

Nature Conservation Advice from DAERA and JNCC: Non-Quota Shellfish FMP for Northern Ireland

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Executive Summary

This advice forms part of a commission from the Department of Agriculture, Environment, and Rural Affairs (DAERA) to the Joint Nature Conservation Committee (JNCC) and to conservation colleagues at DAERA to provide nature conservation advice to support the development of Fisheries Management Plans (FMPs). The advice provides information on the risks arising from the fisheries contained within the Non-Quota Shellfish Fisheries Management Plan for Northern Ireland to:

- the designated features of Marine Protected Areas (MPAs) in Northern Ireland waters
- Northern Ireland's marine Priority Features
- UK Marine Strategy descriptors

This advice sets out our approach and a brief assessment of risks to MPA features, Priority features, and UK MS descriptors in Northern Ireland waters from the fisheries covered in the Non-Quota Shellfish FMP. Although the underlying impact pathways are similar (e.g. bycatch is a risk in all three assessments), there are also important differences. The UK MS and Priority Features list cover a much broader range of features than those protected by MPA designations. Also, the underlying objectives are different for each and therefore there may be subtle but important differences to the assessment of risk and precaution. Therefore, our advice is presented separately for MPA features, Priority Features and UK MS descriptors.

The Non-Quota Shellfish FMP covers a range of gears targeting brown crab, velvet crab, lobster, king scallop and queen scallop. This initial advice has scoped in demersal trawls, dredges and pots/traps as the most relevant gear types for consideration. More specific information on gear types, location and fishing effort would improve the ability to assess environmental risks associated with this FMP and may alter some of the risk-ratings presented. However, the primary aim of this advice is to provide a pragmatic steer on where the greatest concerns lie for interactions between the relevant fishing gear types, the designated features of MPAs, Priority Features, and UK MS descriptors.

It was assumed that the FMP will initially focus on actions to fish target stocks at Maximum Sustainable Yield (MSY) or its equivalent, in line with obligations under the Precautionary Objective in the [Fisheries Act 2020](#); hence, the focus in this advice is on impacts beyond those directly on fish stocks.

Risks relating to the designated features of MPAs in Northern Ireland waters

Fisheries associated with the Northern Ireland Non-Quota Shellfish FMP have the potential to impact the designated features of MPAs in three primary ways;

- (i) through the **bycatch** of designated features of MPAs
- (ii) the direct (targeted) and indirect (bycatch) **removal of prey species** on which designated species depend, and

- (iii) **physical impacts** to seafloor resulting in alterations to habitat feature or supporting habitat condition.

These impacts can potentially occur both inside and outside MPA site boundaries.

In Northern Ireland, current fisheries management measures exist for nine inshore MPAs through The Marine Protected Areas (Prohibited Methods of Fishing) (Amendment) Regulations (Northern Ireland) 2022. Further fisheries measures are being drafted for three offshore MPAs (South Rigg MCZ, Queenie Corner MCZ and Pisces Reef SAC) and will be consulted on early 2026. Therefore, appropriate management should either be in place or introduced soon to ensure any fishing within MPAs is compatible with the MPA's conservation objectives. Assuming such management appropriately mitigates the risks arising from fishing activity within MPA boundaries, no additional action relating to achievement of site conservation objectives is suggested for the Northern Ireland Non-Quota Shellfish FMP *within* MPA site boundaries. **Pressures occurring within MPA sites have therefore been screened out of this advice.** However, potential risks to designated mobile species from bycatch and removal of prey species may remain when they move outside of the MPA.

The results of an initial consideration of the available evidence and expert opinion of the main risks arising from the Non-Quota Shellfish FMP to the designated features of Northern Ireland MPAs are summarised below.

Risk Summary:

While the risk to the conservation status of mobile species that are designated features of MPAs through bycatch from demersal trawls is generally considered low, there are significant gaps in the available evidence, and this fishing activity occurs at a scale which has the potential for population level effects if bycatch rates are higher than expected. Therefore, **the risk rating for bycatch in demersal trawls is assessed as moderate.**

Bycatch in dredges and pots/traps is assumed to be low, based on expert knowledge of the operational conditions of these fisheries, and limited exposure to sensitive MPA designated mobile species in Northern Ireland waters.

Similarly, prey depletion by the Non-Quota Shellfish fisheries is not thought to be a concern for MPA designated species in Northern Ireland waters. The target species of this FMP are not key prey species for mobile species features of the Northern Ireland MPA network. While there is the potential for some bycatch of other species such as juvenile gadoids, which are considered key forage fish species for many marine predators, bycatch of gadoids in the Non-Quota Shellfish fisheries is not thought to be at a level of concern. Given that primary marine mammal and seabird predators feeding on forage fish tend to have varied generalist diets, the direct impacts of reducing one species' numbers might be relatively low. **Thus, the direct risk to mobile features of MPAs from reduced food availability due to bycatch in the inshore fisheries is considered low.**

Risks relating to Priority Features

The [Wildlife and Natural Environment Act \(Northern Ireland\) 2011](#) (WANE) is the primary tool for the conservation and protection of Northern Ireland's threatened or endangered wildlife. "Priority Features" is the collective term for those features listed within the Northern Ireland Habitats and Species lists protected under WANE. The lists include a number of marine mammals, elasmobranchs, seabirds and commercial fish species, as well as sensitive habitats and sessile or low mobility species including corals, seapens and sponges.

The primary impacts pathways for Priority Features are the same as those listed above for MPA features: (i) targeted commercial catch, bycatch, (ii) prey reduction, and (iii) physical impacts to the seafloor.

The results of an initial consideration of the main risks to Priority Features also echo the assessment for MPA features, albeit covering an additional suite of features. In addition, we consider physical impacts to the benthic habitats and low/limited mobility features listed as Priority Features. The results of our assessment are summarised here.

Risk Summary:

In addition to the bycatch risks outlined for MPA designated species above, pots/traps present a risk of entanglement for certain large mobile species listed as Priority Features under WANE, such as minke whales and basking shark. Demersal trawls present a further bycatch risk for many fish and elasmobranch species listed as Priority Features, including several long-lived species and threatened species with an increased vulnerability to bycatch mortality. For listed fish which are also commercial stocks, risks of bycatch may be mitigated through their own stock management processes, but significant gaps in the available evidence remain. Risks for marine mammals and seabirds listed as Priority Features from demersal trawls are likely to echo the risks outlined above for MPA features. **The risk rating for bycatch in demersal trawls is assessed as moderate for marine mammals, seabirds, fish and elasmobranchs listed as Priority Features. There is also a moderate risk of marine mammal and elasmobranch bycatch in pots/traps**, driven primarily by entanglement risk to minke whale and basking shark, **and a moderate risk of fish and elasmobranch bycatch in dredges**, driven by the increased exposure to listed species with a demersal life history and the potential risk of population level impacts to threatened species like the flapper skate. Continued monitoring and enhanced data collection and research to address knowledge gaps may allow us to reassess this risk in future. **The risk of bycatch of other mobile species groups in dredges and pots/traps is considered to be low.**

The target species listed under the Non-Quota Shellfish FMP are not considered key prey species, and bycatch of key prey species is not thought to be at a level of concern for Priority Features. Mobile species that utilise these shellfish as part of their diet are considered generalist feeders and not significantly affected by the availability of particular prey species (Dickey-Collas et al., 2014). **Therefore, we consider there to be a low risk of removal of important prey species that Priority Features depend on.**

Mobile demersal fishing, including demersal trawling and particularly dredging has the capacity to impact the benthic habitats and low/limited mobility species over which they occur, primarily through physical penetration, abrasion, disturbance of the seabed and physical removal. Given that the Priority Features lists are quite comprehensive in scope, there is likely to be considerable overlap between these benthic features and the fishing activities listed. Therefore, the risk rating echoes the rating for the D6 seafloor integrity descriptor above. **The risk rating for physical impacts from demersal trawls and dredges to Priority Features is considered high.** While the physical impacts from pots/traps is likely to be lower, the relative impact will be linked to the intensity of pot/trap fishing in an area. Owing to a need for further evidence, **the risk rating for physical impacts from pots and traps to Priority Features is considered moderate.** Recommendations for further work with respect to physical impacts of the Non-Quota Shellfish fisheries are highlighted under the assessment of risk for GES descriptor D6 “seafloor integrity”.

Risks relating to UK Marine Strategy Descriptors

The UK Marine Strategy Regulations 2010 ([SI 2010/1627](#)) provide the policy framework for delivering marine environmental policy at the UK level and set out how the vision of clean, healthy, safe, productive and biologically diverse oceans and seas will be achieved. The Regulations require authorities to define the characteristics of Good Environmental Status (GES) and in turn develop an associated Programme of Measures to deliver GES. GES establishes a ‘benchmark’ for our seas which seeks to *‘protect the marine environment, preventing its deterioration and restoring it where practical, while allowing sustainable use of marine resources’*. For each descriptor there are a number of practical targets and indicators that facilitate assessment of delivery against each descriptor.

The UK Marine Strategy Regulations require management action to be taken to achieve or maintain GES. [The Fisheries Act \(2020\)](#) enables regulators to deliver on this ambition through the Ecosystem Objective, which states that fisheries and aquaculture activities should be managed using an ecosystem-based approach, which is, in-part, defined in the Act by the achievement of GES. Equally, the [Joint Fisheries Statement \(2022\)](#) lays out the ambition across UK administrations to take action to achieve or maintain GES in all UK waters.

This advice focuses only on the most relevant descriptors in terms of risks posed by commercial and recreational fisheries: D1 biodiversity, D3 commercial fish and shellfish, D4 food webs, D6 seafloor integrity and D10 marine litter. In the UK MS, these descriptors are assessed using indicators for each of their constituent ‘ecosystem components.’ This is carried through to this advice resulting in advice on risks to eight descriptor-ecosystem component combinations: D1, D4 cetaceans; D1, D4 seals; D1, D4 seabirds; D1, D4 fish; D4 food webs; D1, D6 seafloor integrity and D10 Marine Litter.

The results of an initial consideration of the available evidence and expert opinion of the main risks arising from the Non-Quota Shellfish FMP to UK MS Descriptors, are listed in Section 3 of this advice and are summarised below.

Risk Summary:

There is a **moderate** risk to achieving GES for the biological diversity of cetaceans, seals and seabirds from fishing activities associated with this FMP. Although the risks caused by Non-Quota Shellfish fisheries in terms of bycatch and reduced prey are likely to be low for these species, there are still significant gaps in the available evidence. As a result, the FMP risk rating has been upgraded to moderate.

There is a **high** risk to seafloor integrity due to benthic disturbance caused by demersal trawls and dredges. Due to data availability, this risk is assessed only based on data collated across the >12m UK mobile demersal fishing fleet. It does not include impacts from static gears; while these are likely to be lower risk, these gears have the potential to significantly impact seafloor integrity if operating at a high intensity. Further work is needed to disentangle and quantify impacts from individual fisheries.

There is a **moderate** risk of impacts from marine litter. More robust estimates of abandoned, lost, or discarded fishing gear in the fishery are required.

Further Recommendations

The detailed advice, upon which this summary advice is based, also makes a number of recommendations for the Non-Quota Shellfish FMP to reduce associated risks to the designated features of MPAs (arising from fishing activity outside site boundaries), Priority Features, and achievement of GES (UK MS); these include:

- A recommendation to undertake additional targeted evidence collection to improve estimates of bycatch of marine mammals, seabirds, and designated fish for all gear types covered in the Non-Quota Shellfish FMP, utilising Remote Electronic Monitoring where appropriate.
- A recommendation to prioritise the establishment of a UK level strategic Benthic Impacts Working Group to focus on achieving GES for seabed integrity, including through developing and testing targeted mitigation strategies to manage the impacts of fishing and other activities on benthic habitats.
- A recommendation to consider integrating an ecosystem approach to fisheries management (EAFM) in alignment with the UK's objectives to achieve GES, to help guide management decisions in the face of multiple, potentially conflicting social, cultural, and ecological objectives and the trade-offs between human use and status of the marine environment.

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1 Scope and purpose of SNCB advice

This document provides Statutory Nature Conservation Bodies (SNCB) advice to inform the development of the Non-Quota Shellfish Fisheries Management Plan (FMP) for Northern Ireland, focusing on the fisheries covered by this FMP and their potential risks to:

- The designated features of Marine Protected Areas (MPAs) in Northern Ireland waters
- Priority Features (Northern Ireland)
- UK Marine Strategy (UK MS) descriptors

This advice sets out our approach and a brief assessment of risks to MPA features, Priority Features and UK MS descriptors in Northern Ireland waters from Non-Quota Shellfish fisheries. Although the underlying impact pathways are similar (e.g. bycatch is a risk in all three assessments) and some species which function as UK MS indicators are also MPA features and/or Priority Features, there are also important differences. The UK MS and Priority Features list cover a much broader range of species than those protected by MPA designations, especially for cetaceans and fish. Also, the underlying objectives differ for each and therefore there may be subtle but important differences to the assessment of risk and precaution. Therefore, our advice is presented separately for MPA features, Priority Features and UK MS descriptors.

The Non-Quota Shellfish FMP covers a range of gears targeting brown crab, velvet crab, lobster, king scallop and queen scallop. The advice has scoped in demersal trawls, dredges and pots/traps as the most relevant gear types for consideration. More specific information on gear types, location and fishing effort will improve the ability to assess environmental risks associated with each FMP and may alter some of the risk-ratings presented. However, the primary aim of this advice is to provide a pragmatic steer on where the greatest concerns lie for interactions between Non-Quota Shellfish fisheries gear types and the designated features of MPAs, Priority Features, and UK MS descriptors. It intends to guide the FMP's development process, focusing on where to best allocate resources to mitigate wider environmental impacts of the fisheries. Further SNCB advice will be required to support the Habitats Regulations Assessment of any proposed management.

2 Approach to assessing risk

2.1 Indicative risk ratings

In contrast to the SNCBs routine advice around environmental sensitivity, the 'indicative risk ratings' developed for this advice consider the scale of risk associated with the different components of the Non-Quota Shellfish fishery to help identify where the greatest impacts are likely to occur. For example, the risk rating associated with a gear-feature/descriptor interaction may be lowered if the higher-risk activity only makes up a small proportion of the fishing activity covered by the FMP and thus there is low exposure of the feature/descriptor to the higher-risk activity.

Low Risk: An impact pathway exists, but evidence or expert opinion suggests that impacts are minimal or unlikely. This applies in the MPA context where a theoretical impact is either absent or the scale of impact is minimal. For Priority Features, the fishery may have defined impact pathways, but it would be considered low risk where there is either no empirical evidence of significant adverse effects or the impacts are negligible across relevant spatial and temporal scales. This rating is appropriate when interaction with Priority Features is minimal or when existing mitigation measures effectively negate potential harm. For UK MS, impacts were rated low risk where fisheries were considered unlikely to adversely impact the achievement of GES.

Moderate Risk: Interactions rated as moderate risk typically have an evidenced impact or expert judgment indicates a genuine risk. For MPAs, this risk rating would be appropriate where the overall impact level might be ambiguous, possibly due to, limited spatial overlap between relevant gears and protected features, significant variation in impact over space and time, or differences between fisheries covered in the FMP and those from which the evidence base was derived. For Priority Features, moderate risk was deemed appropriate where there is a clear linkage between the fishery's activities and potential adverse effects Priority Features, albeit mitigated by factors like limited spatial overlap, existing management measures, or the resilience of Priority Features. It also covers scenarios where potential risk is identified but more evidence is required to assess the scale of the impact. For UK MS, moderate risk refers to instances where a clear impact pathway exists between the relevant fishing gears and the achievement of GES. However, further evidence might be needed, or other activities also significantly influence the current indicator status.

Such a precautionary approach to risk assessment is aimed at managing identified risks proactively while acknowledging gaps in current understanding. It is recommended that FMPs consider enhancing data collection or mitigation efforts if a moderate risk is identified, taking a proactive approach towards minimising impacts.

High Risk: Interactions identified as high risk are those where available evidence or expert opinion suggests there is an impact at such a scale as is likely to require mitigation. In the MPA context, this rating would be assigned where the scale of impact is likely to have an adverse effect or hinder the achievement of an MPAs' conservation objectives, and the fishing activities managed by the FMP are believed to significantly contribute to these risks. For Priority Features, the rating applies where activities or conditions within the fishery have well-documented, significant negative impacts on Priority Features, threatening loss, damage or degradation of features through direct harm or habitat degradation. High-risk scenarios are those where the intensity, scale, or nature of the impact could lead to a decline in Priority Features populations/extent or degradation of critical habitat in the absence of suitable mitigation measures. This rating would be given for UK MS where a well-evidenced link exists between the fishery and the failure to attain GES based on current indicators, with fishing activities covered by the FMP being assessed as contributing significantly to that failure.

3 Risks to the designated features of Marine Protected Areas in Northern Ireland Waters

Marine Protected Areas (MPAs) in Northern Ireland waters include Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). These are designated and protected under [the Conservation \(Natural Habitats, etc.\) Regulations \(Northern Ireland\) 1995 \(as amended\)](#). Additionally, in Northern Ireland, Marine Conservation Zones (MCZs) are designated and protected under [the Marine Act \(Northern Ireland\) 2013](#) and the UK [Marine and Coastal Access Act 2009](#).

Environmental impacts of human activities are assessed against the conservation objectives of MPAs. Activities should not have an adverse effect on the integrity of SACs or SPAs and should not hinder the achievement of conservation objectives of MCZs.

Fisheries associated with the Non-Quota Shellfish FMP can potentially impact MPA designated features in 3 main ways:

- i) through the **bycatch and entanglement** of designated features of MPAs
- ii) the direct (targeted) and indirect (bycatch) **removal of prey species** on which designated species depend, and
- iii) **physical impacts** to seafloor resulting in alterations to habitat feature or supporting habitat condition.

These impacts can affect the designated features of MPAs both inside and outside the boundaries of MPAs.

In Northern Ireland, fisheries management measures for nine inshore MPAs came into force on the 1st January 2023 through The Marine Protected Areas (Prohibited Methods of Fishing) (Amendment) Regulations (Northern Ireland) 2022. Further fisheries measures are being drafted for three offshore MPAs (South Rigg MCZ, Queenie Corner MCZ and Pisces Reef SAC) and will be consulted on early 2026. Therefore, appropriate management should either be in place or introduced to ensure any fishing within MPAs is compatible with the MPA's conservation objectives. Therefore, the existing assessment and management pathways are assumed to mitigate risks arising from fishing activity within Northern Ireland MPAs, and no additional action is suggested for the Non-Quota Shellfish fisheries *within* Northern Ireland MPA site boundaries at this time. **Pressures occurring within MPAs have therefore been screened out of this advice.** However, potential risks to designated mobile species from bycatch/entanglement and removal of prey species may remain when they move outside of the MPA.

3.1 Impacts to designated features outside MPA boundaries

The potential for fishing activities outside of MPAs to impact designated features, particularly mobile species that move beyond the protections of MPA boundaries, necessitates broader management consideration.

3.1.1 Risk of bycatch to mobile MPA features from shellfish fisheries

Much of the evidence presented below comes from the UK Bycatch Monitoring Programme (BMP). The BMP monitors the levels of bycatch in certain fisheries, gear types and areas and extrapolates the data where appropriate to give an indication of the scale of overall bycatch levels (Kingston *et al.*, 2021). Although the BMP includes many gears of interest to this advice, the monitoring is spread over a number of fisheries. In general, the findings from the BMP should be considered alongside the caveats of the programme, for example current bycatch estimates will likely underestimate bycatch from larger offshore vessels yet overestimate it for smaller inshore vessels (Kingston *et al.*, 2021).

3.1.1.1 Risk to marine mammal features

Demersal trawls

Marine mammals, including harbour porpoise, harbour seals and grey seals, which are designated features of Northern Ireland MPAs, face a limited risk of bycatch in demersal trawls. Historically, these gear types have not been included in the UK Bycatch Monitoring Programme's sampling regime due to the perceived lower risk compared to static nets or longlines. Incidents of harbour porpoise bycatch, though not common, have been recorded (CEFAS 2015). The ICES Working Group on Bycatch of Protected Species report (ICES, 2024) recorded bycatch of one unknown seal species in bottom trawls in the Celtic Sea ecoregion during 2022.

The infrequency of such events suggests a limited impact on the overall population status within MPAs. However, considering the existing data gaps, there is a value in continued or expanded monitoring, whether via enhanced observer coverage or remote electronic monitoring, to further refine risk assessments and strengthen mitigation for marine mammals. Recognising the limited trawling for queen scallops covered under the Non-Quota Shellfish FMP, any additional monitoring would more likely be driven by trawl fisheries not covered in this FMP.

Dredges

There have been very few studies looking at bycatch of marine mammals in dredges; this gear type is not monitored through the BMP and there is limited data available. There are no marine mammal bycatch records from dredges in 2022 from the ICES WGBYC report (ICES, 2024). The bycatch risks to marine mammals from dredging is expected to be low based on operational traits of the fishery (e.g. slow tow speeds, narrow gear aperture, etc) which may reduce the risk of entanglement or capture.

Pots/traps

The drowning of otters in crab and lobster pots has been recognised as an issue since the 1980s, with evidence of crab and lobster potting gears contributing to otter entrapment (Twelves, 1983, Moore *et al.*, 2023). National otter survey reports in England and Wales suggest that pots set at shallow depths of 2-5m at low tides result in most bycatch incidents,

while those set deeper than 10-15m are unlikely to catch otters (Strachan, 2015). Factors like baiting with white fish, pots with internal compartments, and rocky substrates have also been linked to increased bycatch risk. The scale of otter bycatch mortality is unknown at both national and local levels, as most incidents probably go unreported, making it difficult to assess population-level impacts within SACs. However, given that there are no marine sites designated for otter in Northern Ireland waters (the following SACs with otters as a qualifying feature are all freshwater sites: Upper Lough Erne SAC, River Foyle SAC and River Faughan SAC), the impacts from bycatch in the Non-Quota Shellfish FMP are unlikely to affect site integrity for this species.

A study by Königson *et al.* (2015) found seal bycatch rates were reduced to zero for pots equipped with seal exclusion devices (SEDs), without negatively affecting the pot's catchability. Otter, porpoise, and grey seal bycatch may also be associated with abandoned, or lost gear from the pots and traps fishery.

3.1.1.2 Risk to seabird features

There are numerous SPAs in Northern Ireland which are designated for the protection of various seabird species.

Demersal trawls

Demersal trawls represent a bycatch hazard for seabirds, particularly for diving species susceptible to entanglement. 39 of the 109 UK SPA species and subspecies are seabirds that could potentially be affected by benthic trawling. Historical data and studies point to species such as deep diving shags, scaups, eiders, and cormorants being most vulnerable to this fishing method (CEFAS, 2015; Bradbury *et al.*, 2017). Although the focus of recent research, such as Northridge *et al.* (2020), reflects the perception that benthic trawling is less risky than set nets or longlines, the existing data gaps on the bycatch exposure of sensitive seabirds warrant caution (Anderson *et al.*, 2022).

Although current bycatch levels have not been shown to significantly undermine seabird populations or the integrity of Special Protection Areas (SPAs), the limited data calls for an enhancement of the bycatch monitoring regime to capture a clearer picture of the risks these gears pose to seabirds.

Dredges

There have been very few studies looking at bycatch of seabird in dredges, and there is very limited data available, particularly in UK waters. The ICES Workshop to Review and Advise on Seabird Bycatch (WKBYCS) found no record of seabirds being caught by dredges in Atlantic European waters (ICES, 2013). Bycatch in dredge fisheries is unlikely to be at a level capable of affecting site integrity.

Pots/traps

The relative risk of bycatch for marine birds in pots/traps is low (Ellis *et al.*, 2013; Jarrett *et al.*, 2017; Krieger and Eich, 2021). There is some potential for bycatch of diving birds in shallow waters and these species may enter pots while foraging (Krieger and Eich, 2021), but there is little evidence suggesting that bycatch in traps occurs frequently within the FMP area.

3.1.1.3 Conclusions and recommendations relating to bycatch risk

While the risk to the conservation status of designated mobile species through bycatch from demersal trawls is generally considered low, evidence gaps remain. **Therefore, the risk rating for bycatch in demersal trawls is assessed as moderate for marine mammals and seabirds.** Gathering additional evidence has the potential to downgrade this risk in the future.

Bycatch in dredges and pots/traps for MPA designated mobile species is not thought to be at a level of concern **and the risk rating for dredge and pots/traps is assessed as low.**

Whilst these gears are associated with occasional bycatch of designated seabirds and marine mammals, results from the BMP suggest that risks are much lower for trawl gears than for static nets. However, due to the episodic nature of bycatch incidences and the relatively low sampling efforts, risk will vary greatly over space and time. Strategic actions to improve the evidence base and implement appropriate mitigation is required.

In the short-term, greater certainty in bycatch estimates would result from a more systematic approach to data collection. This approach would also generate better understanding of the temporal and spatial patterns of bycatch estimates, and demographic information about which individuals are bycaught. This information could then be used to highlight species and areas most at risk and enable possible pilot area(s) for more focussed development of mitigation trials and monitoring to be identified with stakeholders.

Ongoing work focusing on understanding and mitigating the impact of bycatch on the wider ecosystem is being progressed through the [UK Bycatch Mitigation Initiative \(BMI\)](#), the [Clean Catch UK programme](#), and also the DAERA draft [Elasmobranch](#) and [Seabird](#) Conservation Strategies. This work is crucial to help identify and mitigate bycatch risks and to help close evidence gaps identified in this advice. Building the evidence base through self-reporting of bycatch events may help support future iterations of this assessment, and the implementation of Remote Electronic Monitoring, prioritised by risk (French *et al.*, 2022) would vastly improve our knowledge of, and ability to mitigate, designated species bycatch.

3.1.2 Risk of prey depletion of important prey species to mobile MPA features from shellfish fisheries

The Northern Ireland Non-Quota Shellfish FMP has scoped in the following target species: brown crab, velvet crab, lobster, king scallop and queen scallop. These species are generally not themselves considered key prey species for mobile MPA species. However, there is the potential for some bycatch of other species that act as important prey (forage fish) for marine predators, primarily from dredge and trawl gears.

Key potential prey fish species at risk of bycatch include small gadoids like juvenile cod, haddock, and whiting. Given that marine mammal and seabird predators feeding on these species tend to have varied generalist diets, the direct impacts of reducing one gadoid species' numbers might be relatively low. Thus, the direct risk to mobile features of MPAs from reduced food availability due to bycatch in the inshore fisheries is likely to be minimal. Nevertheless, evaluations may be necessary if significant quantities of other key forage fish groups were caught as bycatch. Overall, based on the characteristics of the Northern Ireland inshore fisheries and the available evidence, the risk of impacting mobile MPA features through diminished prey availability is likely to be low.

3.1.2.1 Conclusions and recommendations relating to risks from prey depletion

Although they contribute to the diet of several designated species, the target shellfish species listed under this FMP are not considered key prey species, and bycatch of key prey species is not thought to be at a level of concern. **There is a low risk of removal of important prey species that designated species depend on.** If routine monitoring (or improved evidence via REM) indicates that bycatch levels of gadoids or other key forage fish species increase significantly then this risk will need to be reassessed.

4 Risks relating to Priority Features in Northern Ireland waters

The [Wildlife and Natural Environment Act \(Northern Ireland\) 2011](#) (hereafter referred to as WANE) is the primary tool for the conservation and protection of Northern Ireland's threatened or endangered wildlife. The Act requires the publication of biodiversity lists which are considered to be of conservation importance in Northern Ireland and outlines where public bodies must take steps as far as reasonably practicable to further their conservation. The list of Northern Ireland Priority Habitats and Species (collectively referred to as 'Priority Features' in this advice document) can be found on the DAERA webpages ([DAERA, 2015](#) and [DAERA, 2023](#), respectively).

Following the enactment of the [Marine Act \(Northern Ireland\) 2013](#), DAERA created the [Priority Marine Feature \(PMF\) List](#), which is the collective term for marine features (habitats, limited/low mobility species, highly mobile species, geological / geomorphological features) of nature conservation importance in the Northern Ireland inshore region. These are compiled from various conservation lists (including the [NI Priority Habitats and Species lists](#)). Where spatial protection is recommended, then a subset of the PMF list forms the basis of the Marine Conservation Zone (MCZ) designation programme.

As a result of confusion between the Priority Marine Feature list and those Priority Habitats and Species listed under WANE, during the review of the 2014 Marine Protected Area (MPA) Strategy (public consultation on this closed on 9th August 2024) it was decided to instead use the term MPA feature, aligning with the UK MPA Feature list. The Northern Ireland MPA feature list refers to those features of importance at an Northern Ireland level and will be used to provide information and support the reporting of protected features. The list will be published on the DAERA website and will be periodically reviewed to enable inclusion of new features where necessary.

Fisheries within the Non-Quota Shellfish FMP can potentially impact Priority Features in 3 main ways:

- (i) through the catch or **bycatch** of mobile marine Priority Features
- (ii) the direct (targeted) and indirect (bycatch) **removal of prey species** on which mobile marine Priority Features depend, and
- (iii) **physical impacts** to seafloor resulting in alterations to the condition of habitat and limited mobility Priority Features or supporting habitats for mobile Priority Features.

4.1.1 Risks of bycatch to mobile marine Priority Features from shellfish fisheries

4.1.1.1 Risks to marine mammals

The Priority Features lists include a much broader suite of marine mammals than those protected within the MPA network, including species like the minke whale. While the risks for this receptor broadly echo the assessment above for MPA designated marine mammals, there are some additional risks of entanglement in pots/traps for large cetaceans resulting in a shift in the risk assessment to a higher rating for Priority Features compared with MPA designated features in the same receptor group.

Demersal trawls

There is likely to be limited risk of bycatch in demersal trawls, but these gears are not routinely monitored for bycatch of marine mammals. Continued or expanded monitoring, whether via enhanced observer coverage or remote electronic monitoring, to further refine risk assessments and strengthen mitigation for marine mammals is recommended.

Dredges

There have been very few studies looking at bycatch of marine mammals in dredges, this gear type is not monitored through the BMP and there is limited data available. The bycatch risks to marine mammals from dredging is expected to be low based on operational traits of

the fishery (e.g. slow tow speeds, narrow gear aperture, etc) which may reduce the risk of entanglement or capture.

Pots/traps

In addition to the bycatch risks outlined for MPA designated species above, pots/traps present a risk of entanglement for certain large marine mammals listed as Priority Features, such as minke whale. Minke whales are considered sensitive to bycatch in pot/trap fisheries (MacLennan et al., 2021), entanglement in creel ropes is a frequent cause of mortality in this species (based on Scottish Marine Animal Stranding Scheme data 2012-2017), though entanglement in other passive gears has been noted. Evidence of entanglement for Risso's dolphins indicates that this species may also be sensitive to bycatch in pot/trap fisheries (Bearzi et al., 2011).

4.1.1.2 Risks to seabirds

While the Priority Features lists include a number of additional seabird species for consideration of impacts, the evidence is broadly similar and the risk assessment mirrors the assessment above for MPA designated seabird species.

Demersal trawls

Demersal trawls represent a bycatch hazard for seabirds, particularly for diving species susceptible to entanglement. Although the focus of recent research, such as Northridge et al. (2020), reflects the perception that benthic trawling is less risky than set nets or longlines, the existing data gaps on the bycatch exposure of sensitive seabirds warrant caution (Anderson et al., 2022).

Although current bycatch levels have not been shown to significantly undermine seabird populations or the integrity of Special Protection Areas (SPAs), the limited data calls for an enhancement of the bycatch monitoring regime to capture a clearer picture of the risks these gears pose to seabirds.

Dredges

There have been very few studies looking at bycatch of seabird in dredges, and there is very limited data available, particularly in UK waters. Bycatch in dredge fisheries is unlikely to be at a level capable of affecting site integrity.

Pots/traps

The relative risk of bycatch for marine birds in pots/traps is low (Ellis *et al.*, 2013; Jarrett *et al.*, 2017; Krieger and Eich, 2021). There is some potential for bycatch of diving birds in shallow waters and these species may enter pots while foraging (Krieger and Eich, 2021), but there is little evidence suggesting that bycatch in traps occurs frequently within the FMP area.

4.1.1.3 Risks to fish, crustaceans and elasmobranchs

The Priority Features lists include a much broader suite of fish, crustaceans and elasmobranch features than those protected within the MPA network, including species like basking shark and flapper skate. Risks for this receptor group are therefore more significant compared with MPA designated fish, as outlined below, resulting in a shift in the risk assessment to a higher rating for Priority Features compared with MPA designated features in the same receptor group.

Demersal trawls and dredges

The Priority Features lists include a much broader suite of marine fish, including commercial species which are targeted by demersal fisheries and species which are vulnerable to bycatch in demersal fisheries. While risks to commercial species will be somewhat mitigated through stock management, there is a significant risk to other demersal fish, crustaceans and elasmobranchs listed as Priority Features. Flapper skate are considered vulnerable to bycatch impacts, owing to their slow growth, late age at maturity and site fidelity. Landings of flapper skate are prohibited. However, towed demersal gears (otter trawls and dredges) are known to take flapper as bycatch (adults, juveniles, and eggs) (STECF, 2017; Fox, 2010).

Pots/traps

There are a number of accounts of basking shark entanglement in creel rope (Bloomfield & Solandt, 2008; MacLennan et al., 2021) although the extent and frequency of this is unknown. Basking sharks are considered sensitive due to their surface feeding habits, slow growth rate, lengthy maturation time (Sims & Quayle, 1998) and site fidelity. The spiny lobster is included on the Priority Features list and is sensitive to bycatch in pots/traps.

4.1.1.4 Conclusions and recommendations relating to bycatch risks for mobile marine Priority Features

In addition to the bycatch risks outlined for MPA designated species above, pots/traps present a risk of entanglement for certain large mobile species listed as Priority Features, such as minke whales and basking shark. Demersal trawls present a further bycatch risk for many fish and elasmobranch species listed as Priority Features, including several long-lived species and threatened species with an increased vulnerability to bycatch mortality. For listed fish which are also commercial stocks, risks of bycatch may be mitigated through their own stock management processes, but significant gaps in the available evidence remain.

Risks for marine mammals and seabirds listed as Priority Features from demersal trawls are likely to echo the risks outlined above for MPA features. **The risk rating for bycatch in demersal trawls is assessed as moderate for marine mammals, seabirds, fish and elasmobranchs listed as Priority Features. There is also a moderate risk of marine mammal and elasmobranch bycatch in pots/traps, driven primarily by entanglement risk to minke whale and basking shark, and a moderate risk of fish and elasmobranch bycatch in dredges, driven by the increased exposure to listed species with a demersal life**

history and the potential risk of population level impacts to threatened species like the flapper skate. Continued monitoring and enhanced data collection and research to address knowledge gaps may allow us to reassess this risk in future. **The risk of bycatch of other mobile species groups in dredges and pots/traps is considered to be low.**

4.1.2 Risks of prey depletion to mobile marine Priority Features from shellfish fisheries

The FMP species are generally not themselves considered key prey species. However, there is the potential for some bycatch of other species that act as important prey (forage fish) for marine predators.

Given that primary marine mammal and seabird predators feeding on these species tend to have varied generalist diets, the direct impacts of reducing one species' numbers might be relatively low. Conclusions and recommendations relating to prey depletion risks for mobile marine Priority Features

4.1.2.1 Conclusions and recommendations relating to bycatch risks for mobile marine Priority Features

There is a low risk of removal of important prey species that Priority Features depend on.

4.1.3 Risks of physical impact on habitat and low/limited mobility marine Priority Features

Mobile demersal fishing, including demersal trawling and particularly dredging has the capacity to impact the benthic habitats and low/limited mobility species over which they occur, primarily through physical penetration, abrasion, disturbance of the seabed and physical removal.

Given that the Priority Features lists are quite comprehensive in scope, there is likely to be considerable overlap between these benthic features and the fishing activities listed. Therefore, the risk rating echoes the rating for the D6 seafloor integrity descriptor above. Demersal trawls and dredges are likely to have a significant impact on seabed integrity. While the physical impacts from pots/traps is likely to be lower, the relative impact will be linked to the intensity of pot/trap fishing in an area. Strategic work at a broad geographic scale is required to identify opportunities to reduce/remove risk and understand trade-offs.

4.1.3.1 Conclusions and recommendations relating to physical impacts for habitat and low/limited mobility Priority Features

The risk rating for physical impacts from demersal trawls and dredges to habitat and low/limited mobility Priority Features is considered high.

While the physical impacts from pots/traps is likely to be lower, the relative impact will be linked to the intensity of pot/trap fishing in an area. Owing to a need for further evidence, **the risk rating for physical impacts from pots and traps to Priority Features is considered moderate.**

Recommendations for further work with respect to physical impacts of the Non-Quota Shellfish fisheries are highlighted under the assessment of risk for GES descriptor D6 “seafloor integrity”.

5 Risks to UK Marine Strategy Descriptors

5.1 The UK Marine Strategy and FMPs

The UK [Marine Strategy Regulations 2010](#) (SI 2010/1627) provide the policy framework for delivering marine environmental policy at the UK level and set out how the vision of clean, healthy, safe, productive and biologically diverse oceans and seas will be achieved. The Regulations place a number of duties on the Defra Secretary of State, including the need to define the characteristics of Good Environmental Status (GES) and, in turn, develop an associated Programme of Measures required to deliver GES. Good Environmental Status (GES) establishes a ‘benchmark’ for our seas which seeks to *‘protect the marine environment, preventing its deterioration and restoring it where practical, while allowing sustainable use of marine resources’*. For each Descriptor there are a number of practical targets and indicators that facilitate assessment of delivery against each descriptor.

The UK Marine Strategy Regulations require management action to be taken to achieve or maintain GES. The Strategy applies an ecosystem-based approach to the management of all relevant human activities. In doing so, it seeks to keep the collective pressure of human activities within levels compatible with the achievement of GES and does not compromise the capacity of marine ecosystems to respond to human-induced changes. The [Fisheries Act \(2020\)](#) enables regulators to deliver on this ambition through the Ecosystem Objective, which states that fish and aquaculture activities should be managed using an ecosystem-based approach, which is, in-part, defined in the Act by the achievement of GES. Equally, the recently published [Joint Fisheries Statement \(2022\)](#) lays out the ambition across UK administrations to take action to achieve or maintain Good Environmental Status (GES) in all UK waters.

The full list of UK MS descriptors can be seen in Annex 1. This advice focuses only on the most relevant descriptors in terms of risks posed by commercial and recreational fisheries: D1 Biodiversity, D4 Foodwebs, D6 Seafloor integrity and D10 Marine litter. Additional consideration of screened-out descriptors may be required in the future if evidence emerges of those descriptors being vulnerable to pressures generated by fisheries relevant to the Northern Ireland Non-Quota Shellfish FMP. Furthermore, the status of many of the current indicators is currently ‘uncertain’ or ‘unassessed’ (see Annex 2). As the evidence base develops, or the suite of indicators associated with a specific descriptor evolves (e.g., after the review in 2024), the advice pertinent to those descriptors will need to be updated.

UK MS Descriptor D3 (commercial fish and shellfish) focuses on achieving Maximum Sustainable Yield (MSY) for commercially exploited stocks. The indicators prioritise maintaining reproductive capacity and fishing mortality rates that support MSY. As the primary goal of this FMP is to ensure that target stocks are sustainably exploited, following the precautionary and sustainability principles outlined in the UK [Fisheries Act \(2020\)](#), significant progress should be made toward meeting GES for D3. While risks exist due to current exploitation levels and data limitations, the focus of the plan to deliver long-term stock viability provides a pathway for reducing these risks. Therefore, detailed advice for D3 is not presented here. However, it is noted that achieving D3 targets alone may not fully support GES for associated descriptors, particularly where the target species may play a key ecological role as a forage/prey species e.g. D1 (biodiversity) and D4 (food webs), that require wider ecosystem considerations beyond single-stock MSY.

In the UK MS, these descriptors are assessed using indicators for each of their constituent 'ecosystem components.' This is carried through to this advice resulting in advice on risks to seven descriptor-ecosystem component combinations: D1, D4 cetaceans; D1, D4 seals; D1, D4 seabirds; D1, D4 fish; D4 foodwebs; D1, D6 seafloor integrity and D10 Marine Litter.

5.2 Assessing risk to UK MS Descriptors

This section provides an overview of the main risks posed to UK MS Descriptors by gear types likely to be covered by the Non-Quota Shellfish FMP for Northern Ireland.

The advice draws upon an existing risk analysis by French et al. (2022), conducted for Natural England as part of a REM prioritisation exercise, which evaluated the impact of various fishing gears on GES descriptors. This study has provided a good foundation for the risk assessment conducted here; although the work focused on fishing interactions relevant to English inshore waters, a broad approach was undertaken in screening-in métiers and the analysis is considered relevant in the Northern Ireland context.

This advice considers the 'overall risk scores' from French et al. (2022), using or adapting these based on additional relevant evidence (e.g., specific to the FMP) and/or expert opinion. The risk rating assigned isn't merely an assessment of gear-feature interaction but also gauges the overall risk in the FMP's context. For example, the risk rating associated with a gear-feature/descriptor interaction may be lowered if the higher-risk activity only makes up a small proportion of the fishing activity covered by the FMP and thus there is low exposure of the feature/descriptor to the higher-risk activity.

The risk ratings aim to provide a pragmatic direction on the significant concerns regarding interactions between fishing gear types and UK MS descriptors for this FMP. A description of how these risk ratings were derived is given in section 2.1 above. It should be noted that the work undertaken by French et al. (2022) used a slightly different grouping of UK MS descriptors to those used in this advice - see Objective 1 in their paper for the full methodology and associated literature reviews.

5.3 Risks to UK MS Descriptors

The risks to UK MS descriptors are presented below for the Non-Quota Shellfish fishery as a whole, but a breakdown of these risks by gear and corresponding actions for this descriptor can be found in Tables 2, 3 and 4. Justifications for risk ratings are provided in Sections 5.3.1-5.3.7.

Table 1. Summary of risks to UK MS descriptors from demersal trawls

UK MS Descriptor	Risk rating	Additional comments on risk	Recommendation
D1, D4 Cetaceans	Moderate	The bycatch risk in this fishery is thought to be low/moderate but this assessment has a degree of precaution as substantial data gaps exist. Further evidence collection and analysis will strengthen robustness and confidence in assessment.	Continue to improve the evidence base to understanding the scale of the pressure and improve this risk assessment. This could focus on improved bycatch data collection for sensitive species, including through enhanced reporting and remote electronic monitoring
D1, D4 Seals	Moderate	The bycatch risk in this fishery is thought to be low/moderate but this assessment has a degree of precaution as substantial data gaps exist. Further evidence collection and analysis will strengthen robustness and confidence in assessment.	Continue to improve the evidence base to understanding the scale of the pressure and improve this risk assessment. This could focus on improved bycatch data collection for sensitive species, including through enhanced reporting and remote electronic monitoring
D1, D4 Seabirds	Moderate	The bycatch risk in this fishery is thought to be low/moderate but this assessment has a degree of precaution as substantial data gaps exist. Further evidence collection and analysis will strengthen robustness and confidence in assessment.	Continue to improve the evidence base to understanding the scale of the pressure and improve this risk assessment. This could focus on improved bycatch data collection for sensitive species, including through enhanced reporting and remote electronic monitoring
D1, D4 Fish	Not assessed	While most fishing activities pose inherent high risks to the biological diversity of fish stocks due to non-target bycatch, we are not presenting detailed advice on this descriptor for this FMP. See section 5.3.4. for further details and rationale.	No action thought to be required at an FMP scale at present, but further work is required by appropriate Authorities and ALBs to understand the indicator and identify appropriate management actions. Focus of FMPs on sustainability & precautionary objectives of the Fisheries Act and policies developed to support delivery of the bycatch objective of the Fisheries Act should contribute to the achievement of GES for this descriptor. Actions at an FMP scale may be required to support achievement of GES for this descriptor in future.
D4 Foodwebs	Not assessed	Comprehensive fishery-level advice is not included here, as substantial further work by appropriate authorities and ALBs is needed to determine appropriate actions. Achieving Good Environmental Status will require strategic collaboration to improve ecosystem models and understand fishing mortality impacts on complex food web dynamics.	No action currently thought to be required for FMP. FMP progress towards sustainability and precautionary objectives under the Fisheries Act may result in incremental steps towards GES
D1, D6 Seafloor integrity	High	Mobile gear benthic fisheries are the key pressure driving failure of GES. Further work is required to understand contribution of different gear types and fisheries to failure to reach GES.	Requires strategic response from appropriate authorities and ALBs, potentially through the Benthic Impacts Working Group to consider the opportunities to reduce/remove risk. FMP should seek to support the development of such a group and integrate with its work.
D10 Marine Litter	Moderate	The risk of losing mobile fishing gear is significantly lower than the risk of losing static fishing gear. However, polyethylene, polypropylene and nylon nets and ropes contribute to non-biodegradable marine litter when lost or discarded at sea. MCS beach litter data suggests fishing contributes <10% of total. Thus, actions targeting fishing litter alone are unlikely to achieve GES.	More robust estimates of ALDFG rates are needed for all gear types. Gear-specific estimates have low certainty due to small numbers of studies and sample sizes. FMPs should seek to develop evidence base. FMPs are also well placed to identify regional fishery specific mitigation measures.

Table 2. Summary of risks to UK MS descriptors from dredges

UK MS Descriptor	FMP Risk Rating	Additional comments on risk	Recommendation
D1, D4 Cetaceans	Low	The risk in this fishery is thought to be low/moderate but this assessment has a degree of precaution as substantial data gaps exist. Further evidence collection and analysis may reveal that the actual risk level is lower than presently determined.	Improved data collection required to improve confidence in the scale and frequency of bycatch. Collaborative action needed action through Bycatch Mitigation Initiative. Appropriate use of Remote Electronic Monitoring (REM). Need to consider Ecosystem Based Approach to Fisheries Management (EBAFM) for forage fish species to improve current management and align with the UKs objectives to achieve Good Environmental Status (i.e. as important prey species for cetaceans).
D1, D4 Seals	Low	The risk in this fishery is thought to be low/moderate but this assessment has a degree of precaution as substantial data gaps exist. Further evidence collection and analysis may reveal that the actual risk level is lower than presently determined.	Improved data collection required to improve confidence in the scale and frequency of bycatch. Collaborative action needed action through Bycatch Mitigation Initiative. Appropriate use of Remote Electronic Monitoring (REM). Need to consider Ecosystem Based Approach to Fisheries Management (EBAFM) for forage fish species to improve current management and align with the UKs objectives to achieve Good Environmental Status (i.e. as important prey species for seals).
D1, D4 Seabirds	Low	The risk in this fishery is thought to be low/moderate but this assessment has a degree of precaution as substantial data gaps exist. Further evidence collection and analysis may reveal that the actual risk level is lower than presently determined.	Improved data collection required to improve confidence in the scale and frequency of bycatch. Collaborative action needed action through Bycatch Mitigation Initiative. Appropriate use of Remote Electronic Monitoring (REM). Need to consider Ecosystem Based Approach to Fisheries Management (EBAFM) for forage fish species to improve current management and align with the UKs objectives to achieve Good Environmental Status (i.e. as important prey species for seabirds).
D1, D4 Fish	Not assessed	Possible high risk of fishing activity to fish biodiversity because of bycatch. However, further work is required to develop appropriate fisheries management advice.	No current action thought to be required for the FMP. Further work required to better understand the status and vulnerability of the many species included in assessments for this descriptor. Some species may require targeted evidence collection (e.g., enhanced reporting requirements/ remote electronic monitoring) and consideration of mitigation e.g., inclusion of additional sensitive fish species in the bycatch mitigation initiative or other appropriate mitigation programme.
D4 Foodwebs	Not assessed	Focus of FMPs on sustainability & precautionary objectives of the Fisheries Act (2020) and policies developed to support delivery of the bycatch objective of the Fisheries Act should contribute to the achievement of GES for this descriptor.	No action currently thought to be required for FMP. However, the extent to which stocks reaching MSY contributes to changes in fish community/ size structure is not yet clear. Further work may be required in the future.
D1, D6 Seafloor integrity	High	Mobile gear benthic fisheries are the key pressure driving failure of GES. Further work is required to understand contribution of different gear types and fisheries to failure to reach GES.	Requires strategic response, potentially through a Benthic Impacts Working Group, to consider the opportunities to reduce/remove risk. The FMP should seek to support the development of such a group and integrate with its work. This recommendation will be linked to similar recommendations made for other UK FMPs.
D10 Marine Litter	Low	The risk of losing mobile fishing gear is significantly lower than the risk of losing static fishing gear. Additionally, dredge gears are mainly comprised of metal and are unlikely to become detached and contribute to marine litter.	More robust estimates of abandoned lost or discarded fishing gear (ALDFG) rates are needed for all gear types. Gear-specific estimates have low certainty due to small numbers of studies and sample sizes. FMPs should seek to develop evidence base. FMPs are also well placed to identify regional fishery specific mitigation measures.

Table 3. Summary of risks to UK MS descriptors from pots and traps

UK MS Descriptor	FMP Risk Rating	Additional comments on risk	Recommendation
D1, D4 Cetaceans	Moderate	Entanglement in pot ropes is known to occur for a number of sensitive species, but it is unclear if this is likely to impact UK populations at a level which will affect reaching GES for this descriptor. Further evidence collection and analysis will strengthen robustness and confidence in assessment.	Continue to improve the evidence base to understanding the scale of the pressure and improve this risk assessment. This could focus on improved bycatch data collection for sensitive species, including through enhanced reporting and remote electronic monitoring
D1, D4 Seals	Low	N/A	No action currently thought to be necessary for the FMPs under consideration , although requirement to report bycatch incidents would improve ability to assess risk
D1, D4 Seabirds	Low	N/A	No action currently thought to be necessary for the FMPs under consideration , although requirement to report bycatch incidents would improve ability to assess risk
D1, D4 Fish	Not assessed	Possible high risk to fish biodiversity because of bycatch. However, further work is required to develop appropriate fisheries management advice.	No current action thought to be required for the FMP. Further work required to better understand the status and vulnerability of the many species included in assessments for this descriptor. Some species may require targeted evidence collection (e.g., enhanced reporting requirements/ remote electronic monitoring) and consideration of mitigation e.g., inclusion of additional sensitive fish species in the bycatch mitigation initiative or other appropriate mitigation programme.
D4 Foodwebs	Not assessed	Focus of FMPs on sustainability & precautionary objectives of the Fisheries Act (2020) and policies developed to support delivery of the bycatch objective of the Fisheries Act should contribute to the achievement of GES for this descriptor.	No action currently thought to be required for FMP. However, the extent to which stocks reaching MSY contributes to changes in fish community/ size structure is not yet clear. Further work may be required in the future.
D1, D6 Seafloor integrity	Not assessed	Whilst pots and traps do have the ability to cause localised impacts, it is not currently thought to be at a scale likely to affect achievement of GES for this descriptor.	No action currently thought to be required for FMPs under consideration for this gear-descriptor combination
D10 Marine Litter	Moderate	Evidence that abandoned, lost, or discarded pots and associated rigging may pose entanglement risk to several large coastal mobile species (minke whale; basking sharks). Extent of risk is not clear.	Fishing litter is likely to be a relatively small component of overall marine litter, thus fishing measures on their own are unlikely to contribute significantly to achievement of GES. Greatest harm is likely to be associated with entanglement and ghost fishing from abandoned, lost or discarded gear. Greatest risk associated with static gears. Action required to better record and map ALDFG. Adopt appropriate technical measures to minimise ghost fishing from pots (e.g. weak links) and rope entanglement (minimised pot lines).

5.3.1 UK MS Descriptor D1, D4 biological diversity of Cetaceans

The current targets and indicators for the Descriptor 'D1, D4 Biological diversity of cetaceans' are set out in Table A2 (Annex 2). Risks are presented below for the Non-Quota Shellfish fishery as a whole, but a summary of the risks and actions by gear for this descriptor can be found in Tables 2, 3 and 4 above.

Potential risks to this UK MS descriptor from the fisheries covered by this FMP arise primarily from bycatch of descriptor species and reductions in the availability of their prey.

5.3.1.1 Risks to D1, D4 Cetaceans from bycatch

To be compatible with UK MS GES targets, fisheries must not result in a situation where the long-term viability of a cetacean population is threatened by incidental bycatch. In addition, there should be no significant decrease in abundance caused by human activities and the population range should not be significantly lower than the favourable reference value for the species.

For harbour porpoise, the bycatch limit is set below a threshold of 1% of the best population estimate. However, the vast majority of bycatch is from static gears, with existing evidence suggesting that mobile gears contribute relatively little to harbour porpoise bycatch. Benthic trawling and dredges are not perceived as high-risk for cetacean bycatch. However, occasional harbour porpoise bycatch in otter trawlers has been reported (Cefas, 2015). The 2019 report on bycatch levels (Kingston *et al.*, 2021) emphasised that the sampling was not specifically tailored for protected species, making the data less conclusive, but current understanding is that this is not at a level that would have impacts on population. Although certain cetaceans are sensitive to entanglement in pots/traps, it is unclear whether the population level impacts are sufficient to threaten their long-term viability. Further evidence is required to increase confidence in this assessment.

5.3.1.2 Risks to D1, D4 Cetaceans from reductions in prey

Links between cetaceans and reductions in prey species have previously been considered in Section 2.2.2. To summarise, key potential forage fish species at risk of bycatch include small gadoids like juvenile cod, juvenile haddock, and juvenile whiting. Given that cetaceans feeding on these species tend to have varied generalist diets, the ecosystem impacts of reducing one gadoid forage fish species' numbers might be relatively low. Thus, the direct risk to mobile features of MPAs from reduced food availability due to bycatch in the inshore fisheries is likely to be minimal. Nevertheless, evaluations may be necessary if significant quantities of other key forage fish groups were caught as bycatch. Overall, based on the characteristics of the Non-Quota Shellfish fisheries and the available evidence, the risk of impacting cetaceans through diminished prey availability is likely to be low.

5.3.1.3 Conclusions and recommended actions for D1, D4 Cetaceans

While the risk to achieving GES for the biological diversity of cetaceans is generally considered low, there are still significant gaps in the available evidence. As a result, **the**

FMP risk rating has been assessed as moderate. This risk is primarily driven by the potential for bycatch in demersal trawls and pots/traps. Additional evidence collected to address gaps could enable us to revisit this risk assessment.

5.3.2 UK MS Descriptor D1, D4 biological diversity of Seals

The current targets and indicator for the Descriptor 'D1, D4 Biological diversity of seals is maintained' are shown in Table A3 (Annex 2). Risks are presented below for the Non-Quota Shellfish fishery as a whole, but a summary of the risks and actions by gear for this descriptor can be found in Tables 2, 3 and 4 above.

5.3.2.1 Risks to D1, D4 Seals from bycatch

For grey seals, whilst bycatch represents the principal fisheries-related pressure, the species is meeting its Good Environmental Status (GES) targets as outlined in Table A3 (Annex 2). In contrast, the common seal population is below target levels in the Greater North Sea, although this decline is not attributed to bycatch.

Demersal trawls, dredges and pots/traps are not considered high-risk gear types for seal bycatch. The Data Collection Framework programme for England and Wales in 2019 did not record any marine mammal bycatch associated with beam, otter, and twin otter trawls. While figures for both seal species are presented together in the BMP, most bycatch observations are for grey seals. There are no "environmental mortality limits" set for grey seals (Kingston *et al.*, 2021) meaning assessment against the incidental bycatch target is not possible, however, available data suggest that demersal trawl gears and dredges are not significantly contributing to current bycatch levels. There is some evidence of grey seal bycatch in trap gear outside UK waters, however the incidence is low (ICES, 2019; ICES, 2020). Nevertheless, more comprehensive evidence gathering is necessary to increase confidence in the assessment of bycatch risk to seals.

5.3.2.2 Risks to D1, D4 Seals from reductions in prey

Links between seals and reductions in prey species have previously been considered in Section 2.2.2. To summarise, whilst target species of the Non-Quota Shellfish FMP are not considered key prey species for seals, some of the associated bycatch may constitute part of a seal's diet (e.g. juvenile gadoids). However, the direct risk to seals from bycatch of their prey in the Non-Quota Shellfish fishery alone is likely to be low, as bycatch levels are unlikely to reach levels that would directly impact the overall abundance of these prey species. Nevertheless, the cumulative effect of bycatch from multiple fisheries could potentially impact prey populations over time. Seals, being generalist feeders, are thought to exhibit weak ecological interactions with specific prey populations, as they consume a variety of species (Dickey-Collas *et al.*, 2014) and are able to exploit alternative prey choices in response to the reduced abundance of any single prey species. However, further work is needed to better understand the impact of prey reduction on seal populations and the ecosystem interactions between fish and higher predators. A collaborative approach between appropriate authorities and ALBs to develop ecosystem modelling approaches will

support a better understanding of the potential impacts of prey reduction on seal populations.

5.3.2.3 Conclusions and recommended actions for D1, D4 Seals

While the risk to achieving GES for the biological diversity of seals is generally considered low, there are still significant gaps in the available evidence. As a result, **the FMP risk rating has been assessed as moderate**. This risk is predominantly related to the demersal trawl and dredge gears rather than pots/traps. Additional evidence collected to fill these gaps could enable us to revisit this risk assessment.

5.3.3 UK MS Descriptor D1, D4 biological diversity of Seabirds

The current targets and indicator for the Descriptor 'D1, D4 Biological diversity of seabirds is maintained' are shown in Table A4 (Annex 2). Risks are presented below for the Non-Quota Shellfish fishery as a whole, but a summary of the risks and actions by gear for this descriptor can be found in Tables 2, 3 and 4 above.

5.3.3.1 Risks to D1, D4 Seabirds from bycatch

To align with UK MS GES targets, fisheries shouldn't compromise the long-term viability of marine bird populations due to incidental bycatch. There shouldn't be significant population decline or distribution changes since 1992 caused by human interventions. Widespread breeding failures in marine birds induced by human activities shouldn't persist for more than three out of six years.

Demersal trawling is thought to pose a potential risk to certain species of seabirds. This is highlighted by both anecdotal reporting during fish bycatch monitoring (CEFAS observer programme report 2015; unpublished), and by previous work looking at the relative risk of bird bycatch that incorporated the behavioural traits of different species (Bradbury et al., 2017). This latter work highlights deep diving shags, scaups, eiders, scooters, guillemots, great northern divers, and cormorants as the most sensitive to demersal trawls. The abundance of European Shags within the North Sea does not meet GES. Species that actively pursue fishing vessels in search of food (e.g. Northern fulmar) are at higher risk of being caught than species that have a tendency to fly away from fishing vessels (e.g. red-throated diver) (ICES, 2018).

Demersal trawling is not included in more recent work looking at seabird bycatch (e.g., Northridge et al., 2020) as it is not generally considered to present a high bycatch risk to birds at scale that is likely to threaten GES descriptors. Pots/traps are also considered low risk in relation to marine bird bycatch (Ellis *et al.*, 2013; Jarrett *et al.*, 2017; Krieger and Eich, 2021). There is some potential for bycatch of diving birds in shallow waters and these species may enter pots while foraging (Krieger and Eich, 2021), but there is little evidence suggesting that bycatch in traps occurs frequently within Northern Ireland waters. The bycatch risks to birds from dredging are similar to the risks from bottom trawling.

An improved monitoring regime would help fill the current data gaps and therefore reduce the uncertainties. This could potentially be done by adapting or expanding existing observer programmes, or through the appropriate use of REM.

5.3.3.2 Risks to D1, D4 Seabirds from reductions in prey

Links between seabirds and reductions in prey species have previously been considered in Section 3.1.2. To summarise, key potential forage fish species at risk of bycatch include small gadoids like juvenile cod, juvenile haddock, and juvenile whiting. Given that seabirds feeding on these species tend to have varied generalist diets, the ecosystem impacts of reducing one gadoid forage fish species' numbers might be relatively low. Thus, the direct risk to seabirds from reduced food availability due to bycatch in the Non-Quota Shellfish fisheries is likely to be minimal. Nevertheless, evaluations may be necessary if significant quantities of other key forage fish groups were caught as bycatch. Overall, based on the characteristics of this fishery and the available evidence, the risk of impact through diminished prey availability is likely to be low.

5.3.3.3 Conclusions and recommended actions for D1, D4 Seabirds

Conclusions and recommended actions for D1, D4 Seabirds relating to bycatch

While the risk to achieving GES for the biological diversity of seabirds is generally considered low, there are still significant gaps in the available evidence. As a result, **the FMP risk rating has been assessed as moderate**. Again, this risk is predominantly related to the demersal trawl fishery rather than pot/trap activity. Further evidence collection and analysis may reveal that the actual risk level is lower than presently determined.

5.3.4 UK MS Descriptor D1, D4 Biological diversity of Fish

The current targets and indicators for 'D1, D4: Biological Diversity of Fish' are outlined in Table A5 (Annex 2). A summary of the risks and actions by gear for this descriptor can be found in Tables 2, 3 and 4 above.

While most fishing activities pose inherent high risks to the biological diversity of fish stocks due to non-target bycatch, we are not presenting detailed advice on this descriptor for the Non-Quota Shellfish Fisheries Management Plan for Northern Ireland. This is because the indicator comprises over 100 sensitive species, and further collaborative work is first needed between relevant government bodies to determine how best to evaluate risks and provide actionable advice at the fishery management level. Given the complexity of interactions between multiple species, fleets, and fishing methods, strategic solutions may be most effective for achieving Good Environmental Status. We will continue engaging with the FMP working group as part of developing a coherent strategy for restoring and protecting biological diversity across fishing activities in the region. In the interim, progress towards the Fisheries Act's sustainability and precautionary objectives will facilitate steps in the right direction.

5.3.5 UK MS Descriptor D4 Foodwebs

The current targets and indicators for the Descriptor 'D4, Foodwebs' are shown in Table A7 (Annex 2). A summary of the risks and actions for this descriptor are found in Tables 1, 2 and 3.

We are not presenting comprehensive advice for UK MS Descriptor D4 foodwebs in this advice, as substantial further work is required to determine appropriate actions at the fishery level. The current indicators focus on size and trophic structure of ecological communities, involving complex interactions between multiple stocks and fisheries. Strategic collaboration will be imperative to improve ecosystem models and our understanding of how fishing mortality impacts food web dynamics. Isolated changes within individual fisheries are unlikely to meaningfully contribute to achieving Good Environmental Status for this descriptor. As the FMP progresses towards sustainability and precautionary objectives under the Fisheries Act, this may result in incremental steps towards GES for D4. However, we will continue engaging with government and other research bodies as part of developing a coherent overarching strategy for food web protections in the region. The close involvement of the FMP working group in this strategic development will help align operational and policy objectives regarding D4 moving forward.

5.3.6 UK MS Descriptor D1, D6 Seafloor integrity

The current targets and indicator for the Descriptor '*D1 & D6 seafloor integrity*' are shown in Table A8 (Annex 2). A summary of the risks and actions by gear for this descriptor can be found in Tables 2, 3 and 4 above.

5.3.6.1 Risks to seafloor integrity from shellfish fishing

All mobile demersal gears pose a risk to this descriptor. For the purposes of this advice SNCBs have focussed on the 'Extent of Physical damage' indicator as it most closely tied to fisheries pressure (see Table A8, Annex 2). This indicator is shared with OSPAR and is commonly known as 'BH3' and will be referred to as such in the current advice.

BH3 is the primary indicator used to assess the level of disturbance from fishing on benthic habitats. The target determines that the level of exposure to pressure (measured on the spatial scale of OSPAR sub-regions) should not result in more than moderate impact/vulnerability of the habitat (dependent on the sensitivity of the habitat to this pressure). The calculations for the BH3 indicator are complex, but essentially fishing effort data is aggregated so that the relative impact of different mobile benthic gears cannot be readily assessed within it. To be able to provide advice, which is meaningful at the scale of an FMP, the way BH3 is currently aggregated and presented needs to be addressed. Natural England is currently working on dis-aggregating the BH3 indicator as a first step in developing specific FMP-relevant advice.

Collaborative working between government, ALBs and regulators to provide more detailed advice on contributions of different mobile demersal gears within the geographic context of FMPs is required. Detailed consideration of mitigation options should extend across

different fisheries and draw on a wide range of stakeholder expertise. The UK Marine Strategy Part 3 (Programme of Measures) suggests the drawing together of a **Benthic Impact Working Group** and this could be a pragmatic option for delivering future advice, including identifying, developing, and trialling possible mitigation or management options, in partnership.

It is not currently thought that fisheries are contributing significantly to the failure of other indicators for this descriptor (e.g., the 'physical loss of predicted habitats'), however if evidence were to emerge in the future, then further advice may be required.

5.3.6.2 Conclusions and recommended actions for D1, D6 seafloor integrity

There is a high risk to seafloor integrity. However, this indicator looks at impacts across the >12m UK mobile demersal fishing fleet. It does not include impacts from the pots/traps – while these are likely to be lower risk, these gears may impact seafloor integrity if operating at a high intensity. Further work is needed to disentangle and quantify impacts from individual fisheries. Strategic work at a broad geographic scale is required to understand the relative impact from this fishery and identify opportunities to reduce/remove risk and understand trade-offs across the UK fishing fleet.

5.3.7 UK MS Descriptor D10 Marine litter

The current targets and indicator for Descriptor 'D10 Marine litter' are shown in Table A9 (Annex 2). A summary of the risks and actions for this descriptor are found in Tables 1, 2 and 3.

5.3.7.1 Risks from marine litter from shellfish fishing

Gear specific estimates of rates of abandoned, lost, or discarded gear (ALDFG) have low certainty due to a small number of studies and low sample sizes. Risks are highest in static gear fisheries (French et al., 2022) where significant quantities of gear are deployed into the marine environment and left unattended. Mobile gears are a lower risk but may be a source of plastic ropes and netting which contribute to non-biodegradable marine litter when lost, abandoned, or discarded at sea. ALDFG is associated with entanglements and ghost fishing. However, fishing litter is likely to be a relatively small component of overall marine litter, therefore fishing measures alone are unlikely to contribute significantly to the achievement of GES. Some gear loss is driven by the spatial conflict between mobile and static fleet sectors, where competition for space leads to interaction between mobile and static fishing gears. FMPs may consider ways in which to mitigate this conflict, if identified, and any associated gear losses.

5.3.7.2 Conclusions and recommended actions for D10 marine litter

There is a moderate risk to marine litter. More robust estimates of ALDFG in the fishery are required.

FMPs could consider initiatives to gather relevant data to record and map gear losses in relevant fisheries in order to better understand the levels of risk and establish baselines.

Individual FMPs may be able to identify and develop mitigating measures/technologies to reduce losses and minimise impacts of ghost fishing and entanglements on marine life.

6 Conclusion and recommendations

This advice has highlighted several risks to the designated features of Northern Ireland MPAs outside site boundaries, to Priority Features protected under [WANE 2011](#), and to UK MS descriptors, namely bycatch of protected species, reductions in prey of marine mammals and birds, physical impacts to the seafloor, and the introduction of marine litter. The role of industry will be crucial in both gathering evidence in the form of fisheries-dependent data, and in identifying practical, workable and locally relevant solutions that can reduce pressures and mitigate risks accordingly.

Government(s) will likely need to coordinate different policy areas and delivery tools, going beyond FMPs, and to provide resourcing to develop synergies and maximise the impact of those actions instigated through FMPs (e.g. through coordination across Marine Plan and FMP programmes). ALBs will need to ensure timely analysis of the evidence supplied and the subsequent provision of robust and appropriate advice. Such an approach is essential to ensure the conservation objectives of MPAs are met or furthered, steps are taken, as far as reasonably practicable, to further the conservation of Northern Ireland's threatened or endangered wildlife protected under WANE, fisheries make a significant contribution to the achievement of Good Environmental Status, and important steps towards an ecosystem-based approach to fisheries management are taken.

In some cases, existing initiatives will complement the work of the FMPs, such as the [UK Bycatch Mitigation Initiative](#) and Clean Catch UK; these will be important for coordinating and achieving progress beyond the regional scale of FMPs and individual fisheries stock units. In the short-term, improvements to achieve greater certainty in bycatch estimates for fisheries would be beneficial. This would also enable a better understanding of the temporal and spatial patterns of bycatch, and demographic information about the individuals bycaught. This information could then be used to highlight species and areas most at risk and enable possible pilot area(s) for more focussed development of mitigation trials and monitoring to be identified with stakeholders. The implementation of Remote Electronic Monitoring prioritised by risk (French et al., 2022) would vastly improve our knowledge of, and ability to mitigate, designated species bycatch. Building the evidence base through self-reporting of bycatch events may also help support future iterations of this assessment. There is currently a requirement for skippers to report any instances of incidental mortality and injury of marine mammals to the MMO within 48 hours of the end of a fishing trip, both to align with the [Fisheries Act \(2020\)](#) ecosystem objective that the "incidental catches of sensitive species are minimised and, where possible, eliminated", and also to enable the UK to continue exporting wild-capture seafood to the US, as required by the US [Marine Mammal Protection Act 1972](#).

In other challenging areas, such as benthic integrity to meet GES, further work to develop the appropriate vehicles to deliver strategic work at a suitable scale will be required. Government may need to develop a strategy guiding where reductions in pressures need to occur across the fleet and to make decisions accounting for the trade-offs between industry sectors. It might be difficult to do this at the individual FMP level, and thus actions may be necessary at a programme level. Collaborative working between government, ALBs and regulators to provide more detailed advice on contributions of different mobile demersal gears within the geographic context of FMPs is required and the proposal to convene a UK wide **Benthic Impact Working Group** could be a pragmatic option for delivering future advice, including identifying, developing, and trialling possible mitigation or management options, in partnership.

It is advisable that the FMP evaluates whether routes to strengthen an ecosystem approach to fisheries management (EAFM) could be implemented to improve current management and align with the UK's objectives to achieve GES. The exploitation of fish stocks and the wider ecosystem impacts should be used to guide a risk-based ecosystem approach that reflects the multiple, potentially conflicting social, cultural, and ecological objectives and the trade-offs between human use and status of the marine environment. This approach necessitates early engagement with stakeholders, decision makers, ICES, and DAERA's arm's-length bodies, as well as the development of interdisciplinary and pragmatic solutions which promote the application of ecosystem information and models.

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Annex 1

Table A1: Box 1 Full list of UK MS descriptors. Those in bold are scoped into this advice.

UK MS Descriptor	Ecosystem component	Screened into this fisheries advice
D1 - Biological diversity	Cetaceans	Yes
	Seals	Yes
	Seabirds	Yes
	Fish	Yes
	Pelagic habitats	No
D2 - Non-indigenous species	N/A	No
D3 - Commercially-exploited fish and shellfish	N/A	Yes
D4 - Food webs	Cetaceans	Yes
	Seals	Yes
	Birds	Yes
	Fish	Yes
	Pelagic habitats	No
D5 - Eutrophication	N/A	No
D6 - Sea-floor integrity	Pelagic habitats	No
	Benthic habitats	Yes
D7 - Hydrographical conditions	N/A	No
D8 - Contaminants	N/A	No
D9 - Contaminants in fish and other seafood for human consumption	N/A	No
D10 - Litter	N/A	Yes
D11 - Introduction of energy, including underwater noise	N/A	No

Annex 2

Table A2: UK MS indicators and targets for D1, D4 Cetaceans

Descriptor	Target 2019	Indicator	North Sea	Trend	Celtic Seas	Trend
<u>D1; D4:</u> <u>CETACEANS</u>	The long-term viability of cetacean populations is not threatened by incidental bycatch.	Harbour porpoise bycatch - Marine online assessment tool (cefas.co.uk) Cetaceans - Marine online assessment tool (cefas.co.uk)	GES Achieved	Insufficient data to assess	GES status unknown/uncertain	Insufficient data to assess
	There should be no significant decrease in abundance caused by human activities.	Abundance and distribution of coastal bottlenose dolphins (OSPAR)	Achieved	stable/mixed	GES status unknown/uncertain	stable/mixed
		Abundance and distribution of cetaceans other than coastal bottlenose dolphins (OSPAR)	Partial	stable/mixed	GES status unknown/uncertain	stable/mixed
	Population range is not significantly lower than the	Abundance and distribution of coastal bottlenose dolphins (OSPAR)	Achieved	stable/mixed	GES status unknown/uncertain	stable/mixed

	favourable reference value for the species.	Abundance and distribution of cetaceans other than coastal bottlenose dolphins (OSPAR)	Partial	stable/mixed	GES status unknown/uncertain	stable/mixed
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Table A3: UK MS indicators and targets for D1, D4 Seals

Descriptor	Target 2019	Indicator	North Sea	Trend	Celtic Seas	Trend
D1; D4: SEALS	The long-term viability of seal populations is not threatened by incidental bycatch.	Marine mammal bycatch (OSPAR)	GES status unknown/ Uncertain	Unknown	GES status unknown/ uncertain	Unknown
	Population abundance and	Grey seal abundance and distribution	Achieved	improving	achieved	improving

	distribution are consistent with favourable conservation status.	Harbour seal abundance and distribution	Not achieved	stable/mixed	GES status unknown/uncertain	Unknown
	Grey seal pup production does not decline substantially in the short or long-term.	Grey seal pup production (OSPAR)	Achieved	improving	achieved	improving

Table A4: UK MS indicators and targets for D1, D4 Birds

Descriptor	Target 2019	Indicator	North Sea	Trend	Celtic Seas	Trend
D1: D4: BIRDS	The long-term viability of marine bird populations is not threatened by deaths caused by incidental bycatch in mobile and static fishing gear.	Seabird bycatch				
	The population size of species has not declined substantially since 1992 as a result of human activities.	Marine bird abundance (OSPAR)	Not achieved	declining	Not achieved	declining
	Widespread lack of breeding success in marine birds caused by human activities should occur in no more than three years in six.	Marine bird breeding success/failure (OSPAR)	Not achieved	declining	Partial	declining
		Kittiwake breeding success	Achieved	declining	Not assessed	Unknown
	There is no significant change or reduction in	Distribution of breeding and non-breeding marine birds	Not assessed	Unknown	Not assessed	Unknown

	population distribution caused by human activities.	Invasive mammal presence on island seabird colonies	Not assessed	Unknown	Not assessed	Unknown
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Table A5: UK MS indicators and targets for D1, D4 Fish

Descriptor	Target 2019	Indicator	North Sea	Trend	Celtic Seas	Trend
D1; D4; FISH	Incidental bycatch is below levels which threaten long-term viability and recovery of fish populations.	To include bycatch numbers of vulnerable species and catch rates per fishing fleet	GES status unknown/ Uncertain	Unknown	GES status unknown/ Uncertain	Unknown
	The population abundance of sensitive species is not decreasing due to anthropogenic activities and long-term viability is ensured.	Recovery in the population abundance of sensitive fish species (OSPAR)	Not achieved	stable/mixed	Achieved	stable/mixed
	For fish species in the Habitats and Birds Directive population abundance and geographic	UK assessments of listed fish species	Not achieved	stable/mixed	Achieved	improving

	distribution meets established favourable reference values.					
	For listed fish species, the area and the quality of the habitat is sufficient.		GES status unknown/ Uncertain	Unknown	GES status unknown/ Uncertain	Unknown

Table A6: UK MS indicators and targets for D3 Commercial Fish

Descriptor	Target 2019	Indicator	North Sea	Trend	Celtic Seas	Trend
<u>D3: COMMERCIAL FISH AND SHELLFISH</u>	The Fishing mortality rate of populations of commercially exploited species is at or below levels which can produce the maximum sustainable yield.	<u>Commercial fishing pressure for stocks of UK interest.</u>	Partial	Improving	Partial	Improving
	The Spawning Stock Biomass of populations of commercially exploited species are above biomass levels capable of producing the maximum sustainable yield.	<u>Reproductive capacity of commercially exploited stocks of UK interest.</u>	Partial	Improving	Partial	Improving

Table A7: UK MS indicators and targets for D4 Foodwebs

Descriptor	Target 2019	Indicator	North Sea	Trend	Celtic Seas	Trend
D4: FOODWEBS	The species composition and relative abundance of representative feeding guilds are indicative of a healthy marine food web.	Mean maximum length of fish (OSPAR).	Not achieved	Stable/mixed	Not achieved	Stable/mixed
		Selected plankton lifeforms pairs (e.g., large vs small zooplankton) (OSPAR)	GES status unknown/ Uncertain	Unknown	GES status unknown/ Uncertain	Unknown
	The balance of abundance between representative feeding guilds is indicative of a healthy marine food web.	An indicator of biomass of predatory feeding guilds for fish is currently under development using current data. This could be expanded to seabirds and marine mammals.	Not assessed	Unknown	Not assessed	Unknown
	The size structure of fish communities is indicative of a healthy marine food web.	Fish community size structure: Typical Length (Tyl - OSPAR) and/or Large Fish Index (LFI - OSPAR)	Not achieved	Stable/mixed	Partial	Improving
	Productivity of the representative feeding guilds, characterised by key species, is indicative	D4C4s required information on multiple components (seabirds, marine mammals, fish and pelagic habitat).				

	of a healthy marine food web.					
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Table A8: UK MS indicators and targets for D1, D6 Seafloor integrity

Descriptor	Target 2019	Indicator	North Sea	Trend	Celtic Seas	Trend
D1; D6: BENTHIC	The physical loss of each seabed habitat type caused by human activities is minimised and where possible reversed.	Physical loss of predicted habitats	Not achieved	unknown	Not achieved	Unknown
	The extent of habitat types adversely affected by physical disturbance caused by human activity should be minimised.	Extent of Physical damage indicator to predominant and special habitats (OSPAR)	Not achieved	Unknown	Not achieved	Unknown
		Benthic communities' indicator (OSPAR)	GES status unknown/ Uncertain	Unknown	GES status unknown/ Uncertain	Unknown
	Habitat loss of sensitive, fragile, or important habitats caused by human activities is prevented, and where feasible reversed.	Physical loss of predicted habitats indicator (Extent of benthic habitat)	Not achieved	Unknown	Not achieved	Unknown
	The extent of adverse effects caused by human activities on the condition, function and	Benthic communities' indicator (OSPAR)	Not assessed	Unknown	Not assessed	Unknown
		Aggregated Infaunal Quality Index	Not achieved	Unknown	Partial	Unknown

	ecosystem processes of habitats is minimised.	Aggregated Saltmarsh Tool	Not achieved	Unknown	Achieved	Unknown
		Aggregated Rocky Shore Macroalgal Index	Achieved	Unknown	Achieved	Unknown
		Aggregated Intertidal Seagrass Tool	Achieved	Stable/mixed	Achieved	Stable/mixed
		Intertidal rock community change indicator (MarClim)	GES status unknown/ Uncertain	Unknown	GES status unknown/ Uncertain	Unknown

Table A9: UK MS indicators and targets for D10 Marine Litter

Descriptor	Target 2019	Indicator	North Sea	Trend	Celtic Seas	Trend
D10: MARINE LITTER	A decrease in the total amount of the most common categories of litter found on surveyed beaches	Litter types on beaches	Not achieved	Declining	Not achieved	Declining