FIVE ESTUARIES OFFSHORE WIND FARM

VOLUME 5, REPORT 5.5: GUILLEMOT AND RAZORBILL COMPENSATION - EVIDENCE, SITE SELECTION & ROADMAP – REVISION E (TRACKED)

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In preparation of this document Five Estuaries Wind Farm Ltd has made reasonable efforts to ensure that the content is accurate, up to date and complete for purpose.

Revision	Date	Status/Reason for Issue	Originator	Checked	Approved
A	Mar-24	DCO Application	GoBe	GoBe	VE OWFL
B	Oct-24	Deadline 2	GoBe	GoBe	VE OWFL
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D	Mar-25	Deadline 8	GoBe	GoBe	VE OWFL
E	Sep-25	Decision Period	GoBe	GoBe	VE OWFL

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DEFINITION OF ACRONYMS

Term	Definition
AA	Appropriate Assessment
AEoI	Adverse Effects on Site Integrity
CfD	Contract for Difference
DCO	Development Consent Order
Defra	Department for Environment, Food, and Rural Affairs
EIA	Environmental Impact Assessment
ES	Environmental Statement
ETG	Expert Topic Group
FFC	Flamborough and Filey Coast
HRA	Habitats Regulation Assessment
IND	Individual
IROPI	Imperative reasons of overriding public interest
KM	Kilometres
MRF	Marine Recovery Fund
MW	Megawatts
NE	Natural England
NSIP	Nationally Significant Infrastructure Projects
OWF	Offshore Wind Farm
RIAA	Report to Inform Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCI	Site of Community Importance
SMP	Seabird Monitoring Programme
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
VE	Five Estuaries Offshore Wind Farm
VE OWFL	Five Estuaries Offshore Windfarm Ltd

GLOSSARY OF TERMS

Term	Definition
Development Consent Order	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS) for the Department for Energy Security and Net Zero (DESNZ).
Environmental Statement	Environmental Statement (the documents that collate the processes and results of the EIA).
Export Cable Corridor (ECC)	The area(s) where the export cables will be located.
Habitats Regulation Assessment (HRA)	The assessment of the impacts of implementing a plan or policy on a European Site (as required by the Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended)), the purpose being to consider the impacts of a project against conservation objectives of the site and to ascertain whether it will adversely affect the integrity of the site
Mitigation	Mitigation measures, or commitments, are commitments made by the project to reduce and/or eliminate the potential for significant effects to arise as a result of the project.
NSIP	Nationally Significant Infrastructure Projects are major infrastructure developments in England and Wales which are consented by DCO under the Planning Act 2008. These include proposals for offshore wind farms with an installed capacity over 100MW.
Order Limits	The extent of development including all works, access routes, TCCs, visibility splays and discharge points. (Not Red Line Boundary (RLB))
The Applicant	Five Estuaries Offshore Wind Farm Limited (The Applicant).
Special Area of Conservation (SAC)	A protected site under the Conservation of Habitats and Species Regulations (2017).
Special Protection Area (SPA)	Sites designated under EU Regulations (79/409/EEC) to protect habitats of migratory birds and certain threatened birds under the Birds Directive Regulations.

INTRODUCTION

1.1 BACKGROUND

FIVE ESTUARIES OFFSHORE WIND FARM

1.1.1 Five Estuaries Offshore Wind Farm (VE - hereafter referred to as the 'Applicant') is a proposed extension to the operational Galloper Offshore Wind Farm (OWF). VE would be located approximately 37 kilometres (km) off the coast of Suffolk, England (at its closest point).

1.1.2 As part of the Development Consent Order (DCO) application, Five Estuaries Offshore Windfarm Ltd (VE OWFL) is required to produce a Report to Inform Appropriate Assessment (RIAA) to provide the information required by the Competent Authority in order to undertake its Habitats Regulation Assessment (HRA) and Appropriate Assessment. If the HRA process concludes that Adverse Effects on Integrity (AEoI) cannot be excluded, a derogations process is followed. In the event that no alternative solutions can be found, and if there are imperative reasons of overriding public interest (IROPI), the final stage of the derogations process is to secure measures to compensate for adverse effects on a site.

1.1.3 This document introduces the without prejudice compensation measures that have been identified for guillemot (*Uria aalge*) and razorbill (*Alca torda*) and provides the key evidence to support small scale management measures. The Applicant presented these measures to Natural England during the ETG in September 2023 and it was agreed that small scale management measures at colonies in southwest England would be a suitable option given the low level of impact on guillemot and razorbill by the Project, should the Secretary of State (SoS) conclude adverse effect on integrity guillemot (*Uria aalge*) and razorbill (*Alca torda*) associated the Flamborough and Filey Coast Special Protection Area (SPA).

1.1.4 Guillemot colonies, especially smaller ones, can experience natural fluctuations in population sizes between counts, however the sites shortlisted, although potentially fluctuating in size naturally have been selected either due to recent declines, declines form historical highs or potential for disturbance.

1.1.5 Another option being considered as an alternative to the small scale management measures is participating in the DEFRA strategic compensation scheme and the associated Marine Recovery Fund (MRF). The Secretary of State has approved predator control as strategic compensation and as such the Applicant deems this to be an alternative viable strategic compensation option.

'WITHOUT PREJUDICE' DEROGATION PREPARATION

1.1.6 Stakeholder engagement with Natural England, RSPB and Defra has taken place throughout the derogation and HRA process, primarily through the Section 42 comments and the subsequent ETG in September 2023. The full list of meetings/feedback can be found below. Appendix A (Section 12) also provides a draft version of this document which was provided to the Planning Inspectorate and Natural England for comment in November 2023.

- Section 42 comments: June 2023;

- NE compensation meetings: 22 August 2023, 5 October 2023, 27 November 2023, 15 December 2023, 16 January 2024 and 19th February 2024;
- Offshore Ornithology ETG: 4 September 2023 (Natural England and RSPB in attendance);
- DEFRA meetings: 26 September 2023, 15 November 2023, 17 January 2024;
- Meetings with RSPB in attendance: 15 December 2023, 17 January 2024, 2 February 2024.

1.1.7 Table 1 presents the most recent consultation responses of relevance to this measure, some of the advice has been superseded by the latest developments and advice.

1.1.8 Table 2 sets out how the Applicant is addressing each of the elements of the Natural England (NE) checklist. It should be noted that this document and its contents do not prejudice the outcome of the ongoing HRA process.

1.1.9 In addition, Appendix A (Section 12) includes the previous version of this document which was submitted at PEIR for reference.

Table 1 Consultation responses in relation to guillemot and razorbill compensation.

Consultee	Comment	The Project Response
NE, DAS Advice Letter, December 2023 (DAS/27347/456745)	**<u>Guillemot and Razorbill Compensation – Ecological Evidence and Roadmap (Appendix A – Section 12)</u>** We agree in principle that the proposed approach is proportionate to the level of risk from the project. We welcome the stepwise approach taken and the investigation undertaken to find suitable sites. However, we have some concerns about the small size and limited history of the guillemot colonies currently earmarked in the proposal. The issues impacting these colonies need to be identified to determine what measure(s), if any, can be applied to help mitigate them and enable colony growth. It is also important to be clear regarding whether the colonies identified are designated for their seabird populations, recognising that this can be hard to determine for example, Grower Rock may fall within the Tintagel Cliffs SSSI.	The Applicant took onboard this advice and refined the site selection to larger colonies. All sites were also identified as having no designations for guillemot or razorbill.

Consultee	Comment	The Project Response
NE, DAS Advice Letter, December 2023 (DAS/27347/456745)	We caution that the developers need to be mindful of risks associated with working on small guillemot colonies. Sites or sub colonies supporting 10s rather than 100s of birds are more prone to failure and abandonment due to disturbance and predation. Guillemot colonies typically need to reach a certain size or 'critical mass' before they become secure and productive (Parrish 1995, Ainley et aL. 2021). This is because guillemots rely on collective defence to protect their eggs and chicks (Ainley et al. 2021), and unless the birds lay synchronously with their adjacent neighbours and most of the colony they are less successful (Hatchwell 1991, Murphy & Schauer 1996). Guillemots are reluctant to defend their nesting places unless they have an egg or chick. As a consequence, early layers even at big colonies are vulnerable as the majority of the colony will flush at the approach of a predator or other form of disturbance until laying has begun in earnest (Birkhead 1977, Ainley et al. 2021). Small colonies are especially vulnerable as laying may never be synchronised well enough or among enough neighbours to ever retain an effective collective defence. Some useful insight into establishing/restoring guillemot colonies can be gleaned from the restoration projects attempted on the Californian coast (see Ainley et al. 2021, McChesney et al. 2021).	The Applicant has noted this information, and it will inform final site selection as required should compensation be required.

Consultee	Comment	The Project Response
NE, DAS Advice Letter, December 2023 (DAS/27347/456745)	With these points in mind this compensation method will benefit and more likely succeed at sites where there is habitat available for substantial colony growth and management can be maintained easily. The best chance of success can also be expected to occur at sites with a history of occupation greater than present or sites located reasonably close to large existing colonies where spill over and immigration could be expected to occur more readily than elsewhere (see Ainley et al. 2021, McChesney et al. 2021).	The Applicant notes this point and the sites selected have had larger historical numbers and/or have room for further expansion. The sites are all found on the north coast of Cornwall and Devon so located within spillover or migration of several larger colonies e.g. Lundy
NE, DAS Advice Letter, December 2023 (DAS/27347/456745)	In addition, sites holding historical records would be preferable so that any effect of compensation can be quantified over and above existing trends more perceptively.	The Applicant has taken onboard this information and where possible has supplied historical data for the short listed sites.

Consultee	Comment	The Project Response
PINS Section 51 advice regarding draft application documents submitted by Five Estuaries Offshore Wind Farm Ltd, November 2023	This document describes a roadmap for developing compensation measures post-consent, rather than a developed proposal; no site has been selected or management measures specified. The document should be further developed to provide information relating to the legal, financial, and technical arrangements as required to deliver and secure the measures. The Inspectorate advises that the Applicant should consider the measure(s) against the Natural England compensation checklist. It should be noted that the weight that the ExA places on any proposals for compensatory measures will depend on the extent and detail of the information available to them during examination.	The Applicant has noted this advice, the compensation measure has progressed as far as possible so far, awaiting feedback from landowners to help refine the shortlist of sites further. The Applicant has also included the option to use DEFRA strategic compensation/ the MRF.
NE Expert Topic Group (ETG) comments , September 2023	Natural England suggested looking at colony management measures at small colonies in the south/southwest of England due to the small impacts.	The Applicant noted this advice and has proceeded with this compensation measure.

Table 2 Natural England compensation checklist and the Applicants project status for guillemot and razorbill compensation measures.

	NE Compensation Checklist	Project Status – DBS kittiwake tower
a	What, where, when: clear and detailed statements regarding the location and design of the proposal.	Several colonies in the southwest of England have been shortlisted. This strategy has been agreed with Natural England. The shortlist will be refined after further consultation with landowners.
b	Why and how: ecological evidence to demonstrate compensation for the impacted site feature is deliverable in the proposed locations	Ecological evidence and examples of implementation of mitigation measures for recreational disturbance can be found in Section 3 and Section 6.1.
c	For measures on land, demonstrate that on ground construction deliverability is secured and not just the requirement to deliver in the DCO e.g., landowner agreement is in place. For measures at sea, demonstrate that measures have been secured e.g. agreements with other sea or seabed users.	Landowner engagement is commencing with a view to having agreements in place once the site selection has been finalised, should compensation be required.
d	Policy/legislative mechanism for delivering the compensation (where needed).	The compensation measures would be delivered via agreements with relevant landowners and local organisations/site rangers etc. Should consent be required for signage this would be secured via planning permission if needed.
e	Agreed DCO/DML conditions.	As this is a without prejudice submission and the final site/s are yet to be confirmed a schedule or conditions have not been provided with the application.
f	Clear aims and objectives of the compensation.	The selected site will have enough capacity for more than the required for 4-12 pairs of guillemot and 2 – 6 pairs of razorbill.

	NE Compensation Checklist	Project Status – DBS kittiwake tower
		Alternatively, the Applicant aims to buy in to the Defra strategic compensation measures/ MRF with regards to strategic compensation measures for predator control. The quantum of compensation required can be found in Section 1.2.
g	Mechanism for further commitments if the original compensation objectives are not met – i.e., adaptive management.	The Guillemot and Razorbill Implementation and Monitoring Plan (Volume 5, Report 5.8) outlines proposed adaptive management measures.
h	Clear governance proposals for the post-consent phase – we do not consider simply proposing a steering group is sufficient.	The Applicant has sought to progress and secure the measure as much as possible prior to the submission of the application. This includes detailed evidence of the feasibility of the measure and illustrates that it is securable. Should consent for the project be granted, and compensation be required for guillemot and razorbill, a steering group, to be termed the "Offshore Ornithology Engagement Group" (OOEG) will be convened by the Applicant, pursuant to an appropriate DCO obligation. This group will help steer the delivery of any compensation measure implementation and maintenance, monitoring, reporting, and any other relevant matters as determined by the Applicant in discussion with the OOEG participants.
i	Ensure development of compensatory measures is open and transparent as a matter of public interest, including how information on the compensation would be publicly available.	Evidence and roadmap documents, including the implementation plans have been submitted to PINS as part of the application and are publicly available. Initial road maps have also been consulted on as part of the RIAA consultation.
j	Timescales for implementation especially where compensation is part of a strategic project,	The Applicant has been in contact with landowners regarding disturbance issues at the sites. With no construction works or complex planning applications required for the proposed

	NE Compensation Checklist	Project Status – DBS kittiwake tower
	including how timescales relate to the ecological impacts from the development.	measures it is envisaged that the measures could be in place 3 years before VE is operational.
k	Commitments to ongoing monitoring of measure performance against specified success criteria.	The Applicant will conduct monitoring of the breeding colony within the compensation site to assess the success of the compensation measure. Further details are provided in the implementation and monitoring plan (Volume 5, Report 5, Annex 5.8 Guillemot and Razorbill Implementation and Monitoring Plan.
l	Proposals for ongoing 'sign off' procedure for implementing compensation measures throughout the lifetime of the project, including implementing feedback loops from monitoring.	An adaptive management plan will be developed in due course and form part of the implementation and monitoring plan. This will be progressed via the OOEG and meetings with Natural England and other stakeholders.
m	Continued annual management of the compensation area including to ensure other factors are not hindering the success of the compensation e.g., changes in habitat, increased disturbance as a result of subsequent plans/projects".	Management of the compensation area will be ongoing throughout the lifetime of the OWF where needed. Where there is room for improvements the management strategy will be updated to help maximize the potential of the site.

1.1.10 Two of the species of potential derogation risk for the Applicant are guillemot and razorbill at Flamborough and Filey Coast (FFC) Special Protection Area (SPA).

1.1.11 FFC SPA is 275.5 km away from VE, out with the mean-max foraging (MMF) range + 1 Standard Deviation (SD) for guillemot (153.7 km; Woodward et al., 2019) and razorbill (164.6 km; Woodward et al., 2019), and therefore there is no potential connectivity between FFC SPA and VE during the breeding season. It was agreed with Natural England that guillemot and razorbill was only considered for non-breeding connectivity, and recent decisions on other offshore wind projects (e.g. Hornsea Three, East Anglia One North, East Anglia Two, Norfolk Vanguard and Norfolk Boreas) concluded that AEoI could not be ruled out for guillemot at FFC SPA when considered in-combination with other projects.

1.1.12 Following consultation with Natural England and the RSPB at the ETG in September 2023 it was deemed that the provision of small scale management measures is the most suitable measure for providing compensation of guillemot and razorbill for the Applicant, should the SoS deem it is required. Based on the recent DEFRA announcement regarding the MRF and predator control, the Applicant is also looking at the option of buying into the MRF. Consequently, the Applicant considers both options suitable and therefore both are discussed in this document.

1.1.13 Based on disturbance analysis of the potential impact of VE on guillemot and razorbill, the estimated compensation requirement is low, with 0.82 guillemot mortalities and 0.22 razorbill mortalities.

1.2 AIMS AND OBJECTIVES

1.2.1 This document collates and presents the ecological evidence for management measures for guillemot and razorbill colonies (Section 2: Ecological evidence) and provides a roadmap (Section 3: Roadmap) for compensation development and implementation.

ESTIMATED COMPENSATION QUANTUM

1.2.2 The predicted magnitude of displacement mortality for which compensation is required by the Applicant is 0.82 individuals (1.10 UCI) for guillemot and 0.22 individuals (0.35 UCI) for razorbill at FFC SPA and 0.69 individuals (0.93 UCI) for guillemot at Farne Islands SPA (see Volume 5, Report 5: RIAA; Volume 6, Part 2, Chapter 4: Offshore Ornithology and Volume 6, Part 5, 4.14: Apportioning Note).

1.2.3 ~~There is no accepted~~A methodology to calculate compensation quantum for auks for disturbance measures has been agreed with Natural England. ~~The Applicant has chosen~~ It uses the Hornsea Four calculation method to estimate ~~the potential benefit of measures because it has been used on other consented projects. The method calculates~~ the number of nests required to generate and recruit the ~~number of fledglings that will survive to recruitment age with the necessary~~ required number of adult birds back into the population. This equates to the impact multiplied by the predicted productivity rate, then considering survival until recruitment age, to calculate the number of nests required. However, there are several limitations of this method, which cause it to underestimate the potential gains. For example, it does not consider the potential benefit to productivity provided by disturbance reduction methods.

1.2.4 A range of compensation ratios have been calculated, in previous compensation examples for ~~the sites~~OWFs that have ~~close~~ connectivity with the FFC SPA a compensation ratio of 2:1 has been used, although up to a 3:1 ratio has also been calculated reflecting the fact that the proposed sites ~~may not be within~~ have limited connectivity of FFC SPA. Both the Applicants preferred approach of 50% displacement and 1% mortality rates and Natural England's preferred approach of 70% displacement and 2% mortality rates were used to calculate the quantum.

1.2.5 The compensation quantums for both methods are presented in Table 3 and Table 4, with both the mean and upper confidence intervals (UCI) calculated.

Table 3 Guillemot compensation quantums using the HOW4 approach

SPA	Methods	Applicants Approach 50% & 1%		Natural England's Approach 70% & 2%	
FFC SPA	**Ratio**	**Mean (0.82)**	**UCI (1.10)**	**Mean (2.28)**	**UCI (3.08)**
	1:1	**3.623.48**	4.864.67	**10.089.69**	13.6113.09
	2:1	7.256.96	9.729.34	20.1519.38	27.2226.18
	3:1	10.8710.44	14.5814.01	30.2329.07	40.8339.27
Farne Islands SPA	**Ratio**	**Mean (0.69)**	**UCI (0.93)**	**Mean (1.93)**	**UCI (2.61)**
	1:1	**3.053.10**	4.114.21	**8.538.73**	11.5311.81
	2:1	6.106.20	8.228.42	17.0617.46	23.0723.62
	3:1	9.159.30	12.3312.63	25.5926.19	34.6035.43

Table 4 Razorbill compensation quantums using the HOW4 approach

Methods	Applicants Approach 50% & 1%		Natural England's Approach 70% & 2%	
Ratio	Mean (0.22)	UCI (0.35)	Mean (0.63)	UCI (0.98)
1:1	**0.851.93**	1.363.07	**2.455.52**	3.808.58
2:1	1.713.86	2.726.14	4.8911.04	7.6117.16
3:1	2.565.79	4.089.21	7.3416.56	11.4125.74

1.2.8 The compensation quantum calculation results in Table 3 and Table 4 have been updated as requested by Natural England to include the latest demographic rate advice presented in the 'Interim advice regarding demographic rates, EIA scale mortality rates and reference populations for use in offshore wind impact assessments' published by Natural England and Natural Resources Wales (2024).

~~1.2.8~~1.2.9 Philopatry and natal dispersal rates ~~were also~~ have been accounted for in Table 5 and Table 6. Philopatry refers to fledglings that survive to breeding age and recruit ~~at~~ back to their natal colony, while ~~those~~ the proportion that choose to breed elsewhere are ~~part of the~~considered in the dispersal rate. Using dispersal rates from Horswill and Robinson (2015) for guillemot and from Lavers *et al* (2007) for razorbill, it is possible to predict what proportion of fledglings ~~from the additional required breeding pairs~~produced from the compensation measure will recruit ~~at~~ into the compensation site(s) versus the number that will disperse to other colonies and into the National Site Network (Table 5 and Table 6).

~~1.2.9~~1.2.10 In their Deadline 8 responses [REP8-051] Natural England stated that the quantum provided above and below will be covered by the measures put forward within this roadmap '*Natural England considers that management of recreational disturbance in the south-west has the potential to provide this level of benefit, particularly if undertaken as part of a collaborative or strategic initiative'*. Natural England also stated in their deadline 8 responses that the compensation targets for guillemot and razorbill should be calculated using the mean number at a ratio of 1:1 using the Natural England approach of 70% displacement and 2% mortality.

Table 5 The compensation targets for each scenario and SPA for guillemot and the expected dispersal and recruitment rates.

SPA	Methods	Compensation target (adults recruited into population)	Philopatry rate	Adults expected to recruit into natal colony (philopatry)			Adults expected to disperse away from natal colony (natal dispersal)		
				1:1	2:1	3:1	1:1	2:1	3:1
Flamborough and Filey Coast (FFC)	50%/1%	0.82	0.58	0.5	1.0	1.4	0.3	0.7	1.0
	70%/2%	2.28		1.3	2.6	4.0	1.0	1.9	2.9
Farne Islands (FI)	50%/1%	0.69		0.4	0.8	1.2	0.3	0.6	0.9
	70%/2%	1.93		1.1	2.2	3.4	0.8	1.6	2.4
Total for FFC and FI	50%/1%	1.51		0.9	1.8	2.6	0.6	1.3	1.9
	70%/2%	4.21		2.4	4.9	7.3	1.8	3.5	5.3

Table 6 The compensation targets for each scenario and SPA for razorbill and the expected dispersal and recruitment rates.

SPA	Methods	Compensation target (adults recruited into population)	Philopatry rate	Adults expected to recruit into natal colony (philopatry)			Adults expected to disperse away from natal colony (natal dispersal)		
				1:1	2:1	3:1	1:1	2:1	3:1
Flamborough and Filey Coast (FFC)	50%/1%	0.22	0.17	0.0	0.1	0.1	0.1	0.2	0.3
	70%/2%	0.63		0.1	0.2	0.3	0.3	0.5	0.8

2 FLAMBOROUGH AND FILEY COAST SPA

2.1 OVERVIEW

2.1.1 The FFC SPA was formally designated in July 2018, representing a geographical extension of the existing Flamborough Head and Bempton Cliffs SPA, when several species were added to the citation list.

2.1.2 The extension consists of a landward extension to the north west of the existing SPA to incorporate important breeding colonies of seabirds and marine extensions out to 2 km in order to protect the areas of the sea adjacent to the breeding colonies that are important to the breeding seabirds.

2.1.3 The designation of guillemot and razorbill was based on a breeding population of 41,607 pairs and 10,570 pairs respectively. The latest counts at the site of 111,925 and 45,780 individual guillemot and razorbill, respectively (Clackson *et al.* 2022), show consistent colony growth for both species in excess of 4% per annum.

2.2 CONSERVATION OBJECTIVES

2.2.1 The conservation objectives of the site include:

- Ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive.
- Subject to natural change, to maintain or restore, for each qualifying feature:
  - The extent and distribution of the habitats of the qualifying features;
  - The structure and function of the habitats of the qualifying features;
  - The supporting processes on which the habitats of the qualifying features rely;
  - The populations of the qualifying features; and
  - The distribution of the qualifying features within the site.

FAVOURABLE CONDITION

2.2.2 ‘Favourable condition’ is the term used in the UK to represent ‘Favourable Conservation Status’ for the interest features of SPAs. For an Annex I and II species. Table presents the relevant advice targets aimed to achieve ‘favouable condition’ for guillemot and razorbill at FFC SPA.

Table 7 Supplementary advice targets for guillemot and razorbill of relevance to VE.

Attribute	Target
Breeding population: abundance	Maintain the size of the breeding population at a level which is above 41,607 pairs for guillemot and 10,570 breeding pairs for razorbill whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.
Connectivity with supporting habitats	Maintain safe passage of birds moving between nesting and feeding areas.
Disturbance caused by human activity	Restrict the frequency, duration and / or intensity of disturbance affecting roosting, nesting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed
Predation - all habitats	Restrict predation and disturbance caused by native and non-native predators
Productivity	[Maintain or recover] productivity so that breeding success is maximised within the constraints of the site.
Supporting habitat: conservation measures	Maintain the structure, function and supporting processes associated with the feature and its supporting habitat through management or other measures (whether within and/or outside the site boundary as appropriate) and ensure these measures are not being undermined or compromised.
Supporting habitat: extent, distribution and availablity of supporting habitat for the breeding season	Maintain the extent, distribution and availability of suitable breeding habitat which supports the feature for all necessary stages of its breeding cycle (courtship, nesting, feeding).
Supporting habitat: food availability (bird)	Maintain the distribution, abundance and availability of key food and prey items (eg. Sandeel, herring, sprat) at preferred sizes.

3 ECOLOGICAL EVIDENCE

3.1 GUILLEMOT ECOLOGY

3.1.1 Guillemot, a member of the auk family (Alcidae), are a cliff-nesting seabird. They nest in large colonies on rocky cliffs around the UK coastline. There are approximately 950,000 total pairs of breeding guillemot in the UK, with the majority of the population found in Scotland and the north of England (Robinson, 2005). The UK population has increased by 23% over the last 40 years (Burnell et al., 2023). Guillemot have two defined bioseasons: breeding season from March to July, and non-breeding season from August to February (Furness, 2015). During their breeding season guillemot forage near their coastal colonies, using pursuit diving to hunt small fish, especially sandeel (*Ammodytes tobianus*), as well as crustaceans (Birdlife International, 2023). Outside of their breeding season, guillemot disperse widely at sea throughout UK waters. They have an average lifespan of 23 years, and reach breeding maturity after five years (Robinson, 2005).

3.2 RAZORBILL ECOLOGY

3.2.1 Razorbill, like guillemot, are also cliff-nesting seabirds from the auk family. There are approximately 165,000 pairs of razorbill in the UK (Robinson, 2005). Whilst the breeding abundance of razorbill has been on the rise since the late 1980s, current trends show an overall population decline since 2017 (JNCC, 2021). This species is long-lived with an average lifespan of 13 years and reaches breeding maturity after 4 years (Robinson, 2005). The razorbill has four defined seasons: breeding season (April - July), post-breeding season (August - October), migration-free winter season (November - December) and return-migration season (January - March) (Furness, 2015). Razorbill are pursuit diving seabirds and prey mainly on sandeel and clupeids (*Clupeidae*) during the breeding season (Birdlife International, 2023).

4 ROADMAP

4.1 SITE SELECTION

SITE LONGLISTING PROCESS

4.1.1 Potential sites that could be selected for compensation were limited to the southwest of England due to its high regional presence of guillemot and razorbill and the desire to provide compensation for English guillemot and razorbill colonies (given the location of VE). Whilst there is also a large population of guillemot and razorbill at the FFC SPA, this site is already highly managed, so there is little room to provide sufficient compensation for guillemot and razorbill in that region. In addition, NE noted in engagement support for management measures at guillemot colonies in South-West England during the VE Evidence Plan Process, suggesting that measures such as signage and fencing would be proportionate to the level of predicted impact on these auk species.

4.1.2 A long list of potential sites was therefore selected from seabird colonies that fell within the boundaries of the South West Inshore and South West Offshore Marine Plan 2021 (HM Government, 2021).

SITE SHORTLISTING PROCESS

4.1.3 After the longlist of sites was compiled, the shortlisting process involved determining each colony's population and health. These characteristics were considered in the shortlisting process to help target colonies that had future potential to increase their population back to peak historical counts. Guillemot and razorbill colonies with a peak historical count that is higher than current levels indicate that there may be unused nesting habitat that was previously occupied by a larger population. The colony, therefore, would have room to expand and benefit from any new compensation measures.

4.1.4 Furthermore, sites were shortlisted based on their proximity to built-up areas or high tourism areas. This process drew from desk-based research and the local knowledge of project delivery teams and stakeholders. Settlements were identified in the southwest of England that provided potential locations for tourist destinations or origin sites of holiday makers. Colonies that have settlements within twenty miles were identified for potential compensation. This distance can account for a reasonable distance that holiday makers may travel for a day trip. Furthermore, research was done into the tourism industry around each site, with the assumption that the presence of recreational businesses indicates the presence of high levels of tourism.

4.1.5 The search criteria used to identify the presence of the recreational industry included searching for watersport equipment hire businesses (kayak, paddleboard, sailboat), boat tour companies, and adventure companies (offering coasteering, kayak, rock climbing tours). Furthermore, hotspots for coastal recreation were identified using Strava, a social subscriber platform that tracks exercise-based activity. A desk-based review of rock climbing and kayak blogs or chat forums was used to identify presence of activities around the selected colonies. This criterion ensured that compensation measures could be targeted towards those sites that have to contend with high human pressure and its associated risks. The short list of sites is presented in Table and a map of the sites can be found in Figure 4.1.

SITE SELECTION – SITE SURVEYS

4.1.6 Site surveys were carried out in May and June 2024 to refine the shortlist of sites and identify key threats for each site. The full results of the surveys are presented in 10.11 Guillemot and Razorbill: Survey Reports [REP1-054]).

4.2 KEY SITE CHALLENGES

4.2.1 There is a strong baseline for understanding guillemot and razorbill, as well as wider seabird, responses to human disturbance. However, it should be noted that there are knowledge gaps that will be a factor in the implementation and monitoring of interventions aiming to reduce recreational disturbance. However, these gaps are not a key issue in considering the success of potential compensation measures.

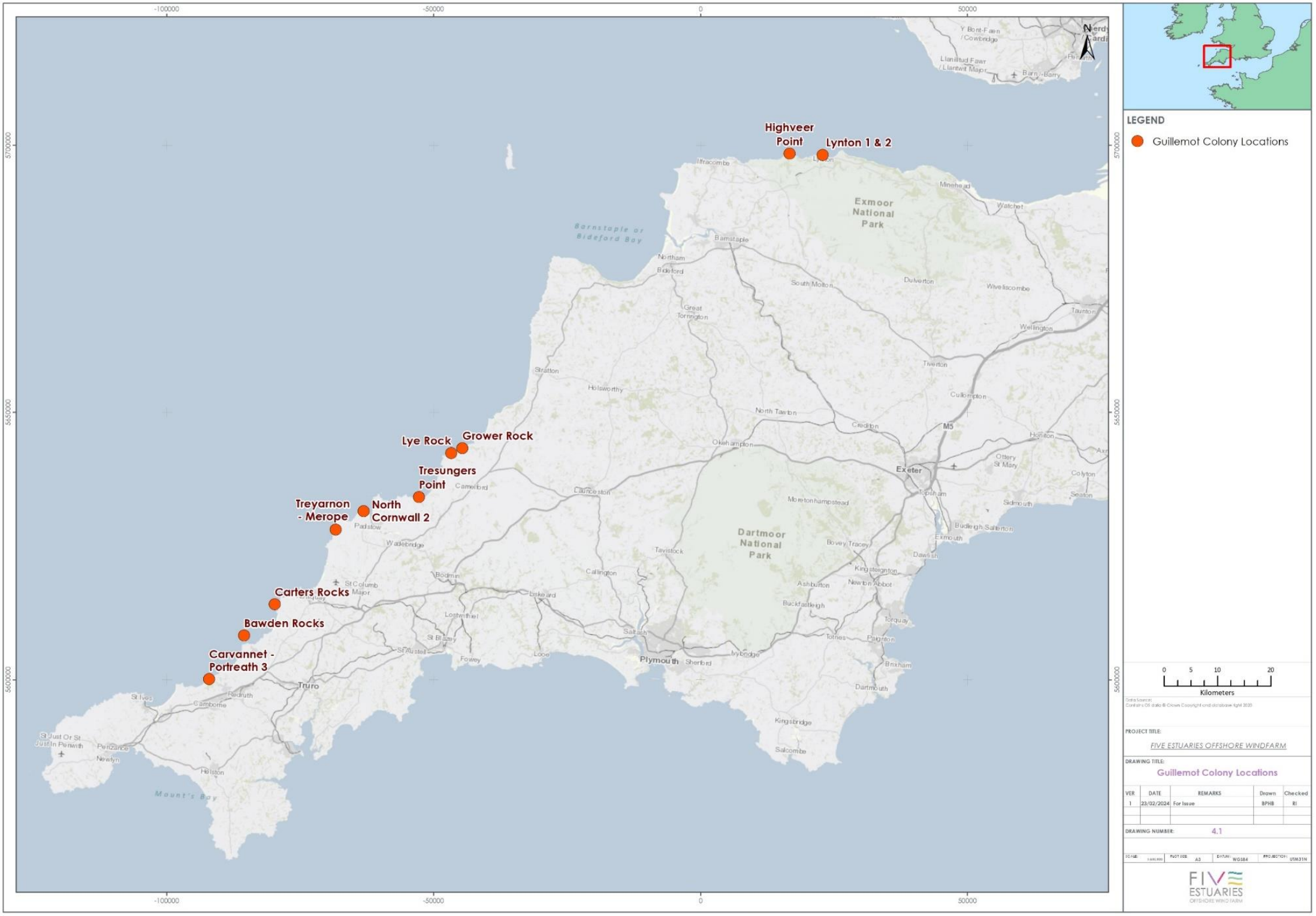
Table 8 Guillemot and razorbill colonies selected for compensation measures

Site	Designation	Management	Are Guillemot or Razorbill a Designated Feature?	Guillemot SMP Population Data (IND)	Guillemot Colony Health	Razorbill SMP Population Data (IND)	Razorbill Colony Health
Bawden Rocks	N/A	Cornwall Area of Outstanding Natural Beauty (AONB) South West Inshore and South West Offshore Marine Plan 2021 National Trust Property (adjacent to site)	N/A	**130** (1985); **80** (1992); **83** (2000); **5** (2007); **4** (2016); **10** (2017); **20** (2018)	Decreasing	**20** (1985); **52** (2000); **12** (2007); **35** (2016); **40** (2017); **70** (2018)	Increasing
Carters Rocks	N/A	South West Inshore and South West Offshore Marine Plan 2021 National Trust Property (adjacent to site)	N/A	**33** (1987); **0** (2000); **20** (2007); **47** (2015); **4** (2017)	Decreasing	**49** (1987); **19** (1991); **0** (2000); **8** (2007); **0** (2017)	Decreasing

Site	Designation	Management	Are Guillemot or Razorbill a Designated Feature?	Guillemot SMP Population Data (IND)	Guillemot Colony Health	Razorbill SMP Population Data (IND)	Razorbill Colony Health
Carvannet – Portreath 3	Godrevy Head to St Agnes SSSI	Natural England Cornwall AONB South West Inshore and South West Offshore Marine Plan 2021	No	**124** (2013); **108** (2014); **205** (2016)	Stable with a slight increase	**5** (2000); **4** (2016)	Stable
Grower Rock	Tintagel Cliffs SSSI	Natural England Cornwall AONB South West Inshore and South West Offshore Marine Plan 2021	No	**7** (1999); **81** (2009); **41** (2015)	Previously increasing with a recent decrease	**2** (1999); **4** (2009); **151** (2015)	Increasing
Highveer Point	West Exmoor Coast and Woods SSSI	Natural England South West Inshore and South West Offshore Marine Plan 2021	Yes (Both)	**53** (2016); **21** (2023)	Decreasing	**7** (2008); **178** (2016); **23** (2023)	Decreasing

Site	Designation	Management	Are Guillemot or Razorbill a Designated Feature?	Guillemot SMP Population Data (IND)	Guillemot Colony Health	Razorbill SMP Population Data (IND)	Razorbill Colony Health
		Exmoor National Park					
Lye Rock	N/A	Cornwall AONB South West Inshore and South West Offshore Marine Plan 2021	N/A	**12** (1989); **22** (1991); **20** (1992); **42** (1999); **124** (2009); **0** (2015)	Previously increasing with a recent decrease	**32** (1985); **19** (1989); **2** (1999); **14** (2009); **0** (2015)	Decreasing
Lynton 1 & 2	West Exmoor Coast and Woods SSSI	Natural England South West Inshore and South West Offshore Marine Plan 2021 Exmoor National Park[f]	Yes (Both)	**160** (2008); **361** (2016); **240** (2023)	Stable with a slight increase	**117** (2008); **58** (2016); **34** (2023)	Decreasing
North Cornwall 2	N/A	Cornwall AONB	N/A	**13** (2000); **134** (2015); **108** (2016); 84 (2017)	Increasing then stable	**49** (2017)	N/A

Site	Designation	Management	Are Guillemot or Razorbill a Designated Feature?	Guillemot SMP Population Data (IND)	Guillemot Colony Health	Razorbill SMP Population Data (IND)	Razorbill Colony Health
		South West Inshore and South West Offshore Marine Plan 2021					
Tresungers Point	N/A	Cornwall AONB South West Inshore and South West Offshore Marine Plan 2021	N/A	**67** (1999); **38** (2017)	Decreasing	**8** (1999); **70** (2017)	Increasing
Treyarnon – Merope	N/A	Cornwall AONB South West Inshore and South West Offshore Marine Plan 2021	N/A	**31** (2000); **31** (2016); **19** (2018); **22** (2020)	Slightly decreasing	**18** (2000); **6** (2018); **6** (2020)	Decreasing


Highveer Point
Lynton 1 & 2
Lye Rock
Grower Rock
Tresungers Point
Treyarnon - Merope
North Cornwall 2
Carters Rocks
Bawden Rocks
Carvannet - Portreath 3
Exmoor National Park
Dartmoor National Park
Barnstaple or Bideford Bay
Mount's Bay
Plymouth
Exeter
Truro
M5
-100000
-50000
0
50000
5700000
5650000
5600000
N
LEGEND
Guillemot Colony Locations
0 5 10 20
Kilometers
PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM
DRAWING TITLE:
Guillemot Colony Locations
VER | DATE | REMARKS | Drawn | Checked
1 | 23/02/2024 | For Issue | BPHB | RI
DRAWING NUMBER: 4.1
PLOT SIZE: A3
DATUM: WGS84
PROJECTION: UTM31N
FIVE ESTUARIES OFFSHORE WIND FARM

5 KEY THREATS

5.1.1 Following discussions and agreement with Natural England, it was highlighted that one of the key threats faced by guillemot and razorbill was recreational disturbance. This section outlines how recreational disturbance can impact these species at a population level.

5.2 RECREATIONAL DISTURBANCE

5.2.1 Recreational activities can disturb guillemot and razorbill both in the marine environment (where the species forage), and on their cliff breeding sites. Various recreational activities, including walking, rock climbing and coasteering, birdwatching, the use of watercraft, and the use of aircraft can affect these auks.

5.2.2 Recreational disturbance has several immediate effects for guillemot and razorbill. First, guillemot and razorbill may demonstrate visible discomfort or distress in the presence of recreational disturbance. Typically, these behaviours are seen as an escalating set of responses that can include looking at the source of disturbance, alarm calling, pacing, freezing, or other species-specific behaviour like bobbing (Buckley, 2004). It is common for guillemot and razorbill to showcase a range of disturbance behaviours. For example, guillemot nesting at Bass Rock, Scotland were seen to display disturbance behaviours that included head bobbing and making direct visual contact in the presence of a tourist boat (Cully, 2023).

5.2.3 The final escalation of disturbance behaviours for guillemot and razorbill is flushing, where birds leave their nests temporarily or permanently (Carney and Sydeman, 1999; Buckley, 2004; Devney and Congdon, 2009). Both temporary flushing and permanent nest abandonment have been recorded for a range of auks, including the tufted puffin (*Fratercula cirrhata*). It is thus likely that nest abandonment could affect guillemot and razorbill, who share similar ecological and behavioural characteristics with other members of the auk family (Buckley, 2004). Flushing results in an increased energetic cost for guillemot and razorbill, as birds must expend additional energy leaving their nest more often (Buckley, 2004). Flushing can also result in direct mortality, as the absence of adult birds at nest sites leaves eggs and young exposed to predation (Buckley, 2004). This has been recorded for Atlantic puffin (*Fratercula arctica*) and is common for colony-nesting birds like guillemot and razorbill (Buckley, 2004). Long-term or temporary nest abandonment during flushing can also leave eggs and chicks exposed to the elements (Carney and Sydeman, 1999).

5.2.4 Flushing is a last-resort behaviour for guillemot and razorbill during nesting season when they prefer to stay to protect their egg (National Trust for Scotland, pers. Comm.). Furthermore, some individuals may be unable to flush if they are injured or sick, and birds may be unwilling or less likely to flush if they are protecting their nest (Gill *et al*., 2001; Beale and Monaghan, 2004a). Therefore, a bird may still experience disturbance in the absence of flushing behaviour, as it can experience non-visible stress responses (Buckley, 2004; Devney and Congdon, 2009, Watson *et al*. 2014). These can result in changes to seabirds' temperature, heart rate, levels of corticosterone, and vigilance (Cairns, 1980; Pierce and Simons, 1986; Carney and Sydeman, 1999; Buckley, 2004; Huddart, 2019).

5.2.5 Besides demonstrating disturbance behaviours and physiological responses, another immediate result of recreational disturbance is direct mortality. Incursions into seabird colonies from recreational activities, especially birdwatching, can crush eggs or chicks. Instances of these behaviours have been recorded at the Isle of May, Scotland when birdwatchers left the path and crushed eggs (Harris and Wanless, 1995). Further effects of birdwatching will be described below. Colony-nesting seabirds like guillemot and razorbill are particularly sensitive to the effects of recreational disturbance because direct mortality events like egg crushing are more likely to occur with the mass flushing events that are found in large seabird colonies (Buckley, 2004).

5.2.6 These disturbance behaviours can ultimately have population-level consequences for guillemot and razorbill. First, recreational disturbance can alter guillemot and razorbill behaviour. Repeated disturbance events may cause seabirds to alter their nest site selection (Huddart, 2019). Secondly, the effects of recreational disturbance can ultimately reduce colony productivity for seabirds. Direct nestling or egg mortality through nest spillage or predation during flushing events, nest abandonment resulting in nestling or egg exposure, and crushed nests from tourists can all result in reproductive failure. Reduced reproductive success due to recreational disturbance and human disturbance has been shown for auks (Carney and Sydeman, 1999; Buckley, 2004; Huddart, 2019). In addition, Pierce and Simons (1986) recorded a higher level of reproductive success in tufted puffin chicks who did not experience disturbance. Chicks in undisturbed areas had a 94% rate of fledgling success as opposed to chicks in a disturbed area who had an 18% fledgling success rate (Pierce and Simons, 1986). Furthermore, physiological effects can reduce the fitness of individual seabirds if they are experienced repeatedly over a long period of time (Buckley, 2004).

5.2.7 It should be noted that recreational disturbance can result in habituation to human presence. This is not a negative effect for guillemot and razorbill in itself, but habituation can make monitoring colony health and response to visitors harder over the long-term. Colonies that have historically received more visitor pressure demonstrate fewer visible disturbance responses (Buckley, 2004). These same individuals may still be experiencing non-visible stress responses, yet these responses are harder to detect (Gill *et al*., 2001; Beale and Monaghan 2004a; Watson *et al*., 2014). Therefore, it may be difficult to monitor the ways in which non-visible stress responses affect long-term individual or colony fitness and degree of disturbance.

5.2.8 The recreational activities that can cause disturbance issues for colonies are:

- Walking;
- Rock climbing and coasteering;
- Birdwatching;
- Watercraft;
- Aircraft.

KEY GAPS

5.2.9 There is a strong baseline for understanding guillemot and razorbill responses to human disturbance. However, it should be noted that there are knowledge gaps that may complicate the implementation and monitoring of interventions aiming to reduce recreational disturbance.

5.2.10 First, there is little consensus as to the appropriate setback distances (a separation distance between human activities and colonies) for guillemot and razorbill. The appropriate distance is species-dependent, and there is currently no research on the appropriate distance for guillemot and razorbill. However, distances on land have been suggested for other seabirds, including terns (*Laridae*; 50 m to 200 m) and storm petrels (*Hydrobates pelagicus*; 10 m; Buckley, 2004; Devney and Congdon, 2009; Watson *et al*., 2014), and examples on flushing distances on water (such as those discussed in the aforementioned study on pigeon guillemot by Chatwin *et al*., 2013) could be used to determine appropriate setback distances on water. Therefore, the implementation of disturbance-reducing measures could apply a conservative approach and set a large setback distance based on the largest suggested distance for similar species. If needed and/or desired, additional research into the appropriate distance for guillemot and razorbill that could then be used to reduce the setback distance where appropriate.

5.2.11 Though there are certain physiological disturbance responses that are common across seabirds (as outlined above), more research would be useful into how guillemot and razorbill specifically experience disturbance. Long-term monitoring studies would help to determine how these responses affect individual- and colony-level fitness. However, as shown earlier, visitor proximity and pressure has been shown to affect breeding success in these and related species (Beale and Monaghan, 2004b), thus illustrating that disturbance-reducing measures have clear benefit to colonies at sites where recreational disturbance is present.

5.2.12 Finally, as mentioned above, it is difficult to monitor non-visible disturbance effects from recreation in guillemot and razorbill that have become habituated to human presence. Therefore, it would be beneficial to fill this gap and develop, where possible, a monitoring method that can assess or estimate the level of disturbance in colonies, including any non-visible signs of disturbance. This would help inform future measures to protect the health of these sites.

6 SELECTED COMPENSATION MEASURES

6.1 REDUCTION OF DISTURBANCE FROM RECREATIONAL ACTIVITIES

6.1.1 Reduction of recreational disturbance, with the aim to increase the size and/ or productivity of guillemot and razorbill colonies, can be achieved by implementing several different measures which include:

- Signage
  - Signage can be used to alert visitors to the presence of breeding colonies, outline appropriate set back distances, and advise on appropriate behaviour around seabirds. Signage can be placed in the water using buoys or on land.
- Visitor access statements
  - Some site management plans and organisations have created visitor coastal access codes, especially in areas where the public has direct access to coastal habitats like beaches or cliffside walks. These visitor access statements can be posted on signs, flyers, or on relevant organisational websites and social media channels to alert visitors to the presence of any wildlife and outline appropriate codes of conduct when visiting coastal habitats.
- Coordination with equipment hire businesses
  - Equipment hire businesses and recreational businesses could help raise awareness about recreational disturbance. Marine activities like boating, kayaking, stand-up paddleboarding, rock climbing, and swimming could bring visitors into close proximity with seabird colonies. Many of these activities require equipment, and while many individuals own their own equipment, many other visitors will rent equipment from businesses. Equipment hire businesses could be part of the solution to help mitigate visitor disturbance. Management organisations could coordinate with these businesses to help create an education programme about the local area and wildlife for their customers who hire equipment.
- Coordination with recreational organisations.
  - Recreational organizations could help raise awareness about recreational disturbance. Marine activities like boating, kayaking, stand-up paddleboarding, rock climbing, and swimming could bring visitors into close proximity with seabird colonies. Organisations could coordinate with their members to help mitigate visitor disturbance. Many dedicated individuals who participate in recreational activities in the marine environment are part of membership organisations associated with their preferred activities. These organisations could be part of the solution to help mitigate visitor disturbance. Management organisations could coordinate with these organisations to help create an education programme about the local area and wildlife for their members.

EXAMPLES OF IMPLEMENTATION

SIGNAGE

6.1.2 Signage has been shown to successfully reduce disturbance at seabird sites. For example, signage implemented at tern breeding colonies was shown to increase little tern (*Sternula albifrons*) nesting success by 34 times (Medeiros *et al*., 2006). Signage at a UK gannet colony was successful in restricting visitor approach distance, as visitor proximity to the colony was reduced when signs were implemented, resulting in fewer birds being flushed from their nests (Allbrook and Quinn, 2023).

VISITOR ACCESS STATEMENTS

6.1.3 Visitor access statements have already been implemented at seabird islands that receive visitor pressure. For example, management at the Saltee Islands has created visitor access statements that are posted on their website and on signage (The Saltee Islands, 2001). These visitor access statements include instructions to remain more than six meters away from nesting birds and include information on the restriction of drones (The Saltee Islands, 2001).

COORDINATION WITH EQUIPMENT HIRE BUSINESSES AND RECREATIONAL ORGANIZATIONS

6.1.4 To our knowledge, there has not yet been a coordinated effort between breeding site managers and equipment hire business or recreational organisations to reduce recreational disturbance. However, recreational organisations or businesses have voluntarily taken steps to reduce disturbance or encourage their clients and members to reduce disturbance. For instance, an Irish rock climbing organisation promoted educational information about cliff nesting seabirds and encouraged its members to avoid popular routes, like Ireland's eye, during the breeding season (UKC, 2023a).

FEASIBILITY

6.1.5 Reducing recreational disturbance through compensation measures has the potential to benefit entire guillemot and razorbill colonies. These measures will have a higher impact at sites that receive higher visitor pressure. Most of these measures are low cost (with the exception of monitoring enforcement, and widespread educational efforts), easily implemented, and do not require specialist equipment, so they can easily be applied across multiple sites.

6.1.6 Monitoring efforts would need to include productivity monitoring to better observe the effects of these measures at the population level. This is often conducted by measuring breeding success using a viewpoint study, with nest failure being checked daily (Beale and Monaghan, 2005). It is important to observe study plots both close to and away from areas of high visitor pressure to monitor whether there are differences in breeding success between the two areas both before and after the implementation of mitigation measures (Watson *et al*., 2021).

7 COLONY ANALYSIS

7.1.1 The following sites have been shortlisted based on their proximity to human settlements and the pressures they face from the recreation industry. This criterion ensured that compensation measures could be targeted towards those sites that have to contend with high human pressure and its associated risks. The search criteria used to identify the presence of the recreational industry at each site included searching for watersport equipment hire businesses (kayak, paddleboard, sailboat), boat tour companies, and adventure companies (offering coasteering, kayak, rock climbing tours). Furthermore, hotspots for coastal recreation were identified using Strava, a social subscriber platform that tracks exercise-based activity. A desk-based review of rock climbing or kayak blogs or chat forums was used to identify various individuals' presence around the selected colonies.

7.1.2 The process of identifying appropriate sites for compensation and the pressures associated with each site is ongoing. As this is a working document, further investigation is needed to define site-specific pressures. The following review of each site, along with its associated pressures and existing management measures has been conducted through desk-based research only, and the work of further categorising the sites will need to be progressed with site-specific surveys and stakeholder engagement. Since the compensation process has progressed for VE, there has not yet been a guillemot and razorbill breeding season during which surveys can be conducted. Following site owner engagement the number of sites will be refined to the one(s) that suffer from the most recreational disturbance. Visiting the selected colonies during the breeding season when these auks are attending their nest site would be beneficial and provide further detail and insights into the specific site pressures and management.

7.1.3 The sections below first highlight the health of the guillemot and razorbill population at each site. Then, the site-specific pressures and management measures that were found during the desk-based review are outlined. The pressures and management measures help determine the feasibility of implementing various compensation measures at each site. The below section also presents a roadmap for pursuing compensation across the sites. Key challenges and future steps are also highlighted, along with opportunities for collaboration with other OWF projects.

7.2 EXISTING MANAGEMENT MEASURES

7.2.1 There are no specific conservation measures in place for guillemot and razorbill in the management plans of relevant management organisations beyond a general desire to conserve the environment that is expressed in the South West Inshore and South West Offshore Marine Plan 2021 (Defra, 2021). The same general desire to conserve the environment is also expressed in the NE Conservation Objectives for Godrevy Head to St Agnes SAC, which is relevant to Carvannet – Portreath 3 (Natural England, 2018).

7.2.2 There is a specific goal to improve bird habitat in the Cornwall AONB management plan, which is relevant to Bawden Rocks, Carvannet – Portreath 3, Grower Rock, Lye Rock, North Cornwall 2, Tresungers Point, and Treyarnon-Merope, but this does not specify seabirds or include specific actions or strategic goals (Cornwall AONB, 2022). There is also a specific goal to conserve breeding seabird populations in the Exmoor National Park management plan, which is relevant to Highveer Point and Lynton 1 & 2, but this does not include specific actions (Exmoor National Park Authority, 2018).

7.2.3 The National Trust property adjacent to Bawden Rocks at St Agnes Head includes reminders on its website for visitors to keep control of their dogs to avoid disturbance to nesting birds (National Trust, n.d.d). Though there are no specific seabird management measures included at Bawden Rocks, the National Trust has included a birdwatching guide for choughs at this site that includes advice on noise, set-back distances, disturbance behaviour, legal protection, and how to report disturbance incidents (National Trust, n.d.b). Furthermore, the National Trust property adjacent to Carters Rock at Holywell includes reminders on its website for visitors to keep control of their dogs to avoid disturbance to nesting birds (National Trust, n.d.c). The National Trust has also generally implemented a signage system to highlight beaches with dog bans (National Trust, n.d.d). Though the National Trust has included management measures for dogs, they have not specified any visitor management techniques for people.

7.2.4 There are strategic measures in place to keep litter away from wildlife at the selected sites in Cornwall (Bawden Rocks, Carters Rocks, Carvannet – Portreath 3, Grower Rock, Lye Rock, North Cornwall 2, Tresungers Point, and Treyarnon-Merope), including statutory fines for littering, and an online reporting system for beaches that need cleaning (Cornwall Council, 2023). There are also strategic measures in place to keep litter away from wildlife at the selected sites in Devon (Highveer Point and Lynton 1 & 2), including statutory fines for littering, an online system to report those who litter, educational campaigns, monitoring systems, and public beach cleans (North Devon Council, n.d.b). Beyond traditional waste removal schemes, community litter picks have been arranged for Bawden Rocks, Carvannet – Portreath 3, and Carters Rocks (Love Portreath, n.d.; National Trust, n.d.a; St Agnes Parish Council, 2020).

7.2.5 There is a current reporting system in place for avian flu, where members of the public can report sightings of dead birds (Defra, 2023). Bird watching clubs in Cornwall (relevant to Bawden Rocks, Carters Rocks, Carvannet – Portreath 3, Grower Rock, Lye Rock, North Cornwall 2, Tresungers Point, and Treyarnon – Merope) have also advertised this helpline, and the Cornwall Council has undertaken public education initiatives that instruct the public to use the reporting system and provides tips to avoid spreading this disease (Cornwall Birds, 2023).

7.2.6 Local councils in Devon (relevant to Highveer Point and Lynton 1 & 2) have also advertised this helpline and passed on instructions to stop its spread in the local area (North Devon Council, n.d.a).

7.2.7 The existing management measures for each site are summarized below in Table 9.

Table 9 Existing management measures at each selected site

Management Measure	Bawden Rocks	Carters Rock	Carvannet – Portreath 3	Grower Rock	Highveer Point	Lye Rock	Lynton 1 & 2	North Cornwall 2	Tresungers Point	Treyarnon-Merope
General environmental conservation goals (South West Inshore and South West Offshore Marine Plan 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
General environmental conservation goals for Godrevy Head to St Agnes SAC (NE)			Y							

Management Measure	Bawden Rocks	Carters Rock	Carvannet – Portreath 3	Grower Rock	Highveer Point	Lye Rock	Lynton 1 & 2	North Cornwall 2	Tresungers Point	Treyarnon-Merope
Goal to improve bird habitat (Cornwall AONB management plan)	Y		Y	Y		Y		Y	Y	Y
Goal to conserve breeding seabird populations (Exmoor National Park management plan)					Y		Y			

7.3 BAWDEN ROCKS

7.3.1 The guillemot population at Bawden Rocks is decreasing while the razorbill population is increasing (Figure 7.1). It is under the management of the Cornwall AONB and the South West Inshore and South West Offshore Marine Plan 2021. There is also a National Trust Property adjacent to this site.

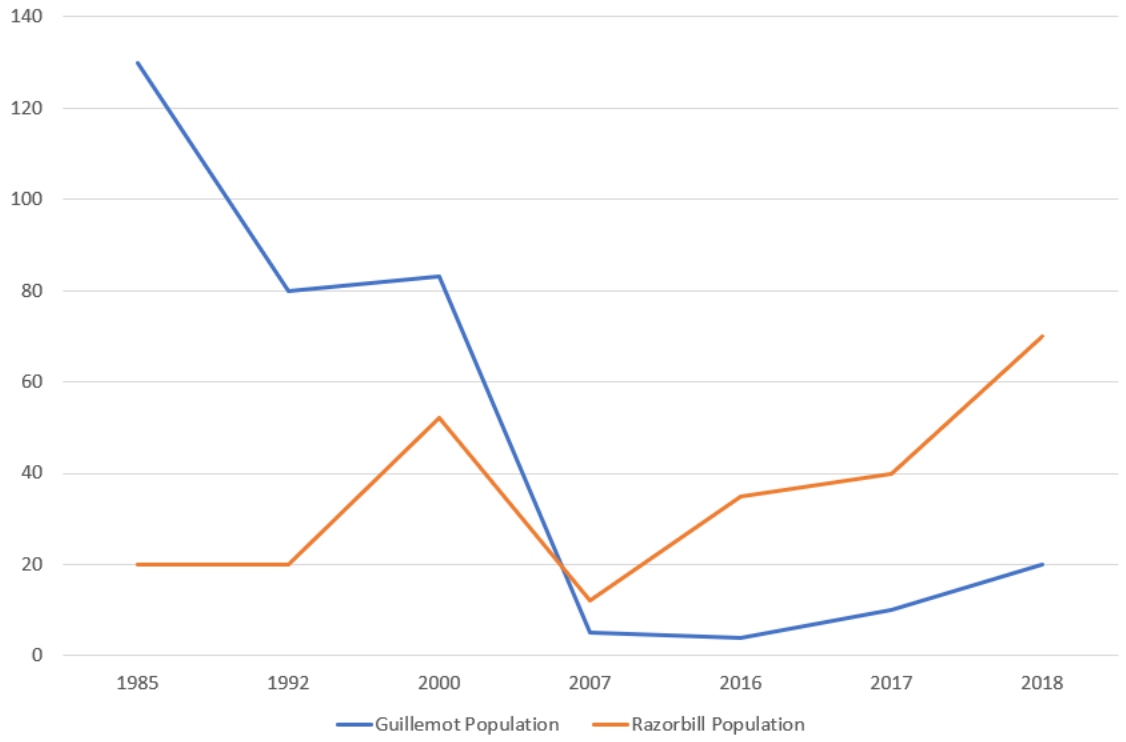


Figure 7.1 Guillemot and razorbill population at Bawden Rocks

SITE PRESSURES

7.3.2 This site is located on an offshore island, so there is no risk of visitor pressure by foot. However, the island receives disturbance from individuals who swim out to the islands (South West Coast Path, 2023). There is further visitor pressure from the water, as this site is a popular kayaking destination due to its proximity to the shore (Go Sea Kayak, 2011; Kayak Fishing Blog, 2023). This visitor pressure is high, as this site is located near the popular tourist areas of Portreath and St Agnes Head. The area hosts equipment hire businesses that allow tourist to hire their own kayaks (Cornwall Surf Centre, n.d.). Access to this equipment allows tourists to visit the seabird colony and cause disturbance. High levels of visitors increase the risk that litter is left around this site and can therefore affect the colony.

7.3.3 There has not yet been evidence of difficulties with mammalian or avian predators at this site, however, this may be due to a lack of monitoring for these pressures, and more research is needed.

7.3.4 Finally, avian flu has affected seabird communities at this site, as this disease has been found in the area (Cornwall Birds, 2023).

7.3.5 Auks were recorded on the sea around the island and flying on to the cliffs at the back of the island out of view, but it was too distant to identify to species with any certainty. No auks were visible from land on the island itself, the colony breeds solely on the north side of the island.

7.3.6 During the survey there were no disturbance events recorded, the weather was not suitable for any sea activities with a strong north westerly wind causing unsuitable sea conditions for recreational waters sports. The island is located between the popular Chapel Porth beach and the coves at St Agnes and there is a known point of interest for kayak tours, so there is potential for disturbance later in the season or in better weather conditions.

7.4 CARTERS ROCK

7.4.1 The guillemot and razorbill populations at Carters Rock have seen recent declines but this could be part of natural cyclical variation (Figure 7.2). This site is under the management of the South West Inshore and South West Offshore Marine Plan 2021, and there is also a National Trust property adjacent to this site.

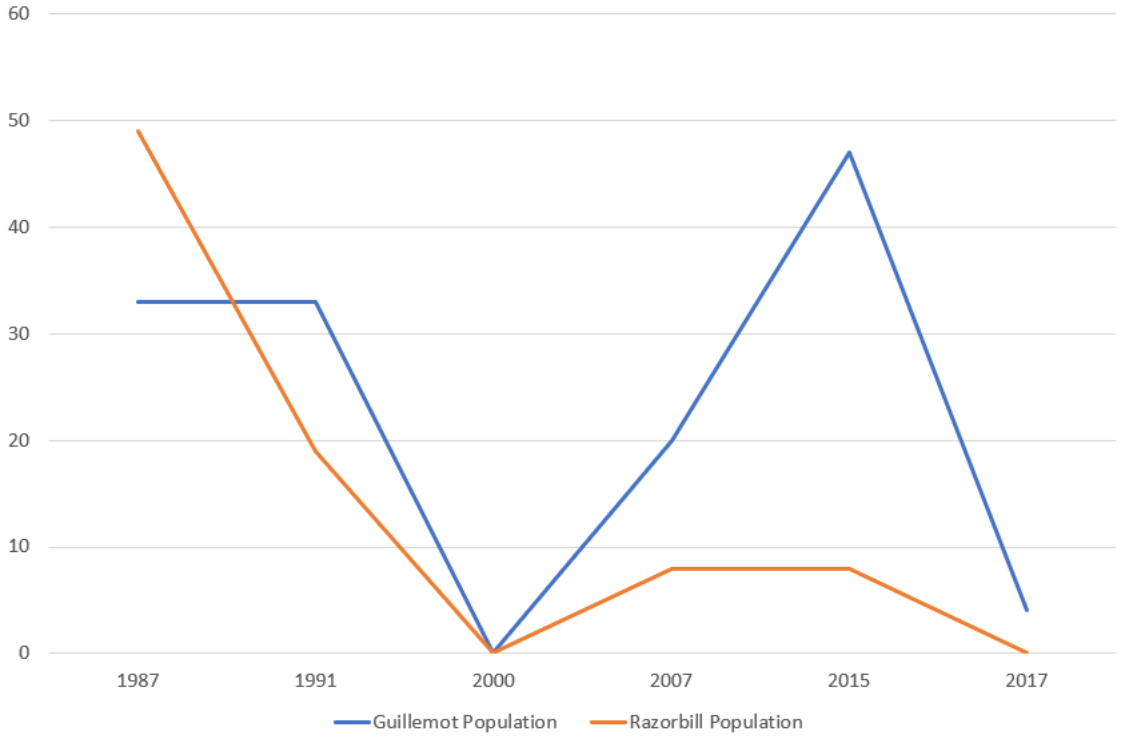


Figure 7.2 Guillemot and razorbill population at Carters Rock

SITE PRESSURES

7.4.2 This site is located on an island approximately 230 m offshore, so there is no risk of visitor pressure by foot. However, this site is located near Newquay which is a popular tourist town. There are multiple equipment hire companies that allow tourists to hire their own sailboats, kayaks, speedboats, and jet skis (Newquay Kayak Hire, n.d.; Newquay Activity Centre, n.d.). Access to this equipment allows tourists to visit the seabird colony and cause disturbance. There are also multiple companies in the area who run boat tours around this site (Cornwall Waverunner Safaris, 2022; Bootlegger Boat Trips, 2021). High levels of visitors increase the risk that litter is left around this site and can therefore affect the colony.

7.4.3 There has not yet been evidence of difficulties with mammalian or avian predators at this site, however, there is the possibility that this could be due to lack of monitoring.

SITE SURVEY RESULTS

7.4.4 During the survey there were no auks visible on the island from land, however up to four razorbill and two guillemots were observed flying into the seaward side of the island not viewable from land. There were no birds recorded loafing on the sea, indicating the colony is still very small. Further around the coast a small colony of 16 razorbills was found near to Penhale Point.

7.5 CARVANNET – PORTREATH 3

7.5.1 The guillemot population at this site is relatively stable, with a slight recent increase. The razorbill population has remained largely stable (Figure 7.3). This site is part of the Godrevy Head to St Agnes SSSI; however, guillemot and razorbill are not a designated feature of this SSSI. The site is also under the management of Cornwall AONB and the South West Inshore and South West Offshore Marine Plan 2021.

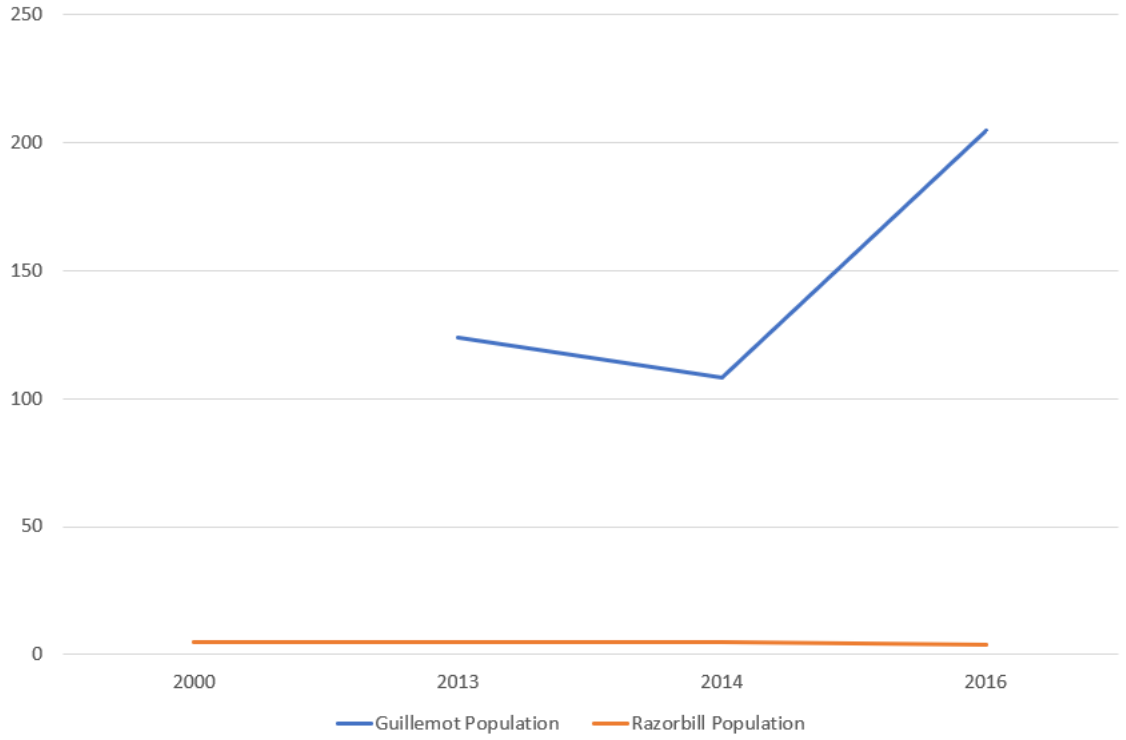


Figure 7.3 Guillemot and razorbill population at Carvannet – Portreath 3

SITE PRESSURES

7.5.2 This site receives high levels of pressure from visitors on foot. The site is adjacent to the popular Carvannel Downs hiking area. Foot traffic will be high in this area due to the presence of popular holiday towns like Portreath. While these colonies are located lower down on the steep cliffs below the coastal path, there is still potential for non-visible indicators of human presence – like noise – to cause disturbance to these colonies. High levels of visitors increase the risk that litter is left around this site and can therefore affect the colony. Furthermore, more dogs are likely to be present in this area if more visitors are present.

7.5.3 Furthermore, this site also experiences visitor pressure from the water. The area hosts equipment hire businesses that allow tourist to hire their own kayaks (Cornwall Surf Centre, n.d.). Access to this equipment allows tourists to visit the seabird colony and cause disturbance. High levels of visitors increase the risk that litter is left around this site and can therefore affect the colony.

7.5.4 There has not yet been evidence of difficulties with mammalian or avian predators at this site, however, there is the possibility that this could be due to lack of monitoring.

SITE SURVEY RESULTS

7.5.5 During the survey a total of 36 guillemots and 21 razorbills were recorded breeding on the mainland cliffs. The main colony visible from land is located on the islands off Carvannel Downs, with the outer most island holding the majority of birds. In total 36 guillemot and 12 razorbills were recorded on the islands, although the seaward cliff face of the outer most island was not visible, and many birds were observed flying onto it. This equated to a total of 72 breeding guillemots and 33 breeding razorbills recorded at the site, though as previously noted visibility of the entire colony was restricted. Additionally, 97 guillemot and 16 razorbills were recorded loafing on the sea just off the islands also.

7.5.6 During the survey only three sea kayakers were recorded in the area, who remained more than 250m+ distant from the colonies with no disturbance responses noted from birds observed on the cliffs/ islands, however flushing response was observed from loafing birds on the sea.

7.6 GROWER ROCK

7.6.1 While the guillemot population at Grower Rock has shown previous increases, this colony is now in decline. The razorbill population, however, is increasing (Figure 7.4). This site is part of Tintagel Cliffs SSSI; however, guillemot and razorbill are not a designated feature of this SSSI. The site is also under the management of Cornwall AONB and the South West Inshore and South West Offshore Marine Plan 2021.

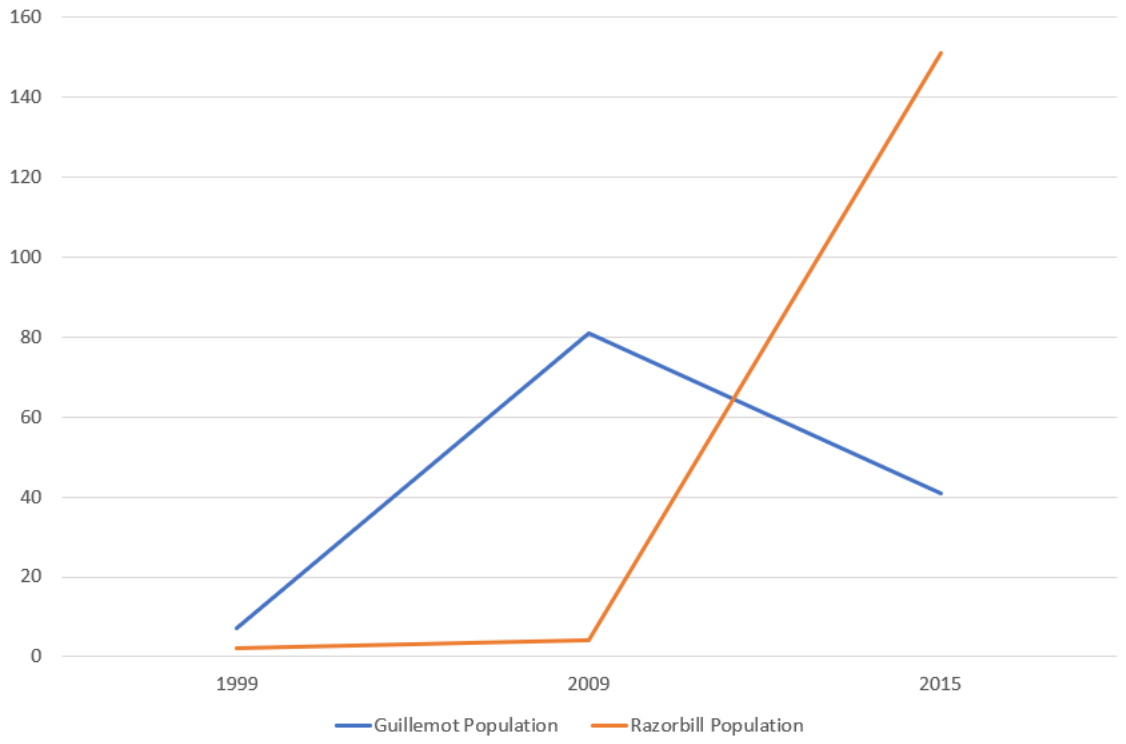


Figure 7.4 Guillemot and razorbill population at Grower Rock

SITE PRESSURES

7.6.2 This site is located on an offshore island, so there is no risk of visitor pressure by foot. However, this site experiences visitor pressure from the water. There is heavy boat traffic in the area, as local wildlife tour companies operate around this site (Padstow Sealife Safaris, 2023). The area is also popular with kayakers, especially on calm days (Kirkwood, 2022). High levels of visitors increase the risk that litter is left around this site and can therefore affect the colony.

7.6.3 There has not yet been evidence of difficulties with mammalian or avian predators at this site, however, there is the possibility that this could be due to a lack of monitoring.

SITE SURVEY RESULTS

7.6.4 During the survey a total of 14 guillemots and 53 razorbills were recorded breeding on the visible part of the cliff, although large part of the colony is not visible from land. To survey the colony appropriately it would be necessary to carry out a survey by boat.

7.6.5 During the survey there no disturbance events were recorded, however the persistent northerly winds created a relatively large swell, not conducive to water sports. There is potential from disturbance from kayaking and paddleboarding as the island is easily accessible, with Boscastle harbour approximately 1km away.

7.7 HIGHVEER POINT

7.7.1 This site is part of the West Exmoor Coast and Woods SSSI for which guillemot and razorbill are a designated feature. However, the guillemot and razorbill populations at Highveer Point are decreasing (Figure 7.5). This site is also under the management of Exmoor National Park and the South West Inshore and South West Offshore Marine Plan 2021.

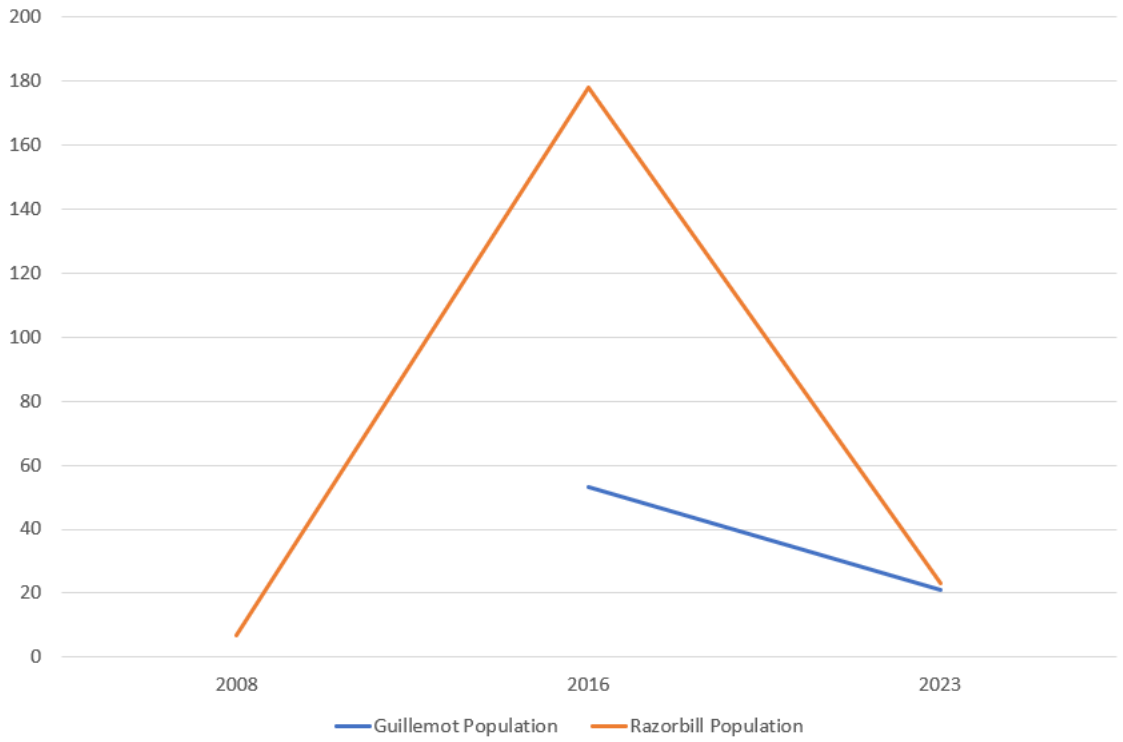


Figure 7.5 Guillemot and razorbill population at Highveer Point

SITE PRESSURES

7.7.2 This site receives high levels of pressure from visitors on foot. The site is adjacent to the popular SW Coast Path. Foot traffic will be high in this area due to the presence of popular features like Heddon's Mouth and the adjacent National Trust visitor centre. While these colonies are located lower down on the steep cliffs below the coastal path, there is still potential for non-visible indicators of human presence, like noise, to cause disturbance to these colonies. High levels of visitors increase the risk that litter is left around this site and can therefore affect the colony. Furthermore, more dogs are likely to be present in this area if more visitors are present.

7.7.3 Due to the sheer cliffs, this site is a popular location for rope climbing; therefore, colonies will face visitor pressure directly on the cliff face (UKC, 2023c).

7.7.4 Furthermore, this site also experiences visitor pressure from the water. There are multiple kayak hire facilities within 5 miles of this site (OSKC Watersports, n.d.). There are also multiple companies in the area who run boat tours to this site to specifically view the seabirds (Ilfracombe Sea Safari, n.d.).

7.7.5 There has not yet been evidence of difficulties with mammalian or avian predators at this site, however, there is the possibility that this could be due to lack of monitoring.

SITE SURVEY RESULTS

7.7.6 During the survey a total of 79 guillemot and 24 razorbill were recorded on the cliffs, however it is unlikely that this represents the whole of the colony due to the restricted view available from the coast path.

7.7.7 No disturbance was recorded during the visit. A single fishing boat was observed throughout the entire site visit, but it never approached more than approximately 2 km from the colony. The nearest accessible locations for kayakers and paddleboarders are a considerable distance away.

7.8 LYE ROCK

7.8.1 Though guillemot have previously increased at this site, they have shown signs of recent decline. The razorbill population is also in decline (Figure 7.6). This site is under the management of Cornwall AONB and the South West Inshore and South West Offshore Marine Plan 2021.

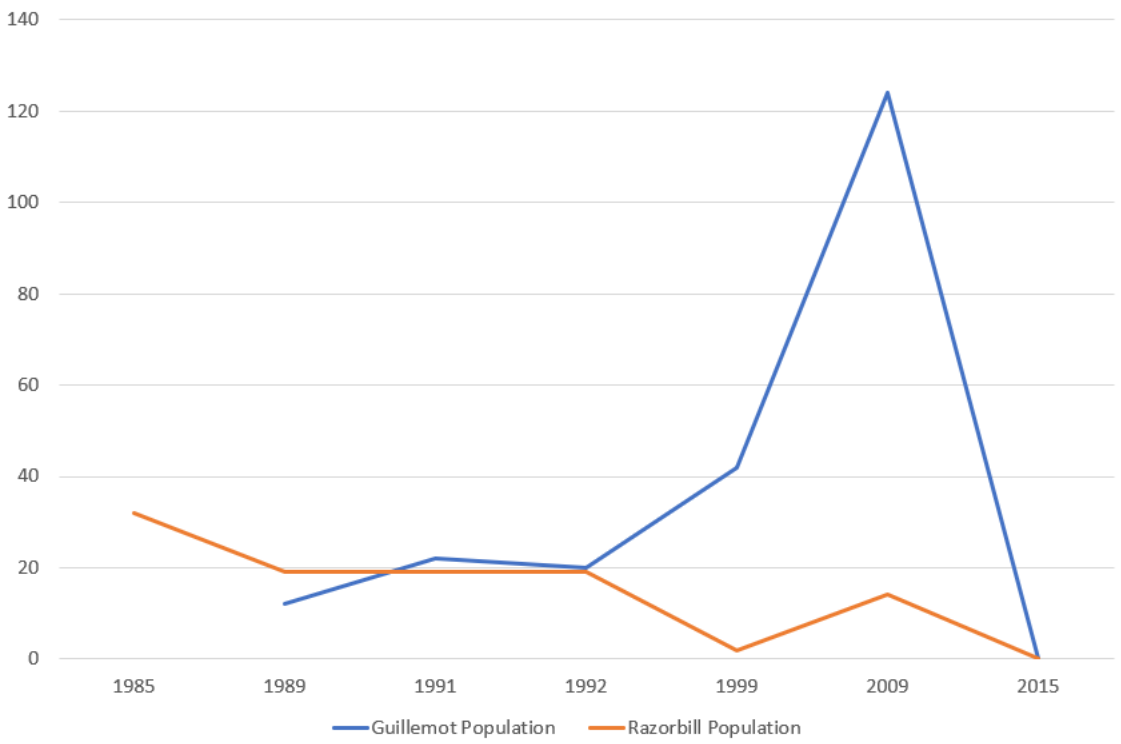


Figure 7.6 Guillemot and razorbill population at Lye Rock

SITE PRESSURES

7.8.2 This site receives high levels of pressure from visitors on foot. The site is adjacent to the popular SW Coast Path. Foot traffic will be high in this area due to the presence of popular features like Tintagel Castle. While these colonies are located lower down on the steep cliffs below the coastal path, there is still potential for non-visible indicators of human presence, like noise, to cause disturbance to these colonies. High levels of visitors increase the risk that litter is left around this site and can therefore affect the colony. Furthermore, more dogs are likely to be present in this area if more visitors are present.

7.8.3 Due to the cliffs, this site is a popular location for coasteering; therefore, colonies will face visitor pressure directly on the cliff face and the surrounding water (OA Surf Club, 2023).

7.8.4 There is also heavy boat traffic in the area, as local wildlife tour companies operate around this site (Padstow Sealife Safaris, 2023). The area is also popular with kayakers (Kirkwood, 2018).

7.8.5 There has not yet been evidence of difficulties with mammalian or avian predators at this site, however, there is the possibility that this could be due to lack of monitoring.

SITE SURVEY RESULTS

7.8.6 During this survey 51 razorbills were recorded on nests on the island but no guillemots were on nests. Up to 75 guillemots were found roosting at the bottom of the cliff on the island and were found just below suitable cliff ledges for breeding. This ledge was quite low down and significantly lower than any of the breeding razorbills, who were using suitable habitat high up on the island.

7.8.7 A single disturbance event was recorded during the day, although it did not involve any nesting birds. A group of 12+ people coasteering were using the coast around Bossiney Cove and were moving west towards Lye Rock. Although they never got within 150m of the island, when they approached to the closest point, the noise created by the participants flushed the majority of the roosting guillemots off the bottom of the cliff into the water.

7.9 LYNTON 1 & 2

7.9.1 This site is part of the West Exmoor Coast and Woods SSSI, for which guillemot and razorbill are a designated feature. The guillemot and razorbill populations at this site are decreasing (Figure 7.7). This site is also under the management of Exmoor National Park and the South West Inshore and South West Offshore Marine Plan 2021.

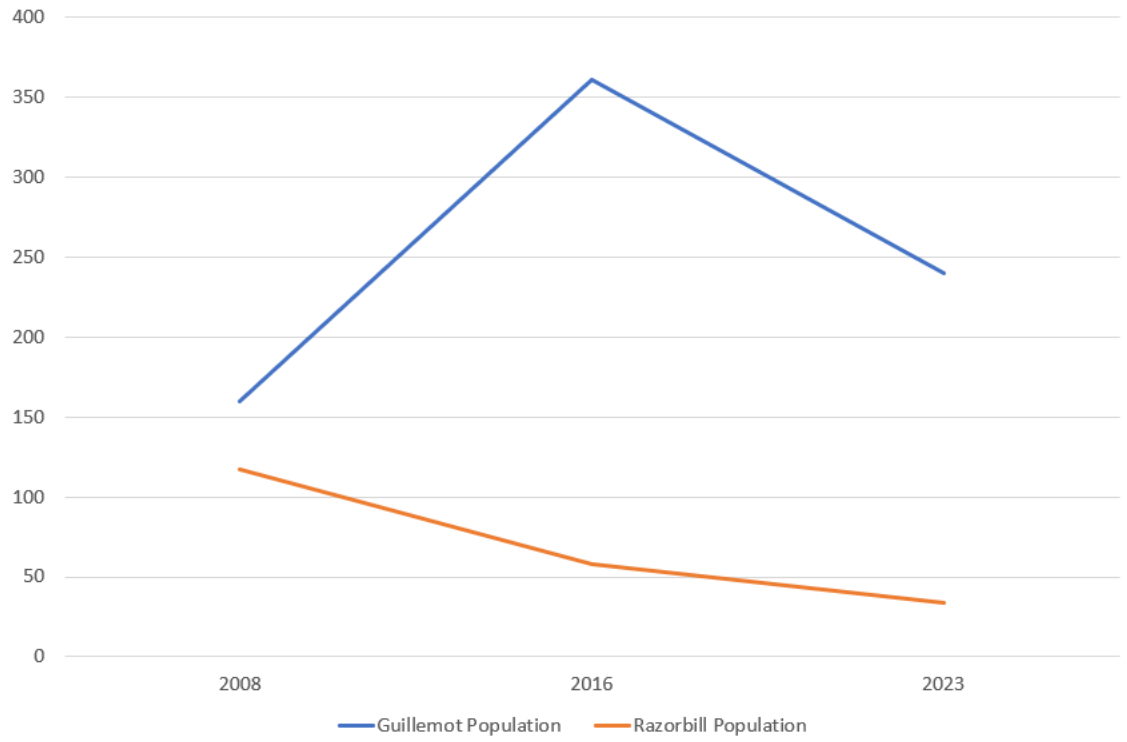


Figure 7.7 Guillemot and razorbill population at Lynton 1 & 2

SITE PRESSURES

7.9.2 This site receives high levels of pressure from visitors on foot. Foot traffic will be high in this area due to its location in Exmoor National Park. While these colonies are located lower down steep cliffs, there is still potential for non-visible indicators of human presence, like noise, to cause disturbance to these colonies. High levels of visitors increase the risk that litter is left around this site and can therefore affect the colony. Furthermore, more dogs are likely to be present in this area if more visitors are present.

7.9.3 Due to the cliffs, this site is a popular location for rope climbing and bouldering; therefore, colonies will face visitor pressure directly on the cliff face (UKC, 2023b).

7.9.4 This site also experiences visitor pressure from the water, as it is popular among kayakers (North Devon Explores, n.d.). There are also multiple companies in the area who run boat tours to this site to specifically view the seabirds (Ilfracombe Sea Safari, n.d.).

7.9.5 There has not yet been evidence of difficulties with mammalian or avian predators at this site, however, there is the possibility that this could be due to lack of monitoring.

SITE SURVEY RESULTS

7.9.6 This site visit found the site is not visible from land, so no counts were possible. The probable location of the colony was identified by the rafting auks observed flying to and from a section of cliff, but this could not be viewed from the coast path.

7.9.7 The area is adjacent to 'The Valley of the Rocks' that is very popular with tourists, but much like Highveer Point no disturbance was recorded during the site visit. The footpath is sufficiently set back to make any disturbance from hikers unlikely. A pair of RIBs being operated by a local sea safari company were observed stopping at multiple locations along the wider coastline to show guests seabird colonies along the North Devon coast.

7.10 NORTH CORNWALL 2

7.10.1 The guillemot population at this site has historically increased and is now decreasing. However, there is not enough razorbill data to determine trends at this site (Figure 7.8). This site is under the management of Cornwall AONB and the South West Inshore and South West Offshore Marine Plan 2021.

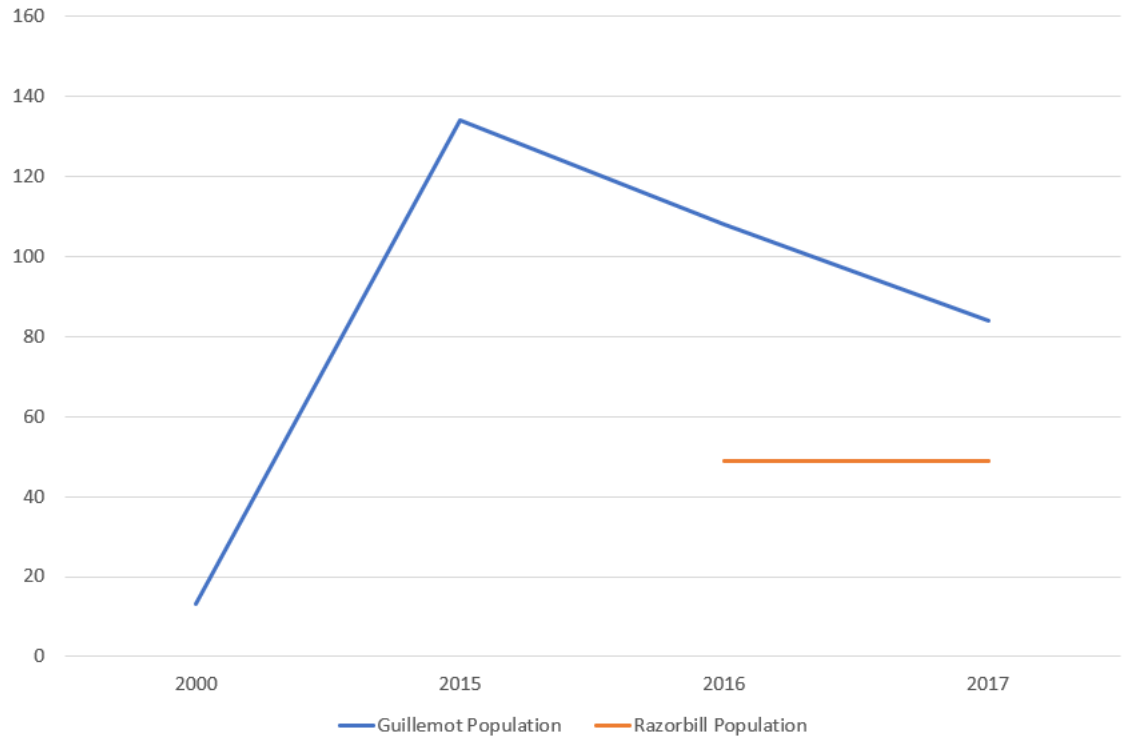


Figure 7.8 Guillemot and razorbill population at North Cornwall 2

SITE PRESSURES

7.10.2 This site receives high levels of pressure from visitors on foot. The site is adjacent to the popular SW Coast Path. Foot traffic will be high in this area due to the presence of popular features like the town of Padstow and the Trevose Head Heritage Coast. While these colonies are located lower down on the steep cliffs below the coastal path, there is still potential for non-visible indicators of human presence, like noise, to cause disturbance to these colonies. High levels of visitors increase the risk that litter is left around this site and can therefore affect the colony. Furthermore, more dogs are likely to be present in this area if more visitors are present.

7.10.3 Due to the cliffs and sea caves in the area, this site is a popular location for coasteering, rope climbing, and kayaking; therefore, colonies will face visitor pressure directly on the cliff face (Trevone Bay Adventures, 2019). This pressure comes from individuals with their own equipment as well as companies who run tours. There are also several companies that conduct wildlife boat tours in the area (Padstow Sealife Safaris, 2023).

7.10.4 There has not yet been evidence of difficulties with mammalian or avian predators at this site, however, there is the possibility that this could be due to lack of monitoring.

SITE SURVEY RESULTS

7.10.5 The colony is split into two distinct areas on the same cliff, with 151 guillemots and 42 razorbills were recorded during the survey on the cliffs presumed to be on nests.

7.10.6 During the survey disturbance was recorded on four occasions, on three occasions a sightseeing Rigid Inflatable Boat (RIB) was observed approaching to within 100m causing birds to flush from nest sites. The fourth occasion was a sight seeing boat approaching to less than 50m from the cliff and lingering for over 6 minutes, causing multiple birds to fly off nests. A full summary of the disturbance events have been described in the (10.11 Guillemot and Razorbill: Survey Reports [REP1-054]).

7.11 TRESUNGERS POINT

7.11.1 The guillemot population at Tresungers Point is decreasing, but the razorbill population is increasing (Figure 7.9). This site is under the management of Cornwall AONB and the South West Inshore and the South West Offshore Marine Plan 2021.

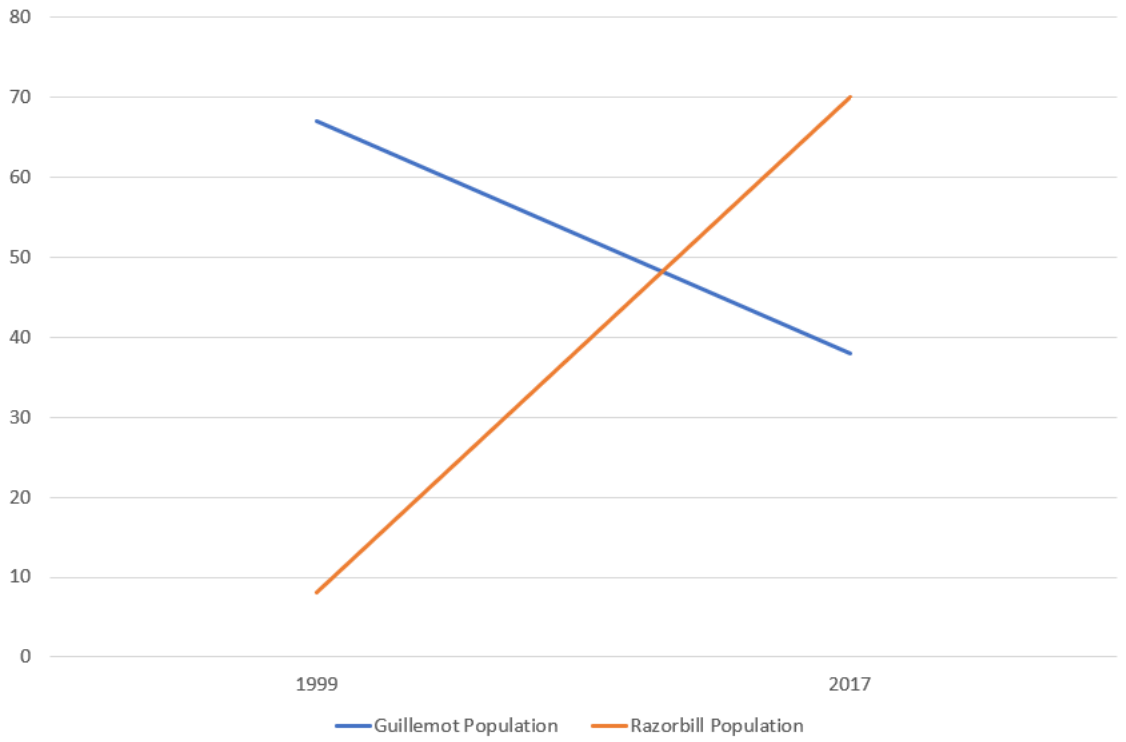


Figure 7.9 Guillemot and razorbill populations at Tresungers Point

SITE PRESSURES

7.11.2 This site receives high levels of pressure from visitors on foot. The site is adjacent to the popular SW Coast Path. Foot traffic will be high in this area due to the presence of popular holiday towns like Port Isaac and Polzeath. While these colonies are located lower down on the steep cliffs below the coastal path, there is still potential for non-visible indicators of human presence - like noise - to cause disturbance to these colonies. High levels of visitors increase the risk that litter is left around this site and can therefore affect the colony. Furthermore, more dogs are likely to be present in this area if more visitors are present.

7.11.3 Due to the cliffs, this site is a popular location for coasteering; therefore, colonies will face visitor pressure directly on the cliff face (Cornish Rock Tors, 2023).

7.11.4 Furthermore, this site also experiences visitor pressure from the water. There are multiple kayak hire facilities near this site, along with companies that run kayak and swimming tours (Cornish Rock Tors, 2023). There are also multiple companies in the area who run boat tours around this site to view seabirds (Wavehunters, 2021).

7.11.5 There has not yet been evidence of difficulties with mammalian or avian predators at this site, however, there is the possibility that this could be due to lack of monitoring.

SITE SURVEY RESULTS

7.11.6 During this survey 125 guillemots and 67 razorbills were recorded on nest ledges. These were found in two distinct separate colonies, one closer to Port Gaverne with 30 guillemot and 17 razorbill and the colony at Tresunger Point itself with 95 guillemot and 50 razorbill.

7.11.7 During the survey there was no disturbance recorded, the recent persistent northerly winds building up a swell into the cliffs perhaps deterring any kayaking or paddleboarding, despite the calm south-westerly conditions on the day. The Port Gaverne area is known for offering coasteering, sea kayaking and paddleboarding experiences and due to the close proximity, combined with the majority of the nests being relatively low on the cliffs, it is possible that disturbance from these activities could cause disturbance during the season in better conditions. This assumption is backed up with data on Strava (www.strava.com) which suggests there is significant activity from water sports in the area.

7.12 TREYARNON – MEROPE

7.12.1 The guillemot and razorbill populations at Treyarnon - Merope have been decreasing in recent years (Figure 7.10). This site is under the management of Cornwall AONB and the South West Inshore and South West Offshore Marine Plan 2021.

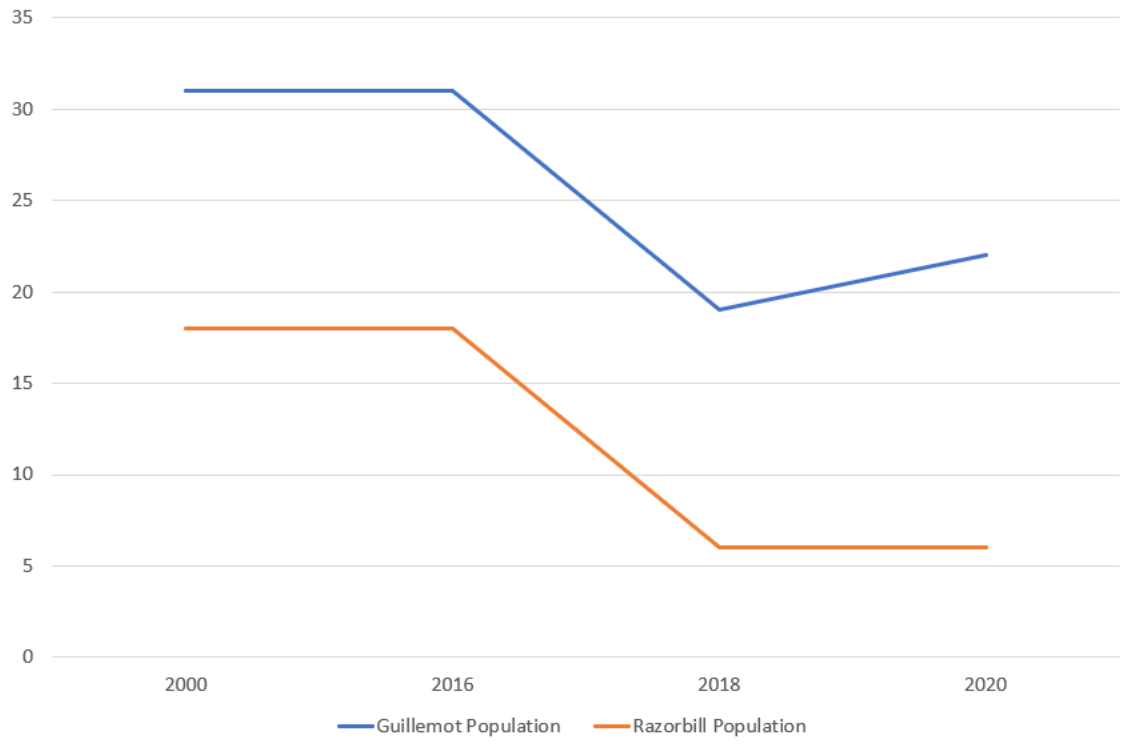


Figure 7.10 Guillemot and razorbill population at Treyarnon-Merope

SITE PRESSURES

7.12.2 This site receives high levels of pressure from visitors on foot. The site is adjacent to the popular SW Coast Path. Foot traffic will be high in this area due to the presence of popular features like the town of Padstow and the Trevose Head Heritage Coast. While these colonies are located lower down on the steep cliffs below the coastal path, there is still potential for non-visible indicators of human presence - like noise - to cause disturbance to these colonies. High levels of visitors increase the risk that litter is left around this site and can therefore affect the colony. Furthermore, more dogs are likely to be present in this area if more visitors are present.

7.12.3 Due to the cliffs and sea caves in the area, this site is a popular location for coasteering, rope climbing, and kayaking; therefore, colonies will face visitor pressure directly on the cliff face (Trevone Bay Adventures, 2019). This pressure comes from individuals with their own equipment as well as companies who run tours. There are also several companies that conduct wildlife boat tours in the area (Padstow Sealife Safaris, 2023).

7.12.4 There has not yet been evidence of difficulties with mammalian or avian predators at this site, however, there is the possibility that this could be due to lack of monitoring.

SITE SURVEY RESULTS

7.12.5 During this survey 23 guillemots and seven razorbills were recorded at the site, with more birds flying into the cliffs that are not visible form land. A site visit by boat would be required for a full census of the colony.

7.12.6 During the survey there was no disturbance recorded, however the site is very close to several popular beaches at Constantine Bay, Harlyn Bay and Long Cove beach which are all next to holiday parks so the potential for disturbance from recreational water users.

7.13 FEASIBLE COMPENSATION MEASURES

7.13.1 There are currently no measures in place across all sites to mitigate the effects of recreational disturbance using signage and visitor access statements. Therefore, there is scope to create compensation measures that implement these tools at all sites.

7.13.2 Bawden Rocks, Carters Rocks, and Grower Rock would not benefit from the restriction of dogs because there is little visitor access by foot, but this would be an effective recreational mitigation measure for the rest of the sites. Bawden Rocks would not also benefit from the restriction of boat time and approach distance because this site mainly faces pressures from individual watercraft, rather than tour boats, for which it is difficult to enforce mitigation. However, these would be effective measures for the rest of the sites. Some local operators around Carters Rocks and Carvannet – Portreath 3 have even taken steps to reduce disturbance, and management measures could build on these efforts (Newquay Sealife, 2023).

7.13.3 There is also scope to involve local gear hire companies and recreational organisations in promoting appropriate visitor behaviour to all sites. Many of the sites, such as Highveer Point, Lynton 1 & 2, North Cornwall 2, Treyarnon-Merope, Tresungers Point, and Lye Rock, are popular for activities like kayaking and rock climbing. North Cornwall 2, Tresungers Point, and Treyarnon - Merope are also popular for coasteering. A coasteering company that operates around Tresungers Point has been "backed" by the National Trust, and work with them to reduce disturbance (Cornish Rock Tors, 2023). Efforts like these could be built upon at this site.

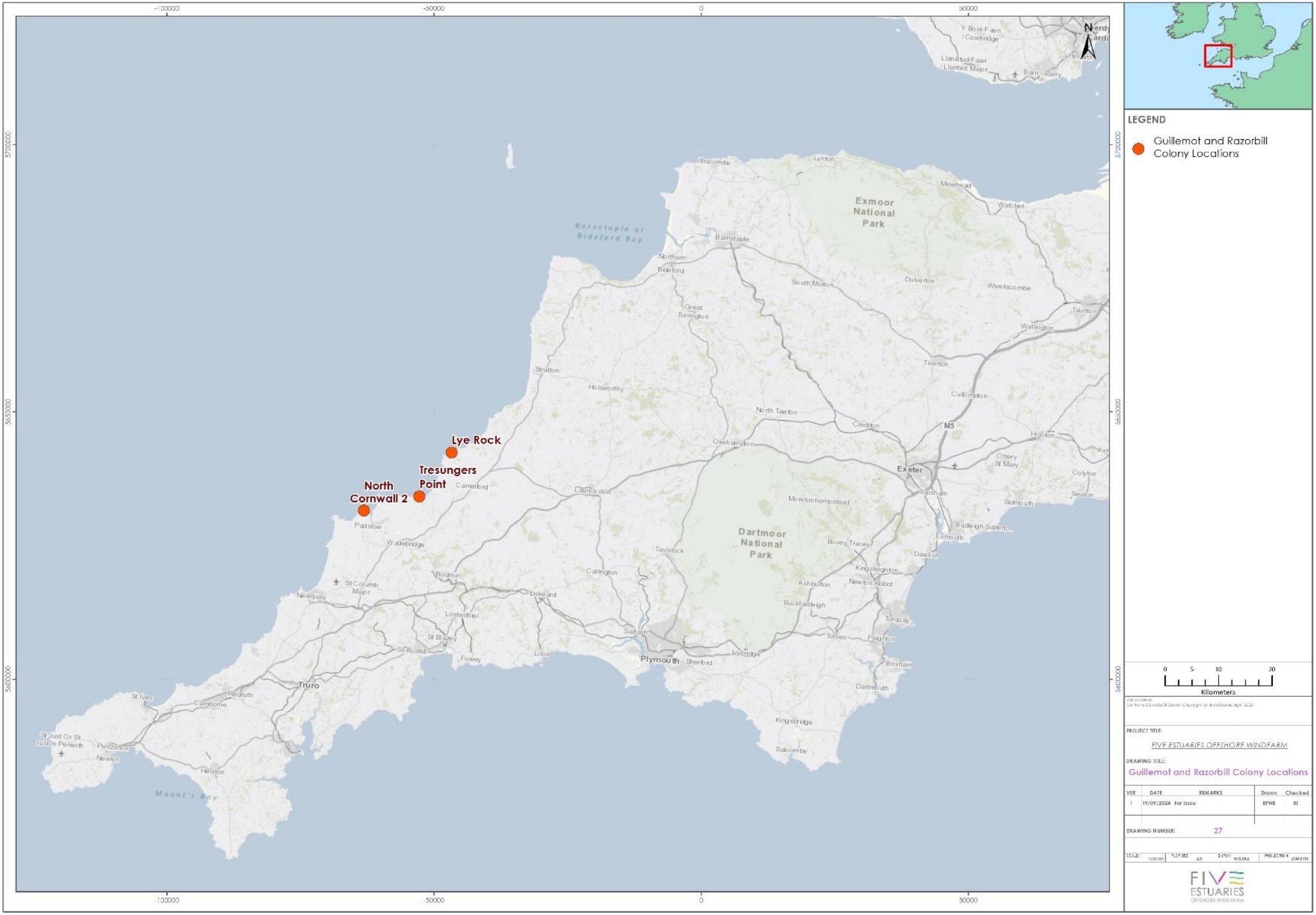
7.13.4 The summary chart of appropriate compensation measures for each site is presented below in Table 10.

FINDINGS FROM THE SITE SURVEYS

7.13.5 During the site surveys carried out in 2024 it was found that the most likely cause of disturbance on the sites was from water-based activities. At each site the coastal paths were set back far enough from the cliff edge not to cause disturbance and none of the cliffs were suitable for climbing activities compared to other nearby cliffs.

7.13.6 Following the site surveys the site selection has been narrowed down to the following sites deemed most suitable for compensation measures (Figure 7.11):

- North Cornwall 2;
- Tresunger's Point; and
- Lye Rock



LEGEND

- Guillemot and Razorbill Colony Locations

0 5 10 20
Kilometers

PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:
Guillemot and Razorbill Colony Locations

VER	DATE	REMARKS	Drawn	Checked
1	19/09/2024	For Issue	BPHB	RI

DRAWING NUMBER: 27

SCALE: 1:500,000 | PAPER SIZE: A3 | DATUM: WGS84 | PROJECTION: UTM31N

FIVE ESTUARIES OFFSHORE WIND FARM

Table 10 Summary chart of effective compensation measures for guillemot and razorbill for the sites carried forward for compensation measures.

Compensation Measure	Overall Compensatory Goal	Lye Rock	North Cornwall 2	Tresungers Point
Signage	Reduce recreational disturbance	Y	Y	Y
Visitor Access Statements	Reduce recreational disturbance	Y	Y	Y
Coordination with Equipment Hire Businesses	Reduce recreational disturbance	Y	Y	Y
Coordination with Recreational Organisations	Reduce recreational disturbance	Y	Y	Y
Wardening	Reduce recreational disturbance	Y	Y	Y

7.13.7 Table 10 highlights additional actions that will supplement any existing management at each site. Feasibility is determined by site-specific characteristics and if the management measure is already taking place at a specific site

8 ROADMAP

8.1.1 It is necessary to contact the relevant stakeholders and management bodies to determine the feasibility of implementing any compensation measures at the sites. Future monitoring of any colonies will allow for an adaptive approach to the delivery of compensation.

8.1.2 Following consultation with landowners the sites will be refined to the most appropriate one(s). Initial visits to the selected sites will be necessary to determine what pressures are present in the area. Secondly, it will be necessary to pursue site-specific surveys during the breeding season to conduct baseline productivity monitoring that can be used as a baseline upon which the population-level effects of any compensation measures can be pursued. These initial baseline surveys will need to take place in coordination with the relevant landowners and lease holders and include agreements to undertake this research with experienced surveyors. After the initial site visits and surveys have been completed, the final site and measures selections can be made using the in-situ data and coordination with relevant stakeholders. Future pre-implementation plans for any measures will be decided through coordination with relevant stakeholders. Based on the site selection and site analysis conducted to date, it is reasonable to conclude that there will be a range of options to deliver the necessary level of compensation, if it is required.

8.1.3 Up to two years of monitoring of the sites will be conducted to help with the final site selection process, allowing the selected site(s) to be managed for up to three years prior to the projects operation phase.

8.1.4 The implementation of these measures will take place through coordination with relevant landowners, conservation bodies, and researchers, so that evidence-based measures are implemented effectively.

8.1.5 It will be necessary to create a monitoring plan to help evidence the benefits of these measures at the population level, as these measures would need to offset any potential population losses from VE at the impacted sites. Productivity monitoring can help evidence the benefits of these measures, and it will build upon the pre-implementation surveys. An adaptive management plan will also be developed in case any compensation measures need to be adjusted to improve their efficacy in the post-implementation phase. Future monitoring, reporting, and adaptive management plans will be decided through coordination with relevant stakeholders. Finally, a reporting system will be developed to communicate the efficacy of any compensation measures to relevant stakeholders.

ROADMAP UPDATE

8.1.6 Following the site surveys in May and June 2024 a site selection process highlighted three sites particularly suitable for compensation measures. The key pressures at these sites were from water-based activities and the most relevant compensation measures for each site are considered to be wardening, education and engagement and signage.

8.1.7 The Applicant is also progressing conversations with the Cornwall Marine and Coastal Partnership to deliver any measures. Consultation with local groups (that are part of the partnership) are ongoing, including discussions with Cornwall Council, Cornwall Wildlife Trust, Cornwall Birds and the Seal Research Trust.

8.1.8 These discussions are taking place to establish the best way to progress the compensation measures proposed in a collaborative way, whether it be through the WISE scheme or Voluntary Marine Conservation Areas (VMCA) for example.

8.1.9 All measures will include a comprehensive monitoring program to assess the effectiveness of the measures at selected colonies. Monitoring will gather data on the number of birds of both species at each colony and their breeding productivity through a series of site visits. Colonies will be divided into zones to evaluate disturbance and its impacts on productivity both within individual colonies and between different colonies.

CALCULATING THE BENEFITS OF IMPLEMENTING MEASURES

8.1.10 Disturbance by watercraft and other activities are known to impact seabird productivity and colony size. Therefore it is assumed that any measure that reduces disturbance will have positive impacts on productivity and on the colony size, if there is scope for expansion.

EQUATIONS

8.1.11 The following methodology has been used to calculate the compensation potential at each site (measured in terms of additional individual fledglings). The inputs into each equation will be described in more detail below. For sites where the current population is lower than the historical peak population, the following equation was used:

$$(Current\ population \times (Expected\ productivity - Current\ productivity)) +$$

$$(Difference\ between\ the\ historical\ peak\ and\ current\ population \times Expected\ productivity)$$

8.1.12 For sites where the current population is the peak population, the following equation was used:

$$Current\ population \times (Expected\ productivity - Current\ productivity)$$

INPUTS

SITE POPULATION

8.1.13 The Seabird Monitoring Programme database was used to collect both historical and current site population data (BTO, n.d.). Each site population was converted into breeding pairs (Individual count x 0.667 = count in pairs; Walsh et al., 1995).

SITE PRODUCTIVITY RATE

8.1.14 The standard regional productivity rates were used for the expected future productivity rates at each site. These rates were 0.82 and 0.64 for guillemot and razorbill, respectively (Horswill and Robinson, 2015).

8.1.15 Where no site-specific productivity rates were available, several different productivity rates were used to stand in for the current productivity rate at each site. These various productivity rates allow for a range of potential outputs to be estimated.

- National average productivity rate (Horswill and Robinson, 2015)
  - Guillemot: 0.67
  - Razorbill: 0.57
- Region-specific productivity rate (To represent scenarios where there would be no change between the current and expected productivity rate; Horswill and Robinson, 2015)
  - Guillemot: 0.82
  - Razorbill: 0.64

OUTPUTS

8.1.16 The calculation described above produces the number of additional individual fledglings at each site. However, not all of these fledglings will survive until adulthood. To determine the number of fledglings that will survive until adulthood, the rate of survival until adulthood was multiplied by the number of fledglings. The survival rates were 0.36 and 0.32 for guillemot and razorbill, respectively (Horswill and Robinson, 2015).

8.1.17 The Hornsea Four compensation calculation method defines the number of adult pairs that each offshore wind development requires to compensate for their respective impacts. In order to compare the compensation potential at each site to project requirements, the number of adult pairs needed to produce the fledgling output was calculated. The number of individual fledglings was divided by the national average productivity rate for each species. National average productivity was also used in the Hornsea Four compensation calculation; therefore, the use of national average productivity allows for consistent methodology across the compensation calculation process.

SITE WHERE THE HISTORICAL POPULATION > CURRENT POPULATION

8.1.18 As a theoretical example, a site currently has 450 pairs of guillemot. The historical peak population for this site is 600 pairs of guillemot. The current productivity rate is represented by the national average productivity rate for guillemot (0.67). The following calculation is used, which results in 190.5 additional individual fledglings:

$$\left(450 \times (0.82 - 0.67)\right) + (150 \times 0.82)$$

8.1.19 Of the 190.5 fledglings, 68.3 will survive until adulthood. To produce 68.3 additional adult birds, 283.5 additional adult pairs are required.

8.1.20 To assess the benefits of measures at these colonies, the Applicant will consider both the expected increase in productivity and population size (in pairs – where individuals counted are multiplied by 0.67 to estimate the number of pairs).

SITE WHERE THE CURRENT POPULATION = CURRENT PEAK

8.1.21 As a theoretical example, a site currently has a peak population of 200 pairs of guillemot. The current productivity rate is represented by the national average productivity rate for guillemot (0.67). The following calculation is used, which results in 30 additional individual fledglings:

$$200 \times (0.82 - 0.67)$$

8.1.22 This measure is therefore predicted to deliver compensation equivalent to 44.6 additional breeding pairs.

RESULTS

8.1.23 From the three shortlisted sites, an equivalent conservative maximum of 184 additional adult pairs could be delivered into the regional population based on national productivity rates (Table 11). If the colonies currently have lower productivity rates then this number would increase. For razorbill the maximum equivalent additional number of adult pairs is estimated to be 113 pairs (Table 12).

8.1.24 It should be noted that these 184 additional guillemot adult pairs may be shared in a collaborative approach between projects, or the scheme may be expanded to include additional sites.

8.1.25 The estimated range for the number of additional fledglings is calculated using two approaches. The lower estimate only measures the benefit from additional birds, and is based on the difference between the historical peak count and the most recent peak count, multiplied by the regional productivity rate (e.g. 27 fledglings for North Cornwall 2, as shown in Table 11). The upper estimate measures the benefit from additional birds and increases to the productivity of the current population. It does this by adding two components: (1) the same historical-to-recent peak count difference multiplied by the regional productivity rate, and (2) the current population multiplied by the difference between the regional and national productivity rates (e.g. 36 fledglings for North Cornwall 2,Table 11). Although productivity at sites in Cornwall may be lower than the national average, the estimates still demonstrate the potential benefits of the proposed measures. If baseline productivity is actually lower than assumed, the measures could deliver even greater benefits than currently estimated.

Table 11 The guillemot historical peak colony count and most recent colony count from the SMP database (individuals x 0.67 = pairs) and the expected number of additional individual fledglings and additional adult pairs.

Site	Historical SMP peak count (pairs)	Most recent SMP count (pairs)	Expected number of additional individual fledglings	Fledglings survived until adulthood	Total equivalent additional breeding pairs
North Cornwall 2	89.3	56.0	27-36	10-13	41-53
Tresunger's Point	82.7	0.0	68	24	101
Lye Rock	44.7	25.3	16-20	6-7	24-29
Total	**216.8**	**81.4**	**111-124**	**40-44**	**166-184**

Table 12 The razorbill historical peak colony count and most recent colony count from the SMP database (individuals x 0.67 = pairs) and the expected number of additional individual fledglings and additional adult pairs.

Site	Historical SMP peak count (pairs)	Most recent SMP count (pairs)	Expected number of additional individual fledglings	Fledglings survived until adulthood	Total equivalent additional breeding pairs
North Cornwall 2	32.7	32.7	2-21	1-7	4-37
Tresunger's Point	21.3	0	14	4	24
Lye Rock	46.7	46.7	3-30	1-10	6-53
Total	**100.7**	**79.4**	**19-65**	**6-21**	**34-113**

9 COLLABORATIVE COMPENSATION DELIVERY

9.1.1 The RIAA (Volume 5, Report 4) undertaken for VE has not identified any adverse effects on guillemot as the annual predicted impact of displacement from the VE array and buffer is 0.82 adult guillemot and 0.22 adult razorbill mortalities attributed to FFC SPA. After recent consultation with NE at ETGs, it was suggested that VE OWFL should consider preparing a without prejudice case for guillemot due to in-combination impacts to the feature at FFC SPA. Due to this low level of impact on guillemot by VE, it was agreed with NE that a proportionate compensation measure would be the management and reduction of disturbance events at small breeding colonies (approx. 100 pairs in England).

9.1.2 As guillemot and razorbill mortalities attributed to VE consist of very low numbers of potentially affected birds, discussions with Defra and NE have suggested that coordination with other projects in a similar position should be explored. If compensation is required, a collaborative approach between VE OWFL and other project(s) with similar levels of impact as VE OWFL may be an appropriate option as the management and reduction of disturbance events at small breeding guillemot colonies (approx. 100 pairs) in England has the scope to deliver compensation for multiple projects if required and the flexibility to target different sized colonies and/or multiple colonies.

9.1.3 The compensation measures are likely to be delivered in collaboration with other projects, and the benefits measured, in one of two ways:

- Measures will form part of a wider strategic scheme that will target and benefit colonies across the region. However, the benefits of the compensation measures attributed to VE OWFL will be monitored at the shortlisted sites presented. It is foreseen that these shortlisted sites may be shared between VE OWFL and Rampion 2 as there is more than sufficient benefit available to compensate for both project's impacts; or
- A broader, regional, compensation package with the same measures that will be undertaken in collaboration with a group of developers and the benefits from these measures will be proportionally distributed between each project at an agreed rate.

9.1.4 The Applicant is confident that the regional benefits of the proposed measures will vastly outweigh the compensation requirements for the projects involved. Given the very low level of impact, VE OWFL will ensure that their low requirement is considered fully within any potential strategic scheme.

10 CONCLUSION

10.1.1 Any proposed compensation measures for guillemot and razorbill for VE will focus on mitigating the effects of recreational disturbance.

10.1.2 Potential sites have been selected for compensation based on a longlisting and shortlisting process. Potential longlist sites were limited to the southwest of England due to the regional presence of guillemot and razorbill, the general lack of management measures at colonies, and the desire to provide compensation for English guillemot and razorbill colonies (given the location of VE). The shortlisting process involved determining each colony's population, health, and location with the intension to focus compensation on colonies that had opportunities for growth and those that were subjected to pressure from tourism. A further refinement of the short list will be undertaken after consultation with landowners.

10.1.3 The document then outlined the feasibility of mitigating the effects of recreational disturbance while highlighting key challenges and future steps. These compensation measures include strategies to reduce disturbance from recreational activity, including signage, visitor access statements and coordination with equipment hire businesses and recreational organisations.

10.1.4 Finally, the feasibility of employing these various measures at the chosen sites was undertaken. Appropriate compensation measures for each site were chosen based on the existing threats and management measures already present at the site, so that recreational disturbance can best be addressed according to the needs of each site.

10.1.5 The roadmap for implementing measures was also presented. The document finished by outlining collaboration opportunities with other OWF projects to implement compensation across the selected sites. A collaborative approach could be a desirable option to ensure compensation for such small numbers of birds is delivered effectively and efficiently, both from an ecological and cost perspective.

10.1.6 Based on the site selection and site analysis conducted to date, it is reasonable to conclude that there will be a range of options to deliver the necessary level of compensation, if it is required.

10.1.7 The other option for compensation considered to be viable is the use of the MRF in regard to strategic compensation for predator control, as per the recent DEFRA announcement.

CONCLUSIONS – POST 2024 SITE SURVEYS

10.1.8 The site surveys carried out in spring 2024 highlighted the disturbance issues or potential disturbance issues at the sites. Of the ten sites surveyed five have low potential, two have moderate potential and three have high potential for compensatory measures to be successful. The sites being carried forward are Lye Rock, North Cornwall 2 and Tresunger's Point.

10.1.9 The disturbance recorded at these sites during the surveys were primarily due to water-based activities and therefore future compensation measures will be focused on reducing this type of disturbance.

10.1.10 The main compensation measures that the Applicant deems most suitable for compensation measures at these sites would be:

- Wardening
- Education and engagement
- Signage

10.1.11 Consultation with local groups in Cornwall is ongoing. Discussions have already taken place with Cornwall Council, Cornwall Wildlife Trust, Cornwall Birds, and the Seal Research Trust, as well as continuing talks with the Cornwall Marine and Coastal Partnership.

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12 APPENDIX A – GUILLEMOT AND RAZORBILL ECOLOGICAL EVIDENCE AND ROADMAP – DRAFT SUBMITTED TO PINS AND NATURAL ENGLAND

FIVE ESTUARIES
OFFSHORE WIND FARM

FIVE ESTUARIES OFFSHORE WIND FARM

GUILLEMOT AND RAZORBILL COMPENSATION - ECOLOGICAL EVIDENCE AND ROADMAP

Document Reference	N/A
Revision	PINS & NE Draft
Date	November 2023

Project	Five Estuaries Offshore Wind Farm
Sub-Project or Package	DCO Application
Document Title	Kittiwake gull compensation - ecological evidence and roadmap
Document Reference	N/A
Revision	PINS & NE Draft

Revision	Date	Status/Reason for Issue	Originator	Checked	Approved
PINS & NE Draft	Nov-23	Draft	GoBe	GoBe	VE OWFL

DEFINITION OF ACRONYMS

Term	Definition
AEoI	Adverse Effects on Integrity
DCO	Development Consent Order
FFC	Flamborough & Filey Coast
HRA	Habitats Regulations Assessment
IROPI	Imperative reasons of overriding public interest
JNCC	Joint Nature Conservation Committee
MCZ	Marine Conservation Zone
MMF	Mean-max foraging range
NE	Natural England
OOEG	Offshore Ornithology Engagement Group
OWF	Offshore Wind Farm
RAG	Red, Amber, Green
RIAA	Report to Inform Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
SAC	Special Areas of Conservation
SD	Standard Deviation
SMP	Seabird Monitoring Programme
SNCB	Statutory Nature Conservation Bodies
SPA	Special Protection Area
VE	Five Estuaries Offshore Wind Farm
VE OWFL	Five Estuaries Offshore Wind Farm Limited

13 INTRODUCTION

13.1 BACKGROUND

FIVE ESTUARIES OFFSHORE WIND FARM

13.1.1 Five Estuaries Offshore Wind Farm (VE) is a proposed extension to the operational Galloper Offshore Wind Farm. VE will be situated approximately 37 km off the coast of Suffolk, England (at its closest point).

13.1.2 As part of the Development Consent Order (DCO) application, Five Estuaries Offshore Windfarm Ltd (VE OWFL) is required to produce a Report to Inform Appropriate Assessment (RIAA) in order to provide the information required by the Competent Authority in order to undertake its Habitats Regulation Assessment (HRA) and Appropriate Assessment. If the HRA process deems that Adverse Effects on Integrity (AEoI) cannot be excluded, a derogations process is followed. In the event that no alternative solutions can be found, and if there are imperative reasons of overriding public interest (IROPI), the final stage of the derogations process is to develop measures to compensate for adverse effects on a site.

13.1.3 This document introduces the without prejudice compensation measures have been identified for common guillemot (hereafter guillemot) (*Uria aalge*) and razorbill (*Alca torda)* and provides the key evidence to support disturbance management measures. These measures were discussed with Natural England during the ETG in August 2023 and it was agreed that they would be the most suitable option given the low level of impact on guillemot and razorbill by the Project.

DEROGATION PREPARATION

13.1.4 Two of the species of potential derogation risk for VE are guillemot and razorbill at Flamborough and Filey Coast (FFC) Special Protection Area (SPA). Due to the very low impact for each species (less than one individual each) and the closely related breeding sites and ecology of both species it was considered appropriate to combine both species for the derogation case.

13.1.5 FFC SPA is 275.5 km away from VE, and outwith the mean-max foraging (MMF) range + 1 Standard deviation (SD) for guillemot (73.2km; Woodward *et al.,* 2019), and for razorbill (88.7km; Woodward *et al*., 2019) and therefore there is no breeding season connectivity between FFC SPA and VE, although some non-breeding connectivity may exist. Concern regarding disturbance and displacement has been raised for guillemot and razorbill on other projects by NE, and recent decisions on other offshore wind projects (e.g. Hornsea Three, East Anglia One North, East Anglia Two, Norfolk Vanguard and Norfolk Boreas) concluded that AEoI could not be ruled out for guillemot at FFC SPA when considered in-combination with other projects. As a precedent for concern around AEoI has been established on other projects, the species is thus of derogation concern for VE. A without prejudice case has been presented due to a lack of breeding connectivity with the site and the low level impact (<1 individual) for both species.

13.1.6 VE OWFL has identified potential compensation measures for VE and created a 'longlist' of all possible compensation options at FFC SPA (and other high-risk sites for other species potentially requiring compensation). The long-listed options were based on the existing VE project proposal, experience with HRA derogation matters in the UK and stakeholder feedback received to date. These longlisted options are discussed in 'Five Estuaries Offshore Wind Farm: Potential compensation measures longlist report' (VE OWFL, 2022a).

13.1.7 The longlist options were narrowed down to a shortlist following a ranking criteria assessment (otherwise known as a Red-Amber-Green (RAG) assessment) and discussed in 'Five Estuaries Offshore Wind Farm: Compensation measures shortlist technical note' (VE OWFL, 2022b). The ranking approach is provided in 'Five Estuaries Offshore Wind Farm: Compensation measures ranking approach note' (VE OWFL, 2022c). In short, longlisted measures were scored against a number of categories, with scores for each category summed to provide a total score. The measures were then allocated to “red”, “amber” and “green” groups based on their total score, and “green” measures taken forward to the shortlist of compensation options.

13.1.8 Following shortlisting and subsequent stakeholder feedback, it was deemed that compensation measures carried out at small colonies on the south coast of England would be most feasible given the scale of the impact caused by VE. For example, the reduction in recreational disturbance at guillemot and razorbill colonies. Following the ETG in August 2023 Natural England agreed in principle with the compensation measure outlined.

13.1.9 Based on preliminary analysis of the potential impact of VE on guillemot and razorbill, there is a much lower compensation requirement compared to other OWF projects. As such, management measures at small colonies have been proposed based on discussions with Natural England at the ETG in August 2023. Therefore, the project has focused on developing guillemot and razorbill compensation in sites that could benefit from management measures to reduce disturbance. Some examples include signage near breeding sites, working with /educating activity groups such as rock climbing, coasteering, paddle boarding etc. This may be delivered through strategic partnerships with organisations or by offering financial contributions for management of the sites.

13.2 AIMS AND OBJECTIVES

13.2.1 This document collates and presents the ecological evidence for small scale management of guillemot and razorbill colonies and provides a roadmap for compensation development and implementation.

13.3 ESTIMATED COMPENSATION QUANTUM

13.3.1 The predicted magnitude of displacement mortality for which compensation is required by VE is 0.82 individuals for guillemots and 0.22 individuals for razorbill. To estimate the number of additional breeding pairs required to achieve this the following calculations have been used:

Equation 1:

$$N_{Fledglings\ required} = \frac{N_{New\ breeding\ recruits\ required}}{\prod_{Age\ =\ 0}^{Age\ =\ 5} Survival_{Age}}$$

Equation 2:

$$N_{Breeding\ pairs\ required} = \frac{N_{Fledglings\ required}}{\text{Productivity}}$$

13.3.2 For the sites that have connectivity with the FFC SPA a compensation ratio of 2:1 has been used (3:1 ratio also calculated reflecting the ratio adopted for other habitat compensation examples):

Equation 1:

$$N_{Fledglings\ required} = \frac{0.82}{0.56 * 0.792 * 0.917 * 0.917 * 0.939 * 0.939} = 2.34$$

Equation 2:

$$N_{Breeding\ pairs\ required} = \frac{2.34}{0.672} = 3.48$$

13.3.3 Therefore, to compensate for one bird (0.82) using the mean at 50% displacement and 1% mortality, an additional 3.5 pairs are required for guillemot. Based on a 2:1 ratio of compensation this will be increased to seven pairs and 11 pairs at a 3:1 ratio. Using the same calculations for razorbill, to compensate for 0.22 birds would require an additional two pairs, with up to six pairs required at a 3:1 ratio.

13.3.4 Table 13 and Table 14 present the full range of compensation quantum scenarios for guillemot and razorbill using the HOW4 methods and including the UCI for both the 50% displacement and 1% mortality and 70% displacement and 2% mortality.

Table 13 Guillemot compensation quantum calculations for the Hornsea Four methodology up to 3:1 ratio.

Guillemot compensation quantum (Pairs required)				
Methods	**HOW4 - 50% & 1%**		**HOW4 - 70% & 2%**	
	Mean	**UCI**	**Mean**	**UCI**
1:1	3.48	4.67	9.69	13.09
2:1	6.96	9.34	19.38	26.18
3:1	10.44	14.01	29.07	39.27

Table 14 Razorbill compensation quantum calculations for the Hornsea Four methodology up to 3:1 ratio.

Razorbill compensation quantum (Pairs required)				
Methods	**HOW4 - 50% & 1%**		**HOW4 - 70% & 2%**	
	Mean	**UCI**	**Mean**	**UCI**
1:1	1.93	3.07	5.52	8.58
2:1	3.86	6.14	11.04	17.16
3:1	5.79	9.21	16.56	25.74

13.3.5 The Applicant believes that the HOW4 methods for calculating the compensation quantum are the most appropriate for determining compensation levels of guillemot and razorbill, with a 3:1 ratio using the mean numbers. The compensation quantum using these parameters would be 11 pairs for guillemot and 6 pairs for razorbill, however this does not consider the additional productivity gain that the colonies will receive from disturbance reduction and therefore overestimates the compensation requirements.

14 BREEDING COLONY DISTURBANCE MANAGEMENT MEASURES

14.1 ECOLOGICAL EVIDENCE

GUILLEMOT AND RAZORBILL ECOLOGY

14.1.1 Guillemot and razorbill are both members of the auk family (Alcidae) and are pursuit diving seabirds which forage primarily during daylight. In the UK the main prey during breeding season is sandeel and cluepids (Birdlife International, 2023). Both species breed on narrow ledges in rocky cliffs along much of the UK coastline. There are approximately 950,000 pairs of guillemot and 165,000 pairs of razorbill in the UK (Robinson, 2005). Both species are long-lived with an average lifespan of 23 years for guillemot and 13 years for razorbill and reach breeding maturity after five years for guillemot and typically 4 years for razorbill (Robinson, 2005). The guillemot has two defined bioseasons: breeding season (March – July); and non-breeding season (August – February) and razorbill has four defined seasons: breeding season (April – July); post-breeding season (August – October); migration-free winter season (November – December); and return-migration season (January – March) (Furness, 2015).

14.2 BREEDING COLONY DISTURBANCE MANAGEMENT

14.2.1 Guillemot and razorbill are particularly sensitive to human disturbance which can have significant impacts on breeding colony success, as well as adult recruitment and survival. This section presents a review of the relevant literature concerning guillemot and razorbill disturbance responses, sources of human interaction with these species, and the impacts of these disturbances on guillemot and razorbill. The section will finish with an outline of key knowledge gaps concerning human disturbance and interaction with guillemot and razorbill that can impact future management efforts.

DISTURBANCE RESPONSES

14.2.2 Flushing at breeding sites, including temporary and permanent nest abandonment, is an indicator of seabird disturbance (Carney and Sydeman, 1999; Buckley, 2004). This response risks nest spillage and egg exposure (Carney and Sydeman, 1999). Furthermore, this behaviour also results in an energetic cost for adult birds.

14.2.3 However, a bird may still experience disturbance effects even if it does not display flushing behaviour. A bird may experience non-visible stress responses, which will be described in paragraph 14.2.24 below (Buckley, 2004; Deyney and Congdon, 2009, Watson *et al*. 2014). An individual may also not be capable of flushing if it is injured, sick, or if it is protecting its nest (Gill *et al*., 2001; Beale and Monaghan, 2004a).

14.2.4 Furthermore, flushing is often a last-resort disturbance behaviour for guillemot and razorbill, especially during nesting season when they guard their nests (Personal Communication). Instead, they display a series of escalating responses, depending on their level of disturbance, including looking at the threat and head bobbing (Personal Communication). Therefore, this review will consider guillemot and razorbill as experiencing disturbance if their behaviour falls anywhere along the spectrum of disturbance responses (even non-visible responses) – not just from flushing responses.

SOURCES OF HUMAN DISTURBANCE

14.2.5 Guillemot and razorbill are at risk from a number of human activities. Human presence can result in direct disturbance for guillemot and razorbill, or it can cause indirect issues for colonies. These sources of disturbance will be explored in more detail below.

BIRDWATCHING

14.2.6 Activity from birdwatching can negatively impact guillemot and razorbill. Both visitor number, approach distance, and temporal duration of presence affect seabirds (Beale and Monaghan, 2005; Beale, 2007; Allbrook and Quinn, 2020).

14.2.7 The significance of this risk has been acknowledged, with many sites implementing ranger presence or set back distances at colonies. Some seabird islands, like Isle of May, Scotland, have even limited visiting times to three hours per day during breeding season (Cully, 2023).

14.2.8 Even visitors' interactions with these mitigation measures demonstrate the risk that birdwatching poses, for visitors have been found to go as close as possible to seabirds. A study from Isle of Staffa, Scotland monitored visitor interaction with seabirds over the course of a week, and 84.75% of visitors went right up to the rope that restricted entry to the seabird colony (Cully, 2023). 4.31% of visitors ignored the rope and entered the colony (Cully, 2023). The literature suggests that photographers are the group that is most likely to ignore set-back signs and ropes (Allbrook & Quinn, 2020). Data from the Isle of Staffa reflects this insight, as photographers were the largest group that ignored the rope, making up 37.14% of incidents where the colony was entered (Cully, 2023). These results suggest that visitors are predisposed to get as close as possible to seabird species and set-back distances can help prevent the majority of disturbance events directly in seabird colonies. However, appropriate set-back distances are species-dependent, as will be discussed in more detail below.

14.2.9 The literature has suggested that signs and set-back ropes carry a risk, as they can be ignored by individual tourists. However, the strength of this disturbance risk can be further mitigated, as several researchers have stressed the importance of guides and rangers in managing visitor behaviour at seabird colonies (Warburton *et al.*, 2000; Berrow, 2001; Ballantyne *et al.*, 2011; Curtin, 2013). Guides and ranger presence, especially during the breeding season, have been used across nesting sites in acknowledgement of this source of disturbance. Studies have shown that they are not only effective at mitigating this risk, but they are so effective because their ability to share knowledge factors heavily into visitors' enjoyment of their birdwatching experience (Cully, 2023).

14.2.10 Birdwatching, in particular, can have extended temporal effects because birdwatchers specifically target and engage in extended observation of individuals (Inman et al., 2016). Furthermore, in a review of 1,772 online visitor ratings and reviews of seabird tourism companies, guillemot and razorbill were among the top ten seabird species that birdwatchers wanted to see, so it is likely that guillemot and razorbill will be specifically sought out and subjected to human disturbance (Cully, 2023).

WALKING

14.2.11 Visitor presence can adversely affect guillemot and razorbill colonies, even outside of formal birdwatching practices. Walkers and other visitors can disturb auk colonies in the vicinity of coastal paths. Visitor access can cause disturbance, even if auk colonies are located further down a cliff face. Human smell, noise, and footfall vibrations can all alert birds to human presence, even in the absence of direct visual contact (Watson *et al*., 2014). Dogs can pose an additional risk to guillemot and razorbill colonies, especially if they are off leash. Observations from Isle of Staffa, Scotland recorded a mass flushing event for puffin when they were subject to a barking dog (Cully, 2023). Isle of May National Nature Reserve, Scotland has acknowledged this risk and worked with tour operators to ban dogs from the island, which includes guillemot and razorbill colonies (Personal Communication).

ROCK CLIMBING

14.2.12 As guillemot and razorbill nest along cliff faces, they are often situated close to popular rock-climbing areas. The significance of this problem has been acknowledged, and some cliffs have now been subject to seasonal closures (Harrison, 2008).

WATERCRAFT

14.2.13 Human disturbance from the water can also cause disturbance for nesting guillemot and razorbill. Boats, jet skis, paddle boards, and kayaks can all cause disturbance. Guillemot and razorbill experience disturbance from any distances less than 200m (Blanchard, 1994; Chardine *et al*., 1998; Lavers *et al*., 2020; Ainley *et al*., 2021).

14.2.14 There are a range of effects that guillemot and razorbill can experience from watercraft. A nesting guillemot colony on Bass Rock, Scotland displayed disturbance behaviour in the presence of a tourist vessel, including looking at the boat and head bobbing (Cully, 2023). In a more extreme case, Barrett *et al*. (1984) also noted that a complete collapse of a Norwegian colony was caused by an increase in approaches to a colony by pleasure boats.

AIRCRAFT

14.2.15 Guillemot and razorbill can also experience disturbance from aircraft proximity, including planes and drones. This source has a larger impact, as guillemot and razorbill can experience disturbance from aircraft up to 1,000m from the colony (Blanchard, 1994; Chardine *et al*., 1998; Lavers *et al*., 2020; Ainley *et al*., 2021). Disturbances from aircraft have even resulted in flushing from entire colonies (Blanchard, 1994; Chardine *et al*., 1998; Lavers *et al*., 2020; Ainley *et al*., 2021).

POLLUTION

14.2.16 Pollution is an indirect result of human disturbance and presence near guillemot and razorbill colonies. Plastic entanglement and ingestion are a particular risk for seabirds (Wilcox *et al*., 2015; Phillips *et al*., 2023). Increased human presence along coastal areas can result in more coastal and marine litter, and any ingestion of these materials by auks can affect behaviour, reproduction, and metabolism (Phillps *et al*., 2023).

AVIAN FLU

14.2.17 Humans, in the vicinity of seabird colonies, can be a vector for avian flu. While not a direct disturbance impact, avian flu is a secondary risk to human disturbance and presence around seabird colonies. Management of human disturbance must also account for the ways that human presence can be a vector for disease. Popular birdwatching destinations like the Isle of May, Scotland had to temporarily close to visitors during the 2022 season to help reduce the spread of disease (NatureScot, 2022).

BIOSECURITY

14.2.18 Similarly, human presence near seabird colonies can bring invasive predators to seabird colonies. These predators can stow away on tourist vessels or ferries, and management of human disturbance must also account for the ways that disturbance can compromise biosecurity (Biosecurity for Life N.D.).

EFFECTS OF HUMAN DISTURBANCE

14.2.19 The above sources of human disturbance can cause adverse individual- and colony-level effects on guillemot and razorbill.

DIRECT MORTALITY

14.2.20 Human disturbance can directly result in the mortality of individual adults, chicks, or eggs in a seabird colony. Incursions into seabird colonies during birdwatching or rock climbing can result in eggs or chicks being crushed. Furthermore, entanglement from sources of litter can strangle adults or chicks.

PHYSIOLOGICAL EFFECTS

14.2.21 Human disturbance can result in more subtle physiological effects for seabirds, including changes in body temperature, heart rate, and corticosterone (Cairns, 1980; Pierce and Simons, 1986; Carney and Sydeman, 1999; Buckley, 2004). If an individual is repeatedly subject to human disturbance, these effects can impact the fitness of an individual over the long-term.

ENERGETIC COST

14.2.22 Sources of human disturbance, including birdwatching, walking, aircraft, and watercraft can result in flushing behaviour from guillemot and razorbill. Flushing comes at an energetic cost for these species, which can affect long-term individual fitness and ability to provision for their young.

NESTING SUCCESS

14.2.23 Nesting success is affected by human disturbance in a variety of ways. Temporary or long-term nest abandonment from flushing incidents can lead to exposure of eggs and chicks. Furthermore, Data from St Abbs, Scotland revealed that several factors of human disturbance, including both visitor numbers and distance from guillemot colonies affected nesting success (Beale and Monaghan, 2004b).

HABITUATION

14.2.24 While habituation is not itself a negative effect of human disturbance, it can create difficulties for monitoring and enforcement of human interaction with seabird colonies. If particular colonies are subject to long-term human presence, they begin to demonstrate fewer disturbance responses (Buckley, 2004). However, they may still experience non-visible stress responses (Gill *et al*., 2001; Beale and Monaghan 2004a; Watson *et al.,* 2014). This may make monitoring difficult over the long term if it is difficult to determine the strength of colony response to disturbance based on visible factors.

KEY GAPS

14.2.25 The literature provides a strong basis with which to understand guillemot and razorbill responses to human disturbance. However, there are certain knowledge gaps that will impact the ability of practitioners to mitigate and monitor human disturbance.

SET BACK DISTANCES

14.2.26 The literature has described how birdwatching poses a significant risk because birdwatchers tend to approach colonies as closely as they are allowed. Set back distances and signage, therefore, are an important management tool. However, there is no consensus as to what distance of visitor approach will result in disturbance, as these effects are species dependent. Minimum distances have been suggested of 50 to 200m for terns, 10m for storm petrels, and 15m for penguins (Buckley, 2004; Deyney and Congdon, 2009; Watson *et al*., 2014). There is currently no suggested distance for guillemot and razorbill, and it is imperative that these distances be standardized for these species.

PHYSIOLOGICAL EFFECTS

14.2.27 As mentioned above, many of the effects of human disturbance on guillemot and razorbill have been outlined, including nesting success, direct mortality, and energy cost. However, while certain physiological responses to human disturbance are common across seabird species or families, it is important to understand how these effects manifest specifically for guillemot and razorbill. There are future opportunities to conduct long-term monitoring studies on the physiological responses of guillemot and razorbill.

PREDATION PROTECTION

14.2.28 Certain seabird scholars have studied the potential that human presence can help protect guillemot colonies from avian predators (Finney *et al*., 2003; Lindsay *et al*., 2008; Hentati-Sundberg *et al*., 2021; Hentati-Sundberg *et al*., 2023). These arguments have been used to justify continued tourism at seabird colonies by organisations who manage these sites (Cully, 2023). However, there is evidence that the removal of avian predators does not result in higher auk colony productivity (Pierotti, 1983; Finney *et al*., 2001). This debate is significant because its conclusions may impact the management of visitors around auk colonies. It is important that this knowledge gap is filled before human presence is justified because of predation protection, especially if the disturbance effects of human presence outweigh any protection.

HABITUATION MONITORING

14.2.29 It is more difficult to monitor the non-visible disturbance effects of guillemot and razorbill that have become habituated to human presence. Therefore, it is important that researchers and practitioners alike develop a method of monitoring non-visible disturbance effects of seabird colonies. This way, the long-term health of colonies can be protected and monitored, as visitor numbers increase in the future.

15 ROADMAP

15.1.1 In the sections below, a roadmap laying out the key steps for compensation development for guillemot and razorbill is provided, focusing in particular on-site selection, stakeholder engagement and consultation, monitoring plans, and adaptive management.

15.2 SITE SELECTION

15.2.1 The delivery of management measures on small colonies is dependent on selecting the most appropriate site(s).

15.2.2 The Applicant has undertaken an initial site selection process. The following elements are key ongoing criteria for the site selection process:

- Suitable colony within the Southwest/ south English coastline based on population size and status, if disturbance is an issue and if guillemot or razorbill is a feature of the site's designation. This area has been chosen due to the lack of guillemot and razorbill colonies elsewhere on the English coastline.
- Ecological criteria, e.g. prey availability; and
- Avoidance of protected sites and infrastructure.

15.2.3 Guillemot colonies were selected based on the suitability of the management measures proposed. Using the Seabird Monitoring Programme (SMP) database small colonies with historic declines were shortlisted (Table 15). Colonies were also selected based on guillemot not being a qualifying feature of the designated site (e.g. SSSI), therefore management of the colony is unlikely to be part of the site's current management plan.

Table 15 Potential guillemot breeding sites for compensation measures

Guillemot breeding site	Historical SMP colony peak counts (year)	Recent SMP colony count (year)
Carters Rock	47 pairs (2015)	4 pairs (2017)
Grower Rock	81 pairs (2009)	41 pairs (2015)
Highveer Point	53 pairs (2016)	21 pairs (2023)
Tresungers Point	67 pairs (1999)	38 pairs (2017)
Treyarnon - Merope	31 pairs (2000)	22 pairs (2022)

15.2.4 The optimal location for the measure would normally involve connectivity with the FFC SPA, and consequently, the compensation measure would likely aim to deliver breeding birds back to this site. However, due to the minimal impact VE has on guillemot and razorbill it was agreed with Natural England at the ETG in August 2023 that a small colony only non-breeding season connectivity with the FFC SPA would be acceptable.

15.2.5 The timescale of the compensation measure is unknown at this stage due to the new approach for compensation.

15.3 NEXT STEPS

15.3.1 To identify key breeding sites with disturbance problems, a desk-based exercise will be undertaken to identify the key colonies suitable for compensation.

STEP 1 - STAKEHOLDER ENGAGEMENT AND CONSULTATION

15.3.2 Stakeholder engagement will be required throughout the development of the colony management implementation process.

15.3.3 In addition to consultation with local experts and stakeholders during the site selection process, compensation plans are being consulted with relevant stakeholders, such as Natural England, before DCO application submission. Consultation on compensation plans to date has consisted of Natural England feedback on the shortlist and longlist of compensation measures (VE OWFL, 2022a; VE OWFL, 2022b), the PIER and from the ETG in August 2023.

15.3.4 During the ETG in August 2023 Natural England advised to prepare a without prejudice compensation plan for guillemot and razorbill. Acknowledging the small impacts of less than one bird for each species Natural England recommended finding a small colony in need of some small scale management measures as a suitable compensation measure for VE.

15.3.5 Following consent of the project, a steering group named the Offshore Ornithology Engagement Group (OOEG) will be convened by VE OWFL. This group will assist in the delivery of any final site selection, implementation and maintenance of the compensation measures, monitoring, reporting, and other relevant matters as determined by VE OWFL. It is envisaged that core members of the OOEG will be the relevant Statutory Nature Conservation Bodies (SNCBs) as well as the local planning authority and owners and/or managers of the sites at which the artificial nesting program is planned to be implemented. The Royal Society for the Protection of Birds (RSPB) and other relevant parties will also be invited to form part of the OOEG in an advisory capacity.

STEP 2 – LANDOWNER/MANAGER ENGAGEMENT

15.3.6 Once the site(s) have been chosen through discussions with the OOEG, VE OWFL will engage with the relevant landowners/managers to carry out monitoring of disturbance impacts on the sites before implementing the compensation measures.

STEP 3 - MONITORING PLAN

15.3.7 Monitoring will be required for all stages of the proposed disturbance management measures. The details of monitoring proposals will be discussed with the OOEG, with key details to be agreed upon including the frequency, duration and nature of monitoring methodology, as well as data analysis and reporting requirements.

15.3.8 Pre-implementation monitoring will be undertaken during the initial stages of the program, including monitoring of prospective sites to inform the site selection process, and monitoring of the colonies to produce up to date breeding populations to help determine future additionality.

15.3.9 It is expected that monitoring will be undertaken throughout the operational lifetime of VE.

15.4 ADAPTIVE MANAGEMENT

15.4.1 Should post-implementation monitoring reveal that the disturbance management program is unsuccessful, or less successful than anticipated, an assessment will be undertaken to determine the reasons underlying the lack of success, and to inform the next steps. Notably, the next steps will consist of identifying potential improvements (or extensions) to the implemented measure, based on potential issues discovered during the assessment. Should the assessment determine that the measure cannot be improved or extended sufficiently, then alternatives, such as contribution to the Marine Recovery Fund (or equivalent), may be considered in consultation with the OOEG.

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