Outer Dowsing Offshore Wind

Supplementary Information

Offshore and Intertidal Ornithology: Population Viability Analysis Parameter log

Date: May 2024

Company:	**Outer Dowsing Offshore Wind**	Asset:	**Whole Asset**
Project:	**Whole Wind Farm**	Sub Project/Package:	Whole Asset
Document Title or Description:	Offshore and Intertidal Ornithology: Population Viability Analysis Parameter log		
Internal Document Number:	PP1-ODOW-DEV-CS-LOG-0009	3rd Party Doc No (If applicable):	N/A
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Rev No.	Date	Status / Reason for Issue	Author	Checked by	Reviewed by	Approved by
1.0	May 2024	For issue to Natural England as Requested	GoBe	GoBe	ODOW	ODOW

Population Viability Analysis Parameter log

Set up

The log file was created on: 2024-01-18 12:25:53 using Tool version 2, with R version 3.5.1, PVA package version: 4.18 (with UI version 1.7)

```
##                               Package          Version
## popbio          "popbio"          "2.4.4"
## shiny           "shiny"           "1.1.0"
## shinyjs         "shinyjs"         "1.0"
## shinydashboard  "shinydashboard"  "0.7.1"
## shinyWidgets    "shinyWidgets"    "0.4.5"
## DT              "DT"              "0.5"
## plotly          "plotly"          "4.8.0"
## rmarkdown       "rmarkdown"       "1.10"
## dplyr           "dplyr"           "0.7.6"
## tidyr           "tidyr"           "0.8.1"
```

Gannet BDMPS

Basic information

This run had reference name "Gannet BDMPS".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 4454.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Northern Gannet.
Region type to use for breeding success data: MSFD.
Available colony-specific survival rate: National. Sector to use within breeding success region: Greater North Sea.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.

Units for initial population size: all.individuals

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

Population 1

Initial population values: Initial population 456298 in 2023

Productivity rate per pair: mean: 0.6948221 , sd: 0.07298986

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

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

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

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

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

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

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone 60,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 1.59983e-05 , se: NA

Scenario B - Name: Project alone 70,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 1.86282e-05 , se: NA

Scenario C - Name: Project alone 80,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 2.14772e-05 , se: NA

Scenario D - Name: Cumulative 60,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000762002 , se: NA

Scenario E - Name: Cumulative 70,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.0008888928 , se: NA

Scenario F - Name: Cumulative 80,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001015784 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Gannet Biogeographic

Basic information

This run had reference name "Gannet Biogeographic".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 9867.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Northern Gannet.
Region type to use for breeding success data: Global.
Available colony-specific survival rate: National. Sector to use within breeding success region: Global.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 1180000 in 2023

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

Adult survival rate: mean: 0.919 , sd: 0.042

Immatures survival rates:

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

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

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

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

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

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone 60,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario B - Name: Project alone 70,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario C - Name: Project alone 80,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario D - Name: Cumulative 60,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 7e-04 , se: NA

Scenario E - Name: Cumulative 70,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000749 , se: NA

Scenario F - Name: Cumulative 80,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000798 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Great Black-Backed Gull BDMPS

Basic information

This run had reference name "GBBG BDMPS".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 57.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Great Black-Backed Gull.
Region type to use for breeding success data: MSFD.
Available colony-specific survival rate: National. Sector to use within breeding success region: Greater North Sea.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 3 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 91399 in 2023

Productivity rate per pair: mean: 1.400163 , sd: 0.4642731

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

Immatures survival rates:

Age class 0 to 1 - mean: 0.93 , sd: 1e-04 , DD: NA

Age class 1 to 2 - mean: 0.93 , sd: 1e-04 , DD: NA

Age class 2 to 3 - mean: 0.93 , sd: 1e-04 , DD: NA

Age class 3 to 4 - mean: 0.93 , sd: 1e-04 , DD: NA

Age class 4 to 5 - mean: 0.93 , sd: 1e-04 , DD: NA

Impacts

Number of impact scenarios: 2.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone BDMPS

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 3.3e-05 , se: NA

Scenario B - Name: Cumulative BDMPS

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.015005 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Great Black-Backed Gull Biogeographic

Basic information

This run had reference name "GBBG Biogeographic".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 4436.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Great Black-Backed Gull.
Region type to use for breeding success data: Global.
Available colony-specific survival rate: National. Sector to use within breeding success region: Global.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 3 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 235000 in 2023

Productivity rate per pair: mean: 0.9707373 , sd: 0.435337

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

Immatures survival rates:

Age class 0 to 1 - mean: 0.93 , sd: 1e-04 , DD: NA

Age class 1 to 2 - mean: 0.93 , sd: 1e-04 , DD: NA

Age class 2 to 3 - mean: 0.93 , sd: 1e-04 , DD: NA

Age class 3 to 4 - mean: 0.93 , sd: 1e-04 , DD: NA

Age class 4 to 5 - mean: 0.93 , sd: 1e-04 , DD: NA

Impacts

Number of impact scenarios: 2.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone Biogeographic

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 1.3e-05 , se: NA

Scenario B - Name: Cumulative Biogeographic

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.005836 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Guillemot BDMPS

Basic information

This run had reference name "Guillemot BDMPS".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 4362.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.
Region type to use for breeding success data: MSFD.
Available colony-specific survival rate: National. Sector to use within breeding success region: Greater North Sea.
Age at first breeding: 6.
Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 2045078 in 2023

Productivity rate per pair: mean: 0.6940442 , sd: 0.1195933

Adult survival rate: mean: 0.94 , sd: 0.025

Immatures survival rates:

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

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

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

Age class 3 to 4 - mean: 0.938 , sd: 0.107 , DD: NA

Age class 4 to 5 - mean: 0.94 , sd: 0.025 , DD: NA

Age class 5 to 6 - mean: 0.94 , sd: 0.025 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone 30,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario B - Name: Project alone 50,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 6.8e-05 , se: NA

Scenario C - Name: Project alone 70,2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000189 , se: NA

Scenario D - Name: Project alone 70, 10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000947 , se: NA

Scenario E - Name: Cumulative 30,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000867 , se: NA

Scenario F - Name: Cumulative 50,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001404 , se: NA

Scenario G - Name: Cumulative 70, 2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00393 , se: NA

Scenario H - Name: Cumulative 70, 10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.019649 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Guillemot Biogeographic

Basic information

This run had reference name "Guillemot Biogeographic".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 1521.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Common Guillemot.
Region type to use for breeding success data: Global.
Available colony-specific survival rate: National. Sector to use within breeding success region: Global.
Age at first breeding: 6.
Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 4125000 in 2023

Productivity rate per pair: mean: 0.5826832 , sd: 0.1894517

Adult survival rate: mean: 0.94 , sd: 0.025

Immatures survival rates:

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

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

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

Age class 3 to 4 - mean: 0.938 , sd: 0.107 , DD: NA

Age class 4 to 5 - mean: 0.94 , sd: 0.025 , DD: NA

Age class 5 to 6 - mean: 0.94 , sd: 0.025 , DD: NA

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone 30,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 2e-05 , se: NA

Scenario B - Name: Project alone 50,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 3.4e-05 , se: NA

Scenario C - Name: Project alone 70,2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 9.4e-05 , se: NA

Scenario D - Name: Project alone 70, 10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000469 , se: NA

Scenario E - Name: Cumulative 30,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00043 , se: NA

Scenario F - Name: Cumulative 50,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario G - Name: Cumulative 70, 2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001948 , se: NA

Scenario H - Name: Cumulative 70, 10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.009742 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Herring gull BDMPS

Basic information

This run had reference name "Herring gull BDMPS".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 4106.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Herring Gull.
Region type to use for breeding success data: MSFD.
Available colony-specific survival rate: National. Sector to use within breeding success region: Greater North Sea.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 3 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 466511 in 2023

Productivity rate per pair: mean: 1.033303 , sd: 0.6585291

Adult survival rate: mean: 0.834 , sd: 0.079

Immatures survival rates:

Age class 0 to 1 - mean: 0.794 , sd: 0.079 , DD: NA

Age class 1 to 2 - mean: 0.834 , sd: 0.079 , DD: NA

Age class 2 to 3 - mean: 0.834 , sd: 0.079 , DD: NA

Age class 3 to 4 - mean: 0.834 , sd: 0.079 , DD: NA

Age class 4 to 5 - mean: 0.834 , sd: 0.079 , DD: NA

Impacts

Number of impact scenarios: 2.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone BDMPS

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario B - Name: Cumulative BDMPS

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.002033 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Herring gull Biogeographic

Basic information

This run had reference name "Herring gull Biogeographic".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 9507.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Herring Gull.
Region type to use for breeding success data: Global.
Available colony-specific survival rate: National. Sector to use within breeding success region: Global.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 3 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 1098000 in 2023

Productivity rate per pair: mean: 0.6146853 , sd: 0.4759263

Adult survival rate: mean: 0.834 , sd: 0.079

Immatures survival rates:

Age class 0 to 1 - mean: 0.794 , sd: 0.079 , DD: NA

Age class 1 to 2 - mean: 0.834 , sd: 0.079 , DD: NA

Age class 2 to 3 - mean: 0.834 , sd: 0.079 , DD: NA

Age class 3 to 4 - mean: 0.834 , sd: 0.079 , DD: NA

Age class 4 to 5 - mean: 0.834 , sd: 0.079 , DD: NA

Impacts

Number of impact scenarios: 2.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone Biogeographic

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario B - Name: Cumulative Biogeographic

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000864 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Kittiwake BDMPS

Basic information

This run had reference name "Kittiwake BDMPS".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 5356.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Black-Legged Kittiwake.
Region type to use for breeding success data: MSFD.
Available colony-specific survival rate: National. Sector to use within breeding success region: Greater North Sea.
Age at first breeding: 4.
Is there an upper constraint on productivity in the model?: Yes, constrained to 2 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 829937 in 2023

Productivity rate per pair: mean: 0.6994274 , sd: 0.3249545

Adult survival rate: mean: 0.854 , sd: 0.077

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 0.077 , DD: NA

Age class 1 to 2 - mean: 0.854 , sd: 0.077 , DD: NA

Age class 2 to 3 - mean: 0.854 , sd: 0.077 , DD: NA

Age class 3 to 4 - mean: 0.854 , sd: 0.077 , DD: NA

Impacts

Number of impact scenarios: 2.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2041 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone (BDMPS)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 3.7e-05 , se: NA

Scenario B - Name: Cumulative (BDMPS)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003871 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Kittiwake biogeographic

Basic information

This run had reference name "Kittiwake biogeographic".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 9414.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Black-Legged Kittiwake.
Region type to use for breeding success data: Global.
Available colony-specific survival rate: National. Sector to use within breeding success region: Global.
Age at first breeding: 4.
Is there an upper constraint on productivity in the model?: Yes, constrained to 2 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 5100000 in 2023

Productivity rate per pair: mean: 0.6036278 , sd: 0.325783

Adult survival rate: mean: 0.854 , sd: 0.077

Immatures survival rates:

Age class 0 to 1 - mean: 0.79 , sd: 0.077 , DD: NA

Age class 1 to 2 - mean: 0.854 , sd: 0.077 , DD: NA

Age class 2 to 3 - mean: 0.854 , sd: 0.077 , DD: NA

Age class 3 to 4 - mean: 0.854 , sd: 0.077 , DD: NA

Impacts

Number of impact scenarios: 2.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone biogeographic)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario B - Name: Cumulative (Biogeographic)

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

LBBG BDMPS

Basic information

This run had reference name "LBBG BDMPS".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 4559.
Years for burn-in: 0.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Lesser Black-Backed Gull.
Region type to use for breeding success data: MSFD.
Available colony-specific survival rate: National. Sector to use within breeding success region: Greater North Sea.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 3 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 209007 in 2023

Productivity rate per pair: mean: 0.4694737 , sd: 0.579858

Adult survival rate: mean: 0.885 , sd: 0.056

Immatures survival rates:

Age class 0 to 1 - mean: 0.82 , sd: 0.056 , DD: NA

Age class 1 to 2 - mean: 0.885 , sd: 0.056 , DD: NA

Age class 2 to 3 - mean: 0.885 , sd: 0.056 , DD: NA

Age class 3 to 4 - mean: 0.885 , sd: 0.056 , DD: NA

Age class 4 to 5 - mean: 0.885 , sd: 0.056 , DD: NA

Impacts

Number of impact scenarios: 2.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone BDMPS

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario B - Name: Cumulative BDMPS

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003469 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

LBBG Biogeographic

Basic information

This run had reference name "LBBG Biogeographic".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 4997.
Years for burn-in: 0.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Lesser Black-Backed Gull.
Region type to use for breeding success data: Global.
Available colony-specific survival rate: National. Sector to use within breeding success region: Global.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 3 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 864000 in 2023

Productivity rate per pair: mean: 0.4000474 , sd: 0.3759093

Adult survival rate: mean: 0.885 , sd: 0.056

Immatures survival rates:

Age class 0 to 1 - mean: 0.82 , sd: 0.056 , DD: NA

Age class 1 to 2 - mean: 0.885 , sd: 0.056 , DD: NA

Age class 2 to 3 - mean: 0.885 , sd: 0.056 , DD: NA

Age class 3 to 4 - mean: 0.885 , sd: 0.056 , DD: NA

Age class 4 to 5 - mean: 0.885 , sd: 0.056 , DD: NA

Impacts

Number of impact scenarios: 2.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone BDMPS

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario B - Name: Cumulative BDMPS

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000839 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Puffin BDMPS

Basic information

This run had reference name "Puffin BDMPS".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 798.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Atlantic Puffin.
Region type to use for breeding success data: MSFD.
Available colony-specific survival rate: National. Sector to use within breeding success region: Greater North Sea.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 868689 in 2023

Productivity rate per pair: mean: 0.5760227 , sd: 0.3308661

Adult survival rate: mean: 0.907 , sd: 0.083

Immatures survival rates:

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

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

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

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

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

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone 30,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario B - Name: Project alone 50,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario C - Name: Project alone 70,10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000113 , se: NA

Scenario D - Name: Cumulative 30,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000177 , se: NA

Scenario E - Name: Cumulative 50,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario F - Name: Cumulative 70,10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Puffin Biogeographic

Basic information

This run had reference name "Puffin Biogeographic".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 1028.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Atlantic Puffin.
Region type to use for breeding success data: Global.
Available colony-specific survival rate: National. Sector to use within breeding success region: Global.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 11840000 in 2023

Productivity rate per pair: mean: 0.5736387 , sd: 0.2109783

Adult survival rate: mean: 0.907 , sd: 0.083

Immatures survival rates:

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

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

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

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

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

Impacts

Number of impact scenarios: 6.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone 30,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0 , se: NA

Scenario B - Name: Project alone 50,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 1e-06 , se: NA

Scenario C - Name: Project alone 70,10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario D - Name: Cumulative 30,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 1.3e-05 , se: NA

Scenario E - Name: Cumulative 50,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 2.2e-05 , se: NA

Scenario F - Name: Cumulative 70,10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Razorbill BDMPS

Basic information

This run had reference name "Razorbill BDMPS".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 1158.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.
Region type to use for breeding success data: MSFD.
Available colony-specific survival rate: National. Sector to use within breeding success region: Greater North Sea.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 591874 in 2023

Productivity rate per pair: mean: 0.5604778 , sd: 0.1619291

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

Age class 0 to 1 - mean: 0.63 , sd: 0.067 , DD: NA

Age class 1 to 2 - mean: 0.63 , sd: 0.067 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone 30,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 7.2e-05 , se: NA

Scenario B - Name: Project alone 50,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000137 , se: NA

Scenario C - Name: Project alone 70,2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000335 , se: NA

Scenario D - Name: Project alone 70, 10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001674 , se: NA

Scenario E - Name: Cumulative 30,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000855 , se: NA

Scenario F - Name: Cumulative 50,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001425 , se: NA

Scenario G - Name: Cumulative 70, 2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.003991 , se: NA

Scenario H - Name: Cumulative 70, 10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.019956 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA

Razorbill Biogeographic

Basic information

This run had reference name "Razorbill Biogeographic".
PVA model run type: simplescenarios.
Model to use for environmental stochasticity: betagamma.
Model for density dependence: nodd.
Include demographic stochasticity in model?: Yes.
Number of simulations: 5000.
Random seed: 1930.
Years for burn-in: 5.
Case study selected: None.

Baseline demographic rates

Species chosen to set initial values: Razorbill.
Region type to use for breeding success data: Global.
Available colony-specific survival rate: National. Sector to use within breeding success region: Global.
Age at first breeding: 5.
Is there an upper constraint on productivity in the model?: Yes, constrained to 1 per pair.
Number of subpopulations: 1.
Are demographic rates applied separately to each subpopulation?: No.
Units for initial population size: all.individuals
Are baseline demographic rates specified separately for immatures?: Yes.

Population 1

Initial population values: Initial population 1707000 in 2023

Productivity rate per pair: mean: 0.4965345 , sd: 0.1721675

Adult survival rate: mean: 0.895 , sd: 0.067

Immatures survival rates:

Age class 0 to 1 - mean: 0.63 , sd: 0.067 , DD: NA

Age class 1 to 2 - mean: 0.63 , sd: 0.067 , DD: NA

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

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

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

Impacts

Number of impact scenarios: 8.

Are impacts applied separately to each subpopulation?: No

Are impacts of scenarios specified separately for immatures?: No

Are standard errors of impacts available?: No

Should random seeds be matched for impact scenarios?: No

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

Years in which impacts are assumed to begin and end: 2030 to 2065

Impact on Demographic Rates

Scenario A - Name: Project alone 30,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 2.5e-05 , se: NA

Scenario B - Name: Project alone 50,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario C - Name: Project alone 70,2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000116 , se: NA

Scenario D - Name: Project alone 70, 10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario E - Name: Cumulative 30,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.000297 , se: NA

Scenario F - Name: Cumulative 50,1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

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

Scenario G - Name: Cumulative 70, 2

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001384 , se: NA

Scenario H - Name: Cumulative 70, 10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.00692 , se: NA

Output:

First year to include in outputs: 2024
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: whole.population
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA