Addendum to the
Natura Impact Statement

NISA
North Irish Sea Array

Volume 2: Appendices

Appendix A20
Offshore and Intertidal Ornithology Population Viability Analysis

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Appendix A20 Offshore Ornithology Population Viability Analysis

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Contents

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Acronyms

Term	Definition
CEA	Cumulative Effects Assessment
CGR	Counterfactual of Population Growth Rate
CPS	Counterfactual of Population Size
CRM	Collision Risk Modelling
DAS	Digital Aerial Survey
ECC	Export Cable Corridor
NIS	Natura Impact Statement
NISA	North Irish Sea Array
NWIS	North West Irish Sea
OWF	Offshore Wind Farm
PVA	Population Viability Analysis
RFI	Request for Further Information
SD	Standard Deviation
SPA	Special Protection Area

1 Introduction

1.1.1 North Irish Sea Array Windfarm Ltd (NISA, hereafter referred to as 'the Developer') has been considering the Request for Further Information (RFI) issued by An Bord Pleanála (now An Coimisiún Pleanála) as well as the third-party submissions received following public consultation. At An Coimisiún Pleanála's behest, the Developer has also continued to consult with stakeholders in respect of the 2024 planning application throughout 2024-2026. The Developer has refined elements of the design to respond to the third-party submissions, the continued public and stakeholder consultation and the RFI. Amendments are therefore required to Appendix 13 Offshore Ornithology Population Viability Analysis of the 2024 Natura Impact Statement (NIS). Full details of consultation undertaken can be found in Appendix A2 of the SISAA.

1.1.2 For the purpose of clarity, this document shall be read in conjunction with Appendix 13 Offshore Ornithology Population Viability Analysis submitted as part of the 2024 NIS.

1.1.3 Any cross reference to a chapter, section, table, image, figure or appendix within this document is to another location within the Addendum to the NIS unless explicitly stated otherwise. Any cross reference to anything included in the 2024 NIS will be clearly labelled as such.

1.1.4 Text in bold is only used throughout this document to indicate where changes are required, and why they are required. Text in italics is text from a section of the 2024 NIS which is deleted, or quotations from other documents (as explicitly stated). Replacement text is in normal font.

1.1.5 Tables which have been updated from the 2024 NIS, or entirely new tables, have been included in the Addendum to the NIS. These can be identified by the "A" prefix in the caption. Any changes within an updated table, in comparison to tables within the 2024 NIS, are indicated by grey shading in the relevant cell, column or row, as necessary.

1.1.6 The sections relevant to Appendix A20 Offshore Population Viability Analysis in the RFI are included below.

RFI Section	RFI	Relevance to Chapter
1 (b)	The scientific information provided as part of the planning application documentation should be based on up-to-date survey reports and data. Accordingly, the applicant is requested to confirm/provide justification/verification that the information submitted in support of the planning application remains relevant and appropriate at the point of submitting further information or to update same as required.	The timeframes associated with the RFI have required a review of the datasets used in the 2024 NIS to ensure that any necessary updates to the baseline environment are captured. The introduction of the Projected Footprint of Infrastructure (PFI)[1] has established a new study area and therefore baseline for the ornithology assessments. As a result, updated density estimates for this area have been modelled for use in the Collision Risk Model (CRM) and updated abundances in the PFI have been used for the displacement assessment. In addition, 12 further months of Digital Aerial Surveys (DAS) were completed across the full North West Irish Sea (NWIS) Candidate Special Protection Area (cSPA) (hereafter referred to as the NWIS DAS), providing more recent data on the distribution and abundance of birds between September 2024 and August 2025. This data has been combined with the original 29 months of DAS data within the Maritime Area Consent (MAC) boundary (hereafter referred to as the MAC DAS) carried out from May 2020 to September 2022 to produce an updated baseline with a total of 41 months of data.
1 (c)	The applicant is requested to confirm whether any on-going or additional surveying has been carried out since the application was lodged and, if so, the applicant is invited to submit any further survey data results and analysis and update the planning application documentation, as appropriate.	Additional ornithological surveys have been undertaken since submission of the Application. These additional surveys are described in Section 5.4 of the NIS.

[1]The PFI represents a defined ornithology study sub-area within the overall array area, where all permanent offshore array infrastructure will be located. The PFI has been developed following design refinements to minimise spatial overlap with sensitive receptors and occupies just 57.7 km², representing 2.5% of the NWIS cSPA.

8 (a)	The applicant has used the Ireland-wide populations of Black-headed Gull *Ichthyaetus ridibundus* and Common (Mew) Gull *Larus canus*, resulting in an overestimation of the reference population which may be affected by the project and, therefore, underestimation of potential impacts. The applicant is requested to apply more appropriate regional population estimates to these species and revise the baseline and assessment accordingly.	The reference population for common gull has been updated within Appendix A14 Offshore and Intertidal Ornithology Technical Baseline. These updated reference populations have also been used for common gull within the NIS Population Viability Analysis (PVA) (Table A1.1) (addressed in Section 1.2).
8 (c)	The Board is satisfied that the applicant has used the industry standard Displacement Matrix approach. However, the Board notes that the applicant has based conclusions in relation to displacement on its preferred rates for displacement and mortality of auks and Northern Gannet (50% displacement and 1% mortality for auks, 70% displacement and 1% mortality for Northern Gannet *Morus bassanus*) instead of on industry recommended rates, and has taken these rates forward to Population Viability Analysis (PVA). The Board queries the applicant's use of preferred rates in relation to auks, due to NISA's close proximity to the coast and to breeding Common Guillemot and Razorbill *Alca torda* colonies (NWIS cSPA, Lambay Island SPA, and Ireland's Eye SPA). The applicant is requested to review the EIAR and NIS to apply rates more appropriate to the location and scale of the development, and in line with industry recommendations (60% displacement and 1-5% mortality for auks; and 70% displacement and 1-3% mortality for Northern Gannet; NatureScot, 2023), to inform assessment and enable comprehensive conclusions. Where impacts with these rates result in a >1% increase in baseline mortality rate, the mortality estimates should be taken forward to PVA.	The Developer acknowledges the board queries and has assessed displacement for gannet and auks using the displacement and mortality rates advised in NatureScot (2023) Guidance Note 8. This has been updated within Appendix A17 Offshore and Intertidal Ornithology Displacement Analysis and the NIS. Therefore, species have been taken forward for PVA where the updated impacts exceed 1% increase in baseline mortality (addressed in Section 1.3).
8 (d)	Impacts on birds in the CEA (Section 15.9 of Chapter 15, and Chapter 38) are presented and assessed against annual populations only. Having regard to points a(vii) Regional Breeding Population and c(i) Displacement Methodology above, the applicant is requested to revise the CEA to ensure	The Developer has undertaken a re-assessment of CEA which includes both the breeding and non-breeding seasons impacts within Chapter 15 Offshore and Intertidal Ornithology, however the same approach is not required in the NIS because the population size of each SPA remains constant across bio-seasons.

	impacts are presented and assessed against the breeding and non-breeding season populations separately.	Therefore, PVA has only been carried out for the annual total impact within the NIS.

1.2 Project Background

1.2.1 There are no changes to this section. Refer to Section 1.1 of Appendix 13 of the 2024 NIS.

1.3 Population Viability Analysis

1.3.1 **The PVA has been updated to reflect new abundance estimates due to the introduction of the Projected Footprint of Infrastructure (PFI) and additional site-specific DAS monitoring of the NWIS cSPA (NWIS DAS) undertaken in response to RFI 1(b). In response to RFI 8 (c), the displacement assessment was also updated to apply the NatureScot displacement and mortality rates.**

1.3.2 **In addition, the Cumulative Effects Assessment (CEA) was revised to include updated project impacts in response to RFI 5. These updates resulted in predicted in-combination impacts for lesser black-backed gull and red-throated diver (when considered alongside other projects) exceeding a 1% increase in baseline mortality, thereby triggering the need for PVA for these additional species.**

1.3.3 **The following paragraph of Appendix 13 Offshore Population Viability Analysis shall be deleted:**

- *This report provides the modelling methodology and results using SPA populations (as presented in the technical baseline). PVA was carried out for the following species, for which predicted impacts exceeded a 1% increase in baseline mortality at a specific SPA (see Table 1.1):*
  - *Common guillemot (Uria aalge);*
  - *Herring gull (Laurs argentatus);*
  - *Kittiwake (Rissa tridactyla); and*
  - *Razorbill (Alca torda).*

1.3.4 **And be replaced with:**

1.3.5 This report provides the modelling methodology and results using SPA populations (as presented in the technical baseline). PVA was carried out for the following species, for which predicted impacts exceeded a 1% increase in baseline mortality (the threshold above which population modelling is required to assess the effect on the population) at a specific SPA (see Table A1.1):

- Common guillemot (*Uria aalge*);
- Herring gull (*Laurs argentatus*);
- Kittiwake (*Rissa tridactyla*);
- Puffin (*Fratercula arctica);*
- Lesser black-backed gull (*Larus fuscus*);
- Razorbill (*Alca torda*); and
- Red-throated diver (*Gavia stellata*).

1.3.6 The following Table A1.1 replaces Table 1-1, so that it presents the most recent reference populations for each SPA.

Table A1.1 Initial SPA Population Sizes. Not applicable (NA) either due to the species not being a QI or impacts were not predicted to exceed the 1% increase in baseline mortality threshold. Two NWIS cSPA population sizes were assessed as part of the PVA. Further details are provided in the NIS (replaces Table 1.1 of Appendix 13 of the 2024 NIS).

Species	Howth Head SPA	Ireland's Eye SPA	Lambay Island SPA	Saltee Islands SPA	NWIS cSPA (citation)	NWIS cSPA (DAS)
Common guillemot	NA	5,051	59,610	35,420	66,166	326,565
Herring gull	NA	1,394	NA	NA	6,893	26,355
Kittiwake	1,290	788	4,446	NA	2,858	4,664
Puffin	NA	NA	144	NA	NA	NA
Lesser black-backed gull	NA	NA	1,158	NA	NA	3,419
Razorbill	NA	1,706	6,366	NA	27,025	131,615
Red-throated diver	NA	NA	NA	NA	2,140	1,512

1.3.7 **There are no further changes to this section. Refer to Section 1.3 of Appendix 13 of the 2024 NIS.**

2 Methodology

2.1 Guidance and Models

2.1.1 There are no changes to this section. Refer to Section 2.1 of Appendix 13 of the 2024 NIS.

2.2 PVA Modelling Approach And Demographic Parameters

Simulation Type

2.2.1 There are no changes to this section. Refer to Section 2.2 of Appendix 13 of the 2024 NIS.

Demographic Parameters

2.2.2 In response to RFI 1 (b) and 8 (d), the key change in this section is the updated use of the Horswill and Robinson (2015) demographic rates as well as the inclusion of lesser black-backed gull and red-throated diver (Table A2 1). All parameters were derived solely from Horswill and Robinson (2015), resulting only in very minor changes (Table A2 1). In some cases, values were also updated to include additional decimal places for consistency and precision. This approach is in line with recently submitted Scottish projects (Muir Mhòr, Caledonia and Ossian) and NatureScot Guidance Note 11 (NatureScot, 2023).

2.2.3 The following paragraph of Appendix 13 Offshore Population Viability Analysis shall be deleted:

- *The input parameters for each species are provided as default within the tool. These are predominately based on those presented in Horswill and Robinson (2015) (Table 2.1).*

2.2.4 And be replaced with:

2.2.5 The input parameters were taken from Horswill and Robinson (2015), where standard deviation (SD) is absent from this report, the standard error has been used instead, in line with recently submitted Scottish projects and NatureScot guidance (2023) (Table A2.1). Natural England and Natural Resources Wales have issued an interim advice note on demographic rates, EIA-scale mortality, and reference populations for use in offshore wind impact assessments. In this advice, the immature survival rates were revised to reflect that some Horswill and Robinson (2015) values are not age-specific; instead, they represent survival across multiple immature years. These updates have been highlighted within Table A2.1 accordingly.

Table A2.1 Summary of demographic rates for PVA species. Source: Horswill and Robinson (2015) unless otherwise specified.

Demographic Parameter	Common guillemot	Herring gull	Lesser black-backed gull	Puffin	Kittiwake	Razorbill	Red-throated diver
Adult survival	0.939 (0.015)	0.834 (0.034)	0.885 (0.022)	0.906 (0.083)	0.854 (0.051)	0.895 (0.067)	0.840 (0.074)
Productivity (SD) (per pair)	0.672 (0.147)	0.920 (0.477)	0.530 (0.325)	0.617 (0.151)	0.690 (0.296)	0.570 (0.247)	0.571 (0.222)
Age of recruitment	6	5	5	5	4	5	3
Brood size (per pair)	1	3	3	1	2	1	2
Survival 0-1	0.560 (0.013)	0.798 (0.092)	0.820 (0.022)	0.709 (0.022)	0.790 (0.051)	0.794 (0.209)	0.600 (0.074)
Survival 1-2	0.792 (0.034)	0.834 (0.034)	0.885 (0.022)	0.709 (0.022)	0.854 (0.051)	0.794 (0.209)	0.620 (0.074)
Survival 2-3	0.917 (0.022)	0.834 (0.034)	0.885 (0.022)	0.76 (0.019)	0.854 (0.051)	0.895 (0.067)	0.840 (0.074)
Survival 3-4	0.939 (0.015)	0.834 (0.034)	0.885 (0.022)	0.805 (0.017)	0.854 (0.051)	0.895 (0.067)	
Survival 4-5	0.939 (0.015)	0.834 (0.034)	0.885 (0.022)		-	0.895 (0.067)	
Survival 5-6	0.939 (0.015)	-	-		-	-	

2.2.6 There are no further changes to this section. Refer to Section 2.2 of Appendix 13 of the 2024 NIS.

3 Impacts Assessed

3.1 Magnitude of Impact

3.1.1 **All impact values and tables in this Section have been updated. These changes arise from the updates described in the introduction and methodology, primarily (1) the introduction of the PFI and (2) the addition of the NWIS DAS data, which are primarily in response to RFI 1 (b). As a result, the baseline (mean peak abundance and monthly average densities in the PFI) as well as the resulting mortality and impact on adult survival rate have been updated since the 2024 NIS. The results section is therefore entirely new, including the tables, with all values updated accordingly. As such, grey shading has not been used considering every entry has been updated.**

3.1.2 Each impact scenario has an associated mortality resulting from the presence of WTGs, through collision risk and/or displacement effects. This additional mortality reduces adult survival rates and is used to determine the magnitude of impact on each SPA population under the different scenarios. The model used relative harvest which was calculated using the predicted mortalities apportioned to the site and the initial population size (see Table A1.1). These scenarios are presented in Table A3.1 to Table A3.8.

3.1.3 In addition, alternative approaches to defining bio-seasons are presented for both guillemot, kittiwake and razorbill based on site-specific survey data. For kittiwake, the migration-free breeding season (May to July) defined by Furness (2015) is included as an additional scenario. For both guillemot and razorbill, the 2025 breeding season excludes July 2025, reflecting trends observed in the site-specific dataset. Both approaches are described in detail within Appendix A14: Offshore and Intertidal Ornithology Technical Baseline.

Table A3.1 Common guillemot displacement magnitude of impact (replaces Table 3.2 of Appendix 13 of the 2024 NIS).

Scenario (Population)			Annual mortalities	Impact on adult survival rate
Ireland's Eye SPA (Furness Approach to bio-seasons) (5,051)	50%, 1%	Project alone	2.05	0.000
		In-combination	11.24	0.002
	60%, 1%,3%	Project alone	5.62	0.001
		In-combination	34.59	0.007
	60%, 3%,5%	Project alone	10.54	0.002
		In-combination	61.56	0.012
Ireland's Eye SPA (Site-specific Approach to bio-seasons) (5,051)	50%, 1%	Project alone	0.90	0.000
		In-combination	10.09	0.002
	60%, 1%,3%	Project alone	1.27	0.000
		In-combination	30.24	0.006
	60%, 3%,5%	Project alone	3.42	0.001
		In-combination	54.45	0.011
Lambay Island SPA (Furness Approach to bio-seasons) (59,610)	50%, 1%	Project alone	47.41	0.001
		In-combination	130.64	0.002
	60%, 1%,3%	Project alone	146.90	0.002
		In-combination	390.64	0.007
	60%, 3%,5%	Project alone	260.69	0.004

Scenario (Population)			Annual mortalities	Impact on adult survival rate
		In-combination	704.19	0.012
Lambay Island SPA (Site-specific Approach to bio-seasons) (59,610)	50%, 1%	Project alone	13.40	0.000
		In-combination	96.63	0.002
	60%, 1%,3%	Project alone	21.53	0.000
		In-combination	265.27	0.004
	60%, 3%,5%	Project alone	53.69	0.001
		In-combination	497.19	0.008
Saltee Islands SPA (Furness Approach to bio-seasons) (35,420)	50%, 1%	Project alone	2.89	0.000
		In-combination	15.54	0.000
	60%, 1%,3%	Project alone	3.47	0.000
		In-combination	31.81	0.001
	60%, 3%,5%	Project alone	10.41	0.000
		In-combination	69.11	0.002
Saltee Islands SPA (Site-specific Approach to bio-seasons) (35,420)	50%, 1%	Project alone	3.25	0.000
		In-combination	15.90	0.000
	60%, 1%,3%	Project alone	3.90	0.000
		In-combination	32.23	0.001
	60%, 3%,5%	Project alone	11.69	0.000
		In-combination	70.39	0.002
NWIS cSPA (regional) (Furness Approach to bio-seasons) (465,111)	50%, 1%	Project alone	175.42	0.000
	60%, 1%,3%	Project alone	406.33	0.001
	60%, 3%,5%	Project alone	827.34	0.002
NWIS cSPA (regional) (Site-specific Approach to bio-seasons) (465,111)	50%, 1%	Project alone	110.31	0.000
	60%, 1%,3%	Project alone	144.22	0.000
	60%, 3%,5%	Project alone	408.95	0.001
NWIS cSPA (citation) (Furness Approach to bio-seasons) (66,166)	50%, 1%	Project alone	175.42	0.003
	60%, 1%,3%	Project alone	406.33	0.006
	60%, 3%,5%	Project alone	827.34	0.013
NWIS cSPA (citation) (Site-specific Approach to bio-seasons) (66,166)	50%, 1%	Project alone	110.31	0.002
	60%, 1%,3%	Project alone	144.22	0.002
	60%, 3%,5%	Project alone	408.95	0.006
NWIS cSPA (DAS) (Furness Approach to bio-seasons) (326,565)	50%, 1%	Project alone	175.42	0.001
	60%, 1%,3%	Project alone	406.33	0.001
	60%, 3%,5%	Project alone	827.34	0.003
NWIS (DAS) (Site-specific Approach to bio-seasons) (326,565)	50%, 1%	Project alone	110.31	0.000
	60%, 1%,3%	Project alone	144.22	0.000
	60%, 3%,5%	Project alone	408.95	0.001

Table A3.2 Great black-backed gull collision magnitude of impact (replaces Table 3.3 of Appendix 13 of the 2024 NIS).

Scenario		Mortalities	Impact on adult survival rate
NWIS cSPA (citation) (2,096)	Project alone	13.38	0.006
NWIS cSPA (DAS) (2,148)	Project alone	13.38	0.006

Table A3.3 Herring gull collision magnitude of impact (replaces Table 3.4 of Appendix 13 of the 2024 NIS).

Scenario		Mortalities	Impact on adult survival rate
Ireland's Eye SPA (1,394)	Project alone	0.22	0.000
	In-combination	3.35	0.002
NWIS cSPA (citation) (6,893)	Project alone	42.35	0.006

Table A3.4 Kittiwake displacement and collision magnitude of impact.

Scenario		Mortalities	Annual mortalities	Impact on adult survival rate
Howth Head Coast SPA (Furness Approach to bio-seasons) (3,600)	30%, 1%	Project alone	0.16	0.000
		In-combination	1.81	0.001
	30%, 3%	Project alone	0.49	0.000
		In-combination	5.44	0.002
	Collision	Project alone	0.57	0.000
		In-combination	9.57	0.003
Howth Head Coast SPA (Site-specific Approach to bio-seasons) (3,600)	30%, 1%	Project alone	0.12	0.000
		In-combination	1.77	0.000
	30%, 3%	Project alone	0.36	0.000
		In-combination	5.31	0.001
	Collision	Project alone	0.33	0.000
		In-combination	9.33	0.003
Ireland's Eye SPA (Furness Approach to bio-seasons) (788)	30%, 1%	Project alone	0.05	0.000
		In-combination	0.71	0.001
	30%, 3%	Project alone	0.14	0.000
		In-combination	2.13	0.003
	Collision	Project alone	0.16	0.000
		In-combination	3.22	0.004
Ireland's Eye SPA (Site-specific Approach to bio-seasons) (788)	30%, 1%	Project alone	0.03	0.000
		In-combination	0.70	0.001
	30%, 3%	Project alone	0.10	0.000
		In-combination	2.09	0.003
	Collision	Project alone	0.09	0.000
		In-combination	3.15	0.004
Lambay Island SPA	30%, 1%	Project alone	0.82	0.000
		In-combination	3.19	0.001

Scenario		Mortalities	Annual mortalities	Impact on adult survival rate
(Furness Approach to bio-seasons) (4,446)	30%, 3%	Project alone	2.45	0.001
		In-combination	9.56	0.002
	Collision	Project alone	2.88	0.001
		In-combination	13.72	0.003
Lambay Island SPA (Site-specific Approach to bio-seasons) (4,446)	30%, 1%	Project alone	0.56	0.000
		In-combination	2.93	0.001
	30%, 3%	Project alone	1.67	0.000
		In-combination	8.79	0.002
	Collision	Project alone	1.55	0.000
		In-combination	12.39	0.003
NWIS cSPA (citation) (Furness Approach to bio-seasons) (2,858)	30%, 1%	Project alone	5.66	0.002
	30%, 3%	Project alone	16.98	0.006
	Collision	Project alone	17.89	0.006
NWIS cSPA (citation) (Site-specific Approach to bio-seasons) (2,858)	30%, 1%	Project alone	6.41	0.002
	30%, 3%	Project alone	19.22	0.007
	Collision	Project alone	17.88	0.006
NWIS cSPA (DAS) (Furness Approach to bio-seasons) (4,664)	30%, 1%	Project alone	5.66	0.001
	30%, 3%	Project alone	16.98	0.004
	Collision	Project alone	17.89	0.004
NWIS (DAS) (Site-specific Approach to bio-seasons) (4,664)	30%, 1%	Project alone	6.41	0.001
	30%, 1%	Project alone	19.22	0.004
	Collision	Project alone	17.88	0.004

Table A3.5 Lesser black-backed gull collision magnitude of impact (replaces Table 3.4 of Appendix 13 of the 2024 NIS)..

Scenario		Mortalities	Impact on adult survival rate
Lambay Island SPA (690)	Project alone	0.18	0.000
	in-combination	4.31	0.004

Table A3.6 Puffin displacement magnitude of impact.

Scenario (Population)			Annual mortalities	Impact on adult survival rate
Lambay Island SPA (144)	50%, 1%	Project alone	0.03	0.000
		In-combination	0.06	0.000
	60%, 1%,3%	Project alone	0.12	0.001
		In-combination	0.20	0.001
	60%, 3%,5%	Project alone	0.20	0.001
		In-combination	0.34	0.002

Table A3.7 Razorbill displacement magnitude of impact.

Scenario (Population)			Mortalities	Impact on adult survival rate
Ireland's Eye SPA (Furness Approach to bio-seasons) (1,706)	50%, 1%	Project alone	0.34	0.001
		In-combination	3.80	0.002
	60%, 1%,3%	Project alone	0.98	0.001
		In-combination	7.42	0.004
	60%, 3%,5%	Project alone	1.79	0.002
		In-combination	16.53	0.010
Ireland's Eye SPA (Site-specific Approach to bio-seasons) (1,706)	50%, 1%	Project alone	0.14	0.000
		In-combination	3.59	0.002
	60%, 1%,3%	Project alone	0.25	0.000
		In-combination	6.70	0.004
	60%, 3%,5%	Project alone	0.58	0.000
		In-combination	15.32	0.009
Lambay Island SPA (Furness Approach to bio-seasons) (6,366)	50%, 1%	Project alone	2.85	0.000
		In-combination	11.38	0.002
	60%, 1%,3%	Project alone	9.15	0.001
		In-combination	26.87	0.004
	60%, 3%,5%	Project alone	15.98	0.003
		In-combination	54.18	0.009
Lambay Island SPA (Site-specific Approach to bio-seasons) (6,366)	50%, 1%	Project alone	0.84	0.000
		In-combination	9.37	0.001
	60%, 1%,3%	Project alone	1.91	0.000
		In-combination	19.62	0.003
	60%, 3%,5%	Project alone	9.37	0.001
		In-combination	42.11	0.007
Saltee Islands SPA (7,921)	50%, 1%	Project alone	0.18	0.000
		In-combination	4.68	0.001
	60%, 1%,3%	Project alone	0.22	0.000
		In-combination	6.60	0.001
	60%, 3%,5%	Project alone	0.66	0.000
		In-combination	17.84	0.002
NWIS cSPA (citation) (Furness Approach to bio-seasons) (27,025)	50%, 1%	Project alone	40.70	0.002
	60%, 1%,3%	Project alone	62.20	0.002
	60%, 3%,5%	Project alone	159.90	0.006
NWIS cSPA (citation) (Site-specific Approach to bio-seasons) (27,025)	50%, 1%	Project alone	36.06	0.001
	60%, 1%,3%	Project alone	45.37	0.002
	60%, 3%,5%	Project alone	131.91	0.005
NWIS cSPA (DAS) (Furness Approach to bio-seasons) (131,615)	50%, 1%	Project alone	40.70	0.000
	60%, 1%,3%	Project alone	62.20	0.000
	60%, 3%,5%	Project alone	159.90	0.001
NWIS cSPA (DAS) (Site-specific Approach to bio-seasons) (131,615)	50%, 1%	Project alone	36.06	0.000
	60%, 1%,3%	Project alone	45.37	0.000
	60%, 3%,5%	Project alone	131.91	0.001

Table A3.8 Red-throated diver displacement magnitude of impact.

Scenario			Mortalities	Impact on adult survival rate
NWIS cSPA (DAS) (1,512)	90%, 1%	Project alone	4.06	0.003
	100%, 1%	Project alone	4.51	0.003

4 PVA Results

4.1 Introduction

4.1.1 **All impact values in this Section have been updated. These changes arise from the updates described in the introduction and methodology, primarily (1) the introduction of the PFI and (2) the addition of the NWIS DAS data, primarily in response to RFI 1 (b). As a result, the baseline (mean peak abundance and monthly average densities in the PFI) as well as the resulting mortality and impact on adult survival rate have been updated since the 2024 NIS. The results section is therefore entirely new, with all values and tables, updated accordingly. As such grey shading has not been used considering every entry has been updated.**

4.1.2 The outputs of the Seabird PVA Tool are set out in Table A 4.1 to Table A 4.8 below for all species for each SPA. The main metric used to summarise the PVA results are based on the counterfactual of population growth rate (CGR) calculated as the median of the ratio of the annual growth rate of the impacted to un-impacted population. This is also expressed as a percentage decrease. Where the CGR for an impact is above 0.995 (or a reduction in the population growth rate below 0.5%), the level of change would not have any meaningful effect on the population growth rate over the long term. When the impacts are below 0.995 population trends are further considered to determine population impact (further detail on the approach to analysing PVA outputs is provided in the NIS).

4.2 Common Guillemot

Ireland's Eye SPA

Table A4.1 Metrics and counterfactuals for 5000 simulations over 35 years of the guillemot PVA at Ireland's Eye SPA. CGR highlighted in orange are below 0.995 (replaces Table 4.1 of Appendix 13 of the 2024 NIS).

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.984	0.045%	1.649%
	60%, 1%,3%	0.999	0.956	0.125%	4.431%
	60%, 3%,5%	0.998	0.920	0.233%	8.041%
In-combination	50%, 1%	0.998	0.915	0.250%	8.532%
	60%, 1%,3%	0.992	0.758	0.764%	24.157%
	60%, 3%,5%	0.986	0.610	1.365%	39.015%
Project Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.995	0.015%	0.542%
	60%, 1%,3%	1.000	0.991	0.025%	0.928%
	60%, 3%,5%	0.999	0.973	0.074%	2.708%
In-combination	50%, 1%	0.998	0.924	0.222%	7.603%
	60%, 1%,3%	0.993	0.786	0.667%	21.437%
	60%, 3%,5%	0.988	0.646	1.205%	35.402%

Lambay Island SPA

Table A4.2 Metrics and counterfactuals for 5000 simulations over 35 years of the guillemot PVA at Lambay Island SPA. CGR highlighted in orange are below 0.995 (replaces Table 4.2 of Appendix 13 of the 2024 NIS).

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	50%, 1%	0.999	0.968	0.090%	3.170%
	60%, 1%,3%	0.997	0.905	0.276%	9.462%
	60%, 3%,5%	0.995	0.838	0.489%	16.185%
In-combination	50%, 1%	0.998	0.915	0.246%	8.467%
	60%, 1%,3%	0.993	0.767	0.733%	23.265%
	60%, 3%,5%	0.987	0.620	1.321%	38.048%
Project Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.991	0.025%	0.898%
	60%, 1%,3%	1.000	0.986	0.040%	1.435%
	60%, 3%,5%	0.999	0.964	0.101%	3.557%
In-combination	50%, 1%	0.998	0.937	0.181%	6.321%
	60%, 1%,3%	0.995	0.836	0.498%	16.433%
	60%, 3%,5%	0.991	0.714	0.933%	28.638%

Saltee Islands SPA

Table A4.3 Metrics and counterfactuals for 5000 simulations over 35 years of the guillemot PVA at Saltee Islands SPA.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.997	0.009%	0.339%
	60%, 1%,3%	1.000	0.996	0.011%	0.405%
	60%, 3%,5%	1.000	0.988	0.033%	1.153%
In-combination	50%, 1%	1.000	0.982	0.049%	1.753%
	60%, 1%,3%	0.999	0.964	0.100%	3.553%
	60%, 3%,5%	0.998	0.924	0.218%	7.573%
Project Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.996	0.011%	0.401%
	60%, 1%,3%	1.000	0.995	0.014%	0.483%
	60%, 3%,5%	1.000	0.986	0.038%	1.369%
In-combination	50%, 1%	0.999	0.982	0.050%	1.819%
	60%, 1%,3%	0.999	0.964	0.102%	3.599%
	60%, 3%,5%	0.998	0.923	0.223%	7.710%

NWIS (regional) SPA

Table A4.4 Metrics and counterfactuals for 5000 simulations over 35 years of the guillemot PVA at NWIS (regional) SPA.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.985	0.042%	1.506%
	60%, 1%,3%	0.999	0.965	0.098%	3.462%
	60%, 3%,5%	0.998	0.931	0.199%	6.916%
Project Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.990	0.027%	0.953%
	60%, 1%,3%	1.000	0.988	0.035%	1.243%
	60%, 3%,5%	0.999	0.965	0.098%	3.482%

NWIS (citation) SPA

Table A4.5 Metrics and counterfactuals for 5000 simulations over 35 years of the guillemot PVA at NWIS (citation) SPA. CGR highlighted in orange are below 0.995.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	50%, 1%	0.997	0.899	0.296%	10.128%
	60%, 1%,3%	0.993	0.780	0.687%	21.967%
	60%, 3%,5%	0.986	0.602	1.399%	39.789%
Project Approach to bio-seasons					
Project alone	50%, 1%	0.998	0.935	0.187%	6.500%
	60%, 1%,3%	0.998	0.916	0.244%	8.405%
	60%, 3%,5%	0.993	0.779	0.691%	22.108%

NWIS (DAS) SPA

Table A4.6 Metrics and counterfactuals for 5000 simulations over 35 years of the guillemot PVA at NWIS (DAS) SPA.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	50%, 1%	0.999	0.979	0.060%	2.142%
	60%, 1%,3%	0.999	0.951	0.139%	4.882%
	60%, 3%,5%	0.997	0.903	0.283%	9.716%
Project Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.986	0.038%	1.356%
	60%, 1%,3%	1.000	0.982	0.050%	1.764%
	60%, 3%,5%	0.999	0.951	0.140%	4.917%

4.3 Great black-backed gull

NWIS (citation) SPA

Table A4.7 Metrics and counterfactuals for 5000 simulations over 35 years of the great black-backed gull PVA at NWIS (citation) SPA. CGR highlighted in orange are below 0.995.

Scenario	CGR	CPS	Difference in GR (%)	Difference in PS (%)
Project alone	0.993	0.770	0.723%	23.045%

NWIS (DAS) SPA

Table A4.8 Metrics and counterfactuals for 5000 simulations over 35 years of the great black-backed gull PVA at NWIS (citation) SPA. CGR highlighted in orange are below 0.995.

Scenario	CGR	CPS	Difference in GR (%)	Difference in PS (%)
Project alone	0.993	0.775	0.705%	22.480%

4.4 Herring Gull

Ireland's Eye SPA

Table A4.9 Metrics and counterfactuals for 5000 simulations over 35 years of the herring gull PVA at Ireland's Eye SPA (replaces Table 4.3 of Appendix 13 of the 2024 NIS).

Scenario	CGR	CPS	Difference in GR (%)	Difference in PS (%)
Project alone	1.000	0.991	0.025%	0.898%
In-combination	0.997	0.903	0.282%	9.665%

NWIS (citation) SPA

Table A4.10 Metrics and counterfactuals for 5000 simulations over 35 years of the herring gull PVA at NWIS (citation) SPA. CGR highlighted in orange are below 0.995.

Scenario	CGR	CPS	Difference in GR (%)	Difference in PS (%)
Project alone	0.993	0.766	0.739%	23.403%

4.5 Kittiwake

Howth Head SPA

Table A4.11 Metrics and counterfactuals for 5000 simulations over 35 years of the kittiwake PVA at Howth Head SPA (replaces Table 4.5 of Appendix 13 of the 2024 NIS).

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	30%, 1%	1.000	0.999	0.002%	0.121%
	30%, 3%	1.000	0.995	0.012%	0.508%
	Collision	1.000	0.994	0.019%	0.633%
In-combination	30%, 1%	0.999	0.979	0.058%	2.110%
	30%, 3%	0.998	0.937	0.182%	6.339%
	Collision	0.997	0.894	0.310%	10.580%
Project Approach to bio-seasons					
Project alone	30%, 1%	1.000	0.999	0.007%	0.142%
	30%, 3%	1.000	0.997	0.011%	0.328%
	Collision	1.000	0.996	0.011%	0.362%
In-combination	30%, 1%	0.999	0.980	0.055%	2.014%
	30%, 3%	0.998	0.941	0.169%	5.889%
	Collision	0.997	0.897	0.301%	10.302%

Ireland's Eye SPA

Table A4.12 Metrics and counterfactuals for 5000 simulations over 35 years of the kittiwake PVA at Ireland's Eye SPA (replaces Table 4.6 of Appendix 13 of the 2024 NIS).

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	30%, 1%	1.000	0.996	0.010%	0.441%
	30%, 3%	1.000	0.993	0.018%	0.744%
	Collision	1.000	0.991	0.029%	0.943%
In-combination	30%, 1%	0.999	0.963	0.107%	3.686%
	30%, 3%	0.997	0.893	0.315%	10.672%
	Collision	0.995	0.841	0.480%	15.859%
Project Approach to bio-seasons					
Project alone	30%, 1%	1.000	0.998	0.010%	0.215%
	30%, 3%	1.000	0.993	0.027%	0.712%
	Collision	1.000	0.996	0.018%	0.393%
In-combination	30%, 1%	0.999	0.965	0.095%	3.480%
	30%, 3%	0.997	0.894	0.314%	10.578%
	Collision	0.995	0.845	0.467%	15.544%

Lambay Island SPA

Table A4.13 Metrics and counterfactuals for 5000 simulations over 35 years of the kittiwake PVA at Lambay Island SPA (replaces Table 4.7 of Appendix 13 of the 2024 NIS).

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	30%, 1%	1.000	0.993	0.021%	0.691%
	30%, 3%	0.999	0.978	0.061%	2.228%
	Collision	0.999	0.973	0.074%	2.696%
In-combination	30%, 1%	0.999	0.971	0.084%	2.899%
	30%, 3%	0.997	0.913	0.253%	8.681%
	Collision	0.996	0.876	0.365%	12.400%
Project Approach to bio-seasons					
Project alone	30%, 1%	1.000	0.995	0.013%	0.480%
	30%, 3%	1.000	0.985	0.044%	1.509%
	Collision	1.000	0.984	0.042%	1.557%
In-combination	30%, 1%	0.999	0.972	0.079%	2.753%
	30%, 3%	0.998	0.920	0.235%	7.999%
	Collision	0.997	0.889	0.328%	11.081%

NWIS (citation) SPA

Table A4.14 Metrics and counterfactuals for 5000 simulations over 35 years of the kittiwake PVA at NWIS (citation) SPA. CGR highlighted in orange are below 0.995.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	30%, 1%	0.998	0.917	0.238%	8.304%
	30%, 3%	0.993	0.774	0.702%	22.558%
	Collision	0.993	0.764	0.739%	23.605%
Project Approach to bio-seasons					
Project alone	30%, 1%	0.997	0.907	0.268%	9.342%
	30%, 3%	0.992	0.751	0.793%	24.919%
	Collision	0.993	0.766	0.743%	23.391%

NWIS (DAS) SPA

Table A4.15 Metrics and counterfactuals for 5000 simulations over 35 years of the kittiwake PVA at NWIS (DAS) SPA.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	30%, 1%	0.999	0.950	0.144%	5.026%
	30%, 3%	0.996	0.855	0.433%	14.454%
	Collision	0.995	0.848	0.455%	15.151%
Project Approach to bio-seasons					
Project alone	30%, 1%	0.998	0.943	0.163%	5.715%
	30%, 3%	0.995	0.838	0.489%	16.185%
	Collision	0.995	0.850	0.451%	14.962%

4.6 Lesser black-backed gull

Lambay Island SPA

Table A4.16 Metrics and counterfactuals for 5000 simulations over 35 years of the lesser black-backed gull PVA at Lambay Island SPA.

Scenario	CGR	CPS	Difference in GR (%)	Difference in PS (%)
Project alone	1.000	0.992	0.018%	0.775%
In-combination	0.996	0.858	0.425%	14.236%

4.7 Puffin

Table A4.17 Metrics and counterfactuals for 5000 simulations over 35 years of the puffin PVA at Ireland's Eye SPA.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Project alone	50%, 1%	1.000	1.000	0.015%	0.000%
	60%, 1%,3%	0.999	1.000	0.075%	0.000%
	60%, 3%,5%	0.998	0.944	0.166%	5.556%
In-combination	50%, 1%	1.000	1.000	0.029%	0.000%
	60%, 1%,3%	0.998	0.944	0.182%	5.556%
	60%, 3%,5%	0.997	0.913	0.275%	8.696%

4.8 Razorbill

Ireland's Eye SPA

Table A4.18 Metrics and counterfactuals for 5000 simulations over 35 years of the razorbill PVA at Ireland's Eye SPA (replaces Table 4.8 of Appendix 13 of the 2024 NIS). CGR highlighted in orange are below 0.995.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.993	0.019%	0.673%
	60%, 1%,3%	0.999	0.976	0.067%	2.423%
	60%, 3%,5%	0.999	0.958	0.114%	4.195%
In-combination	50%, 1%	0.998	0.915	0.247%	8.487%
	60%, 1%,3%	0.995	0.837	0.493%	16.291%
	60%, 3%,5%	0.989	0.671	1.105%	32.904%
Project Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.998	0.003%	0.173%
	60%, 1%,3%	1.000	0.994	0.014%	0.595%
	60%, 3%,5%	1.000	0.987	0.038%	1.343%
In-combination	50%, 1%	0.998	0.919	0.235%	8.106%
	60%, 1%,3%	0.996	0.852	0.443%	14.770%
	60%, 3%,5%	0.990	0.691	1.023%	30.915%

Lambay Island SPA

Table A4.19 Metrics and counterfactuals for 5000 simulations over 35 years of the razorbill PVA at Lambay Island SPA. CGR highlighted in orange are below 0.995.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.982	0.049%	1.775%
	60%, 1%,3%	0.998	0.943	0.166%	5.704%
	60%, 3%,5%	0.997	0.902	0.288%	9.841%
In-combination	50%, 1%	0.998	0.929	0.206%	7.108%
	60%, 1%,3%	0.995	0.840	0.481%	16.015%
	60%, 3%,5%	0.990	0.704	0.969%	29.645%
Project Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.994	0.017%	0.609%
	60%, 1%,3%	1.000	0.987	0.036%	1.299%
	60%, 3%,5%	0.999	0.975	0.071%	2.525%
In-combination	50%, 1%	0.998	0.941	0.170%	5.918%
	60%, 1%,3%	0.996	0.881	0.353%	11.940%
	60%, 3%,5%	0.992	0.761	0.756%	23.940%

Saltee Islands SPA

Table A4.20 Metrics and counterfactuals for 5000 simulations over 35 years of the razorbill PVA at Saltee Islands SPA.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Project alone	50%, 1%	1.000	0.999	0.005%	0.145%
	60%, 1%,3%	1.000	0.999	0.004%	0.128%
	60%, 3%,5%	1.000	0.996	0.011%	0.407%
In-combination	50%, 1%	0.999	0.976	0.069%	2.392%
	60%, 1%,3%	0.999	0.966	0.097%	3.390%
	60%, 3%,5%	0.997	0.912	0.257%	8.810%

NWIS (citation) SPA

Table A4.21 Metrics and counterfactuals for 5000 simulations over 35 years of the razorbill PVA at NWIS (citation) SPA. CGR highlighted in orange are below 0.995.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	50%, 1%	0.998	0.940	0.171%	6.025%
	60%, 1%,3%	0.997	0.910	0.263%	9.015%
	60%, 3%,5%	0.993	0.783	0.674%	21.665%
Project Approach to bio-seasons					
Project alone	50%, 1%	0.998	0.946	0.155%	5.422%
	60%, 1%,3%	0.998	0.933	0.193%	6.676%
	60%, 3%,5%	0.994	0.818	0.558%	18.245%

NWIS (DAS) SPA

Table A4.22 Metrics and counterfactuals for 5000 simulations over 35 years of the razorbill PVA at NWIS (DAS) SPA.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Furness Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.987	0.036%	1.289%
	60%, 1%,3%	0.999	0.981	0.055%	1.933%
	60%, 3%,5%	0.999	0.951	0.140%	4.907%
Project Approach to bio-seasons					
Project alone	50%, 1%	1.000	0.989	0.031%	1.137%
	60%, 1%,3%	1.000	0.986	0.039%	1.401%
	60%, 3%,5%	0.999	0.960	0.114%	4.033%

4.9 Red-throated diver

NWIS (DAS) SPA

Table A4.23 Metrics and counterfactuals for 5000 simulations over 35 years of the razorbill PVA at NWIS (DAS) SPA.

Scenario		CGR	CPS	Difference in GR (%)	Difference in PS (%)
Project alone	90%, 1%	0.997	0.887	0.342%	11.290%
	100%, 1%	0.996	0.867	0.390%	13.333%

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