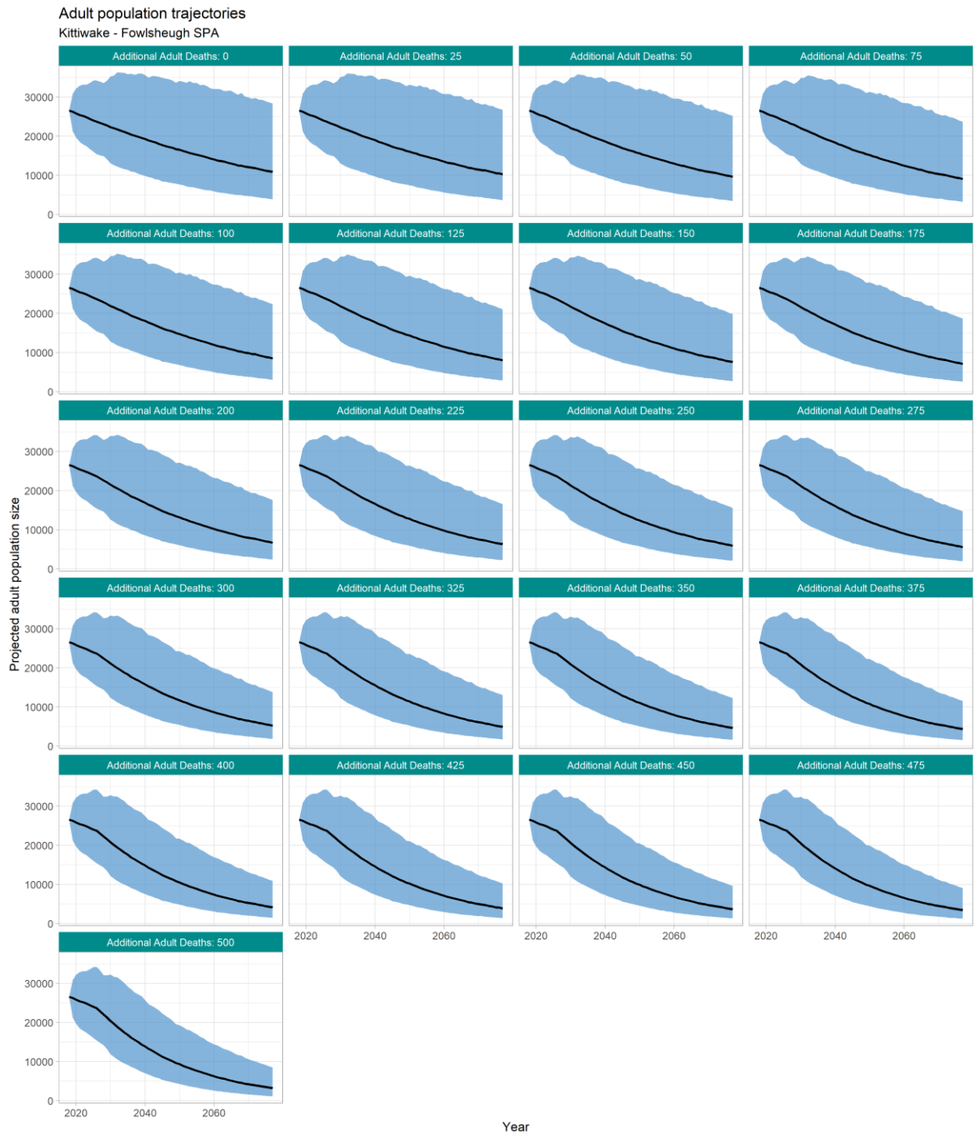

Figure 3.69: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.**

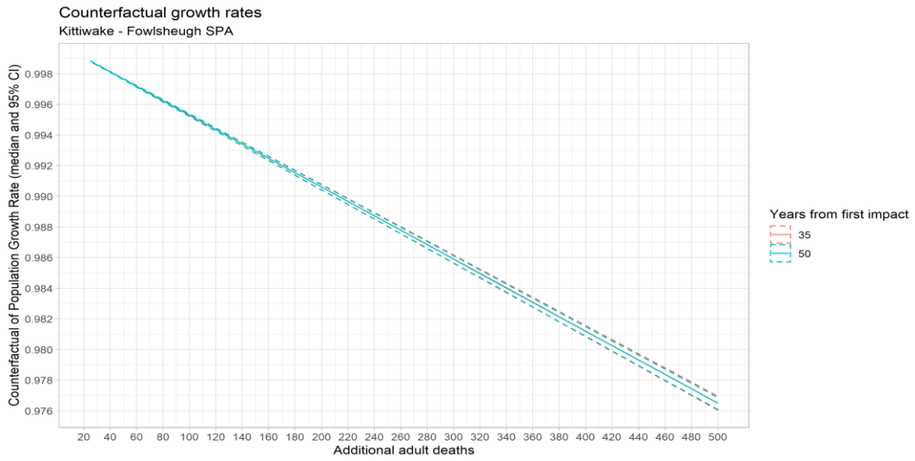

Figure 3.70: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

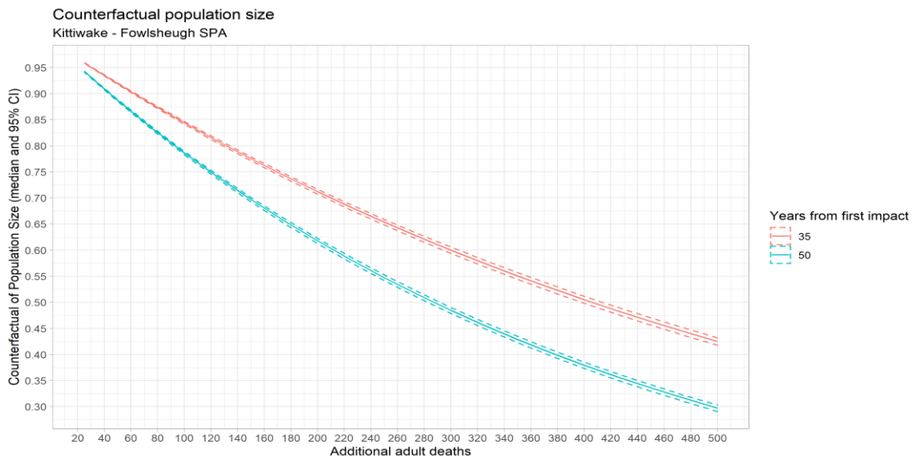

Figure 3.71: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

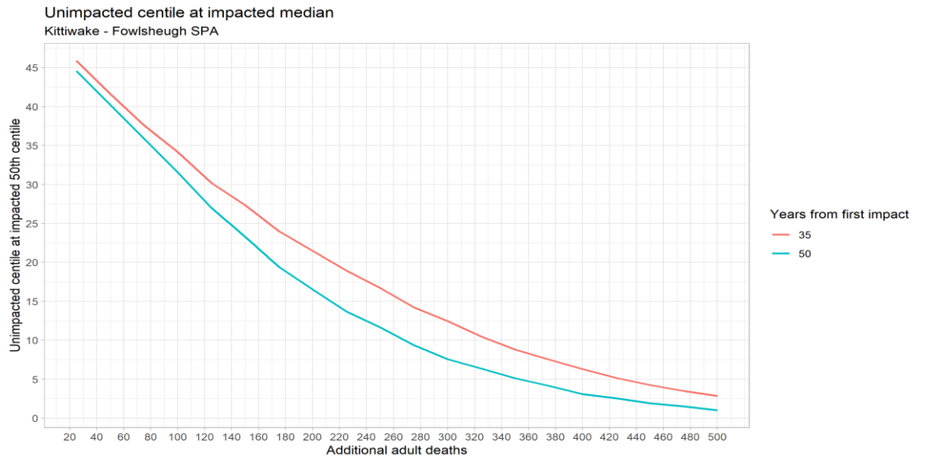

Figure 3.72: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.92: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	0.985	0.963	1.006			
2062	25	0.984	0.962	1.005	0.959	0.999	45.9
2062	50	0.983	0.961	1.004	0.919	0.998	41.6
2062	75	0.982	0.960	1.003	0.881	0.996	37.6
2062	100	0.981	0.959	1.002	0.844	0.995	34.2
2062	125	0.979	0.958	1.000	0.809	0.994	30.2
2062	150	0.978	0.956	0.999	0.775	0.993	27.3
2062	175	0.977	0.955	0.998	0.743	0.992	24.0
2062	200	0.976	0.954	0.997	0.712	0.991	21.5
2062	225	0.975	0.953	0.996	0.682	0.989	19.0
2062	250	0.974	0.952	0.995	0.654	0.988	16.7
2062	275	0.972	0.951	0.993	0.626	0.987	14.2
2062	300	0.971	0.950	0.992	0.600	0.986	12.4
2062	325	0.970	0.948	0.991	0.575	0.985	10.5
2062	350	0.969	0.947	0.990	0.551	0.984	8.8
2062	375	0.968	0.946	0.989	0.527	0.982	7.5
2062	400	0.967	0.945	0.988	0.505	0.981	6.3
2062	425	0.966	0.944	0.986	0.484	0.980	5.2
2062	450	0.964	0.943	0.985	0.463	0.979	4.2
2062	475	0.963	0.942	0.984	0.444	0.978	3.5
2062	500	0.962	0.940	0.983	0.425	0.977	2.8
2077	0	0.985	0.967	1.003			
2077	25	0.984	0.966	1.001	0.942	0.999	44.6
2077	50	0.983	0.965	1.000	0.887	0.998	40.2
2077	75	0.982	0.964	0.999	0.835	0.996	35.9
2077	100	0.981	0.963	0.998	0.786	0.995	31.6
2077	125	0.979	0.961	0.997	0.740	0.994	27.0
2077	150	0.978	0.960	0.996	0.697	0.993	23.3
2077	175	0.977	0.959	0.994	0.656	0.992	19.4
2077	200	0.976	0.958	0.993	0.618	0.991	16.5
2077	225	0.975	0.957	0.992	0.581	0.989	13.7
2077	250	0.974	0.956	0.991	0.547	0.988	11.6
2077	275	0.972	0.955	0.990	0.515	0.987	9.4
2077	300	0.971	0.953	0.988	0.485	0.986	7.6
2077	325	0.970	0.952	0.987	0.456	0.985	6.4
2077	350	0.969	0.951	0.986	0.429	0.984	5.1
2077	375	0.968	0.950	0.985	0.404	0.982	4.2
2077	400	0.967	0.949	0.984	0.380	0.981	3.1
2077	425	0.965	0.948	0.983	0.357	0.980	2.6
2077	450	0.964	0.947	0.981	0.336	0.979	1.9
2077	475	0.963	0.945	0.980	0.316	0.978	1.5
2077	500	0.962	0.944	0.979	0.297	0.976	1.0

Table 3.93: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.000	0.00	13614.8	5563.4	31968.6
Forth and Tay Consented developer approach	0.1	141.704	10.80	11719.5	4769.0	27630.1
Forth and Tay Consented Scoping approach a	0.1	155.351	12.51	11548.0	4697.0	27228.7
Forth and Tay Consented Scoping Approach b	0.1	197.246	16.94	11047.3	4484.8	26048.3
North Sea Consented developer approach	0.1	183.604	24.10	11139.1	4526.6	26267.8
North Sea Consented Scoping Approach a	0.1	200.351	27.91	10927.9	4437.8	25769.0
North Sea Consented Scoping Approach b	0.1	252.346	36.24	10313.2	4185.4	24338.0
(1) Project Alone: developer approach	0.1	87.03	4.90	12435.9	5068.1	29283.7
(2) Project Alone: Scoping approach a	0.1	109.051	7.01	12143.4	4945.7	28607.7
(2) Project Alone: Scoping approach b	0.1	130.446	8.84	11868.9	4831.4	27977.3

Table 3.94: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.000	0.00	10858.1	3857.8	28376.2
Forth and Tay Consented developer approach	0.1	141.704	10.80	8795.0	3119.9	23127.2
Forth and Tay Consented Scoping approach a	0.1	155.351	12.51	8611.4	3053.1	22663.2
Forth and Tay Consented Scoping Approach b	0.1	197.246	16.94	8082.5	2863.2	21316.1
North Sea Consented developer approach	0.1	183.604	24.10	8181.7	2898.5	21548.7
North Sea Consented Scoping Approach a	0.1	200.351	27.91	7960.8	2818.9	20982.3
North Sea Consented Scoping Approach b	0.1	252.346	36.24	7335.2	2594.5	19384.0
(1) Project Alone: developer approach	0.1	87.03	4.90	9561.2	3392.9	25072.1
(2) Project Alone: Scoping approach a	0.1	109.051	7.01	9245.1	3280.6	24268.1
(2) Project Alone: Scoping approach b	0.1	130.446	8.84	8953.2	3176.2	23530.5

Table 3.95: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.000	0.00	0.985	0.963	1.006	0.985	0.967	1.003
Forth and Tay Consented developer approach	0.1	141.704	10.80	0.981	0.959	1.002	0.981	0.963	0.998
Forth and Tay Consented Scoping approach a	0.1	155.351	12.51	0.981	0.959	1.002	0.981	0.963	0.998
Forth and Tay Consented Scoping Approach b	0.1	197.246	16.94	0.979	0.958	1.000	0.979	0.962	0.997
North Sea Consented developer approach	0.1	183.604	24.10	0.980	0.958	1.001	0.980	0.962	0.997
North Sea Consented Scoping Approach a	0.1	200.351	27.91	0.979	0.957	1.000	0.979	0.961	0.997
North Sea Consented Scoping Approach b	0.1	252.346	36.24	0.978	0.956	0.999	0.978	0.960	0.995
(1) Project Alone: developer approach	0.1	87.03	4.90	0.983	0.961	1.004	0.983	0.965	1.000
(2) Project Alone: Scoping approach a	0.1	109.051	7.01	0.982	0.960	1.003	0.982	0.964	0.999
(2) Project Alone: Scoping approach b	0.1	130.446	8.84	0.981	0.960	1.002	0.981	0.964	0.999

Table 3.96: **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
Forth and Tay Consented developer approach	0.1	141.704	10.80	0.861	0.810	0.996	0.996
Forth and Tay Consented Scoping approach a	0.1	155.351	12.51	0.849	0.793	0.995	0.995
Forth and Tay Consented Scoping Approach b	0.1	197.246	16.94	0.811	0.744	0.994	0.994
North Sea Consented developer approach	0.1	183.604	24.10	0.818	0.754	0.994	0.994
North Sea Consented Scoping Approach a	0.1	200.351	27.91	0.803	0.733	0.994	0.994
North Sea Consented Scoping Approach b	0.1	252.346	36.24	0.758	0.676	0.992	0.992
(1) Project Alone: developer approach	0.1	87.03	4.90	0.914	0.880	0.997	0.998
(2) Project Alone: Scoping approach a	0.1	109.051	7.01	0.892	0.851	0.997	0.997
(2) Project Alone: Scoping approach b	0.1	130.446	8.84	0.872	0.825	0.996	0.996

3.20 KITTIWAKE - ST ABB'S HEAD TO FAST CASTLE SPA

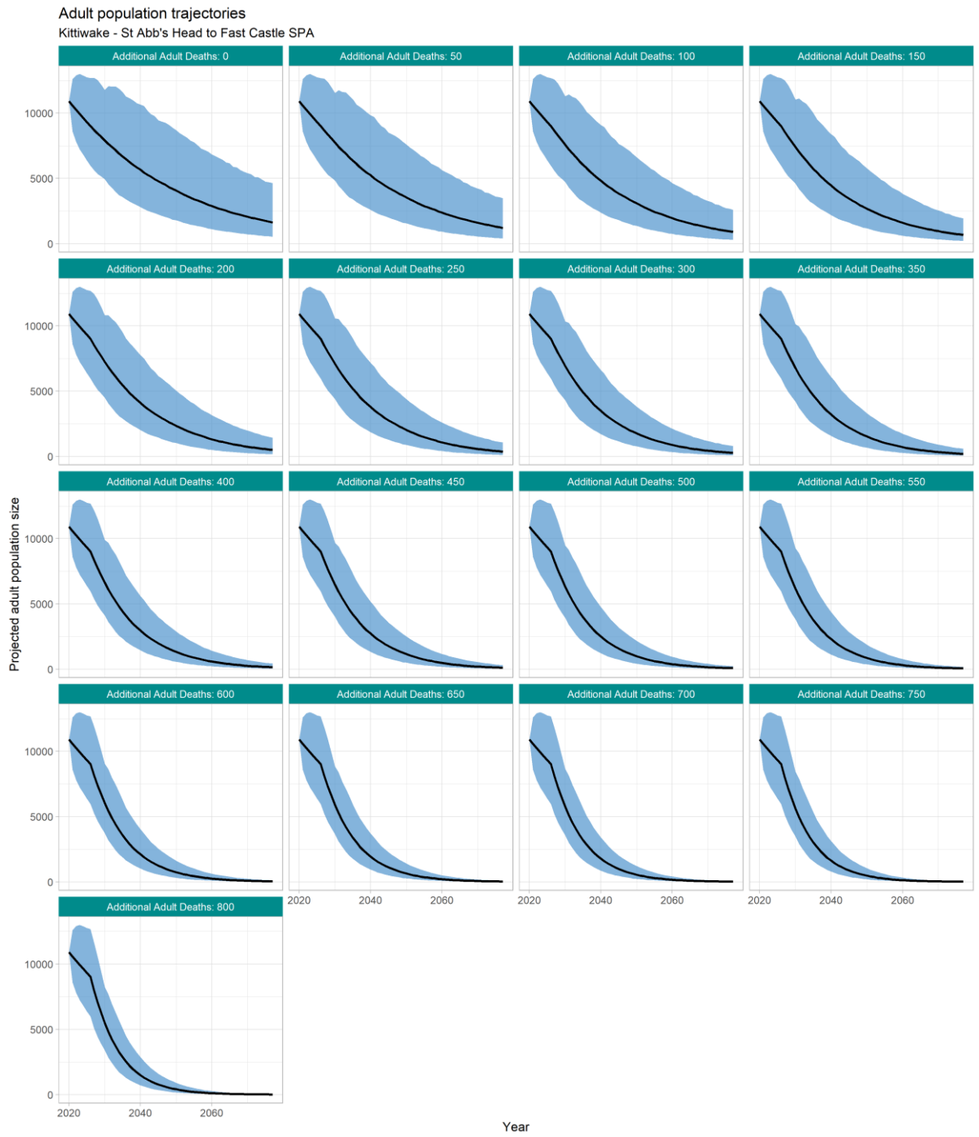

Figure 3.73: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

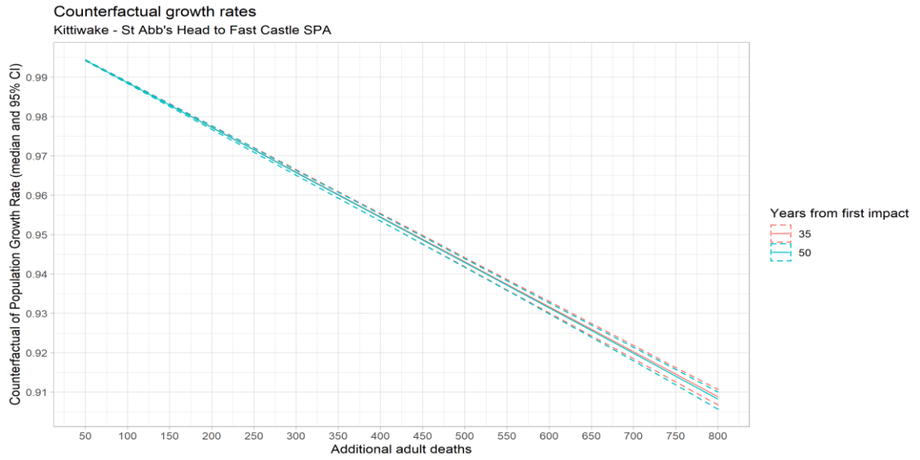

Figure 3.74: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

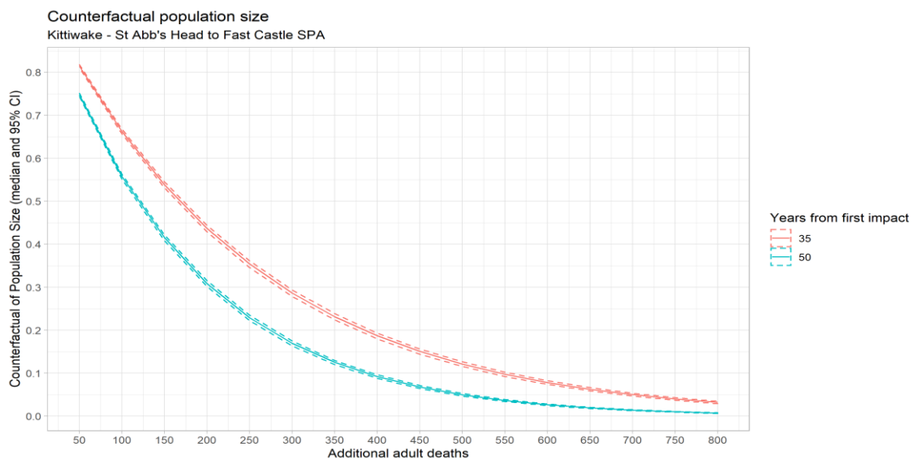

Figure 3.75: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

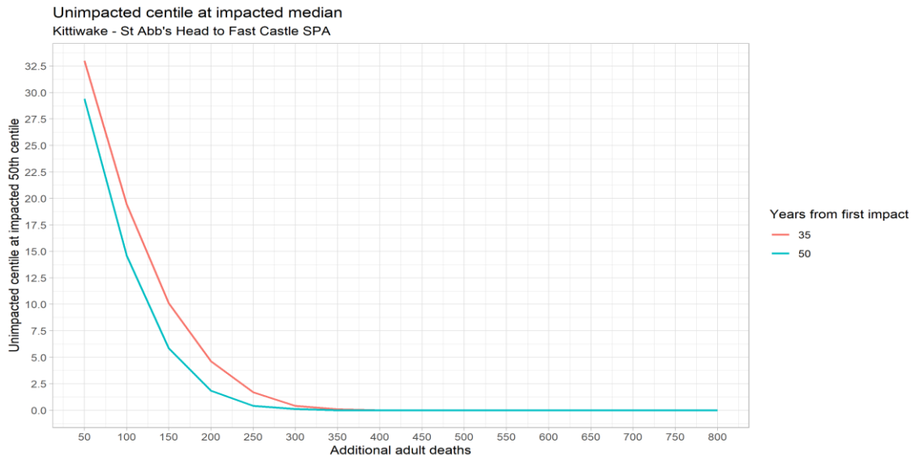

Figure 3.76: **The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).**

Table 3.97: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	0.967	0.944	0.989			
2062	50	0.962	0.939	0.983	0.814	0.994	33.0
2062	100	0.956	0.934	0.978	0.662	0.989	19.4
2062	150	0.951	0.928	0.972	0.538	0.983	10.1
2062	200	0.945	0.923	0.967	0.437	0.977	4.6
2062	250	0.940	0.917	0.961	0.354	0.972	1.7
2062	300	0.934	0.912	0.956	0.286	0.966	0.4
2062	350	0.929	0.906	0.950	0.232	0.960	0.1
2062	400	0.923	0.901	0.945	0.187	0.954	0.0
2062	450	0.918	0.895	0.939	0.151	0.949	0.0
2062	500	0.912	0.890	0.934	0.121	0.943	0.0
2062	550	0.907	0.884	0.928	0.098	0.937	0.0
2062	600	0.901	0.879	0.922	0.078	0.932	0.0
2062	650	0.896	0.873	0.917	0.063	0.926	0.0
2062	700	0.890	0.868	0.911	0.050	0.920	0.0
2062	750	0.885	0.863	0.906	0.040	0.915	0.0
2062	800	0.879	0.857	0.900	0.032	0.909	0.0
2077	0	0.967	0.948	0.986			
2077	50	0.962	0.943	0.980	0.747	0.994	29.4
2077	100	0.956	0.937	0.974	0.557	0.989	14.6
2077	150	0.951	0.932	0.969	0.415	0.983	5.9
2077	200	0.945	0.927	0.963	0.308	0.977	1.8

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2077	250	0.940	0.921	0.958	0.229	0.971	0.4
2077	300	0.934	0.916	0.952	0.169	0.966	0.1
2077	350	0.929	0.910	0.947	0.125	0.960	0.0
2077	400	0.923	0.905	0.941	0.092	0.954	0.0
2077	450	0.918	0.899	0.936	0.068	0.949	0.0
2077	500	0.912	0.894	0.930	0.050	0.943	0.0
2077	550	0.907	0.888	0.924	0.037	0.937	0.0
2077	600	0.901	0.883	0.919	0.027	0.931	0.0
2077	650	0.895	0.877	0.913	0.019	0.926	0.0
2077	700	0.890	0.871	0.908	0.014	0.920	0.0
2077	750	0.884	0.865	0.902	0.010	0.914	0.0
2077	800	0.878	0.860	0.896	0.007	0.908	0.0

Table 3.98: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.000	0.00	2694.8	1028.9	6567.2
Forth and Tay Consented developer approach	0.1	266.606	10.50	1332.9	495.6	3311.7
Forth and Tay Consented Scoping approach a	0.1	323.327	12.94	1146.5	423.6	2865.5
Forth and Tay Consented Scoping Approach b	0.1	388.731	16.15	963.6	354.0	2422.3
North Sea Consented developer approach	0.1	275.706	15.00	1291.2	479.7	3210.2
North Sea Consented Scoping Approach a	0.1	333.827	18.24	1104.7	407.9	2763.4
North Sea Consented Scoping Approach b	0.1	402.231	22.95	918.9	337.6	2311.5
(1) Project Alone: developer approach	0.1	253.206	9.40	1382.3	514.8	3432.3
(2) Project Alone: Scoping approach a	0.1	312.627	11.94	1180.7	436.9	2946.7
(2) Project Alone: Scoping approach b	0.1	371.331	14.35	1010.8	372.3	2538.0

Table 3.99: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.000	0.00	1633.1	543.6	4647.0
Forth and Tay Consented developer approach	0.1	266.606	10.50	604.5	194.7	1756.3
Forth and Tay Consented Scoping approach a	0.1	323.327	12.94	488.9	156.5	1423.3
Forth and Tay Consented Scoping Approach b	0.1	388.731	16.15	382.3	121.0	1120.1
North Sea Consented developer approach	0.1	275.706	15.00	577.8	186.1	1680.4
North Sea Consented Scoping Approach a	0.1	333.827	18.24	463.9	148.2	1351.9
North Sea Consented Scoping Approach b	0.1	402.231	22.95	357.4	113.0	1048.2
(1) Project Alone: developer approach	0.1	253.206	9.40	636.3	205.2	1848.4
(2) Project Alone: Scoping approach a	0.1	312.627	11.94	509.7	163.1	1484.2
(2) Project Alone: Scoping approach b	0.1	371.331	14.35	409.3	129.9	1197.8

Table 3.100: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.000	0.00	0.967	0.944	0.989	0.967	0.948	0.986
Forth and Tay Consented developer approach	0.1	266.606	10.50	0.949	0.925	0.970	0.949	0.930	0.967
Forth and Tay Consented Scoping approach a	0.1	323.327	12.94	0.945	0.921	0.966	0.945	0.926	0.963
Forth and Tay Consented Scoping Approach b	0.1	388.731	16.15	0.940	0.917	0.962	0.940	0.921	0.958
North Sea Consented developer approach	0.1	275.706	15.00	0.948	0.925	0.969	0.948	0.929	0.966
North Sea Consented Scoping Approach a	0.1	333.827	18.24	0.944	0.920	0.965	0.944	0.925	0.962
North Sea Consented Scoping Approach b	0.1	402.231	22.95	0.939	0.916	0.960	0.939	0.920	0.957
(1) Project Alone: developer approach	0.1	253.206	9.40	0.950	0.926	0.971	0.950	0.931	0.968
(2) Project Alone: Scoping approach a	0.1	312.627	11.94	0.945	0.922	0.967	0.945	0.926	0.964
(2) Project Alone: Scoping approach b	0.1	371.331	14.35	0.941	0.918	0.963	0.941	0.922	0.960

Table 3.101: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
Forth and Tay Consented developer approach	0.1	266.606	10.50	0.494	0.370	0.981	0.981
Forth and Tay Consented Scoping approach a	0.1	323.327	12.94	0.425	0.299	0.977	0.977
Forth and Tay Consented Scoping Approach b	0.1	388.731	16.15	0.357	0.234	0.972	0.972
North Sea Consented developer approach	0.1	275.706	15.00	0.479	0.354	0.980	0.980
North Sea Consented Scoping Approach a	0.1	333.827	18.24	0.410	0.284	0.976	0.976
North Sea Consented Scoping Approach b	0.1	402.231	22.95	0.341	0.218	0.971	0.971
(1) Project Alone: developer approach	0.1	253.206	9.40	0.513	0.389	0.982	0.982
(2) Project Alone: Scoping approach a	0.1	312.627	11.94	0.438	0.312	0.977	0.977
(2) Project Alone: Scoping approach b	0.1	371.331	14.35	0.375	0.250	0.973	0.973

3.21 KITTIWAKE - FARNE ISLANDS SPA

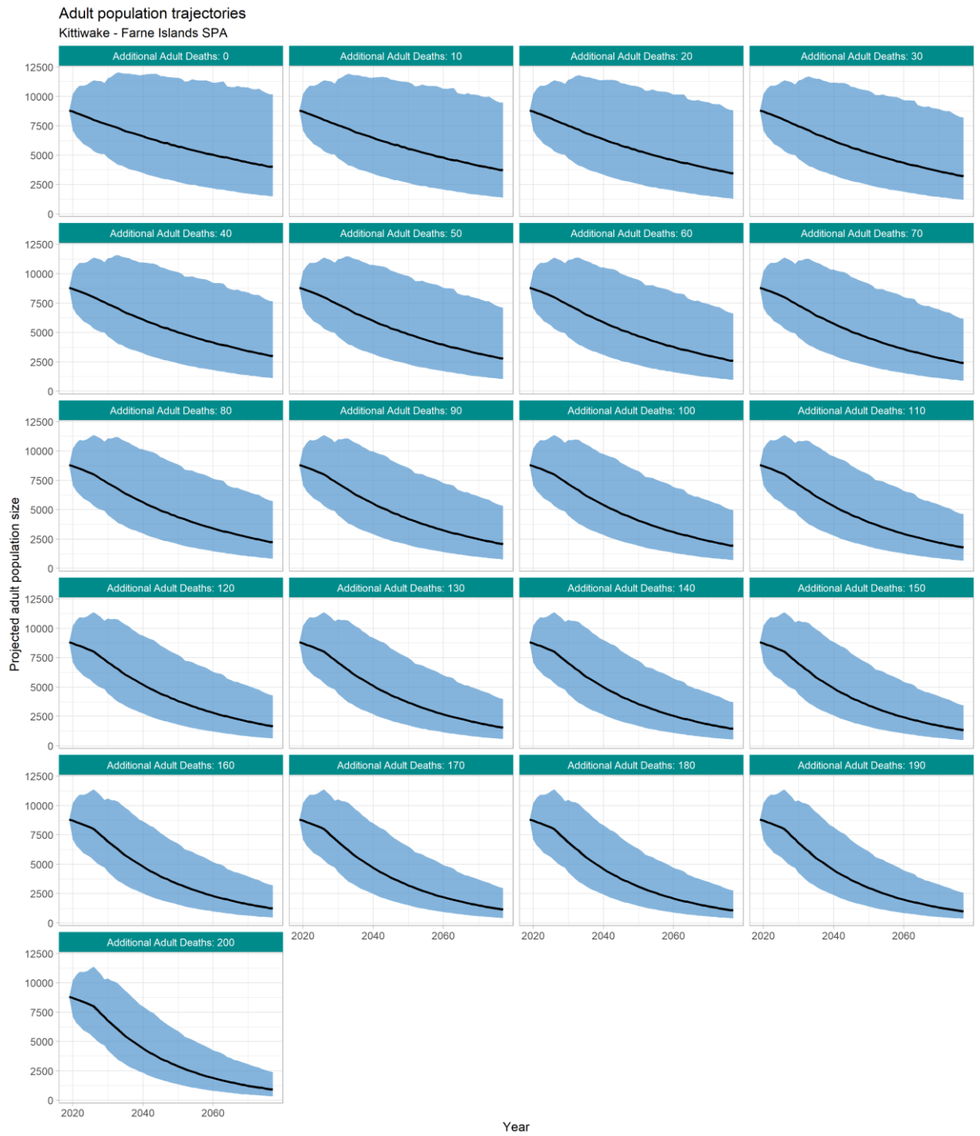

Figure 3.77: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

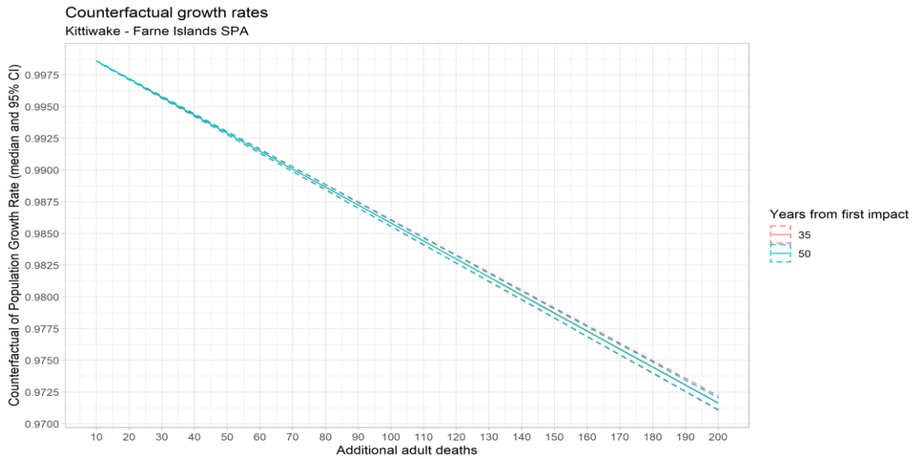

Figure 3.78: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

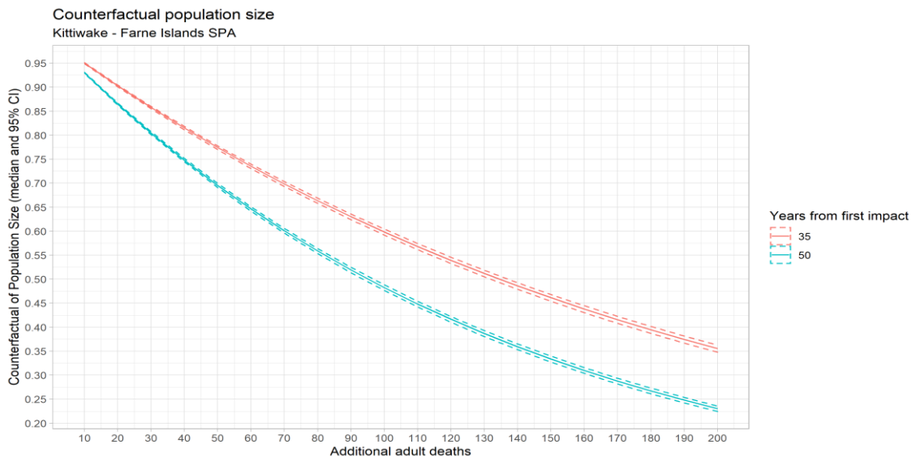

Figure 3.79: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

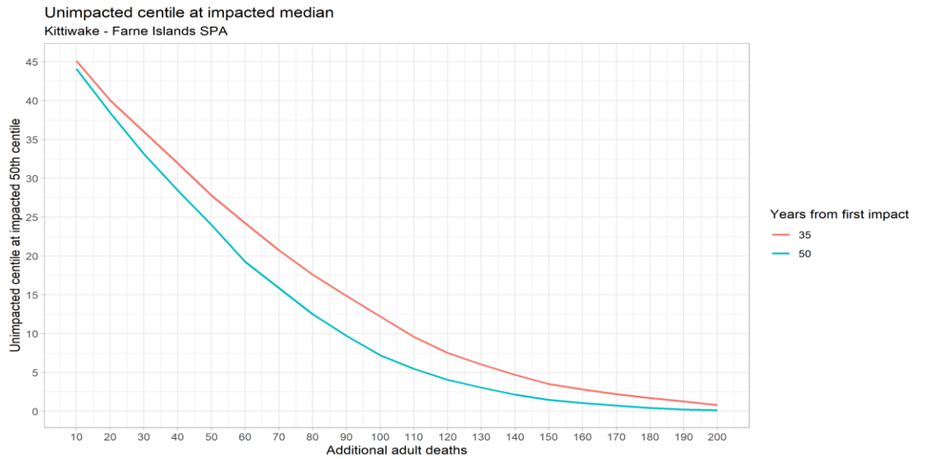

Figure 3.80: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.102: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	0.987	0.966	1.007			
2062	10	0.985	0.964	1.005	0.950	0.999	45.1
2062	20	0.984	0.963	1.004	0.903	0.997	40.0
2062	30	0.982	0.962	1.003	0.858	0.996	36.0
2062	40	0.981	0.960	1.001	0.815	0.994	31.9
2062	50	0.980	0.959	1.000	0.774	0.993	27.8
2062	60	0.978	0.957	0.998	0.735	0.992	24.2
2062	70	0.977	0.956	0.997	0.699	0.990	20.7
2062	80	0.975	0.955	0.996	0.663	0.989	17.6
2062	90	0.974	0.953	0.994	0.630	0.987	14.9
2062	100	0.973	0.952	0.993	0.598	0.986	12.2
2062	110	0.971	0.950	0.991	0.568	0.984	9.6
2062	120	0.970	0.949	0.990	0.539	0.983	7.5
2062	130	0.968	0.948	0.988	0.512	0.982	6.0
2062	140	0.967	0.946	0.987	0.486	0.980	4.7
2062	150	0.966	0.945	0.986	0.461	0.979	3.5
2062	160	0.964	0.943	0.984	0.438	0.977	2.8
2062	170	0.963	0.942	0.983	0.416	0.976	2.2
2062	180	0.961	0.941	0.981	0.395	0.974	1.7
2062	190	0.960	0.939	0.980	0.374	0.973	1.3
2062	200	0.959	0.938	0.979	0.355	0.972	0.8
2077	0	0.987	0.969	1.004			
2077	10	0.985	0.968	1.002	0.930	0.999	44.1
2077	20	0.984	0.966	1.001	0.865	0.997	38.4
2077	30	0.982	0.965	0.999	0.805	0.996	33.1
2077	40	0.981	0.964	0.998	0.748	0.994	28.4
2077	50	0.980	0.962	0.997	0.696	0.993	24.0
2077	60	0.978	0.961	0.995	0.647	0.991	19.3
2077	70	0.977	0.959	0.994	0.601	0.990	15.9
2077	80	0.975	0.958	0.992	0.559	0.989	12.5
2077	90	0.974	0.957	0.991	0.519	0.987	9.7
2077	100	0.973	0.955	0.990	0.483	0.986	7.2
2077	110	0.971	0.954	0.988	0.448	0.984	5.5
2077	120	0.970	0.953	0.987	0.417	0.983	4.0
2077	130	0.968	0.951	0.985	0.387	0.982	3.0
2077	140	0.967	0.950	0.984	0.359	0.980	2.1
2077	150	0.966	0.948	0.983	0.334	0.979	1.5
2077	160	0.964	0.947	0.981	0.310	0.977	1.1
2077	170	0.963	0.946	0.980	0.288	0.976	0.7
2077	180	0.961	0.944	0.978	0.267	0.974	0.4
2077	190	0.960	0.943	0.977	0.248	0.973	0.2
2077	200	0.959	0.941	0.975	0.230	0.972	0.1

Table 3.103: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.000	0.00	4867.0	2087.5	11242.4
North Sea Consented developer approach	0.1	33.177	6.60	4346.3	1862.7	10059.2
North Sea Consented Scoping Approach a	0.1	41.128	8.21	4229.3	1811.3	9793.0
North Sea Consented Scoping Approach b	0.1	50.694	10.62	4089.0	1750.2	9473.0
(1) Project Alone: developer approach	0.1	23.177	1.50	4526.7	1941.0	10468.1
(2) Project Alone: Scoping approach a	0.1	29.328	2.21	4436.6	1901.5	10267.2
(2) Project Alone: Scoping approach b	0.1	35.194	2.82	4353.5	1865.0	10078.5

Table 3.104: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. Med. popn size = Median population size, Med. popn size (2077) 2.5/97.5% = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.000	0.00	3998.3	1494.5	10191.8
North Sea Consented developer approach	0.1	33.177	6.60	3406.7	1270.0	8707.2
North Sea Consented Scoping Approach a	0.1	41.128	8.21	3277.9	1221.5	8383.5
North Sea Consented Scoping Approach b	0.1	50.694	10.62	3125.0	1163.7	7999.1
(1) Project Alone: developer approach	0.1	23.177	1.50	3608.3	1346.0	9215.3
(2) Project Alone: Scoping approach a	0.1	29.328	2.21	3508.0	1307.9	8962.9
(2) Project Alone: Scoping approach b	0.1	35.194	2.82	3415.3	1272.7	8730.2

Table 3.105: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.000	0.00	0.987	0.966	1.007	0.987	0.969	1.004
North Sea Consented developer approach	0.1	33.177	6.60	0.983	0.963	1.004	0.983	0.966	1.001
North Sea Consented Scoping Approach a	0.1	41.128	8.21	0.983	0.962	1.003	0.983	0.965	1.000
North Sea Consented Scoping Approach b	0.1	50.694	10.62	0.982	0.961	1.002	0.982	0.965	0.999
(1) Project Alone: developer approach	0.1	23.177	1.50	0.985	0.964	1.005	0.985	0.967	1.002
(2) Project Alone: Scoping approach a	0.1	29.328	2.21	0.984	0.963	1.004	0.984	0.967	1.001
(2) Project Alone: Scoping approach b	0.1	35.194	2.82	0.984	0.963	1.004	0.983	0.966	1.001

Table 3.106: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.1	33.177	6.60	0.893	0.852	0.997	0.997
North Sea Consented Scoping Approach a	0.1	41.128	8.21	0.869	0.820	0.996	0.996
North Sea Consented Scoping Approach b	0.1	50.694	10.62	0.840	0.782	0.995	0.995
(1) Project Alone: developer approach	0.1	23.177	1.50	0.930	0.902	0.998	0.998
(2) Project Alone: Scoping approach a	0.1	29.328	2.21	0.911	0.877	0.997	0.997
(2) Project Alone: Scoping approach b	0.1	35.194	2.82	0.894	0.854	0.997	0.997

3.22 KITTIWAKE - BUCHAN NESS TO COLLIESTON COAST SPA

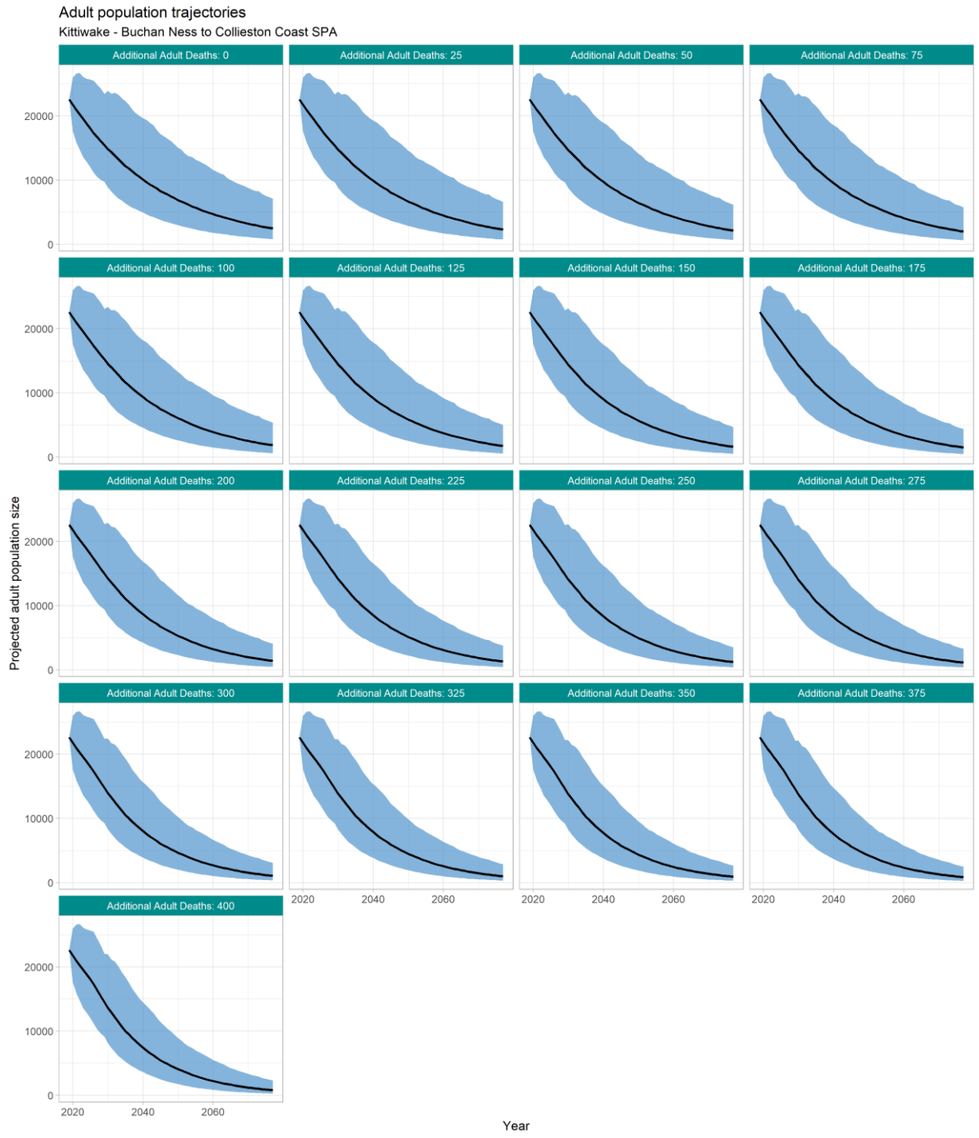

Figure 3.81: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

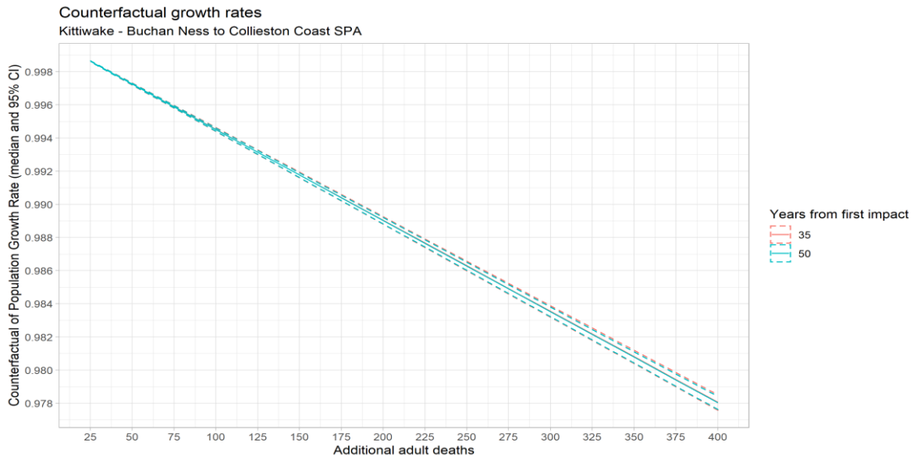

Figure 3.82: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

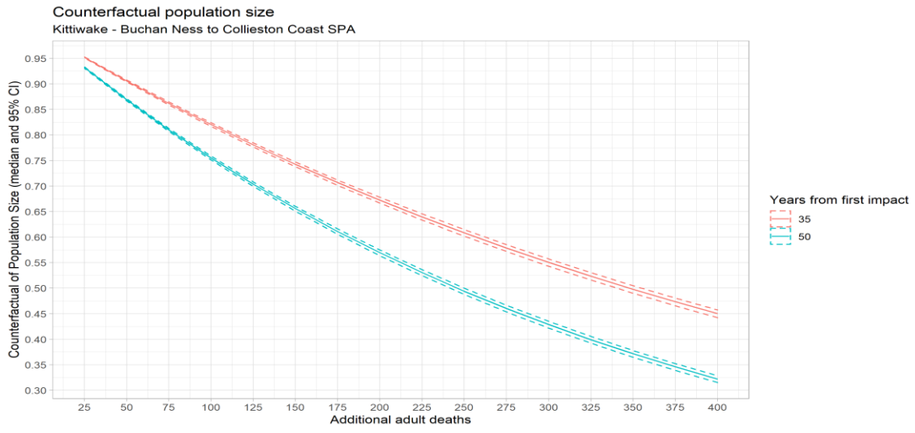

Figure 3.83: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

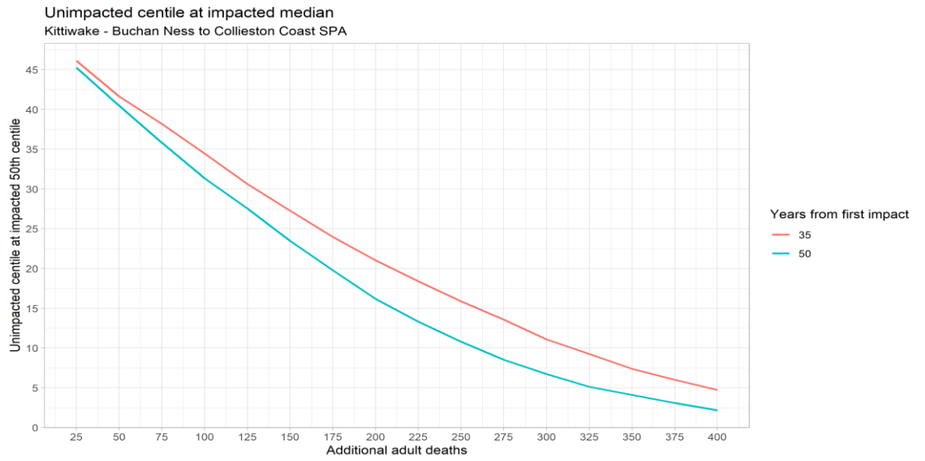

Figure 3.84: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.107: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	0.963	0.940	0.985			
2062	25	0.961	0.939	0.984	0.952	0.999	46.1
2062	50	0.960	0.937	0.982	0.906	0.997	41.6
2062	75	0.959	0.936	0.981	0.862	0.996	38.2
2062	100	0.957	0.935	0.980	0.820	0.995	34.5
2062	125	0.956	0.933	0.978	0.781	0.993	30.6
2062	150	0.955	0.932	0.977	0.743	0.992	27.3
2062	175	0.953	0.931	0.975	0.707	0.990	24.0
2062	200	0.952	0.930	0.974	0.672	0.989	21.0
2062	225	0.951	0.928	0.973	0.640	0.988	18.4
2062	250	0.949	0.927	0.971	0.608	0.986	15.9
2062	275	0.948	0.926	0.970	0.579	0.985	13.6
2062	300	0.947	0.924	0.969	0.550	0.984	11.1
2062	325	0.946	0.923	0.967	0.523	0.982	9.3
2062	350	0.944	0.922	0.966	0.498	0.981	7.4
2062	375	0.943	0.920	0.965	0.473	0.979	6.0
2062	400	0.942	0.919	0.964	0.450	0.978	4.7
2077	0	0.963	0.944	0.981			
2077	25	0.961	0.942	0.980	0.932	0.999	45.3
2077	50	0.960	0.941	0.979	0.869	0.997	40.4
2077	75	0.959	0.940	0.977	0.810	0.996	35.8
2077	100	0.957	0.938	0.976	0.755	0.995	31.3
2077	125	0.956	0.937	0.975	0.704	0.993	27.5
2077	150	0.955	0.936	0.973	0.656	0.992	23.5
2077	175	0.953	0.934	0.972	0.611	0.990	19.8
2077	200	0.952	0.933	0.971	0.569	0.989	16.2
2077	225	0.951	0.932	0.969	0.530	0.988	13.3
2077	250	0.949	0.931	0.968	0.494	0.986	10.8
2077	275	0.948	0.929	0.967	0.460	0.985	8.5
2077	300	0.947	0.928	0.965	0.429	0.984	6.7
2077	325	0.946	0.927	0.964	0.399	0.982	5.1
2077	350	0.944	0.925	0.963	0.372	0.981	4.1
2077	375	0.943	0.924	0.961	0.346	0.979	3.1
2077	400	0.942	0.923	0.960	0.322	0.978	2.2

Table 3.108: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.000	0.00	4373.7	1679.9	11054.4
Forth and Tay Consented developer approach	0.1	14.161	4.65	4279.4	1642.5	10820.3
Forth and Tay Consented Scoping approach a	0.1	20.774	7.24	4234.6	1624.8	10708.3
Forth and Tay Consented Scoping Approach b	0.1	27.507	10.18	4188.6	1606.8	10593.3
North Sea As-built: develper approach	0.1	63.361	19.25	3972.2	1521.4	10054.5
North Sea As built Approach a	0.1	75.374	24.54	3894.8	1491.2	9862.4
North Sea As-built: scoping approach b	0.1	93.107	32.78	3781.8	1447.6	9581.0
North Sea Consented developer approach	0.1	68.161	21.75	3939.9	1508.8	9974.3
North Sea Consented Scoping Approach a	0.1	80.174	27.04	3862.9	1479.0	9782.9
North Sea Consented Scoping Approach b	0.1	97.907	35.28	3751.3	1435.5	9503.9
(1) Project Alone: developer approach	0.1	11.35	2.94	4302.2	1651.5	10877.1
(2) Project Alone: Scoping approach a	0.1	16.474	4.94	4265.9	1637.3	10786.0
(2) Project Alone: Scoping approach b	0.1	21.007	6.58	4235.7	1625.3	10710.8

Table 3.109: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.000	0.00	2496.6	831.2	7120.6
Forth and Tay Consented developer approach	0.1	14.161	4.65	2421.4	805.8	6907.5
Forth and Tay Consented Scoping approach a	0.1	20.774	7.24	2385.9	793.9	6806.7
Forth and Tay Consented Scoping Approach b	0.1	27.507	10.18	2349.0	781.4	6703.1
North Sea As-built: develper approach	0.1	63.361	19.25	2180.1	725.1	6226.6
North Sea As built Approach a	0.1	75.374	24.54	2120.2	704.9	6057.6
North Sea As-built: scoping approach b	0.1	93.107	32.78	2033.7	675.8	5815.0
North Sea Consented developer approach	0.1	68.161	21.75	2155.0	716.4	6155.8
North Sea Consented Scoping Approach a	0.1	80.174	27.04	2095.8	696.5	5988.6
North Sea Consented Scoping Approach b	0.1	97.907	35.28	2010.3	667.9	5748.6
(1) Project Alone: developer approach	0.1	11.35	2.94	2440.0	812.4	6959.2
(2) Project Alone: Scoping approach a	0.1	16.474	4.94	2410.5	802.6	6877.2
(2) Project Alone: Scoping approach b	0.1	21.007	6.58	2386.7	794.1	6809.3

Table 3.110: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.000	0.00	0.963	0.940	0.985	0.963	0.944	0.981
Forth and Tay Consented developer approach	0.1	14.161	4.65	0.962	0.939	0.984	0.962	0.943	0.981
Forth and Tay Consented Scoping approach a	0.1	20.774	7.24	0.962	0.939	0.984	0.962	0.943	0.981
Forth and Tay Consented Scoping Approach b	0.1	27.507	10.18	0.962	0.939	0.984	0.962	0.942	0.980
North Sea As-built: develper approach	0.1	63.361	19.25	0.960	0.937	0.982	0.960	0.941	0.979
North Sea As built Approach a	0.1	75.374	24.54	0.960	0.937	0.982	0.960	0.941	0.978
North Sea As-built: scoping approach b	0.1	93.107	32.78	0.959	0.936	0.981	0.959	0.940	0.977
North Sea Consented developer approach	0.1	68.161	21.75	0.960	0.937	0.982	0.960	0.941	0.979
North Sea Consented Scoping Approach a	0.1	80.174	27.04	0.959	0.937	0.982	0.959	0.940	0.978
North Sea Consented Scoping Approach b	0.1	97.907	35.28	0.959	0.936	0.981	0.959	0.940	0.977
(1) Project Alone: developer approach	0.1	11.35	2.94	0.962	0.940	0.984	0.962	0.943	0.981
(2) Project Alone: Scoping approach a	0.1	16.474	4.94	0.962	0.939	0.984	0.962	0.943	0.981
(2) Project Alone: Scoping approach b	0.1	21.007	6.58	0.962	0.939	0.984	0.962	0.943	0.981

3.23 KITTIWAKE - TROUP, PENNAN AND LION'S HEADS SPA

Table 3.111: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
Forth and Tay Consented developer approach	0.1	14.161	4.65	0.978	0.970	0.999	0.999
Forth and Tay Consented Scoping approach a	0.1	20.774	7.24	0.968	0.955	0.999	0.999
Forth and Tay Consented Scoping Approach b	0.1	27.507	10.18	0.958	0.941	0.999	0.999
North Sea As-built: develper approach	0.1	63.361	19.25	0.908	0.873	0.997	0.997
North Sea As built Approach a	0.1	75.374	24.54	0.891	0.849	0.997	0.997
North Sea As-built: scoping approach b	0.1	93.107	32.78	0.865	0.814	0.996	0.996
North Sea Consented developer approach	0.1	68.161	21.75	0.901	0.863	0.997	0.997
North Sea Consented Scoping Approach a	0.1	80.174	27.04	0.883	0.839	0.997	0.997
North Sea Consented Scoping Approach b	0.1	97.907	35.28	0.858	0.805	0.996	0.996
(1) Project Alone: developer approach	0.1	11.35	2.94	0.984	0.977	1.000	1.000
(2) Project Alone: Scoping approach a	0.1	16.474	4.94	0.975	0.965	0.999	0.999
(2) Project Alone: Scoping approach b	0.1	21.007	6.58	0.968	0.956	0.999	0.999

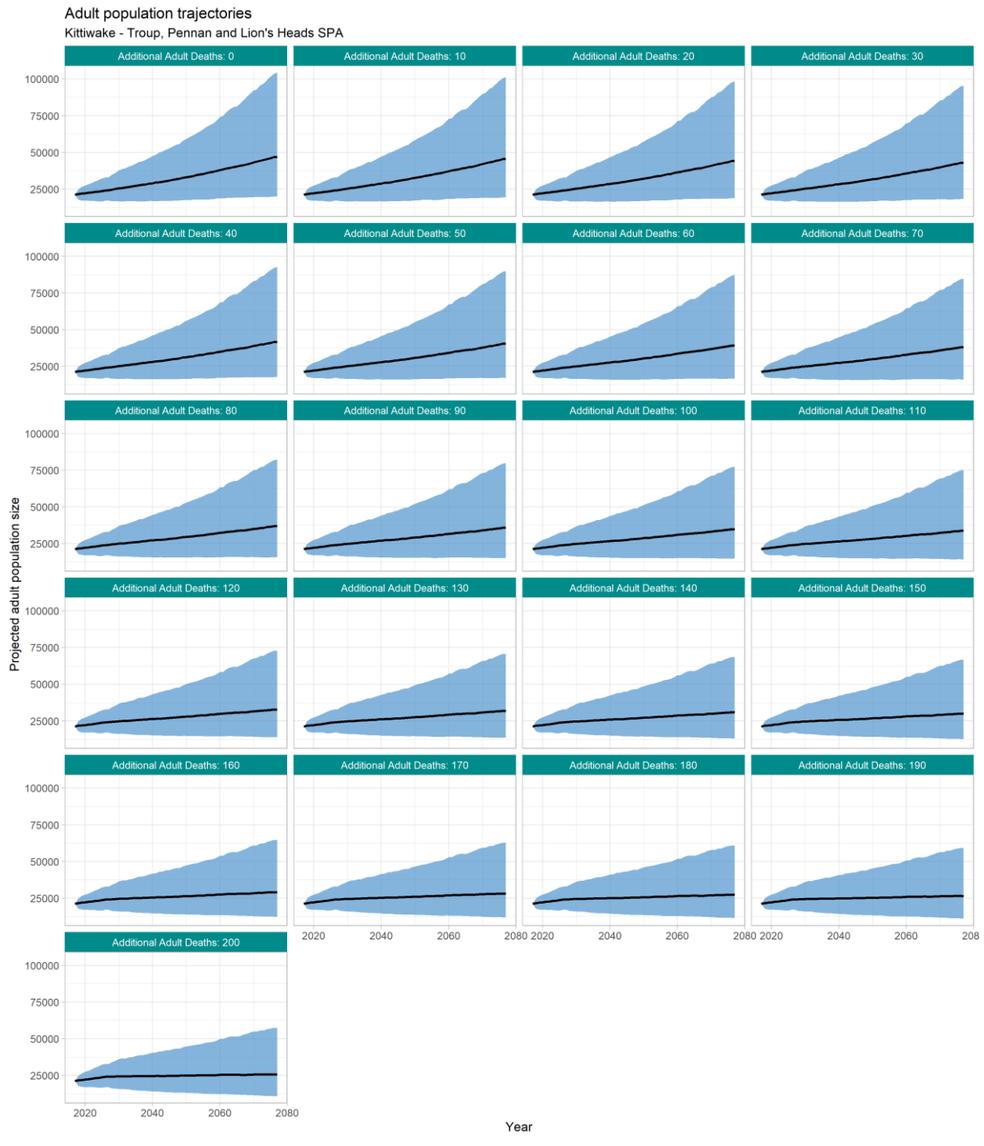

Figure 3.85: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

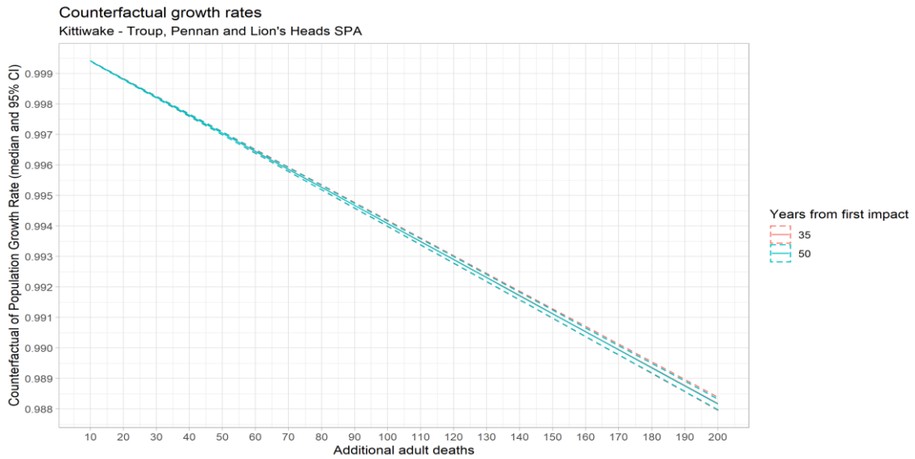

Figure 3.86: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

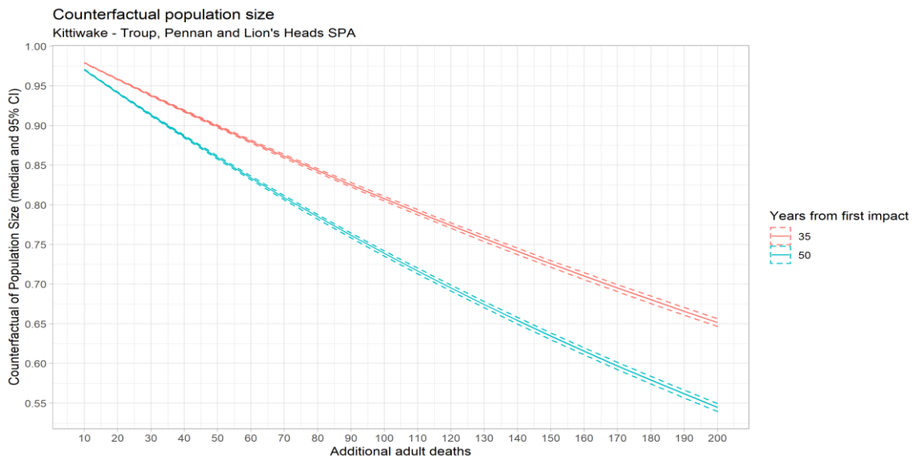

Figure 3.87: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

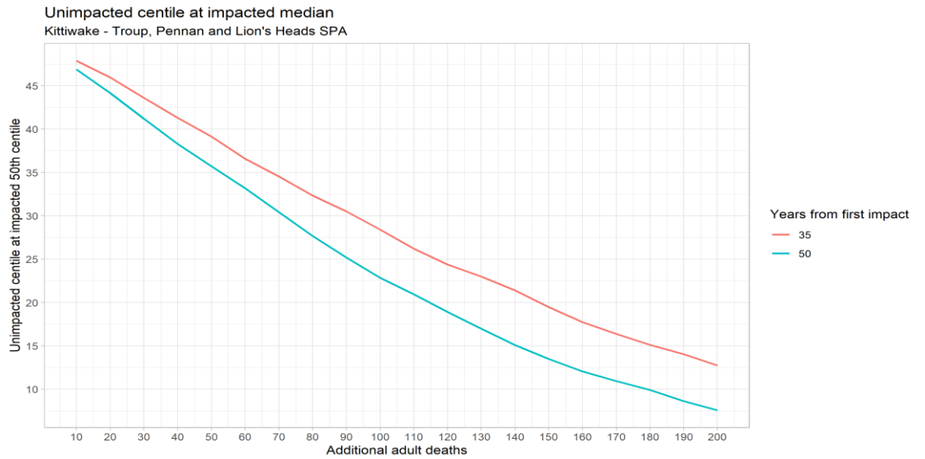

Figure 3.88: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.112: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.014	0.996	1.031			
2062	10	1.013	0.995	1.030	0.979	0.999	47.9
2062	20	1.012	0.994	1.030	0.958	0.999	46.0
2062	30	1.012	0.994	1.029	0.938	0.998	43.6
2062	40	1.011	0.993	1.029	0.918	0.998	41.3
2062	50	1.011	0.993	1.028	0.899	0.997	39.1
2062	60	1.010	0.992	1.027	0.880	0.996	36.6
2062	70	1.009	0.991	1.027	0.861	0.996	34.5
2062	80	1.009	0.991	1.026	0.843	0.995	32.3
2062	90	1.008	0.990	1.026	0.825	0.995	30.5
2062	100	1.008	0.990	1.025	0.808	0.994	28.4
2062	110	1.007	0.989	1.024	0.791	0.993	26.2
2062	120	1.006	0.988	1.024	0.774	0.993	24.4
2062	130	1.006	0.988	1.023	0.757	0.992	23.0
2062	140	1.005	0.987	1.023	0.741	0.992	21.4
2062	150	1.005	0.987	1.022	0.726	0.991	19.5
2062	160	1.004	0.986	1.021	0.710	0.991	17.7
2062	170	1.003	0.985	1.021	0.695	0.990	16.4
2062	180	1.003	0.985	1.020	0.680	0.989	15.1
2062	190	1.002	0.984	1.020	0.666	0.989	14.0
2062	200	1.002	0.984	1.019	0.652	0.988	12.7
2077	0	1.013	0.998	1.028			
2077	10	1.013	0.997	1.028	0.970	0.999	46.9
2077	20	1.012	0.997	1.027	0.941	0.999	44.2
2077	30	1.012	0.996	1.026	0.913	0.998	41.2
2077	40	1.011	0.996	1.026	0.886	0.998	38.3
2077	50	1.010	0.995	1.025	0.860	0.997	35.7
2077	60	1.010	0.994	1.025	0.834	0.996	33.2
2077	70	1.009	0.994	1.024	0.809	0.996	30.4
2077	80	1.009	0.993	1.023	0.785	0.995	27.7
2077	90	1.008	0.993	1.023	0.762	0.995	25.2
2077	100	1.007	0.992	1.022	0.739	0.994	22.8
2077	110	1.007	0.991	1.022	0.717	0.993	20.9
2077	120	1.006	0.991	1.021	0.695	0.993	18.9
2077	130	1.006	0.990	1.020	0.674	0.992	17.0
2077	140	1.005	0.990	1.020	0.654	0.992	15.1
2077	150	1.004	0.989	1.019	0.634	0.991	13.5
2077	160	1.004	0.988	1.019	0.615	0.991	12.0
2077	170	1.003	0.988	1.018	0.597	0.990	10.9
2077	180	1.003	0.987	1.017	0.579	0.989	9.9
2077	190	1.002	0.987	1.017	0.562	0.989	8.6
2077	200	1.001	0.986	1.016	0.545	0.988	7.6

Table 3.113: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.000	0.00	39031.9	18948.7	77564.5
North Sea As-built: developer approach	0.1	60.059	23.44	35748.1	17331.6	71080.1
North Sea As built Approach a	0.1	69.768	29.39	35184.1	17055.1	69972.2
North Sea As-built: scoping approach b	0.1	96.818	39.79	33826.3	16384.8	67276.6
North Sea Consented developer approach	0.1	65.659	26.44	35433.7	17177.1	70460.9
North Sea Consented Scoping Approach a	0.1	75.468	32.39	34871.4	16902.5	69353.8
North Sea Consented Scoping Approach b	0.1	102.518	42.79	33525.4	16236.7	66683.5
(1) Project Alone: developer approach	0.1	9.01	3.34	38542.4	18706.7	76597.5
(2) Project Alone: Scoping approach a	0.1	14.068	5.69	38231.7	18555.0	75985.1
(2) Project Alone: Scoping approach b	0.1	18.418	7.59	37983.4	18431.4	75495.6

Table 3.114: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.000	0.00	46996.9	19922.1	104504.2
North Sea As-built: develper approach	0.1	60.059	23.44	41516.2	17575.9	92414.4
North Sea As built Approach a	0.1	69.768	29.39	40593.7	17181.7	90384.0
North Sea As-built: scoping approach b	0.1	96.818	39.79	38390.7	16240.6	85524.3
North Sea Consented developer approach	0.1	65.659	26.44	41001.4	17356.8	91281.0
North Sea Consented Scoping Approach a	0.1	75.468	32.39	40084.2	16964.4	89260.0
North Sea Consented Scoping Approach b	0.1	102.518	42.79	37906.8	16035.2	84455.9
(1) Project Alone: developer approach	0.1	9.01	3.34	46166.2	19566.9	102670.2
(2) Project Alone: Scoping approach a	0.1	14.068	5.69	45641.3	19341.9	101517.7
(2) Project Alone: Scoping approach b	0.1	18.418	7.59	45223.5	19164.0	100595.0

Table 3.115: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.000	0.00	1.014	0.996	1.031	1.013	0.998	1.028
North Sea As-built: develper approach	0.1	60.059	23.44	1.011	0.993	1.029	1.011	0.996	1.026
North Sea As built Approach a	0.1	69.768	29.39	1.011	0.993	1.028	1.010	0.995	1.025
North Sea As-built: scoping approach b	0.1	96.818	39.79	1.010	0.992	1.027	1.009	0.994	1.024
North Sea Consented developer approach	0.1	65.659	26.44	1.011	0.993	1.028	1.011	0.995	1.025
North Sea Consented Scoping Approach a	0.1	75.468	32.39	1.010	0.992	1.028	1.010	0.995	1.025
North Sea Consented Scoping Approach b	0.1	102.518	42.79	1.009	0.991	1.027	1.009	0.994	1.024
(1) Project Alone: developer approach	0.1	9.01	3.34	1.013	0.995	1.031	1.013	0.998	1.028
(2) Project Alone: Scoping approach a	0.1	14.068	5.69	1.013	0.995	1.030	1.013	0.997	1.028
(2) Project Alone: Scoping approach b	0.1	18.418	7.59	1.013	0.995	1.030	1.013	0.997	1.027

Table 3.116: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea As-built: developer approach	0.1	60.059	23.44	0.916	0.883	0.998	0.998
North Sea As built Approach a	0.1	69.768	29.39	0.902	0.864	0.997	0.997
North Sea As-built: scoping approach b	0.1	96.818	39.79	0.867	0.817	0.996	0.996
North Sea Consented developer approach	0.1	65.659	26.44	0.908	0.873	0.997	0.997
North Sea Consented Scoping Approach a	0.1	75.468	32.39	0.894	0.853	0.997	0.997
North Sea Consented Scoping Approach b	0.1	102.518	42.79	0.859	0.807	0.996	0.996
(1) Project Alone: developer approach	0.1	9.01	3.34	0.987	0.982	1.000	1.000
(2) Project Alone: Scoping approach a	0.1	14.068	5.69	0.980	0.971	0.999	0.999
(2) Project Alone: Scoping approach b	0.1	18.418	7.59	0.973	0.962	0.999	0.999

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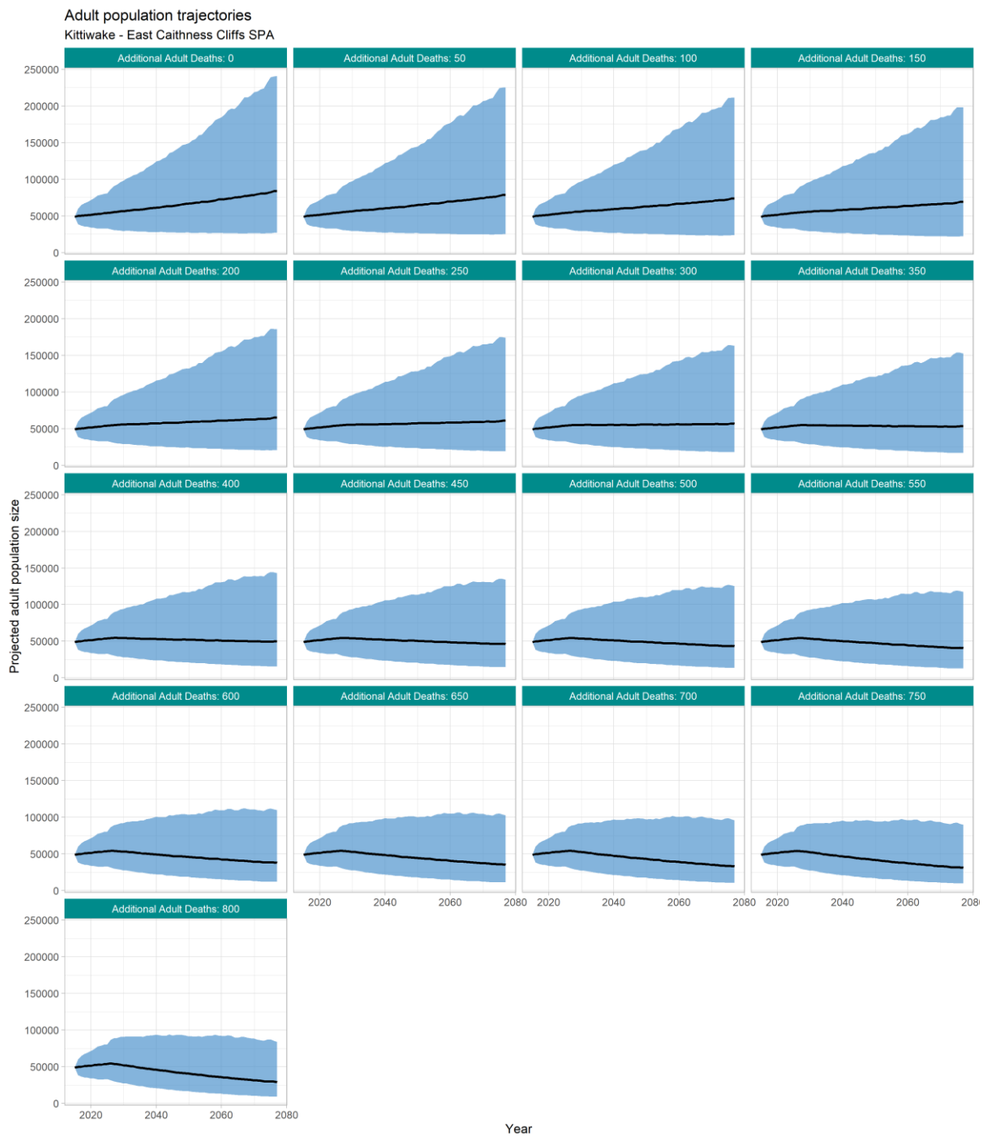

Figure 3.89 **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median**

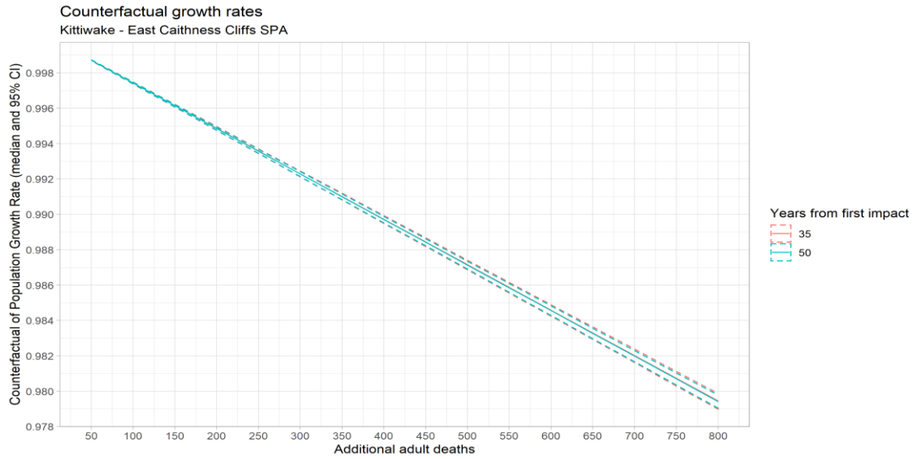

Figure 3.90: **Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

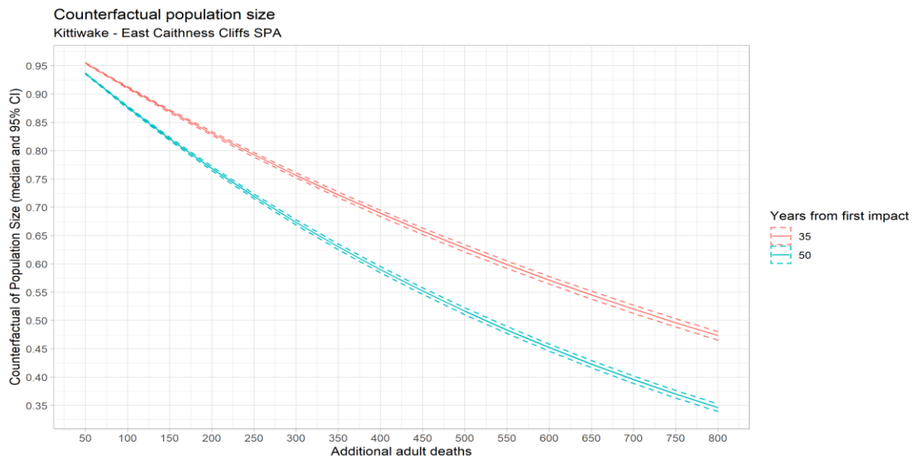

Figure 3.91: **The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

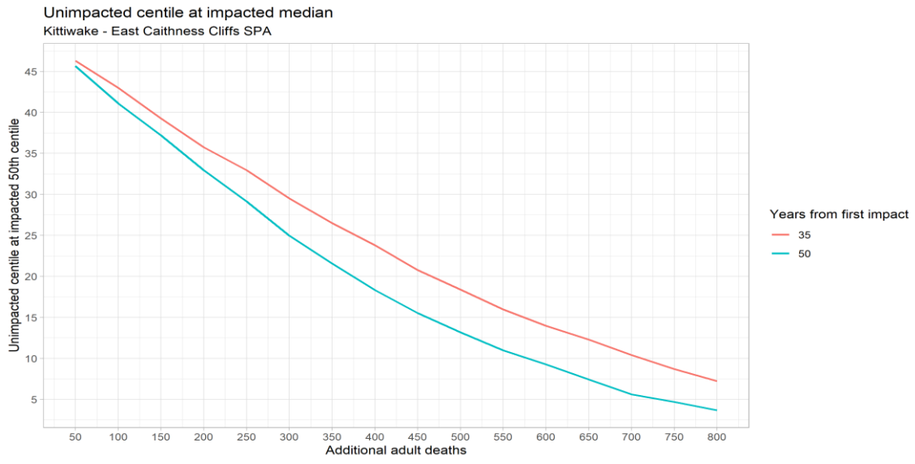

Figure 3.92: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)

Table 3.117: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.009	0.984	1.031			
2062	50	1.007	0.983	1.030	0.955	0.999	46.3
2062	100	1.006	0.981	1.029	0.912	0.997	43.0
2062	150	1.005	0.980	1.028	0.870	0.996	39.3
2062	200	1.003	0.979	1.026	0.831	0.995	35.7
2062	250	1.002	0.977	1.025	0.793	0.994	32.9
2062	300	1.001	0.976	1.024	0.757	0.992	29.5
2062	350	1.000	0.975	1.022	0.722	0.991	26.5
2062	400	0.998	0.974	1.021	0.689	0.990	23.8
2062	450	0.997	0.972	1.020	0.658	0.988	20.8
2062	500	0.996	0.971	1.018	0.628	0.987	18.4
2062	550	0.994	0.970	1.017	0.599	0.986	16.0
2062	600	0.993	0.969	1.016	0.572	0.985	14.0
2062	650	0.992	0.967	1.014	0.545	0.983	12.3
2062	700	0.990	0.966	1.013	0.520	0.982	10.4
2062	750	0.989	0.965	1.012	0.496	0.981	8.7
2062	800	0.988	0.963	1.010	0.473	0.979	7.2
2077	0	1.009	0.988	1.027			
2077	50	1.007	0.987	1.026	0.936	0.999	45.7
2077	100	1.006	0.986	1.024	0.877	0.997	41.1
2077	150	1.005	0.985	1.023	0.821	0.996	37.2
2077	200	1.004	0.983	1.022	0.769	0.995	33.0

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2077	250	1.002	0.982	1.020	0.720	0.994	29.1
2077	300	1.001	0.981	1.019	0.674	0.992	25.0
2077	350	1.000	0.979	1.018	0.630	0.991	21.6
2077	400	0.998	0.978	1.016	0.590	0.990	18.3
2077	450	0.997	0.977	1.015	0.552	0.988	15.5
2077	500	0.996	0.976	1.014	0.517	0.987	13.2
2077	550	0.994	0.974	1.013	0.483	0.986	11.0
2077	600	0.993	0.973	1.011	0.452	0.985	9.3
2077	650	0.992	0.972	1.010	0.423	0.983	7.4
2077	700	0.991	0.970	1.009	0.396	0.982	5.6
2077	750	0.989	0.969	1.007	0.370	0.981	4.7
2077	800	0.988	0.968	1.006	0.346	0.979	3.7

Table 3.118: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.000	0.00	73730.0	26111.5	193755.7
North Sea As-built: develper approach	0.1	276.521	74.45	62463.7	22101.7	164898.7
North Sea As built Approach a	0.1	277.605	88.37	62124.7	21978.2	163990.0
North Sea As-built: scoping approach b	0.1	395.616	120.80	57868.2	20485.8	153026.4
North Sea Consented developer approach	0.1	291.921	82.55	61805.2	21869.1	163209.2
North Sea Consented Scoping Approach a	0.1	293.105	96.47	61467.3	21745.2	162304.8
North Sea Consented Scoping Approach b	0.1	411.116	128.90	57257.2	20268.8	151428.1
(1) Project Alone: developer approach	0.1	18.385	8.85	72824.7	25786.2	191428.1
(2) Project Alone: Scoping approach a	0.1	30.705	15.17	72213.6	25567.1	189858.2
(2) Project Alone: Scoping approach b	0.1	41.116	20.30	71706.7	25385.7	188554.0

Table 3.119: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.000	0.00	84181.3	26789.3	240754.6
North Sea As-built: develper approach	0.1	276.521	74.45	66602.5	21089.4	190803.1
North Sea As built Approach a	0.1	277.605	88.37	66102.9	20935.3	189401.8
North Sea As-built: scoping approach b	0.1	395.616	120.80	59771.7	18874.9	171410.5
North Sea Consented developer approach	0.1	291.921	82.55	65612.8	20768.4	187991.7
North Sea Consented Scoping Approach a	0.1	293.105	96.47	65110.3	20615.5	186593.0
North Sea Consented Scoping Approach b	0.1	411.116	128.90	58877.9	18585.8	168869.0
(1) Project Alone: developer approach	0.1	18.385	8.85	82726.2	26321.3	236628.7
(2) Project Alone: Scoping approach a	0.1	30.705	15.17	81749.3	26007.7	233863.0
(2) Project Alone: Scoping approach b	0.1	41.116	20.30	80946.3	25748.0	231571.4

Table 3.120: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.000	0.00	1.009	0.984	1.031	1.009	0.988	1.027
North Sea As-built: develper approach	0.1	276.521	74.45	1.004	0.979	1.027	1.004	0.984	1.022
North Sea As built Approach a	0.1	277.605	88.37	1.004	0.979	1.027	1.004	0.984	1.022
North Sea As-built: scoping approach b	0.1	395.616	120.80	1.002	0.977	1.025	1.002	0.982	1.020
North Sea Consented developer approach	0.1	291.921	82.55	1.004	0.979	1.026	1.004	0.984	1.022
North Sea Consented Scoping Approach a	0.1	293.105	96.47	1.004	0.979	1.026	1.004	0.983	1.022
North Sea Consented Scoping Approach b	0.1	411.116	128.90	1.002	0.977	1.024	1.002	0.981	1.020
(1) Project Alone: developer approach	0.1	18.385	8.85	1.008	0.983	1.031	1.008	0.988	1.027
(2) Project Alone: Scoping approach a	0.1	30.705	15.17	1.008	0.983	1.031	1.008	0.988	1.026
(2) Project Alone: Scoping approach b	0.1	41.116	20.30	1.008	0.983	1.031	1.008	0.988	1.026

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Table 3.121: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea As-built: develper approach	0.1	276.521	74.45	0.847	0.791	0.995	0.995
North Sea As built Approach a	0.1	277.605	88.37	0.843	0.785	0.995	0.995
North Sea As-built: scoping approach b	0.1	395.616	120.80	0.785	0.710	0.993	0.993
North Sea Consented developer approach	0.1	291.921	82.55	0.838	0.780	0.995	0.995
North Sea Consented Scoping Approach a	0.1	293.105	96.47	0.834	0.774	0.995	0.995
North Sea Consented Scoping Approach b	0.1	411.116	128.90	0.777	0.700	0.993	0.993
(1) Project Alone: developer approach	0.1	18.385	8.85	0.988	0.983	1.000	1.000
(2) Project Alone: Scoping approach a	0.1	30.705	15.17	0.980	0.971	0.999	0.999
(2) Project Alone: Scoping approach b	0.1	41.116	20.30	0.973	0.962	0.999	0.999

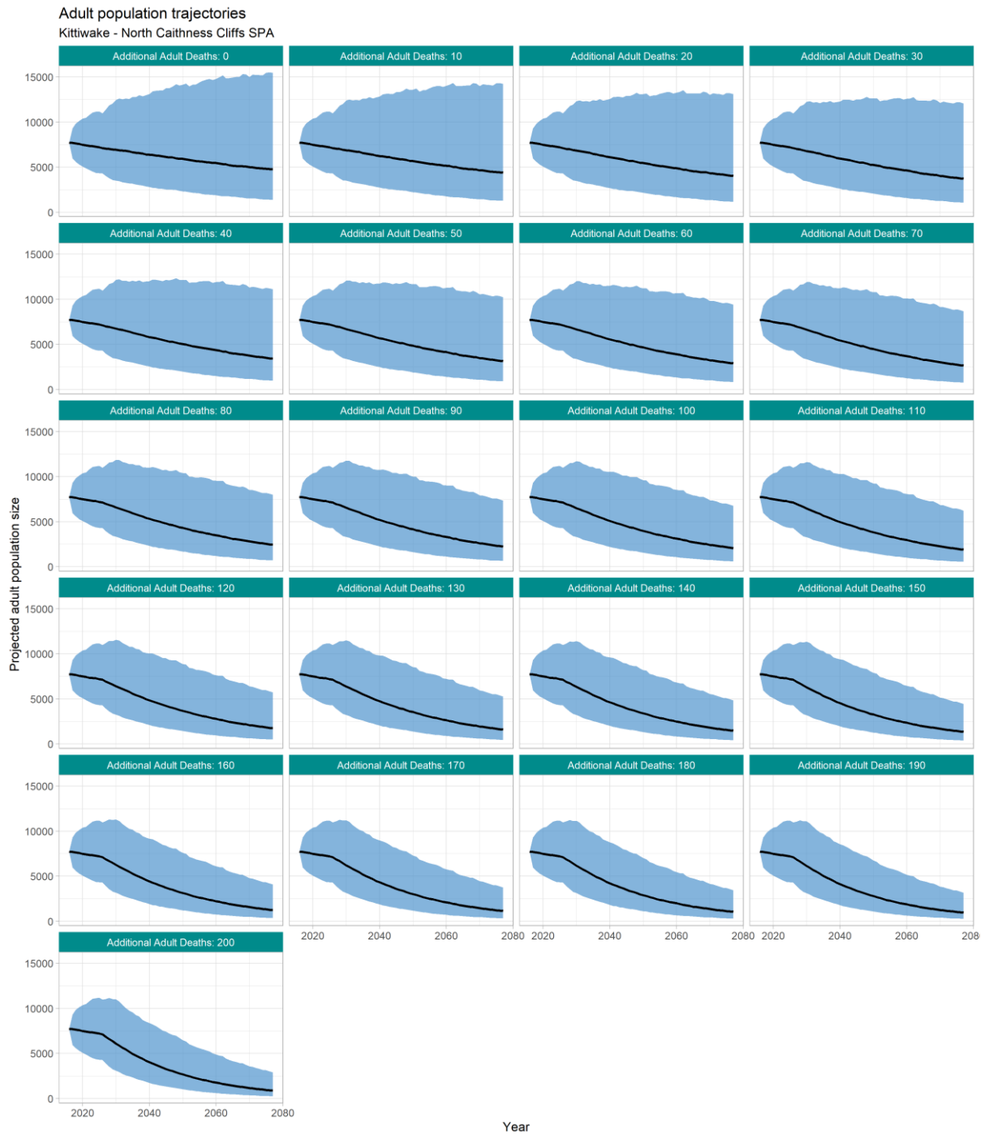

Figure 3.93: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

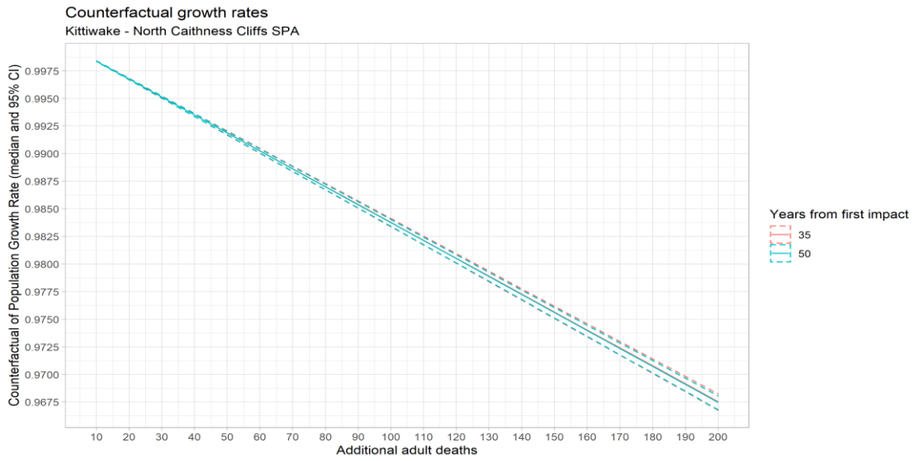

Figure 3.94: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

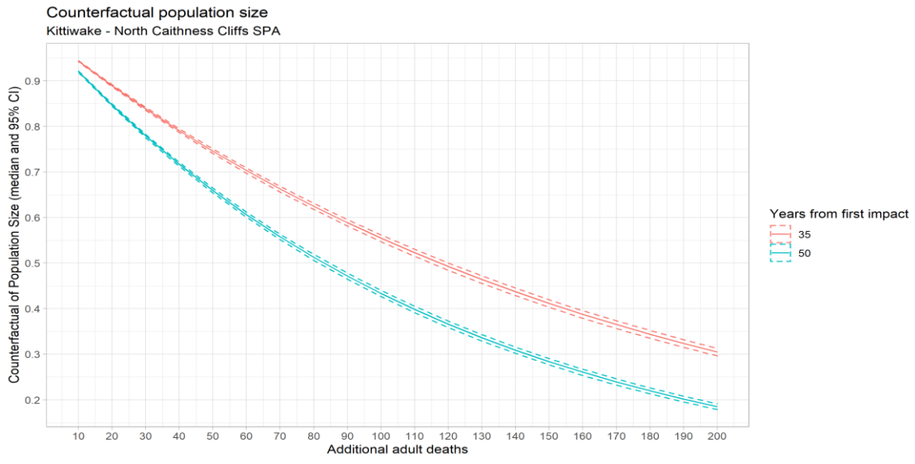

Figure 3.95: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

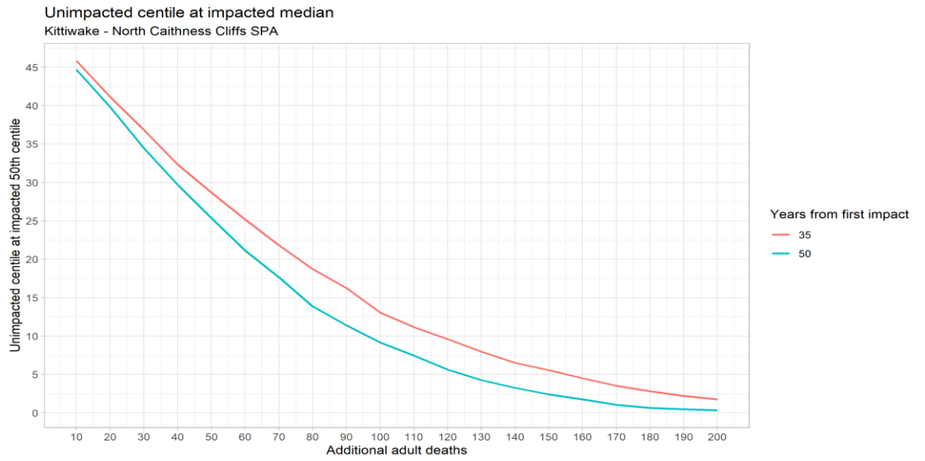

Figure 3.96 The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.122: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	0.992	0.966	1.017			
2062	10	0.991	0.965	1.015	0.943	0.998	45.8
2062	20	0.989	0.963	1.013	0.890	0.997	41.1
2062	30	0.987	0.962	1.012	0.839	0.995	36.9
2062	40	0.986	0.960	1.010	0.791	0.994	32.3
2062	50	0.984	0.958	1.008	0.746	0.992	28.7
2062	60	0.983	0.957	1.007	0.703	0.990	25.2
2062	70	0.981	0.955	1.005	0.663	0.989	21.8
2062	80	0.979	0.954	1.004	0.625	0.987	18.7
2062	90	0.978	0.952	1.002	0.589	0.985	16.2
2062	100	0.976	0.950	1.000	0.555	0.984	13.0
2062	110	0.975	0.949	0.999	0.523	0.982	11.2
2062	120	0.973	0.947	0.997	0.493	0.981	9.6
2062	130	0.971	0.946	0.995	0.464	0.979	8.0
2062	140	0.970	0.944	0.994	0.437	0.977	6.5
2062	150	0.968	0.942	0.992	0.412	0.976	5.6
2062	160	0.967	0.941	0.990	0.388	0.974	4.5
2062	170	0.965	0.939	0.989	0.365	0.972	3.5
2062	180	0.963	0.938	0.987	0.344	0.971	2.8
2062	190	0.962	0.936	0.986	0.324	0.969	2.2
2062	200	0.960	0.934	0.984	0.305	0.968	1.7
2077	0	0.992	0.971	1.013			
2077	10	0.990	0.969	1.011	0.920	0.998	44.7
2077	20	0.989	0.968	1.009	0.847	0.997	39.8
2077	30	0.987	0.966	1.008	0.779	0.995	34.5
2077	40	0.986	0.965	1.006	0.717	0.993	29.7
2077	50	0.984	0.963	1.005	0.660	0.992	25.3
2077	60	0.982	0.961	1.003	0.607	0.990	21.1
2077	70	0.981	0.960	1.001	0.558	0.989	17.6
2077	80	0.979	0.958	1.000	0.513	0.987	13.9
2077	90	0.978	0.957	0.998	0.472	0.985	11.4
2077	100	0.976	0.955	0.997	0.433	0.984	9.1
2077	110	0.974	0.953	0.995	0.398	0.982	7.5
2077	120	0.973	0.952	0.993	0.366	0.980	5.6
2077	130	0.971	0.950	0.992	0.336	0.979	4.3
2077	140	0.970	0.949	0.990	0.309	0.977	3.2
2077	150	0.968	0.947	0.988	0.284	0.976	2.4
2077	160	0.966	0.945	0.987	0.261	0.974	1.8
2077	170	0.965	0.944	0.985	0.239	0.972	1.0
2077	180	0.963	0.942	0.984	0.220	0.971	0.6
2077	190	0.961	0.941	0.982	0.202	0.969	0.5
2077	200	0.960	0.939	0.980	0.185	0.967	0.3

Table 3.123: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.000	0.0000	5332.8	1765.1	15193.8
North Sea As-built: develper approach	0.1	33.679	14.7302	4602.9	1518.8	13139.5
North Sea As built Approach a	0.1	43.419	19.8103	4402.1	1451.7	12582.0
North Sea As-built: scoping approach b	0.1	58.710	26.5900	4112.7	1355.8	11786.3
North Sea Consented developer approach	0.1	37.579	16.7302	4521.5	1491.9	12914.5
North Sea Consented Scoping Approach a	0.1	47.219	21.8103	4325.6	1426.0	12371.5
North Sea Consented Scoping Approach b	0.1	62.510	28.5900	4041.3	1331.3	11588.0
(1) Project Alone: developer approach	0.1	2.279	1.3302	5276.9	1746.1	15034.6
(2) Project Alone: Scoping approach a	0.1	7.619	3.8103	5153.1	1704.3	14686.5
(2) Project Alone: Scoping approach b	0.1	10.210	5.0900	5093.8	1684.5	14518.7

Table 3.124: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.000	0.0000	5332.8	1765.1	15193.8
North Sea As-built: develper approach	0.1	35.942	15.6200	4558.7	1504.0	13016.9
North Sea As built Approach a	0.1	43.419	19.8103	4402.1	1451.7	12582.0
North Sea As-built: scoping approach b	0.1	58.710	26.5900	4112.7	1355.8	11786.3
North Sea Consented developer approach	0.1	39.842	17.6200	4478.4	1477.2	12794.1
North Sea Consented Scoping Approach a	0.1	47.219	21.8103	4325.6	1426.0	12371.5
North Sea Consented Scoping Approach b	0.1	62.510	28.5900	4041.3	1331.3	11588.0
(1) Project Alone: developer approach	0.1	4.541	2.2200	5226.3	1728.6	14891.3
(2) Project Alone: Scoping approach a	0.1	7.619	3.8103	5153.1	1704.3	14686.5
(2) Project Alone: Scoping approach b	0.1	10.210	5.0900	5093.8	1684.5	14518.7

Table 3.125: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR (2077) lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.000	0.0000	4767.8	1368.7	15462.9
North Sea As-built: develper approach	0.1	35.942	15.6200	3821.9	1091.7	12434.2
North Sea As built Approach a	0.1	43.419	19.8103	3638.0	1038.6	11845.9
North Sea As-built: scoping approach b	0.1	58.710	26.5900	3306.3	942.9	10788.2
North Sea Consented developer approach	0.1	39.842	17.6200	3727.5	1064.5	12130.3
North Sea Consented Scoping Approach a	0.1	47.219	21.8103	3549.2	1013.3	11561.4
North Sea Consented Scoping Approach b	0.1	62.510	28.5900	3225.3	919.7	10528.1
(1) Project Alone: developer approach	0.1	4.541	2.2200	4633.4	1329.2	15032.0
(2) Project Alone: Scoping approach a	0.1	7.619	3.8103	4543.3	1302.6	14742.0
(2) Project Alone: Scoping approach b	0.1	10.210	5.0900	4469.4	1281.7	14506.2

Table 3.126: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.000	0.0000	0.992	0.966	1.017	0.992	0.971	1.013
North Sea As-built: develper approach	0.1	35.942	15.6200	0.988	0.962	1.012	0.988	0.967	1.008
North Sea As built Approach a	0.1	43.419	19.8103	0.987	0.961	1.011	0.987	0.966	1.007
North Sea As-built: scoping approach b	0.1	58.710	26.5900	0.985	0.959	1.009	0.985	0.964	1.006
North Sea Consented developer approach	0.1	39.842	17.6200	0.987	0.962	1.012	0.987	0.966	1.008
North Sea Consented Scoping Approach a	0.1	47.219	21.8103	0.987	0.961	1.011	0.986	0.965	1.007
North Sea Consented Scoping Approach b	0.1	62.510	28.5900	0.985	0.959	1.009	0.985	0.963	1.005
(1) Project Alone: developer approach	0.1	4.541	2.2200	0.992	0.966	1.016	0.992	0.970	1.012
(2) Project Alone: Scoping approach a	0.1	7.619	3.8103	0.991	0.965	1.016	0.991	0.970	1.012
(2) Project Alone: Scoping approach b	0.1	10.210	5.0900	0.991	0.965	1.015	0.991	0.970	1.011

Table 3.127: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. Med. cnterfact. popn size = Median counterfactual of population size, Med. cnterfact. GR = Median counterfactual of growth rates, Cent. unimp. match 50th cent. unimp. = Centile of unimpacted matching 50th centile of unimpacted.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea As-built: develper approach	0.1	35.942	15.6200	0.855	0.801	0.996	0.996
North Sea As built Approach a	0.1	43.419	19.8103	0.826	0.763	0.995	0.995
North Sea As-built: scoping approach b	0.1	58.710	26.5900	0.772	0.693	0.993	0.993
North Sea Consented developer approach	0.1	39.842	17.6200	0.840	0.781	0.995	0.995
North Sea Consented Scoping Approach a	0.1	47.219	21.8103	0.811	0.744	0.994	0.994
North Sea Consented Scoping Approach b	0.1	62.510	28.5900	0.759	0.677	0.992	0.992
(1) Project Alone: developer approach	0.1	4.541	2.2200	0.980	0.972	0.999	0.999
(2) Project Alone: Scoping approach a	0.1	7.619	3.8103	0.966	0.953	0.999	0.999
(2) Project Alone: Scoping approach b	0.1	10.210	5.0900	0.955	0.937	0.999	0.999

3.26 KITTIWAKE - COQUET ISLAND SPA

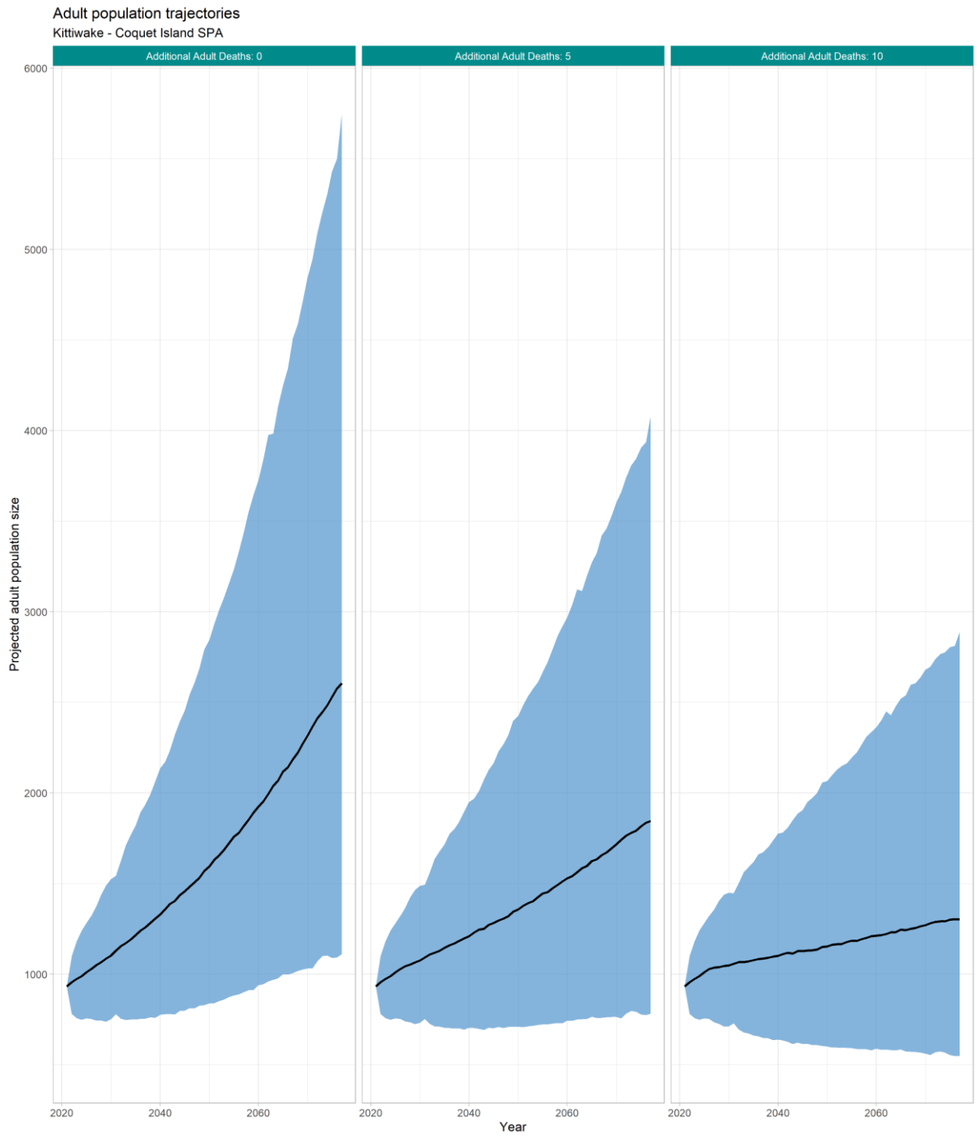

Figure 3.97: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

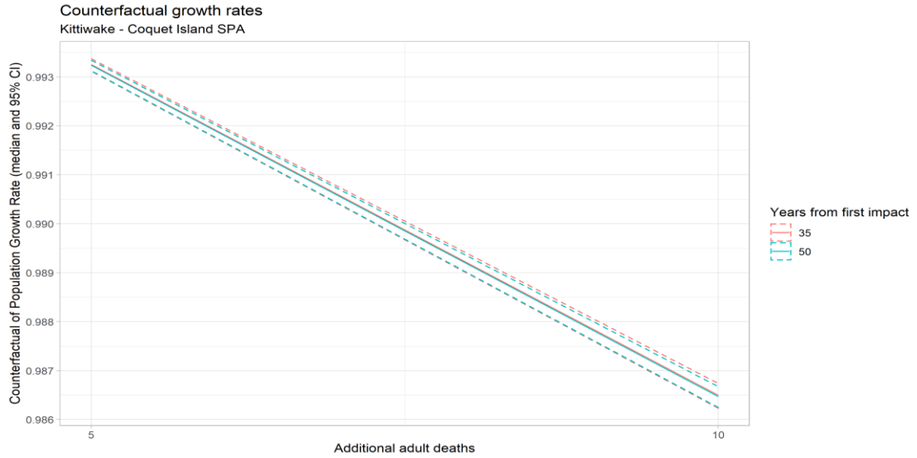

Figure 3.98: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

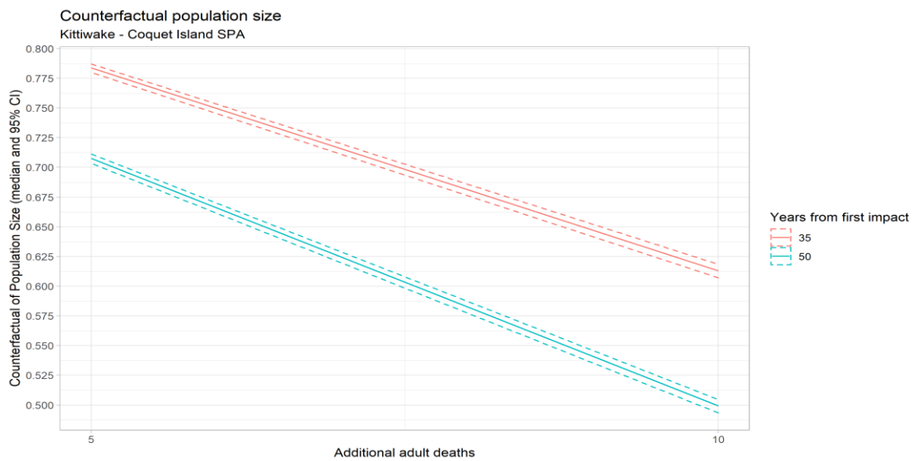

Figure 3.99: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

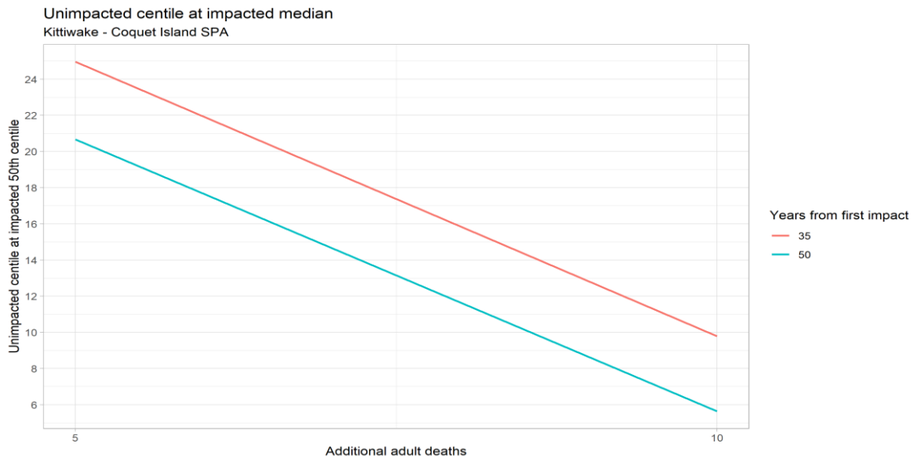

Figure 3.100: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.128: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.019	1.000	1.037			
2062	5	1.012	0.993	1.030	0.784	0.993	25.0
2062	10	1.005	0.986	1.023	0.613	0.986	9.8
2077	0	1.019	1.003	1.033			
2077	5	1.012	0.996	1.027	0.707	0.993	20.7
2077	10	1.005	0.989	1.020	0.499	0.986	5.6

Table 3.129: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. ***Med. popn size*** = Median population size, ***Med. popn size (2062) 2.5/97.5%*** = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.000	0.000	1994.7	959.5	3976.6
North Sea Consented developer approach	0.1	1.696	0.700	1885.4	906.1	3761.1
North Sea Consented Scoping Approach a	0.1	2.085	0.801	1863.1	895.3	3717.5
North Sea Consented Scoping Approach b	0.1	2.744	1.102	1822.2	874.6	3634.2
(1) Project Alone: developer approach	0.1	0.296	0.000	1978.9	951.9	3947.4
(2) Project Alone: Scoping approach a	0.1	0.485	0.000	1968.9	947.2	3927.9
(2) Project Alone: Scoping approach b	0.1	0.644	0.000	1961.7	943.4	3911.0

Table 3.130: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. ***Med. popn size*** = Median population size, ***Med. popn size (2077) 2.5/97.5%*** = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.000	0.000	2605.0	1110.0	5754.5
North Sea Consented developer approach	0.1	1.696	0.700	2406.0	1023.8	5322.0
North Sea Consented Scoping Approach a	0.1	2.085	0.801	2365.8	1006.4	5234.2
North Sea Consented Scoping Approach b	0.1	2.744	1.102	2291.5	973.8	5069.9
(1) Project Alone: developer approach	0.1	0.296	0.000	2576.4	1097.2	5695.6
(2) Project Alone: Scoping approach a	0.1	0.485	0.000	2559.5	1089.7	5656.6

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
(2) Project Alone: Scoping approach b	0.1	0.644	0.000	2544.1	1082.9	5624.3

Table 3.131: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.000	0.000	1.019	1.000	1.037	1.019	1.003	1.033
North Sea Consented developer approach	0.1	1.696	0.700	1.017	0.998	1.035	1.017	1.001	1.032
North Sea Consented Scoping Approach a	0.1	2.085	0.801	1.017	0.998	1.035	1.017	1.001	1.032
North Sea Consented Scoping Approach b	0.1	2.744	1.102	1.016	0.997	1.034	1.016	1.000	1.031
(1) Project Alone: developer approach	0.1	0.296	0.000	1.019	0.999	1.037	1.018	1.002	1.033
(2) Project Alone: Scoping approach a	0.1	0.485	0.000	1.019	0.999	1.036	1.018	1.002	1.033
(2) Project Alone: Scoping approach b	0.1	0.644	0.000	1.018	0.999	1.036	1.018	1.002	1.033

Table 3.132: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.1	1.696	0.700	0.945	0.924	0.998	0.998
North Sea Consented Scoping Approach a	0.1	2.085	0.801	0.934	0.908	0.998	0.998
North Sea Consented Scoping Approach b	0.1	2.744	1.102	0.913	0.880	0.997	0.997
(1) Project Alone: developer approach	0.1	0.296	0.000	0.992	0.989	1.000	1.000
(2) Project Alone: Scoping approach a	0.1	0.485	0.000	0.987	0.982	1.000	1.000
(2) Project Alone: Scoping approach b	0.1	0.644	0.000	0.983	0.977	1.000	1.000

3.27 KITTIWAKE - FLAMBOROUGH AND FILEY COAST SPA

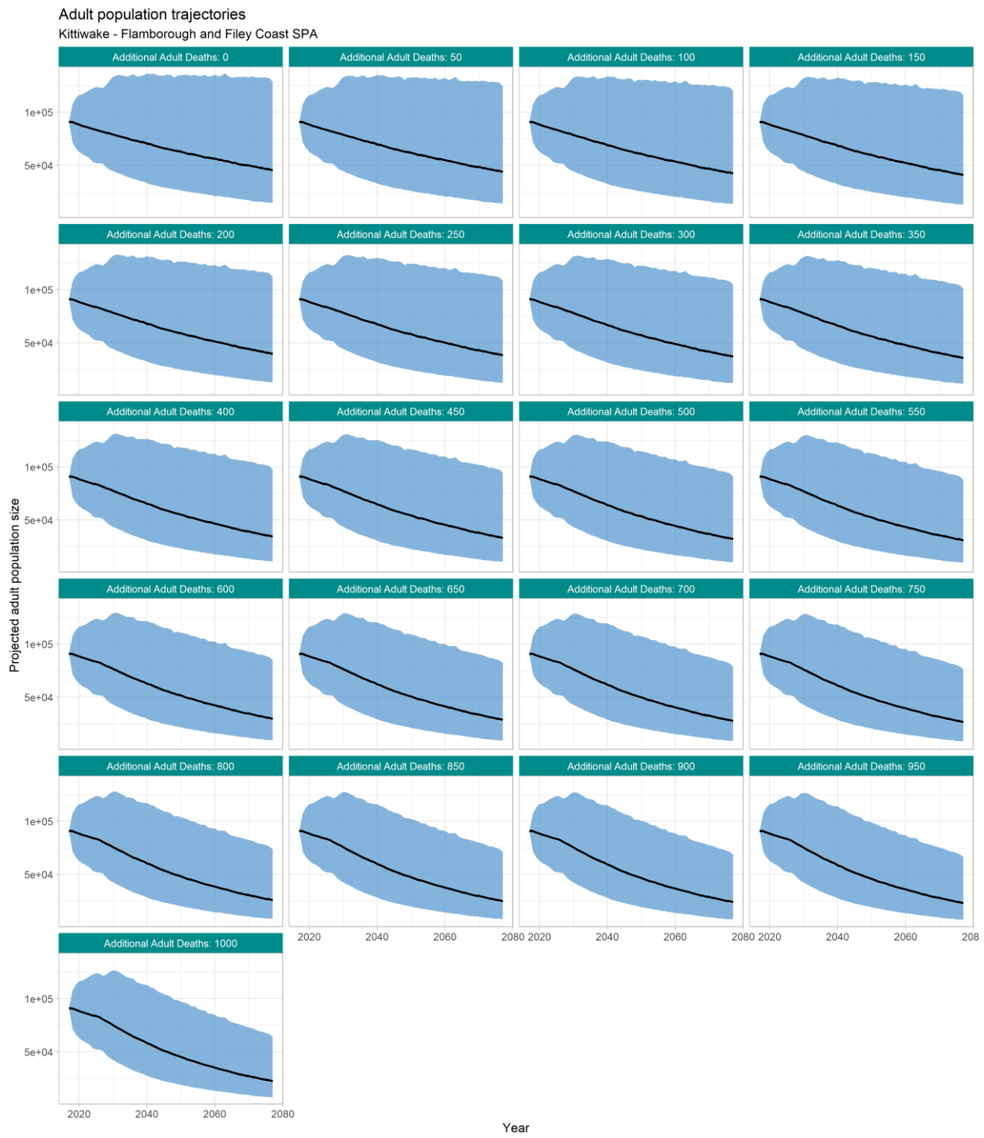

Figure 3.101: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

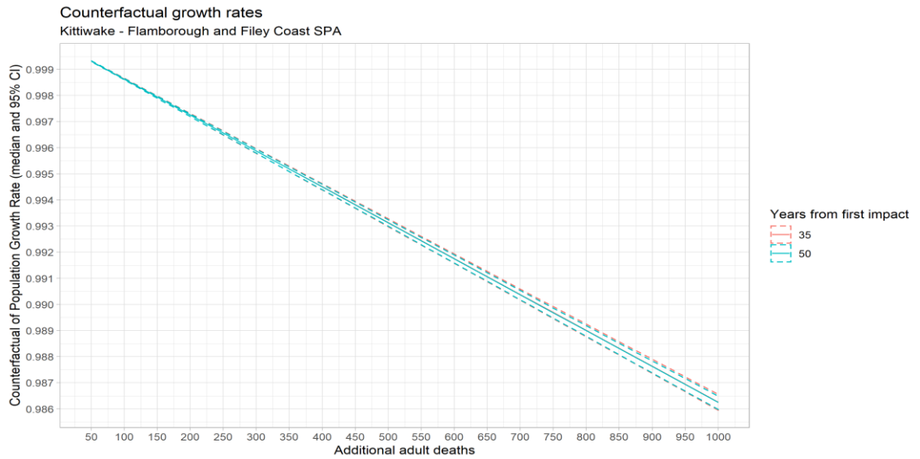

Figure 3.102: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

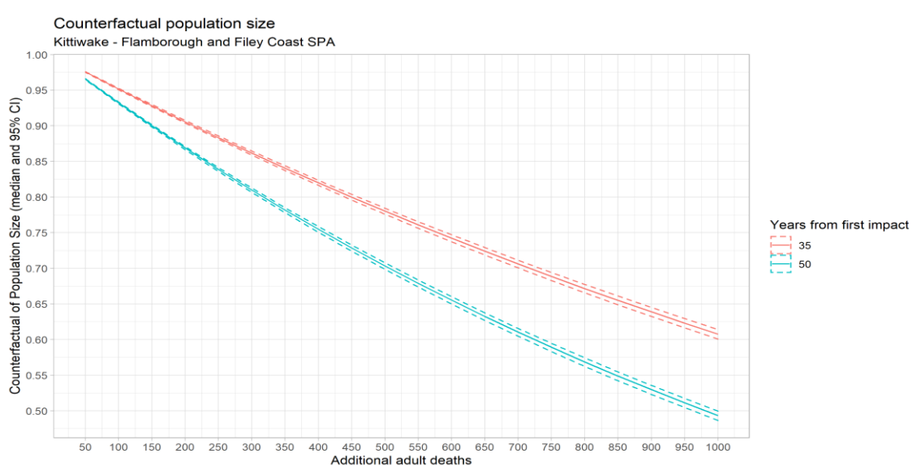

Figure 3.103: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).

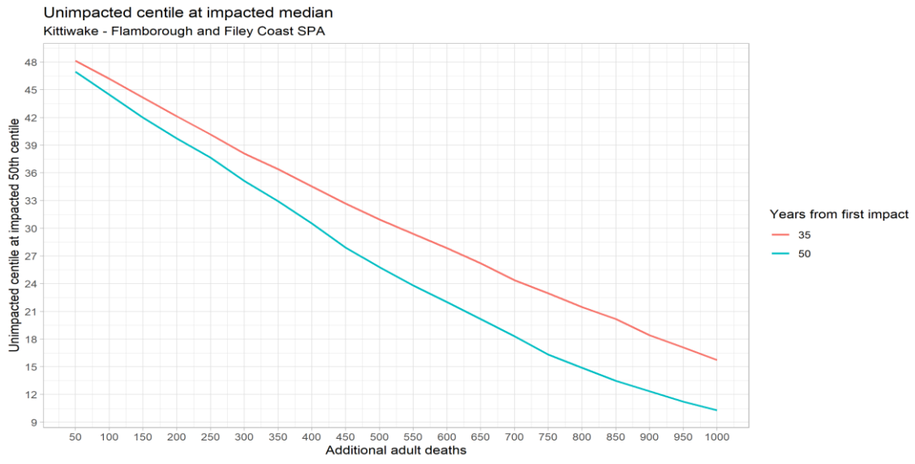

Figure 3.104: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.133: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates.

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	0.989	0.966	1.011			
2062	50	0.988	0.966	1.010	0.976	0.999	48.1
2062	100	0.987	0.965	1.010	0.952	0.999	46.2
2062	150	0.987	0.964	1.009	0.928	0.998	44.2
2062	200	0.986	0.964	1.008	0.906	0.997	42.1
2062	250	0.985	0.963	1.008	0.884	0.997	40.2
2062	300	0.985	0.962	1.007	0.862	0.996	38.1
2062	350	0.984	0.961	1.006	0.841	0.995	36.4
2062	400	0.983	0.961	1.006	0.820	0.995	34.5
2062	450	0.983	0.960	1.005	0.800	0.994	32.7
2062	500	0.982	0.959	1.004	0.780	0.993	31.0
2062	550	0.981	0.959	1.004	0.761	0.992	29.4
2062	600	0.981	0.958	1.003	0.742	0.992	27.8
2062	650	0.980	0.957	1.002	0.724	0.991	26.2
2062	700	0.979	0.957	1.002	0.706	0.990	24.4
2062	750	0.979	0.956	1.001	0.689	0.990	23.0
2062	800	0.978	0.955	1.000	0.672	0.989	21.5
2062	850	0.977	0.955	0.999	0.655	0.988	20.2
2062	900	0.977	0.954	0.999	0.639	0.988	18.4
2062	950	0.976	0.953	0.998	0.623	0.987	17.1
2062	1000	0.975	0.953	0.997	0.608	0.986	15.7
2077	0	0.989	0.969	1.008			

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2077	50	0.988	0.968	1.007	0.966	0.999	47.0
2077	100	0.987	0.968	1.006	0.932	0.999	44.5
2077	150	0.987	0.967	1.006	0.900	0.998	42.0
2077	200	0.986	0.966	1.005	0.869	0.997	39.7
2077	250	0.985	0.966	1.004	0.839	0.997	37.6
2077	300	0.985	0.965	1.004	0.810	0.996	35.1
2077	350	0.984	0.964	1.003	0.782	0.995	32.9
2077	400	0.983	0.964	1.002	0.755	0.994	30.5
2077	450	0.982	0.963	1.001	0.729	0.994	27.9
2077	500	0.982	0.962	1.001	0.703	0.993	25.8
2077	550	0.981	0.961	1.000	0.679	0.992	23.8
2077	600	0.980	0.961	0.999	0.655	0.992	22.0
2077	650	0.980	0.960	0.999	0.633	0.991	20.2
2077	700	0.979	0.959	0.998	0.611	0.990	18.3
2077	750	0.978	0.959	0.997	0.589	0.990	16.3
2077	800	0.978	0.958	0.997	0.569	0.989	14.9
2077	850	0.977	0.957	0.996	0.549	0.988	13.5
2077	900	0.976	0.957	0.995	0.530	0.988	12.3
2077	950	0.976	0.956	0.995	0.511	0.987	11.2
2077	1000	0.975	0.955	0.994	0.493	0.986	10.3

Table 3.134: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.000	0.000	55022.1	20971.5	134597.9
North Sea As-built: develper approach	0.1	410.674	61.136	48232.6	18361.6	118530.5
North Sea As built Approach a	0.1	441.907	76.920	47653.8	18137.2	117123.4
North Sea As-built: scoping approach b	0.1	491.300	101.500	46756.2	17789.4	114940.9
North Sea Consented developer approach	0.1	445.574	70.336	47665.1	18140.7	117160.0
North Sea Consented Scoping Approach a	0.1	476.807	86.020	47094.2	17920.1	115771.8
North Sea Consented Scoping Approach b	0.1	526.171	110.580	46207.2	17575.9	113614.7
(1) Project Alone: developer approach	0.1	17.047	8.236	54665.1	20833.0	133735.4
(2) Project Alone: Scoping approach a	0.1	28.507	14.120	54422.0	20738.8	133151.0
(2) Project Alone: Scoping approach b	0.1	38.171	18.880	54219.5	20661.3	132663.6

Table 3.135: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.000	0.000	45555.5	14846.9	128811.5
North Sea As-built: develper approach	0.1	410.674	61.136	37900.1	12276.7	107534.6
North Sea As built Approach a	0.1	441.907	76.920	37255.1	12063.1	105727.8
North Sea As-built: scoping approach b	0.1	491.300	101.500	36260.5	11734.2	102944.1
North Sea Consented developer approach	0.1	445.574	70.336	37266.2	12066.4	105766.6
North Sea Consented Scoping Approach a	0.1	476.807	86.020	36632.6	11856.6	103992.8
North Sea Consented Scoping Approach b	0.1	526.171	110.580	35655.5	11535.3	101254.5
(1) Project Alone: developer approach	0.1	17.047	8.236	45137.4	14707.4	127652.7
(2) Project Alone: Scoping approach a	0.1	28.507	14.120	44853.5	14612.5	126865.3
(2) Project Alone: Scoping approach b	0.1	38.171	18.880	44618.4	14534.2	126214.3

Table 3.136: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. lower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.000	0.000	0.989	0.966	1.011	0.989	0.969	1.008
North Sea As-built: develper approach	0.1	410.674	61.136	0.985	0.963	1.007	0.985	0.965	1.004
North Sea As built Approach a	0.1	441.907	76.920	0.985	0.962	1.007	0.985	0.965	1.004
North Sea As-built: scoping approach b	0.1	491.300	101.500	0.984	0.962	1.007	0.984	0.965	1.003
North Sea Consented developer approach	0.1	445.574	70.336	0.985	0.962	1.007	0.985	0.965	1.004
North Sea Consented Scoping Approach a	0.1	476.807	86.020	0.985	0.962	1.007	0.984	0.965	1.003
North Sea Consented Scoping Approach b	0.1	526.171	110.580	0.984	0.962	1.006	0.984	0.964	1.003
(1) Project Alone: developer approach	0.1	17.047	8.236	0.989	0.966	1.011	0.988	0.969	1.007
(2) Project Alone: Scoping approach a	0.1	28.507	14.120	0.989	0.966	1.011	0.988	0.969	1.007
(2) Project Alone: Scoping approach b	0.1	38.171	18.880	0.988	0.966	1.011	0.988	0.969	1.007

3.28 KITTIWAKE - WEST WESTRAY SPA

Table 3.137: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea As-built: develper approach	0.1	410.674	61.136	0.878	0.832	0.996	0.996
North Sea As built Approach a	0.1	441.907	76.920	0.867	0.818	0.996	0.996
North Sea As-built: scoping approach b	0.1	491.300	101.500	0.851	0.796	0.996	0.996
North Sea Consented developer approach	0.1	445.574	70.336	0.868	0.818	0.996	0.996
North Sea Consented Scoping Approach a	0.1	476.807	86.020	0.857	0.804	0.996	0.996
North Sea Consented Scoping Approach b	0.1	526.171	110.580	0.841	0.783	0.995	0.995
(1) Project Alone: developer approach	0.1	17.047	8.236	0.994	0.991	1.000	1.000
(2) Project Alone: Scoping approach a	0.1	28.507	14.120	0.989	0.985	1.000	1.000
(2) Project Alone: Scoping approach b	0.1	38.171	18.880	0.985	0.979	1.000	1.000

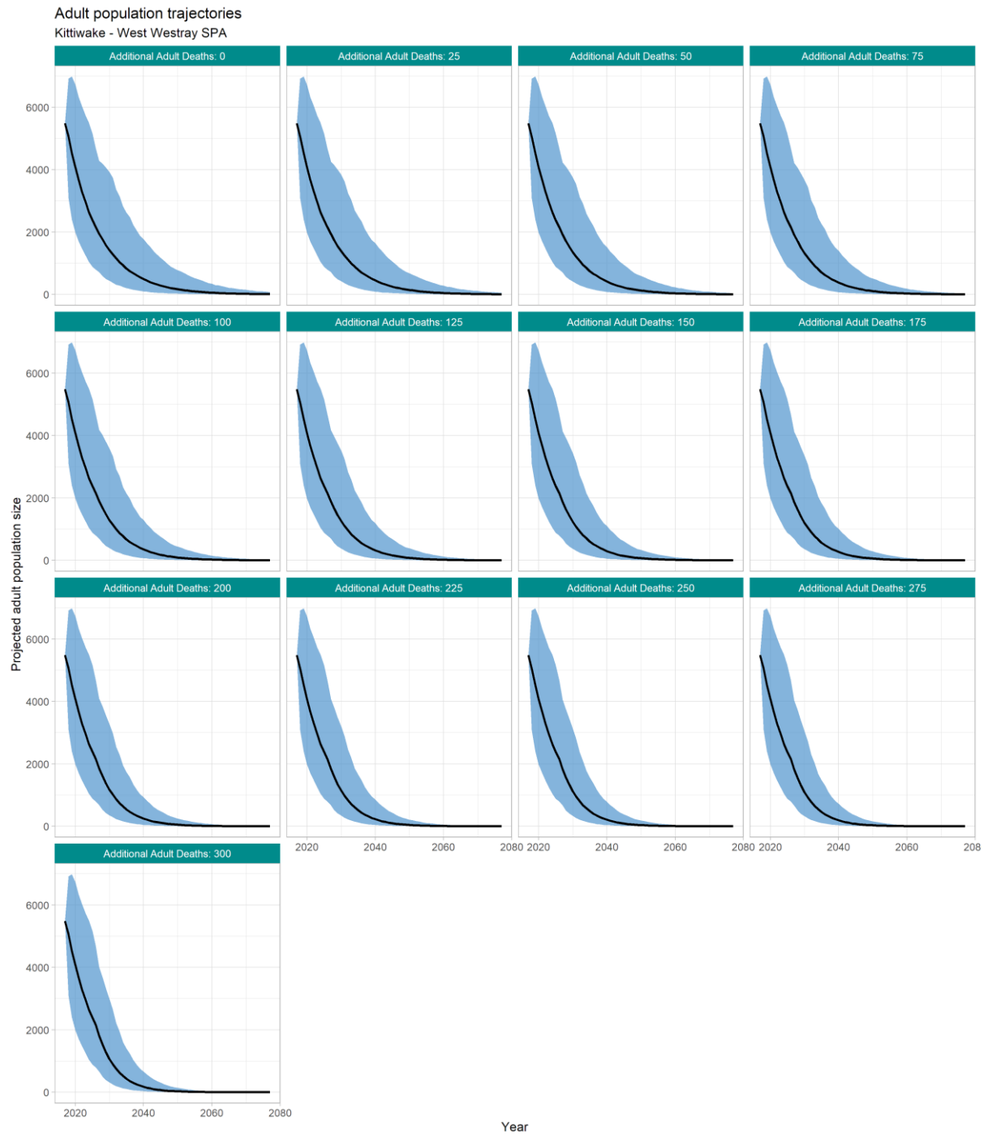

Figure 3.105: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.

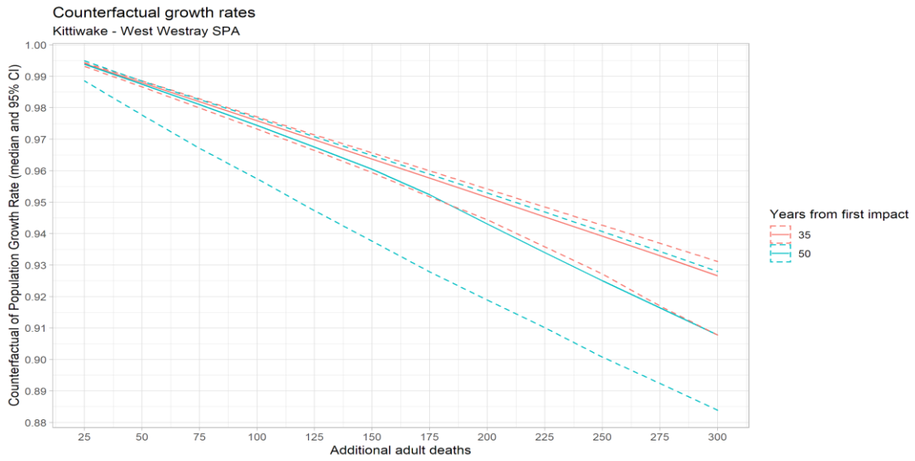

Figure 3.106: **Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).**

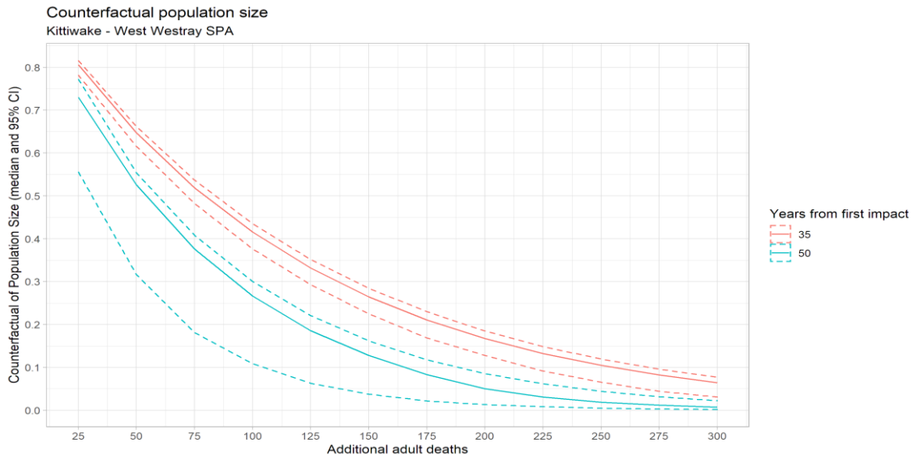

Figure 3.107: **The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).**

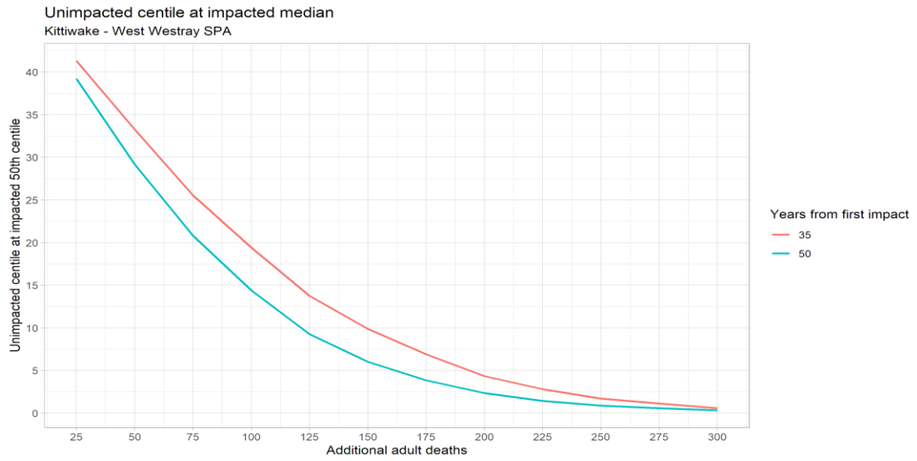

Figure 3.108: **The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).**

Table 3.138: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	0.900	0.857	0.941			
2062	25	0.894	0.851	0.935	0.806	0.994	41.3
2062	50	0.889	0.846	0.930	0.647	0.988	33.3
2062	75	0.884	0.839	0.925	0.519	0.982	25.5
2062	100	0.878	0.834	0.919	0.416	0.976	19.4
2062	125	0.873	0.828	0.914	0.332	0.970	13.8
2062	150	0.867	0.822	0.908	0.265	0.964	9.9
2062	175	0.862	0.815	0.903	0.211	0.958	6.9
2062	200	0.856	0.810	0.897	0.167	0.952	4.3
2062	225	0.850	0.803	0.892	0.132	0.945	2.8
2062	250	0.845	0.796	0.886	0.105	0.939	1.7
2062	275	0.839	0.787	0.881	0.082	0.933	1.1
2062	300	0.834	0.780	0.875	0.064	0.927	0.6
2077	0	0.899	0.853	0.934			
2077	25	0.893	0.844	0.929	0.730	0.994	39.2
2077	50	0.887	0.835	0.923	0.526	0.987	29.1
2077	75	0.881	0.826	0.918	0.376	0.981	20.8
2077	100	0.875	0.819	0.912	0.266	0.974	14.4
2077	125	0.869	0.811	0.907	0.186	0.968	9.3
2077	150	0.862	0.804	0.901	0.128	0.960	6.0
2077	175	0.855	0.796	0.895	0.083	0.952	3.9
2077	200	0.847	0.789	0.890	0.050	0.943	2.3
2077	225	0.839	0.781	0.884	0.031	0.934	1.4
2077	250	0.831	0.775	0.878	0.019	0.925	0.9
2077	275	0.823	0.769	0.872	0.012	0.916	0.6
2077	300	0.815	0.761	0.865	0.007	0.908	0.3

Table 3.139: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.1	0.00	0.00	47.3	5.8	295.2
North Sea As-built: develper approach	0.1	35.60	17.94	35.9	4.3	227.1
North Sea As built Approach a	0.1	45.84	22.92	33.2	4.0	210.6
North Sea As-built: scoping approach b	0.1	61.72	30.85	29.3	3.5	187.0
North Sea Consented developer approach	0.1	40.20	20.34	34.6	4.2	219.2
North Sea Consented Scoping Approach a	0.1	50.54	25.32	32.0	3.9	203.2
North Sea Consented Scoping Approach b	0.1	66.32	33.25	28.3	3.3	180.5
(1) Project Alone: developer approach	0.1	5.10	2.64	45.4	5.6	284.1
(2) Project Alone: Scoping approach a	0.1	9.04	4.52	44.1	5.4	275.9
(2) Project Alone: Scoping approach b	0.1	12.12	6.05	43.0	5.3	269.9

Table 3.140: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.1	0.00	0.00	9.0	0.5	78.6
North Sea As-built: develper approach	0.1	35.60	17.94	6.0	0.2	54.0
North Sea As built Approach a	0.1	45.84	22.92	5.3	0.2	48.6
North Sea As-built: scoping approach b	0.1	61.72	30.85	4.4	0.1	41.0
North Sea Consented developer approach	0.1	40.20	20.34	5.7	0.2	51.3
North Sea Consented Scoping Approach a	0.1	50.54	25.32	5.0	0.2	46.1
North Sea Consented Scoping Approach b	0.1	66.32	33.25	4.2	0.1	38.9
(1) Project Alone: developer approach	0.1	5.10	2.64	8.5	0.4	74.3
(2) Project Alone: Scoping approach a	0.1	9.04	4.52	8.1	0.4	71.7
(2) Project Alone: Scoping approach b	0.1	12.12	6.05	7.8	0.4	69.4

Table 3.141: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. lower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.1	0.00	0.00	0.900	0.857	0.941	0.899	0.853	0.934
North Sea As-built: develper approach	0.1	35.60	17.94	0.893	0.849	0.934	0.891	0.842	0.927
North Sea As built Approach a	0.1	45.84	22.92	0.891	0.848	0.932	0.889	0.838	0.925
North Sea As-built: scoping approach b	0.1	61.72	30.85	0.888	0.844	0.929	0.886	0.834	0.922
North Sea Consented developer approach	0.1	40.20	20.34	0.892	0.849	0.933	0.890	0.840	0.926
North Sea Consented Scoping Approach a	0.1	50.54	25.32	0.890	0.847	0.931	0.888	0.837	0.924
North Sea Consented Scoping Approach b	0.1	66.32	33.25	0.887	0.843	0.928	0.885	0.832	0.921
(1) Project Alone: developer approach	0.1	5.10	2.64	0.899	0.856	0.940	0.897	0.851	0.933
(2) Project Alone: Scoping approach a	0.1	9.04	4.52	0.898	0.855	0.939	0.897	0.850	0.932
(2) Project Alone: Scoping approach b	0.1	12.12	6.05	0.897	0.854	0.939	0.896	0.849	0.932

Table 3.142: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea As-built: develper approach	0.1	35.60	17.94	0.761	0.670	0.992	0.992
North Sea As built Approach a	0.1	45.84	22.92	0.703	0.596	0.990	0.990
North Sea As-built: scoping approach b	0.1	61.72	30.85	0.621	0.494	0.987	0.986
North Sea Consented developer approach	0.1	40.20	20.34	0.734	0.635	0.991	0.991
North Sea Consented Scoping Approach a	0.1	50.54	25.32	0.677	0.564	0.989	0.989
North Sea Consented Scoping Approach b	0.1	66.32	33.25	0.599	0.467	0.986	0.985
(1) Project Alone: developer approach	0.1	5.10	2.64	0.962	0.946	0.999	0.999
(2) Project Alone: Scoping approach a	0.1	9.04	4.52	0.934	0.906	0.998	0.998
(2) Project Alone: Scoping approach b	0.1	12.12	6.05	0.912	0.875	0.997	0.997

3.29 LESSER BLACK-BACKED GULL - COQUET ISLAND SPA

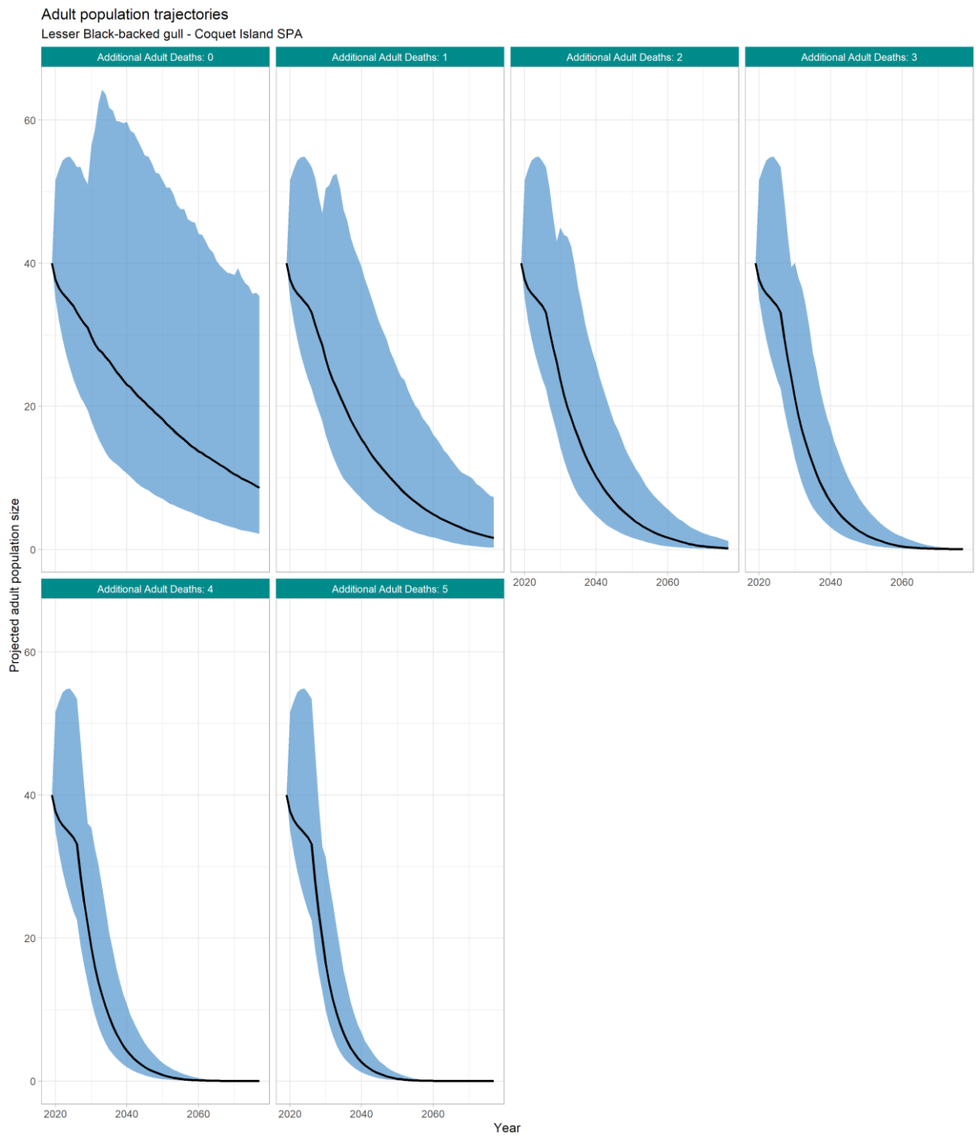

Figure 3.109: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median**

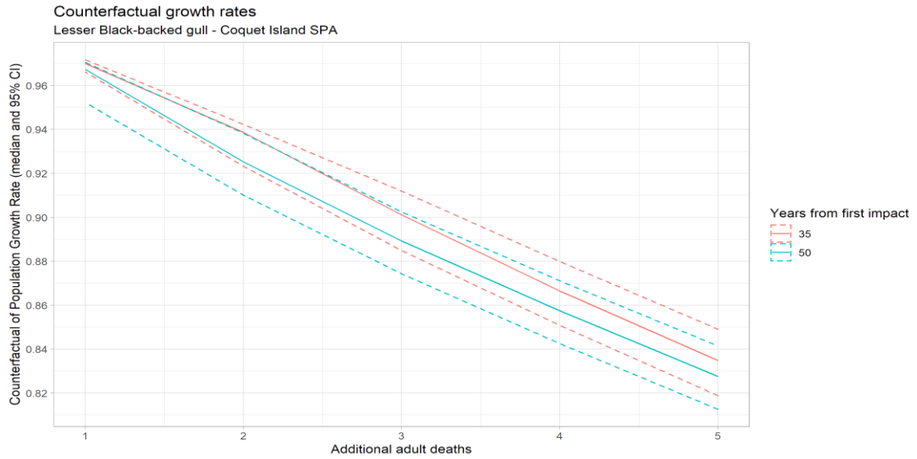

Figure 3.110: **Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

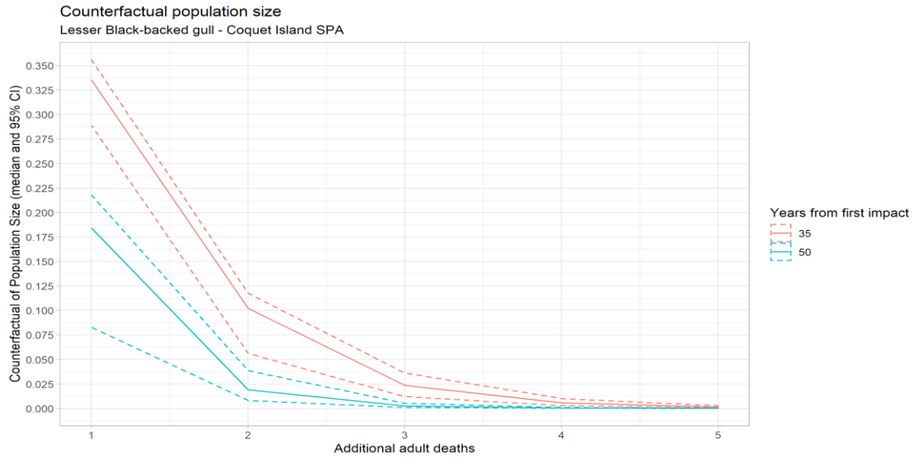

Figure 3.111: **The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

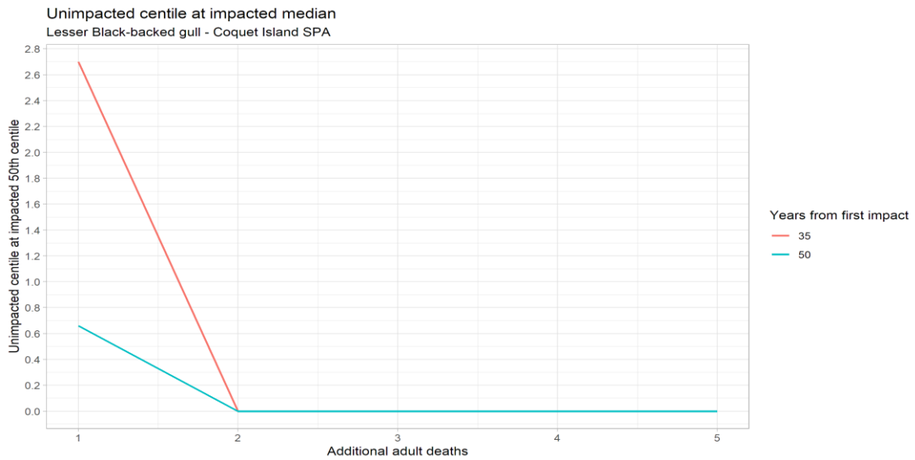

Figure 3.112: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)

Table 3.143: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	0.974	0.949	1.001			
2062	1	0.945	0.920	0.971	0.335	0.970	2.7
2062	2	0.914	0.884	0.941	0.102	0.939	0.0
2062	3	0.877	0.853	0.909	0.024	0.901	0.0
2062	4	0.844	0.824	0.871	0.006	0.866	0.0
2062	5	0.813	0.796	0.836	0.002	0.835	0.0
2077	0	0.974	0.951	0.997			
2077	1	0.942	0.911	0.967	0.184	0.967	0.7
2077	2	0.900	0.878	0.932	0.019	0.925	0.0
2077	3	0.865	0.848	0.888	0.003	0.889	0.0
2077	4	0.834	0.820	0.854	0.000	0.857	0.0
2077	5	0.805	0.793	0.822	0.000	0.828	0.0

Table 3.144: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.35	0.0000	0.000	13.1	4.3	43.0
(1) Project Alone: developer approach	0.35	0.0078	0.001	13.0	4.2	42.7
(2) Project Alone: Scoping approach a	0.35	0.0104	0.002	13.0	4.2	42.5

Table 3.145: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.35	0.0000	0.000	8.6	2.2	35.4
(1) Project Alone: developer approach	0.35	0.0078	0.001	8.5	2.2	35.1
(2) Project Alone: Scoping approach a	0.35	0.0104	0.002	8.5	2.2	34.8

Table 3.146: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GRlower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.35	0.0000	0.000	0.974	0.949	1.001	0.974	0.951	0.997
(1) Project Alone: developer approach	0.35	0.0078	0.001	0.974	0.949	1.001	0.973	0.951	0.997
(2) Project Alone: Scoping approach a	0.35	0.0104	0.002	0.974	0.949	1.001	0.973	0.951	0.997

Table 3.147: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
(1) Project Alone: developer approach	0.35	0.0078	0.001	0.996	0.996	1	1
(2) Project Alone: Scoping approach a	0.35	0.0104	0.002	0.995	0.994	1	1

3.30 LESSER BLACK-BACKED GULL - FARNE ISLANDS SPA

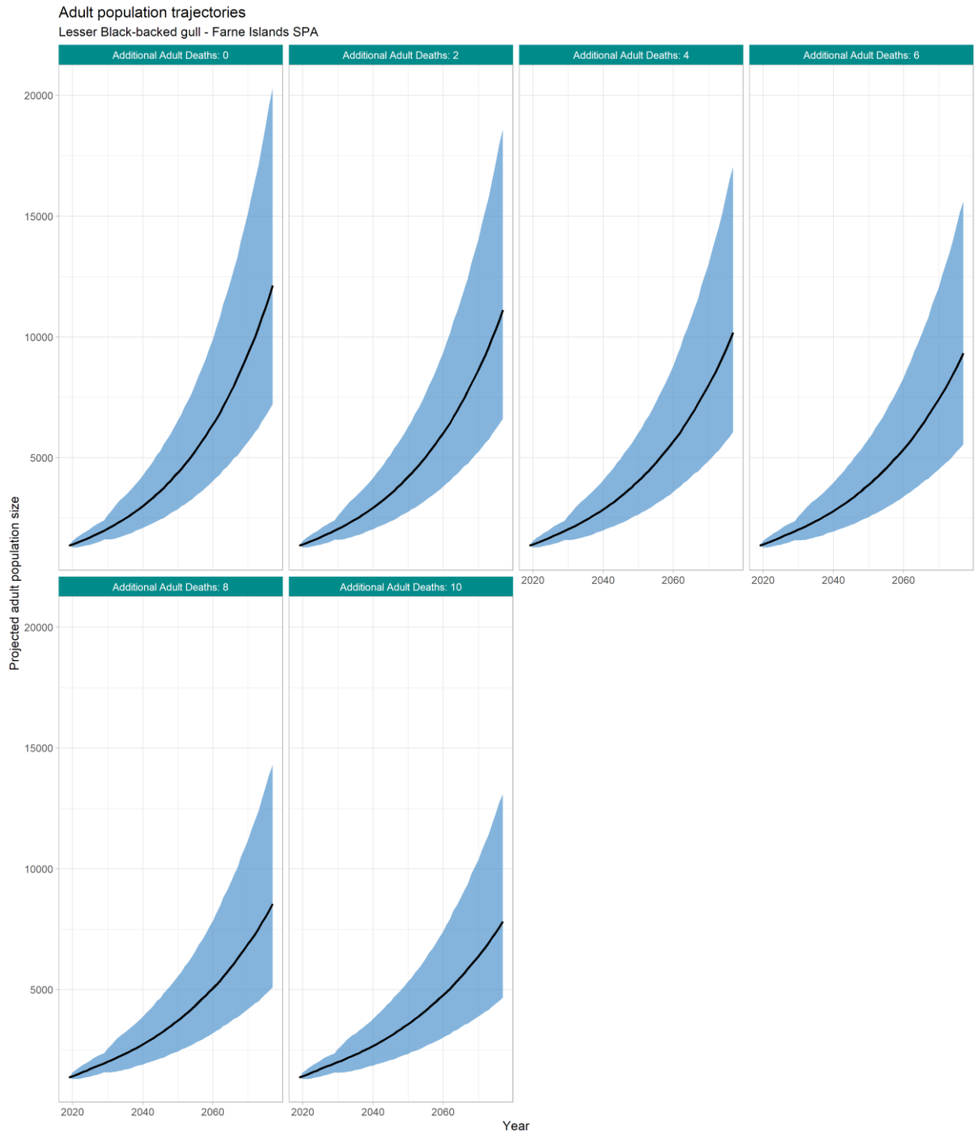

Figure 3.113: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median**

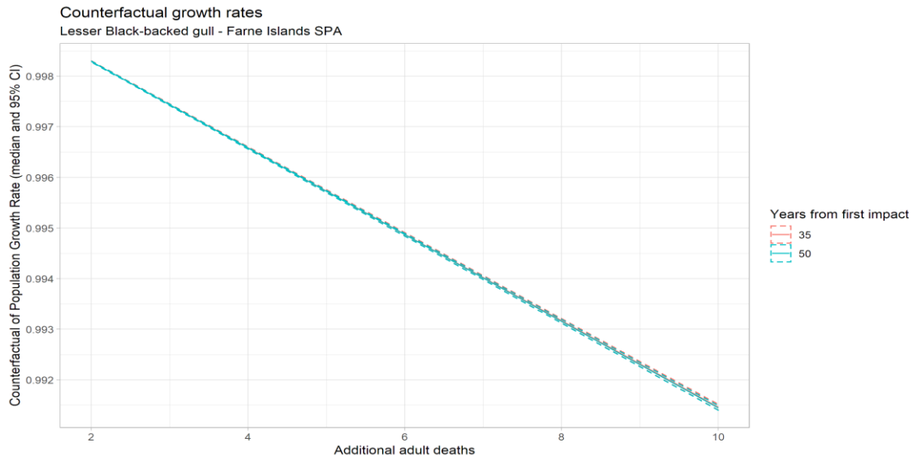

Figure 3.114: **Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).**

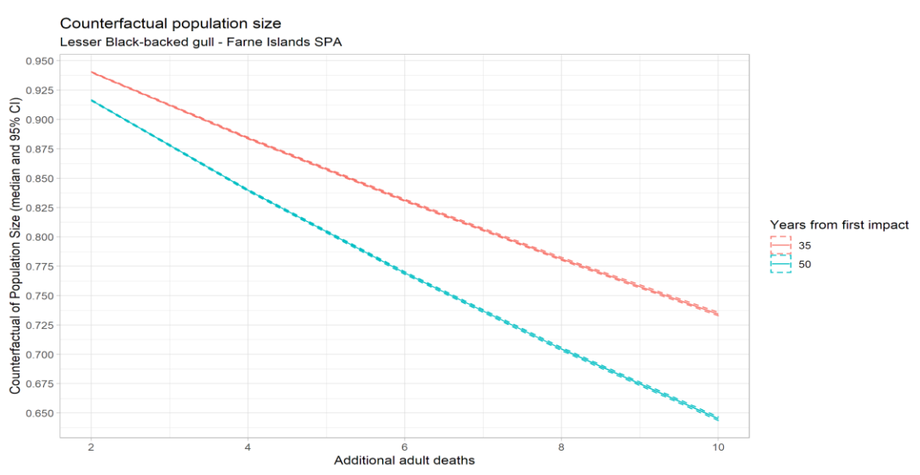

Figure 3.115: **The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

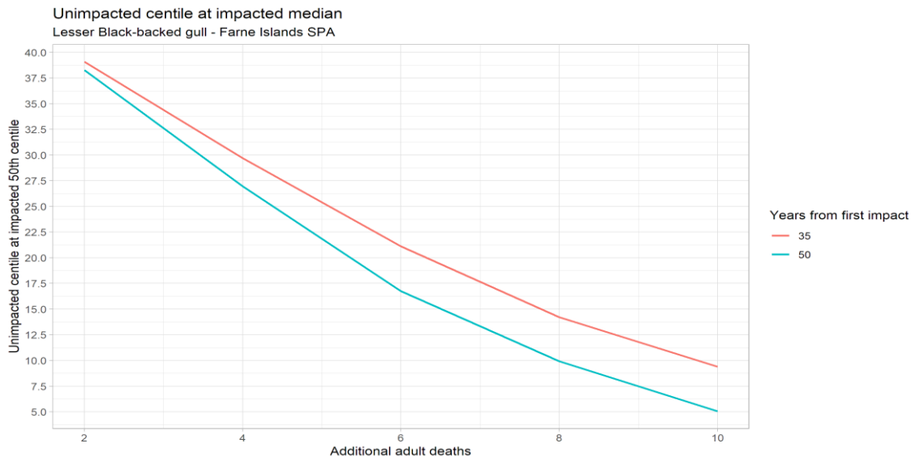

Figure 3.116: **The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)**

Table 3.148: **Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates**

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.038	1.027	1.050			
2062	2	1.037	1.025	1.048	0.940	0.998	39.1
2062	4	1.035	1.023	1.046	0.884	0.997	29.7
2062	6	1.033	1.022	1.044	0.831	0.995	21.1
2062	8	1.031	1.020	1.043	0.781	0.993	14.2
2062	10	1.030	1.018	1.041	0.734	0.991	9.4
2077	0	1.038	1.029	1.048			
2077	2	1.037	1.027	1.046	0.916	0.998	38.3
2077	4	1.035	1.026	1.044	0.840	0.997	27.0
2077	6	1.033	1.024	1.043	0.769	0.995	16.8
2077	8	1.031	1.022	1.041	0.705	0.993	9.9
2077	10	1.030	1.020	1.039	0.645	0.991	5.1

Table 3.149: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.35	0.0000	0.00	6851.7	4312.1	10827.8
(1) Project Alone: developer approach	0.35	0.5135	0.08	6783.5	4268.3	10721.9
(2) Project Alone: Scoping approach	0.35	0.7150	0.11	6756.9	4251.7	10682.7

Table 3.150: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.35	0.0000	0.00	12130.3	7226.6	20322.6
(1) Project Alone: developer approach	0.35	0.5135	0.08	11961.1	7123.9	20046.3
(2) Project Alone: Scoping approach	0.35	0.7150	0.11	11895.5	7086.1	19943.0

Table 3.151: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR (2062) lower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.35	0.0000	0.00	1.038	1.027	1.050	1.038	1.029	1.048
(1) Project Alone: developer approach	0.35	0.5135	0.08	1.038	1.027	1.050	1.038	1.029	1.048
(2) Project Alone: Scoping approach	0.35	0.7150	0.11	1.038	1.027	1.049	1.038	1.029	1.048

Table 3.152: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
(1) Project Alone: developer approach	0.35	0.5135	0.08	0.990	0.986	1	1
(2) Project Alone: Scoping approach	0.35	0.7150	0.11	0.986	0.981	1	1

3.31 LESSER BLACK-BACKED GULL - FORTH ISLANDS SPA

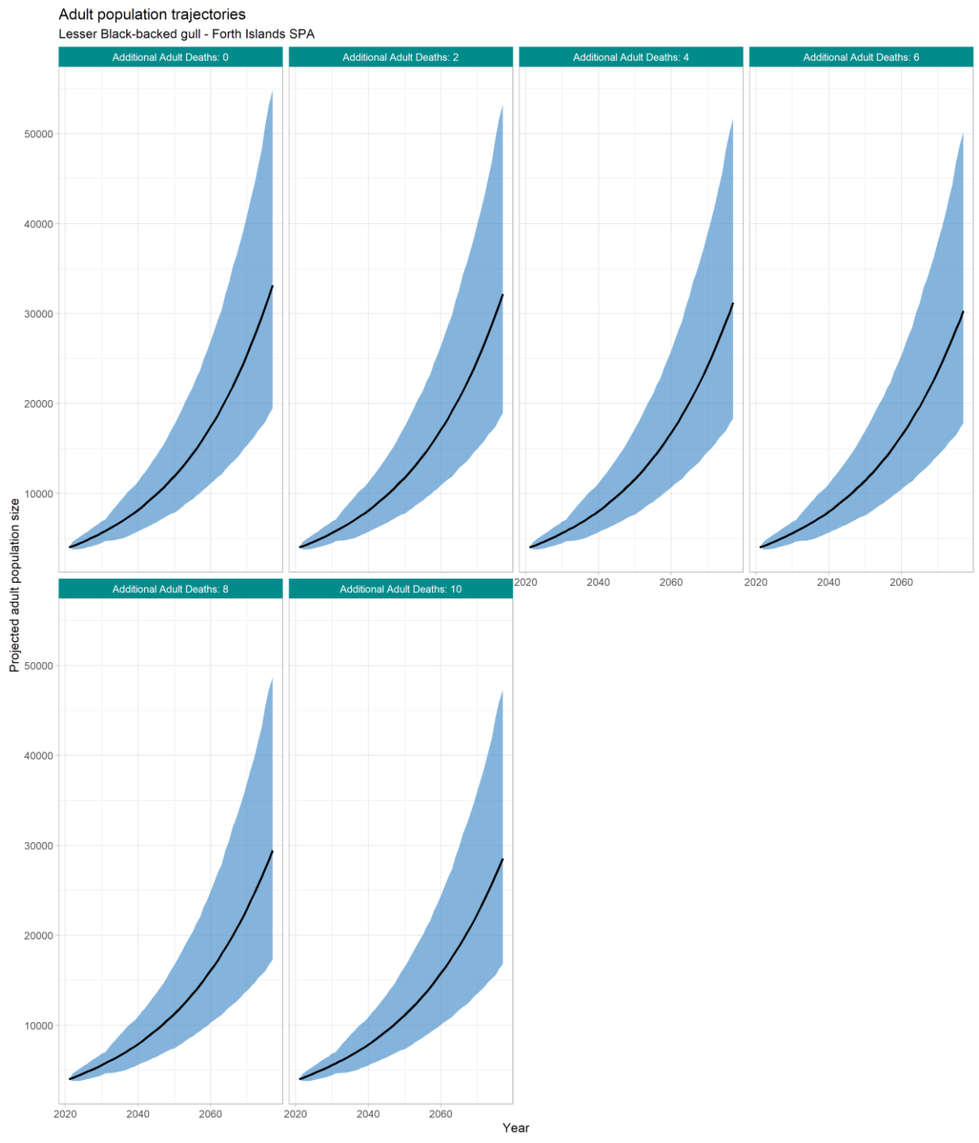

Figure 3.117: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median.**

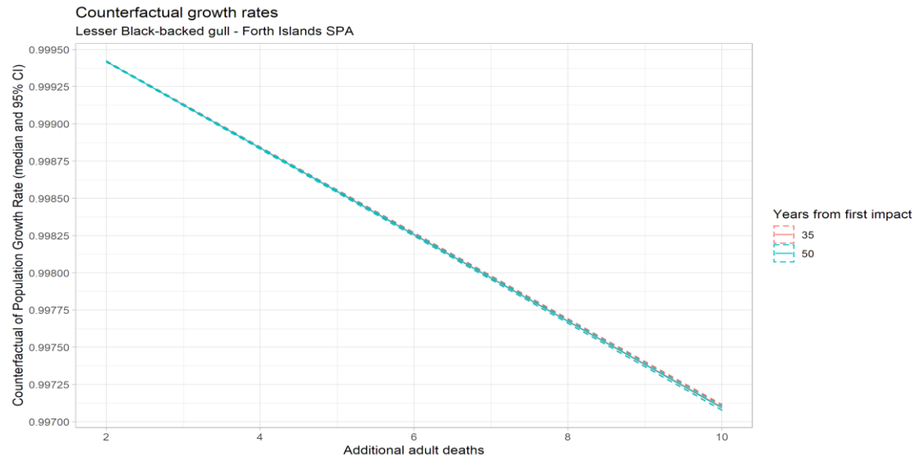

Figure 3.118: **Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).**

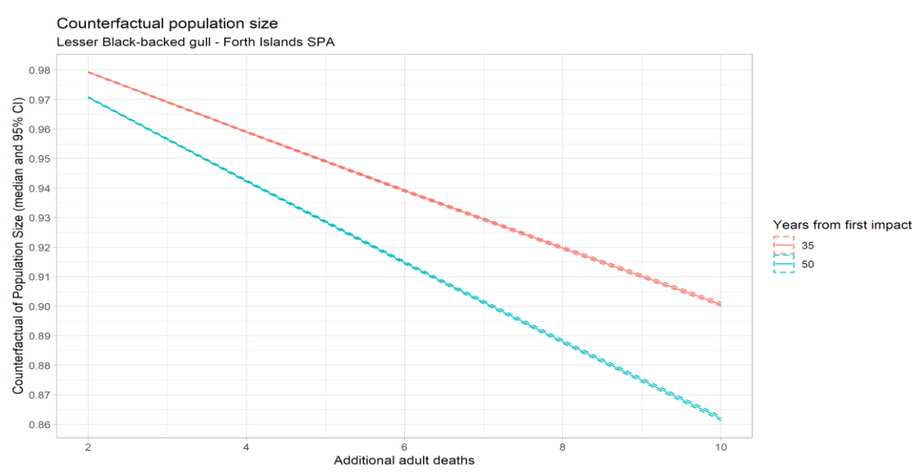

Figure 3.119: **The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points).**

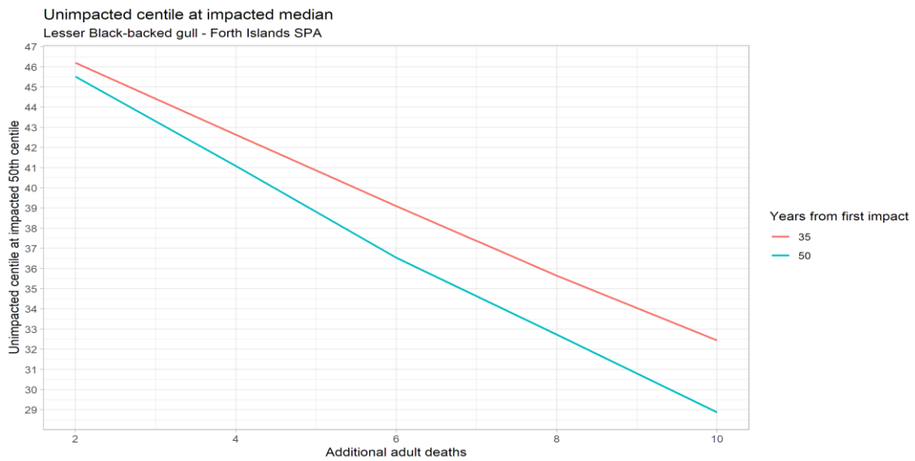

Figure 3.120: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years).

Table 3.153: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.039	1.027	1.050			
2062	2	1.038	1.027	1.049	0.979	0.999	46.2
2062	4	1.037	1.026	1.049	0.959	0.999	42.6
2062	6	1.037	1.025	1.048	0.939	0.998	39.1
2062	8	1.036	1.025	1.047	0.920	0.998	35.6
2062	10	1.036	1.024	1.047	0.901	0.997	32.4
2077	0	1.038	1.029	1.048			
2077	2	1.038	1.028	1.047	0.971	0.999	45.5
2077	4	1.037	1.028	1.047	0.942	0.999	41.1
2077	6	1.037	1.027	1.046	0.915	0.998	36.5
2077	8	1.036	1.026	1.045	0.888	0.998	32.7
2077	10	1.035	1.026	1.045	0.862	0.997	28.9

Table 3.154: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.35	0.0000	0.00	18768.4	11852.2	29400.8
(1) Project Alone: developer approach	0.35	1.9695	0.30	18527.2	11696.9	29031.8
(2) Project Alone: Scoping approach	0.35	2.7625	0.42	18431.4	11634.8	28884.9

Table 3.155: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.35	0.0000	0.00	33141.0	19499.5	54905.5
(1) Project Alone: developer approach	0.35	1.9695	0.30	32549.0	19142.6	53932.9
(2) Project Alone: Scoping approach a	0.35	2.7625	0.42	32312.1	19001.1	53545.3

Table 3.156: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. lower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.35	0.0000	0.00	1.039	1.027	1.050	1.038	1.029	1.048
(1) Project Alone: developer approach	0.35	1.9695	0.30	1.038	1.027	1.050	1.038	1.028	1.047
(2) Project Alone: Scoping approach	0.35	2.7625	0.42	1.038	1.027	1.049	1.038	1.028	1.047

Table 3.157: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
(1) Project Alone: developer approach	0.35	1.9695	0.30	0.987	0.982	1.000	1
(2) Project Alone: Scoping approach	0.35	2.7625	0.42	0.982	0.975	0.999	1

3.32 PUFFIN - FORTH ISLANDS SPA

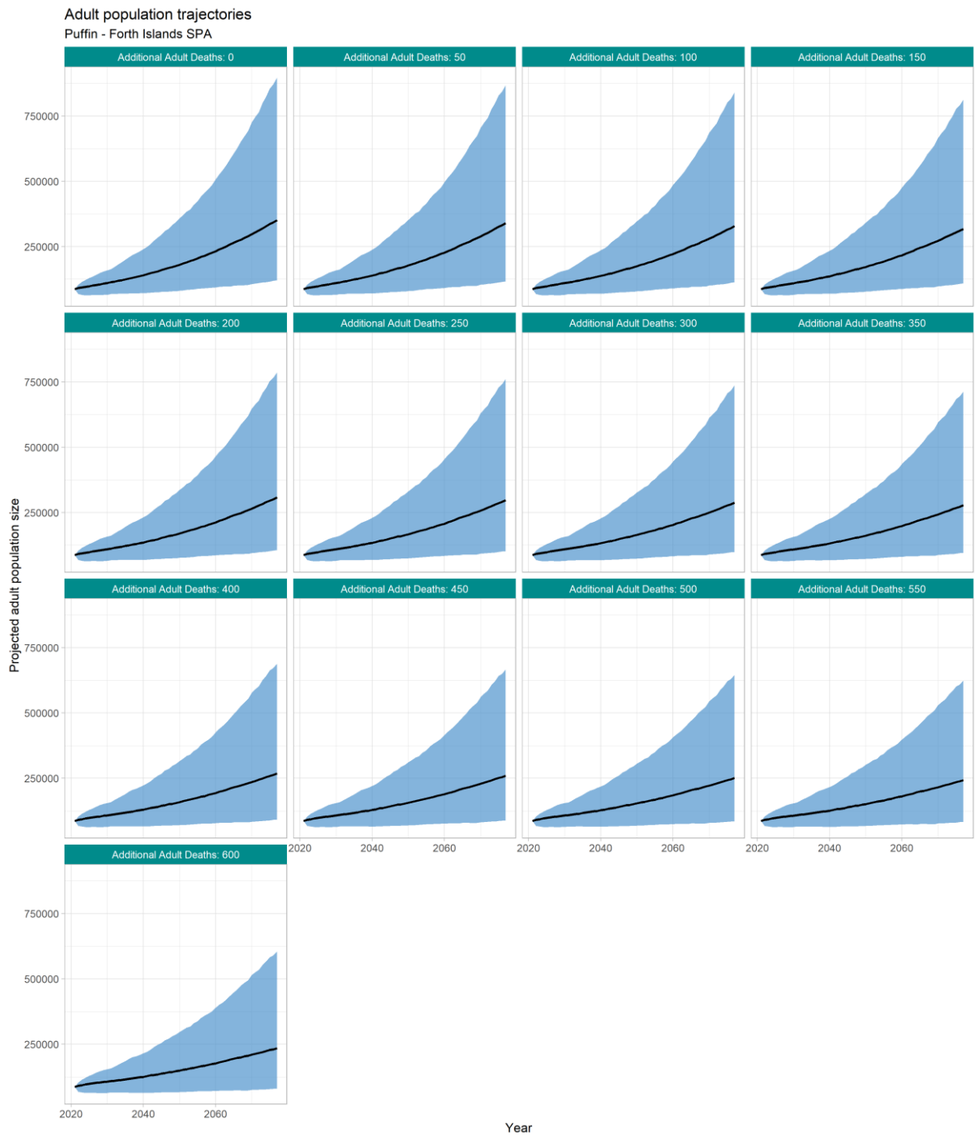

Figure 3.121: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median**

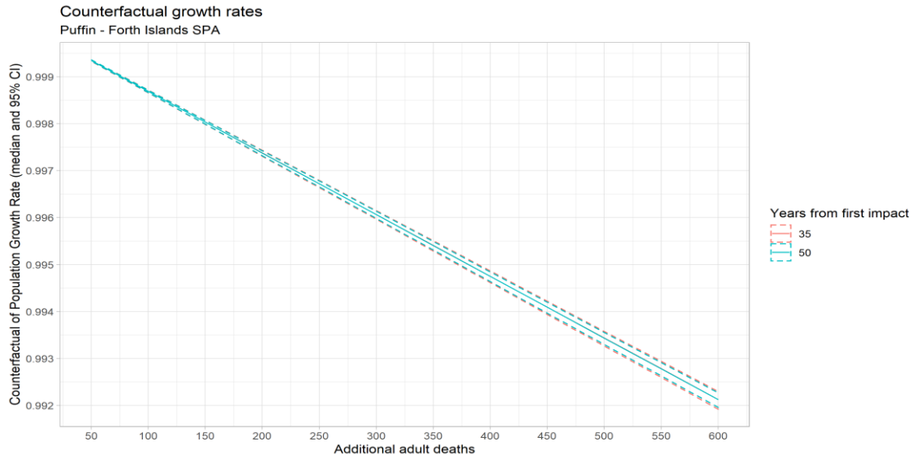

Figure 3.122: **Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

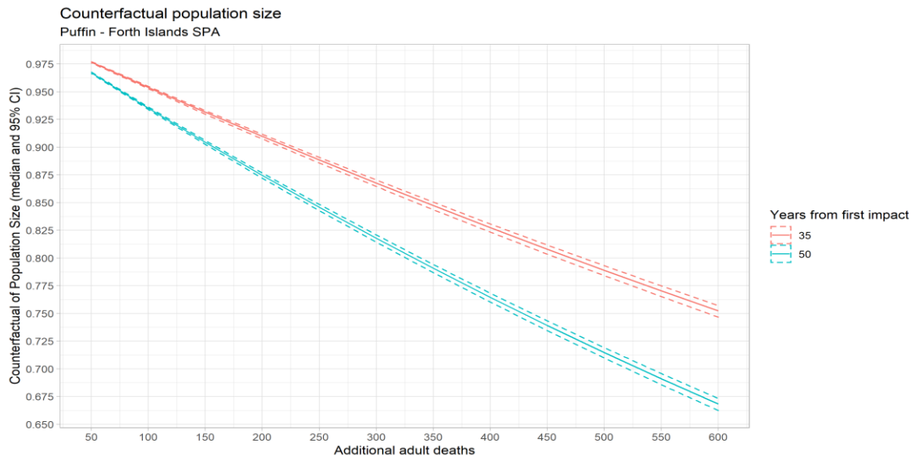

Figure 3.123: **The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

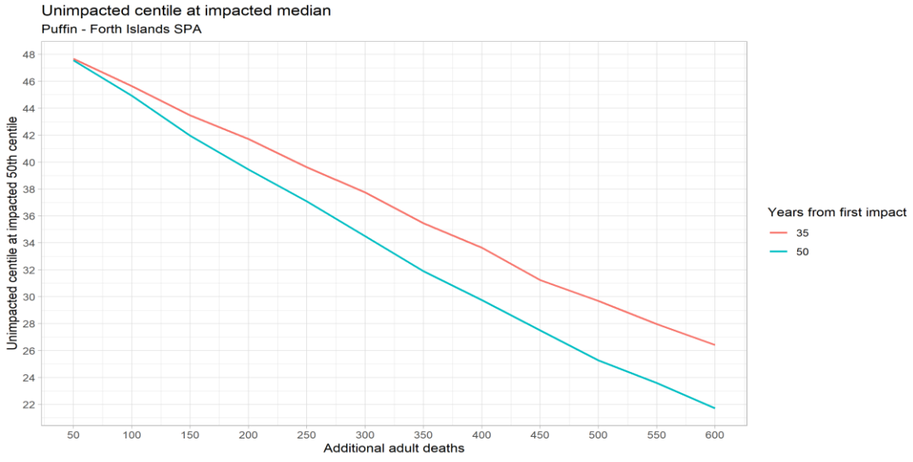

Figure 3.124: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)

Table 3.158: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.026	1.001	1.047			
2062	50	1.025	1.000	1.046	0.977	0.999	47.7
2062	100	1.024	1.000	1.046	0.954	0.999	45.6
2062	150	1.024	0.999	1.045	0.932	0.998	43.5
2062	200	1.023	0.998	1.044	0.910	0.997	41.7
2062	250	1.022	0.998	1.043	0.888	0.997	39.6
2062	300	1.022	0.997	1.043	0.868	0.996	37.7
2062	350	1.021	0.996	1.042	0.847	0.995	35.5
2062	400	1.020	0.996	1.041	0.827	0.995	33.6
2062	450	1.020	0.995	1.041	0.808	0.994	31.2
2062	500	1.019	0.994	1.040	0.789	0.993	29.7
2062	550	1.018	0.994	1.039	0.770	0.993	28.0
2062	600	1.018	0.993	1.039	0.752	0.992	26.4
2077	0	1.025	1.004	1.044			
2077	50	1.025	1.004	1.043	0.967	0.999	47.6
2077	100	1.024	1.003	1.042	0.935	0.999	44.9
2077	150	1.023	1.002	1.042	0.904	0.998	42.0
2077	200	1.023	1.002	1.041	0.875	0.997	39.5
2077	250	1.022	1.001	1.040	0.846	0.997	37.1
2077	300	1.021	1.000	1.040	0.818	0.996	34.5
2077	350	1.021	1.000	1.039	0.791	0.995	31.9
2077	400	1.020	0.999	1.038	0.765	0.995	29.7

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2077	450	1.019	0.998	1.038	0.739	0.994	27.5
2077	500	1.019	0.998	1.037	0.715	0.993	25.3
2077	550	1.018	0.997	1.036	0.691	0.993	23.6
2077	600	1.017	0.996	1.035	0.668	0.992	21.7

Table 3.159: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	243954.6	96522.5	542889.0
North Sea Consented developer approach	0.07	44.3057	51.11	238782.7	94423.3	531535.1
North Sea Consented Scoping Approach a	0.07	159.3908	183.80	225846.6	89176.8	503131.3
North Sea Consented Scoping Approach b	0.07	265.0972	306.16	214573.5	84600.8	478373.4
(1) Project Alone: developer approach	0.07	5.1057	6.01	243347.8	96276.3	541557.6
(2) Project Alone: Scoping approach a	0.07	18.1908	21.44	241798.7	95647.5	538155.2
(2) Project Alone: Scoping approach b	0.07	29.7972	35.56	240414.1	95084.5	535113.1

Table 3.160: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	351192.1	121139.3	897183.1
North Sea Consented developer approach	0.07	44.3057	51.11	340670.9	117447.6	870888.2
North Sea Consented Scoping Approach a	0.07	159.3908	183.80	314883.2	108373.5	806291.0
North Sea Consented Scoping Approach b	0.07	265.0972	306.16	292804.1	100658.1	751027.3
(1) Project Alone: developer approach	0.07	5.1057	6.01	349952.6	120704.6	894058.2
(2) Project Alone: Scoping approach a	0.07	18.1908	21.44	346793.4	119595.7	886144.3

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
(2) Project Alone: Scoping approach b	0.07	29.7972	35.56	343975.0	118608.8	879135.5

Table 3.161: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.026	1.001	1.047	1.025	1.004	1.044
North Sea Consented developer approach	0.07	44.3057	51.11	1.025	1.000	1.046	1.025	1.004	1.043
North Sea Consented Scoping Approach a	0.07	159.3908	183.80	1.024	0.999	1.045	1.023	1.002	1.041
North Sea Consented Scoping Approach b	0.07	265.0972	306.16	1.022	0.997	1.043	1.022	1.001	1.040
(1) Project Alone: developer approach	0.07	5.1057	6.01	1.026	1.001	1.047	1.025	1.004	1.044
(2) Project Alone: Scoping approach a	0.07	18.1908	21.44	1.026	1.001	1.047	1.025	1.004	1.043
(2) Project Alone: Scoping approach b	0.07	29.7972	35.56	1.025	1.001	1.046	1.025	1.004	1.043

Table 3.162: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.07	44.3057	51.11	0.979	0.970	0.999	0.999
North Sea Consented Scoping Approach a	0.07	159.3908	183.80	0.926	0.897	0.998	0.998
North Sea Consented Scoping Approach b	0.07	265.0972	306.16	0.880	0.834	0.996	0.996
(1) Project Alone: developer approach	0.07	5.1057	6.01	0.998	0.996	1.000	1.000
(2) Project Alone: Scoping approach a	0.07	18.1908	21.44	0.991	0.988	1.000	1.000
(2) Project Alone: Scoping approach b	0.07	29.7972	35.56	0.986	0.980	1.000	1.000

3.33 PUFFIN - FARNE ISLANDS SPA

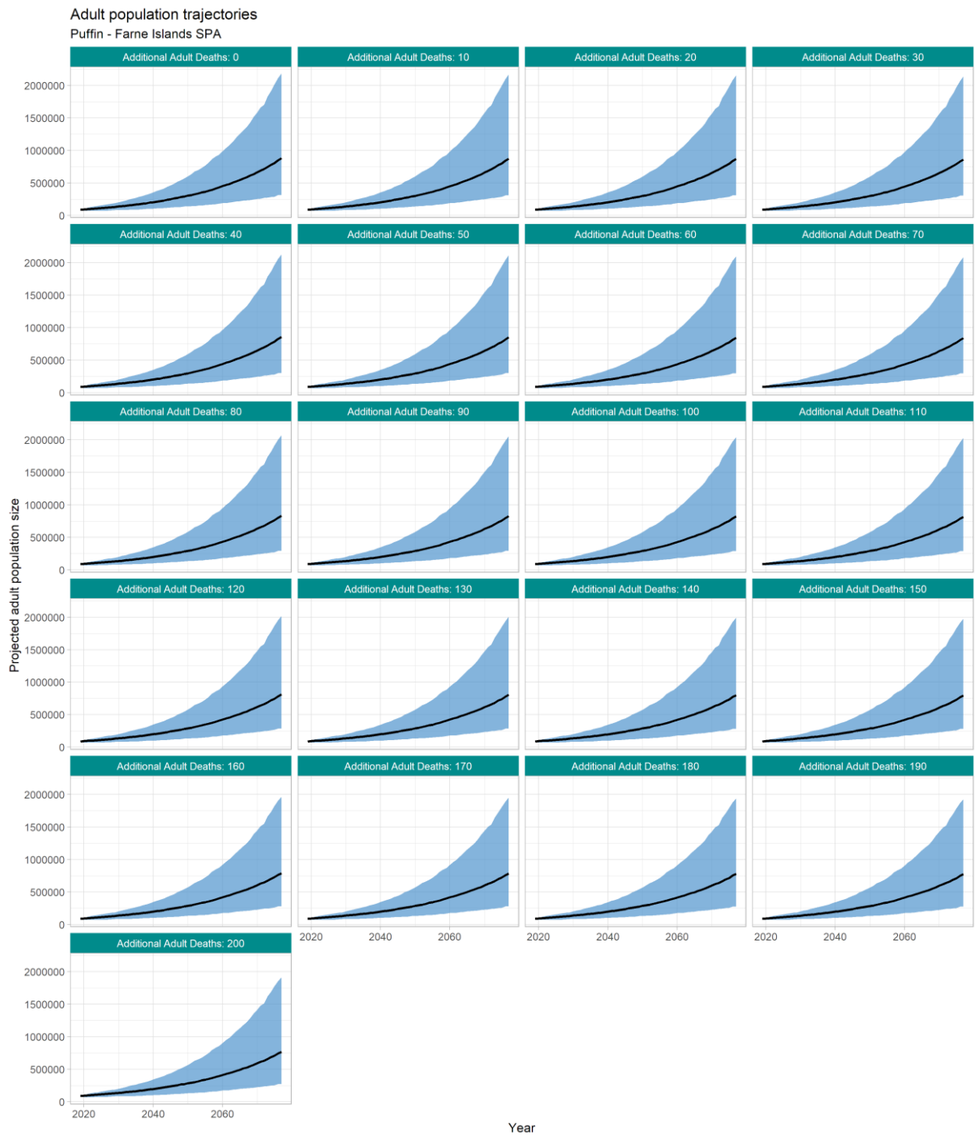

Figure 3.125 Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median

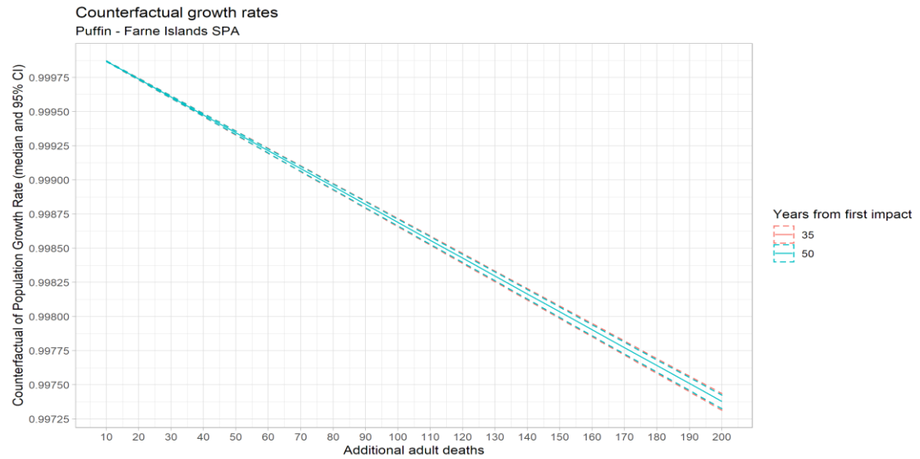

Figure 3.126: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)

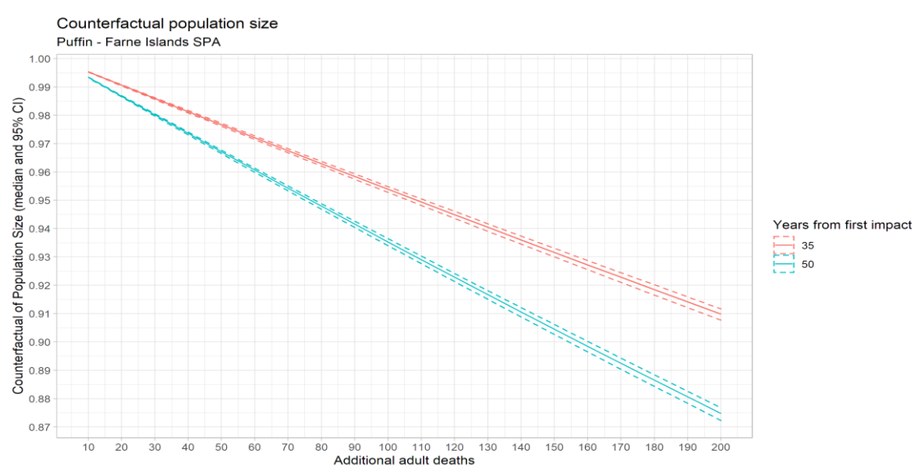

Figure 3.127: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)

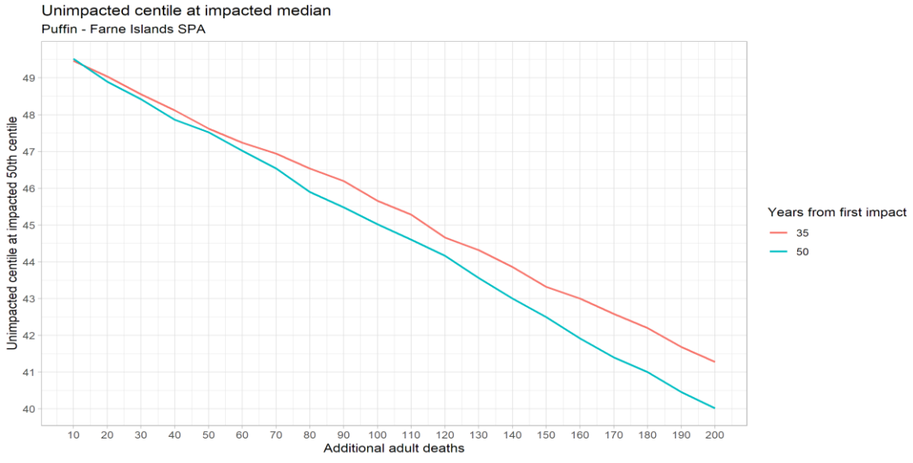

Figure 3.128: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)

Table 3.163: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.041	1.016	1.062			
2062	10	1.041	1.016	1.062	0.995	1.000	49.5
2062	20	1.041	1.016	1.062	0.991	1.000	49.0
2062	30	1.040	1.016	1.062	0.986	1.000	48.6
2062	40	1.040	1.016	1.062	0.981	0.999	48.1
2062	50	1.040	1.016	1.061	0.977	0.999	47.6
2062	60	1.040	1.016	1.061	0.972	0.999	47.2
2062	70	1.040	1.015	1.061	0.967	0.999	46.9
2062	80	1.040	1.015	1.061	0.963	0.999	46.5
2062	90	1.040	1.015	1.061	0.958	0.999	46.2
2062	100	1.039	1.015	1.061	0.954	0.999	45.7
2062	110	1.039	1.015	1.061	0.949	0.999	45.3
2062	120	1.039	1.015	1.061	0.945	0.998	44.7
2062	130	1.039	1.015	1.060	0.940	0.998	44.3
2062	140	1.039	1.015	1.060	0.936	0.998	43.9
2062	150	1.039	1.014	1.060	0.932	0.998	43.3
2062	160	1.039	1.014	1.060	0.927	0.998	43.0
2062	170	1.038	1.014	1.060	0.923	0.998	42.6
2062	180	1.038	1.014	1.060	0.918	0.998	42.2
2062	190	1.038	1.014	1.060	0.914	0.998	41.7
2062	200	1.038	1.014	1.059	0.910	0.997	41.3
2077	0	1.041	1.021	1.058			

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2077	10	1.040	1.021	1.058	0.993	1.000	49.5
2077	20	1.040	1.021	1.058	0.987	1.000	48.9
2077	30	1.040	1.021	1.058	0.980	1.000	48.4
2077	40	1.040	1.020	1.057	0.974	0.999	47.9
2077	50	1.040	1.020	1.057	0.967	0.999	47.5
2077	60	1.040	1.020	1.057	0.961	0.999	47.0
2077	70	1.040	1.020	1.057	0.954	0.999	46.5
2077	80	1.040	1.020	1.057	0.948	0.999	45.9
2077	90	1.039	1.020	1.057	0.942	0.999	45.5
2077	100	1.039	1.020	1.057	0.935	0.999	45.0
2077	110	1.039	1.019	1.057	0.929	0.999	44.6
2077	120	1.039	1.019	1.056	0.923	0.998	44.2
2077	130	1.039	1.019	1.056	0.917	0.998	43.6
2077	140	1.039	1.019	1.056	0.911	0.998	43.0
2077	150	1.039	1.019	1.056	0.905	0.998	42.5
2077	160	1.038	1.019	1.056	0.898	0.998	41.9
2077	170	1.038	1.019	1.056	0.892	0.998	41.4
2077	180	1.038	1.018	1.056	0.887	0.998	41.0
2077	190	1.038	1.018	1.055	0.881	0.998	40.5
2077	200	1.038	1.018	1.055	0.875	0.997	40.0

Table 3.164: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	483380.5	196815.1	1079847
North Sea Consented developer approach	0.07	4.8177	6.69	482228.7	196336.1	1077315
North Sea Consented Scoping Approach a	0.07	17.3100	23.75	479280.4	195110.2	1070825
North Sea Consented Scoping Approach b	0.07	28.8000	39.44	476591.8	193989.1	1064891
(1) Project Alone: developer approach	0.07	3.6177	4.89	482525.2	196461.9	1077968
(2) Project Alone: Scoping approach a	0.07	12.9100	17.45	480338.3	195551.5	1073157
(2) Project Alone: Scoping approach b	0.07	21.4000	28.94	478355.0	194724.9	1068778

Table 3.165: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	878307.8	312731.7	2183913
North Sea Consented developer approach	0.07	4.8177	6.69	875342.9	311657.3	2176721
North Sea Consented Scoping Approach a	0.07	17.3100	23.75	867763.7	308909.4	2158295
North Sea Consented Scoping Approach b	0.07	28.8000	39.44	860850.0	306402.4	2141478
(1) Project Alone: developer approach	0.07	3.6177	4.89	876105.5	311933.4	2178566
(2) Project Alone: Scoping approach a	0.07	12.9100	17.45	870487.0	309896.8	2164905
(2) Project Alone: Scoping approach b	0.07	21.4000	28.94	865377.6	308045.7	2152482

Table 3.166: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.041	1.016	1.062	1.041	1.021	1.058
North Sea Consented developer approach	0.07	4.8177	6.69	1.041	1.016	1.062	1.041	1.021	1.058
North Sea Consented Scoping Approach a	0.07	17.3100	23.75	1.041	1.016	1.062	1.040	1.021	1.058
North Sea Consented Scoping Approach b	0.07	28.8000	39.44	1.040	1.016	1.062	1.040	1.021	1.058
(1) Project Alone: developer approach	0.07	3.6177	4.89	1.041	1.016	1.062	1.041	1.021	1.058
(2) Project Alone: Scoping approach a	0.07	12.9100	17.45	1.041	1.016	1.062	1.040	1.021	1.058
(2) Project Alone: Scoping approach b	0.07	21.4000	28.94	1.040	1.016	1.062	1.040	1.021	1.058

Table 3.167: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.07	4.8177	6.69	0.998	0.997	1	1
North Sea Consented Scoping Approach a	0.07	17.3100	23.75	0.992	0.988	1	1
North Sea Consented Scoping Approach b	0.07	28.8000	39.44	0.986	0.980	1	1
(1) Project Alone: developer approach	0.07	3.6177	4.89	0.998	0.998	1	1
(2) Project Alone: Scoping approach a	0.07	12.9100	17.45	0.994	0.991	1	1
(2) Project Alone: Scoping approach b	0.07	21.4000	28.94	0.990	0.985	1	1

3.34 PUFFIN - NORTH CAITHNESS CLIFFS SPA

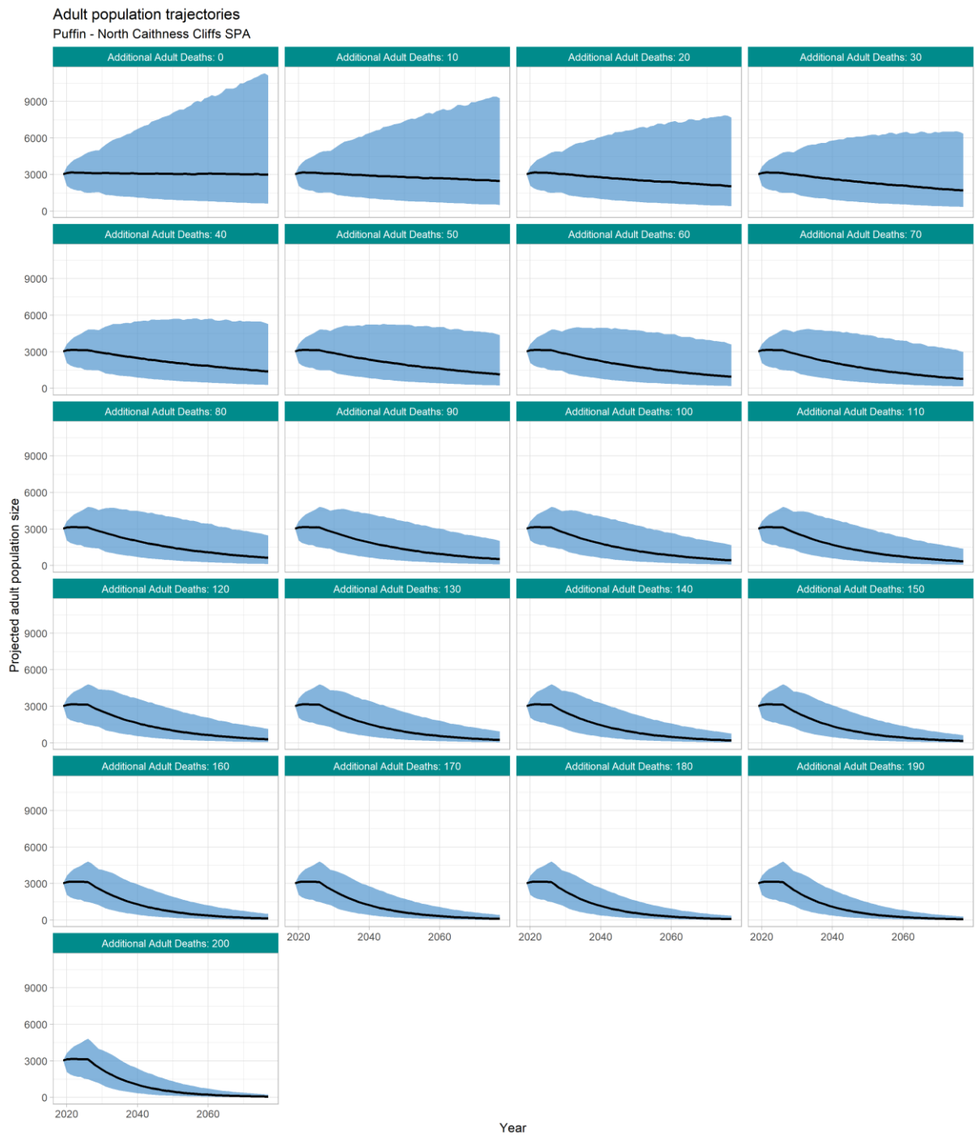

Figure 3.129: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median**

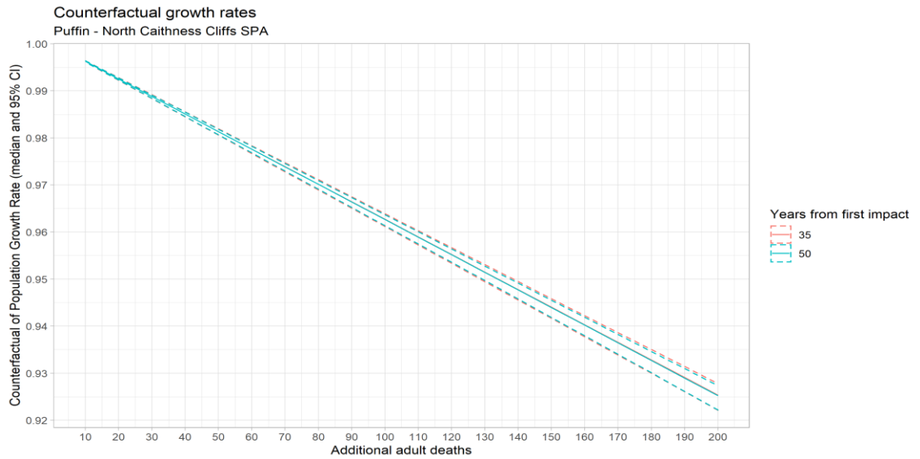

Figure 3.130: **Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

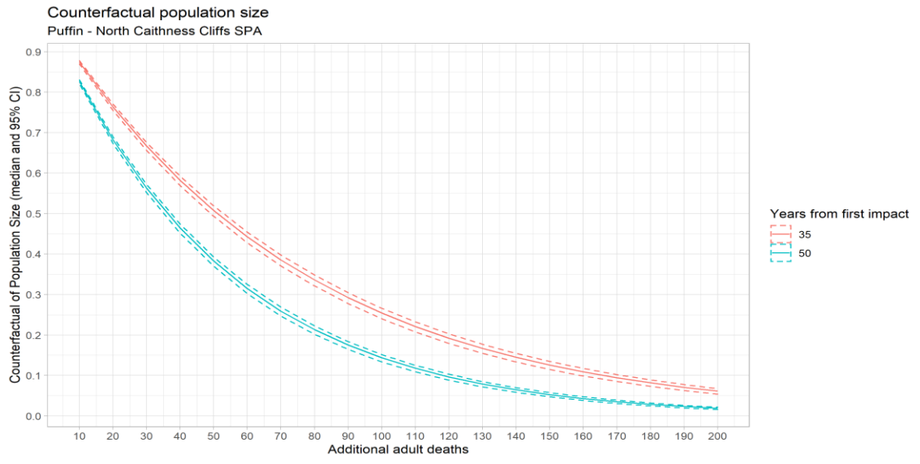

Figure 3.131: **The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

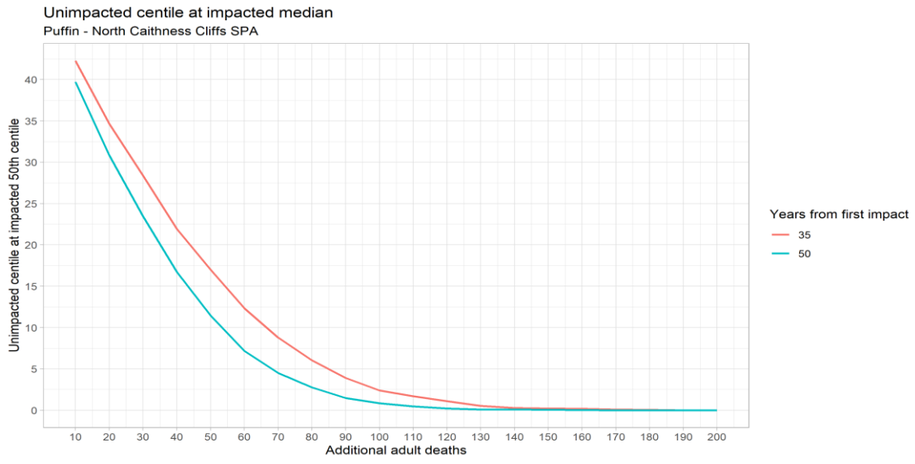

Figure 3.132: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)

Table 3.168: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.001	0.965	1.030			
2062	10	0.997	0.961	1.026	0.874	0.996	42.3
2062	20	0.993	0.957	1.022	0.764	0.993	34.7
2062	30	0.989	0.954	1.018	0.667	0.989	28.4
2062	40	0.986	0.950	1.015	0.582	0.985	21.9
2062	50	0.982	0.946	1.011	0.508	0.981	17.0
2062	60	0.978	0.942	1.007	0.443	0.978	12.4
2062	70	0.974	0.939	1.003	0.386	0.974	8.8
2062	80	0.971	0.935	1.000	0.336	0.970	6.0
2062	90	0.967	0.931	0.996	0.292	0.966	3.9
2062	100	0.963	0.927	0.992	0.254	0.963	2.4
2062	110	0.959	0.924	0.988	0.221	0.959	1.7
2062	120	0.956	0.920	0.985	0.192	0.955	1.1
2062	130	0.952	0.916	0.981	0.167	0.951	0.5
2062	140	0.948	0.913	0.977	0.145	0.948	0.3
2062	150	0.944	0.909	0.973	0.126	0.944	0.2
2062	160	0.941	0.905	0.970	0.109	0.940	0.2
2062	170	0.937	0.901	0.966	0.094	0.937	0.1
2062	180	0.933	0.897	0.962	0.082	0.933	0.1
2062	190	0.930	0.894	0.959	0.071	0.929	0.0
2062	200	0.926	0.890	0.955	0.061	0.925	0.0
2077	0	1.000	0.971	1.024			

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2077	10	0.996	0.967	1.021	0.826	0.996	39.7
2077	20	0.993	0.963	1.017	0.682	0.993	30.8
2077	30	0.989	0.960	1.013	0.563	0.989	23.5
2077	40	0.985	0.956	1.010	0.464	0.985	16.7
2077	50	0.981	0.952	1.006	0.383	0.981	11.4
2077	60	0.978	0.948	1.002	0.315	0.978	7.2
2077	70	0.974	0.945	0.998	0.259	0.974	4.5
2077	80	0.970	0.941	0.995	0.213	0.970	2.8
2077	90	0.967	0.937	0.991	0.175	0.966	1.5
2077	100	0.963	0.934	0.987	0.144	0.963	0.8
2077	110	0.959	0.930	0.983	0.118	0.959	0.5
2077	120	0.955	0.926	0.980	0.096	0.955	0.2
2077	130	0.952	0.922	0.976	0.079	0.951	0.1
2077	140	0.948	0.918	0.972	0.065	0.948	0.1
2077	150	0.944	0.914	0.968	0.053	0.944	0.0
2077	160	0.940	0.911	0.965	0.043	0.940	0.0
2077	170	0.937	0.907	0.961	0.035	0.936	0.0
2077	180	0.933	0.903	0.957	0.029	0.933	0.0
2077	190	0.929	0.899	0.953	0.023	0.929	0.0
2077	200	0.925	0.895	0.950	0.019	0.925	0.0

Table 3.169: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	3046.6	779.3	9437.3
North Sea Consented developer approach	0.07	8.2279	8.51	2689.7	684.8	8365.7
North Sea Consented Scoping Approach a	0.07	29.4800	30.67	1941.5	488.1	6123.1
North Sea Consented Scoping Approach b	0.07	49.1500	51.12	1435.5	356.1	4596.6

Table 3.170: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	2990.6	614.2	11127.0
North Sea Consented developer approach	0.07	8.2279	8.51	2504.9	511.3	9377.2
North Sea Consented Scoping Approach a	0.07	29.4800	30.67	1581.6	317.5	5997.6
North Sea Consented Scoping Approach b	0.07	49.1500	51.12	1029.0	202.3	3942.7

3.35 RAZORBILL - FORTH ISLANDS SPA

Table 3.171: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.001	0.965	1.030	1.000	0.971	1.024
North Sea Consented developer approach	0.07	8.2279	8.51	0.997	0.961	1.026	0.997	0.967	1.021
North Sea Consented Scoping Approach a	0.07	29.4800	30.67	0.988	0.952	1.017	0.988	0.958	1.012
North Sea Consented Scoping Approach b	0.07	49.1500	51.12	0.980	0.944	1.009	0.979	0.950	1.004

Table 3.172 Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.07	8.2279	8.51	0.883	0.838	0.997	0.997
North Sea Consented Scoping Approach a	0.07	29.4800	30.67	0.638	0.528	0.988	0.988
North Sea Consented Scoping Approach b	0.07	49.1500	51.12	0.471	0.344	0.979	0.979

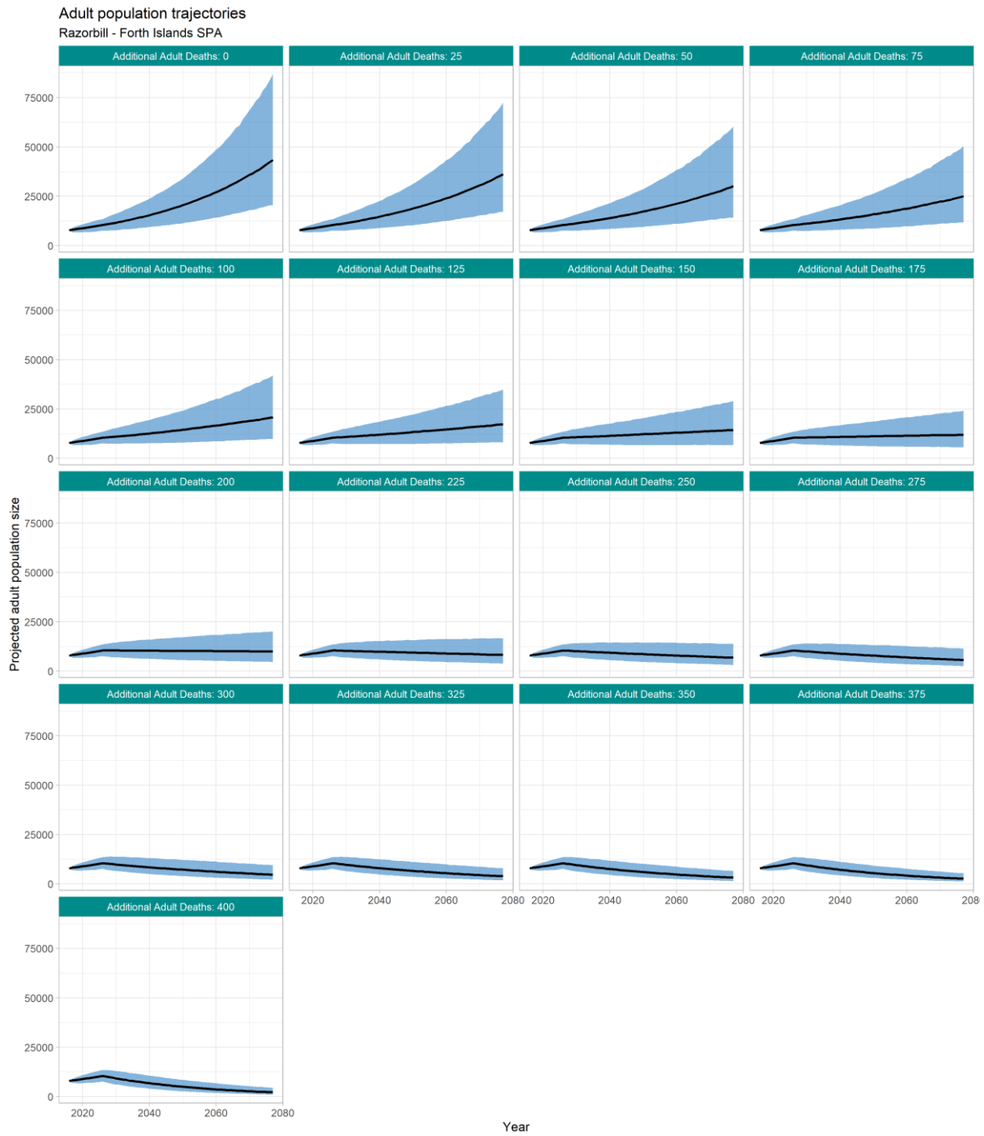

Figure 3.133: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median

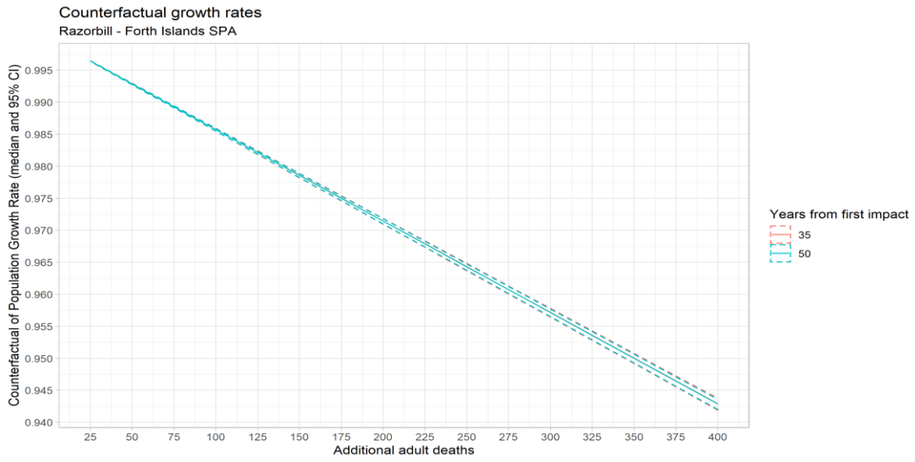

Figure 3.134: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)

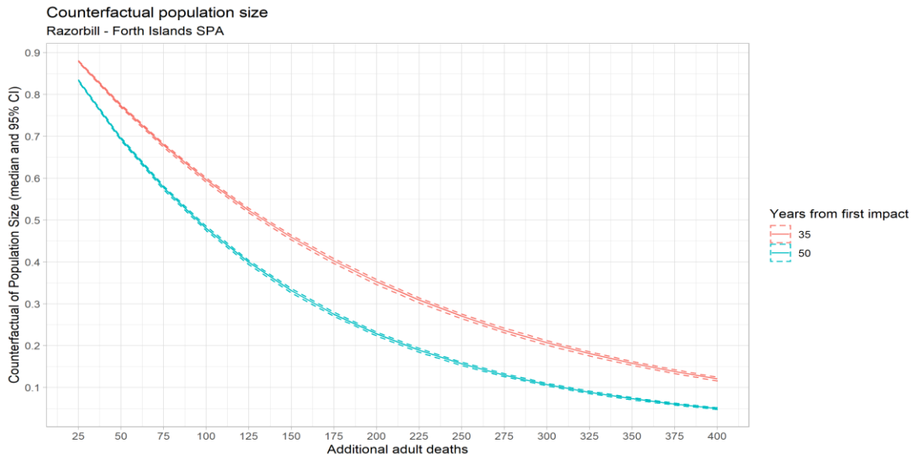

Figure 3.135: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)

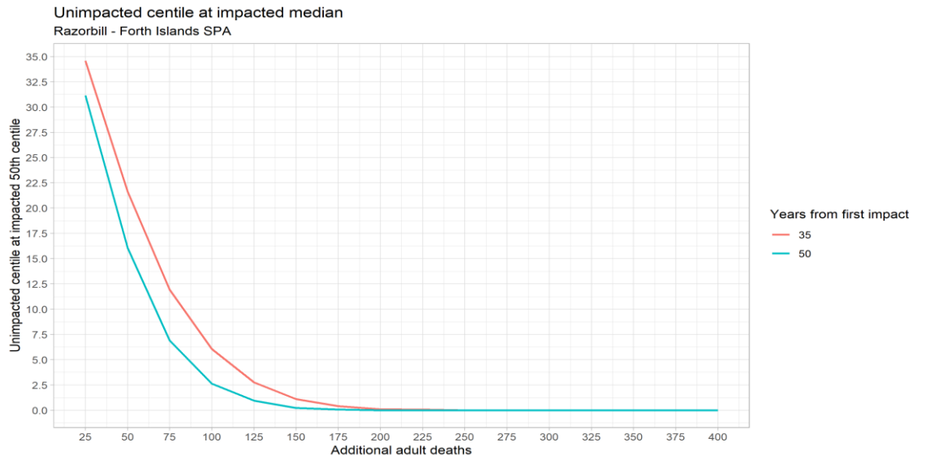

Figure 3.136: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)

Table 3.173: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.029	1.011	1.044			
2062	25	1.025	1.008	1.040	0.879	0.996	34.6
2062	50	1.021	1.004	1.036	0.773	0.993	21.6
2062	75	1.018	1.000	1.033	0.679	0.989	11.9
2062	100	1.014	0.997	1.029	0.596	0.986	6.1
2062	125	1.010	0.993	1.025	0.523	0.982	2.7
2062	150	1.007	0.989	1.022	0.459	0.979	1.1
2062	175	1.003	0.986	1.018	0.402	0.975	0.4
2062	200	0.999	0.982	1.014	0.353	0.971	0.1
2062	225	0.996	0.978	1.011	0.309	0.968	0.1
2062	250	0.992	0.975	1.007	0.270	0.964	0.0
2062	275	0.988	0.971	1.003	0.237	0.961	0.0
2062	300	0.985	0.967	1.000	0.207	0.957	0.0
2062	325	0.981	0.964	0.996	0.181	0.954	0.0
2062	350	0.977	0.960	0.992	0.158	0.950	0.0
2062	375	0.973	0.956	0.989	0.138	0.946	0.0
2062	400	0.970	0.953	0.985	0.120	0.943	0.0
2077	0	1.029	1.015	1.041			
2077	25	1.025	1.011	1.037	0.833	0.996	31.2
2077	50	1.021	1.007	1.034	0.694	0.993	16.1
2077	75	1.017	1.004	1.030	0.577	0.989	6.9
2077	100	1.014	1.000	1.026	0.480	0.986	2.6
2077	125	1.010	0.996	1.023	0.399	0.982	0.9
2077	150	1.006	0.993	1.019	0.331	0.979	0.2
2077	175	1.003	0.989	1.015	0.275	0.975	0.1
2077	200	0.999	0.985	1.012	0.228	0.971	0.0
2077	225	0.995	0.982	1.008	0.189	0.968	0.0
2077	250	0.992	0.978	1.004	0.157	0.964	0.0
2077	275	0.988	0.974	1.001	0.130	0.961	0.0
2077	300	0.984	0.971	0.997	0.107	0.957	0.0
2077	325	0.981	0.967	0.993	0.089	0.954	0.0
2077	350	0.977	0.963	0.990	0.073	0.950	0.0
2077	375	0.973	0.960	0.986	0.060	0.946	0.0
2077	400	0.970	0.956	0.982	0.050	0.943	0.0

Table 3.174: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	28645.4	14779.7	51527.5
Forth and Tay Consented developer approach	0.07	13.5600	11.86	26690.0	13766.0	48091.3
Forth and Tay Consented Scoping approach a	0.07	44.8206	40.11	22638.0	11653.5	40914.7
Forth and Tay Consented Scoping Approach b	0.07	77.2813	69.01	19079.8	9795.0	34601.6
North Sea Consented developer approach	0.07	17.2600	14.06	26247.6	13534.0	47304.9
North Sea Consented Scoping Approach a	0.07	49.3206	42.61	22189.2	11419.4	40114.5
North Sea Consented Scoping Approach b	0.07	90.5813	76.71	17962.9	9214.7	32604.6
(1) Project Alone: developer approach	0.07	3.5600	3.06	28122.1	14508.1	50610.2
(2) Project Alone: Scoping approach a	0.07	10.6206	9.51	27087.2	13972.1	48794.2
(2) Project Alone: Scoping approach b	0.07	18.9813	17.31	25906.1	13356.2	46707.7

Table 3.175: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	43438.5	20553.2	86926.1
Forth and Tay Consented developer approach	0.07	13.5600	11.86	39307.6	18579.4	78744.3
Forth and Tay Consented Scoping approach a	0.07	44.8206	40.11	31117.9	14659.2	62494.7
Forth and Tay Consented Scoping Approach b	0.07	77.2813	69.01	24404.4	11466.6	49167.5
North Sea Consented developer approach	0.07	17.2600	14.06	38390.4	18138.2	76913.2
North Sea Consented Scoping Approach a	0.07	49.3206	42.61	30250.2	14245.9	60755.7
North Sea Consented Scoping Approach b	0.07	90.5813	76.71	22412.5	10519.9	45154.5
(1) Project Alone: developer approach	0.07	3.5600	3.06	42323.6	20019.9	84717.7
(2) Project Alone: Scoping approach a	0.07	10.6206	9.51	40134.6	18974.2	80398.0
(2) Project Alone: Scoping approach b	0.07	18.9813	17.31	37682.3	17797.2	75500.2

Table 3.176: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.029	1.011	1.044	1.029	1.015	1.041
Forth and Tay Consented developer approach	0.07	13.5600	11.86	1.027	1.009	1.042	1.027	1.013	1.039
Forth and Tay Consented Scoping approach a	0.07	44.8206	40.11	1.022	1.005	1.037	1.022	1.008	1.034
Forth and Tay Consented Scoping Approach b	0.07	77.2813	69.01	1.017	1.000	1.032	1.017	1.003	1.030
North Sea Consented developer approach	0.07	17.2600	14.06	1.026	1.009	1.041	1.026	1.012	1.039
North Sea Consented Scoping Approach a	0.07	49.3206	42.61	1.021	1.004	1.037	1.021	1.007	1.034
North Sea Consented Scoping Approach b	0.07	90.5813	76.71	1.015	0.998	1.031	1.015	1.001	1.028
(1) Project Alone: developer approach	0.07	3.5600	3.06	1.028	1.011	1.043	1.028	1.014	1.041
(2) Project Alone: Scoping approach a	0.07	10.6206	9.51	1.027	1.010	1.042	1.027	1.013	1.039
(2) Project Alone: Scoping approach b	0.07	18.9813	17.31	1.026	1.009	1.041	1.026	1.012	1.038

Table 3.177: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
Forth and Tay Consented developer approach	0.07	13.5600	11.86	0.932	0.905	0.998	0.998
Forth and Tay Consented Scoping approach a	0.07	44.8206	40.11	0.790	0.716	0.993	0.993
Forth and Tay Consented Scoping Approach b	0.07	77.2813	69.01	0.666	0.562	0.989	0.989
North Sea Consented developer approach	0.07	17.2600	14.06	0.917	0.884	0.998	0.998
North Sea Consented Scoping Approach a	0.07	49.3206	42.61	0.775	0.696	0.993	0.993
North Sea Consented Scoping Approach b	0.07	90.5813	76.71	0.627	0.516	0.987	0.987
(1) Project Alone: developer approach	0.07	3.5600	3.06	0.982	0.974	0.999	0.999
(2) Project Alone: Scoping approach a	0.07	10.6206	9.51	0.946	0.924	0.998	0.998
(2) Project Alone: Scoping approach b	0.07	18.9813	17.31	0.905	0.868	0.997	0.997

3.36 RAZORBILL - ST ABB'S HEAD TO FAST CASTLE SPA

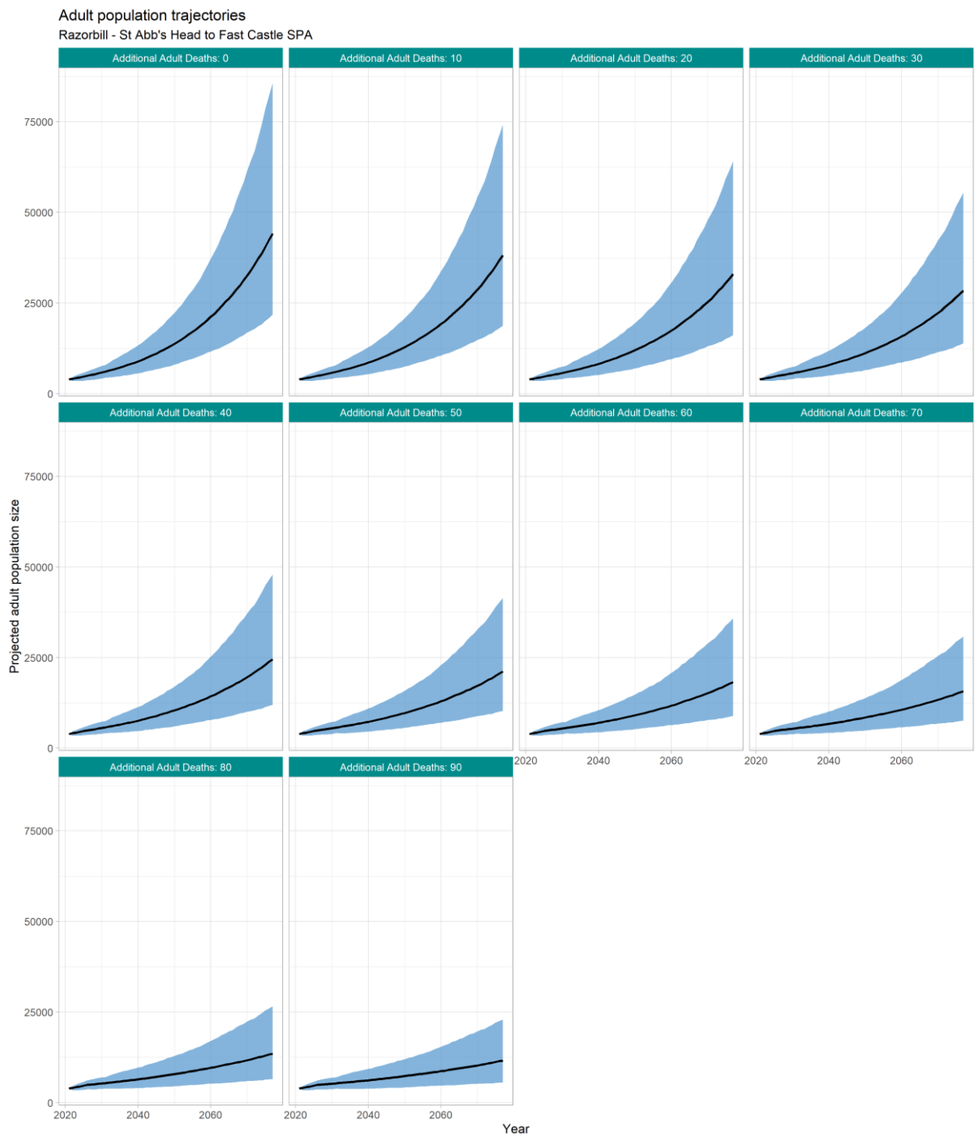

Figure 3.137 Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median

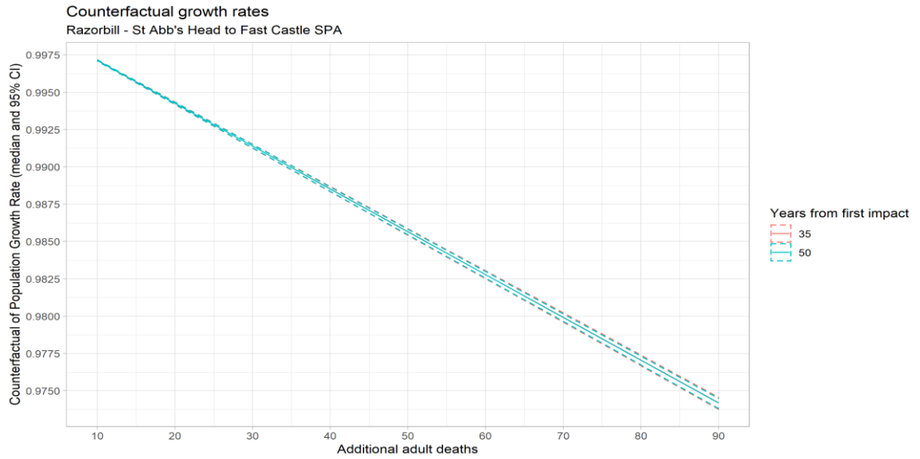

Figure 3.138: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)

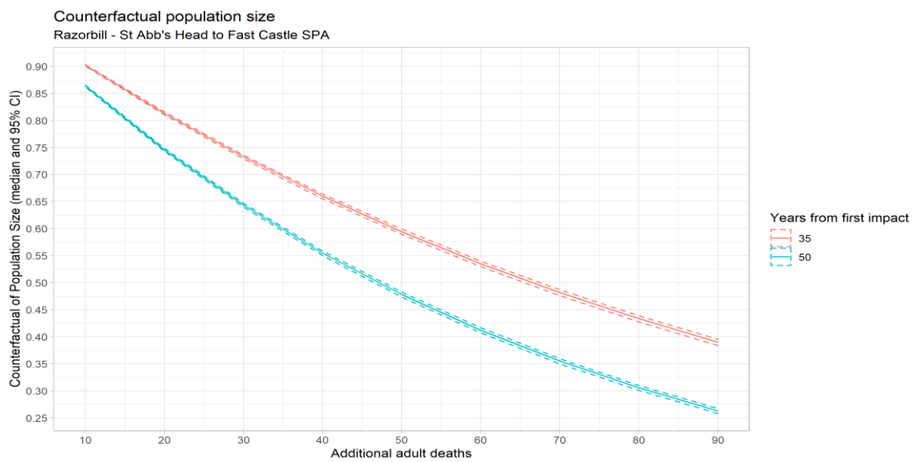

Figure 3.139: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)

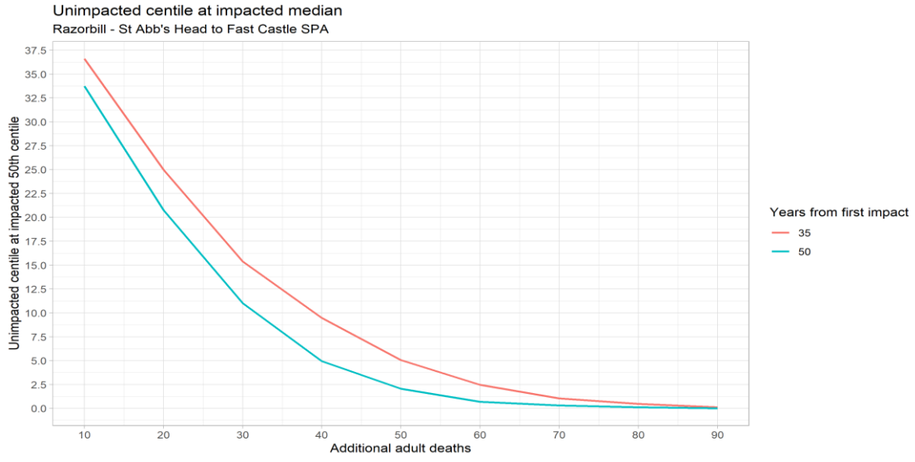

Figure 3.140: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)

Table 3.178: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.044	1.028	1.060			
2062	10	1.041	1.025	1.057	0.902	0.997	36.6
2062	20	1.038	1.022	1.054	0.813	0.994	25.0
2062	30	1.035	1.019	1.051	0.733	0.991	15.4
2062	40	1.032	1.016	1.048	0.660	0.989	9.5
2062	50	1.029	1.013	1.045	0.595	0.986	5.1
2062	60	1.026	1.010	1.042	0.535	0.983	2.5
2062	70	1.023	1.007	1.039	0.482	0.980	1.1
2062	80	1.020	1.004	1.036	0.434	0.977	0.5
2062	90	1.017	1.001	1.033	0.390	0.974	0.1
2077	0	1.044	1.030	1.057			
2077	10	1.041	1.027	1.054	0.864	0.997	33.7
2077	20	1.038	1.024	1.051	0.746	0.994	20.8
2077	30	1.035	1.021	1.048	0.643	0.991	11.0
2077	40	1.032	1.018	1.045	0.555	0.989	5.0
2077	50	1.029	1.015	1.042	0.479	0.986	2.1
2077	60	1.026	1.012	1.039	0.412	0.983	0.7
2077	70	1.023	1.009	1.036	0.355	0.980	0.3
2077	80	1.020	1.006	1.033	0.306	0.977	0.1
2077	90	1.017	1.003	1.030	0.263	0.974	0.0

Table 3.179: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	23084.9	12393.1	41062.5
Forth and Tay Consented developer approach	0.07	3.2199	3.05	22346.1	11988.6	39763.7
Forth and Tay Consented Scoping approach a	0.07	9.6885	9.70	20883.0	11187.6	37188.1
Forth and Tay Consented Scoping Approach b	0.07	17.3200	16.91	19326.2	10339.0	34450.5
North Sea Consented developer approach	0.07	4.9199	4.05	22023.3	11813.8	39196.1
North Sea Consented Scoping Approach a	0.07	11.7885	10.90	20511.5	10985.9	36537.2
North Sea Consented Scoping Approach b	0.07	23.5216	20.51	18327.1	9795.0	32687.8
(1) Project Alone: developer approach	0.07	2.6199	2.65	22466.1	12053.9	39974.7
(2) Project Alone: Scoping approach a	0.07	8.2885	8.70	21149.9	11333.2	37661.3
(2) Project Alone: Scoping approach b	0.07	14.4216	14.91	19839.8	10617.5	35353.8

Table 3.180: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	44161.1	21771.8	85830.6
Forth and Tay Consented developer approach	0.07	3.2199	3.05	42173.0	20774.4	81995.4
Forth and Tay Consented Scoping approach a	0.07	9.6885	9.70	38299.8	18847.9	74539.1
Forth and Tay Consented Scoping Approach b	0.07	17.3200	16.91	34334.3	16865.4	66874.1
North Sea Consented developer approach	0.07	4.9199	4.05	41312.3	20346.9	80346.7
North Sea Consented Scoping Approach a	0.07	11.7885	10.90	37348.8	18371.2	72708.8
North Sea Consented Scoping Approach b	0.07	23.5216	20.51	31847.6	15630.2	62115.2
(1) Project Alone: developer approach	0.07	2.6199	2.65	42492.3	20934.3	82611.9
(2) Project Alone: Scoping approach a	0.07	8.2885	8.70	38996.6	19195.4	75878.9
(2) Project Alone: Scoping approach b	0.07	14.4216	14.91	35627.4	17511.4	69354.8

Table 3.181: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR (2062) lower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.044	1.028	1.060	1.044	1.030	1.057
Forth and Tay Consented developer approach	0.07	3.2199	3.05	1.043	1.027	1.059	1.043	1.029	1.056
Forth and Tay Consented Scoping approach a	0.07	9.6885	9.70	1.041	1.025	1.057	1.041	1.027	1.054
Forth and Tay Consented Scoping Approach b	0.07	17.3200	16.91	1.039	1.023	1.055	1.039	1.025	1.052
North Sea Consented developer approach	0.07	4.9199	4.05	1.043	1.026	1.058	1.043	1.029	1.056
North Sea Consented Scoping Approach a	0.07	11.7885	10.90	1.041	1.024	1.056	1.041	1.027	1.054
North Sea Consented Scoping Approach b	0.07	23.5216	20.51	1.038	1.021	1.053	1.038	1.024	1.050
(1) Project Alone: developer approach	0.07	2.6199	2.65	1.044	1.027	1.059	1.043	1.029	1.056
(2) Project Alone: Scoping approach a	0.07	8.2885	8.70	1.042	1.025	1.057	1.042	1.028	1.054
(2) Project Alone: Scoping approach b	0.07	14.4216	14.91	1.040	1.023	1.055	1.040	1.026	1.053

Table 3.182: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
Forth and Tay Consented developer approach	0.07	3.2199	3.05	0.968	0.955	0.999	0.999
Forth and Tay Consented Scoping approach a	0.07	9.6885	9.70	0.904	0.867	0.997	0.997
Forth and Tay Consented Scoping Approach b	0.07	17.3200	16.91	0.837	0.777	0.995	0.995
North Sea Consented developer approach	0.07	4.9199	4.05	0.954	0.935	0.999	0.999
North Sea Consented Scoping Approach a	0.07	11.7885	10.90	0.889	0.846	0.997	0.997
North Sea Consented Scoping Approach b	0.07	23.5216	20.51	0.794	0.721	0.994	0.994
(1) Project Alone: developer approach	0.07	2.6199	2.65	0.973	0.962	0.999	0.999
(2) Project Alone: Scoping approach a	0.07	8.2885	8.70	0.916	0.883	0.998	0.998
(2) Project Alone: Scoping approach b	0.07	14.4216	14.91	0.859	0.807	0.996	0.996

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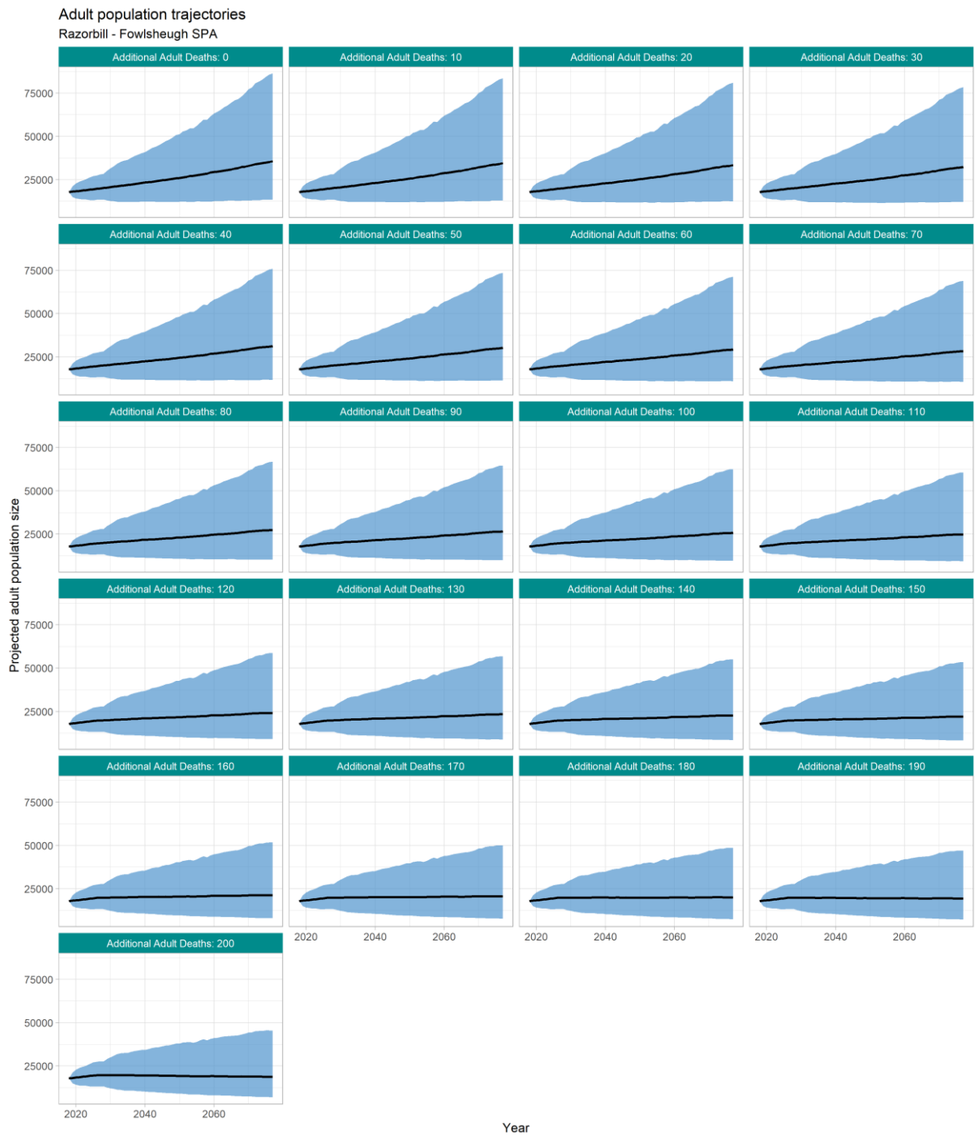

Figure 3.141: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median**

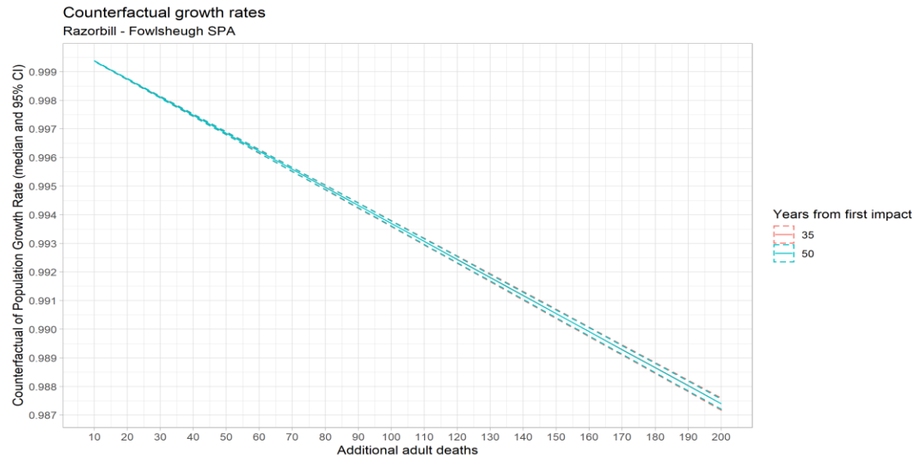

Figure 3.142: **Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

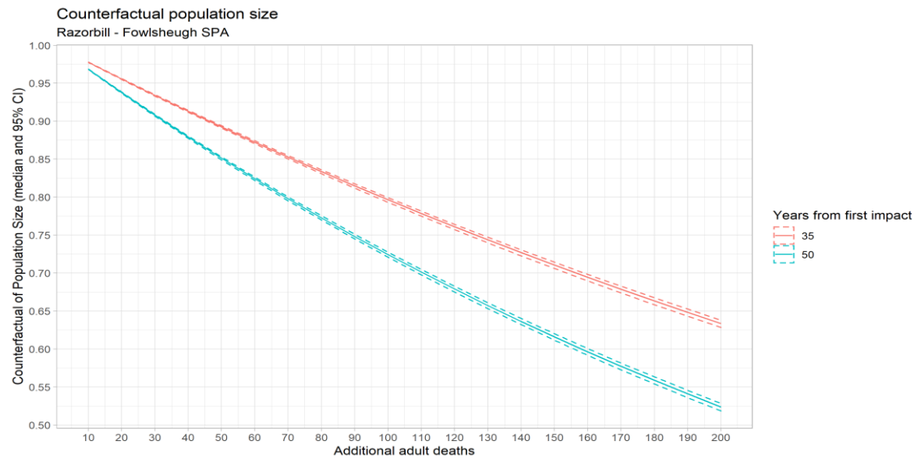

Figure 3.143: **The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

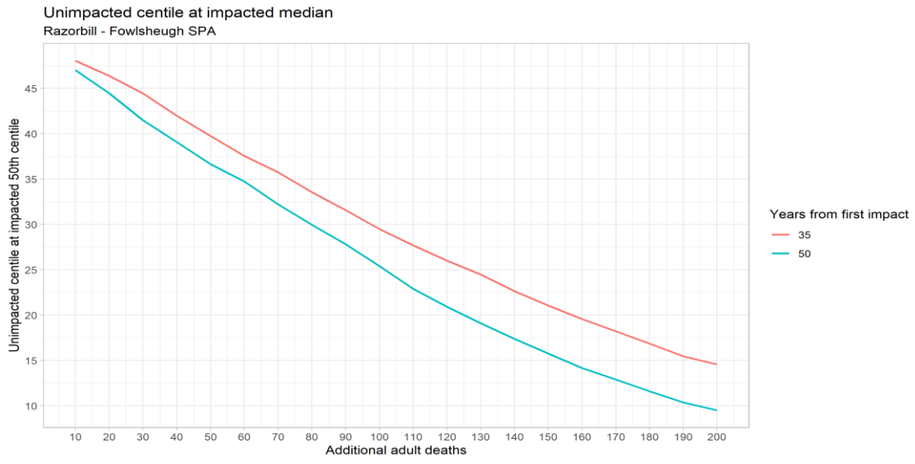

Figure 3.144: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)

Table 3.183: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.012	0.991	1.032			
2062	10	1.011	0.990	1.031	0.978	0.999	48.1
2062	20	1.011	0.990	1.030	0.956	0.999	46.4
2062	30	1.010	0.989	1.030	0.934	0.998	44.5
2062	40	1.009	0.988	1.029	0.913	0.997	42.0
2062	50	1.009	0.988	1.028	0.893	0.997	39.8
2062	60	1.008	0.987	1.028	0.873	0.996	37.6
2062	70	1.007	0.986	1.027	0.853	0.996	35.8
2062	80	1.007	0.986	1.026	0.834	0.995	33.6
2062	90	1.006	0.985	1.026	0.815	0.994	31.6
2062	100	1.005	0.985	1.025	0.797	0.994	29.5
2062	110	1.005	0.984	1.025	0.779	0.993	27.7
2062	120	1.004	0.983	1.024	0.761	0.992	26.0
2062	130	1.004	0.983	1.023	0.744	0.992	24.5
2062	140	1.003	0.982	1.023	0.727	0.991	22.7
2062	150	1.002	0.981	1.022	0.710	0.991	21.1
2062	160	1.002	0.981	1.021	0.694	0.990	19.6
2062	170	1.001	0.980	1.021	0.679	0.989	18.2
2062	180	1.000	0.980	1.020	0.663	0.989	16.9
2062	190	1.000	0.979	1.019	0.648	0.988	15.5
2062	200	0.999	0.978	1.019	0.634	0.987	14.6
2077	0	1.012	0.995	1.028			

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2077	10	1.011	0.994	1.027	0.968	0.999	47.0
2077	20	1.010	0.993	1.027	0.938	0.999	44.5
2077	30	1.010	0.993	1.026	0.908	0.998	41.5
2077	40	1.009	0.992	1.025	0.879	0.997	39.1
2077	50	1.009	0.991	1.025	0.851	0.997	36.6
2077	60	1.008	0.991	1.024	0.824	0.996	34.7
2077	70	1.007	0.990	1.024	0.798	0.996	32.2
2077	80	1.007	0.989	1.023	0.773	0.995	30.0
2077	90	1.006	0.989	1.022	0.748	0.994	27.8
2077	100	1.005	0.988	1.022	0.724	0.994	25.4
2077	110	1.005	0.988	1.021	0.701	0.993	22.9
2077	120	1.004	0.987	1.020	0.679	0.992	20.9
2077	130	1.003	0.986	1.020	0.657	0.992	19.1
2077	140	1.003	0.986	1.019	0.636	0.991	17.4
2077	150	1.002	0.985	1.018	0.616	0.991	15.8
2077	160	1.002	0.984	1.018	0.596	0.990	14.2
2077	170	1.001	0.984	1.017	0.577	0.989	12.9
2077	180	1.000	0.983	1.016	0.559	0.989	11.6
2077	190	1.000	0.982	1.016	0.541	0.988	10.4
2077	200	0.999	0.982	1.015	0.524	0.987	9.5

Table 3.184: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	29932.8	12537.7	65440.6
Forth and Tay Consented developer approach	0.07	15.6408	12.85	28834.2	12076.9	63085.9
Forth and Tay Consented Scoping approach a	0.07	50.9348	42.76	26485.3	11086.3	58012.8
Forth and Tay Consented Scoping Approach b	0.07	88.2500	73.38	24223.7	10137.0	53142.0
North Sea Consented developer approach	0.07	20.7408	15.75	28526.8	11947.0	62426.4
North Sea Consented Scoping Approach a	0.07	57.2348	46.46	26134.0	10937.6	57256.7
North Sea Consented Scoping Approach b	0.07	106.7000	84.18	23292.7	9743.0	51129.5
(1) Project Alone: developer approach	0.07	4.3408	3.25	29634.8	12412.3	64801.2
(2) Project Alone: Scoping approach a	0.07	12.7348	9.76	29058.8	12170.4	63568.1
(2) Project Alone: Scoping approach b	0.07	22.9538	17.38	28382.2	11887.1	62116.9

Table 3.185: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	35592.6	13292.0	86311.6
Forth and Tay Consented developer approach	0.07	15.6408	12.85	33759.4	12605.6	81899.6
Forth and Tay Consented Scoping approach a	0.07	50.9348	42.76	29913.7	11152.8	72630.0
Forth and Tay Consented Scoping Approach b	0.07	88.2500	73.38	26370.2	9829.6	64056.2
North Sea Consented developer approach	0.07	20.7408	15.75	33252.4	12412.7	80678.9
North Sea Consented Scoping Approach a	0.07	57.2348	46.46	29354.0	10941.4	71280.5
North Sea Consented Scoping Approach b	0.07	106.7000	84.18	24939.7	9290.4	60625.5
(1) Project Alone: developer approach	0.07	4.3408	3.25	35092.2	13105.4	85109.1
(2) Project Alone: Scoping approach a	0.07	12.7348	9.76	34132.1	12744.9	82797.8
(2) Project Alone: Scoping approach b	0.07	22.9538	17.38	33014.4	12322.6	80108.2

Table 3.186: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.012	0.991	1.032	1.012	0.995	1.028
Forth and Tay Consented developer approach	0.07	15.6408	12.85	1.011	0.990	1.031	1.011	0.994	1.027
Forth and Tay Consented Scoping approach a	0.07	50.9348	42.76	1.008	0.988	1.028	1.008	0.991	1.025
Forth and Tay Consented Scoping Approach b	0.07	88.2500	73.38	1.006	0.985	1.026	1.006	0.989	1.022
North Sea Consented developer approach	0.07	20.7408	15.75	1.011	0.990	1.030	1.010	0.993	1.027
North Sea Consented Scoping Approach a	0.07	57.2348	46.46	1.008	0.987	1.028	1.008	0.991	1.024
North Sea Consented Scoping Approach b	0.07	106.7000	84.18	1.005	0.984	1.025	1.005	0.988	1.021
(1) Project Alone: developer approach	0.07	4.3408	3.25	1.012	0.991	1.031	1.011	0.994	1.028
(2) Project Alone: Scoping approach a	0.07	12.7348	9.76	1.011	0.990	1.031	1.011	0.994	1.027
(2) Project Alone: Scoping approach b	0.07	22.9538	17.38	1.010	0.989	1.030	1.010	0.993	1.027

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Table 3.187: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
Forth and Tay Consented developer approach	0.07	15.6408	12.85	0.963	0.949	0.999	0.999
Forth and Tay Consented Scoping approach a	0.07	50.9348	42.76	0.885	0.841	0.997	0.997
Forth and Tay Consented Scoping Approach b	0.07	88.2500	73.38	0.809	0.741	0.994	0.994
North Sea Consented developer approach	0.07	20.7408	15.75	0.953	0.934	0.999	0.999
North Sea Consented Scoping Approach a	0.07	57.2348	46.46	0.873	0.825	0.996	0.996
North Sea Consented Scoping Approach b	0.07	106.7000	84.18	0.778	0.701	0.993	0.993
(1) Project Alone: developer approach	0.07	4.3408	3.25	0.990	0.986	1.000	1.000
(2) Project Alone: Scoping approach a	0.07	12.7348	9.76	0.971	0.959	0.999	0.999
(2) Project Alone: Scoping approach b	0.07	22.9538	17.38	0.948	0.928	0.999	0.999

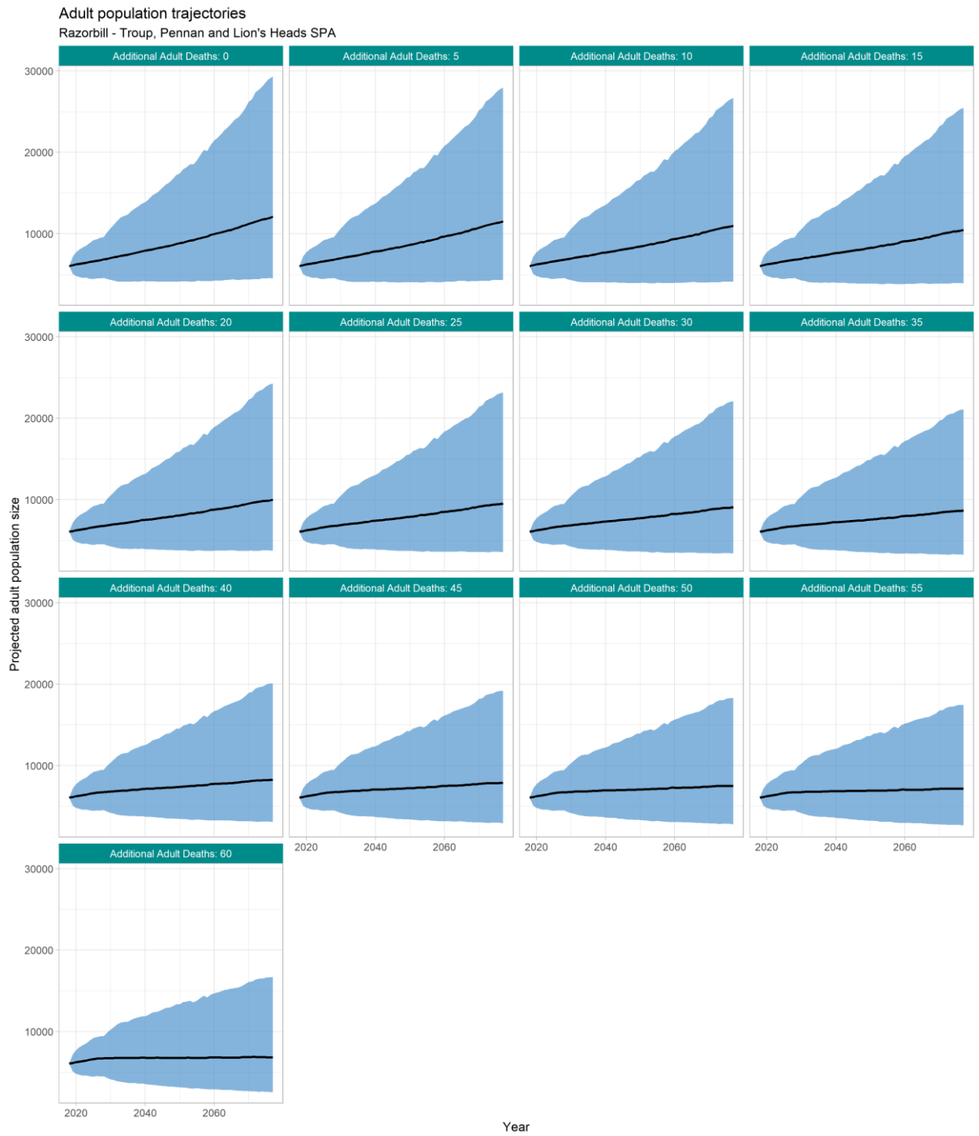

Figure 3.145: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median

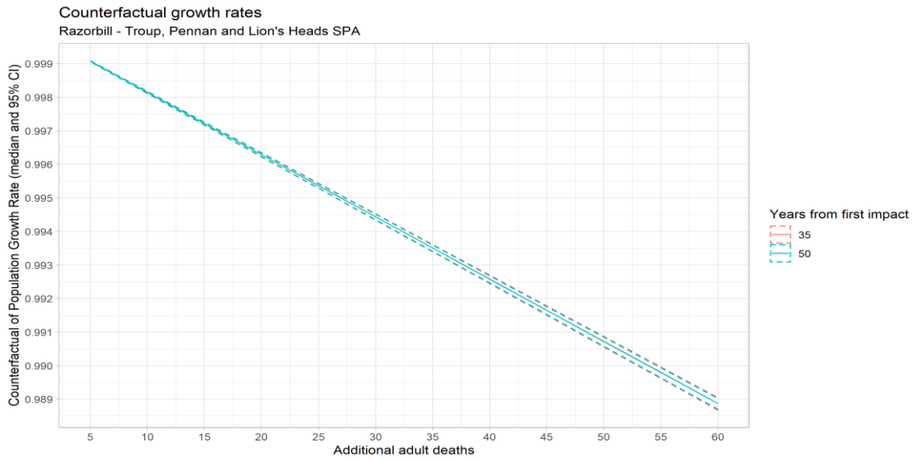

Figure 3.146: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)

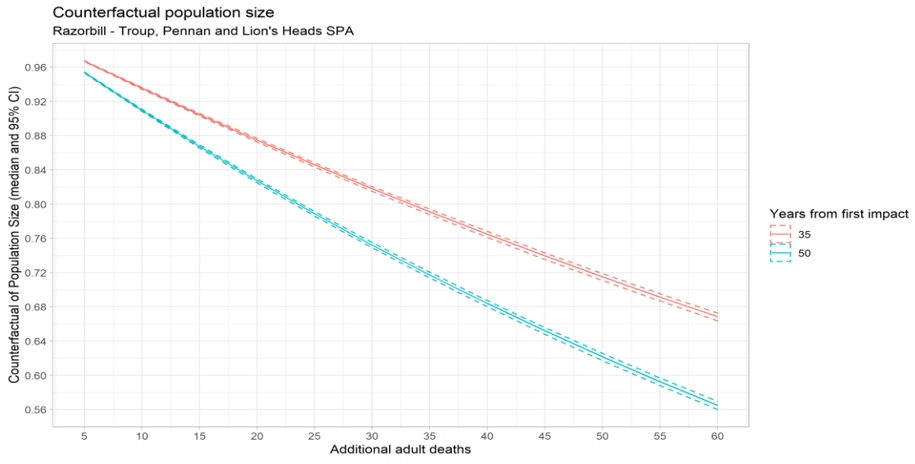

Figure 3.147: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)

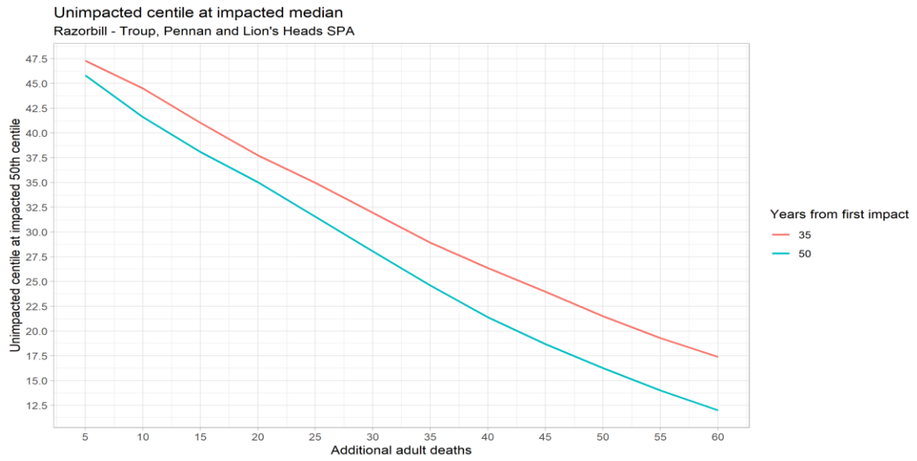

Figure 3.148: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)

Table 3.188: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.012	0.991	1.032			
2062	5	1.011	0.990	1.031	0.967	0.999	47.3
2062	10	1.010	0.989	1.030	0.935	0.998	44.5
2062	15	1.009	0.988	1.029	0.905	0.997	41.0
2062	20	1.008	0.987	1.028	0.875	0.996	37.7
2062	25	1.007	0.986	1.027	0.846	0.995	35.0
2062	30	1.006	0.985	1.026	0.818	0.994	32.0
2062	35	1.005	0.984	1.025	0.791	0.994	28.9
2062	40	1.004	0.983	1.024	0.765	0.993	26.4
2062	45	1.003	0.983	1.023	0.740	0.992	24.0
2062	50	1.002	0.982	1.022	0.715	0.991	21.5
2062	55	1.002	0.981	1.021	0.691	0.990	19.3
2062	60	1.001	0.980	1.020	0.668	0.989	17.4
2077	0	1.012	0.995	1.028			
2077	5	1.011	0.994	1.027	0.954	0.999	45.8
2077	10	1.010	0.993	1.026	0.910	0.998	41.6
2077	15	1.009	0.992	1.025	0.868	0.997	38.1
2077	20	1.008	0.991	1.024	0.827	0.996	35.0
2077	25	1.007	0.990	1.023	0.789	0.995	31.6
2077	30	1.006	0.989	1.022	0.752	0.994	28.0
2077	35	1.005	0.988	1.021	0.717	0.994	24.6
2077	40	1.004	0.987	1.020	0.684	0.993	21.4
2077	45	1.003	0.986	1.020	0.652	0.992	18.7
2077	50	1.002	0.985	1.019	0.622	0.991	16.3
2077	55	1.001	0.984	1.018	0.593	0.990	14.0
2077	60	1.000	0.983	1.017	0.565	0.989	12.0

Table 3.189: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	10167.5	4257.9	22231.3
North Sea Consented developer approach	0.07	4.0518	2.50	9909.2	4149.7	21679.1
North Sea Consented Scoping Approach a	0.07	6.0570	3.95	9777.3	4093.9	21394.6
North Sea Consented Scoping Approach b	0.07	15.6450	9.79	9201.3	3850.5	20160.2
(1) Project Alone: developer approach	0.07	0.7518	0.52	10117.6	4236.6	22125.3
(2) Project Alone: Scoping approach a	0.07	1.4570	1.05	10069.1	4216.6	22021.1
(2) Project Alone: Scoping approach b	0.07	3.2450	2.29	9950.7	4166.4	21768.2

Table 3.190: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	12090.4	4514.7	29320.5
North Sea Consented developer approach	0.07	4.0518	2.50	11658.7	4352.4	28283.6
North Sea Consented Scoping Approach a	0.07	6.0570	3.95	11439.8	4269.2	27756.3
North Sea Consented Scoping Approach b	0.07	15.6450	9.79	10499.5	3913.4	25496.2
(1) Project Alone: developer approach	0.07	0.7518	0.52	12006.0	4482.8	29117.2
(2) Project Alone: Scoping approach a	0.07	1.4570	1.05	11925.4	4452.4	28921.3
(2) Project Alone: Scoping approach b	0.07	3.2450	2.29	11726.9	4378.3	28448.8

Table 3.191: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.012	0.991	1.032	1.012	0.995	1.028
North Sea Consented developer approach	0.07	4.0518	2.50	1.011	0.990	1.031	1.011	0.994	1.027
North Sea Consented Scoping Approach a	0.07	6.0570	3.95	1.011	0.990	1.030	1.011	0.993	1.027
North Sea Consented Scoping Approach b	0.07	15.6450	9.79	1.009	0.988	1.029	1.009	0.992	1.025
(1) Project Alone: developer approach	0.07	0.7518	0.52	1.012	0.991	1.031	1.012	0.994	1.028
(2) Project Alone: Scoping approach a	0.07	1.4570	1.05	1.012	0.991	1.031	1.011	0.994	1.028
(2) Project Alone: Scoping approach b	0.07	3.2450	2.29	1.011	0.990	1.031	1.011	0.994	1.027

3.39 RAZORBILL - FARNE ISLANDS SPA

Table 3.192: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.07	4.0518	2.50	0.975	0.964	0.999	0.999
North Sea Consented Scoping Approach a	0.07	6.0570	3.95	0.962	0.946	0.999	0.999
North Sea Consented Scoping Approach b	0.07	15.6450	9.79	0.905	0.868	0.997	0.997
(1) Project Alone: developer approach	0.07	0.7518	0.52	0.995	0.993	1.000	1.000
(2) Project Alone: Scoping approach a	0.07	1.4570	1.05	0.990	0.986	1.000	1.000
(2) Project Alone: Scoping approach b	0.07	3.2450	2.29	0.979	0.970	0.999	0.999

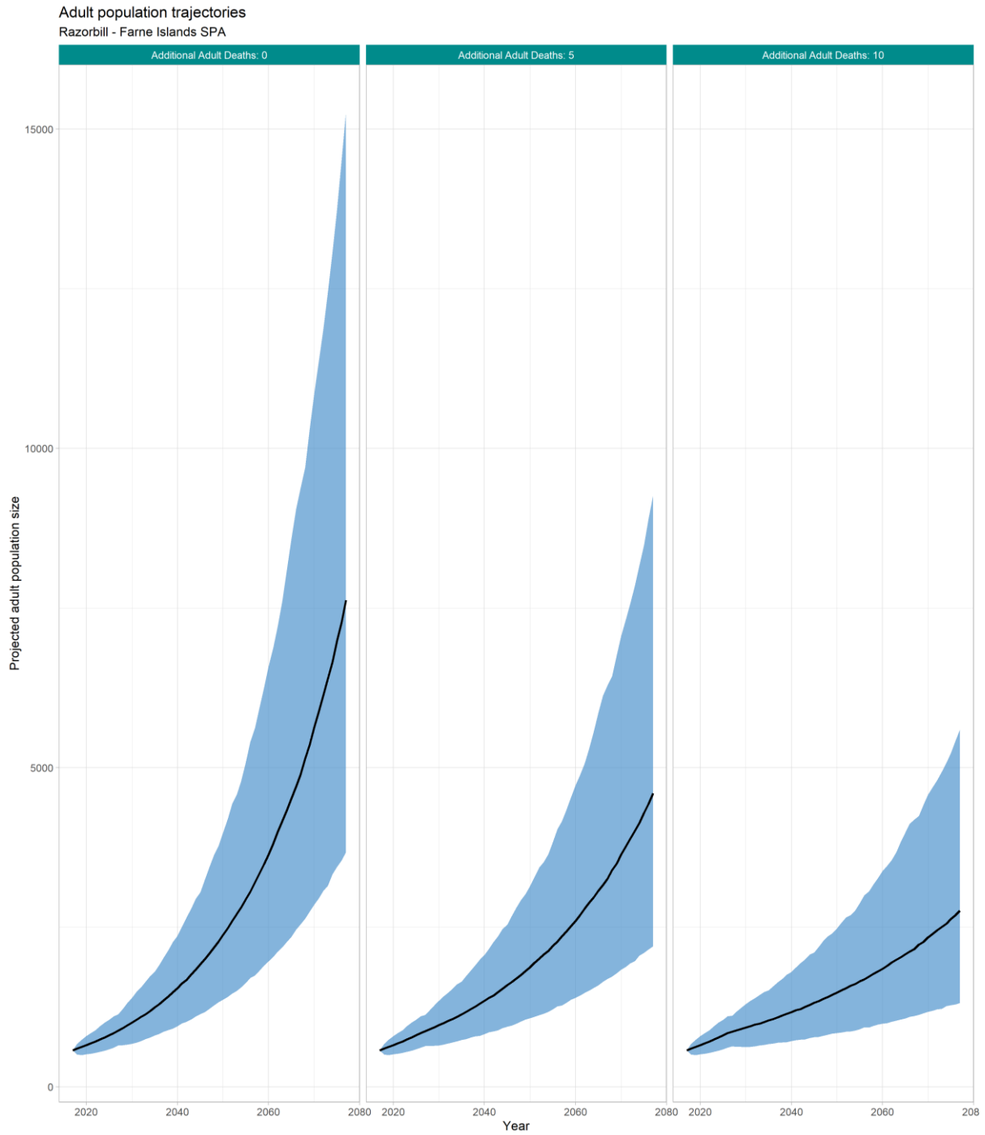

Figure 3.149: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median

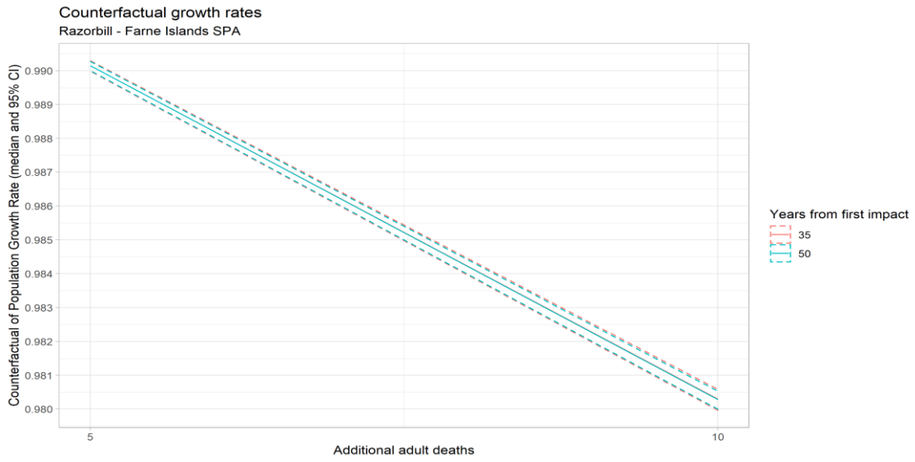

Figure 3.150: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)

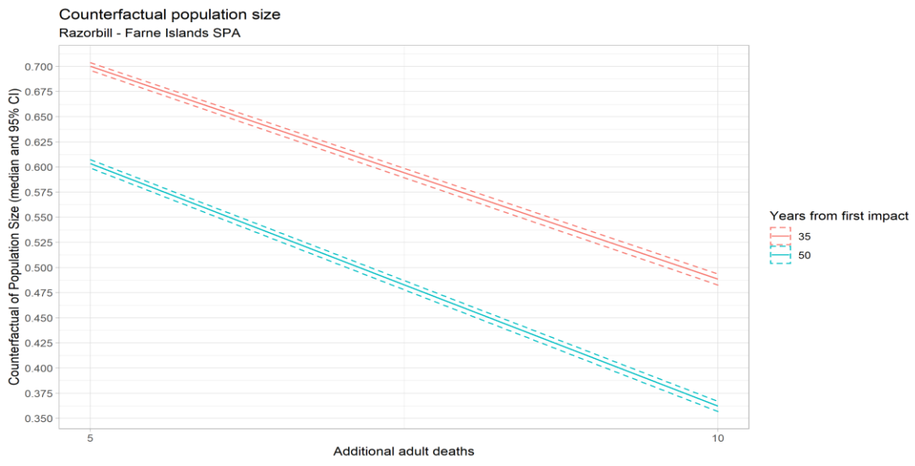

Figure 3.151: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)

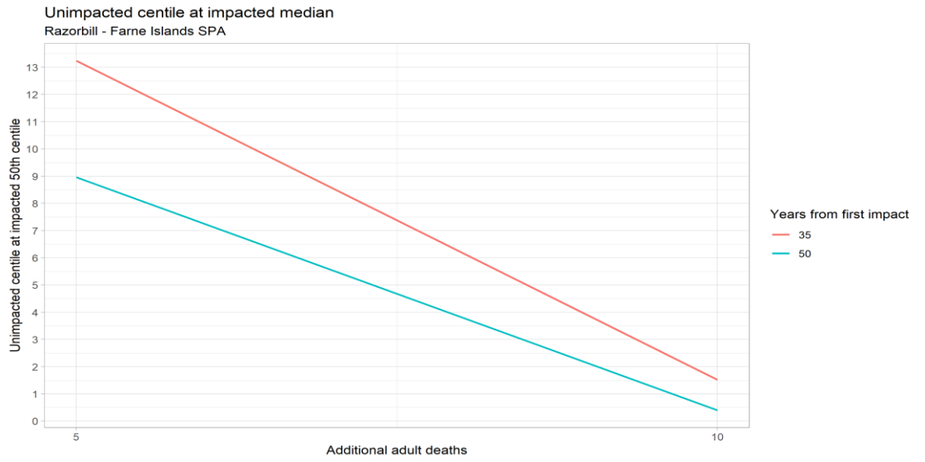

Figure 3.152: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)

Table 3.193: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.044	1.028	1.060			
2062	5	1.034	1.017	1.049	0.700	0.99	13.2
2062	10	1.024	1.007	1.039	0.488	0.98	1.5
2077	0	1.044	1.030	1.057			
2077	5	1.034	1.020	1.047	0.603	0.99	9.0
2077	10	1.024	1.010	1.036	0.362	0.98	0.4

Table 3.194: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	3988.2	2118.4	7206.1
North Sea Consented developer approach	0.07	0.4972	0.20	3884.0	2063.3	7021.0
North Sea Consented Scoping Approach a	0.07	0.6200	0.50	3829.2	2033.2	6926.0
North Sea Consented Scoping Approach b	0.07	1.7600	1.20	3578.0	1899.3	6473.5
(1) Project Alone: developer approach	0.07	0.0972	0.08	3963.1	2105.3	7161.8
(2) Project Alone: Scoping approach a	0.07	0.2195	0.20	3928.2	2085.9	7100.3
(2) Project Alone: Scoping approach b	0.07	0.4600	0.40	3866.6	2052.7	6989.2

Table 3.195: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	7621.9	3673.4	15272.0
North Sea Consented developer approach	0.07	0.4972	0.20	7346.2	3537.0	14719.8
North Sea Consented Scoping Approach a	0.07	0.6200	0.50	7198.0	3467.6	14428.6
North Sea Consented Scoping Approach b	0.07	1.7600	1.20	6540.3	3146.6	13125.6
(1) Project Alone: developer approach	0.07	0.0972	0.08	7553.4	3640.2	15134.0
(2) Project Alone: Scoping approach a	0.07	0.2195	0.20	7461.8	3594.5	14955.8
(2) Project Alone: Scoping approach b	0.07	0.4600	0.40	7295.4	3515.2	14627.4

Table 3.196: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.044	1.028	1.060	1.044	1.030	1.057
North Sea Consented developer approach	0.07	0.4972	0.20	1.043	1.027	1.059	1.043	1.030	1.056
North Sea Consented Scoping Approach a	0.07	0.6200	0.50	1.043	1.027	1.058	1.043	1.029	1.056
North Sea Consented Scoping Approach b	0.07	1.7600	1.20	1.041	1.025	1.056	1.041	1.027	1.054
(1) Project Alone: developer approach	0.07	0.0972	0.08	1.044	1.028	1.059	1.044	1.030	1.057
(2) Project Alone: Scoping approach a	0.07	0.2195	0.20	1.044	1.027	1.059	1.044	1.030	1.057
(2) Project Alone: Scoping approach b	0.07	0.4600	0.40	1.043	1.027	1.059	1.043	1.030	1.056

Table 3.197: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.07	0.4972	0.20	0.974	0.964	0.999	0.999
North Sea Consented Scoping Approach a	0.07	0.6200	0.50	0.960	0.944	0.999	0.999
North Sea Consented Scoping Approach b	0.07	1.7600	1.20	0.897	0.858	0.997	0.997
(1) Project Alone: developer approach	0.07	0.0972	0.08	0.994	0.991	1.000	1.000
(2) Project Alone: Scoping approach a	0.07	0.2195	0.20	0.985	0.979	1.000	1.000
(2) Project Alone: Scoping approach b	0.07	0.4600	0.40	0.970	0.957	0.999	0.999

3.40 RAZORBILL - EAST CAITHNESS CLIFFS SPA

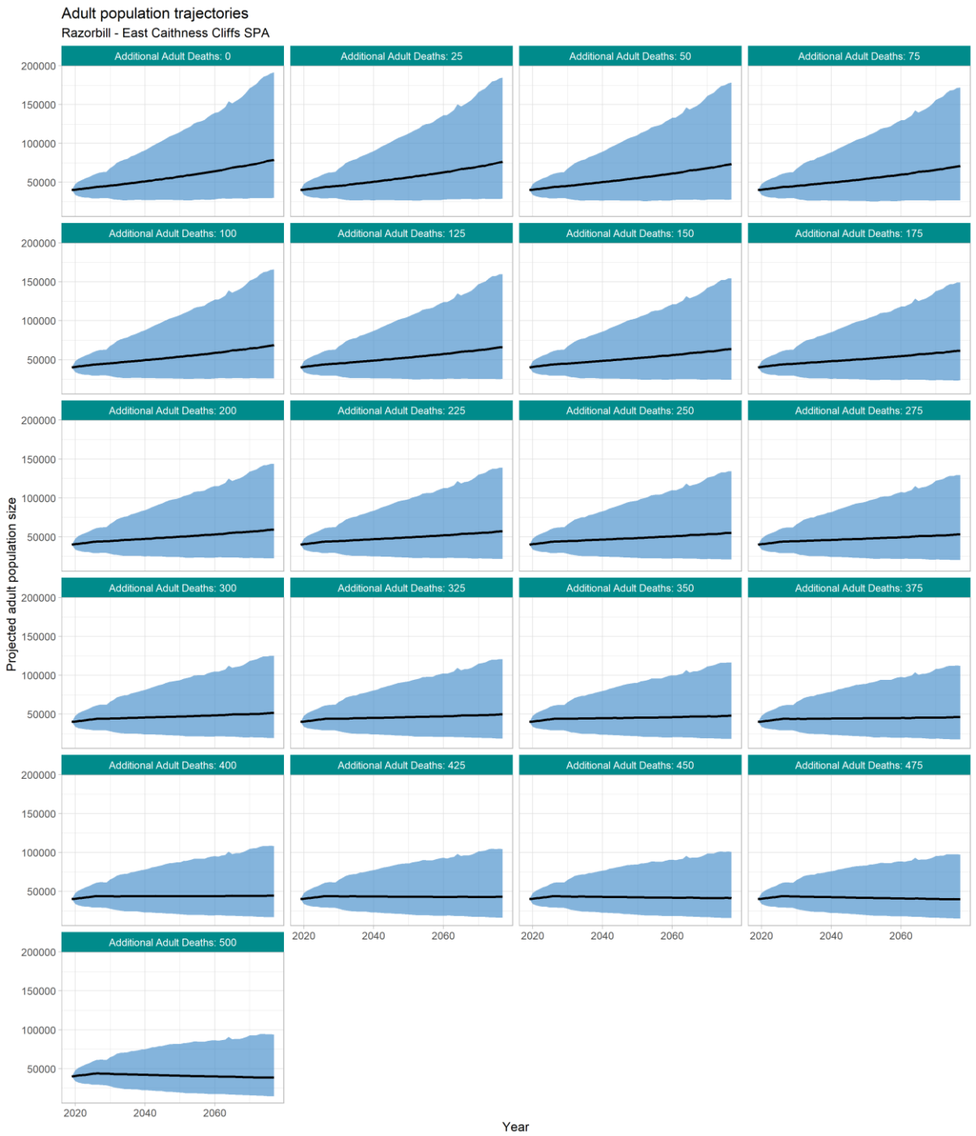

Figure 3.153: Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median

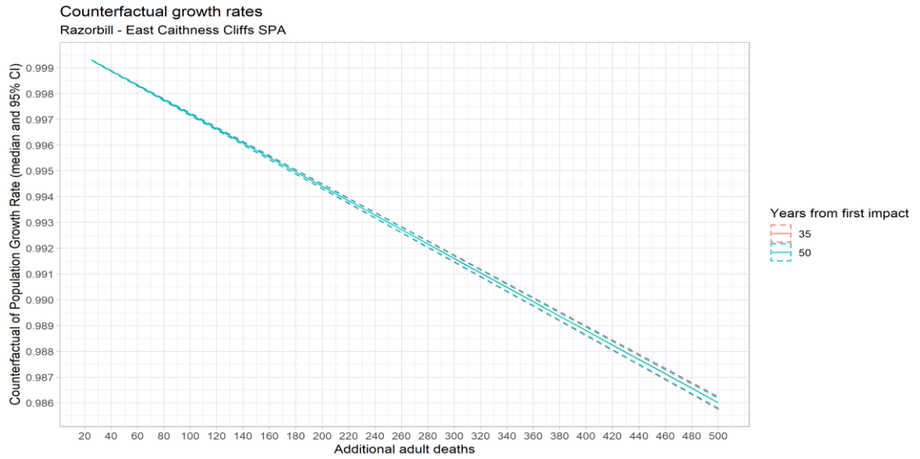

Figure 3.154: Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)

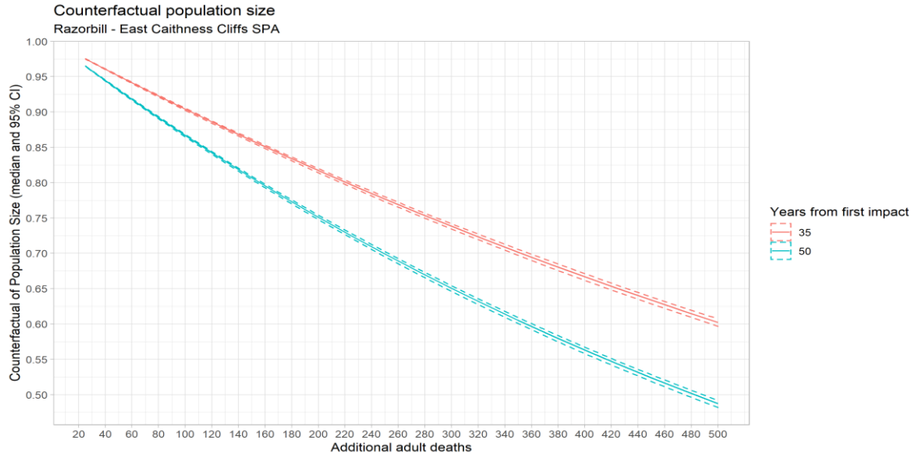

Figure 3.155: The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)

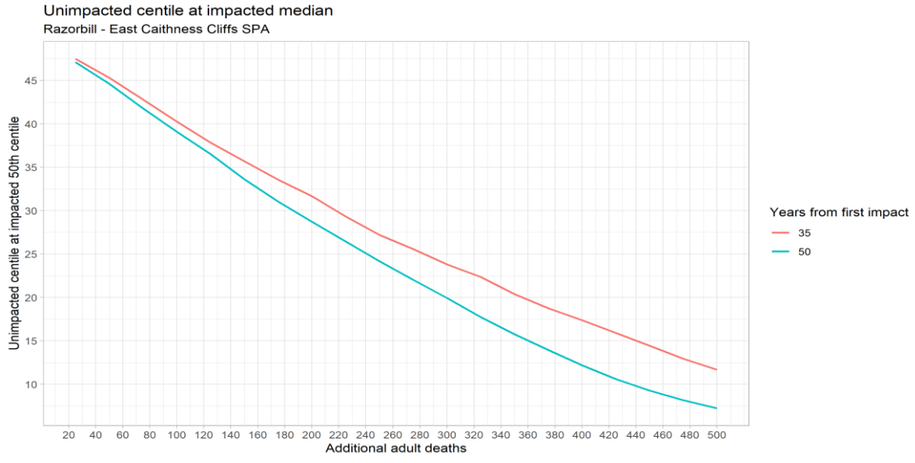

Figure 3.156: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)

Table 3.198: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.012	0.991	1.031			
2062	25	1.011	0.990	1.030	0.975	0.999	47.5
2062	50	1.010	0.990	1.030	0.951	0.999	45.3
2062	75	1.010	0.989	1.029	0.927	0.998	42.8
2062	100	1.009	0.988	1.028	0.904	0.997	40.3
2062	125	1.008	0.987	1.028	0.881	0.997	37.8
2062	150	1.008	0.987	1.027	0.859	0.996	35.7
2062	175	1.007	0.986	1.026	0.838	0.995	33.6
2062	200	1.006	0.985	1.025	0.817	0.994	31.7
2062	225	1.005	0.985	1.025	0.797	0.994	29.3
2062	250	1.005	0.984	1.024	0.777	0.993	27.2
2062	275	1.004	0.983	1.023	0.757	0.992	25.6
2062	300	1.003	0.983	1.023	0.738	0.992	23.8
2062	325	1.003	0.982	1.022	0.720	0.991	22.4
2062	350	1.002	0.981	1.021	0.702	0.990	20.4
2062	375	1.001	0.980	1.020	0.684	0.990	18.8
2062	400	1.000	0.980	1.020	0.667	0.989	17.4
2062	425	1.000	0.979	1.019	0.650	0.988	15.9
2062	450	0.999	0.978	1.018	0.634	0.987	14.4
2062	475	0.998	0.978	1.018	0.618	0.987	12.9
2062	500	0.998	0.977	1.017	0.602	0.986	11.7
2077	0	1.012	0.994	1.028			

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2077	25	1.011	0.994	1.028	0.965	0.999	47.1
2077	50	1.010	0.993	1.027	0.931	0.999	44.6
2077	75	1.010	0.992	1.026	0.898	0.998	41.8
2077	100	1.009	0.992	1.025	0.867	0.997	39.1
2077	125	1.008	0.991	1.025	0.836	0.997	36.5
2077	150	1.008	0.990	1.024	0.807	0.996	33.6
2077	175	1.007	0.989	1.023	0.778	0.995	31.0
2077	200	1.006	0.989	1.023	0.751	0.994	28.7
2077	225	1.005	0.988	1.022	0.725	0.994	26.5
2077	250	1.005	0.987	1.021	0.699	0.993	24.2
2077	275	1.004	0.987	1.020	0.674	0.992	22.0
2077	300	1.003	0.986	1.020	0.650	0.992	19.9
2077	325	1.003	0.985	1.019	0.627	0.991	17.7
2077	350	1.002	0.984	1.018	0.605	0.990	15.8
2077	375	1.001	0.984	1.018	0.584	0.990	14.0
2077	400	1.000	0.983	1.017	0.563	0.989	12.2
2077	425	1.000	0.982	1.016	0.543	0.988	10.6
2077	450	0.999	0.982	1.015	0.524	0.987	9.3
2077	475	0.998	0.981	1.015	0.505	0.987	8.2
2077	500	0.998	0.980	1.014	0.487	0.986	7.2

Table 3.199 **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.00	0.00	65650.3	29085.3	143345.2
North Sea Consented developer approach	0.07	48.02	32.17	62627.3	27722.8	136825.0
North Sea Consented Scoping Approach a	0.07	113.00	80.21	58616.9	25919.5	128165.6
North Sea Consented Scoping Approach b	0.07	228.38	157.57	52315.5	23087.1	114546.9
(1) Project Alone: developer approach	0.07	3.92	2.57	65399.9	28972.4	142806.5
(2) Project Alone: Scoping approach a	0.07	5.30	3.51	65310.8	28932.2	142613.6
(2) Project Alone: Scoping approach b	0.07	14.78	9.77	64709.1	28660.6	141316.8

Table 3.200 **Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes**

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.00	0.00	78982.0	30251.1	191307.2
North Sea Consented developer approach	0.07	48.02	32.17	73891.2	28278.6	179052.4
North Sea Consented Scoping Approach a	0.07	113.00	80.21	67312.2	25731.0	163149.7
North Sea Consented Scoping Approach b	0.07	228.38	157.57	57295.9	21867.0	139059.0
(1) Project Alone: developer approach	0.07	3.92	2.57	78558.2	30086.2	190284.5
(2) Project Alone: Scoping approach a	0.07	5.30	3.51	78407.6	30027.8	189920.4
(2) Project Alone: Scoping approach b	0.07	14.78	9.77	77391.5	29632.8	187467.8

Table 3.201: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds.

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.00	0.00	1.012	0.991	1.031	1.012	0.994	1.028
North Sea Consented developer approach	0.07	48.02	32.17	1.010	0.990	1.030	1.010	0.993	1.027
North Sea Consented Scoping Approach a	0.07	113.00	80.21	1.009	0.988	1.028	1.009	0.991	1.025
North Sea Consented Scoping Approach b	0.07	228.38	157.57	1.005	0.985	1.025	1.005	0.988	1.022
(1) Project Alone: developer approach	0.07	3.92	2.57	1.012	0.991	1.031	1.012	0.994	1.028
(2) Project Alone: Scoping approach a	0.07	5.30	3.51	1.012	0.991	1.031	1.012	0.994	1.028
(2) Project Alone: Scoping approach b	0.07	14.78	9.77	1.011	0.991	1.031	1.011	0.994	1.028

Table 3.202: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.07	48.02	32.17	0.954	0.935	0.999	0.999
North Sea Consented Scoping Approach a	0.07	113.00	80.21	0.893	0.852	0.997	0.997
North Sea Consented Scoping Approach b	0.07	228.38	157.57	0.797	0.725	0.994	0.994
(1) Project Alone: developer approach	0.07	3.92	2.57	0.996	0.995	1.000	1.000
(2) Project Alone: Scoping approach a	0.07	5.30	3.51	0.995	0.993	1.000	1.000
(2) Project Alone: Scoping approach b	0.07	14.78	9.77	0.986	0.980	1.000	1.000

3.41 RAZORBILL - FLAMBOROUGH AND FILEY COAST SPA

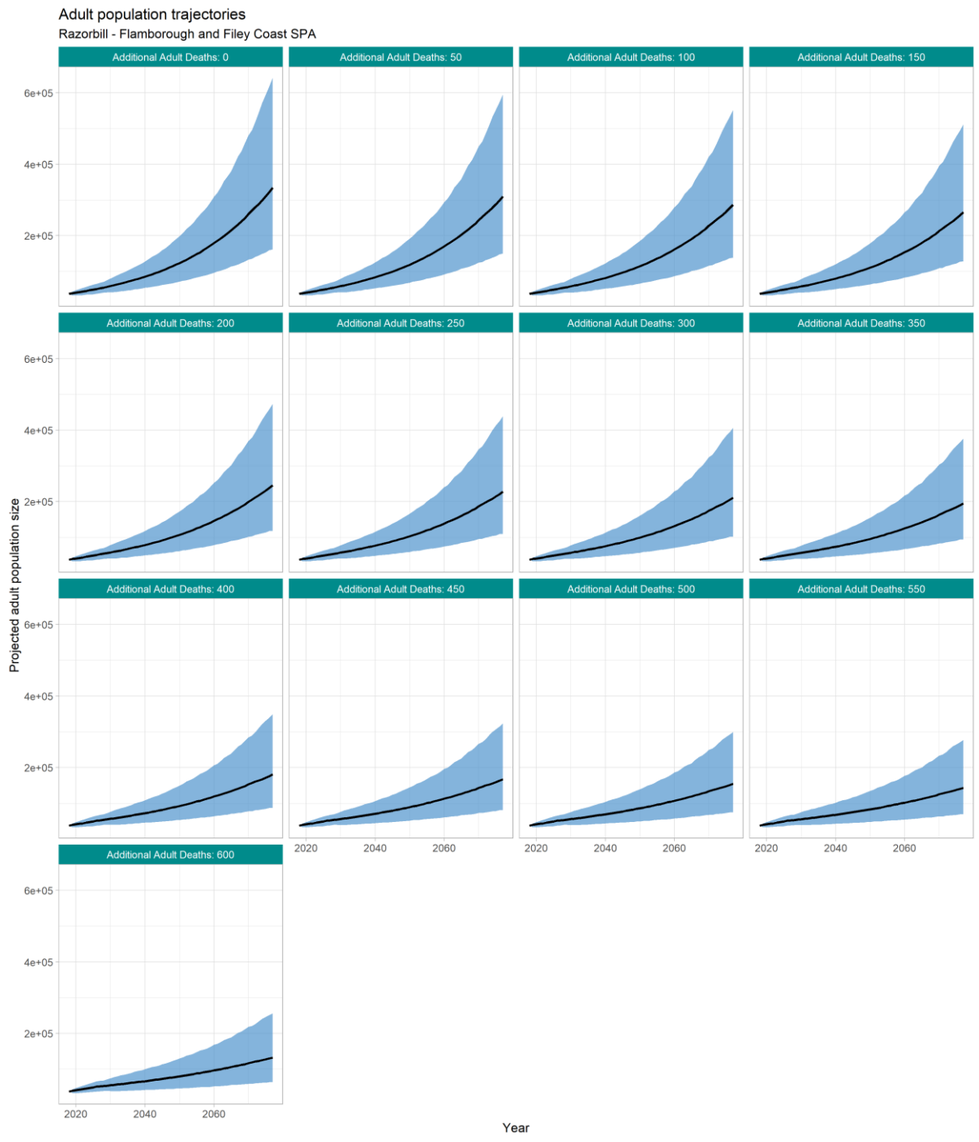

Figure 3.157: **Projections of population sizes over a 50-year time-frame. Each plot represents a different impact scenario in terms of additional adult mortalities (starting at 0 i.e. unimpacted). Blue envelopes bound the central 95% of simulations, the dark central line the median**

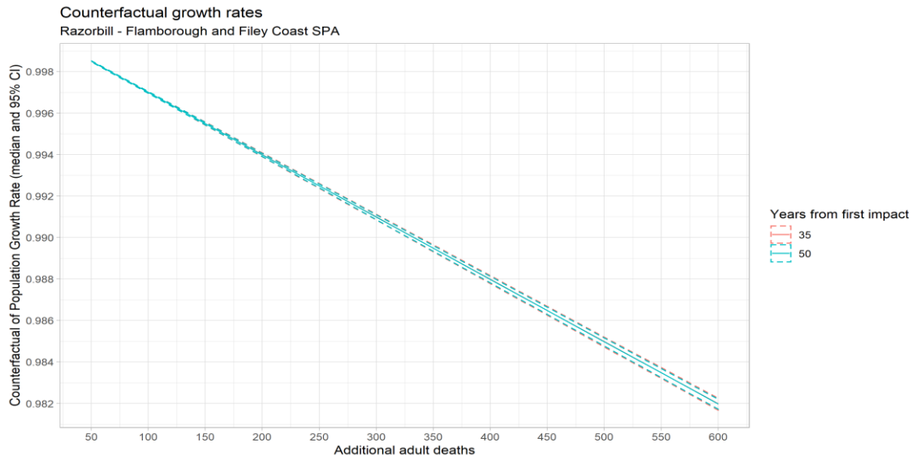

Figure 3.158: **Ratio of impacted and unimpacted growth rates under a range of impact scenarios (additional adult mortalities – x-axis) i.e. 0.9 means a 10% decrease in the growth rate under the impact scenario. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

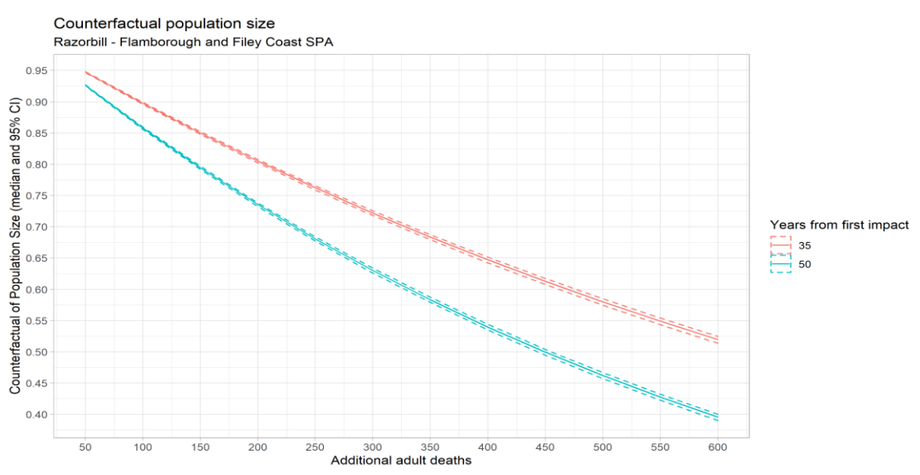

Figure 3.159: **The ratio of the median impacted and median unimpacted population sizes from the simulations over a range of impact scenarios (additional adult deaths - x-axis) i.e. 0.5 means the median impacted population size is one-half the median unimpacted population size. Figures are based on paired simulations for the impacted and unimpacted populations i.e. based on the same sampled population parameters. The bold lines represent the 50th percentile (median), dashed lines give the central 95% of simulated values (2.5% and 97.5% reference points)**

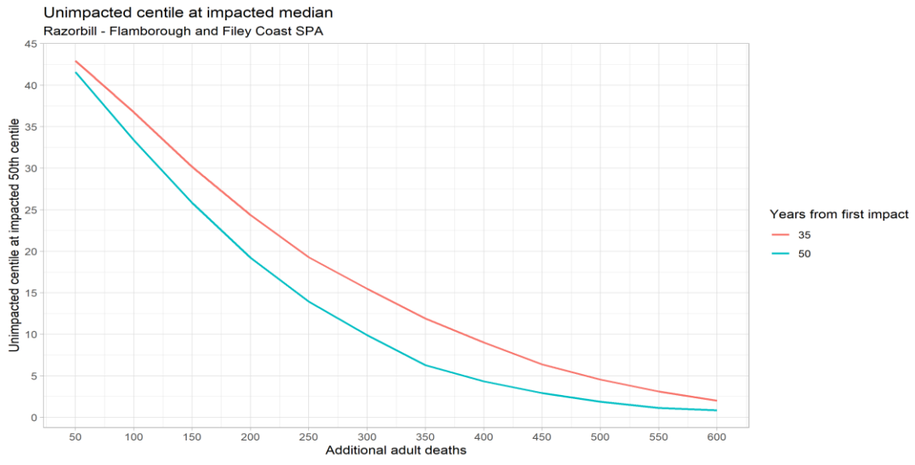

Figure 3.160: The median of the impacted population size as a centile of the unimpacted population size, under a range of impact scenarios (incremental additional adult deaths – x-axis). For example, 30 means the median (50th percentile) of the impacted projections sits at the 30th percentile of the unimpacted projections. Individual lines represent years post-construction (35 and 50 years)

Table 3.203: Growth rates of simulated populations under different impact scenarios for the 35 and 50 year post-construction projections. Reference points are 2.5%, 50% (median) and 97.5% of the distribution of simulated growth rates

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2062	0	1.038	1.021	1.053			
2062	50	1.036	1.020	1.051	0.947	0.998	42.9
2062	100	1.035	1.018	1.050	0.897	0.997	36.7
2062	150	1.033	1.017	1.048	0.850	0.995	30.2
2062	200	1.032	1.015	1.047	0.805	0.994	24.4
2062	250	1.030	1.013	1.045	0.762	0.992	19.3
2062	300	1.029	1.012	1.043	0.722	0.991	15.5
2062	350	1.027	1.010	1.042	0.684	0.989	11.9
2062	400	1.025	1.009	1.040	0.647	0.988	9.0
2062	450	1.024	1.007	1.039	0.613	0.986	6.4
2062	500	1.022	1.006	1.037	0.580	0.985	4.5
2062	550	1.021	1.004	1.036	0.549	0.983	3.1
2062	600	1.019	1.003	1.034	0.520	0.982	2.0
2077	0	1.038	1.024	1.050			
2077	50	1.036	1.022	1.049	0.926	0.998	41.6
2077	100	1.035	1.021	1.047	0.858	0.997	33.4
2077	150	1.033	1.019	1.046	0.794	0.995	25.8
2077	200	1.032	1.018	1.044	0.735	0.994	19.2
2077	250	1.030	1.016	1.043	0.681	0.992	13.9
2077	300	1.028	1.014	1.041	0.630	0.991	9.9
2077	350	1.027	1.013	1.039	0.583	0.989	6.3
2077	400	1.025	1.011	1.038	0.540	0.988	4.3

Projection year	Additional adult mortalities	Median growth rates	2.5 percentile of simulated growth rates	97.5 percentile of simulated growth rates	Median counterfactual of population size	Median counterfactual of growth rates	Centile of unimpacted matching 50th centile of unimpacted
2077	450	1.024	1.010	1.036	0.499	0.986	2.9
2077	500	1.022	1.008	1.035	0.462	0.985	1.9
2077	550	1.021	1.007	1.033	0.427	0.983	1.1
2077	600	1.019	1.005	1.032	0.395	0.982	0.9

Table 3.204: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2062) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2062)	Med. popn size (2062) 2.5%	Med. popn size (2062) 97.5%
Baseline	0.07	0.0000	0.00	192211.1	102337.2	335747.7
North Sea Consented developer approach	0.07	41.9000	12.10	186097.6	99092.8	325181.2
North Sea Consented Scoping Approach a	0.07	102.7800	14.79	178833.6	95188.9	312659.5
North Sea Consented Scoping Approach b	0.07	203.3400	43.94	165510.5	87924.6	289492.2
(1) Project Alone: developer approach	0.07	3.0000	2.17	191646.6	102033.4	334768.2
(2) Project Alone: Scoping approach a	0.07	3.7811	2.79	191494.8	101951.1	334505.4
(2) Project Alone: Scoping approach b	0.07	11.0385	8.04	190137.0	101220.9	332153.1

Table 3.205: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. popn size* = Median population size, *Med. popn size (2077) 2.5/97.5%* = are the central 95% of simulated population sizes

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. popn size (2077)	Med. popn size (2077) 2.5%	Med. popn size (2077) 97.5%
Baseline	0.07	0.0000	0.00	334324.1	161668.8	642842.8
North Sea Consented developer approach	0.07	41.9000	12.10	319383.1	154328.5	614649.7
North Sea Consented Scoping Approach a	0.07	102.7800	14.79	302008.6	145701.3	581857.0
North Sea Consented Scoping Approach b	0.07	203.3400	43.94	270700.1	130460.3	521871.1
(1) Project Alone: developer approach	0.07	3.0000	2.17	332937.8	160991.3	640202.2
(2) Project Alone: Scoping approach a	0.07	3.7811	2.79	332563.7	160809.6	639493.4
(2) Project Alone: Scoping approach b	0.07	11.0385	8.04	329229.5	159184.2	633160.9

Table 3.206: Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Ann. med. GR* = Annual median growth rate, *Ann. med. GR lower/upper CI* are the 95% confidence bounds

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Ann. med. GR (2062)	Ann. med. GR (2062) lower CI	Ann. med. GR (2062) upper CI	Ann. med. GR (2077)	Ann. med. GR (2077) lower CI	Ann. med. GR (2077) upper CI
Baseline	0.07	0.0000	0.00	1.038	1.021	1.053	1.038	1.024	1.050
North Sea Consented developer approach	0.07	41.9000	12.10	1.037	1.020	1.052	1.037	1.023	1.049
North Sea Consented Scoping Approach a	0.07	102.7800	14.79	1.036	1.019	1.051	1.036	1.022	1.048
North Sea Consented Scoping Approach b	0.07	203.3400	43.94	1.034	1.017	1.048	1.033	1.020	1.046
(1) Project Alone: developer approach	0.07	3.0000	2.17	1.038	1.021	1.053	1.038	1.024	1.050
(2) Project Alone: Scoping approach a	0.07	3.7811	2.79	1.038	1.021	1.053	1.038	1.024	1.050
(2) Project Alone: Scoping approach b	0.07	11.0385	8.04	1.038	1.021	1.052	1.037	1.023	1.050

Table 3.207; Relevant PVA metrics from models with impact scenarios for specific additional mortalities. Tabulated adult deaths account for the indicated sabbatical rate. *Med. cnterfact. popn size* = Median counterfactual of population size, *Med. cnterfact. GR* = Median counterfactual of growth rates, *Cent. unimp. match 50th cent. unimp.* = Centile of unimpacted matching 50th centile of unimpacted

Scenario	Sabb. Rate	Add. adult deaths	Add. immat. deaths	Med. cnterfact. popn size (2062)	Med. cnterfact. popn size (2077)	Med. cnterfact. GR (2062)	Med. cnterfact GR (2077)
North Sea Consented developer approach	0.07	41.9000	12.10	0.968	0.955	0.999	0.999
North Sea Consented Scoping Approach a	0.07	102.7800	14.79	0.930	0.903	0.998	0.998
North Sea Consented Scoping Approach b	0.07	203.3400	43.94	0.861	0.809	0.996	0.996
(1) Project Alone: developer approach	0.07	3.0000	2.17	0.997	0.996	1.000	1.000
(2) Project Alone: Scoping approach a	0.07	3.7811	2.79	0.996	0.995	1.000	1.000
(2) Project Alone: Scoping approach b	0.07	11.0385	8.04	0.989	0.985	1.000	1.000

4 CONCLUSIONS

47. Below, we summarise the worst case, in terms of reduction in population growth rate and median population size for each species for the expected life-span of the project (25 years). In all cases, modelling of Scoping Approach mortality estimates resulted in greatest effects for project alone and in-combination. It is important to note that density dependent effects on growth rate are not included in these models.

48. For gannet, project alone impacts were greatest at Forth Islands SPA for Scoping Approach B at the end of 35 years of impact (2062) resulting in a 4.3% and 0.1% reduction in population growth rate and median population size, respectively. With regards incombination impacts, the North Sea consented Scoping B was the worst case for the Flamborough and Filey Coast SPA resulting in a 39% and 14% reduction in population growth rate and median population size, respectively

49. For guillemot, project alone impacts were greatest at St Abb's Head to Fast Castle SPA for Scoping Approach B at the end of 35 years of impact (2062) resulting in a 33% and 11% reduction in population growth rate and median population size, respectively. With regards incombination impacts on this SPA, the North Sea consented Scoping B was the worst case for resulting in a 38% and 13% reduction in population growth rate and median population size, respectively. The incombination totals compares with the equivalent Developer Approach scenario of 8.6% and 0.02% reduction in population growth rate and median population size, respectively.

50. For herring gull, project alone impacts were greatest at St Abb's Head to Fast Castle SPA for Scoping Approach at the end of 35 years of impact (2062) resulting in a 2.9% and 0.01% reduction in population growth rate and median population size, respectively. With regards incombination impacts on this SPA, the North Sea consented Scoping was the worst case resulting in a 5.3% and 0.01% reduction in population growth rate and median population size, respectively.

51. For kittiwake, project alone impacts were greatest at St Abb's Head to Fast Castle SPA for Scoping Approach B at the end of 35 years of impact (2062) resulting in a 62.5% and 2.7% reduction in population growth rate and median population size, respectively. With regards incombination impacts on this SPA, the North Sea consented Scoping B was the worst case for resulting in a 65.9% and 29.9% reduction in population growth rate and median population size, respectively. The incombination totals compares with the equivalent Developer Approach scenario of 52.1% and 2% reduction in population growth rate and median population size, respectively.

52. For lesser black-back gull, project alone impacts were greatest at Forth Islands SPA for Scoping Approach at the end of 35 years of impact (2062) resulting in a 1.8% and 0.01% reduction in population growth rate and median population size, respectively.

53. For puffin, project alone impacts were greatest at Forth Islands SPA for Scoping Approach B at the end of 35 years of impact (2062) resulting in a 1.4% reduction in population growth rate but no change in median population size, respectively. With regards incombination impacts on this SPA, the North Sea consented Scoping B was the worst case for resulting in a 12% and 0.04% reduction in population growth rate and median population size, respectively.

54. For razorbill, project alone impacts were greatest at St Abb's Head to Fast Castle SPA for Scoping Approach B at the end of 35 years of impact (2062) resulting in a 14.1% reduction in population growth rate and 0.04% reduction in median population size. With regards incombination impacts on this SPA, the North Sea consented Scoping B was the worst case for resulting in a 20.6% and 0.06% reduction in population growth rate and median population size, respectively.

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ANNEX A BREEDING SEAON APPORTIONED MORTALITY

ANNEX B NON-BREEDING SEASON APPORTIONED MORTALITY

ANNEX C THRESHOLD APPLICATION FOR POPULATION VIABILITY ANALYSIS

ANNEX D INCOMBINATION MORTALITY AND SCENARIOS

ANNEX E SUMMARY OF APPROACH AND COLLATION OF INCOMBINATION TOTALS

ANNEX F ASYMPTOTIC AGE DISTRIBUTIONS

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