

Irish Sea Front Special Protection Area UK site: UK9020328

Conservation Objectives and Advice on Operations

March 2023

Advice under Regulation 21 of The Conservation of Offshore Marine Habitats and Species Regulations 2017

Summary

The Conservation Objectives and Advice on Operations for Irish Sea Special Protection Area (SPA) provided in this document are based on best available evidence and should be read in conjunction with <u>wider site information</u>. The site occurs entirely within UK offshore waters (beyond 12 nautical miles of coast) and thus the Joint Nature Conservation Committee (JNCC) has advisory responsibilities under the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended). The advice is site- and feature-specific and has been developed using the best-available scientific information and expert interpretation as of March 2023. The advice provided here will be subject to change as our knowledge about the site, its feature and the impacts of human activities develops over time. The Advice on Operations has been generated through a broad assessment of sensitivity of the feature of interest and their supporting habitats to physical, chemical and biological pressures associated with human activity.

Management actions should enable the site to support the regularly occurring migratory species Manx shearwater (*Puffinus puffinus*) in the Irish Sea Front SPA (subject to natural change) by ensuring the natural processes and supporting habitats, and therefore prey populations are maintained. Detailed Conservation Objectives (with attributes) are provided in this document. Manx shearwaters are Amber listed in both the <u>Birds of Conservation</u> <u>Concern in the UK, Channel Islands and Isle of Man</u> (Stanbury *et al.* 2021) and in the <u>Birds of Conservation</u> <u>Conservation Concern in Ireland 2020–2026</u> (Gilbert *et al.* 2021).

To fulfil the Conservation Objectives for the feature and their supporting habitat for this SPA, competent authorities¹ should consider whether any human activities whose control is within their remit might affect the site and the Conservation Objectives of the site as described. Any human activities likely to have an adverse impact on the listed feature within the site, including activities likely to affect processes on which the population is dependent as outlined in the Conservation Objectives in Section 2 of this document, should be assessed against the Conservation Objectives and may require management measures to enable the feature to meet their Conservation Objectives.

¹ Defined by <u>Regulation 5</u> of the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) as:

⁽a) a Minister of the Crown, government department, public or statutory undertaker, or public body of any description or person holding a public office;

⁽b) the Scottish Ministers;

⁽c) the Welsh Ministers;

⁽d) any Northern Ireland department; and

⁽e) any person exercising any function of a person or body referred to in sub-paragraphs (a) to (d).

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Glossary

- AIS Automatic Identification System
- AOS Apparently Occupied Sites
- CR Chick-rearing period of the breeding season
- ESAS European Seabirds at Sea
- GPS Global Positioning System
- HRA Habitats Regulations Assessment
- INC Incubation period of the breeding season
- ISF Irish Sea Front
- IUCN International Union for the Conservation of Nature
- JNCC Joint Nature Conservation Committee
- MPA Marine Protected Area
- MCZ Marine Conservation Zone
- MoD Ministry of Defence
- SAC Special Area of Conservation
- SMP Seabird Monitoring Programme
- SPA Special Protection Area
- SST Sea Surface Temperature

1 Introduction

1.1 Background and context to the site

The Irish Sea Front (ISF) SPA was classified in 2017 under the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) (hereafter 'Offshore Regulations') for its importance as a foraging location for Manx shearwaters listed in Annex 1 of the EU Birds Directive (2009/147/EC). Post EU-Exit these regulations have been superseded by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 which ensure that the habitat and species protection and standards derived from EU law continue to apply. The SPA is located in the Irish Sea and coincides with part of a tidal front in the western Irish Sea which is known to be an important foraging location for Manx shearwaters.

This document presents JNCC's advice as required under Regulation 21 of the Offshore Regulations for the Irish Sea Front SPA. The obligations of competent authorities and organisations under such designations and legislation are not affected by the advice contained in this document. Supporting information is also provided for transparency and to aid interpretation. For more information on JNCC's responsibilities under the Offshore Regulations, see <u>Regulation 21</u>.

Irish Sea Front SPA has been classified to protect one species of breeding seabird, Manx shearwater, and contributes to the Favourable Conservation Status of this species in the Atlantic biogeographic region. The Irish Sea Front SPA forms part of the UK and OSPAR MPA networks, supporting the conservation of the wider marine environment, and progress towards Good Environmental Status within the North-East Atlantic marine 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 feature of the SPA.

1.2 Overlapping designations

The Irish Sea Front SPA sits within the <u>North Anglesey Marine/ Gogledd Môn Forol</u> Special Area of Conservation (SAC), which was designated in 2019. This SAC was designated as it is an area of importance for harbour porpoise (*Phocoena phocoena*), supporting 2.4% of the UK Celtic and Irish Seas Management Unit (MU) population. The protection afforded to this site may also benefit Manx shearwaters as there is overlap between diets of the two species, including herring (*Clupea harengus*), sand eel (*Ammodytes sp*) and sprat (*Sprattus sprattus*). There are no apparent management conflicts between the classified/designated features of the SPA and the SAC.

To the north-west of the Irish Sea Front SPA is a Marine Conservation Zone (MCZ), <u>Queenie</u> <u>Corner</u>, which does not overlap with the SPA but lies around 2 km from the north-west corner. This site was designated in 2019 for the features subtidal mud, sea-pen and burrowing megafauna, which support a wide range of species including the economically important Norwegian lobster (*Nephrops norvegicus*) and a variety of other crustaceans. Mud habitats such as this are very important sites for biodiversity and can be a source of mud to other MPAs within the Irish Sea.



Figure 1. Location of the Irish Sea Front SPA together with other Marine Protected Areas in the region.

1.3 The role of Conservation Objectives

The role of the Conservation Objectives is to ensure that the obligations of the relevant Habitats Regulations are met by ensuring the integrity of the site is maintained, or where necessary restored, and that the qualifying feature, Manx shearwater, makes an appropriate contribution to favourable conservation status (FCS) at the national level. Conservation Objectives constitute a necessary reference for defining what will maintain the favourable condition of the feature or restore it to FCS. They provide the basis for advice on any sitebased conservation or management measures and inform the consideration of whether plans and projects are likely to have significant effect on the site; the scope and conclusions of appropriate assessments; and the determination of whether plans or projects will adversely affect the integrity of the site. Advice should be referred to if you:

- undertake Habitat Regulations Assessments (HRAs) to identify and assess the potential impacts of plans or projects that could impact the site;
- provide information for an HRA;

- respond to specific measures to support delivery of the conservation objectives for the site; and
- consider the need to put new or additional management measures in place.

The key role of an HRA is to establish whether a plan or project, individually or in combination with other plans/projects, will affect the site's integrity (i.e. its ability to achieve its Conservation Objectives and consequently contribute to Favourable Conservation Status).

Manx shearwaters are protected throughout UK waters by virtue of the Offshore Regulations. This site has been classified for its significance as a foraging location for breeding Manx shearwaters and the aim of the Conservation Objectives is to maintain this function. It is not appropriate to set a population level target for this site, as usually applied in SPAs adjacent to breeding colonies, for two reasons:

- There is an inherent strong variability of numbers of Manx shearwaters present at the Irish Sea Front due to the nature of the site. The formation of the Irish Sea Front, the feature creating the favourable foraging conditions for Manx shearwaters, is annual and the timing and strength can vary between years, meaning that its value as a resource for Manx shearwaters may not be consistent and numbers of birds at the site fluctuate. Manx shearwaters have an extensive foraging range (Woodward *et al.* 2019) and previous studies have shown that at-sea foraging distribution varies between individuals and between years. For this highly mobile species this site is one of several possible foraging locations, although an important one, and they travel between sites depending on environmental conditions. Tracking data indicates that individuals from multiple colonies consistently use the front, but that the overall at-sea distribution varies between years (Dean *et al.* 2015; Guilford *et al.* 2008).
- Population level targets have already been set for this species at its SPA-protected colonies. Numbers at colonies will be more stable than at the Irish Sea Front SPA and monitoring of population sizes is more feasible at colonies. As these are the colonies from which the individuals feeding at the Irish Sea Front SPA are likely to originate, including but not limited to the <u>Skomer</u>, <u>Skokholm and Seas of</u> <u>Pembrokeshire SPA</u>, <u>Aberdaron Coast and Bardsey Island SPA</u> and <u>Rum SPA</u>, maintaining the population sizes at colonies should also maintain the individuals foraging at the Irish Sea Front SPA, if the Irish Sea Front SPA is kept intact as an attractive and available foraging area.

The Conservation Objectives for the Irish Sea Front SPA therefore focus on maintaining the foraging habitat, its important prey resources, and the access to those, such that Manx shearwaters from breeding colonies can continue to utilise the site.

2 Conservation Objectives for the Irish Sea Front SPA

2.1 Background to Conservation Objectives

The Conservation Objectives are designed to ensure that the obligations under the Offshore Regulations can be met; that is, deterioration or significant disturbance of the qualifying feature or to the habitat upon which they rely should be avoided. Meeting such obligations will ensure that the site achieves Favourable Conservation Status for its feature, Manx shearwater, and contributes to the UK Marine Strategy vision of "clean, healthy, safe, productive and biologically diverse oceans and seas".

The Conservation Objectives include both a general statement in Section 3.2 setting out the overall objectives for the site, supplemented with advice on specific attributes which can help measure if the objectives are met, and which are important to ensure the site contributes

appropriately to the status of the wider populations of the bird feature. Section 7 (Table 2) lists these attributes.

As described before, no population abundance target has been set for the site itself, with the focus being on the relevant, linked populations from colony SPAs and the supporting habitats and processes. Population estimates of Manx shearwaters in colonies where a link has been established to the Irish Sea Front region through tracking can be used as indicators of whether the overall population size of Manx shearwaters has changed over the time. Shearwater population estimates from these colonies suggest in most cases an increase of these populations. In the absence of any other evidence to the contrary and at the time of writing, JNCC considers the current level of use by Manx shearwaters of Irish Sea Front SPA is comparable to the scale of that originally estimated at classification based on the analysis of the ESAS data.

The Conservation Objectives seek to *maintain* the protected SPA feature where evidence exists that the feature is in favourable condition in the site, or where there is uncertainty concerning the assessed condition of the feature but no reason to suspect deterioration in condition since classification. The objectives were set by reviewing the existing evidence on Manx shearwater distribution and abundance, both at sea and at colonies, based on established databases such as the ESAS programme and the Seabird Monitoring Programme (SMP). In addition, publications using the targeted deployment of Global Positioning System (GPS) tags have been reviewed to establish links between specific colonies of the feature and the site itself.

2.2 Irish Sea Front SPA Conservation Objectives

The qualifying feature of the Irish Sea Front SPA is:

- Manx shearwater *Puffinus puffinus* (breeding)

The Conservation Objectives for the Irish Sea Front SPA are:

Site conservation objective:

To avoid significant deterioration of the habitats used by the qualifying species, or significant disturbance to the qualifying species, subject to natural change, thus ensuring that the integrity of the site is maintained in the long term and makes an appropriate contribution to achieving the aims of the Conservation of Habitats and Species Regulations 2017.

This contribution would be achieved through delivering the following objectives for the site's qualifying feature:

- A. Avoid significant disturbance of the qualifying feature within the site, so that the ability of the species to use the site is maintained in the long-term;
- B. Maintain the habitats, processes and food resources of the qualifying feature in favourable condition;
- C. Ensure connectivity between the site and its supporting habitats and Manx shearwater breeding colonies is maintained.

The explanatory notes with supplementary advice on the Conservation Objectives for Irish Sea Front SPA provide more site-specific detail.

Explanatory notes:

General

Marine bird species are exposed to a range of wider drivers of change. Some of these are natural (e.g. population fluctuations/ shifts or habitat changes resulting from natural processes) and are not a direct result of human influences. Such changes in the qualifying species' distribution and use of the site which are brought about by entirely natural drivers, directly or indirectly, are considered compatible with the site's Conservation Objectives.

There may also be wide scale anthropogenic impacts driving change within the site, such as climate change, ocean acidification or dispersed pollution, which cannot be managed effectively at site level. Where impacts can be identified a review of the definition of favourable condition may be appropriate.

A) Avoid significant disturbance of the qualifying feature within the site, such that the ability of the species to use the site is maintained in the long-term.

The purpose of this objective is to protect the qualifying feature from significant disturbance (mortality, injury or removal) that can lead to a long-term decline of the feature within the site, including continued access to all areas within the site required for feeding, loafing and other maintenance activities. It protects the feature from significant risk of incidental killing and injury from activities both within and outside the site. Impacts and effects are considered 'significant' where they could result in a permanent reduction or continued decline in the population. 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.

This site has been selected because evidence indicates it is a hotspot for Manx shearwaters and important in supporting the wider population of this species. The viability of the species within the Irish Sea Front SPA is linked to their ability to access and use breeding habitat in areas of functionally linked land outside the site, in addition to the ability of the site to support breeding adult survival and chick rearing. Disturbance of these birds within the site would have a detrimental effect on the contribution that this site makes to wider populations, including those in breeding colony SPAs, and therefore should be avoided.

There is no site-specific population target for this site and therefore any effects should be apportioned to breeding colonies. The relevant breeding colonies to which to refer to for references populations are:

- <u>Rum</u> (Rum SPA)
- <u>Copeland Islands</u> (Copeland Islands SPA)
- <u>Skomer Island</u> (Skomer, Skokholm and Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA)
- <u>Skokholm Island</u> (Skomer, Skokholm and Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA)
- <u>Bardsey Island</u> (Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island SPA)
- Lundy Island (Lundy SSSI)

This is not an exhaustive list of all the possible breeding colonies with connectivity (i.e. within species-specific foraging range, which is extensive for this species; mean maximum foraging range of 1,346.8 +/- 1,018.7 km), however it is based on evidence from tracking data and provides a starting point for those carrying out plan or project assessments. Species-specific foraging ranges were taken from Woodward *et al.* 2019.

All birds require energy, which they obtain from food, to survive and to breed. Significant disturbance can impair the birds' ability to obtain energy or minimize the loss of energy which could detrimentally affect productivity, adult condition and potentially survival. Impacts such as displacement, the exclusion of birds from a site, and barrier effects, preventing birds accessing a site, can increase energy expenditure. Where such disturbance is brought about by human activities which affect the qualifying species' distribution and use of the site, such that their ability to survive and/or breed is compromised in the longer term, it is considered significant.

For this site "significant" is taken to mean anthropogenic disturbance that affects the qualifying species' distribution within and use of the site such that recovery either cannot be expected or would only occur in the long-term (full recovery expected within 10–25 years, based on long lifespan, deferred maturity, low natural mortality and low reproductive output (FeAST, Rogerson *et al.* 2021)).

B) To maintain the supporting habitats, processes and food resources of the qualifying feature in favourable condition.

Manx shearwaters using the site require sufficient, high-quality food resources to be available during the breeding season. Their diet consists of a variety of pelagic or benthic prey and these prey species should be maintained at a level that is able to materially contribute to supporting healthy populations in Favourable Conservation Status. Where prey species have particular habitat requirements and these can be identified, management measures may be needed to ensure the extent and quality of the habitats are sufficient to maintain these prey species in the longer term.

C) Ensure connectivity between the site and its supporting habitats and Manx shearwater breeding colonies is maintained.

For Manx shearwaters to be able to continue using the site as delineated, it is important that they continue to have access to the site for foraging within the breeding season, ensuring safe movements between the site and spatially disjointed breeding colonies, and ensuring no significant increase in energetic costs for the birds in those movements.

3 The role of Advice on Operations

JNCC's Advice on Operations identifies operations (human activities) that may cause damage or deterioration of the qualifying species for which the site has been classified or of their supporting habitats. The aim of this advice is to enable the competent/relevant authorities and practitioners to conduct and prioritise the management of activities within and out-with the site in order to reduce/minimise the potential threat to Manx shearwaters within the SPA.

Our advice is divided into two sections. Section 4 - advice on operations - lists activities that might adversely impact the feature of the SPA because the best-available evidence indicates that Manx shearwaters are moderately, or highly, sensitive to associated pressures as described in FEAST (Rogerson*et al.*2021). This advice includes operations that may not currently be occurring in the Irish Sea Front SPA. The second section (4.1) – advice on existing operations – lists operations that are currently occurring in the Irish Sea Front SPA and where best available evidence indicates the feature is moderately or highly sensitive to them.

The lists provide a basis for discussion about the nature and extent of the operations taking place that may have an impact on the feature of interest. The advice should also be used to identify the extent to which existing measures of control, management and forms of use are,

or can be made, consistent with the Conservation Objectives, and thereby highlights to relevant authorities the areas that may need management measures.

The Offshore Regulations require that where an authority concludes that a development proposal is incompatible with the nature conservation management of a site and is likely to have a significant effect on that site, it must undertake an appropriate assessment of the implications for the qualifying feature of interest for which the area has been classified.

Competent authorities are required by the Offshore Regulations to undertake a review of all consents and permissions for activities affecting the site as soon as reasonably practicable after it becomes a European site.

4 Advice on Operations

JNCC's advice covers a range of different human activities and infrastructural developments that could occur in the marine environment but is not exhaustive. By stating those activities and their associated pressures to which the feature is considered to be sensitive, our advice focuses on where we consider there could be a risk of the feature not achieving its Conservation Objectives for the site should these activities occur in or near the SPA. This section does not attempt to cover all possible future activities or eventualities (e.g. as a result of accidents), and does not consider likely cumulative effects that could result from different types of activities being carried out simultaneously within or outside of the SPA. This advice is not a prohibition, but rather indicates that some form of management measure(s) may be required, or further measures may be required where actions are already in force. The advice is indicative and does not remove the need for formal consultation on individual plans and projects.

The pressures and activities identified in the Advice on Operations package have been extracted from the Feature Activity Sensitivity Tool (FeAST) which has been developed by NatureScot (available on request) (Rogerson *et al.* 2021). This tool investigates the sensitivity of marine features to anthropogenic activities with a focus on Scottish waters, although the same pressures exist throughout the UK. The activities exerting pressures were identified using the Marine Pressures Activity Database.

Manx shearwater is thought to be sensitive to a number of direct and indirect pressures at sea which can be exerted by a number of activities:

- Extraction of living resources
- Extraction of non-living resources
- Energy generation (renewable and hydrocarbon)
- Transport (shipping)
- Recreation and leisure
- Defence and national security
- Waste management
- Other man-made structures
- Research

For more information on the sensitivities and pressures see the <u>Advice on Operations</u> <u>spreadsheet</u>.

Given the importance of prey availability as a supporting feature, pressures which impact on abundance and availability of prey species are also important. It is likely that removal of target species is an important pressure for prey species which are of commercial interest (such as herring, sprat, sand eels and cephalopods). Removal of non- target species is also an important pressure for any non-commercial prey species that are bycaught during fishing activities. Fishing types that have the greatest bycatch risk are demersal longlines and < 10 m set nets (gillnets) which occur at very low levels within the site (Anderson *et al.* 2022). The effect of this pressure is increased mortality. Benthic, surface and water column feeders represent the species guilds most susceptible to entanglement in nets due to their foraging strategies. In the UK, offshore demersal longline and < 10 m static nets (gillnets) have been observed to be the greatest cause of seabird bycatch, particularly for fulmar (*Fulmarus glacialis*) and guillemot (*Uria aalge*) in longlines and gillnets respectively. Entanglement can occur during net setting, hauling, trawls, most often when birds are foraging/scavenging around nets. One of the prey species, herring, are targeted using pelagic trawls and purse seine fisheries within the Irish Sea, however this only occurs at low levels in the north and north-west of the site respectively and very low levels throughout the rest of the site (based on VMS data 2009–2020). The level of fishing activity for most other gear types is either low or negligible, with the exception of beam trawls where overall activity levels are low to moderate (VMS data). However, beam trawls are not expected to target the key prey species of Manx shearwater.

Any activity that can cause a pressure or pressures to which the feature and supporting habitats or species may be sensitive could present a risk to the feature of not achieving the conservation objectives and should be assessed against the attributes listed in Table 2.

The next section looks at which of the potentially damaging activities which can cause pressures to which Manx shearwater are sensitive. This is provided to highlight where JNCC advises that more immediate management effort be focused.

4.1 Advice on existing operations

This section provides advice on those activities that might impact the species and are known to occur, or are planned to occur, within the SPA at present (March 2023). It lists the most important activities and potential associated pressures as identified by FeAST and provides advice on operations. The activities, pressures and further information can be found in the associated <u>Advice on Operations spreadsheet</u>. Our advice does not go into detail about the level of exposure to associated pressures caused by these activities and hence the level of impact that might be expected on the species. This section should therefore be considered as the starting point for discussions about the appropriate management actions relating to the SPA. Detailed information on current exposure levels held by the relevant authorities responsible for management should be used to inform the management of any activity that might impact upon the site's integrity.

The comments below are general and should not be considered definitive. They are made without prejudice to any comments JNCC may provide or any assessment that may be required for individual plans or projects to be considered by a competent or relevant authority. The level of any impact will depend on the location, intensity and duration of the specific activity. The advice is provided to assist and focus the authorities on their consideration of the management of these operations.

Military activity

MOD operations could occur in and around the site and may include low-flying aircraft, firing munitions and exploding ordinance, high speed vessel manoeuvres or military exercises which could cause disturbance to the feature.

Fisheries

Fishing activity of various types (beam trawl, demersal trawl, dredges, demersal seine, pelagic trawls, pots and traps, hooks and lines, gillnets and purse seines) occur within or close to the site and may exert direct pressure on the feature through disturbance from vessels, mortality through bycatch and removal of prey species.

Cables

Telecommunications cables pass through the north-west of the site and power cables pass close to the southern edge of the site. Impacts to the feature are only likely to occur during maintenance activities.

4.1.1 Supporting habitats and processes

As set out in Objective B of the Conservation Objectives, key supporting processes that are vital for the formation and functioning of the Irish Sea Front need to be maintained. In the Irish Sea, deep water and reduced tidal flows to the south-west of the Isle of Man result in annual seasonal stratification. This causes the formation of a cyclonic, seasonal gyre which has a significant impact on water circulation in the region and separates the well-mixed waters from stratified ones (Gowen *et al.* 1995; Hill *et al.* 1994; O'Reilly *et al.* 2014; Trimmer *et al.* 1999). One key feature of the gyre and its circulatory nature is its function in retaining planktonic larvae, juvenile and larval fish, and zooplankton (Hill *et al.* 1994; Dickey-Collas *et al.* 1996; 1997). The timing of formation and stability of the Irish Sea Front is vital to maintaining the site's reliable and productive characteristics.

The only current issue possibly affecting the timing, formation and stability of the front is climate change, which is not something that can be managed at a site level. Climate change is likely to have a variety of impacts including increases in sea surface temperature (SST) and more frequent extreme events, evidence has shown that severe gales can have an impact on stratification of the Irish Sea (Scrope-Howe and Jones 1985). In addition, construction of sub-surface infrastructure, in particular to the north-west where the seasonal gyre forms which is vital for the retention of prey, could be of concern. Such structures can have impacts on the currents/water flow and sediment regime of the seabed. Alterations to the hydrodynamic regime (tidal flows/seasonal stratification & seasonal gyre formation) have the potential to affect larval recruitment and the availability of food and oxygen, and waste removal (De Dominicis *et al.* 2017; Dickey-Collas *et al.* 1996; Hill *et al.* 1994 & 1997; O'Reilly *et al.* 2014; Trimmer *et al.* 2003).

4.1.2 Prey

As outlined above, the physical processes present within and in the areas surrounding the SPA are vital for the accumulation and retention of prey species within the Irish Sea Front and the SPA itself. Given the lack of data and certainty around the diet of Manx shearwaters, the potential reproductive activity of fish within and in the vicinity of the site and the origin of prey species occurring within the SPA, assessing the impact of activities on prey species is not straightforward. Therefore at this time of writing, we cannot provide evidence-based management advice concerning the prey species themselves.

4.1.3 Advice on Seasonality

Manx shearwaters spend the winter in the southern hemisphere, arriving back to their breeding colonies in the UK at the beginning of March, and they have an extended breeding period with chicks still present in the burrow into September. Table 1 indicates the months in which significant numbers of Manx shearwater are most likely to be present at the site during a typical calendar year, as well as months where the species is known to be present during a typical calendar year but in fewer numbers (adapted from Waggitt *et al.* 2020).

Applicants considering plans or projects scheduled in the periods where Manx shearwater are most likely to be present at the site during a typical calendar year would benefit from early consultation with JNCC given the greater scope for there to be likely significant effects that require consideration. The months outside these periods are not ones in which the feature is necessarily absent, rather that the feature may be present in less significant numbers in typical years, but there may still be a significant effect. Please note that this period can vary between years and that in any one year considerable numbers may be present outside of the months indicated below. Any assessment of potential impacts on the feature must be based on up-to-date count data and take account of population trends evident from these data and any other available information. Additional surveys may be required.

Table 1. Seasonality table showing the months where Manx shearwater are most likely to be present at the site during a typical calendar year. Dark shading (**) represents months where significant numbers of Manx shearwater are likely to be present (April to September inclusive). Paler shading (*) represents months where the species is present, but in fewer numbers (March, October) (adapted from Waggitt *et al.* 2020).

Feature name	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Manx shearwater, breeding			*	**	**	**	**	**	**	*		

5 Links to wider conservation strategy for the species

Any seabird conservation strategies in the four devolved nations will directly inform the conservation advice presented in this document. The strategies assess the most important pressures for each species and across different seasons, based on assessments of existing evidence and informed by expert opinions. Manx shearwater assessments from each of the country strategies will be relevant as birds from colonies in England (Lundy), Wales (Skomer), Scotland (Rum) and Northern Ireland (Copeland) use the Irish Sea Front during the breeding season (Dean *et al.* 2015).

The seabird strategies also provide a broader context and address the wider issues affecting this species that cannot be covered within this conservation advice package, such as those covered in the Advice on operations (Section 4). They also provide some contextual discussion on issues such as climate change and prey availability which will act via multiple pathways, such as sea surface temperature, extreme weather and changes in species distribution and composition.

6 Supplementary information on the Conservation Objectives

Objective		Action	Additional Evidence
Α.	Avoid significant disturbance of the qualifying feature within the site, such that the ability of the species to use the site is	Ensure Manx shearwaters are not at significant risk from disturbance within the breeding season	An area as outlined in Figure 1 has been identified as an aggregation hotspot for Manx shearwater (Kober <i>et al.</i> 2010, 2012). Tracking data has shown that birds from Skomer, Skokholm, Bardsey, Rum, Copeland and Lundy all use the Irish Sea Front region for foraging during the breeding season (Dean <i>et al.</i> 2013; Guilford <i>et al.</i> 2008). ESAS data suggest that shearwaters are present throughout the site between March and September. They will mainly be using this site for foraging, although it may also be an important site for maintenance behaviours and resting/roosting as demonstrated by tracking data collected by Dean <i>et al.</i> (2015).
	maintained in the long-term.	site is intained in the g-term.	There is high uncertainty surrounding assessments of various forms of disturbance, for example shearwaters have been observed within the footprint of a windfarm in the Celtic Sea, but there is little evidence of their occurrence within other established windfarms (Dierschke <i>et al.</i> 2016; Furness <i>et al.</i> 2013; Wade <i>et al.</i> 2016). Surveys before, during and post-construction at the Robin Rigg windfarm found numbers within the windfarm did appear to decrease during operational years compared with pre- and during-construction, however numbers were always relatively low (Canning <i>et al.</i> 2013).
В.	Maintain the habitats, processes and food resources of the qualifying feature in favourable condition	Maintain the variety and abundance of food resources	In the UK, Manx shearwater diet studies are few and the forage species listed here are based on the only diet study identified through review and other opportunistic studies. Manx shearwater diet may mainly consist of small fish, particularly clupeids, including herring and sprat, as well as sand eels and a variety of cephalopod species (Brooke 1990; Camphuysen 2005; Cramp and Brooks 1992; Stone <i>et al.</i> 1995; Tasker and Furness 1996; Thompson 1987; Warham 1990). They tend to forage more on fish during the chick rearing period and fledging weight (which is related to survival) has shown to be significantly linked to the quality of herring stocks, therefore the abundance and quality of forage fish stocks during the chick rearing period of end of June to September will be vital for breeding success (Riou <i>et al.</i> 2011; Perrins <i>et al.</i> 1973; Thompson 1987). Manx shearwater breeding success has been assessed to have a very low vulnerability to a reduction in prey in the vicinity of the colony, due to their extensive foraging range, low flight costs, flexible daily energy budget and varied diet (Furness and Tasker 2000). This study was conducted in the North Sea and focussed on sand eels therefore the sensitivity to reduction in other prey species (herring) in the Irish Sea may not be the same.

Table 2. Additional evidence for the Conservation Objectives

Objective	Action	Additional Evidence				
B. Maintain the habitats, processes and food resources of the qualifying feature in favourable condition	and the condition of supporting habitats	Atlantic herring are benthic spawners, they tend to spawn in discreet beds and require substrates such as gravel, stones, shells and/or flat rock, see Appendix 2 Figures 1 & 2 (Breslin 1998; Campanella and van der Kooij 2021; Hay <i>et al.</i> 2001; Townsend 1992). They prefer to spawn at depths of around 15–40 m, in well-mixed, "high energy environments", at these sites they can spawn at very high densities (BEIS 2016; Maravelias <i>et al.</i> 2000; O'Sullivan <i>et al.</i> 2013). Key spawning areas that contribute juvenile herring to the Irish Sea were identified as the east coast of the Isle of Man, the south coast of Ireland and a small area off the south-west of Pembrokeshire, although these data may need updating (Coull <i>et al.</i> 1998; BEIS 2016; Ellis 2012).				
(continued)		A recent review, which used adult herring density as a proxy for spawning activity, identified a hotspot in the northern Irish Sea around the Isle of Man (Campanella & van der Kooij 2021). The spawning grounds around the coast of Isle of Man and Pembrokeshire are partially protected by Marine Nature Reserves and SACs, however, the waters off Ireland do not appear to have any protections in place and therefore may be vulnerable to anthropogenic impacts (Isle of Man Government 2021; NRW & JNCC 2017).				
		Alongside spawning grounds which ensure the replenishment of prey for shearwaters, fish nursery grounds play an important role for prey availability to seabirds and research has shown that shearwaters favour juvenile fish (Riou <i>et al.</i> 2011; Thompson 1987). Herring stay in nursery grounds until they are between 2 and 3 years old when they migrate to their spawning grounds (Hay <i>et al.</i> 2001). The northern part of the Irish Sea, particularly the Liverpool Bay area, is an important nursery ground for juvenile herring hatched in the Celtic Sea around the South and West coasts of Ireland. They can form dense aggregations, often associating with sprats (BEIS 2016; Brophy and Danilowicz 2002; Dickey-Collas <i>et al.</i> 2015; Hay <i>et al.</i> 2001). In a recent study, all these main nursery areas have been confirmed by the presence of juvenile herring, and in addition a new nursery ground in the Bristol Channel has been identified (Campanella & van der Kooij 2021).				
		The Irish Sea Front SPA overlaps low intensity spawning grounds for sand eel (<i>Ammodytidae</i> species) and high intensity nursery areas located to the south-west (Campanella & van der Kooij 2021; Ellis 2012) (See Appendix 2). Sand eels are reliant on favourable sandy benthic habitats, preferring sandy seabeds with high proportion of coarse and medium sand particles (Greenstreet <i>et al.</i> 2010, Holland <i>et al.</i> 2005). Sand eels are highly site-faithful and non-migratory, with large-scale dispersal only possible during larval phase and this is generally to a limited extent (Proctor <i>et al.</i> 1998; Christensen <i>et al.</i> 2008 & 2009; Van Deurs <i>et al.</i> 2010). Therefore, sand eel seabed habitats in or linked to the Irish Sea Front SPA should be maintained in favourable condition.				

Objective		Action	Additional Evidence				
В.	Maintain the habitats, processes and food resources of the qualifying feature in favourable condition (continued)	and the condition of supporting habitats <i>(continued)</i>	Sprat are prevalent across the entire Irish Sea region; they spawn pelagic eggs in batches around the entire UK coast between May-August, near the coast or up to 100 km offshore between depths 10–20 m (De Silva 1973; Dickey-Collas <i>et al.</i> 2015; Gordon 2006). The most recent study did not identify egg data, adult density of adults was used as a proxy and the main spawning areas were distributed along the English coast of the western English Channel and in coastal waters of the northern Irish Sea (Campanella and van der Kooij 2021).				
		and associated processes	Seasonal stratification in the western Irish Sea is a key factor controlling the production, distribution and fate of marine organic matter (O'Reilly <i>et al.</i> 2014). The timing of formation and stability of the Irish Sea Front is vital to maintaining its reliable and productive characteristics. Early stratification and the formation of a stable front has been associated with significantly higher concentrations of plankton in the Irish Sea when compared with years of later stratification. A further study showed that when disrupted by severe gales, a breakdown in stratification led to a decrease in zooplankton abundance (Lee <i>et al.</i> 2005; Scrope-Howe and Jones 1985). A similar association was found in the north-eastern North Sea where a weakened frontal structure was linked to a decrease in gadoid larvae (Munk <i>et al.</i> 1999).				
			Tidal fronts are areas of high primary productivity and subsequently attract and support a wide range of other organisms throughout the food chain. Ichthyoplankton surveys off the coast of the Isle of Man found that the frontal waters were the preferred habitat of both clupeids and sand eel larvae (Lee <i>et al.</i> 2005). The front attracts large aggregations of fish, such as herring, which are a key forage species for seabirds such as Manx shearwaters (Begg and Reid 1997; Fernandes 1993; Hardy 1936; Maravelias <i>et al.</i> 2000). Manx shearwaters can cover vast distances searching for food, however, tracking studies have shown that birds breeding on Skomer carry out most of their foraging within 100 km of fronts (Shoji <i>et al.</i> 2015).				

Objective		Action	Additional Evidence
В.	Maintain the habitats, processes and food resources of the qualifying feature in favourable condition (continued)	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.	Seasonal stratification in the western Irish Sea is a key factor controlling the production, distribution and fate of marine organic matter (O'Reilly <i>et al.</i> 2014). Long periods of increased turbidity, caused by persistent high levels of suspended sediments, could potentially affect Manx shearwaters directly and indirectly. Prey availability can be affected through reduced primary productivity, as well as the impacts on the health of fish and other organisms within the habitat. As shearwaters are visual predators, increased turbidity may impair their ability to locate prey patches within the environment (Ainley 1977; Baduini <i>et al.</i> 2001; Eriksson 1985; Hanley and Stone 1988; Lovvorn <i>et al.</i> 2001). Evidence collected using biologgers attached to Manx shearwaters suggests that visual cues are vital for successful foraging and that fine-scale prey capture was constrained by the detectability of prey underwater (Darby <i>et al.</i> 2022).
С.	Ensure connectivity between the site and its supporting habitats and Manx shearwater breeding colonies is maintained	Ensure Manx shearwaters continue to have access to and utilise the site for foraging within the breeding season and avoid significant disturbance to Manx shearwaters to ensure individuals can move safely between the site and their breeding colonies	Given the extensive foraging ranges of Manx shearwaters during the breeding season (mean maximum foraging range of 1,346.8 +/- 1,018.7 km but the maximum foraging distance recorded can be over 2,890 km), there are 57 colonies in the UK with the ability to forage within the SPA, although the number of colonies with individuals that regularly use this area is more likely to be between 16 - 21 (Woodward <i>et al.</i> 2019). Manx shearwaters show moderate displacement towards offshore activities such as wind, wave and tidal development, low displacement from dredging, aggregates, oil and gas activities and very low displacement from vessel activities such as traffic, fishing and transport (Dierschke <i>et al.</i> 2016; MMO 2018). Currently there are no operational wind farms that may act as a barrier for shearwaters accessing the site, although noting the planned floating and fixed wind projects off Pembrokeshire, Northern Ireland, Ireland, the ScotWind plan areas and Round 4 sites off the coast of Wales and Cumbria. Potential impacts on the Irish Sea Front SPA will be considered as part of the impact assessment process for these projects.

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Appendix 1. Supplementary information

Ecology and life-history – Manx shearwater

Manx shearwaters are transatlantic migrants, spending the winter off the coast of South America before returning to the UK to breed in early spring (February/March). They can be found on their breeding grounds from the end of February and begin their return migration at the end of September (Brooke 1990). These efficient fliers are able to cover vast distances in search of prey or on their migration.

Manx shearwaters are listed as "Least Concern" by International Union for Conservation of Nature (IUCN) at both a global and European level of assessment (BirdLife International 2015; 2018). Within the UK they are listed as a species of Least Concern by the IUCN due to their large range and current population estimates (BirdLife International 2021). However, the UK has a special responsibility for this species as the majority of the world population of Manx shearwaters breed in the UK, where they are mainly restricted to small offshore islands. They are extremely site faithful and often return to their natal colony to breed, often to the same burrow and partner as in previous years. Studies have shown that many seabirds, including Manx shearwaters, become more successful breeders with age and the longer partners have been together (Brooke 1978 & 1990; Mauck *et al.* 2018; Riou *et al.* 2011).

Manx shearwater is a long-lived species. The oldest known bird was re-trapped on Bardsey in 2003, having been ringed there as an adult (> 5 years old) in 1953, making it at least 55 years old (Clark *et al.* 2004). Like many other seabird species, they invest heavily in a single egg, which they lay in a burrow, usually acquired from a rabbit or puffin (*Fratercula arctica*), although they are capable of digging burrows themselves. Both parents contribute to incubating the egg until it hatches after around 51 days and then continue to feed the chick for around 10 weeks until fledging. Shearwaters display a dual-foraging strategy; parents make either short trips to gather food for the chick or longer excursions to improve their own body condition (Shoji *et al.* 2015).

Manx shearwaters are ungainly on land due to their physiological adaptations to life at sea with their legs situated very far back on their bodies. They therefore only come back to land at night to avoid the risk of predation from large gulls, raptors and corvids. Being nocturnal can have disadvantages, for example in poor weather conditions they can become disorientated by light. This is of particular concern for fledging juveniles as they can easily become grounded on large vessels or on the mainland where they are very vulnerable to predation, vehicle collision or starvation as they struggle to take off again.

Manx shearwater feeding behaviour

Manx shearwaters can travel vast distances to find prey. On average they travel 136.1 +/- 88.7 km, and they can change their feeding strategy by making either short or long trips from the colony (Guilford *et al.* 2008; Shoji *et al.* 2015; Woodward *et al.* 2019). The mean maximum foraging range is 1,346.8 +/- 1,018.7 km when associated with a breeding colony, but the maximum foraging distance recorded can be over 2,890 km in the breeding period (Woodward *et al.* 2019).

They are visual predators, grabbing prey at the surface or beneath the surface by pursuitplunging or pursuit-diving, using their feet and wings to propel themselves beneath the water (Cramp and Simmons 1977; Shoji *et al.* 2016). They routinely make shallow dives of around 7 m but can dive up to 55 m in pursuit of prey (Shoji *et al.* 2016).

Distribution

Given their extensive foraging range, individuals from all UK colonies will have the ability to forage within the Irish Sea Front SPA. The majority of UK colonies are along the west coast of the UK and Ireland and almost exclusively on islands. In the latest UK wide census (Seabird 2000), 57 potential colonies were identified and surveyed. Skomer holds the biggest single colony, with its estimated 350,000 Apparently Occupied Sites (AOS) being nearly three times the size of the next biggest colony on Rum (120,000) (Murray *et al.* 2003; Perrins *et al.* 2020). The most concentrated area in the UK for Manx shearwaters is off the southwest coast of Pembrokeshire, where the islands of Skomer, Skokholm and Middleholm are estimated to hold 456,000 AOS (Perrins *et al.* 2020).

The Irish Sea Front

The Irish Sea Front is a tidal front which forms every year in early summer (Lee *et al.* 2005). This type of front forms at the transition between an area of low tidal energy, where waters become stratified, and an area of high tidal energy with well mixed water (Franks 1992). Stratification causes a thermal gradient, with surface waters up to 3°C warmer than the rest of the water column. This stratification in turn causes the formation of a cyclonic, seasonal gyre; a dome of cold, dense bottom water in the western Irish Sea Basin, which has a significant impact on circulation in the region and separates the well-mixed regions from stratified ones (Hill *et al.* 1994; O'Reilly *et al.* 2014; Trimmer *et al.* 1999).

Manx shearwater use of the site

Tracking data collected from several colonies over multiple years have demonstrated that Manx shearwaters use the Irish Sea Front region, and by extension likely use the SPA itself in a variety of ways. Behavioural states data can be interpreted using GPS tracks, based on flight speed and/or variation in turning angle or in combination with other devices such as immersion loggers or time-depth recorders (TDR) (Dean *et al.* 2013; 2015). Interrogation of such data presented in research papers has demonstrated that Manx shearwaters use the Irish Sea Front region for foraging and resting as well as passing through the area whilst commuting between foraging locations and their colonies (Dean *et al.* 2013; 2015; Guilford *et al.* 2008). The data are not all publicly available (although some is via the <u>Seabird</u> <u>Tracking Database</u>), and therefore it is not possible to definitively outline the use of and behaviours expressed within the SPA. However, it is likely that it is used for vital feeding, maintenance and transiting activities by Manx shearwaters.

Appendix 2



Herring juveniles

Figure 2. Hotspot maps of juvenile herring (*Clupea harengus*) in Welsh and surrounding waters in Quarters 1 (February to April) and 4 (September to December). Please note that Grid-cells for which no data were available in a particular Quarter are left blank with a point in the centre. Figure taken from Cefas Project Report for RSPB (Campanella and Van der Kooij 2021).

Herring adults



Figure 1. Hotspot maps of adult herring (*Clupea harengus*) in Welsh and surrounding waters in Quarters 1 (February to April) and 4 (September to December). Please note that grid-cells for which no data were available in a particular Quarter are left blank with a point in the centre. Figure taken from Cefas Project Report for RSPB (Campanella and Van der Kooij 2021).