NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

Conservation and Management Advice

FOWLSHEUGH SPA

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This document provides advice to Public Authorities and stakeholders about the activities that may affect the protected features of the Fowlsheugh Special Protection Area (SPA). It provides advice from Scottish Natural Heritage (SNH) (operating under the name of and hereinafter referred to as NatureScot) under Regulation 33(2) of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) to other relevant authorities on the Conservation Objectives for the Fowlsheugh SPA, and any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species for which the site has been designated. It covers a range of different activities and developments but is not exhaustive. It focuses on where there is a risk to achieving the Conservation Objectives. The paper does not attempt to cover all possible future activities or eventualities (e.g. as a result of accidents), and does not consider cumulative effects.

Further information on marine protected areas and management is available at -

https://www.gov.scot/policies/marine-environment/marine-protected-areas/

For the full range of MPA site documents and more on the fascinating range of marine life to be found in Scotland's seas, please visit -

www.nature.scot/mpas or https://jncc.gov.uk/advice/marine-protected-areas/

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Contents

1 Overview of document

This document provides details of the Conservation and Management Advice for Fowlsheugh Special Protection Area (SPA), and it is divided into eight main sections. The introduction in section 2 gives an overview of Fowlsheugh SPA and its contribution in terms of conservation and wider benefits. Section 3 provides an overview of the roles of the various bodies involved with advising, regulating and managing the SPA. Section 4 describes the protected features and their condition, and section 5 introduces the Conservation Objectives for the site. Section 6 describes the threats and pressures to which the protected features are sensitive, and section 7 provides the management advice for these activities. Section 8 identifies what further research and surveys may be required to increase our understanding of how the protected features utilise the marine protected area.

Annex 1 sets out Fowlsheugh SPA's Conservation Objectives. Annex 2 provides supporting information relating to the protected features.

Throughout this document the term Special Protection Area (SPA) is used in relation to the site name, i.e. Fowlsheugh SPA or in discussion of the specific legislation relating to the site. Otherwise the term Marine Protected Area (MPA) is used when discussing the MPA network generally. The term *qualifying features* is used in the Conservation Objectives to refer to those Annex 1 and regularly occurring migratory bird species that the Fowlsheugh SPA has specifically been designated to protect. Within the wider document text, the term *protected features* is used to refer both to these specific site features and more generally to species or habitats protected through MPA designations.

2 Introduction

2.1 Purpose statement

Fowlsheugh SPA has been designated to protect five species of breeding seabirds, a seabird breeding assemblage, and their supporting habitats. By doing so it contributes to the Scottish, UK and OSPAR MPA networks, the conservation of the wider marine environment around Scotland, and progress towards Good Environmental Status within the North-East Atlantic marine region.

The main purpose of the Fowlsheugh SPA is to contribute towards the Favourable Conservation Status of the protected features in the Marine Atlantic Biogeographic Region. The Conservation Objectives form the framework for establishing appropriate management measures and assessing all future plans and projects that have the potential to affect the protected features of the SPA.

2.2 Conservation benefits

The conservation benefits for the Fowlsheugh SPA are:

- Protecting the largest mainland seabird colony in Scotland.
- Protecting internationally important numbers of seabirds during the breeding season including guillemot (around 1.7% of the western European population) and kittiwake (over 1% of the world population) and nationally important numbers of razorbill (around 3.9% of the GB population), herring gull (around 2% of the GB population) and fulmar (around 0.2% of the GB population).
- Protecting important waters immediately surrounding the seabird breeding colony, which birds use for resting, preening and other maintenance activities.
- Protecting important cliff habitats where the seabird protected features can nest.

- Protecting waters with rich marine habitats, including important shelf waters with areas of high productivity, that support a diversity of pelagic and demersal fish, bivalve molluscs, gastropods and crustaceans where the seabirds can feed.

2.3 Wider benefits

The protected features of the Fowlsheugh SPA provide ecosystem services locally and to the wider marine ecosystem. We describe these ecosystem services in terms of their functions (the support or provision of something to the wider ecosystem e.g. habitat, nutrient cycling, sediment stabilisation) and natural resources (e.g. fish and shellfish, aggregates, wildlife), which in turn lead to benefits for people.

Figure 1 illustrates how the protected features of the Fowlsheugh SPA contribute to benefits for people. There can be many complex interactions and dependencies amongst the protected features, their functions, associated natural resources and the benefits we gain from them.

The protected features, especially when taken within the context of the whole SPA and/or local ecosystem, contribute to certain functions more than others, e.g. biomass production and nutrient cycling and are fundamental to the continued supply of natural resources and benefits associated with this MPA, and to the long-term health of the protected features.

In terms of resources, the SPA comprises a combination of sea cliff habitat, between 30-60m high, cut mostly from basalt and conglomerate rocks of Old Red Sandstone age, stretching 10.15 ha. The sea cliffs offer suitable breeding habitat for seabirds. Coastal and maritime plant species can be seen. The SPA's adjacent coastal waters extending 2 km into the marine environment support a variety of natural resources, including molluscs, crustaceans, marine worms, pelagic and demersal fish species together with the birds and mammals that feed on them.

The rich and varied natural resources present within the SPA give rise to a wide range of benefits to people. The seascapes and wildlife within the SPA provide opportunities for tourism and wildlife watching, all of which encourage local jobs and businesses. The SPA forms part of the Fowlsheugh nature reserve, managed by the Royal Society for the Protection of Birds (RSPB). The coastal path and low-key visitor facilities provide access to the seabird colony and attract many visitors each year. Fisheries and supporting businesses from local communities within and around the SPA utilise and benefit from the wildlife and the area's fish and shellfish resources. Further benefits relating to health and well-being, food and nutrition also arise from the site's natural resources, resulting in a place where communities and visitors can spend time connecting with and enjoying nature.

The benefits that arise from the functions and natural resources of the MPA are typically small in the context of the whole of Scotland, but some are of greater importance for this MPA and the people that use it. There is potential for benefits to be enhanced by improving the quantity or quality (health) of the protected features themselves.

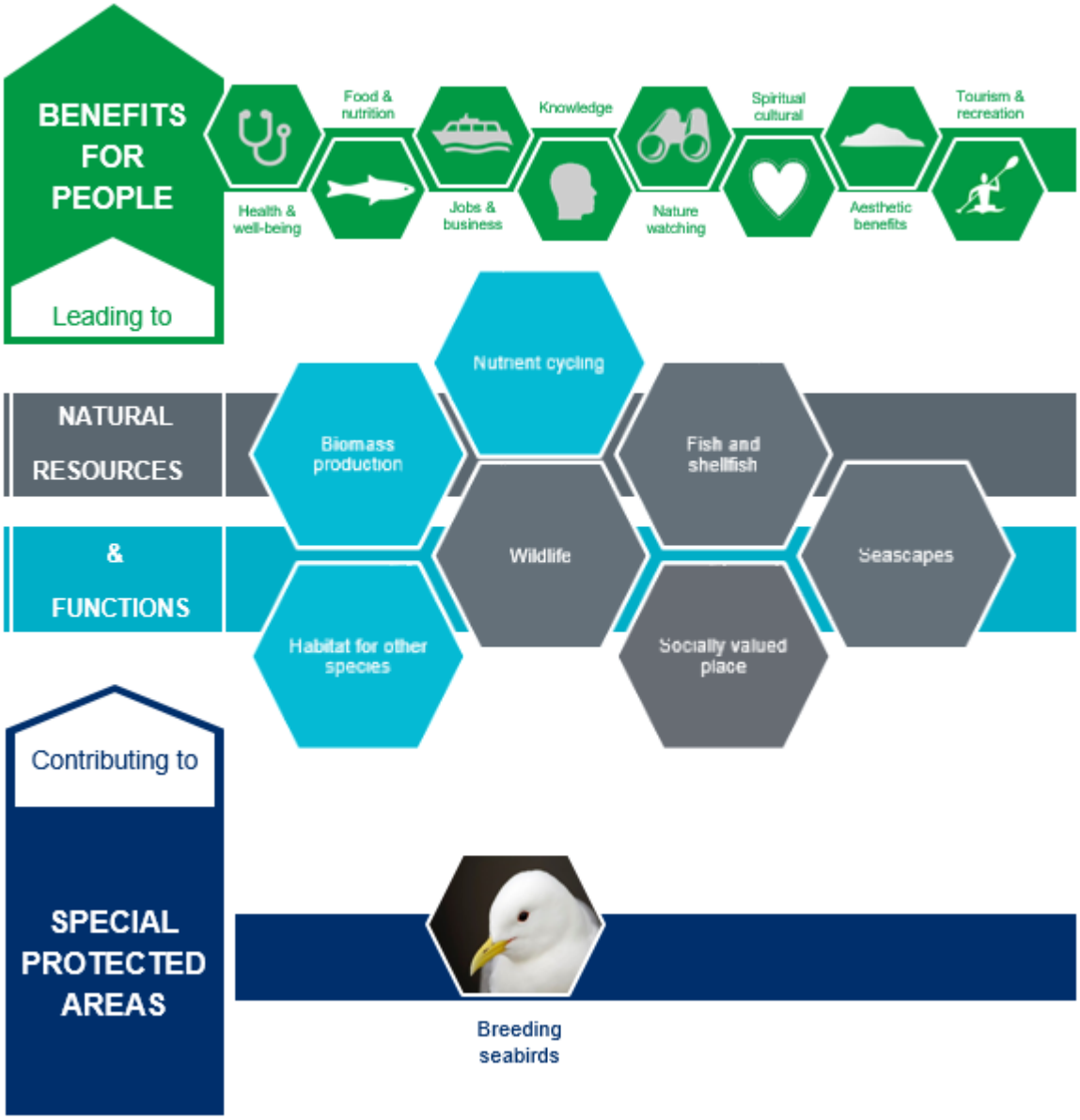

Figure 1. Benefits to people associated with protected features of the Fowlsheugh SPA.

2.4 Contribution to policy commitments

Managing Fowlsheugh SPA to maintain the protected features in favourable condition will ensure the continued provision of the benefits above as well as the SPA's contribution to:

- An ecologically coherent network of MPAs which are well managed under the OSPAR convention and national legislation.
- Achieving Favourable Conservation Status for the protected features in the Atlantic Biogeographic Region.
- Progress towards achieving Good Environmental Status in relation to maintaining biological diversity, and ensuring marine food web abundance and diversity.
- Making a significant contribution to the protection, enhancement and health of the marine area under the National Marine Plan.

- Restoring marine and coastal ecosystems and increasing the environmental status of our seas under the Scottish Biodiversity Strategy.
- Helping to adapt to climate change under The Scottish Climate Change Adaptation Programme.

3 Roles

This document provides advice for Fowlsheugh SPA in relation to activities that may affect the protected features. More detailed advice can be provided to relevant authorities to inform their decision making as required. In doing this, our aim is to ensure the Conservation Objectives for the protected features are met.

The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) (the "Habitats Regulations") under Regulation 33(2), make special provisions for the protection of European marine sites, requiring SNH (now referred to as NatureScot), to advise other relevant authorities of the Conservation Objectives for a site, and also of the operations which may cause deterioration of the habitats or species, or disturbance of species protected in the SPA.

It is the role of the relevant and competent authorities[1] to ensure that the activities they regulate, permit or license do not hinder the achievement of the Conservation Objectives of Fowlsheugh SPA. The management advice in this document is provided to assist authorities in managing the activities outlined in section 7 and undertaking Habitats Regulations Appraisals of plans and projects.

Stakeholders can provide additional evidence to support the development of management including local knowledge of the environment and of activities. This will contribute to the development of well-designed and effective management measures.

4 Protected features and status

Fowlsheugh SPA has been selected to become part of the UK's SPA network, contributing to Scotland's MPA network, which in turn has been established to help conserve and recover a range of Scotland's important marine habitats, wildlife, geology and landforms.

The protected features of Fowlsheugh SPA are protected within the SPA throughout the year, irrespective of the season for which they qualified as a protected feature.

Table 1 provides a summary of the protected features within the SPA, their condition within the site (where known) based on the latest NatureScot Site Condition Monitoring (SCM) assessment, and the broader conservation status of the protected features. Current trends for relevant seabird colonies can be found in JNCC (2021), and is based on trends derived from the Seabird Monitoring Programme (SMP) including where available, Seabird Counts census data (Burnell *et al.* 2023). Where the SMP data is more recent than the SCM data this has been used to inform the feature condition at the site.

[1] A relevant authority is a body or authority that has a function in relation to land or waters within or adjacent to the site (Regulation 5) and include: a nature conservation body; a local authority; water undertakers; a navigation authority; a harbour authority; a lighthouse authority; a river purification board (SEPA); a district salmon fishery board; and a local fisheries committee. All relevant authorities are competent authorities. A competent authority is defined in Regulation 6 as "any Minister, government department, public or statutory undertaker, public body of any description or person holding a public office". In the context of a plan or project, the competent authority is the authority with the power or duty to determine whether or not the proposal can proceed.

Table 1. Protected features and status for Fowlsheugh SPA.
Feature condition refers to the condition of the protected feature at a site level. Broader conservation status is the overall conservation status of the feature within the UK and Europe. No assessment on the condition of the feature at the Marine Atlantic Biogeographic Region scale is available.

Protected Feature	Feature condition at site	Assessment year	Broader conservation status	
			UK[2]	European region[3]
Black-legged kittiwake (breeding)	Unfavourable, declining	2018	Red	Vulnerable
Common guillemot (breeding)	Favourable maintained	2018	Amber	Least Concern
Herring gull (breeding)	Unfavourable, no change	2018	Red	Least Concern
Northern fulmar (breeding)	Unfavourable, declining	2018	Amber	Vulnerable
Razorbill (breeding)	Favourable, maintained	2018	Amber	Least Concern

5 Setting Conservation Objectives

5.1 Background

Under Regulation 33(2) of the Habitats Regulations, NatureScot have responsibility for providing the Conservation Objectives for European marine sites in Scottish territorial waters. These site-level Conservation Objectives seek to define the contribution that each SPA should make to achieving Favourable Conservation Status for the protected features. They provide the framework for the setting of site conservation measures (management) and for the Habitats Regulations Appraisal of projects and plans.

Annex 1 sets out the Conservation Objectives for Fowlsheugh SPA.

5.2 Relationship between feature condition and Conservation Objectives

The Conservation Objectives seek to *maintain* protected SPA features where evidence exists that a feature is in favourable condition in the site, or where there is uncertainty concerning the assessed condition of a feature (see section 4) but no reason to suspect deterioration in condition since designation. Where evidence exists that a feature is declining and/or damaged and therefore not in a favourable condition in the site, the Conservation Objectives will seek to *restore* the protected feature.

[2] Based on Birds of Conservation Concern 5 (BoCC5), for further details on definitions see Stanbury *et al.* 2024.
[3] Based on BirdLife International, 2021

The following protected features are in favourable condition at Fowlsheugh SPA: guillemot, and razorbill. Therefore, the Conservation Objectives seek to *maintain* this condition.

The following protected features are in unfavourable condition at Fowlsheugh SPA: kittiwake, herring gull and fulmar. Therefore, the Conservation Objectives seek to *restore* this condition.

Breeding kittiwake are in unfavourable condition at Fowlsheugh SPA due to a decline from around 36,650 pairs (1986 survey at citation) compared to around 14,000 pairs at the most recent count (2018). The reasons for declines of kittiwakes at this SPA are uncertain but reduction of prey in their foraging areas (off-colony factors) is considered a key contributing factor. Kittiwake breeding success was found to be related to sandeel abundance and availability (e.g. Daunt *et al.* 2008; Poloczanska *et al.* 2004). Long-term diet studies on other nearby colonies (Isle of May) also highlighted a long-term decline in the overall prevalence of sandeels in kittiwake chick diet, concomitant with an increase in the relative prevalence of clupeids in Scottish waters (Wanless *et al.* 2018).

Breeding herring gull are in unfavourable condition at Fowlsheugh SPA due to a decline of 68% from around 3200 pairs (1986 survey at citation) to 815 pairs at the most recent count (2018). The reasons for the decline are uncertain. Off-colony factors such as reduction in prey in foraging areas (including within the Outer Firth of Forth and St Andrews Bay Complex SPA) may be contributing to the decline. Possible on-site factors may include recreational disturbance or predation.

Breeding fulmar are in unfavourable condition at Fowlsheugh SPA due to a decline of around 55% from 1170 pairs (1986 survey at citation) to 525 pairs at the most recent count (2018). The reasons for the decline are uncertain but are most likely to be related to off-colony factors such as reduction in prey in foraging areas. Possible on-site factors may include recreational disturbance, as this species is known to be prone to disturbance, particularly during the incubation period.

5.3 Conservation priorities

On the rare occasion where the need to favour the management of one protected feature of a site over another, conservation priority will be given to the most important species/habitats to take action for and/or the most important or urgent measures to be taken.

For Fowlsheugh SPA, all protected features are regularly occurring migratory species and as such no one protected feature should take precedence over the other.

There are currently no apparent management conflicts between the protected features within Fowlsheugh SPA.

5.4 Overlapping Protected Areas

The following protected areas boundaries overlap with, or are immediately adjacent to, Fowlsheugh SPA:

- Fowlsheugh Site of Special Scientific Interest (SSSI)
- Crawton Bay SSSI

Conservation measures in the overlapping protected areas need to ensure the Conservation Objectives of all sites are met. Priority for the SPA protected features would take place over

the SSSI protected features. There are no apparent management conflicts between the protected features of the Fowlsheugh SPA and the protected features of the other overlapping protected areas.

Site information including the Conservation Objectives for the overlapping protected areas are available on SiteLink.

6 Feature sensitivity

The following section provides an overview of the pressures associated with human activities that are most relevant to the protected features. Further information on feature sensitivity, will be made available on Marine Scotland's Feature Activity Sensitivity Tool (FeAST)[4]. The information in FeAST will reflect our current understanding of the interactions between activities, pressures and features. It highlights that activities can give rise to a range of pressures, which the protected features may be sensitive to. Our assessment of sensitivity is based on a feature's tolerance (response to change) and its ability to recover.

6.1 Black-legged kittiwake (breeding)

Kittiwakes may be susceptible to collision (Furness *et al.* 2013) and displacement (Peschko *et al.* 2020) from marine developments. They may also be vulnerable to oil spills (Mendel *et al.* 2008) and organochlorine pollution (Tartu *et al.* 2015), which can lead to lower adult survival and reduced breeding performance (Tartu *et al.* 2013; Svendsen *et al.* 2018). Kittiwakes are identified as potentially sensitive to accidental bycatch in fishing nets particularly in surface gears in UK waters (Bradbury *et al.* 2017). Kittiwakes may also be susceptible to disease (OSPAR Commission, 2009), including avian flu (APHA). Any reduction in prey items will also have an effect on kittiwake populations (Tasker *et al.* 2000), whether due to climate change (Sandvik *et al.* 2014) or industry (Bicknell *et al.* 2013). (*See also Sandeel sensitivity assessment in FeAST*).

6.2 Common guillemot (breeding) and razorbill (breeding)

Auks (including guillemots and razorbills) may be prone to accidental bycatch in fishing nets particularly in surface gears (Zydelis *et al.* 2013). Depletion of prey resources either due to climate change or industry can also have effects on their populations (Mendel *et al.* 2008). These species are also susceptible to large scale mortality in major oil spills (Mendel *et al.* 2008), particularly during their flightless moult period. There is potential for impacts on auk species due to collision with artificial structures under water (Furness *et al.* 2012). Guillemots and razorbills may also be susceptible to disease, including avian flu (APHA). These species may be displaced as a result of marine developments (Furness *et al.* 2013) and associated vessel activities (Furness, 2016). Guillemots and razorbills show sensitivity to visual disturbance associated with vessels (Cook & Burton, 2010) and for guillemots, noise disturbance due to marine industry may also occur (Leopold & Camphuysen, 2009). As these are species that feed in the water column, they can be potentially affected by any increase in turbidity that would affect their ability to successfully forage for their prey (Cook & Burton, 2010). *(See also Sandeel sensitivity assessment in FeAST).*

6.3 Herring gull (breeding)

Gulls may be susceptible to disease (including avian flu (APHA)), persecution and licensed control (Coulson, 2015). Gulls are vulnerable to collision with marine development above water (Furness *et al.* 2013). Other pressures include: accidental bycatch in fishing nets (Žydelis *et al.* 2013), oil pollution (Mendel *et al.* 2008) and organochlorine pollution (Camphuysen *et al.* 2010). Gulls may be displaced by marine development. Herring gulls are

[4] http://www.marine.scotland.gov.uk/feast/

sensitive to large-scale changes in prey availability (e.g. Camphuysen, 2013; Bicknell *et al.* 2013).

6.4 Northern fulmar (breeding)

Fulmars are one of the main seabird species taken as accidental bycatch in long-line fisheries in the northern hemisphere (Tasker *et al.* 2000; ICES, 2013) and are identified as among the species most sensitive to bycatch in surface gears in UK waters (Bradbury *et al.* 2017). Examination of corpses indicates high levels of plastic ingestion in fulmars, but there is currently a lack of published information on the population level impacts of this (Franeker *et al.* 2011). Fulmars are also vulnerable to diseases such as avian flu (APHA). Human intrusions and disturbance of fulmars at their nest site can cause nest desertion if they are approached too closely, particularly if there is repeated disturbance during the sensitive egg incubation period. Fulmars are vulnerable to changes in their prey resource, whether due to changes in fisheries practices (Bicknell *et al.* 2013) or to large-scale climatic factors (Thompson & Ollason, 2001).

7 Management

7.1 Conservation Measures

The following conservation measures are currently in place for the Fowlsheugh SPA:

- The Habitats Regulations require all plans or projects that may have an effect on the protected features of a SPA to be assessed against the Conservation Objectives for that site. This process is known as a Habitats Regulations Appraisal (HRA). HRA is a statutory procedure that ensures the integrity of the site is maintained. It also provides an opportunity to consider appropriate mitigation that can reduce impacts, avoid adverse effects and permit plans or projects to proceed having taken full account of the protected features of an SPA.

Other relevant measures include:

- The SPA overlaps with a number of notified Site of Special Scientific Interests and management changes described on their lists of Operations Requiring Consent, available on SiteLink, must have prior consent from NatureScot.
  The SPA overlaps with the Fowlsheugh nature reserve, managed by the RSPB for the benefit of the seabird colony.

7.2 Advice to support management

Table 2 provides NatureScot's advice on management for activities where we consider this may be necessary to achieve the Conservation Objectives for the protected features. The advice is focused on the activities that cause an effect (a pressure) that a feature is sensitive to. Pressures can be physical (e.g. abrasion of the seabed), chemical (e.g. introduction of pollutants) or biological (e.g. removal of prey resources). Different activities may cause the same pressure, e.g. fishing using bottom gears and aggregate dredging both cause abrasion which can damage the surface of the seabed.

Our advice takes a risk-based approach, i.e. we are focusing on providing advice where we believe there is a risk to achieving the Conservation Objectives. We have identified risks to achieving the Conservation Objectives where there is an overlap between protected features and activities associated with pressures that the features are sensitive to. We have provided management advice to support public authorities and others in managing these risks. Our advice is based on existing data and information on protected features and relevant activities, and our understanding of the relationships between the features and activities. We have identified a range of management advice:

- management to remove or avoid pressures;
- management to reduce or limit pressures; or
- no additional management required.

For our advice on fisheries management we have also stated where we think this should be 'considered.' This term is included to highlight that an issue exists, but circumstances mean that a specific recommendation for action cannot, or need not, be made at this point. However, there is sufficient cause to make fishery managers aware of the issue and for them to consider if a fishery management measure may be helpful in achieving Conservation Objectives – particularly where there may be a synergy between the benefits of management actions for the fishery and the Conservation Objectives for the feature. The term 'recommended' highlights that an issue of fishery-feature interaction exists, there is a reasonable evidence base and a specific recommendation can be made/justified.

New or other activities not identified within the table would need to be considered on a case-by-case basis.

We recognise that stakeholders can provide local environmental knowledge and more detailed information on activities, including in relation to intensity, frequency and methods. This additional information will help public authorities and others develop more specific management, focussed on the interaction between features and activities. If new information becomes available our management advice may be revised.

Table 2 describes the activities that are considered capable of affecting the protected features. Spatial data relating to the location and extent of the activities listed can be accessed on Marine Scotland's National Marine Plan Interactive[5] (where available). Activities that are considered not likely to affect the protected features (other than insignificantly) are listed in Table 3.

7.3 Best Practice

In our management advice for activities in Table 2 we refer to the development, adoption or use of 'best practice' as a way of managing interactions between activities and the features. Best practice is taken to mean approaches or procedures that are developed and accepted by regulators and relevant stakeholders as being an effective way of dealing with an interaction between a habitat or species and the pressures created by an activity. Much of this best practice is already being implemented by sectors and regulators, e.g. pre-application discussions between developers and regulators, the Scottish Marine Wildlife Watching Code, Scottish Outdoor Access Code, and Technical Standards for Scottish Finfish Aquaculture.

[5] https://marinescotland.atkinsgeospatial.com/nmpi/

Table 2. NatureScot's advice to support management for the Fowlsheugh SPA for activities which are considered capable of affecting the protected features.

The text under the 'Advice to support management' columns provides NatureScot's management advice for the features in relation to the activities (further details about the terminology used are provided in section 7.2). Where a cell is coloured grey this indicates that management is already in place, this includes where there are existing regulatory requirements for new proposals. Cells are also coloured grey where it is considered there is no additional management required to achieve the Conservation Objectives. An * has been used to highlight those activities to which the advice under '*Boat use associated with both commercial and recreational activities'* also applies. For some activities, the pressures associated with new proposals are considered unlikely to affect some the features either because these activities do not occur in the same locations as the features or the pressure is unlikely to be at levels that can affect the features (see also Table 3). In these cases, we have not provided advice however, where regulated; this does not exempt new plans or projects related to these activities undergoing a Habitats Regulations Appraisal (HRA).

Activities considered capable of affecting the protected features	**Advice to support management**	
	Kittiwake, guillemot, fulmar, razorbill.	**Herring gull**
Aircraft (specifically unmanned aerial vehicles (UAV))	**Reduce or limit pressures (disturbance)** associated with UAVs within the SPA through effective mitigation such as: • following the Good Practice Advice for drones and wildlife. • seasonal restrictions to avoid sensitive time periods for those protected features most susceptible to disturbance and/or; • spatial restrictions.	
Boat use associated with both commercial (includes ship to ship) and recreational activities	**Reduce or limit pressures** (disturbance) associated with boat use during commercial and recreational activities through effective mitigation such as: • following the Scottish Marine Wildlife Watching Code (SMWWC); • seasonal restrictions to avoid sensitive time periods for those protected features most susceptible to disturbance and/or; • production of vessel management plans associated with activities that require a marine licence. This may include agreed routes and for boats, potential seasonal speed restrictions.	
Coastal development	**No additional management** for existing coastal protection and flood defences. **Reduce or limit pressures** (disturbance, loss of prey-supporting habitat) associated with new coastal development through effective seasonal and temporal mitigation.	

Activities considered capable of affecting the protected features	Advice to support management	
	Kittiwake, guillemot, fulmar, razorbill.	**Herring gull**
Dredging/extraction of material* (inc. maintenance dredging and capital dredging)	**No additional management** for existing maintenance dredging (ports and harbours). **Reduce or limit pressures** (disturbance, damage of supporting habitat) associated with new capital dredging projects and associated maintenance dredging through appropriate mitigation such as: • spatial limitations to avoid damaging supporting habitat within foraging dive ranges of protected features and/or; • seasonal restrictions	
Fishing - demersal mobile/active gear (inc. mechanical trawls and benthic trawls)*	Whilst we have limited understanding about the extent of interactions between benthic fisheries and prey-supporting habitat within the site, a principal objective of the management of the relevant fisheries should be to ensure that the fishing activity does not cause such disturbance to the benthic habitats that it adversely affects the abundance and availability of prey. **Reduce or limit pressures** (removal of prey species and abrasion of prey-supporting habitat) associated with fishing that has the potential to damage seabed habitat (in particular, sandeel habitat, herring spawning grounds) **should be considered.**	
Fishing – hydraulic dredge*	Hydraulic dredging has the potential to cause significant disturbance to the sedimentary habitats that support the prey species of the protected features, particularly for sandeel and herring. A principal objective of the management of the relevant fisheries should be to ensure that the fishing activity does not cause such disturbance to the benthic habitats that it adversely affects the abundance and availability of prey. **Remove or avoid pressures** (removal of prey species and disturbance of prey-supporting habitat) associated with hydraulic fishing that has the potential to damage seabed habitat (in particular, sandeel habitat, herring spawning grounds) **is recommended.**	
Fishing – static gear (drift nets and bottom set nets inc. fyke nets)*	**Remove or avoid pressures** (entanglement) associated with the use of all static nets. Spatial exclusion of all static nets in areas identified as being important for auks (as identified from habitat and dive depth preferences) **is recommended**.	*Pressures unlikely to affect this feature.*

Activities considered capable of affecting the protected features	Advice to support management	
	Kittiwake, guillemot, fulmar, razorbill.	**Herring gull**
Fishing – pelagic*	**Remove or avoid pressures** (removal of key prey species) associated with fishing for sandeels. There is no current targeted sandeel fishery within the SPA, this position should be retained. Pelagic fishing for herring/sprat may occur within or around the SPA. We **recommend** that a principal objective of the management of the fishery should be ensuring that the fishing activity does not prevent or disrupt the availability of prey species i.e. it should be considered as part of a broader ecosystem-based approach to management of this fishery.	
Fishing – long-lining (not including jigging)	Our current understanding is that long-line fisheries are largely restricted to offshore waters. Site-specific measures for long-lining are not currently considered appropriate due to the scale of the fishery, and the wide-spread interaction with seabirds. However, there is evidence of seabird bycatch in long-line (not jigging) fisheries which we **recommend** require wider seas management measures.	
Harvesting	*Pressure not applicable for these protected features.*	**Remove or avoid pressures (egg loss)** associated with harvesting of eggs within or adjacent to the SPA – *Existing management in place through licensing.*
Infrastructure – cables*	**Reduce or limit pressures** (disturbance, loss or damage to breeding habitat or prey-supporting habitat) associated with new cable laying activities within or adjacent to the SPA.	
Marine disposal sites*	**No additional management** for established licensed disposal sites (ports and harbours). **Reduce or limit pressures** (disturbance, smothering of prey supporting habitat, changes in water clarity) associated with new disposal sites within or adjacent to the SPA. Appropriate mitigation to reduce or limit pressures associated with these activities may include: • spatial limitations to avoid damaging supporting habitat within foraging dive ranges of the protected species and/or; • seasonal restrictions.	**No additional management** for established licensed disposal sites (ports and harbours). **Reduce or limit pressures** (disturbance) associated with new disposal sites within or adjacent to the SPA.

Activities considered capable of affecting the protected features	Advice to support management	
	Kittiwake, guillemot, fulmar, razorbill.	**Herring gull**
Ports and harbours (inc. development and ship-to-ship transfer)	**Reduce or limit pressures** (disturbance, displacement, loss or damage to prey-supporting habitat) associated with new development proposals or expansion of ports and harbours within or adjacent to the SPA. Appropriate mitigation may include: • spatial limitations to avoid damaging supporting habitat within foraging dive range of the protected features and/or; • seasonal restrictions during construction to avoid periods when birds are present. **Reduce or limit pressures** (mortality risk, disturbance, loss or damage to prey-supporting habitat) associated with new ship to ship transfer proposals, and the potential for oil-spill risk.	
Renewable energy (inc. wind)	**No additional management** for operational and for consented, but not yet constructed, offshore wind developments. There are new marine renewable development proposals within connectivity to the Fowlsheugh SPA. Mitigation should focus on reducing or limiting pressures (disturbance, displacement, collision) on the protected features.	**No additional management** for operational and for consented, but not yet constructed, offshore wind developments. There are new marine renewable development proposals within connectivity to the Fowlsheugh SPA. Mitigation should focus on reducing or limiting pressures (disturbance, displacement, collision) on the protected features. For any new onshore renewable development proposals within connectivity to the Fowlsheugh SPA, mitigation should focus on reducing or limiting pressures (disturbance, displacement, collision) on herring gull features.
Tourism & recreation (inc. walking, reserve visitors, angling, boating, kayaking, paddle boarding)	**No additional management** for existing recreational activities (includes angling, boating) providing the Scottish Marine Wildlife Watching Code (SMWWC) is followed by water-borne recreational users. The SMWWC highlights why birds are sensitive to disturbance and offers practical advice on how to avoid disturbance. **Reduce or limit pressures** (disturbance) associated with paddleboarding and kayaking activities.	

Activities considered capable of affecting the protected features	Advice to support management	
	Kittiwake, guillemot, fulmar, razorbill.	**Herring gull**
	No additional management requirements for land-based tourism activities (walking, reserve visitors), providing the Scottish Outdoor Access Code is followed. **Reduce or limit pressures** (disturbance) where an increase by water-borne or land-based recreational activities demonstrates there is evidence of impacts at particular locations and/or if there is a major increase in intensity of these pursuits within the SPA. There would be potential for some zonation of measures across the site.	

Table 3. Activities that are considered not likely to affect the protected features (other than insignificantly) [6]

Activity	Comments
Anchorages & moorings	Beyond pressures associated with the vessel traffic (covered in Table 2), we are not aware of any further pressures that have the potential to cause an adverse effect on the protected features.
Farming and livestock	Pressures unlikely to affect these features.
Fishing – static gear – Creels (including lobster, crabs and *Nephrops*)	Fishing using creels may take place within the MPA. Whilst there is the potential for entanglement for all the protected features, the occurrence is thought to be rare and therefore we consider this method poses a low risk to the protected features.
Fishing – line fishing (jigging)	Beyond pressures associated with the vessel movement (covered in Table 2), this activity is not expected to have the potential to cause an adverse effect on the protected features.
Infrastructure – pipelines and outfalls.	There are pressures associated with vessel movements (covered in Table 2) and there is a potential both temporary and permanent seabed habitat destruction. However, due to the scale of it and the low occurrence of this activity in this area at this time, we consider this poses a low risk to conservation objectives.

[6] Only the specific examples of activities listed in the table have been excluded, rather than the broad activity types. New plans or projects will still need to be considered by the relevant competent authority (see Annex 1 for further details).

8 Research and survey

We recognise that there are still important gaps in our understanding and knowledge of the features of this site. We will identify research and survey projects to inform our understanding of these aspects. The knowledge gaps identified below are not a commitment to undertake this work. However, by highlighting these gaps we hope to inform future discussions with parties interested in undertaking research in this site and/or on these features, to help direct research and improve understanding of monitoring needs. The following list of research and survey needs is not prioritised and is not exhaustive.

- Establish adequate baseline information for supporting habitats and prey species and gain an understanding of which prey items are the most important at a local scale within the SPA for all protected features.
- Establish a marine bird monitoring programme that informs changes in species populations and distributions at a site and SPA network level, and which may include monitoring of the supporting prey, habitats and processes within the SPA.
- Further understanding required on the reasons behind the protected features' decline at the SPA. Productivity estimates at the SPA would be beneficial to help understand this decline.
- Further ecological studies of all protected features habitat preferences and use, and movements within the SPA.
- Better understanding on the implications of new onshore and offshore developments around the site on the protected features.
- Oceanographic studies, such as sea temperature and acidity levels, how these might change in future, and the effects of such changes on prey availability for birds.
- Studies of food availability and competition for food between different fish predators (e.g., birds, seals, dolphins, porpoises, whales) in relation to fisheries policy.
- Improved understanding of what supporting processes the key prey species are reliant upon within the SPA.
- Additional research is required to better understand the relationships between the impact of dredging and benthic trawling on supporting habitats, their ability to support suitable prey and any consequential effect this may have on protected features.
- Understanding of the impact of tourism on the protected features at the SPA.
- Understanding of the impacts of non-native mammals on the protected features at the SPA.
- Investigation is required to assess the potential impact of highly pathogenic avian flu on the protected features both within the SPA and at a wider scale.
- Research required on the evolution of the HPAI virus, exposure and survival rates in affected seabird species following the 2021-2023 HPAI outbreak.
- Evaluate the potential mitigations that could be put into place to limit disease spread should another outbreak of HPAI occur at this, or any other SPAs.
- Better understanding of temporal foraging strategies of fulmar and whether there are any differences between daytime and night-time attraction of these species to fishing.
- Research is required on understanding the connectivity between the SPA and inland sites used by gull species.
- Research is required on understanding the connectivity between the SPA and inland sites used by gull species and whether gulls from this SPA are at risk of collision with wind turbines.

- Research is required on understanding the potential population level impact of licensed control on herring gulls which use this SPA.
- Up-to-date site assessment required for the protected features.

Annex 1. Fowlsheugh SPA Conservation Objectives

The box below provides the high-level Conservation Objective statements for the Fowlsheugh SPA.

The full Conservation Objectives, which includes site-specific advice and information on the qualifying features that form part of this SPA, are provided in the tables that follow. The site-specific advice and information provides more detail in relation to each of the high level Conservation Objective statements for each feature, e.g. detail on the seasonal timings and what the supporting habitats and prey are for the qualifying features.

Information is also provided below on how minor changes to features should be considered and the influence of environmental change on features, particular in relation to climate change. Temporary impacts on the qualifying features resulting from plans or projects can only be permitted where there is certainty that the features will be able to quickly recover. Further details on the potential for each qualifying feature to recover are described in more detail in Annex 2 '*Factors determining the potential of features to recover*'.

A definition of the terms used is in the Glossary (Annex 3).

Fowlsheugh SPA
Qualifying features: Breeding season: • Black-legged kittiwake (*Rissa tridactyla*) • Common guillemot (*Uria aalge*) • Herring gull (*Larus argentatus*) • Northern fulmar (*Fulmarus glacialis*) • Razorbill (*Alca torda*)
The Fowlsheugh SPA also supports: • Breeding seabird assemblage (includes all qualifying features)
1. To ensure that the qualifying features of the Fowlsheugh SPA are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status. 2. To ensure that the integrity of the Fowlsheugh SPA is restored in the context of environmental changes by meeting objectives 2a, 2b and 2c for each qualifying feature: 2a The populations of the qualifying features are viable components of the Fowlsheugh SPA. 2b. The distribution of the qualifying features is maintained, or where appropriate restored, throughout the site by avoiding significant disturbance of the species. 2c. The supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the Fowlsheugh SPA.

1. To ensure that the qualifying features of the Fowlsheugh SPA are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status.
Achieving FCS is defined in terms of the natural range and population of the species and the extent of habitat necessary for long-term maintenance of populations. There is an important role for all protected sites in the UK in defining, achieving and maintaining FCS for any habitat or species. Achieving FCS requires that each parameter is either stable or increasing, exceeds the relevant reference value and has good prospects of continuing to do so in the foreseeable future (JNCC, 2018). Favourable Conservation Status (FCS) is assessed across the Marine Atlantic Biogeographic Region with individual SPAs and SPA networks contributing to FCS. The conservation status will be taken as 'favourable' when: • population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis; When carrying out appraisals of plans and projects against these Conservation Objectives, it is not necessary to understand the status of the qualifying features within each individual SPA in this Biogeographic Region. The focus of the appraisal should be to understand whether the integrity of the Fowlsheugh SPA would be maintained. If this is the case, then its contribution to FCS across the qualifying features' biogeographic range will be met. Similarly, when determining whether management measures may be required to ensure that the Conservation Objectives for this SPA are achieved, the focus should be on maintaining the contribution that it makes to FCS. Further advice on how these appraisals should be focussed in relation to maintaining site integrity is provided by Conservation Objective 2 (including parts a, b and c). If broader information (status, trends) on the qualifying features is available, it should be used to provide context to the site-based appraisal. Note '*Appropriate'* within this part of the Conservation Objectives is included to indicate that the contribution to FCS varies from site to site, and feature to feature.

2. To ensure that the integrity of the Fowlsheugh SPA is restored in the context of environmental changes by meeting objectives 2a, 2b and 2c for each qualifying feature:

This objective recognises that kittiwake, herring gull, and fulmar are in unfavourable condition at the Fowlsheugh SPA and consequently site integrity is compromised.

For the Fowlsheugh SPA, when carrying out appraisals of plans or projects, the focus of the appraisal should be to understand the impact of the plan or project on site integrity. For qualifying features that are favourable condition this means maintaining that condition. For those that are in unfavourable condition, it means ensuring that the plan or project does not prevent or reduce the potential for recovery. The expectation is not for the plan or project to restore site integrity. Should the plan or project compromise the ability of the qualifying features to recover (e.g. result in a further decline or accelerate the rate of decline, or prevent a recovery from occurring), then the Fowlsheugh SPA will not make an appropriate contribution to achieving FCS across the Atlantic Biogeographic Region. Similarly, when determining whether management measures are required to meet the Conservation Objectives, the focus is on ensuring the conditions are appropriate to support recovery and subsequently restore site integrity. Further advice on how these appraisals should be focussed in relation to site integrity is provided in 2a, b and c.

The breeding seabird assemblage is not considered further in the Conservation Objectives as each qualifying feature and 'named qualifier' of the assemblage are addressed individually.

Temporary impacts on these objectives resulting from plans or projects can only be permitted where there is a high degree of certainty that the features will be able to quickly recover from the impact and that impacts do not prevent the ability of unfavourable features to fully recover in the long-term.

Environmental changes

This Conservation Objective recognises that the qualifying features are part of a complex, dynamic and multi-dimensional marine environment. Marine birds depend on environmental conditions (for example water movement, up-wellings and prevailing weather) which vary over time and space. Consequently, marine bird species are exposed to a wide range of drivers of change. 'Environmental changes' for the purpose of these Conservation Objectives means any change to the qualifying features reflecting both natural population dynamics and also broader environmental changes (i.e. those related to climate change and environmental variability, management of which is beyond the scope of the SPA). The impact of human activities on the SPA that can be managed will not be considered as part of the broader context of environmental change (i.e. where required they should be managed).

Some site-level changes are natural and are not a direct result of human influences (e.g. population fluctuations arising from factors such as variable breeding success or weather conditions across the wintering range / shifts or changes in prey availability resulting from variability in

environmental factors processes such as water temperature and movements). Changes in the qualifying features' distribution and use of the site, which are brought about by entirely natural drivers, directly or indirectly, are normally considered compatible with the SPA's Conservation Objectives.

There may also be historical human influences that have now ceased but have modified and continue to drive change within the protected area. It is also recognised that climate change pressures could affect the qualifying features within the site. These changes cannot be prevented, so the Conservation Objectives seek at a site level to take account of them and where possible, improve the qualifying species' resilience to environmental change when considering future plans or projects. The magnitude of the future impacts will depend on the nature, scale, duration and intensity of the activity and the qualifying features tolerance and ability to recover from such an impact.

Additionally, management of human activities at a wider scale (i.e. regional, Scotland or the area covered by an international agreement such as the OSPAR convention), may also affect the qualifying features associated with this site (either by making a positive contribution or having a negative impact). Wider-scale impacts may affect the ability of the qualifying features to recover from site level changes, and therefore additional precaution over the impacts of any future human activities may be necessary.

An assessment of whether a change is natural or anthropogenic, or a combination of both, will need to be looked at on a case-by-case basis.

In relation to the Fowlsheugh SPA and its qualifying features, the following effects of environmental change (climate change) are relevant. These effects should be taken into account when considering plans and projects as additional pressures may reduce the protected features' resilience to climate change, and conversely climate change impacts may start to hinder the their ability to recover from human activities.

- ***All qualifying features -*** Under climate change, sea temperatures are predicted to increase, sea levels will rise and there could be increases in the frequency of stormy conditions. Increased levels of atmospheric CO_2 will also result in ocean acidification. Any of these factors could cause changes in bird abundance and distribution at the SPA due to changes in prey (species, availability and distribution).
- ***For breeding seabirds -*** climate change may result in effects at wintering grounds or in other parts of the overall breeding range which could have subsequent effects on their breeding population and distributions. In coastal breeding sites, increased flooding associated with storm tides may also cause nest site failures in breeding seabirds (Mendel *et al.* 2008).
- ***Auks (guillemot and razorbill):*** Auks may be vulnerable to extreme weather events, particularly winter storms, which have been linked to adult mortality and winter 'wreck' events (BirdLife International, 2022). Decreased survival rates in these species have been linked to increased sea temperatures and stronger winds (Votier *et al.* 2005; 2008; Sandvik *et al.* 2005).
- ***Kittiwake:*** Breeding phenology is affected by climate change, with a trend in later breeding being seen in kittiwakes (Wanless *et al.* 2009). Kittiwake breeding populations are highly vulnerable to the impacts of climate change on the population dynamics and distribution of their preferred prey (e.g. Sandvik *et al.* 2014).

- ***Herring gull:*** this species is indirectly influenced by climate variation (for example stratification, sea surface temperature, the North Atlantic Oscillation), as mediated through changes in their food supply (Johnston *et al.* 2021), which in turn can affect their breeding success. Low-lying gull nests can be susceptible to flooding either through sea level rise or increase in storminess (Johnston *et al.* 2021). Overall, herring gulls are predicted to decrease as a result of climate change (Davies *et al.* 2021).
- ***Fulmar:*** a species which has been identified as sensitive to climate change. Studies have demonstrated a link between a large-scale climatic factor, the North Atlantic Oscillation (NAO) on both survival and reproduction. Survival in fulmars, particularly of females, has been shown to be influenced by the NAO (Grosbois & Thompson, 2005). Reproductive success at this colony has also been linked to winter NAO and lagged winter NAO, with year to year variation in breeding success strongly related to oscillations in the NAO (Thompson & Ollason, 2001; Lewis *et al.* 2009).

2a. The populations of the qualifying features are viable components of the Fowlsheugh SPA.

This objective seeks to specifically protect the qualifying features from ***significant*** mortality, injury or removal that can lead to a long-term decline of the feature(s) within the site. It protects the features from significant risk of incidental killing and injury from activities both within and outwith the site. Impacts and effects are considered 'significant' where they could result in a permanent reduction or continued decline in the population and consequently, reduction in the contribution the Fowlsheugh SPA makes to the maintenance of the qualifying features in their natural range in the UK. It should be ensured that the qualifying features are protected from anthropogenic pressures that could lead to a significant long-term decline in numbers using the site, such that recovery cannot be expected. Ensuring the capacity of the Fowlsheugh SPA to support all the essential behaviours and activities required to support viable populations of the qualifying features in the relevant season(s) are addressed by Conservation Objectives 2b and 2c.

At a site level, the population is considered to be viable if the species can carry out their life-cycle functions relevant to the season(s) they are present, irrespective of dependencies such as immigration. For the qualifying features, the viability of the species within the Fowlsheugh SPA is intrinsically linked to their ability to access and use foraging habitat in areas of functionally linked sea, within foraging range, outwith the site, in addition to the ability of the site to support breeding adult survival and chick-rearing.

When assessing the effects of any plan or project consideration should also be given to whether impacts outwith the SPA could affect achievement of this Conservation Objective. This Conservation Objective is considered to be met if the conditions to support all the species' essential behaviours and activities are in place. This includes:

- avoiding effects within and outwith the site that could prevent or reduce the ability of the populations of qualifying features to recover.
- avoiding effects within and outwith the site that could lead to a permanent reduction in the populations of qualifying features through mortality, injury, or impacts caused by disturbance, displacement, barrier effects or reduction in mobile prey resources.
- maintaining the species' ability to use all areas of importance within the site (to be considered under Conservation Objective 2b)
- maintaining access to, and availability of, supporting habitats and prey within the site (to be considered under Conservation Objective 2c).

Where known, the populations of the qualifying features should be maintained at or above site reference populations, as detailed below. The site reference population may be revised from the baseline at designation where a) there is evidence to show that a population's size has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally equivalent to at least one generation length for the given species) and/or b) to reflect any wider strategic objectives for the species (e.g. national or international species action plan). Where there is evidence to show that a qualifying feature has historically been more abundant than the stated minimum target and current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account.

All qualifying features are protected throughout the whole site, throughout the year. This means that irrespective of the season for which they are designated, the qualifying features are protected during both their breeding and non-breeding seasons when using the SPA.

Temporary short-term changes in the populations due to human activity may be considered not to compromise the Conservation Objectives within the site provided it can be demonstrated that the populations of any affected qualifying features can fully recover. Factors limiting the recovery of the qualifying features include: the average generation times, population growth rates, availability of prey and the timing and duration of the activity around vulnerable stages of their life cycles such as during moulting or chick-rearing period.

Direct mortality can arise from: collision (above and underwater); entanglement (incidental bycatch); predation, disease, flooding events, and pollution. Indirect mortality can arise from loss of or damage to prey or prey-supporting habitats (e.g. through harvesting; physical removal of or damage to seabed; nutrient enrichment; changes to water temperature, salinity, or flows; introduction of invasive non-native species (INNS); pollution). Indirect mortality can arise from reduced ability to capture or access prey arising from e.g. increased water turbidity or displacement from foraging areas.

The site-specific information includes a site reference population that is considered the most appropriate for assessments of plans and projects. Where this is based on the citation population at classification or recent surveys, the site reference population is rounded using standard procedures (Stroud *et al.* 2001).

Feature	Site-specific advice	Site-specific information
Black-legged kittiwake	Ensure the breeding population of kittiwake have the ability to recover to the site reference population.	The site reference population for kittiwakes at the Fowlsheugh SPA is 37,000 pairs (1986 count). The count for the last assessment for kittiwakes was 14,000 pairs (2018). This represents a decrease of 62% in the kittiwake population. Kittiwake populations have declined in both Scotland and the UK, with decreases of 42% in their UK population since Seabird 2000 (1998-2002) and 57% in Scotland (Burnell *et al.,* 2023).

	and Ensure kittiwakes are not at significant risk from injury or mortality. ***and*** Ensure kittiwakes can move safely between the site and important areas of functionally linked sea outwith the site.	It is acknowledged that due to the steep national decline in kittiwakes it will be difficult to recover the kittiwake population to the site reference population. Reasons for the decline in kittiwakes at the Fowlsheugh SPA, are not fully understood but are likely to be related to off-colony factors affecting their food supply. Wider pressures on kittiwakes, such as climate change or disease, may limit the potential for kittiwakes to achieve Favourable Conservation Status. Therefore, when assessing the effects of any plan or project, consideration should be given to ensuring that the plan or project will not hinder the ability to recover. This will help ensure resilience within the wider kittiwake population. Plans or projects should also ensure that kittiwakes are not at significant risk from injury or mortality either within or outwith the SPA. The long-term recovery of kittiwakes at the Fowlsheugh SPA is also intrinsically linked to their ability to access and use habitats in areas of functionally linked sea outwith the SPA. This may include foraging areas such as the Outer Firth of Forth and St Andrews Bay Complex SPA. Kittiwakes also require access to freshwater for bathing, which may include places such as Loch of Lumgair or Burn of Catterline, but is not yet known. When assessing the effects of any plan or project consideration should therefore also be given to whether impacts on the population whilst outwith the SPA could affect achievement of this Conservation Objective.
Common guillemot	Maintain the breeding population of guillemot at a stable or increasing trend relative to the current site reference population. ***and*** Ensure guillemots are not at significant	The site reference population for guillemots at the Fowlsheugh SPA is 56,000 individuals. The last assessment for the Fowlsheugh SPA shows this number increased to around 70,000 individuals (2018 count). Guillemot populations in the UK decreased by 8% since Seabird 2000 (1998-2002) and 31% in Scotland (Burnell *et al.,* 2023). The long-term maintenance of guillemot in the Fowlsheugh SPA is intrinsically linked to their ability to access and use habitats in areas of functionally linked sea outwith the SPA. When assessing the effects of any plan or project consideration should therefore also be given to whether impacts on the population whilst outwith the SPA could affect achievement of this Conservation Objective.

	risk from injury or mortality. ***and*** Ensure guillemots can move safely between the site and important areas of functionally linked sea outwith the site.	
Herring gull	Ensure the breeding population of herring gull have the ability to recover to the site reference population. ***and*** Ensure herring gulls are not at significant risk from injury or mortality. ***and*** Ensure herring gull can move safely between the site and important areas of functionally linked land and sea outwith the site.	The site reference population for herring gulls at the Fowlsheugh SPA is 3,200 pairs (1986 survey). The latest assessment (2018) counted 815 pairs in total. Herring gulls have experienced a 44% decline in their breeding populations within the UK since Seabird 2000 (1998-2002). In Scotland, Herring gull have decreased by 44% (Burnell *et al.,* 2023). Monitoring in 2023 indicated a further decline of 24% in Scotland due to avian flu (Tremlett *et al.,* 2024). The reasons for the decline at the Fowlsheugh SPA are uncertain. Off-colony factors such as reduction in prey in foraging areas (including within the Outer Firth of Forth and St Andrews Bay Complex SPA) may be contributing to the decline. Possible on-site factors may include recreational disturbance or predation. Research is required to fully understand the reasons behind the decline and whether there is anything that can be done to reverse it. The long-term recovery of herring gulls the Fowlsheugh SPA is also intrinsically linked to their ability to access and use habitats in areas of functionally linked sea and land outwith the SPA. This may include marine foraging areas as well as terrestrial environments. In the terrestrial environment herring gulls from a nearby SPA have been tracked to agricultural/pastoral fields, along the coastlines in intertidal habitats, in freshwater habitats, at landfills, and in urbanised/more built-up areas. It is not known where the herring gulls at Fowlsheugh SPA forage, but it is likely to be a mixture of all the marine, terrestrial and coastal habitats. When assessing the effects of any plan or project consideration should therefore also be given to whether impacts on the population whilst outwith the SPA could affect achievement of this Conservation Objective.
Northern fulmar	Ensure the breeding population of fulmars	The site reference population for fulmars at the Fowlsheugh SPA is 1170 pairs (1986 survey). The latest assessment total was 525 pairs (2018). As such, the numbers of fulmars at this SPA have

	have the ability to recover to the site reference population. and Ensure fulmars are not at significant risk from injury or mortality during the breeding season. ***and*** Ensure fulmars can move safely between the site and important areas of functionally linked sea outwith the sites.	decreased by around 55%. Fulmar populations in the UK have decreased by 35% since Seabird 2000 (1998-2002). In Scotland fulmar have decreased by 37% (Burnell *et al.,* 2023). The reasons for the decline of fulmar at this SPA are uncertain but are most likely to be related to off-colony factors such as reduction in prey in foraging areas. Possible on-site factors may include recreational disturbance, as they are a species known to be prone to disturbance, particularly during the incubation period. The long-term recovery of fulmars at the Fowlsheugh SPA is intrinsically linked to their ability to access and use habitats in areas of functionally linked sea outwith the SPA. When assessing the effects of any plan or project consideration should therefore also be given to whether impacts on the population whilst outwith the SPA could affect achievement of this Conservation Objective.
Razorbill	Maintain the breeding population of razorbills at a stable or increasing trend relative to the current site reference population. ***and*** Ensure razorbills are not at significant risk from injury or mortality.	The site reference population for razorbills at the Fowlsheugh SPA is 5,800 individuals (1986 count). Counts for the latest assessment totalled over 14,000 individuals (2018). Razorbill populations in the UK have increased by 18% since Seabird 2000 (1998 – 2000). However, in Scotland the opposite trend is emerging with razorbill populations having decreased by 2% in the same period (Burnell *et al.,* 2023). The long-term maintenance of razorbills at the Fowlsheugh SPA is intrinsically linked to their ability to access and use habitats in areas of functionally linked sea outwith the SPA. When assessing the effects of any plan or project consideration should therefore also be given to whether impacts on the population whilst outwith the SPA could affect achievement of this Conservation Objective.

	and Ensure razorbills can move safely between the site and important areas of functionally linked sea outwith the site.	

2b. The distribution of the qualifying features is maintained, or where appropriate restored, throughout the site by avoiding significant disturbance of the species.
This objective seeks to ensure that the qualifying features can continue to use and access all areas within the Fowlsheugh SPA used for breeding, feeding, moulting, roosting, loafing, shelter and other maintenance activities. This objective also recognises however, that the populations of kittiwake, herring gull and fulmar using the SPA are in unfavourable condition and that this may, in part, be due to disturbance at the site causing declines. Changes in the distribution of the qualifying features are most likely to be brought about through disturbance, therefore this objective relates to avoiding significant disturbance. Disturbance associated with human activity may take a variety of forms including: noise, light, sound, vibration, trampling, presence of people, animals and structures, as well as displacement and barrier effects on the species. The type of disturbance, its duration and the area over which the qualifying features are likely to be affected are important considerations in any appraisal of disturbance. Disturbance can, for example, result in changes to feeding or roosting behaviour, increased energy expenditure due to increased time spent moving to avoid stressors , abandonment of nest sites and desertion of supporting habitat (both within or outside the protected area where appropriate). This may affect successful chick rearing in the subsequent breeding season (related to poor winter condition of adult birds), feeding and/or roosting, and/or may reduce the availability of suitable habitat as birds are displaced and their distribution within the site contracts. 'Significant disturbance' should be interpreted to mean disturbance that affects the integrity of the site through alteration of the distribution of the qualifying features such that recovery cannot be expected or effects can be considered long term. It is expected that significant disturbance will lead to more than a transient effect on the distribution of the qualifying features. It may result in the following types of effect: • Contributes to the long-term decline in the use of the site by the qualifying features. • Changes to the distribution of the qualifying features on a continuing or sustained basis. • Changes to the qualifying features behaviour such that it reduces the ability of the species to survive, breed or rear their young.

There are two main ways in which the qualifying features' continued access to suitable resources could be restricted and distribution affected and this is where assessments should be focussed:
1. Large scale physical barriers, or;
2. Significant disturbance which alters their distribution within the site or disrupts important behaviours.

Temporary short-term disturbances due to human activity may be considered not to compromise the Conservation Objectives within the site provided it can be demonstrated that the population can fully recover with a high degree of certainty. Factors limiting the recovery of the qualifying features include the timing, frequency and duration of the activity around vulnerable stages of their life cycle such as during moulting or chick-feeding period.

All qualifying features are protected throughout the whole site, throughout the year. We anticipate that some locations within the Fowlsheugh SPA will be more, or less, important than others for individual species. Distributions within the site may also change over time in response to a range of abiotic and biotic factors (e.g. changes in abundance or quality of prey resources at particular locations, numbers of each qualifying feature within the site as a whole, seasonal fluctuations or trends in prevailing weather conditions etc.). In some cases detailed bespoke surveys of bird numbers and distributions, to determine qualifying features' current usage of particular locations within a proposals area of influence, may be required to complete the necessary assessments.

Direct displacement/redistribution of the qualifying features can arise from: barriers to movement to and between foraging and roosting locations; and visual disturbance (e.g. associated with vessel movements). Indirect displacement/redistribution can arise from loss of or damage to prey or prey-supporting habitats (e.g. through harvesting; physical removal of or damage to seabed; nutrient enrichment; changes to water temperature, salinity, or flows; introduction of INNS; pollution (e.g. light, noise, chemical)).

For breeding seabirds: Disturbance to foraging birds may reduce the time spent feeding or cause them to move to different areas that are less energetically profitable. Disturbance that creates an avoidance response or disrupts/reduces incubation, chick-rearing, foraging or resting behaviour can also put increased energetic demands on birds during an already energetically expensive season. Ensuring safe movement within and between the breeding colony and those areas used for foraging, roosting and other maintenance behaviours (see also 2c) is important to meet the energetic demands required to achieve or maintain body condition needed to support migration and successful breeding and for subsequent winter survival,. Barriers to movement may reduce access to preferred foraging habitat and cause sub-optimal foraging.

Feature	Site-specific advice	Site-specific information
Black-legged kittiwake	Ensure kittiwakes continue to have access to and can utilise all optimal habitats suitable for all relevant aspects	Kittiwakes are migratory species with the vast majority of adults from North Atlantic colonies such as the Fowlsheugh SPA appearing to winter in the west Atlantic between Newfoundland and the mid-Atlantic ridge with relatively small numbers wintering in the North Sea and west of the British Isles. Kittiwakes are present at the Fowlsheugh SPA during their breeding period from mid-April to end of August. However feeding aggregations may still be seen around the Scottish coast until late

	of their life cycle associated with the site. ***and*** Avoid significant disturbance to kittiwakes and ensure individuals can move safely between these areas within the site.	October/early November. They will therefore be present during both the breeding and non-breeding seasons. In the Fowlsheugh SPA kittiwakes will nest on the steep, coastal cliffs, with the largest concentration of kittiwakes being within the RSPB Fowlsheugh nature reserve section of the coast. Kittiwakes also require access to areas of freshwater which they require for bathing. For roosting, they may use manmade walls and sandy shores. Kittiwakes at the Fowlsheugh SPA will use both inshore waters within 1 km of their colony for loafing, preening, bathing and other important maintenance behaviours, and further offshore waters and shelf waters for foraging. In the breeding period, the mean maximum foraging range for kittiwakes is 156.1+/- 144.5 km, though they will forage further, with a maximum range of 770 km (Woodward *et al.* 2019). After breeding, kittiwakes will also use sandy beaches near their breeding grounds to moult in large flocks of individuals.
Common guillemot	Ensure guillemots continue to have access to and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site. ***and*** Avoid significant disturbance to guillemots and ensure individuals can move safely between these areas within the site.	Guillemots are present in the Fowlsheugh SPA throughout the year. Guillemots' breeding season is from April until mid-August. From the beginning of August to mid-October they will remain on the waters by the Fowlsheugh SPA, where adults will undergo a flightless moult period. Guillemots will attend their breeding sites surrounding the Fowlsheugh SPA frequently during the non-breeding period, particularly from February onwards. Guillemots will nest on bare cliff ledges and flat boulders at the Fowlsheugh SPA in dense colonies. The majority of the guillemots at this SPA are found within the RSPB Fowlsheugh nature reserve section of the coast. They use areas close to the coast as well as offshore waters in which to forage, rest, and carry out other maintenance activities. In the breeding period, the foraging range of common guillemot has a mean maximum of 73.2 ± 80.5 km, with a maximum range of 338km (Woodward *et al.* 2019). Guillemots forage both at the seabed (demersal) and within the water column (pelagic), primarily during daylight hours (Wakefield *et al.* 2017). They have an average dive depth of 42m, though can forage up to 200m depth (Ropert-Coudert *et al.* 2018). Guillemots may fly in small groups and will often form large rafts on the sea close in the colony before heading out on a foraging trip. When ready to fledge the chick will leave the nest site and joins the male of the pair on the sea, where they travel further out to sea together and remain close for around two months (Harris & Wanless, 2003).
Herring gull	Ensure herring gulls continue to have access to and can utilise all optimal habitats suitable	Herring gulls will be present at the Fowlsheugh SPA throughout the year. Their breeding season is from March to the end of August, and their non-breeding period from September to end of February.

	for all relevant aspects of their life cycle associated with the site. ***and*** Avoid significant disturbance to herring gulls and ensure individuals can move safely between these areas within the site.	Herring gulls nest on top of the cliffs at the Fowlsheugh SPA as well as lower down on flat rocks and beaches. As with other gull species, herring gulls nest on flat ground, sometimes on top of cliffs or stacks, with a shallow nest made from grass, moss and sometimes seaweed. Herring gulls use areas close to the coast as well as offshore waters in which to forage, rest, and carry out other maintenance activities. Herring gulls feeding in the marine environment are largely surface feeders, scavengers, and predators although they can dive up to 2m for prey items. They may also kleptoparasitise other seabirds for fish such as sandeel. They can dive up to 2m for prey items. In the breeding period, herring gulls have a mean maximum foraging range of 58.8±26.8km (Woodward *et al.* 2019), though in the non-breeding season the foraging range may be much larger than this.
Northern fulmar	Ensure fulmar continue to have access to and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site. ***and*** Avoid significant disturbance to fulmar and ensure individuals can move safely between these areas within the site.	Fulmars have their main breeding period at the Fowlsheugh SPA from April to mid-September. Despite dispersing large distances during the non-breeding period, fulmars will regularly visit their colonies over the non-breeding period and thus will be present at the Fowlsheugh SPA at some stage throughout the yearly cycle. Fulmars at the Fowlsheugh SPA will nest on grassy ledges by cliffs, or on the ground, with a small scrapping and pieces of vegetation on the ground. They use areas close to the coast as well as offshore waters in which to forage, rest, and carry out other maintenance activities. Fulmars have a large foraging range of 542.3 ±657.9km during the breeding period, though distances of 2890km have been recorded (Woodward *et al.* 2019). Fulmars forage both during the day and at night. They are surface feeding predators and scavengers, able to dive usually less than 5m (Edwards *et al.* 2013).
Razorbill	Ensure razorbill continue to have access to and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site.	Razorbills will be present during their breeding period at the Fowlsheugh SPA from March to September. They will then undergo a flightless moult period from mid-August to end of October and may winter in UK waters or move further east to Norway or Denmark (Furness, 2015). It is not known where razorbills from the Fowlsheugh SPA winter. Razorbills at the Fowlsheugh SPA will nest in crevices in cliffs, often mixing with common guillemots on the same ledges. They may also nest amongst boulders and rocks on grassy slopes or rocky beaches.

	and Avoid significant disturbance to razorbill and ensure individuals can move safely between these areas within the site.	From the last count made (2018) it appears the majority of razorbills nests within the RSPB nature reserve section of the Fowlsheugh SPA. Razorbills use areas close to the coast as well as offshore waters in which to forage, rest, and carry out other maintenance activities. In the breeding period, razorbills have a mean maximum foraging range of 88.7 ± 75.9km (Woodward *et al*. 2019). Razorbills are pursuit divers which make frequent dives of up to 140m, though average dive depth is around 15m (Ropert-Coudert *et al.* 2018). Most dives are under one minute. Razorbills will regularly roost on the sea overnight and may drift with the tide during their rest (Cooper *et al.* 2018).

2c. The supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored at the Fowlsheugh SPA.
This objective seeks to maintain the current extent, quality and distribution of supporting habitats within the site as well as ensure a sufficient food supply within the site. It also recognises however, that the populations of breeding kittiwake, herring gull and fulmar using the Fowlsheugh SPA are in unfavourable condition and that this may, in part, be due to a reduction in quality of habitats or in prey causing declines at the breeding colonies. In the terrestrial environment, supporting habitats refer to the characteristics of the cliffs, relevant to their use by the qualifying features. Supporting processes relates to wider processes such as factors affecting coastal erosion, factors affecting vegetation formation, which will influence the habitat types available for the qualifying features. In the marine environment, supporting habitats refer to the characteristics of the seabed and water column relevant to their use by the qualifying features. Supporting processes relates to wider oceanographic processes such as up-wellings, tidal flows, hydrological movements which may be necessary for the habitat, and thus affects nutrient cycling and prey distribution. Temporary short-term changes in supporting habitat and/or food resources due to human activity may be considered not to compromise the Conservation Objectives within the site provided it can be demonstrated with a high degree of certainty that the populations of any affected qualifying features can fully recover. The species-specific information includes a summary of available information on food resources and where known, the distribution of the key supporting habitats and associated processes within the Fowlsheugh SPA.

The overall water body condition status relevant to Fowlsheugh SPA was assessed being "High" (2020)[7]. This assessment includes consideration of water chemistry, pollutants, the physical condition of the water body, plant and animal communities, including plankton, and the risk from invasive non-native species. There is currently insufficient information to provide quantitative advice on the environmental processes associated with the supporting habitats and prey of the qualifying features at the Fowlsheugh SPA.		
Feature	**Site-specific advice**	**Site-specific information**
Black-legged kittiwake	Maintain or enhance the extent and distribution of the supporting habitats for kittiwakes within the site. ***and*** Ensure the variety and abundance of food resources and the condition of supporting habitats and associated processes have the ability to recover. ***and*** Existing water quality should be maintained any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats	Kittiwakes at the Fowlsheugh SPA will use steep, coastal cliffs for nesting. Their nest is made of compacted mud, grass, feathers and occasionally seaweed (Snow & Perrins, 1998). Kittiwakes require access to areas of freshwater for bathing and for roosting they may use manmade walls and sandy shores. Kittiwakes at the Fowlsheugh SPA will use both inshore waters within 1 km of their colony for loafing, preening, bathing and other important maintenance behaviours, and further offshore waters and shelf waters for foraging. Kittiwakes may also use sandy beaches to moult in flocks of individuals. Kittiwakes are omnivorous, with a diet consisting predominantly of shoaling marine fish and invertebrates (e.g. squid and shrimps) obtained just below or under (up to 4 m) the sea surface. During the breeding season they may also feed on intertidal molluscs, crustaceans (e.g. crayfish), earthworms and plant matter (del Hoyo *et al.* 1996) and may use seaweed for foraging due to the association of seaweed with benthic infauna (Goodship & Furness, 2019). Sandeel are a particularly important prey item, as well as sprat, rockling and gadoids. When fishing, they will often feed in small flocks. Information is lacking on the supporting habitats for kittiwakes at Fowlsheugh SPA, but may relate to the availability of cliff nesting habitat. In the marine environment the supporting processes may relate to water quality (nutrients and turbidity) and water flow.

[7] https://www.sepa.org.uk/data-visualisation/water-classification-hub/

	and/or prey, should be avoided.	
Common guillemot	Maintain the extent and distribution of the supporting habitats for guillemots within the site. ***and*** Maintain the variety and abundance of food resources and the condition of supporting habitats and associated processes. ***and*** Existing water quality should be maintained any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats and/or prey, should be avoided.	Guillemots at the Fowlsheugh SPA require suitable habitat for breeding, foraging, resting, and other maintenance activities. They will use cliff ledges as their nesting habitat. Guillemots use areas close to the coast as well as offshore waters in which to forage and rest. Guillemots forage both at the seabed (demersal) and within the water column (pelagic) up to 200 m, primarily during daylight hours (Wakefield *et al.* 2017). Breeding guillemot feed on small schooling fish including sandeels, clupeids, capelin, sprats and juvenile herring and cod (Wakefield *et al.* 2017). They may also consume molluscs, marine worms, squid, crustaceans and amphipods. The key supporting habitats for guillemots at the Fowlsheugh SPA will relate to the availability of suitable cliff-nesting habitat. As they are a species that feeds in the water column, they can be potentially affected by any increase in turbidity that would affect their ability to successfully forage for their prey (Cook & Burton, 2010). Guillemots have been shown to show a weak preference for frontal regions and for substrate containing a relatively low proportion of gravel (Wakefield *et al.* 2017). Guillemots have also been observed to forage in riptides (Wanless *et al.* 1990). Studies have also demonstrated guillemots foraging in areas at fronts between thermally distinct bodies of water (BirdLife International, 2022).
Herring gull	Maintain or enhance the extent and distribution of the supporting habitats for herring gulls within the site. ***and***	Herring gulls require suitable habitat for breeding, roosting, loafing, foraging, and maintenance activities within the Fowlsheugh SPA. Their nest will usually be shallow and made from grass, moss and sometimes seaweed. Herring gulls are opportunistic scavengers and predators. Herring gulls feed in the marine, coastal and terrestrial environments. Herring gulls feeding in the marine environment within this SPA will be largely feeding on the surface and scavenging, diving up to 2 m for prey items. When foraging in the marine and coastal environments their prey will include fish, crabs, molluscs, starfish, marine worms

	Ensure the variety and abundance of food resources and the condition of supporting habitats and associated processes have the ability to recover. ***and*** Existing water quality should be maintained any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats and/or prey, should be avoided.	and may also scavenge from fishing boats (del Hoyo *et al.* 1996). Herring gulls may also forage within infralittoral reef kelp forests to feed on benthic infauna (Kelly, 2005). Information is lacking on the supporting habitats and processes for herring gulls at Fowlsheugh SPA, but may relate to the availability of suitable nesting habitat and well as any processes that would affect their prey.
Northern fulmar	Maintain or enhance the extent and distribution of the supporting habitats for fulmars within the site. ***and*** Ensure the variety and abundance of food resources and the condition of supporting habitats and associated processes have the ability to recover. ***and***	Fulmars require suitable habitat for breeding, foraging, loafing, and other maintenance activities within the Fowlsheugh SPA. Fulmars at Fowlsheugh SPA will use grassy ledges by cliffs for nesting habitat. Fulmars will forage in the offshore waters, feeding within 5m of the surface. Fulmars forage both during the day and at night. They have a wide ranging prey base, with their main prey items being: small fish, zooplankton (especially copepods and amphipods), shrimp, squid, jellyfish, crustaceans, offal from fisheries, carrion (BirdLife International, 2022). The key supporting habitats for fulmars at the Fowlsheugh SPA may relate to the availability of suitable grass and ledges for nesting. In the marine environment the presence of shelf breaks are often important, where there are areas of high biological productivity due to the oceanic thermal fronts (Edwards *et al.* 2013).

	Existing water quality should be maintained and any increase in eutrophication or water turbidity, where this could reduce supporting habitats and/or prey, should be avoided.	
Razorbill	Maintain the extent and distribution of the supporting habitats for razorbills within the site. ***and*** Maintain the variety and abundance of food resources and the condition of supporting habitats and associated processes. ***and*** Existing water quality should be maintained and any increase in eutrophication or water turbidity, where this could reduce supporting habitats and/or prey, should be avoided.	Razorbills at the Fowlsheugh SPA require suitable habitat for breeding, foraging, resting, and other maintenance activities. They may use crevices and ledges on cliffs, boulders, rocks on grassy slopes, or rocky beaches for their nesting habitat. They will use inshore waters for foraging, but may also feed further offshore in deeper pelagic waters, particularly preferring to feed at shelf waters due to their productivity (Linnebjerg *et al.* 2013). Razorbills will also use the marine waters for roosting overnight and will drift with the tide during their rest (Cooper *et al.* 2018). Razorbills are a pursuit diver which make frequent, shallow dives in the pelagic zone (Thaxter *et al.* 2010; Linnebjerg *et al.* 2013). They have a foraging depth of up to 140 m (Jury 1986) though average dive depth is 15m (Ropert-Coudert *et al.* 2018) and most dives are under 1 minute (Ropert-Coudert *et al.* 2018). Razorbills will feed on small fish (e.g. sandeels, clupeids, capelin, sprat, juvenile herring and cod), crustaceans and polychaetes (Wakefield *et al.* 2017). They may also steal fish from puffins at certain colonies (Snow & Perrins, 1998). Razorbill distribution has been linked to substrate type, relating to their main prey item, the sandeel (Wakefield *et al.* 2017). The key supporting habitats for razorbill at the Fowlsheugh SPA in the terrestrial environment may relate to suitable cliff-nesting habitat. In the surrounding waters by Fowlsheugh SPA supporting processes may include water quality (nutrients and turbidity), tidal cycles, water temperature and water flow. As they are a species that feeds in the water column, they can be potentially affected by any increase in turbidity that would affect their ability to successfully forage for their prey (Cook & Burton, 2010). Razorbills tend to use areas where mixing of cool and higher sea surface temperatures exist (Wakefield *et al.* 2017).

Annex 2. Supporting information

Factors determining the potential for feature recovery.

Feature	Factors determining the potential for feature recovery
Black-legged kittiwake	Kittiwake estimated generation length is 9.8 years and age of first breeding is 4 years old (Bird *et al.* 2020). Maximum age recorded is around 29 years (Fransson *et al.* 2010). Kittiwake clutch size is 2 (1-3) (Snow & Perrins, 1998). Fledglings typically depart colonies between late July and mid-August, dispersing rapidly from colonies, leaving the area about 10 days on average after their first flight (Coulson, 2011). Adult survival rates vary with period and colony but range from 0.8-0.93, with an average survival of 0.854 (Coulson, 2011; Horswill & Robinson, 2015). Any effect on adult mortality can potentially have serious effects on breeding numbers. As a long-lived seabird species, the adult will balance parental investment into their current breeding attempt with their own need to survive, and future reproductive attempts. A wide-scale tracking study found that the vast majority of adults from North Atlantic colonies appear to winter in the west Atlantic between Newfoundland and the mid-Atlantic ridge with the relatively small numbers wintering in the North Sea and west of the British Isles coming mostly from colonies in the British Isles or in the Barents Sea (Furness, 2015). Feeding aggregations may be seen around the Scottish coast until late October/early November (Forrester *et al.* 2007). Numbers of kittiwakes passing through UK waters in spring and autumn vary strongly from year to year apparently in relation to weather conditions (Furness, 2015). Pressures in these wintering or passage grounds could limit potential for populations to recover from impacts arising in breeding areas. Adult moult may begin during the breeding season but in general will occur after breeding. This species will often moult in large flocks of several thousand individuals on sandy beaches between the breeding grounds and the open sea (BirdLife International, 2022). Any pressure (e.g. disturbance) to these moulting flocks may have subsequent effects on their energy expenditure and hence their survival. Kittiwakes are surface feeders and are therefore limited to those prey found in the upper 1m of the sea (Snow & Perrins, 1998). Kittiwakes have a high reliance on sandeel as their main prey (Daunt *et al.* 2008), and as such are judged to be one of the most vulnerable species in terms of breeding success in relation to sandeel abundance (Furness & Tasker, 2000). This means they may be less resilient to a loss of sandeel prey resource, and thus their recovery would be compromised.
Common guillemot	Guillemot estimated generation length is 14.8 years and age of first breeding is 4 years (Bird *et al.* 2020). Guillemots can live in excess of 40 years (Fransson *et al.* 2010), though the average lifespan is likely to be less than 25 years. Guillemots lay a single egg and will not relay if the egg is lost (Snow & Perrins, 1998), meaning they have a slow reproductive rate. As with many species, productivity of first time breeders is relatively low, and for guillemots stabilises from the fifth breeding attempt (Crespin *et al.* 2006). When ready to fledge the chick will leave the nest site and joins the male of the pair on the sea, where they then travel further out to sea together and remain close for around two months (Harris & Wanless, 2003). In this post-fledgling period, the chicks will be vulnerable to predation at this lifestage being less able to

	escape predators (from late July-end of August during fledging). Adult survival is estimated as being 0.935 (Bird *et al.* 2020) and average productivity 0.672 (Horswill & Robinson, 2015). Any effect on adult mortality can potentially have serious effects on breeding numbers. As with other long-lived seabird species, the adult will balance parental investment into their current breeding attempt with their own need to survive, and future reproductive attempts. The majority of guillemots in UK waters during the non-breeding season are likely to be from UK colonies (Furness, 2015). Few adults move beyond UK waters, although immatures range more widely during the non-breeding season (Furness, 2015). Non-breeding adults tend to remain near their breeding colonies throughout the year and attend their nest ledges, except during their flightless moult period from beginning of August to mid-October. Pressures during this moult period, where adults will be flightless for 1-2 months, could have a subsequent effect on reproduction or survival. Guillemots are not particularly agile in the air and they find take-off from water difficult (Bédard, 1985), which may limit their ability to avoid e.g. fast moving vessels. A guillemot's foraging technique means that they only carry one fish back to their chick at a time, whereas other auk species can carry multiple fish. This limits the quantity of prey they can bring back to their chick each day. As guillemots can dive deeply, they can feed both at the seabed (on demersal prey) and in the water column (on pelagic prey) (Wakefield *et al.* 2017), meaning they may have more flexibility in the prey items they can forage on, depending on their availability. Guillemots, as with other auk species, have a high wing loading, meaning that there is a high energetic cost of flight (Thaxter *et al.* 2010). This may mean if they have to travel further to find food they may suffer energetically (Masden *et al.* 2010).
Herring gull	Estimated generation length is 14 years, which is longer than other gull species, with a maximum known longevity of around 35 years (Bird *et al.* 2020). Age of first breeding is around 5 years old (Horswill & Robinson, 2015). Clutch size is 3 (2-4) eggs (Cramp & Simmons, 2004). Herring gulls have the ability to lay more than one clutch if the first one has been destroyed, but it depends on the female's physiological condition and replacement clutches will often have smaller or fewer eggs than the first clutch. Incubation takes 28-30 days (from mid-April), chick rearing takes 35-40 days (Cramp & Simmons, 2004). Herring gulls are long-lived species, with an age of 49 having been recorded. Adult survival rates have been estimated to be between 0.83-0.89 (Bird *et al.* 2020; Horswill & Robinson, 2015), though lower survival rates have been estimated for urban nesting herring gulls (Rock & Vaughan, 2013). Any effect on adult mortality can potentially have serious effects on breeding numbers. As a long-lived seabird species, the adult will balance parental investment into their current breeding attempt with their own need to survive, and future reproductive attempts. Northern breeding populations of this species are migratory (del Hoyo *et al.* 1996) although populations in the south are nomadic or completely non-migratory (BirdLife International, 2022). Herring gulls show high site fidelity to their breeding sites. Such high site fidelity may limit individual ability to adapt to changes and hence potential for population recovery from perturbations. Herring gulls feeding in the marine environment are largely surface feeders, scavengers, and predators. Herring gulls are opportunistic foragers and will also forage in terrestrial environments. They have the ability to switch prey

	depending on what is available, meaning they may be more resilient to change if a particularly prey item decreases.
Northern fulmar	Estimated generation length is 25.3 years (Bird *et al.* 2020), one of the longest in any bird species, meaning they may be less resilient to any negative effects on their population. Fulmars generally begin breeding ~10 years old (Dunnet, 1991) and can continue to breed into old age; some individuals still recorded as breeding in their late 40s (P.Thompson, unpub.data). Maximum longevity is recorded as being 51 years (Bird *et al.* 2020). Reproduction rates in fulmars are slow with clutch size being 1 egg, one clutch per year. Fulmars may not breed every year (Ollason & Dunnet, 1988), deferring by at least a year if poor food conditions exist such that the adult cannot reach good body condition to breed, or if the bird's partner has not returned and a new partnership may need to establish. Adult survival rates have been estimated at 0.971 (Bird *et al.* 2020), one of the highest of all seabird species, and average productivity as 0.419 (Horswill & Robinson, 2015). Changes in adult survival rates are most likely to drive population change. The fulmar non-breeding population will be mixed individuals across many differing colonies. Tracked birds from Scotland disperse during the non-breeding period to the West Atlantic, to the Labrador Sea, across to the Barents Sea and northern Norway, to the west of Ireland, and some may remain within North Sea waters (Quinn, 2014). There are sex differences in foraging such that female fulmars tracked from Scotland travelled further on average and towards the West Atlantic, compared to males which on average remained closer to the colony over the non-breeding period (Quinn, 2014). There therefore may be different pressures in the wintering grounds for females and males. Despite dispersing large distances in the non-breeding period, from November onwards fulmars will regularly visit their breeding colonies; from January onwards numbers will increase at the colony (Quinn, 2014). In April, breeding fulmars undertake a pre-laying exodus (Macdonald, 1977), an important period of foraging to ensure body condition is ready for the energetically expensive egg laying period. Fulmars may be particularly sensitive to disturbance during their egg laying period, and may abandon their nest if disturbed, leaving the egg vulnerable to predation. During chick-rearing it is common for both pair members to forage away from the nest (Mallory *et al.* 2008), leaving the chick to defend itself with its ability to expel oil and vomit. Fulmars are highly site faithful, which may limit individual ability to adapt to changes within these areas and hence potential for population recovery from perturbations. The majority of the fulmar's primary moult is usually post-breeding during September and October (Quinn, 2016). It is thought that individuals undergoing wing moult may remain largely flightless for the period of wing moult (Warham, 1996), thus making them more vulnerable to pressures during this time. In a typical year, a full wing and tail moult should be completed by the end of February (Ginn & Melville, 2000). In unusual years (e.g. 2004, during a winter wreck event), 60% of birds examined from a wreck were still in primary moult in February, compared to 8% in a normal year (van Franeker, 2004), indicating in years of poor food supply the energetically expensive period of moult may be delayed or arrested. Fulmars have a wide prey base (BirdLife International, 2022), so they should be more resilient to changes in prey abundance. However, in the past, population increases and decreases have been linked to changes in

	anthropogenic food sources such as offal discharges (Tasker, 2004). Fulmars are surface feeders which scavenge on anything that looks like prey. Thus, can be more susceptible to ingesting non-prey items, such as marine litter. Fulmars have the ability to forage widely across large distances (Woodward *et al.* 2019) which means they may be more resilient to changes in prey abundances closer to their breeding colonies.
Razorbill	Estimated generation length of razorbills is 16.4 and they are a long-lived species, having been recorded to live up to 42 years old (Bird *et al.* 2020). Razorbills first breed around 5 years old (Horswill & Robinson, 2015) and, as with other auks, only lay 1 egg (Snow & Perrins, 1998). Razorbills may defer breeding for a year when conditions are not favourable. Adult survival rates have been estimated at 0.906 (Bird *et al.* 2020) and productivity as 0.570 (Horswill & Robinson, 2015). As with other long-lived seabird species, the adult will balance parental investment into their current breeding attempt with their own need to survive, and future reproductive attempts. Razorbills breed around the north Atlantic in eastern North America, Greenland, the White Sea, Norway, Denmark, Iceland, Faroe Islands, GB, Germany and France (BirdLife International, 2022; Furness, 2015). Razorbills wintering in UK waters are thought to derive mainly from breeding populations in the UK, Iceland, Faroe Islands and Norway (Furness, 2015). Scottish breeding razorbills are thought to move east to southwest Norway and Denmark, or the southern North Sea to winter (Furness, 2015). Pressures in these wintering grounds, especially during their vulnerable flightless moult period (from mid-August-end of October), could limit potential for populations to recover from impacts arising in breeding areas. Nest site fidelity has been shown to be high in razorbills (Harris & Wanless, 1989), which may limit individual ability to adapt to changes within their breeding areas, and hence potential for population recovery from perturbations. Razorbills are pursuit divers which tend to make frequent, shallow dives in the pelagic zone (Thaxter *et al.* 2010; Linnebjerg *et al.* 2013). Razorbills will regularly roost on the sea overnight and will drift with the tide during their rest (Cooper *et al.* 2018), which may make them more vulnerable to pressures that occur during the night. Highest rates of feeding for chicks have been recorded at dawn (Condor, 1950), suggesting this is a particularly important time for them to commute between foraging grounds and their breeding colony. Razorbills, as with other auk species, have a high wing loading, meaning that there is a high energetic cost of flight (Thaxter *et al.* 2010). This may mean if they have to travel further to find food they may suffer energetically (Masden *et al.* 2010).

Annex 3: Glossary for Conservation Objectives and References

Glossary

Conservation Objective term	Definition
Distribution	The "distribution" is how the qualifying feature is spread out within the site.
Favourable condition	This refers to the assessed condition of a feature through Site Condition Monitoring. Features considered to be in favourable condition for the purposes of these Conservation Objectives are those that have an assessed condition of either: • Favourable Declining - The attribute targets set for the natural feature have been met, but evidence suggests that its condition will worsen unless remedial action is taken. • Favourable Maintained - the attribute targets set for the natural features have been met, and the natural feature is likely to be secure on the site under present conditions. • Favourable Recovered - the condition of the natural feature has recovered from a previous unfavourable condition, and attribute targets are now being met.
Generation length	Generation length is "the average age of parents of the current cohort". Generation length therefore reflects the turnover rate of breeding individuals in a population (IUCN, 2019).
Maintain	Where a qualifying feature of the SPA is assessed as being in favourable condition the conservation objective is 'maintain'. This means that the various attributes of the feature should be kept at that favourable level. This can include increasing/improving condition as well, but not a permanent decline.
Marine birds	This term encompasses true seabirds and waterfowl (seaducks, divers, and grebes).
Metapopulation	A group of connected populations of a species within a defined area, where the individual populations may interact with one another.
Restore	Where a qualifying feature of the SPA is assessed as being in unfavourable condition the conservation objective is 'restore'. This means that the various attributes of the feature should be returned to the favourable level by increasing/improving condition.
Site integrity	The integrity of a site is defined in general terms as the coherence of its ecological structures and function, across its whole area, which enables it to sustain the habitat, complex of habitats and and/or the levels of populations of the species for which it was designated.
Site reference population	This refers to the estimated population figure for the site and should be used to form the basis of carrying out HRAs. In most cases, the site reference population will be the baseline population (figure at designation). However, where recent surveys show a population to have increased or stayed stable, the current population is considered the most appropriate population figure to use for HRA's.

Conservation Objective term	Definition
Supporting habitats and processes	This includes the following environmental conditions (but is not limited to) which are important for maintaining/restoring the protected features, e.g. hydrography and supporting water currents, chemical water quality parameters, suspended sediment levels, radionuclide levels.
Unfavourable condition	This refers to the assessed condition of a feature through Site Condition Monitoring. Features considered to be in unfavourable condition for the purposes of these Conservation Objectives are those that have an assessed condition of either: • Unfavourable recovering - One or more of the attribute targets have not been met on the site, but management measures are in place to improve the condition. • Unfavourable no change - One or more of the attribute targets have not been met, and recovery is unlikely under the present management and activity on the site. • Unfavourable declining - One or more of the attribute targets have not been met, evidence suggests that condition will worsen unless remedial action is taken.
Waterfowl	Encompasses seaducks, grebes and divers.

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