MORGAN OFFSHORE WIND PROJECT: GENERATION ASSETS

Assessment of Gannet at the Grassholm SPA

Image of an offshore wind farm

Document status

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Prepared for:

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Glossary

Term	Meaning
Applicant	Morgan Offshore Wind Limited.
Morgan Offshore Wind Project: Generation Assets	This is the name given to the Morgan Generation Assets project as a whole (includes all infrastructure and activities associated with the project construction, operations and maintenance, and decommissioning).
Parameter	Parameters are the input elements of a model that together affect the output of a model. In collision risk models, examples of parameters are the number of wind turbines and the length of the bird.

Acronyms

Acronym	Description
CGR	Counterfactual of Growth Rate
CPS	Counterfactual of Population Size
HRA	Habitats Regulations Assessment
PVA	Population Viability Analysis
SNCB	Statutory Nature Conservation Body

Units

Unit	Description
km	Kilometres
%	Percentage

1 ASSESSMENT OF GANNET AT THE GRASSHOLM SPA

1.1 Introduction

1.1.1.1 In the HRA Stage 2 information to support an appropriate assessment Part Three: Special Protection Areas and Ramsar Site assessments (APP-098), the Applicant presented an assessment for gannet at the Grassholm Special Protection Area (SPA). The assessment concluded that there was no Adverse Effect on the Integrity of the SPA from the Morgan Generation Assets alone due to the impact representing less than a 1% increase in baseline mortality of the SPA population. In addition, it was concluded that the Morgan Generation Assets would not materially contribute to any existing in-combination impact as the predicted impact from the Morgan Generation Assets alone represents less than a 0.05% increase in baseline mortality of the SPA population.

1.1.1.2 To address comments received from Natural Resources Wales (NRW) during the Examination, the Applicant submitted Annex 16.2 to Ornithological assessment clarification data Welsh sites (REP5-033) at Deadline 5. Following Deadline 5, the Applicant consulted with NRW and NRW identified that an explanatory note on the assessments undertaken for the gannet feature of the Grassholm SPA would be useful to inform the assessments undertaken by all stakeholders. An update to REP5-033 incorporating this information was provided on 31 January 2025 ('Updated ornithological clarification data in relation to Natural Resources Wales submissions from the Applicant received on 31 January 2025' (AS-013)).

1.1.1.3 This clarification note provides further detail in relation to the information provided for gannet at the Grassholm SPA in AS-013, as discussed with NRW, for both the Statutory Nature Conservation Body (SNCB) and Applicant positions.

1.2 Methodology

1.2.1.1 Following the approach applied in REP5-033 which provided Population Viability Analysis (PVA) modelling for the predicted in-combination impact on gannet at the Grassholm SPA, this report provides the following additional information:

- An assessment for the gannet qualifying feature of the Grassholm SPA applying those parameters advocated by NRW

- An assessment for the gannet qualifying feature of the Grassholm SPA applying those parameters advocated by the Applicant

- Additional supporting information to the ornithological clarification data workbook submitted at Deadline 5 (REP5-033) and updated in AS-013.

1.3 Impact estimates

1.3.1 Project alone

1.3.1.1 At Deadline 5, the Applicant submitted Annex 16.2 to Ornithological assessment clarification data Welsh sites (REP5-033), which quantified the predicted impact from the Morgan Generation Assets on the gannet feature of the Grassholm SPA using the parameters advocated by NRW.

1.3.1.2 Table 1.1 provides the predicted impact from the Morgan Generation Assets when applying different displacement rate and mortality rate parameters.

Table 1.1: **Predicted impacts for gannet at the Grassholm SPA.**

Scenario	Displacement rate	Mortality rate	Displacement impact (no. of birds)	Collision risk estimate (no. of birds)	Total impact (no. of birds)	Increase in baseline mortality (%)
Project alone 1	70	1	0.4	0.3	0.7	0.02
Project alone 2	80	10	4.1	0.3	4.4	0.16
Project alone 3	60	1	0.3	0.3	0.6	0.02

1.3.1.3 When applying the displacement and mortality rates advocated by the Applicant (Project alone 1 in Table 1.1) and those at the lower end of the range advocated by the SNCBs (Project alone 3 in Table 1.1), the increase in the baseline mortality of the SPA population of gannet is below the 0.05% threshold applied in HRA Stage 2 information to support an appropriate assessment Part Three: Special Protection Areas and Ramsar Site assessments (APP-098). This threshold is set to indicate whether the Morgan Generation Assets would materially contribute to any existing in-combination impact. These scenarios are therefore not considered further in this clarification note.

1.3.1.4 When applying the upper end of the range advocated by the SNCBs (Project alone 2 in Table 1.1) the increase in baseline mortality of the SPA population is above the 0.05% threshold applied in in HRA Stage 2 information to support an appropriate assessment Part Three: Special Protection Areas and Ramsar Site assessments (APP-098). This scenario is therefore considered in relation to in-combination impacts.

1.3.2 In-combination

1.3.2.1 At Deadline 5, the Applicant submitted Annex 16.2 to Ornithological assessment clarification data Welsh sites (REP5-033), which quantified the predicted in-combination impact on gannet at the Grassholm SPA. This submission presents impacts using the parameters advocated by NRW. This was subsequently updated following Deadline 5 to include further information following advice from NRW (see AS-013). Table 1.2 provides the seasonal population estimates for all projects included in the in-combination assessment as used for displacement analysis. Table 1.3 provides the collision risk estimates for all projects included in the in-combination assessment.

Table 1.2: **Abundance for gannet at the Grassholm SPA for projects considered in-combination in relation to disturbance and displacement.**

Notes

[a] Assumed to be the same as the Morgan Generation Assets

[b] Assumed to be the same as Awel y Môr

Yellow highlighting identifies those projects for which gap-filling has been undertaken

Values are rounded to whole numbers whereas all calculations have been undertaken using exact values (i.e. with all decimal places).

Project	Seasonal apportioning values			Seasonal abundance values		
	Breeding	Post-breeding	Pre-breeding	Breeding	Post-breeding	Pre-breeding
Awel y Môr	0.345	0.144	0.119	113	29	0
Barrow	0.216[a]	0.144	0.119	2	1	0
Burbo Bank	0.345[b]	0.144	0.119	2	1	0
Burbo Bank Extension	0.345[b]	0.144	0.119	224	4	3
Erebus	0.995	0.144	0.119	223	48	12
Gwynt y Môr	0.345[b]	0.144	0.119	9	3	1
Llŷr 1	0.969	0.144	0.119	238	103	8
Mona Offshore Wind Project	0.176	0.144	0.119	44	8	3
Morecambe Offshore Wind Farm: Generation Assets	0.314	0.144	0.119	170	18	1
Morgan Generation Assets	0.216	0.144	0.119	33	9	4
North Hoyle	0.345[b]	0.144	0.119	2	1	0
Ormonde	0.216[a]	0.144	0.119	43	1	0
Rhyl Flats	0.345[b]	0.144	0.119	3	1	0
Robin Rigg	0.216[a]	0.144	0.119	3	1	0
Twinhub	1.000	0.144	0.119	244	22	1

Project	Seasonal apportioning values			Seasonal abundance values		
	Breeding	Post-breeding	Pre-breeding	Breeding	Post-breeding	Pre-breeding
Walney 1&2	0.216[a]	0.144	0.119	8	4	2
Walney 3 + 4	0.216[a]	0.144	0.119	33	37	3
West of Duddon Sands	0.216[a]	0.144	0.119	93	3	1
West of Orkney	0.000	0.144	0.119	0	197	9
White Cross	0.521	0.144	0.119	124	20	7
Annual total					2,179	

Table 1.3: In-combination collision risk total for gannet at the Grassholm SPA.

Notes

[a] Assumed to be the same as the Morgan Generation Assets

[b] Assumed to be the same as Awel y Môr

Yellow highlighting identifies those projects for which gap-filling has been undertaken.

Values are rounded to whole numbers whereas all calculations have been undertaken using exact values (i.e. with all decimal places)

Project	Seasonal apportioning values			Seasonal apportioned collision values (99.28% avoidance rate) (no. of collisions)		
	Breeding	Post-breeding	Pre-breeding	Breeding	Post-breeding	Pre-breeding
Awel y Môr	0.345	0.144	0.119	3.8	0.4	0.0
Barrow	0.216[a]	0.144	0.119	0.1	0.0	0.0
Burbo Bank	0.345[b]	0.144	0.119	0.1	0.0	0.0
Burbo Bank Extension	0.345[b]	0.144	0.119	4.1	0.0	0.0
Erebus	0.995	0.144	0.119	4.1	0.0	0.0
Gwynt y Môr	0.345[b]	0.144	0.119	2.3	0.2	0.1
Llŷr 1	0.969	0.144	0.119	3.0	0.1	0.0
Mona Offshore Wind Farm	0.176	0.144	0.119	0.2	0.0	0.0
Morecambe	0.314	0.144	0.119	0.4	0.0	0.0
Morgan Generation Assets	0.216	0.144	0.119	0.3	0.0	0.0
North Hoyle	0.345[b]	0.144	0.119	0.3	0.0	0.0
Ormonde	0.216[a]	0.144	0.119	1.5	0.0	0.0
Rhyl Flats	0.345[b]	0.144	0.119	0.4	0.0	0.0
Robin Rigg	0.216[a]	0.144	0.119	0.1	0.0	0.0
TwinHub	0.655	0.144	0.119	15.0	0.6	0.8
Walney 1 & 2	0.216[a]	0.144	0.119	0.4	0.0	0.0
Walney (3 & 4) Extension	0.216[a]	0.144	0.119	2.4	1.8	0.1
West of Duddon Sands	0.216[a]	0.144	0.119	0.4	0.0	0.0

Project	Seasonal apportioning values			Seasonal apportioned collision values (99.28% avoidance rate) (no. of collisions)		
	Breeding	Post-breeding	Pre-breeding	Breeding	Post-breeding	Pre-breeding
West of Orkney	No connectivity	0.144	0.119	-	1.1	0.1
White Cross	0.521	0.144	0.119	0.5	0.1	0.0
Annual totals				45.1		

1.4 Assessment

1.4.1.1 The total in-combination abundance of gannet apportioned to the Grassholm SPA is 2,179 birds. A displacement matrix incorporating this population is provided in Table 1.4.

Table 1.4: In-combination displacement analysis for the gannet feature of the Grassholm SPA

Gannet	Mortality rate (%)												
		1	2	5	10	20	30	40	50	60	70	80	90	100
Displacement rate (%)	10	2	4	11	22	44	65	87	109	131	153	174	196	218
	20	4	9	22	44	87	131	174	218	261	305	349	392	436
	30	7	13	33	65	131	196	261	327	392	458	523	588	654
	40	9	17	44	87	174	261	349	436	523	610	697	784	872
	50	11	22	54	109	218	327	436	545	654	763	872	981	1,090
	60	13	26	65	131	261	392	523	654	784	915	1,046	1,177	1,307
	70	15	31	76	153	305	458	610	763	915	1,068	1,220	1,373	1,525
	80	17	35	87	174	349	523	697	872	1,046	1,220	1,395	1,569	1,743
	90	20	39	98	196	392	588	784	981	1,177	1,373	1,569	1,765	1,961
	100	22	44	109	218	436	654	872	1,090	1,307	1,525	1,743	1,961	2,179

1.4.1.2 An assessment of the impact on gannet at the Grassholm SPA when displacement and collision impacts are combined is provided in Table 1.5.

Table 1.5: Predicted in-combination impact on gannet at the Grassholm SPA.

Project alone scenario	Displacement rate	Mortality rate	Displacement impact (no. of birds)	Collision risk estimate (no. of birds)	Total impact (no. of birds)	Increase in baseline mortality (%)
Project alone 2	80	10	174.3	45.1	219.4	8.22

1.4.1.3 The predicted in-combination impact when collision and displacement impacts are combined represents an increase in baseline mortality of the SPA population of above 1%. Population modelling has therefore been conducted incorporating the decrease in survival rate presented in Table 1.6. PVA outputs are provided in Table 1.7.Appendix A:

Table 1.6: PVA input values for the predicted in-combination impact on gannet at the Grassholm SPA.

Scenario	Decrease in survival rate
Project alone 2	0.006656595

1.4.1.4   The assessment presented in Annex 16.2 to Ornithological assessment clarification data Welsh sites (REP5-033) also provided PVA outputs for a displacement scenario applying a 60% displacement rate and a 1% mortality rate. The input log and outputs associated with this PVA are provided in Appendix A:.

Table 1.7:   PVA outputs for gannet at the Grassholm SPA.

Notes:

CGR = Counterfactual of Growth Rate

CPS = Counterfactual of Population Size

Year	Impact scenario	Simulated population size	Median population change (%)	Median growth rate	Lower confidence limit of simulated growth rate	Upper confidence limit of simulated growth rate	Median CGR	Median CPS
2030	Baseline (unimpacted)	41,327	1.9	1.019	0.913	1.085	-	-
2030	Project alone 2	41,013	1.1	1.011	0.906	1.078	0.993	0.993
2065	Baseline (unimpacted)	63,194	55.4	1.012	1.001	1.023	-	-
2065	Project alone 2	47,598	17.1	1.004	0.993	1.015	0.992	0.753

1.4.1.5   The results of the PVA (Table 1.7) indicate that the population of gannet at the SPA will continue to increase even when considering an impact calculated using a displacement rate of 80% and a mortality rate of 10%. The CGR is a more realistic metric than population size to review the impact when undertaking density independent PVAs. There is a marginal change in the CGR (0.992 to 1.000) compared to the baseline (unimpacted) scenario. The predicted median growth rate of the gannet population is >1 and therefore, the modelled population is predicted to grow under all impact scenarios.

1.4.1.6   The predicted impact is considered to be an over-estimate for a number of factors. These have been raised by NRW in relation to the information provided for gannet at the Grassholm SPA in Annex 16.2 to Ornithological assessment clarification data Welsh sites (REP5-033). These factors that have contributed to an over-estimate are discussed below with the individual and cumulative effect of each factor on the in-combination total predicted for gannet calculated in Table 1.8.

1.4.2   Apportioning

1.4.2.1   The apportioning values used in the breeding season for projects in the north east Irish Sea (Awel y Môr, Barrow, Burbo Bank, Burbo Bank Extension, Gwynt y Môr, Mona Offshore Wind Project, Morecambe Offshore Windfarm: Generation Assets, Morgan Generation Assets, North Hoyle, Ormonde, Rhyl Flats, Robin Rigg, Walney 1&2, Walney Extension and West of Duddon Sands) are calculated using the generic NatureScot (2020) approach. This approach assumes that birds could be located throughout the generic foraging range applied within the modelling approach. For the purposes of the apportioning exercise undertaken for the Morgan Generation Assets the foraging range used was taken from Woodward *et al.* (2019) and represents the mean-maximum foraging range of 509.4 km.

1.4.2.2   There is evidence that breeding gannet from the Grassholm SPA exhibit spatial segregation. Tracking data for gannets from the Grassholm SPA shows that birds from this SPA do not forage within the north east Irish Sea during the breeding period (Wakefield *et al.,* 2013). If the apportioning values associated with these projects (Awel y Môr, Barrow, Burbo Bank, Burbo Bank Extension, Gwynt y Môr, Mona Offshore Wind Project, Morecambe Offshore Windfarm: Generation Assets, Morgan Generation Assets, North Hoyle, Ormonde, Rhyl Flats, Robin Rigg, Walney 1&2, Walney Extension and West of Duddon Sands) are set to zero during the breeding season, the in-combination impact (using SNCB parameters for collision risk modelling, an 80% displacement rate and 10% mortality rate) reduces to 140.2 birds (a 36% decrease) representing a 5.25% increase in baseline mortality.

1.4.3   Macro-avoidance

1.4.3.1   Evidence suggests that gannets show strong macro-avoidance of offshore wind farms (e.g. Dierschke *et al.*, 2016; Pavat *et al.*, 2023). Following SNCB advice for the Morgan Generation Assets (see Table 1.1 in APP-055), the collision risk modelling undertaken for the Morgan Generation Assets (and also the Mona Offshore Wind Project and the Morecambe Offshore Windfarm: Generation Assets) incorporated a 70% reduction in the densities incorporated into the modelling to account for the macro-avoidance behaviour exhibited by gannets. This correction was not applied to other projects as part of the respective project-specific assessments undertaken or as part of the in-combination assessments conducted for the Morgan Generation Assets. As the collision risk estimates for other projects were corrected to account for other recent advice on avoidance rates, the resulting collision risk estimates are likely to over-

estimate the risk to gannet from the Grassholm SPA as macro-avoidance behaviour has not been accounted for.

1.4.3.2   Applying a 70% reduction to the collision risk estimates for all other projects would reduce the total in-combination impact (using SNCB parameters for collision risk modelling, an 80% displacement rate and 10% mortality rate) to 120.3 birds. This represents a further 14% reduction on the 140.2 bird impact in paragraph 1.4.2.2 providing a combined 45% reduction when compared to the impact in Table 1.5. An impact of 120.3 birds represents a 4.51% increase in baseline mortality. If applied in isolation, this factor would reduce the in-combination impact by 14%.

1.4.4   Mortality rates

1.4.4.1   Gannets have a large foraging range (mean-maximum of 516.7 km for Grassholm SPA, Woodward *et al.*, 2019) and have a high habitat flexibility (Wade *et al.,* 2016). This suggests that displaced birds would readily find alternative habitats including alternative foraging areas. It is therefore considered unlikely that mortality rates applied as part of the displacement analysis would be at the upper end of the mortality range advised by SNCBs and would be more likely to be towards the lower end of the range. If a 1% mortality rate (using SNCB parameters for collision risk modelling) and an 80% displacement rate was applied, this would reduce the in-combination impact to 19.8 birds (an 84% reduction) representing a 0.74% increase in baseline mortality. If applied in isolation, this factor would reduce the in-combination impact by 71%.

1.4.5   Implications for project alone impact

1.4.5.1   It should be noted that if an apportioning value of 0% in the breeding season was applied to the impact from the Morgan Generation Assets alone, this would reduce the project alone impact on the gannet feature of the Grassholm SPA to 1.1 birds per annum (collision and displacement combined) which represents a 0.04% increase in the baseline mortality of the SPA population. Applying the approach set out in HRA Stage 2 information to support an appropriate assessment Part Three: Special Protection Areas and Ramsar Site assessments (APP-098) would mean that a conclusion of no adverse effect could be reached for the Morgan Generation Assets alone and it would therefore be considered that the Morgan Generation Assets will not contribute to the existing in-combination impact, as the impact predicted for the Morgan Generation Assets is not measurable and is within the limits of natural variation. The impact would be further reduced if a mortality rate of 1% were to be applied (impact of 0.1 birds representing a 0.01% increase in baseline mortality).

Table 1.8:   Changes to the in-combination impact on gannet at the Grassholm SPA as a result of additional factors affecting the assumptions incorporated into the assessment undertaken in Table 1.5.

Step	Factor	Displacement impact (no. of birds)	Collision risk estimate (no. of birds)	Total impact (no. of birds)	Increase in baseline mortality	Difference in isolation (%)	Cumulative difference (%)
-	Impact from Table 1.5	174.3	45.1	219.4	8.22	-	-
1	Apportioning	111.7	28.4	140.2	5.25	-36	-36
2	Macro-avoidance	111.7	8.6	120.3	4.51	-14	-45
3	Mortality rate	11.2	8.6	19.8	0.74	-71	-84

1.5 Conclusion

1.5.1.1 The application of these factors reduces the impact below the thresholds at which an adverse effect would be concluded based on the approach in HRA Stage 2 information to support an appropriate assessment Part Three: Special Protection Areas and Ramsar Site assessments (APP-098).

1.5.1.2 It is therefore concluded that there is no adverse effect on the site integrity of the Grassholm SPA as a result of impacts on the gannet feature of the SPA due to combined collision and displacement impacts from the Morgan Generation Assets, both alone and in-combination with other plans and projects. This conclusion is identical to the conclusion reached in HRA Stage 2 information to support an appropriate assessment Part Three: Special Protection Areas and Ramsar Site assessments (APP-098) and aligned with the conclusion reached by NRW in AS-012.

1.5.1.3 The Applicant considers that HRA Stage 2 information to support an appropriate assessment Part Three: Special Protection Areas and Ramsar Site assessments (APP-098) provides a robust assessment of the potential impacts on the gannet feature of the Grassholm SPA. The additional information presented in this clarification note provides additional evidence to support the conclusion of no AEoI alone and in-combination reached in HRA Stage 2 information to support an appropriate assessment Part Three: Special Protection Areas and Ramsar Site assessments (APP-098).

1.6 References

Dierschke, V., Furness, R.W. & Garthe, S. (2016) Seabirds and offshore wind farms in European waters: avoidance and attraction. Biological Conservation, 202, 59-68.

NatureScot (2018) Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs.

Pavat, D., Harker, A.J., Humphries, G., Keogan, K., Webb, A. and Macleod K. (2023) Consideration of avoidance behaviour of northern gannet (Morus bassanus) in collision risk modelling for offshore wind farm impact assessments. [Online]. Available at: (Accessed January 2024).

Wade, H.M., Masden, E.A., Jackson, A.C. and Furness, R.W. (2016) Incorporating data uncertainty when estimating potential vulnerability of Scottish seabirds to marine renewable energy developments. Marine Policy 70, 108–113. Available online at

Wakefield, E.D., Bodey, T.W., Bearhop, S., Blackburn, J., Colhoun, K., Davies, R., Dwyer, R.G., Green, J.A., Grémillet, D., Jackson, A.L. and Jessopp, M.J. (2013) Space partitioning without territoriality in gannets. Science, 341(6141), pp.68-70.

Woodward, I., Thaxter, C.B., Owen, E. and Cook, A.S.C.P. (2019) Desk-based revision of seabird foraging ranges used for HRA screening. BTO Report 724 for The Crown Estate.

Appendix A: PVA input log

A.1   Set up

The log file was created on: 2025-01-10 16:53:53 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"
```

A.2   Basic information

This run had reference name "Gannet_Grassholm_SNCB".
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: 15.
Years for burn-in: 5.
Case study selected: None.

A.3   Baseline demographic rates

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

A.3.1   Population 1

Initial population values: Initial population 38398 in 2024

Productivity rate per pair: mean: 0.766 , sd: 0.051

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

A.4　　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

A.4.1　　Impact on Demographic Rates

A.4.1.1　　Scenario A - Name: GX_Grassholm_80_10

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.006656595 , se: NA

A.4.1.2　　Scenario B - Name: GX_Grassholm_60_1

All subpopulations

Impact on productivity rate mean: 0 , se: NA

Impact on adult survival rate mean: 0.001764792 , se: NA

A.5　　Output:

First year to include in outputs: 2030
Final year to include in outputs: 2065
How should outputs be produced, in terms of ages?: breeding.adults
Target population size to use in calculating impact metrics: NA
Quasi-extinction threshold to use in calculating impact metrics: NA