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# Review and Evaluation of the Marine Protected Area networks in England and Northern Ireland

## A report commissioned by the Office for Environmental Protection

HMC were commissioned by the Office for Environmental Protection to undertake a review and evaluation of the MPA network in England and Northern Ireland. The views provided in this report are those of HMC and do not represent the opinion or position of the OEP.

**Acknowledgements**

The authors would like to thank the OEP Project team members for their input and advice throughout the development and delivery of this project. We also thank the marine experts and practitioners who gave their time to be interviewed and participate in a workshop, as well as provide additional support throughout.

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| Author | Version | Date |
|---|---|---|
| S Collin, N Smith, Z Pearson, | V1 | 13/11/2024 |
| S Collin, N Smith, Z Pearson, P Whomersley, H Tillin | V2 | 06/12/2024 |
| S Collin, N Smith, Z Pearson, P Whomersley, H Tillin | V3 | 24/01/2025 |
| S Collin, N Smith, Z Pearson, P Whomersley, H Tillin | V4 | 19/02/2025 |
| S Collin, N Smith, Z Pearson, P Whomersley, H Tillin | FINAL | 04/04/2025 |

# 1 Executive Summary

The development of the marine protected area (MPA) networks in England and Northern Ireland has taken place incrementally over the last 50 years and is considered an essential tool for protecting and enhancing the health of marine habitats and species, improving marine ecosystem functioning, and building ecosystem resilience against the impacts of climate change. The MPA network currently covers 40% of England's inshore and offshore waters and 38% of Northern Ireland inshore region, and contains 232 sites, each of which has bespoke conservation objectives, management measures, and monitoring programme.

The UK is signatory to several international commitments, most notably through OSPAR and the Convention on Biological Diversity (CBD), that have set targets to have 30% of its marine area covered by MPAs with effective management in place. Domestic legislation, such as the Marine and Coastal Access Act 2009 and the Marine Strategy Regulations 2010, further require the UK to bring the designated features of MPAs into favourable condition and the wider UK marine environment into 'Good Environmental Status' (GES).

The UK Government and Northern Ireland Executive have identified the MPA network as a key tool for achieving domestic and international targets and commitments, including the achievement of GES. However, while the MPA networks in England and Northern Ireland are well established, and continue to expand, there are questions over how effectively they are being managed and monitored, and to what extent they contribute towards the achievement of GES.

To gain a better understanding of how well the MPA networks in England and Northern Ireland function and assess their impact, particularly with regards to meeting UK domestic and international commitments, the Office for Environmental Protection (OEP) commissioned Howell Marine Consulting (HMC) to conduct an evaluation of the current status of the MPA networks. The commissioned work focused on the following three actions:

- Review and evaluate the current approach to managing the MPA network in England and Northern Ireland waters.
- Review and evaluate the plans and methodologies in place to monitor and assess the MPA network in England and Northern Ireland, including for assessing condition and for enforcement of management measures.
- Provide a high-level assessment of progress towards achievement of UK marine targets and assess their interactions.

To address the above actions, this report begins with an overview of the different pieces of legislation in the UK that contain the powers to designate MPAs in England and Northern Ireland. By understanding the legislative background to MPA designation it becomes easier to understand why the MPA network consists of different types of MPAs with different conservation objectives, management approaches, monitoring programmes, and reporting requirements. An update on the MPA network's contribution to meeting domestic and international targets is also provided.

The report then provides an overview of the different management measures in place across the MPA network, such as byelaws and co-developed management plans, how these measures are developed, and who is responsible for their development and implementation.

Further, information on how marine planning and licensing contribute towards ensuring MPA features are protected from future activities, while ensuring sustainable development can be achieved alongside marine conservation, is included. This section concludes with a review of the whole site approach to MPA management: a current topic of interest driven largely by the designation of Highly Protected Marine Areas in England that have in place conservation objectives that go beyond specific features and aim to improve ecosystem functioning and health within the MPA. The benefits and challenges of this approach are discussed along with potential opportunities for its implementation in the future.

The current approach to MPA monitoring is then discussed, highlighting why monitoring is required, how it is conducted, and this information is used to conduct MPA condition assessments. The challenges with monitoring the marine environment and collecting data on the abundance and distribution of MPA features is discussed, including how MPAs are assessed when confidence in the data available is low.

Following the overview of MPA management and monitoring, an evaluation of the MPA network's contribution towards achieving GES is provided along with an assessment of its coherence and connectedness.

The final component of the report focuses on the impact of climate change on the MPA network, particularly with regards to identifying how to identify MPAs most at risk and how to ensure the MPA network remains effective in achieving its conservation targets in a changing environment.

The findings in this report have been developed through an extensive literature review of academic, government, and other organisation resources, interviews with marine experts and practitioners (who are cited anonymously), and a workshop with government marine experts. The recommendations provided at the end of the report were developed by HMC and reflect our views on the information collected during this project.

## 2 Introduction

In recognition of the highly depleted state of the United Kingdom's marine environment, the Office of Environmental Protection (OEP) has identified improving nature at sea as a priority work area, focusing on England and Northern Ireland's marine regions.[1] Foundational pieces of work conducted by OEP that support this growing area of work were carried out, which included:

- a call for evidence on the drivers and pressures affecting the achievement of GES in the UK marine environment
- a UK Marine Strategy (UKMS) data review to provide an updated assessment of progress towards Good Environmental Status (GES)

The UKMS data review, which assessed the updated Convention for the Protection of the Marine Environment of the North-East Atlantic ('OSPAR') Quality Status Report and other key research and data in the sector, indicated that GES, which applies in all UK waters, is unlikely to have been met in 2020 for most ecosystem components and descriptors from a scientific perspective. This was further supported by stakeholder responses submitted in the call for evidence. The UKMS data review and responses to the call for evidence also highlighted the importance of Marine Protected Areas (MPAs) for achieving targets and commitments in the marine environment and raised concerns regarding their management and effectiveness to date and in the future.

Underpinning MPA legislation is the scientific evidence that MPAs work best when part of a coherent - i.e. connected and representative - network that collectively contributes to biodiversity resilience. The MPA network in England and Northern Ireland is made up of different types of MPAs, specifically:

- Marine Conservation Zones (MCZs),
- Highly Protected Marine Areas (HPMAs)
- Special Areas of Conservation (SACs),
- Special Protection Areas (SPAs)
- Special Sites of Scientific Interest (SSSIs) – England only
- Areas of Special Scientific Interest (ASSIs) – Northern Ireland only
- Ramsar sites.

While the MPA network is well established, containing 232 sites across inshore and offshore waters and covering 40% of England's and 38% of Northern Ireland's marine areas (see Section 3.5), questions remain over how effective it is in achieving its intended objectives and supporting the delivery of UK GES targets.

To support the OEP's understanding, Howell Marine Consulting (HMC), with support from Plymouth Marine Laboratory and ICF, were commissioned to critically appraise the management and effectiveness of MPAs in England and Northern Ireland. The elements of this appraisal build on OEP's earlier foundational work on improving nature at sea, and includes the following key components:

[1] OEP website: Plans for next two years

- Review and evaluate the current approach to managing the MPA network in England and Northern Ireland waters.
- Review and evaluate the plans and methodologies in place to monitor and assess the MPA network in England and Northern Ireland, including for assessing condition and for enforcement of management measures.
- Provide a high-level assessment of progress towards achievement of UK marine targets and assess their interactions.

This report presents the findings of an extensive literature review[2], interviews with experts and practitioners, and an online workshop. It sets out an overview of the status of the MPA network in England and Northern Ireland, focusing on the drivers for establishing MPAs and the growth of the network, the management measures in place, and the approach to monitoring. The report includes a more in-depth evaluation on progress of the MPA network towards meeting targets, the network's contribution to GES, ecological coherence, and resilience to the effects of climate change. A final set of recommendations aimed at maximising the effectiveness and impact of the MPA network is also provided.

# 3 Background and context of MPAs in England and Northern Ireland

This section of the report provides an overview of how the MPA network in England and Northern Ireland came to be, highlighting key international commitments and domestic legislation that provide the powers to designate MPAs and set targets for the network. Further information is provided on the process for designating MPAs, including setting conservation objectives and management measures, as well as an overview of the status of the MPA network.

## 3.1 International commitments

The UK is signatory to several international commitments that contain targets for establishing MPAs and a wider network of well-managed MPAs. The Ramsar Convention on Wetlands (1971), for example, established some of the UK's earliest protected areas, recognising the international importance of coastal wetlands. However, while Ramsar sites are recognised as part of the MPA network in England and Northern Ireland, they are not considered further in this report as they are largely co-designated with other types of MPA (e.g., SSSI, ASSI, SPA, and SAC).

One of the most important international nature commitments is the Convention of Biological Diversity (CBD). More specifically, the Kunming-Montreal Global Biodiversity Framework, which was adopted at the 15th meeting of the Conference of the Parties (COP 15) in December 2022, sets out under Target 3 that at least 30% of the global ocean should be effectively conserved and managed by 2030 (also known as the 30 by 30 target). The UK last officially reported on the CBD in 2019,[3] before these more recent targets. However, as

[2] The literature review included a semi-structured thematic search of academic literature using Google Scholar and Scopus database, relevant UK and Northern Ireland government reports, legislation, and web pages, SNCB reports, industry reports, and NGO reports.

[3] United Kingdom's 6th National Report to the Convention on Biological Diversity

of July 2023, JNCC reports that 40% of English inshore and offshore waters are covered by MPAs, and DAERA reports that 38% of Northern Ireland's waters are covered by MPAs (Section 3.5 sets this out in more detail).

**OSPAR**

The UK is also a signatory to the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic, for which member States have agreed to establish an ecologically coherent network of MPAs across the North-East Atlantic and ensure it is well-managed. As an OSPAR Contracting Party, the UK has committed to furthering the development of the OSPAR network of MPAs, as part of the North-East Atlantic Environmental Strategy, to ensure that:

*'by 2030 the network of marine protected areas (MPAs) and other effective conservation measures (OECMs) cover at least 30% of the OSPAR maritime area and to ensure it is representative, ecologically coherent and effectively managed to achieve its conservation objectives.'*[4]

To date, the UK has nominated a total of 389 MPAs to OSPAR, covering an area of 238,883 $km^2$, including 17,158 $km^2$ beyond its EEZ. This is significantly higher than all other Contracting Parties; Table 1, adapted from the 'Report and assessment of the status of the OSPAR network of Marine Protected Areas in 2023', sets out the next three highest ranking countries for comparison.[5] Similar to the CBD 30 by 30 target, the requirement that the MPAs are effectively managed is less easy to assess as UK-level reporting is focused on condition and vulnerability assessments only.

Table 1: Number of MPAs and aerial extent of top ranking OSPAR Contracting Parties

| Country | Number of MPAs | Areal extent within OSPAR area ($km^2$) | Percent of total area of country's EEZ |
|---|---|---|---|
| UK | 389 | 338883 | 38% |
| Denmark | 40 | 12876 | 12% |
| France | 39 | 22102 | 6% |
| Norway | 32 | 88899 | 4% |

In the most recent UK MPA network assessment submission to OSPAR (October 2023), 21% of the 389 MPAs were considered to be moving towards their conservation objectives (41% partially, 17% no, and 21% unknown).[6] However, only 10% of sites had monitoring in place to assess if management measures were working (79% partial and 12% none). Subsequently, only 3% of sites had a high level of confidence in the final assessment (i.e., sufficient monitoring data in place to have high confidence in the condition of the protected feature); 39% had moderate confidence and 44% had low confidence (remaining 13% noted as not applicable).

[4] https://oap.ospar.org/en/ospar-assessments/committee-assessments/biodiversity-committee/status-ospar-network-marine-protected-areas/assessment-reports-mpa/mpa-2021/#:~:text=By%202030%20OSPAR%20will%20further,to%20achieve%20its%20conservation%20objectives.

[5] Report and assessment of the status of the OSPAR network of Marine Protected Areas in 2023 Note also that reporting is at a UK wide scale.

[6] Information received by OEP through Freedom of Information request.

## 3.2 Legislative obligations

Domestic legislation for MPAs is complex and has been developed iteratively over several decades as the need to protect the marine environment has become increasingly important. This iterative approach led to different types of MPAs being designated under different pieces of legislation, presented in Table 2 (See Annex A for additional details on the legislation).

Table 2: List of legislation in England and Northern Ireland that enables the different types of MPAs to be designated.

| MPA type | English Law | Northern Ireland Law |
|---|---|---|
| SPA and SAC | The Conservation of Habitats and Species Regulations 2017 (as amended) | The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 |
| MCZs and HPMAs | Marine and Coastal Access Act 2009 | Marine Act (Northern Ireland) 2013 |
| SSSI and ASSI | Wildlife and Countryside Act 1981 | Environment (Northern Ireland) Order 2002 |
| Ramsar Sites | Convention on Wetlands<br>Requirements set through legislation associated with underpinning MPAs | Convention on Wetlands<br>Requirements set through legislation associated with underpinning MPAs |

Some of the legislation applies to MPAs in both England and Northern Ireland, while other pieces apply in only one of the countries. Figure 1 provides an overview of the different types of MPAs, their associated legislation, and how they are applied across England and Northern Ireland.

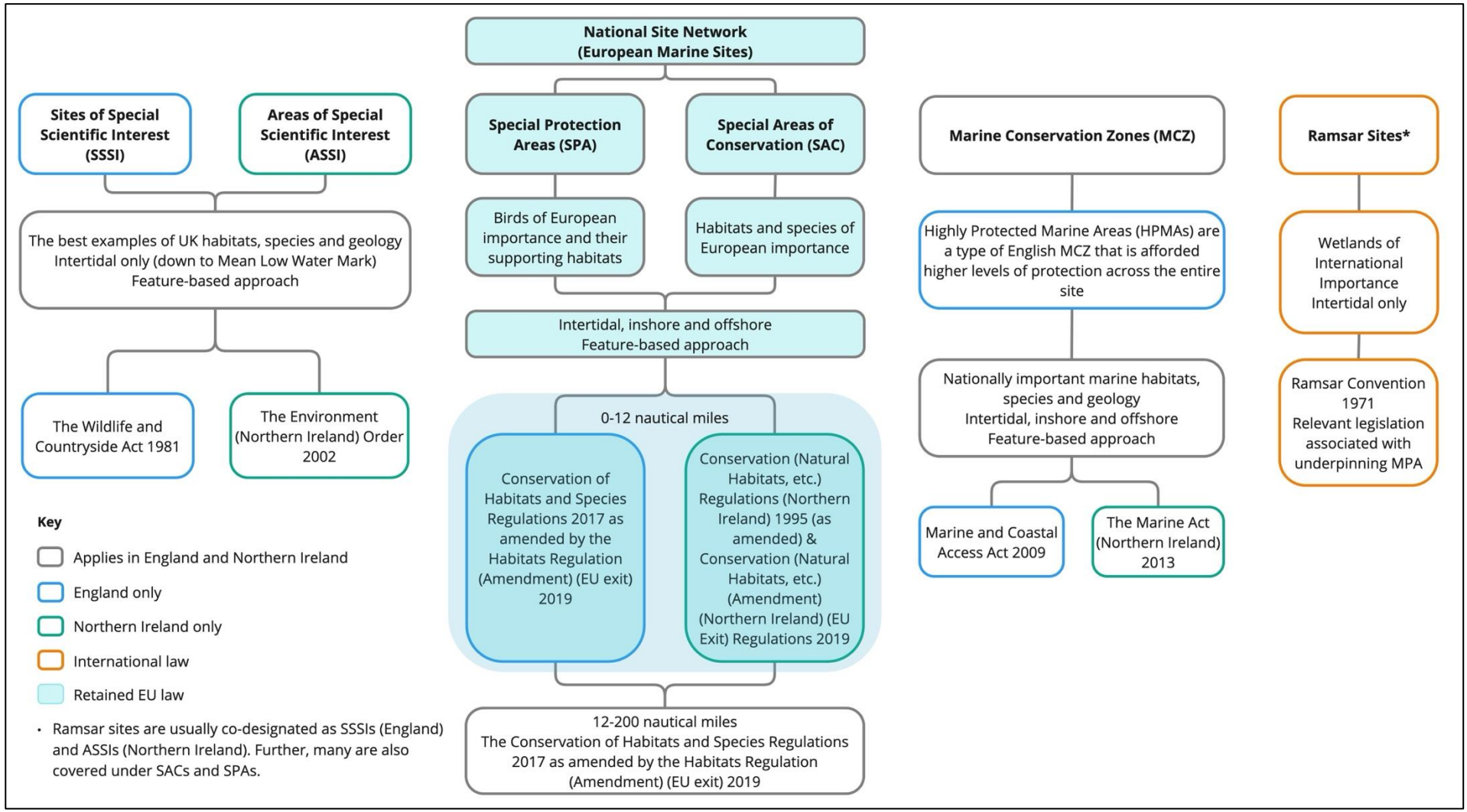


Figure 1: Overview of legislation that provides for the designation of each type of MPA (SSSI, ASSI, SPA, SAC, MCZ, and Ramsar) that make up the MPA networks in England and Northern Ireland.

## EU Habitats and Birds Directives

In 1979, the European Union's (EU) Birds Directive was adopted, which required EU Member States to protect, manage and regulate all species of bird and their most important habitats, within the EU territory of the Member State. The measures put in place should halt their decline or disappearance and allow them to recover and thrive over the long-term.[7] To achieve this, Member States were required to designate SPAs for 197 species and subspecies listed in Annex I of the Directive.

The EU Birds Directive was transposed into UK law under the Wildlife and Countryside Act 1981. In the UK, SPAs with 'marine components' protect birds listed in the Birds Directive that are dependent on the marine environment for all or part of their life cycle. There are 60 bird species currently protected in UK SPAs.[8]

Following the adoption of the Birds Directive, the EU Habitats Directive was adopted in 1992, which aimed to protect 230 characteristic habitat types and over a thousand different species listed as Annex I[9] and Annex II[10] features, respectively. Similar to SPAs, the Habitats Directive required Member States to designate SACs to ensure that Annex I and II species and habitats are maintained or restored to a favourable condition.[11]

The Habitats Directive was transposed into UK law under the Conservation (Natural habitats, &c.) Regulations 1994. The Joint Nature Conservation Committee (JNCC) have produced lists of Annex I[12] and Annex II[13] features that occur in the UK and for which one, or more, SACs has been designated.

Collectively, SPAs and SACs formed part of the EU's Natura 2000 ecological network and were known as European Marine Sites.

Following the UK's exit from the EU in 2016, the Conservation of Habitats and Species Regulations 2017 and the Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 were adopted to enable the continued provision of protection to SPAs and SACs in England and Northern Ireland, respectively.

The 2019 amendment to these Regulations – the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 in England and the Conservation (Natural Habitats, etc) (Amendment) (Northern Ireland) (EU Exit) Regulations 2019 in Northern Ireland – transferred functions from the European Commission to the appropriate authorities in England and Northern Ireland.

The 2019 amendments rebranded European Marine Sites as the National Site Network (NSN), which includes all SPAs and SACs across the UK, in both inshore and offshore waters.[14]

## The Marine and Coastal Access Act 2009

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[7] EU Birds Directive
[8] JNCC: UK MPA Network Feature List 2019
[9] European Environment Agency: Annex 1 EUNIS list
[10] European Environment Agency: Annex 2 EUNIS list
[11] EU Habitats Directive
[12] JNCC Habitats List
[13] JNCC Species List
[14] UK Government: Changes to the Habitats Regulations 2017

The Marine and Coastal Access Act (MACAA) 2009 sets out the need to create a network of MPAs in England. Section 123(3) of MACAA 2009 states that MCZs designated, along with other existing MPAs and relevant conservation sites, specifically SACs, SPAs, SSSIs, and Ramar sites, should form the network.

In Northern Ireland, Section 20 of the Marine Act (Northern Ireland) 2013 sets out the need to create a "network of conservation sites" where the designation of MCZs, taken together with other MPAs, nature conservation MPAs in Scotland, and relevant conservation sites (i.e., SACs, SPAs, ASSIs, and Ramsar sites) form the network.

In both pieces of legislation, it states that the MPA network should satisfy the following conditions:

- The MPA network contributes to the conservation or improvement of the marine environment in the UK marine area.
- The features which are protected by the sites comprised in the network represent the range of features present in the UK marine area.
- The designation of sites comprised in the network reflects the fact that the conservation of a feature may require the designation of more than one site

**The Marine Strategy Regulations 2010**

In 2008, the EU adopted the Marine Strategy Framework Directive (MSFD), which required all member states to take measures to achieve or maintain GES by 2020, which is defined by a series of qualitative descriptors (see Section 6.1). The MSFD was transposed into UK law under the Marine Strategy Regulations 2010, which placed duty on the Secretary of State (SoS) in England and the Northern Ireland Executive to secure compliance with the MSFD. The Marine Strategy Regulations 2010 required the development of a marine strategy for all UK waters, to be coordinated across all four UK Administrations. The UK Marine Strategy (UKMS) has three components:

- Part One – assessment of marine waters,
- Part Two – monitoring programmes, and
- Part Three – programme of measures for achieving GES

Each part of the UKMS is updated every six years (see Section 6.1 for further detail).

**The Environment Act 2021**

The Environment Act 2021 was established to create a long-term legal framework for environmental protection in the UK following its exit from the EU. With the MPA network in England and Northern Ireland well advanced, and the implementation of management measures still in progress, the Act was timely, requiring the SoS to set long-term, measurable targets for the natural environment in England. The Environmental Targets (Marine Protected Areas) Regulations 2022 ('MPA Regulations 2022') establishes these targets, broadly defining what favourable condition means for features of MCZs, SACs, and SPAs covered by the targets (Annex B). The subsequent Environmental Improvement Plan (EIPs) for England[15] introduced interim targets. The Environment Act targets do not apply to

[15] UK Government: Environmental Improvement Plan 2023

Northern Ireland, however the EIP for Northern Ireland[16] establishes non-statutory targets for MPA condition and extent.

While the Environment Act covers both England and Northern Ireland, it does not require binding targets in Northern Ireland and, therefore, only the English targets are statutory. Figure 2 summarises interim and long-term targets. The English MPA targets do not, however, apply to the coastal components of SSSIs, which are instead covered by separate targets in the EIP for England to restore 75% of SSSIs to favourable condition by 2042. Two interim targets, also set out in the EIP for England, require all SSSIs to have an up-to-date condition assessment and 50% to have actions on track to achieve favourable condition by January 2028.

The latest data for England, set out in Defra's Marine Protected Areas Network Report 2019–2024, is that 44% of protected species and habitats are in favourable condition.

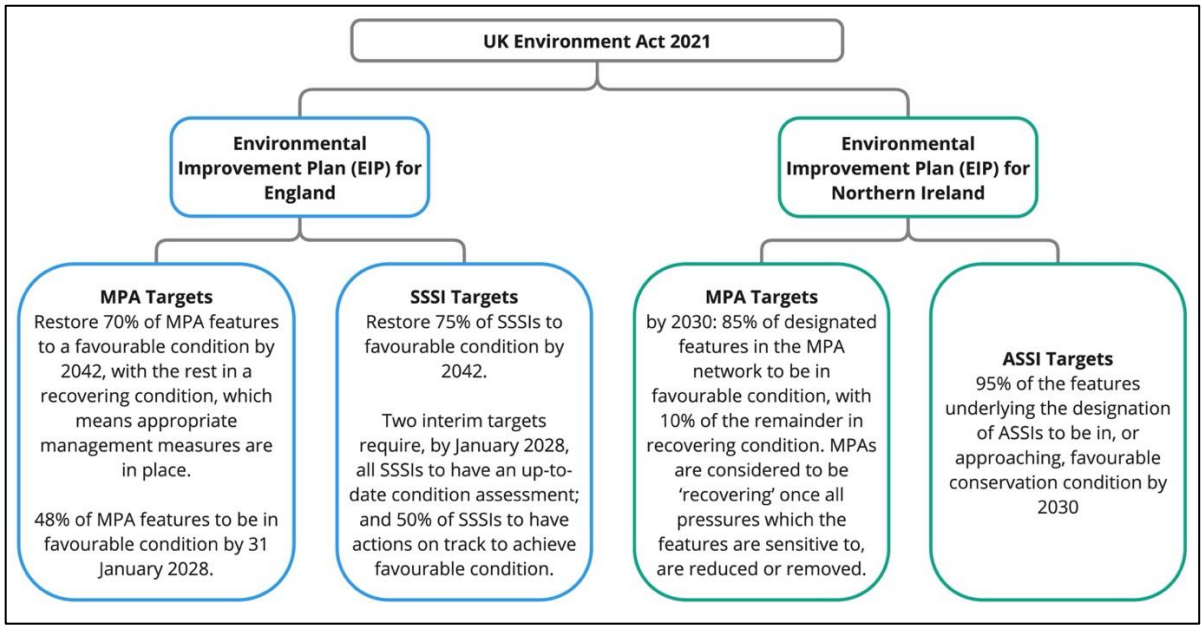


Figure 2: Environment Act 2021 implementation and country targets relating to sites within the English and Northern Irish MPA network

The Northern Ireland MPA target, set out in the EIP for Northern Ireland, requires 85% of designated features in the MPA network to be in favourable condition, with 10% of the remainder in recovering condition by 2030. MPAs are considered to be 'recovering' once all pressures the features are sensitive to are reduced or removed. Separate ASSI targets require 95% of the features underlying the designation of ASSIs to be in, or approaching, favourable conservation condition. DAERA's Northern Ireland Environmental Statistics Report 2024[17] sets out that 40 out of 46 marine features, equating to 87%, are currently in favourable condition. However, it should be noted that concerns were raised that the scientific methodology to reach this figure has not been made public (Interview).

[16] DAERA: Environmental Improvement Plan for Northern Ireland
[17] Northern Ireland Environmental Statistics Report 2024, Table 5.2b

While English MPAs and SSSIs are managed and monitored under separate regimes, there appears to be more integration of coastal ASSIs into MPA regimes in Northern Ireland where they are more formally recognised as part of the MPA network.[18]

**Energy Act 2023**

Section 291 of the Energy Act 2023 contains an environmental compensation obligation, which includes a statutory duty to ensure measures are taken to compensate for adverse environmental impacts of offshore wind development. The intention is that strategic compensation may be delivered in relation to one or more relevant offshore wind activities, through the powers in Subsection 3. To enable compensatory measures to be delivered for unavoidable environmental impacts to seabed habitats within MPAs, Defra has committed to designating new MPAs and/or extending existing MPAs[19]; a measure that can only be delivered strategically, rather than on a project-by-project basis.

The MPAs will be in SoS waters, and will be identified, based on ecological principles, in collaboration with Statutory Nature Conservation Bodies (SNCBs). Once a developer application to use this measure has been approved, the established legislative processes for designating an MPA will be followed (i.e., the process established under MACAA 2009).

The use of MPA designation as strategic compensation for offshore wind developments is considered a temporary measure, with applicants limited to:

- those who have already secured a lease under the Crown Estate's Leasing Round 3, Round 4 or the 2017 Extensions Round, or in the process of securing a lease under the current Leasing Round 5,
- those that have already been granted consent for development but are unable to discharge their consent conditions or where adaptive management may now be required as the agreed compensation measures have not had the expected impact, and
- associated transmission projects (e.g., cabling routes).

Defra plan to consult in spring 2025 on reforms to the environmental compensation requirements for offshore wind developments, with the aim to bring legislation by autumn 2025.[20] As the process for designating (or extending) MPAs as a strategic compensation measure is still in development, it will not be covered in this report.

## 3.3 Public authorities with MPA responsibilities

MPA legislation in England and Northern Ireland requires all public authorities[21] to exercise their statutory functions in line with the conservation objectives for a site. For example, Section 125 of the MACAA 2009 places general duties on any public authority that has responsibility for an activity capable of significantly affecting the protected features of an

[18] DAERA: Consultation on the Northern Ireland Marine Protected Areas Strategy Review
[19] Defra: Offshore Wind Development: Library of Strategic Compensation Measures
[20] UK Parliament Hansard: Marine Environment – Parliamentary Under-Secretary of State for Environment, Food and Rural Affairs
[21] Relevant authorities are set out in MACAA 2009 (Ch. 3) for MCZs and Section 6 of The Conservation of Habitats and Species Regulations 2017[21] for marine SPAs and SACs in England. In Northern Ireland, relevant public authorities are provided in Section 4 of The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 for marine SPAs and SACs.

MCZ. The key public authorities, along with their relevant responsibilities for MPA management, are set out in Table 3.

Table 3: Overview of public authorities and their MPA management responsibilities.

| Public Authority | Responsibilities |
|---|---|
| Inshore Fisheries and Conservation Authorities (IFCAs) | The Marine and Coastal Access Act 2009 places a duty on IFCAs to sustainably manage sea fisheries resource and protect marine ecosystems in their Districts (covering England's inshore waters out to 6 nm). Their main regulatory tools for MPAs are byelaws (See Section 4.1.1) |
| Marine Management Organisation (MMO) | The Marine and Coastal Access Act 2009 gives the MMO powers as the lead domestic regulator for England for implementation and compliance with fisheries measures between 6-200 nm. Their main regulatory tools for MPAs are byelaws (See Section 4.1.1)<br>The MMO is also the lead regulator for licensable activities, such as construction, alteration or improvement of works, dredging and disposal within England's marine area, as well as activities requiring a marine wildlife licence. |
| Environment Agency (EA) | The Environment Act 1995 defines the EA's general powers and responsibilities for regulating pollution, managing water resources, and protecting the environment, including environmental permits for discharges from terrestrial sources. |
| Oil and Gas Authority (OGA) | The Energy Act 2016 gives the OGA authority to provide licensing for exploration and exploitation of oil and gas reserves. |
| Department for Energy Security and Net Zero (DESNZ) | Oil and gas related activities<br>Renewable energy related activities<br>Support emerging Carbon Capture, Usage and Storage and hydrogen sectors |
| Offshore Petroleum Regulator for Environment and Decommissioning (department of DESNZ) | Regulating environmental and decommissioning activity for offshore oil and gas operations, including carbon capture and storage operations, on the UK continental shelf. |
| Harbour Authorities | The Marine and Coastal Access Act 2009 allows for byelaws related to marine conservation zones that may affect port activities. |
| Local Planning Authorities (LPAs) | The Local Government Act 1972 provides LPAs to create byelaws for activities on beaches, and The Marine and Coastal Access Act 2009 enables local authorities to assist in managing Marine Conservation Zones (MCZs).<br>LPAs are responsible more generally for management of activities at the coast, including coastal recreation, public rights of way, tourism, and planning and development on coasts and estuaries, including aquaculture in the intertidal zone. |
| Department for Transport | Environmental impacts associated with ports and shipping, including pollution from ships. |
| The Planning Inspectorate | Activities requiring Development Consent Orders under the Planning Act 2008, regarded as Nationally Significant Infrastructure Projects |
| Joint Nature Conservation Committee (JNCC) | The Natural Environment and Rural Communities Act 2006 (NERC Act 2006) establishes JNCC as a statutory advisor on nature conservation. |

| | |
|---|---|
| | The Wildlife and Countryside Act 1981 extends this to SSSIs, Conservation of Habitats and Species Regulations 2017 extend advice to SACs and SPAs and the Marine and Coastal Access Act 2009 extends this advice further to MCZs.<br><br>JNCC is responsible for nature conservation advice in the offshore marine environment (12-200 nm), supporting government and industry to use the offshore environment sustainably through identifying, monitoring, and advising on protected areas, and advising on the impacts of offshore industries. |
| Natural England (NE) | The Natural Environment and Rural Communities Act 2006 (NERC Act 2006) establishes NE as a statutory advisor on nature conservation.<br><br>The Wildlife and Countryside Act 1981 extends this to SSSIs, Conservation of Habitats and Species Regulations 2017 extend advice to SACs and SPAs. The Marine and Coastal Access Act 2009 extends this advice further to MCZs.<br><br>NE is the Government's statutory advisor on nature conservation in English territorial waters (0-12 nm), although it should be noted that NE also has delegated responsibility to provide conservation advice relating to renewable energy developments out to 200 nm.[22] Regulators are required to seek NE's advice on the achievement of MPA conservation objectives and the mitigation of potential impacts. |
| Department of Agriculture Environment and Rural Affairs (DAERA) | The Environment (Northern Ireland) Order 2002 provides DAERA with the powers to protect the environment by regulating pollution, waste management, and industrial emissions, which is relevant for the designation and management of ASSIs.<br><br>The Wildlife and Natural Environment Act (Northern Ireland) 2011 expands DAERA's powers to conserve wildlife and biodiversity and strengthens enforcement for the protection of habitats and species, including species on the coast such as seabirds and seals.<br><br>The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 gives DAERA authority to designate and manage SACs and SPAs.<br><br>The Marine Act (Northern Ireland) 2013 gives DAERA powers to regulate marine conservation and designate MCZs.<br><br>DAERA's Marine and Fisheries Division is responsible for designating and protecting MPAs, providing marine conservation advice and guidance, marine monitoring, and marine licensing. |
| Agri-Food and Biosciences Institute (AFBI) | A non-departmental public body, established under the Agri-Food and Biosciences Institute (Northern Ireland) Order 2004, sponsored by DAERA that provides scientific research and services to government, NGOs, and commercial organisations. |

General duties also apply to other public body functions that do not involve authorising or consenting activities (listed in Section 322 of the MACAA 2009) to carry out their functions in a manner that they consider "best furthers – or least hinders" conservation objectives (as set out in MACAA 2009, Explanatory Note 355). For example, a coastal local authority may have statutory functions associated with keeping public amenity beaches clean. Where those beaches are also a designated MPA feature, such as sandy bays within SACs[23], cleaning must be carried out in a manner that does not hinder conservation objectives.

[22] UK Government: Advice on working with public bodies in the infrastructure planning process, Annex C: NE and the Planning Inspectorate

[23] For example, the Berwickshire and North Northumberland Coast European Marine Site: Management Scheme 2014

## 3.4 MPA implementation

International best-practice sets out that MPA design and management should follow an adaptive approach, which is often demonstrated through the concept of an MPA management cycle.[24] While it is not explicit, Part 5, Chapter 1: Marine Conservation Zones of MACAA 2009 sets out multiple sections that demonstrate the need for reviewing MCZ management measures to inform any necessary adjustments based on new evidence and changing environmental conditions. Similarly, the Conservation of Habitats and Species Regulations 2017 sets out, across multiple regulations, mechanisms for adaptive management of SACs and SPAs. These include the ability to amend management schemes and byelaws.

Several examples of the MPA management cycle have been produced or used across Defra Arm's-Length Bodies (ALBs), to reflect different responsibilities and approaches, but they generally cover the key stages of MPA site identification, designation, management, monitoring and enforcement of compliance with MPA regulations. Table 4 provides an extended list of the different stages of the MPA management cycle, highlighting the different authorities responsible in England and Northern Ireland at each stage of the process (sometimes multiple authorities for a single stage).

[24] UNEP MPA Lifecycle Implementation

Table 4: Overview of lead authorities responsible for the identification, designation, management, monitoring, and enforcement of MPAs in England and Northern Ireland.

| MPA management cycle stage | England | Northern Ireland |
|---|---|---|
| **Inshore** | | |
| MPA site identification | NE | DAERA |
| MPA designation | Department for Environment, Food, and Rural Affairs (Defra) | DAERA |
| Conservation advice and objectives | NE | DAERA |
| Identification and implementation of MPA management measures<br><br>(developed in collaboration with relevant SNCB) | Fisheries management:<br>Inshore Fisheries and Conservation Authorities (IFCAs) (0-6 nm)<br>MMO (6-12 nm)<br><br>Management of other activities:<br>MMO | DAERA |
| MPA Condition Monitoring | NE<br>Centre for Environment, Fisheries and Aquaculture Science (Cefas)<br>IFCAs | DAERA<br>Agri-Food Bioscience Institute (AFBI)<br>Northern Ireland Environment Agency (SPAs only) |
| MPA Condition/Vulnerability Assessment | NE | DAERA |
| MPA compliance and enforcement** | MMO<br>IFCAs | DAERA |
| Marine licensing* | MMO | DAERA |
| **Offshore** | | |
| MPA site identification | Joint Nature Conservation Committee (JNCC) | JNCC |
| MPA designation | Defra | Defra |
| Conservation advice and objectives | JNCC | JNCC |
| MPA Management | MMO | DAERA, MMO |
| MPA Monitoring | Cefas<br>JNCC | AFBI, Cefas, JNCC |
| MPA Condition/Vulnerability Assessment | JNCC | JNCC |
| MPA compliance and enforcement | MMO | DAERA, MMO |
| Marine licensing* | MMO | MMO |

*licensing is not generally considered part of an MPA management cycle, but is an important management measure within the UK, so included here for completeness.

**MPA compliance and enforcement is an important component of MPA management but is out of scope for this project due to the range and complexity of enforcement approaches in place across the MPA network.

Where MPAs straddle inshore (0-12 nm) and offshore (12-200 nm) delineations, falling into the responsibility of multiple authorities, a collaborative approach is taken (Interview). For example, JNCC and NE jointly provide advice for the Offshore Overfalls MCZ because it is

located in both offshore and inshore waters.[25] Other sites, such as the North Channel SAC covers both Northern Ireland inshore and offshore waters and, therefore, DAERA and JNCC jointly provide advice.[26]

## 3.5 Conservation objectives

The development of MPA conservation objectives is an important part of the designation process as it sets out the ecological aims for the habitat and/or species features of MPAs, providing the foundation from which to develop management measures and monitoring approaches. SNCBs are responsible for providing conservation advice and setting conservation objectives, at the time of MPA designation, and assessing the condition of MPAs in their jurisdiction (see Table 3 and Annex A for an overview of legal duties within the legislation).

For MCZs, conservation objectives are developed on a case-by-case basis and are, therefore, developed as part of the original 'designation order'[27], with input from NE, JNCC, or DAERA depending on where the MCZ is located. Therefore, once the MCZ is designated, the conservation objectives are already in place. Box 1 provides an example of the process for developing MCZ conservation objectives and their translation into management measures.

[25] JNCC: Offshore Overfalls MPA
[26] JNCC: North Channel MPA
[27] Each MCZ is established by a legal order made by Defra under section 116(1) of MACAA 2009, or DAERA under Section 13 of the Marine Act (Northern Ireland) 2013, which designates an area as an MCZ, defines that area, lists the features being protected, and specifies the conservation objective or objectives of the MCZ. The orders are referred to as 'designation orders'. See Defra MCZ Designation Explanatory Note for more information.

## Box 1: Development of conservation orders and management of the Offshore Overfalls MCZ – case study

The Offshore Overfalls MCZ* straddles England's offshore and inshore waters and, therefore, JNCC and Natural England are jointly responsible for providing conservation advice, setting conservation objectives, and advising on MPA management measures.

The key stages in designation and management of the Offshore Overfalls MCZ are provided below:

- The site was recommended as an MCZ site by the Balanced Seas Regional Stakeholder Group in 2011
- JNCC and Cefas surveyed the site in 2012 to improve confidence in the presence and extent of broad-scale habitats and habitat features of conservation importance (FOCI). The survey confirmed the presence of the following features:
    - Subtidal coarse sediment
    - Subtidal mixed sediments
    - Subtidal sand sediment
    - Moderate energy circalittoral rock
- JNCC provided conservation advice on those features based on analysis of survey data and set the following conservation objectives, which are included in the MPA Designation Order:
    - "Subject to natural change, the broad-scale habitats Subtidal coarse sediment, Subtidal sand and Subtodal mixed sediments features are to remain in or be brought into favourable condition"
- In addition to conservation advice, JNCC and NE may also be required to provide advice and guidance for activities that are capable of damaging protected features (MACAA 2009, Section 127). For the Offshore Overfalls MPA, the following advice was provided:
    - MCZ Fisheries Advice (JNCC and NE)
    - MCZ Licensed Activitiues Advice (JNCC and NE)
    - Pre-consultation and post-consultation scientific advice for Tranche Two MCZs
- Sensitivity information for the protected features within the site were provided in a Technical Report for the MPA.
- The MPA features are monitored by JNCC and Cefas: the initial site survey in 2012 and the most recent survey in 2020.
- Information available through the Technical Report, monitoring data, and advice on activities provide an important resource for those who are:
    - Carrying out any activity that may impact the protected features of the site and need to find out how to operate within the law;
    - An authority providing advice on specific proposals; and/or
    - An authority responsible for putting management measures in place

Further information can be found on JNCC's Site Information Centre webpage for the Offshore Overfalls MPA

The development of conservation objectives for the NSN, however, has followed a different process to MCZs. For NSN sites, there is a standard set of high-level conservation objectives (HLCOs) that apply to any new site, regardless of the designated feature. HLCOs aim to ensure that, subject to natural change, the site's integrity is maintained or restored as appropriate, and that the site contributes to achieving a favourable conservation status of its qualifying features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of the qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of the qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of each of the qualifying species
- the distribution of qualifying species within the site

Draft conservation objectives are developed by the relevant authority (i.e., NE, JNCC, or DAERA) throughout the designation process for NSN MPAs. For example, the designation of offshore SACs has several stages where conservation advice and objectives developed by JNCC evolve at each stage, including revising draft SAC proposals through public consultation, developing draft conservation objectives for candidate SACs, and developing the formal conservation objectives that must be in place at the time the government designates the SAC.[28] Information on SAC and SPA conservation advice and objectives are published on JNCC's website[29], such as JNCC's conservation advice for the Dogger Bank SAC, which includes conservation objectives and supplementary advice.[30]

Although HLCOs are in place at the point of designation of NSN MPAs, SNCBs are required to provide Supplementary Advice on the Conservation Objectives (SACO) to further refine the HLCOs and tailor them to suit the species and site conditions. For example, NE has a policy requiring SACO to be provided within six months of designation (Interview). However, conservation advice continues to evolve and be updated over time as new evidence becomes available (Interview).

Prior to the UK leaving the EU in 2016, candidate SACs and SPAs had to be proposed to the European Commission, where, if approved, they become Sites of Community Importance (SCIs). SCIs were then required to be designated by UK Government within six years, with conservation measures established and applied from the time of designation. Since leaving the EU, however, the functions of the European Commission have been transferred to relevant authorities in the UK and the process for designating offshore NSN MPAs is, so far, untested as there have not been any new designations in England or Northern Ireland (Interview).

While there is no direct reference to conservation objectives in the legislation for SSSI and ASSI, the need is implied through the Statement on Common Standards for Monitoring[31], which was developed by SNCBs to provide an agreed and consistent approach to the

[28] JNCC: Offshore SAC Designation Process
[29] JNCC: SAC and SPA: site condition, citations and conservation objectives
[30] JNCC: Dogger Bank MPA – Conservation Advice 2022
[31] JNCC: Statement of Common Standards for Monitoring Protected Sites 2022

assessment of condition on statutory sites designated through UK legislation and international agreements. For sites that have multiple designations (e.g., SSSI/ASSI and SAC designations), joint management plans can be developed that incorporate the conservation objectives from each of the designations.

## 3.6 A brief history of MPA designation in England and Northern Ireland

The UK's first MPA was the Lundy voluntary marine nature reserve, located in the Bristol Channel, which was established in 1971. Until the adoption of the Wildlife and Countryside Act 1981, there was no statutory mechanism for formally designating MPAs. In 1986, Lundy[32], along with Skomer Island in Pembrokeshire, Wales (1990[33]), and Strangford Lough in Northern Ireland (1995[34]) became the first legally designated 'Marine Nature Reserves' under the Act.

Following the designation of Marine Nature Reserves, SPAs and SACs were designated in England and Northern Ireland under the EU's Birds and Habitats and Directives, respectively. The first SPAs designated the Wash in 1984 (England) and Swan Island in 1992 (Northern Ireland). There are currently 84 SPAs in England (with a further six straddling either offshore waters or another devolved jurisdiction) and 16 SPAs in Northern Ireland.[35]

The first SACs with a marine component designated in England and Northern Ireland were the Lundy Island SAC and the Strangford Lough SAC, respectively; both of which were designated in 2005.[36] Currently, there are 40 SACs with marine components in England (including 13 that straddle other jurisdictions and the offshore) and eight in Northern Ireland (including one offshore).[37]

To further expand the range of features protected within the MPA network, MCZs, were designated under the MACAA 2009 to protect a range of nationally important, rare or threatened habitats and species. A feature-based approach to designating MCZs was used. In 2008, four Regional Project Groups were established to work with stakeholders to identify recommendations for MCZs within their respective regions: the south-west (Finding Sanctuary), the Irish Sea (Irish Sea Conservation Zones), the North Sea (Net Gain), and the south-east (Balanced Seas). The final list of MCZs were designated in three tranches between 2013-2019. Most recently, three HPMAs under the same legislation, were designated in England in 2023.[38]

In England, as of January 2025, the MPA network of SACs, SPAs, and MCZs consisted of 158 MPAs in inshore waters (0-12 nm), covering 51% of this region (26,126 km$^2$), and 42 MPAs in offshore waters (12-200 nm), covering 37% of the offshore area (66,690 km$^2$). There are 19 MPAs which straddle both offshore and inshore waters. Altogether, there are

[32] UK Government: MCZ 2013 Designation: Lundy
[33] Wales Government: Skomer Marine Conservation Zone
[34] Strangford and Lecale AONB: Strangford Lough MPA
[35] JNCC: Special Protection Areas
[36] JNCC: SACs with marine components (all UK waters) 2020
[37] JNCC: SACs with marine components (all UK waters) 2020
[38] JNCC: Marine Conservation Zones

181 MPAs covering 40% of English inshore and offshore waters, with a combined area of 92,817 km$^2$ (Figure 3).[39]

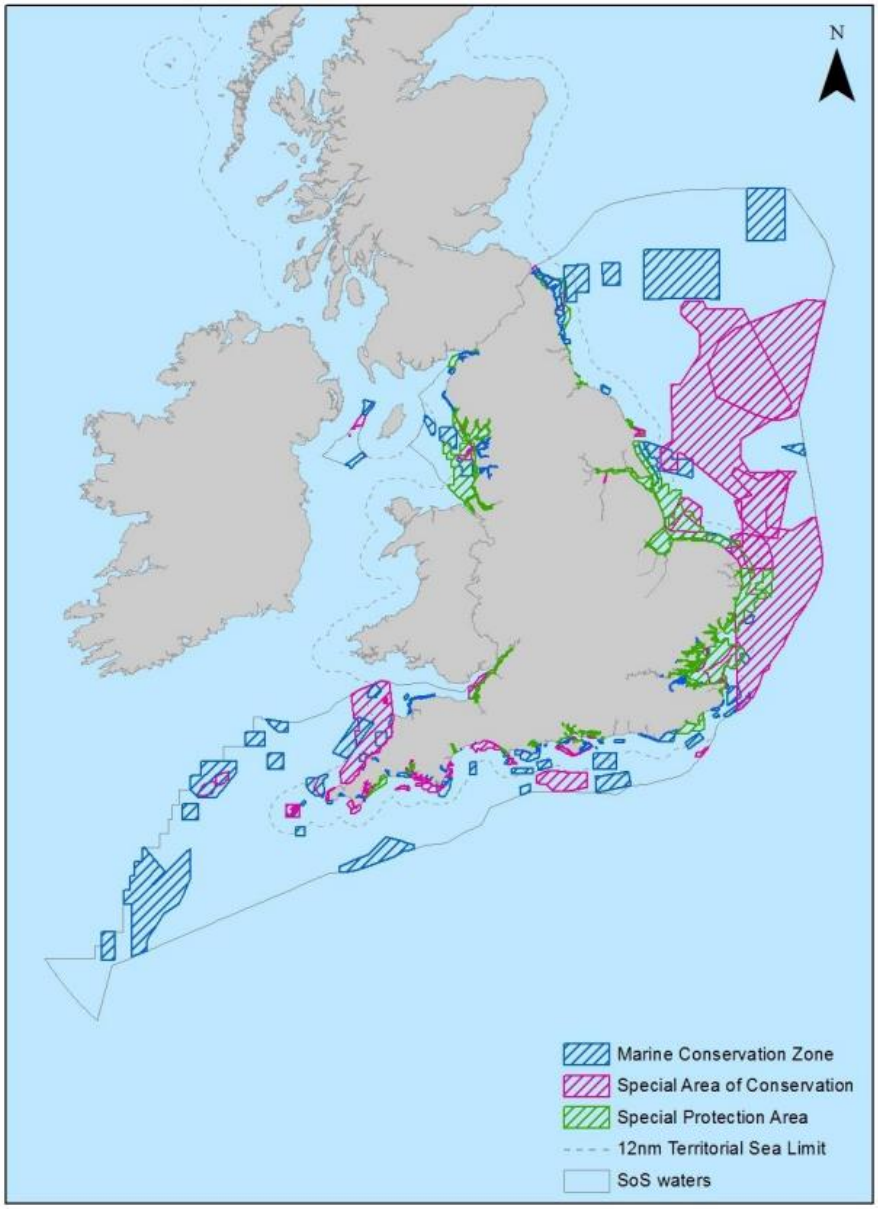


Figure 3: Map of the MPA network in England, including MCZs, SACs, and SPAs[40]

In Northern Ireland, the MPA network is made up of 25 MPAs (SACs, SPAs, and MCZs), covering 35.5% (2,420 km$^2$) of Northern Ireland's waters (Figure 4). There are 21 MPAs covering 38% (2,022 km$^2$) of Northern Ireland's inshore waters and five MPAs covering 26.5% (398 km$^2$) of offshore waters.[41] One MPA (North Channel SAC) straddles both Northern Ireland's inshore and offshore waters, and one (North Anglesey Marine/Gogledd Môn Forol SAC) that straddles both Welsh and Northern Ireland offshore waters.

[39] JNCC: UK MPA network statistics
[40] Defra: Biodiversity Marine target: Detailed evidence report 2022
[41] JNCC: UK Offshore MPA Spreadsheet

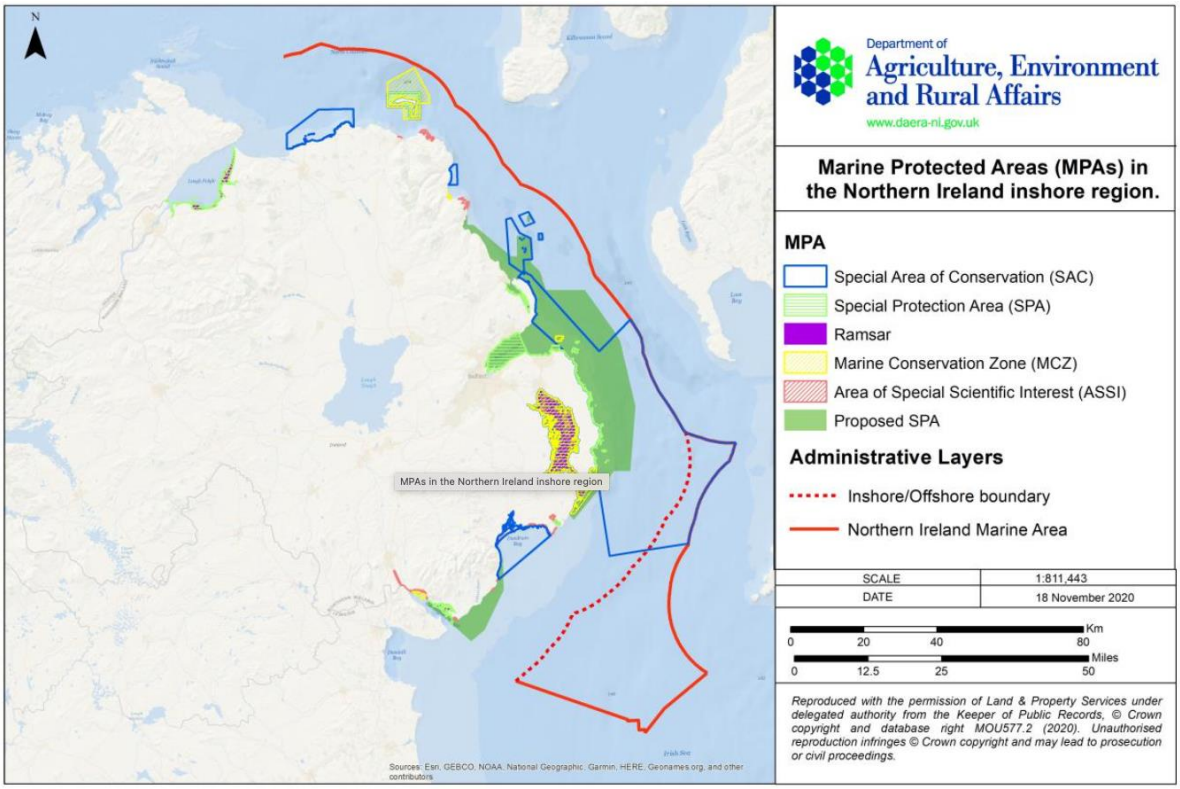


Figure 4: Map of the MPA network in Northern Ireland, including MCZs, SACs, SPAs, ASSIs, and Ramsar sites.[42] The inclusion of ASSIs and Ramsar sites increases the number of MPAs in Northern Ireland MPA network from 25 to 48.

A standardised UK MPA Features List was created by the JNCC, in collaboration with relevant national SNCBs across the UK, that provides a stocktake of all features in UK waters that are protected through the MPA network.[43]

## 4 Review of MPA management measures

This section of the report provides an overview of the different management measures in place for MPAs in England and Northern Ireland, focusing on three main areas: fisheries, marine non-licensable activities, and planning and licensing. A review exploring the benefits and challenges of the whole site approach to MPA management, which has become an area of interest particularly since the designation of HPMAs in England, is also provided. Throughout this section, case studies have been included to provide further detail on different MPA management types and evidence from interviews with experts is also included.

An MPA without effective management, often referred to as a 'paper park', will not fully protect its designated features or achieve its conservation objectives. The conservation objectives for each MPA provide important information for regulators responsible for developing and implementing management measures (i.e., MMO, IFCAs, and DAERA). In England, SNCBs (i.e., NE (inshore), and JNCC (offshore)) have a duty to provide advice on

[42] DAERA: Marine Protected Areas
[43] JNCC: UK MPA Network Features List

MPA conservation objectives and management measures if requested by the relevant authority. In Northern Ireland, DAERA's Marine and Fisheries Division performs the equivalent advisory role for the inshore and JNCC for the offshore environment.[44]

The advice provided by SNCBs supports those responsible for designing effective MPA management measures, which includes identifying the types of activities that could hinder MPA conservation objectives. Further, it advises regulators making decisions on marine planning, and licensing consents.

MPA management measures vary substantially, depending on location, type of feature(s) being protected, and the type and amount of pressure (e.g., human activity) being managed. But they can generally be classified into two main categories; the reduction of existing pressures, such as fishing or non-licensable activities like sailing, on MPAs through byelaws and voluntary measures, and the management and mitigation of future pressures in MPAs through marine and terrestrial planning and licensing systems.

## 4.1 Fisheries management

In England and Northern Ireland, the Fisheries Act 2020 sets out the current fisheries management regime, which includes fisheries objectives, statements, and management plans.[45] The management of fisheries has tended to focus on maintaining fish stocks through measures such as licensing, quotas, gear and effort restrictions, and minimum landing sizes. However, with the introduction of MPAs and the requirement to protect designated features and support the achievement of MPA conservation objectives, management measures had to be introduced that focused on the removal of pressures from human activity (including fishing). Subsequently, MPA management measures, delivered under the MACAA 2009, included creating areas where fishing activity (or specific fishing methods, such as dredging) is prohibited. Section 48 of the Fisheries Act 2020 also contains an amendment to the MACAA 2009 that gives the MMO and the 'Northern Ireland Department' (i.e., DAERA) powers to make byelaws or orders relating to the exploitation of sea fisheries resources for conservation purposes.

For offshore waters (12-200 nm) in England and Northern Ireland, the MACAA 2009 (Sections 129, 129A, 129B, 133(7)) empowers the MMO and DAERA to implement fisheries byelaws for the purpose of protecting habitats and species from activities that may harm them. Up until 2016, when the UK voted to leave the EU, fishing activities beyond 12 nm were managed under the Common Fisheries Policy (CFP) (Article 11) and required joint recommendations to be developed where other EU Member States had fishing interests within a Natura 2000 site (NSN MPA). Subsequently, fisheries management measures were not introduced in offshore MPAs in a substantive way. However, since leaving the EU in 2016, consensus with other EU States is no longer required and the MMO, using new powers under the Fisheries Act 2020, introduced fisheries management byelaws.

[44] DAERA: Monitoring marine habitats and species

[45] Note in Northern Ireland provisions are subject to the Northern Ireland Protocol post-EU exit.

### 4.1.1 Fisheries management in MPAs in England

In 2013, the UK Government published its revised approach to management of fishing in SPAs and SACs in English waters[46] to ensure its European Marine Sites (NSN MPAs) were managed in line with Article 6 of the Habitats Directive.[47] The approach was later extended to include all MCZs.[48]

The revised approach to management required an assessment of the impact existing commercial fisheries have on MPA features. Under this approach, responsibilities for assessing impact and developing management measures for inshore sites were given to IFCAs (inshore 0-6 nm) and the MMO (inshore 6-12 nm) (Figure 5).

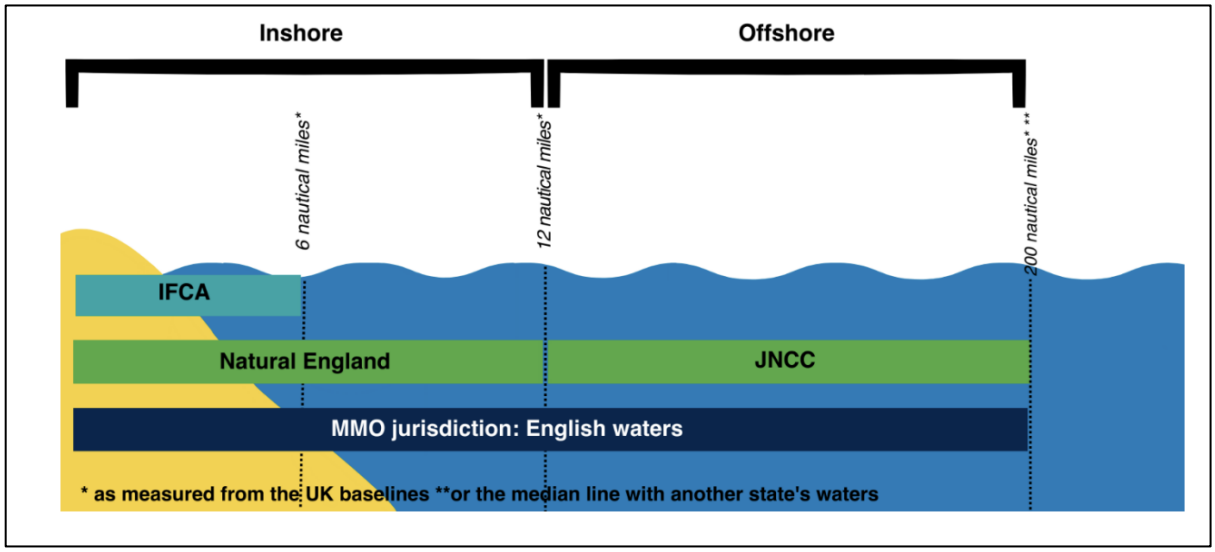


Figure 5: The jurisdictions of MMO, JNCC, NE, and IFCA for fisheries management in England.[49]

#### 4.1.1.1 IFCA byelaws

Established in 2011, following the adoption of the MACAA 2009, IFCAs are the competent authority for the management of sea fisheries resources between 0-6 nm off the coast in England.[50] In addition to their role as inshore sea fisheries regulators, IFCAs also have a responsibility for the protection of marine ecosystems, which centres on ensuring fisheries management measures in MCZs are in place and the necessary steps are taken to further the conservation objectives of MPAs, as set out in Sections 153 and 154 of the MACAA 2009.[51] IFCAs are also responsible for fisheries management measures in other MPAs in inshore waters (e.g., SACs and SPAs). In total, there are 10 IFCAs covering England's inshore waters.

[46] UK Government: Revised approach to the management of commercial fisheries in European Marine Sites: overarching policy and delivery
[47] Article 6 sets three provisions: setting conservation measures (e.g., management plans), implementing preventative measures to avoid deterioration of habitats, and setting out procedural and substantive safeguards governing plans and projects.
[48] UK Government: Managing fishing in MPAs
[49] MMO: Stage 3 call for evidence on the assessment and management of the impacts of fishing on seabed features in 41 MPAs.
[50] Association of IFCAs: Byelaws we are involved in
[51] AIFCA: Management of Inshore MPAs by the IFCAs 2011 to 2018

To enable them to meet their responsibilities to manage inshore fisheries and support MPAs in achieving their objectives, IFCAs have the powers under Section 155 of the MACAA 2009 to implement fisheries management measures using a range of approaches, which include:

- **MPA Byelaws** (e.g., Sussex IFCA MPA Byelaw for the Kingmere MCZ). IFCAs lead on the development and implementation of fisheries byelaws within their jurisdiction in the 0-6 nm area that protect MPAs. Management options under a proposed byelaw are consulted upon with industry before the IFCA committee ultimately makes the final decision on submitting it to the MMO for quality assurance, Defra for confirmation, and finally the SoS for approval.[52] The byelaw may be confirmed without modification or with modifications that are agreed to by the IFCA.[53]
- **Fisheries Orders** (e.g., the Fal Fishery Order (2016) managed by Cornwall IFCA). There are three types of Fisheries Order: a regulating order that provides power to regulate and restrict fishing for, dredging, or otherwise taking shellfish within a specified area; a several order, which is granted for setting up or improving private shellfisheries; and a hybrid of the two. Powers include issuing licences, setting conditions and restrictions, management of the shellfishery, and excluding unlicensed people from the shellfishery.[54]
- **Fishing Permits** (e.g., Devon and Severn IFCA Permitting Byelaws for Mobile Fishing, Potting, Diving, and Netting). Permits are a legal mechanism for managing fishing activity, both commercial and recreational. Permits are purchased and give the permit owner permission to fish for a specified species, using a specified method. Permit holders are under a legal obligation to adhere to the specifications of the permit.
- **Voluntary measures** (e.g., Isles of Scilly MCZ, developed by Isles of Scilly IFCA). A voluntary, non-statutory agreement between stakeholders to manage a specific marine area for nature conservation.

#### 4.1.1.2 MMO byelaws in England

The MMO has the powers to designate byelaws to deliver MPA conservation objectives from 0-200 nm and leads on management between 6-200 nm. These byelaws can be established for the conservation of marine flora, fauna and habitats and apply to all domestic and international fishing vessels. MMO byelaws can also be applied to areas outside of MPAs.

The MMO follows a similar process to the IFCAs in developing byelaws for MPAs. They assess the impact of fishing and non-licensable activities (e.g., sailing and diving) on MPA features and determine whether an activity is incompatible with the MPA's conservation objectives, which can include a site assessment and advice from JNCC and/or NE. If required, management options are proposed. A public call for evidence usually follows to gather feedback from stakeholders and, once the MPA assessment is finalised, a preferred management option is selected. If a byelaw is selected, a draft byelaw and an impact

[52] Association of IFCAs: Byelaws we are involved in
[53] IFCA Byelaw Guidance 2011
[54] UK Government: Shellfisheries: Several Orders and Regulating Orders

assessment are created, followed by a formal consultation. After consultation, if the byelaw is still considered the best option, it is submitted to the SoS for confirmation.

To date, the MMO has implemented byelaws for 17 MPAs. The earliest byelaws, developed between 2013 and 2018, were developed for inshore sites:

- The Start Point to Plymouth Sound and Eddystone European Marine Site (Specified Areas) Bottom Towed Gear Byelaw SAC; 2013
- The Land's End and Cape Bank European Marine Site (Specified Areas) Bottom Towed Fishing Gear Byelaw; 2013
- The Margate and Long Sands European Marine Site (Specified Areas) Bottom Towed Fishing Gear Byelaw; 2017
- The West of Walney Marine Conservation Zone (Specified Area) Bottom Towed Fishing Byelaw; 2018

In 2022, the MMO launched an ambitious plan to develop byelaws to manage fishing activities within all 54 offshore MPAs by the end of 2024.[55] A prioritised four-stage feature-based approach[56] was adopted:

**Stage 1**

Stage 1 focused on assessing the impacts of fishing activity on four offshore MPAs: Dogger Bank SAC, Inner Dowsing, Race Bank and North Ridge SAC, South Dorset MCZ, and The Canyons MCZ. The findings from the assessment found that fishing activity was undermining the conservation objectives of the MPAs, resulting in the MMO introducing byelaws for each of the four MPAs in 2022:

- The Dogger Bank Special Area of Conservation (Specified Area) Bottom Towed Fishing Gear Byelaw 2022 (See Box 2 Case Study for further detail)
- The Inner Dowsing, Race Bank and North Ridge Special Area of Conservation (Specified Areas) Prohibited Fishing Gears Byelaw 2022
- The South Dorset Marine Conservation Zone (Specified Area) Bottom Towed Fishing Gear Byelaw 2022
- The Canyons Marine Conservation Zone (Specified Area) Prohibited Fishing Gears Byelaw 2022

**Stage 2**

Stage 2 focused on the impacts of bottom towed fishing gear on 13 MPAs with rock and reef features. Following public consultation conducted in 2022/23, the MMO concluded that bottom towed fishing should be prohibited across the rocky biogenic reef features of all 13

[55] UK Government: Vital marine ecosystems in an additional 4,000 square km of our seas to receive protection
[56] UK Government: Marine Protected Areas

MPAs considered[57], resulting in the Marine Protected Areas Bottom Towed Fishing Gear Byelaw 2023[58], which focused on conserving the following marine fauna and habitats:

- Annex I reef,
- High energy circalittoral rock,
- Moderate energy circalittoral rock
- Fragile sponge and anthozoan communities on subtidal rocky habitats
- Pink sea-fan (*Eunicella verrucosa*)

For some of the MPAs, the byelaw prohibits bottom-towed fishing activity across the entire site, while for others the prohibition applies to specific areas within the MPA. Details on the MPAs and the spatial management applied can be found within in the byelaw.[59]

**Stage 3**

Stage 3 has not yet been completed and will focus on the impacts of fishing on the remaining MPAs with seabed features not already covered in Stages 1 & 2. A call for evidence was made in 2024 to seek additional information and views, which is expected to be followed by additional stakeholder engagement and public consultation.

**Stage 4**

Stage 4 will focus on the impact of fishing activity on MPAs designated for highly mobile species. This stage will include two MPAs protecting harbour porpoise and three protecting bird species:

- Bristol Channel Approaches SAC (harbour porpoise)
- Southern North Sea SAC (harbour porpoise)
- Greater Wash SPA (bird species)
- Liverpool Bay SPA (bird species)
- Outer Thames Estuary SPA (bird species)

In December 2023, the MMO published two Stage 4 Fishing Gear MPA Impacts Evidence reports, one for harbour porpoise[60] and one for marine birds[61]. The next step is to undertake site level assessments for fishing in each MPA, followed by the development of management measures. Details on the timeline for when this stage will be conducted was not available at the time of writing.

While the first two stages of the plan have been completed, the third and fourth stages are in development, meaning that the MMO has missed its 2024 target for implementing all MPA byelaws.

[57] MMO: Stage 2 Decision Document 2023
[58] MMO MPA Bottom Towed Fishing Gear Byelaw 2023
[59] MMO MPA Bottom Towed Fishing Gear Byelaw 2023
[60] MMO: Stage 4 Fishing Gear MPA Impacts Evidence: Harbour Porpoise
[61] MMO: Stage 4 Fishing Gear MPA Impacts: Marine Birds

## Box 2: Dogger Bank SAC case study

**Dogger Bank represents an example of where the MMO has used its new powers, since leaving the EU, to implement byelaw management measures to prohibit bottom-towed fishing activity within the whole of the Dogger Bank SAC.**

Dogger Bank is the largest offshore sandbank in the North Sea, covering a total area of 17,600 km$^2$ (Figure A).The sandbank provides a home to a variety of species living both on the surface and within the sediment, including segmented polychaete worms, amphipods, hermit crabs, flatfish, and starfish. The shallower parts of the sandbank are free from vegetation, due to wave action, and provide a suitable habitat for sandeels; an important food source for seabirds, whales, dolphins, and larger fish species, such as cod.

Although most of Dogger Bank is located in UK waters, it extends into German, Danish and Dutch waters. It is an economically important area that has supported historical fishing activity by UK, German, Dutch, and Danish fishing fleets and competition for space has been intense.

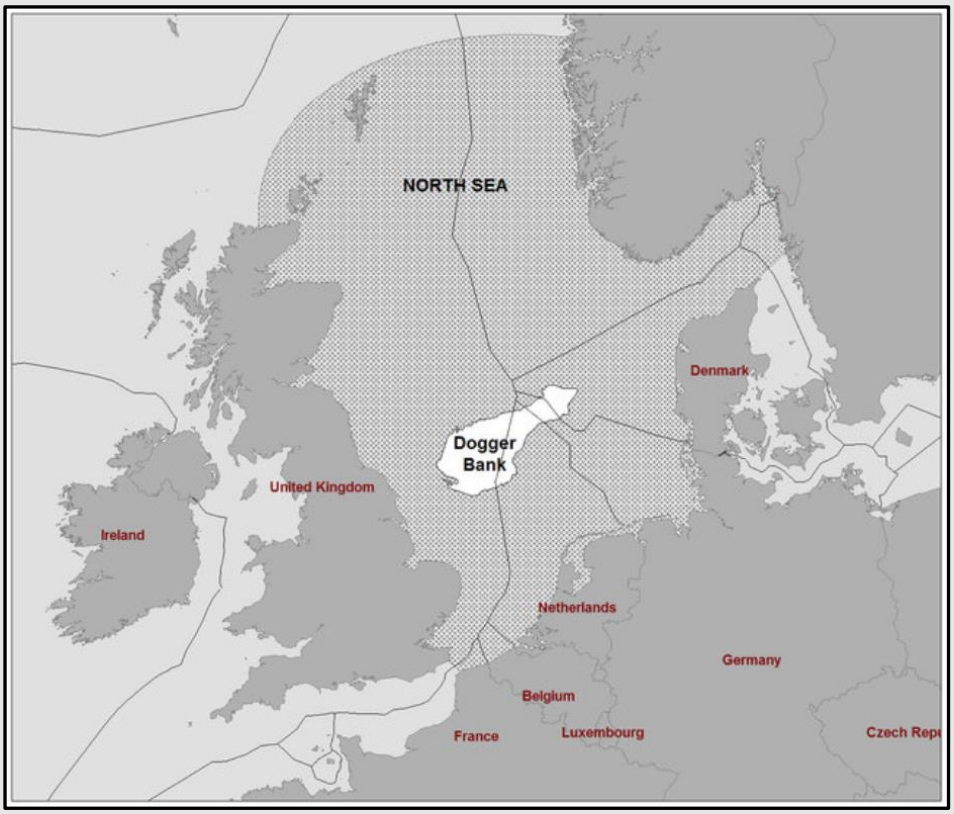


Figure A: Dogger Bank sand bank located in the southern North Sea.[a]

[a] Hattam, C. et al. 2014 Marine ecosystem services: Linking indicators to their classification *Ecological Indicators* 49

Protecting the Dogger Bank sandbank is important for enhancing biodiversity and providing a safe haven for juvenile fish to grow and has the potential to support commercial fish stocks in neighbouring areas. In 2017, Dogger Bank was designated a SAC by the UK Government to protect the Annex I habitat 'sandbanks which are slightly covered by sea water all the time'. It applies to the UK component of the sandbank only, covering an area of 12,331 $km^2$.[b] Dogger Bank has also been designated as a SAC in Dutch and German waters, although there are not any management measures currently in place, and has yet to be designated in Danish waters.[c]

Although designated as a SAC, the UK powers for implementing management measures prior to EU exit, extended to UK fishing vessels only, due to regulations within the EU Common Fisheries Policy. However, following EU exit, the UK government developed greater powers to control the activity of foreign fishing vessels in UK waters, which includes restricting fishing activity within offshore MPAs.

Subsequently, in 2022, the Dogger Bank SAC (Specified Area) Bottom Towed Fishing Gear Byelaw 2022[d] was implemented, which prevents the use of bottom towed fishing gear within the SAC and requires all vessels transiting through the SAC to have all bottom towed fishing gear inboard, lashed, and stowed.

The only exemptions to the byelaw include:

a. *The act was carried out in accordance with written permission issued by the Marine Management Organisation permitting the act for scientific, stocking or breeding purposes; or*
b. *The act was carried out in accordance with a marine licence issued by the Secretary of State under Part 4 of the Marine and Coastal Access Act 2009, in connection with a decommissioning programme required under Part IV of the Petroleum Act 1998 (c. 17).*

The Byelaw prevents fishing activity by all vessels, including international vessels, and it was estimated that the annual fisheries landings impacted by the Byelaw are £6,452,648, of which £2,920,463 are from UK vessels.[b] Since the introduction of the Byelaw, the amount of fishing within the Dogger Bank SAC has dropped significantly, from 632 hours of fishing activity (June-October average between 2015 and 2019) to 13 hours in 2022 (Figure B).

[b] MMO: Dogger Bank SAC MMO Byelaw: Information Sheet
[c] European MSP Platform: International fisheries management plan for Dogger Bank
[d] MMO: Dogger Bank SAC Bottom Towed Fishing Gear Byelaw 2022


Figure B: Fishing hours within the Dogger Bank SAC before and after the introduction of the byelaw on bottom towed fishing activity[e]

Despite the introduction of the Byelaw, fishing continues to take place in the adjacent Dutch component of Dogger Bank. The implementation of fisheries management measures in the Dutch and German Dogger Bank MPAs have been delayed due to negotiations breaking down with UK and other complications following EU exit.[f]

The Dogger Bank SAC byelaw demonstrates a whole site approach to bottom towed fisheries management measures that applies to UK and international vessels. Since its implementation, the amount of fishing activity taking place within the SAC has dramatically decreased, indicating the management measure has been effective at controlling a key pressure on the habitat and increases the potential for the site to meet its conservation objective.

[e] Marine Conservation Society: Dogger Bank MPA Update: 6 months on from ban
[f] Seas At Risk: Fisheries measures against bottom trawling and gillnets improve marine protection in German and Dutch MPAs

#### 4.1.1.3 Highly Protected Marine Areas byelaws in England

The UK government defines HPMAs as 'areas of the sea that allow the protection and recovery of marine ecosystems by prohibiting extractive, destructive, and depositional uses and allowing only non-damaging levels of other activities to the extent permitted by international law'.[62] High Level Conservation Advice (HCLA) from JNCC and NE advises that within an HPMA:

1. The ecosystem is allowed to fully recover in the absence of damaging activities such that:

[62] UK Government Response to the HPMA review

a. The ecosystem structure consists of a diverse range of benthic and pelagic communities, habitats and species, including biotic and abiotic components of the ecosystem. These fulfil a variety of functional roles, including supporting key life cycle stages and/or behaviours of marine species.

b. The physical, biological and chemical ecosystem processes and functions proceed unhindered, so that the site realises its full ecological potential to deliver goods and services, including habitats and species considered important to the long-term storage of carbon, and habitats and species important for flood and erosion protection.

c. The ecosystem is resilient to change and stressors

2. Any ecosystem changes brought about by the process of removing anthropogenic pressures should be considered in the context of a naturally recovering ecosystem.
3. The HPMA supports understanding of how marine ecosystems change and recover in the absence of impacting activities.[63]

Following a government-led process for identifying candidate HPMA sites, based on ecological, social, and economic criteria, three sites were identified in 2023 that provided maximum biodiversity and ecosystem benefit while minimising impacts on sea users. These sites are: Allonby Bay, Dolphin Head and North East of Farnes Deep.[64] Both Allonby Bay and North East Farnes Deep sites were previously designated as MCZs.

In August 2023, the MMO consulted on a draft byelaw[65] to prohibit fishing activity and allow full recovery of all species and habitats and associated ecosystems in the three sites. The site-wide prohibitions stated in the draft byelaw include:

- A person must not remove any fish or sea fisheries resources from within a specified area.
- A person must not use any fishing gear in a specified area.
- A person must not carry fishing gear on a vessel which is present in a specified area unless that gear is inboard, lashed and stowed
- Failure to comply with [the above] constitutes an offence contrary to Section 139 of [the Marine and Coastal Access Act 2009].

In March 2025, the MMO also consulted on a proposed byelaw prohibiting anchoring activity in Allonby Bay HPMA to allow for full recovery of all species and habitats and associated ecosystem processes.[66]

The next steps on the draft HPMA byelaws and when they would be submitted to the SoS for confirmation were not publicly available at the time of writing.

To date, HPMAs have only been designated in English waters but legislation allows for HPMAs to be designated in Northern Ireland. At the time of writing, DAERA did not have a publicly available position on HPMAs in Northern Ireland.

[63] MMO 2023 HPMA Fisheries Assessment
[64] UK Government: Policy Paper: HPMAs
[65] MMO: HPMA Fishing Byelaw Formal Consultation: Introduction
[66] MMO: Consultation: management of anchoring activities in Allonby Bay HPMA

### 4.1.2 Fisheries management in MPAs in Northern Ireland

In Northern Ireland, inshore fisheries are managed by DAERA's Sea Fisheries Policy Branch and regulations are enforced by DAERA's Sea Fisheries Inspectorate. Offshore fisheries are managed by DAERA but, prior to implementing an order, DAERA must consult with the SoS. If an order might affect the exploitation of sea fisheries in the English offshore region, DAERA must consult with the MMO (MACAA 2009, Section 137F).

In January 2023, DAERA introduced the Marine Protected Areas (Prohibited Methods of Fishing) Regulations (Northern Ireland) 2022 to protect the marine features within Northern Ireland's MPA network. These Regulations prohibit demersal mobile gear in nine inshore MPAs as well as management measures for pot fishing activity.

In January 2023, DAERA introduced the Marine Protected Areas (Prohibited Methods of Fishing) Regulations (Northern Ireland) 2022 to protect the features of the following MPAs:

- Carlingford Lough MCZ
- Murlough SAC
- Outer Belfast Lough MCZ
- Rathlin Island SAC and MCZ;
- Red Bay SAC;
- Skerries and Causeway SAC;
- Strangford Lough MCZ restricted area;
- The Maidens SAC; and
- Waterfoot MCZ

The Regulations protect MPA features through the prohibition of fishing using demersal fishing gear and the use of pots/creels in some sites.

To support the development of fisheries management measures, Co-Fish: Fisheries and Conservation Partnership – a partnership between DAERA and industry stakeholders – was created in 2022. Co-Fish provides a forum to co-ordinate knowledge sharing between government departments and stakeholders, with the overarching aim of improving the efficacy of the MPA network for which fisheries management measures are implemented.

## 4.2 Management of marine non-licensable activities in MPAs

Marine non-licensable activities (MNLAs) are activities that do not require a marine licence, or other type of consent, such as sailing or diving, and are, therefore, not automatically subject to the same rigorous assessment process as those that do. Between 0-12 nm, most MNLAs are recreational activities. Management mechanisms can be light touch, including education and communication, for example signage and voluntary codes of conduct, or more formal legal approaches through byelaws and permitting. For MNLAs, regulation should be considered a last resort and alternatives should be considered early on in the decision making process.[67] While MNLAs are managed through different mechanisms to fishing and licensable activities (see Section 4.3), they are not considered of less importance and

[67] National Audit Office: Using alternatives to regulation to achieve policy objectives

lighter-touch methods for management are implemented as these are considered the most appropriate for achieving MPA conservation objectives (Interview).

### 4.2.1 MNLAs in England

The MMO has responsibility, alongside other government bodies, for managing existing and future MNLAs, i.e. those activities which are *not defined* as requiring a license under Section 66 of the MACAA 2009, to further the conservation objectives of MPAs within 0-12 nm.[68]

Due to the regulatory complexity of the coastal environment, there is a diverse range of authorities that have a specific duty to help manage MNLAs, which include the MMO, SNCBs, IFCAs, and local authorities.[69]

Under the MACAA 2009 (Part 5), the MMO can make byelaws to enhance conservation objectives for an MCZ, although voluntary approaches to managing activities, developed in collaboration with relevant stakeholders, has been found to be the most effective in achieving the required behaviour change (Interviews). If required, a byelaw can prohibit or restrict a range of activities depending on the location and need for protection, such as:

- entry to a site, movement or other activity by people, animals, vessels or vehicles;
- vessel speed;
- vessel anchoring;
- killing, taking, destroying or disturbing any animals or plants;
- anything that interferes with the seabed or damages or disturbs any object in the sea;
- specific activities in certain parts of the site;
- specific activities in certain periods of a year; or
- certain methods of activity within a site.[70]

In England, the MMO and NE assess the impacts of MNLAs on MPAs considered to be most at risk. These assessments are participatory and are conducted with stakeholders. If the assessment concludes that MNLAs are hindering the achievement of the MPA's conservation objectives, then the MMO are responsible for considering management measures to avoid or mitigate these impacts.

In 2021, Studland Bay was the first MPA to have the impacts of MNLAs assessed, in recognition as one of England's busiest inshore MPAs. Following a site assessment and stakeholder engagement, a voluntary no-anchor zone was introduced in December 2021 (see Box 3). For the remaining MPAs, NE produced condition assessments for MMO to review, highlighting where MNLAs are causing pressure on MPA features and leading to the unfavourable condition of features. This screening and prioritisation process identified six MPAs to be taken forward for detailed site assessment:

- Cromer Shoal Chalk Beds MCZ
- Fal and Helford SAC
- Isles of Scilly Complex SAC

[68] UK Government: Managing MNLAs in MPAs
[69] MMO: Management of MNLAs in England
[70] UK Government: Better Regulation in Defra

- Plymouth Sound and Estuaries SAC
- Solent Maritime SAC
- The Wash and North Norfolk Coast SAC

The MMO's next steps are to identify appropriate management measures for MNLAs within these MPAs and work collaboratively with stakeholders to have management measures in place in by 2025.[71] Following the implementation of management measures, the next phase of MPAs for assessment will be considered.

[71] UK Government: Managing MNLAs in MPAs

## Box 3: Studland Bay Voluntary No Anchor Zone case study

**The Studland Bay Voluntary No Anchor Zone represents an example of a stakeholder-led approach to managing a non-licensable activity within an MPA.**

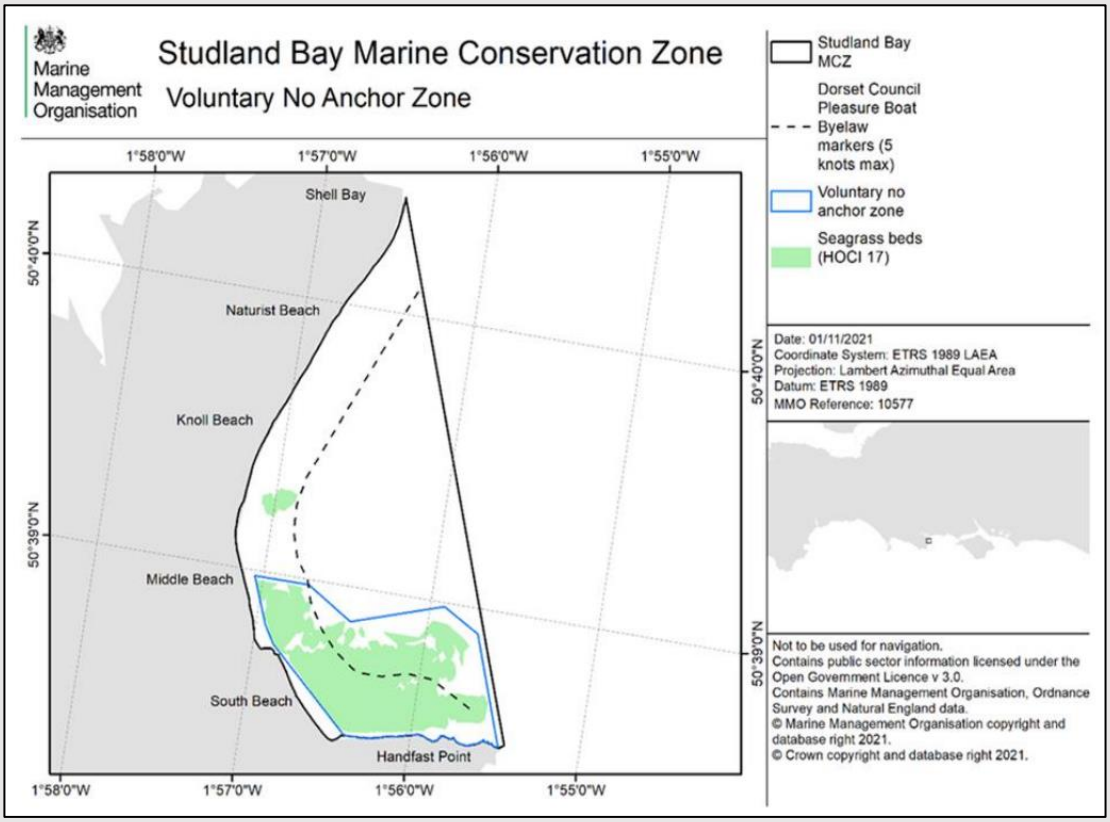


Figure C: Map of the Studland Bay Voluntary No Anchor Zone[g]

Studland Bay MCZ, designated in May 2019, is located inshore along the south coast of Dorset. It covers an area of 4 km$^2$, encompassing a sheltered bay that provides protection from prevailing south-westerly winds and waves (Figure C). The bay creates ideal environmental conditions for its four protected features:

- intertidal coarse sediment,
- long-snouted seahorse (*Hippocampus guttulatus*),
- subtidal sand, and
- seagrass beds.

The management objectives of the four features vary, with three: intertidal coarse sediment, long-snouted seahorse, and subtidal sand, managed to 'maintain in favourable condition', and seagrass managed to 'recover to favourable condition'.

[g] MMO: Studland Bay – Protecting pur precious seagrass habitats together

Studland Bay is one of England's busiest inshore MCZs, and is heavily used by recreational boating community who use the sheltered bay as an anchoring location, which has the potential to damage protected features. As boat anchoring is a non-licensable activity, the MMO worked with local stakeholders to identify an acceptable management approach, which led to the introduction of a Voluntary No Anchor Zone (VNAZ) in 2021 and a further extension in 2022 (Figure C). Although the management measures are voluntary, a statutory measure could potentially be introduced in the future if levels of compliance with the voluntary measure are poor.[h]

The successful management of the Studland Bay MCZ highlights the valuable role local coastal partnerships can play in the management of MPAs. The Studland Bay VNAZ has been made possible by the involvement of the Studland Bay Marine Partnership (SBMP)[i] who have used local and national resources to bring forward new initiatives, including the delivery of ecomoorings and marker buoys. For the 2024 summer season, 87 eco-moorings installed by the SBMP were available for boaters visiting the bay, providing an option for boaters to moor within the MPA without dropping anchor on the seagrass.

The voluntary approach to management of the Studland Bay MCZ was reviewed in 2023 by the MMO to assess its effectiveness and found that boaters have been using the ecomoorings when available, and anchoring outside of the VNAZ when they are not, which shows good compliance with the measures. The review concluded that the VNAZ remains the most effective way to protect the MPA and, therefore, do not plan to introduce statutory measures at this stage. Although it is still too early to assess the role of the VNAZ in the recovery of seagrass, monitoring data does show that the levels of anchoring have decreased from the year of their introduction.

[h] MMO: Studland Bay MCZ MMO Marine Non-Licensable Activity Assessment
[I] Dorset Coastal Forum: Studland Bay Marine Partnership

### 4.2.2 MNLAs in Northern Ireland

In Northern Ireland, DAERA has the authority to implement management measures/plans for inshore MPAs, including byelaws where required, under the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended) and the Marine Act (Northern Ireland) 2013, with the purpose to maintain or improve the ecological health of SACs/SPAs and MCZs, respectively. A list of MNLAs for Northern Ireland is provided in the Marine Licensing (Exempted Activities) Order (Northern Ireland) 2011.

The management of MNLAs has been delivered through the implementation of byelaws, for example, in the Strangford Lough MPA, which prohibits anchoring, mooring and diving within the MPA.[72] The management of MNLAs in MPAs can also be delivered through the establishment of MPA management groups, which consist of competent authorities, NGOs, stakeholder organisations and individuals.[73] Examples of MPA management groups include:

[72] Strangford Lough Regulations of Anchoring, Mooring, and Diving Byelaw 2012
[73] DAERA: Northern Ireland Inshore MPA Network 2019-2024

- the Strangford Lough MPA Management Steering Group, whose management plan for the Strangford Lough European Marine Site has been in place since 2003 and sets the framework through which activities can be co-managed, either voluntarily or through regulation.
- the Rathlin Island European Site Management Group, whose management plan for the Rathlin Island European Marine Site has been in place since 2013 and has focused largely on biosecurity and the threat that non-native mammalian predators present to breeding seabirds.

## 4.3 Management of future pressures through planning and licensing

### 4.3.1 Marine Planning

Marine planning is the framework through which decisions are made on how we use the marine environment, enforced by the relevant public authority. To support marine planning and licensing decisions, marine plans are developed to inform and guide marine users and regulators, enabling the sustainable development of marine industries, such as wind farms, shipping, marine aggregates and aquaculture, alongside the need to conserve and protect marine species and habitats.[74]

#### 4.3.1.1 Marine planning in England

Marine planning is a statutory process in England, set out within MACAA 2009, and the MMO has a statutory duty to deliver marine planning and licensing in England. Part 3, Section 44 of MACAA 2009 requires the preparation and adoption of a Marine Policy Statement (MPS), which provides a high-level framework for marine planning and decision-making across the UK, and the development of marine plans in England.

There are eleven marine plan areas in England and the plans for these areas provide, amongst other things, a strategic framework to guide how public authorities (identified in Section 3.3) should carry out their duties and make licensing decisions about approvals and permissions in a way that supports the goals of the UK Marine Policy Statement (UK MPS). These duties are set out in MACAA 2009 (Section 58) for England.

MPA policies contained within England's marine plans translate the statutory obligations set out in MPA legislation into a marine plan area context. They provide further steer to public bodies on exercising their functions and determining development proposals that may impact MPAs. As marine plans extend up to Mean High Water Springs (MHWS) and, therefore, overlap with the terrestrial planning framework, they provide an integrated approach for decision making across the marine and terrestrial planning systems. This includes decisions associated with SSSI consent. While marine plan polices tend not to prescribe additional management measures to MPAs, they ensure existing MPA management requirements are set out alongside the statutory requirements for other sectors.

[74] MMO: Marine Planning in England

#### 4.3.1.2 Marine planning in Northern Ireland

Marine planning is a statutory process in Northern Ireland, as set out in the Marine Act (Northern Ireland) 2013, and DAERA holds the statutory duty to deliver marine planning and licensing in Northern Ireland.[75] The UK MPS (as required under Part 3, Section 44 of MACAA 2009) provides a high-level framework for the development of marine plans in Northern Ireland. Section 8 of the Marine Act (Northern Ireland) 2013 sets out DAERA's responsibilities, as the relevant public authority, to make decisions in accordance with a marine plan.

The UK 25 Year Environment Plan contained an aim to complete all UK marine plans by 2021, however this was not achieved in Northern Ireland. At the time of writing, the Northern Ireland marine plan was still in development, but it is expected to inform and guide the regulation, management, use, and protection of Northern Ireland's marine area. It is expected to be a single document made up of two plans, one for the inshore region and one for the offshore region. In 2018, a draft Marine Plan was published[76] and in 2021 an update report on the marine plan process for Northern Ireland was published.[77] In 2022, DAERA published a revised Statement of Public Participation (SPP)[78], which sets out how and when stakeholders can be involved in the Marine Plan process. The next update report on the marine plan process is due in 2027 (a six-year reporting requirement).

### 4.3.2 Marine licensing

Marine plans provide direct policy guidance to marine users and statutory decision makers on how and where development activities can take place in the relevant marine plan area. Marine licensing decisions must be made in accordance with marine plan policies but should also consider the UK MPS where relevant. Where there is no marine plan, such as in Northern Ireland[79], marine licensing decisions should look to the UK MPS for guidance.

#### 4.3.2.1 Marine licensing in England

Marine licenses are permits, issued by the MMO for both inshore and offshore waters, that allow a certain activity to take place, with limitations, in the marine environment below Mean High Water Springs (MHWS). Whether an activity needs a marine licence will depend on what the activity is, where the activity will take place, and how the activity will be carried out.

Activities that may require a marine licence fall into seven categories:

- Construction
- Dredging
- Deposit of any substance or object
- Removal of any substance or object
- Incineration of any substance or object
- Scuttling (sinking) of any vessel or floating container

[75] DAERA: Marine and Fisheries Division
[76] DAERA: Draft Marine Plan for Northern Ireland
[77] DAERA: Six-year report on the marine plan process for Northern Ireland's inshore and offshore regions for the period 2015-2021
[78] DAERA: Marine Plan for Northern Ireland webpage
[79] DAERA: Marine Plan for Northern Ireland webpage

- Use of explosives[80]

Section 126 of the MACAA 2009, which underpins marine licensing in England, places specific duties on the regulator relating to MCZs and marine licence decision making, specifically where an activity is capable of affecting the protected feature of an MCZ or any ecological or geomorphological (e.g., changes in water currents or sediment distribution) process the protected feature depends on.

Similarly for SACs and SPAs, the Conservation of Habitats and Species Regulations 2017 Part 5 specifies which activities the MMO can grant a licence for, including scientific or educational purposes (e.g., research), preserving public health or public safety (e.g., unexploded ordnance clearance[81]), and preventing the spread of disease (e.g., aquaculture[82]).

Some activities may require consents from other bodies, in addition to a marine licence. For example, if an activity could impact a protected species or habitat, a wildlife licence (e.g., a Mitigation licence – see Section 4.3.2) may be required, or if an activity physically interacts with the foreshore or seabed owned by The Crown Estate, a seabed survey licence or coastal survey licence[83] may be required under the Crown Estate Act 1961. Where activities occur between Mean Low Water Springs (MLWS) and MHWS, they may also be subject to decisions made under the terrestrial planning framework by, for example, Local Planning Authorities.

In England, major projects, such as offshore wind farms, ports, tidal lagoons, and subsea cables, are defined as Nationally Significant Infrastructure Projects (NSIPs)[84] and require special planning approval under the Planning Act 2008.

#### 4.3.2.2 Marine licensing in Northern Ireland

In Northern Ireland, the authority responsible for issuing licences is different for inshore and offshore waters. For inshore waters, DAERA is the responsible authority and for offshore waters the MMO is responsible.

As in England, Section 126 of the MACAA 2009 underpins marine licensing in Northern Ireland and places specific duties on the regulator relating to MCZs and marine licence decision-making. However, for SACs and SPAs, the Conservation (Natural Habitats etc.) Regulations (Northern Ireland) 1995 (Part 3, Section 39)[85] sets out the function of DAERA and specifies which activities can be granted licences (the same activities as those specified in English legislation in previous section).

As in England, The Crown Estate owns the seabed and parts of the foreshore and, therefore, a seabed survey licence or coastal survey licence[86] may be required under the Crown Estate Act 1961. However, where activities occur between MLWS and MHWS, and may be subject to decisions made under the terrestrial planning framework, the Department

[80] UK Government: Guidance on activities that may require a marine licence
[81] UK Government: Marine environment: unexploded ordnance clearance Joint Position Statement
[82] UK Government: Fish, shellfish or crustacean farm authorisation
[83] The Crown Estate: Licensing and guidelines
[84] UK Government: National Infrastructure Planning
[85] Amended by The Conservation (Natural Habitats, etc.) (Amendment) (Northern Ireland) (EU Exit) Regulations 2019
[86] The Crown Estate: Licensing and guidelines

for Infrastructure would be the relevant authority in Northern Ireland, under the Planning Act (Northern Ireland) 2011.

Major projects defined as NSIPs (e.g., offshore wind farms and tidal lagoons) require special planning approval under the Planning Act (Northern Ireland) 2011.

#### 4.3.2.3 Licensing within MPAs

If a license request for a proposed development or activity falls within the NSN (i.e., SAC or SPA), under the Habitats Regulations (2017) and The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended), the license will require a Habitat Regulations Assessment (HRA) to be conducted. For MCZs, a similar impact assessment, known as an MCZ Assessment (MCZA), is required under the Marine and Coastal Access Act 2009 or Marine Act (Northern Ireland) 2013.

HRAs and MCZAs both provide assessment frameworks to determine impacts of plans, projects and developments on protected features and conservation objectives, but follow slightly different processes, as set out in Table 5.

Table 5: Main differences between HRA and MCZA

| | HRA | MCZA |
|---|---|---|
| Legal Basis<br>(England/Northern Ireland) | Habitat Regulations (2017)/ The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended). | MACAA 2009/ Marine Act (Northern Ireland) 2013 |
| Applies to | SACs, SPAs, Ramsar sites | MCZs |
| Screening | Looks for Likely Significant Effects (LSE) | Looks for hindrance to conservation objectives |
| Main test | Adverse Effect on Integrity (AEOI) | Significant risk to site features |
| Can a project which impacts conservation objectives be approved? | Only if 'imperative reasons of overriding public interest' (IROPI) applies and compensation is provided | Only if public benefit outweighs damage and mitigation/compensation is provided |

A marine licence is only issued if the HRA or MCZA considers that an activity does not pose a significant risk to conservation objectives of the MPA, identified risks are mitigated, or if compensatory measures bring an equivalent environmental benefit. However, if the competent authority is satisfied that there are no alternative solutions and that the plan or project must be carried out for "imperative reasons of overriding public interest" (IROPI), it can still be approved even if the HRA or MCZA says the activity could do harm to the site.[87] Section 68 of the Habitat Regulations 2017 and Section 36 of the Conservation of Offshore Marine Habitats and Species Regulations 2017 both state that if a plan or project is approved despite a negative impact assessment, the relevant authority must ensure that "any necessary compensatory measures are taken to ensure that the overall coherence of [site] is protected".

[87] See Section 64 of the Habitats Regulations 2017, Section 29 of the Conservation of Offshore Marine Habitats and Species Regulations 2017, and Sections 126 and 127 of the MACAA 2009

For example, the Humber Estuary SAC was designated for a range of habitats and species[88] that are at threat from coastal developments. To compensate for the impact of the Able Marine Energy Park development on designated features, the compensation measures included, amongst others, managed realignment of the coastline to create 27 ha of saltmarsh as well as the creation of 73 ha of intertidal mudflats.[89] These measures were developed with a steering group that included NE, the Environment Agency, and the Royal Society for the Protection of Birds.

Where an activity is likely to cause disturbance or injury to a European Protected Species (EPS), i.e., features within an SAC or SPA, a Mitigation licence[90] (England) or Wildlife Licence[91] (Northern Ireland) is required. In England, a Mitigation licence is designated under the Conservation (Natural Habitats, &c.) Regulations 1994 and the Conservation of Offshore Marine Habitats and Species Regulations 2017. In Northern Ireland, a Wildlife licence is designated under the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended) and the Wildlife (Northern Ireland) Order 1985 (as amended). For MPAs, this is particularly relevant for the management of underwater noise from activities taking place outside of an MPA (e.g., geological survey, wind farm construction, clearing unexploded ordnance) that could potentially impact the MPA feature (e.g., harbour porpoise in the Southern North Sea SAC).

In addition to the provision of Mitigation Licences, SNCBs can provide guidance for pressure management. For example, in recognition of the sensitivity of harbour porpoises to underwater noise and the increasing amount of offshore activity (e.g., offshore wind development) occurring in and around SACs designated to protect them, JNCC, NE, and DAERA produced guidance on noise management in harbour porpoise SACs in 2020.[92] SNCBs are required to provide advice on noise management and the Guidance provides advice to competent authorities on what constitutes significant disturbance within harbour porpoise SACs in England and Northern Ireland marine areas. DAERA has developed guidance[93] for public authorities on the various assessments that must be undertaken to meet the various legislative obligations for MPAs. This covers the HRAs for SACs, SPAs and Ramsar sites, ASSI assessment and the MCZA.

Activities in SSSI and ASSI are managed primarily through the separate terrestrial regulatory frameworks and mechanisms under the Wildlife and Countryside Act 1981, and the Environment (Northern Ireland) Order 2002 (as amended), respectively. These include dedicated SSSI and ASSI consenting regimes for public authorities to manage activities. Where coastal SSSI and ASSI features are also designated features of a marine SPA, SAC or MCZ, impacts to those features are also considered as part of the HRA and MCZ assessment process.

[88] Natural England: European Site Conservation Objectives for Humber Estuary SAC
[89] Able Marine Energy Park: Environmental Management and Monitoring Plan
[90] UK Government: European Protected Species: apply for a mitigation licence (A12)
[91] DAERA: Wildlife Licensing
[92] JNCC: Guidance on noise management in harbour porpoise SACs 2020
[93] DAERA: Guidance for MPA Assessments in the NI inshore area

### 4.3.3 Terrestrial planning

While not a primary focus of this project and, therefore, not presented in detail here, activities that take place between MHWS and MLWS (e.g., aquaculture) or traverse marine and terrestrial environments (e.g., offshore wind developments) may also need planning permission, which is administered under the terrestrial planning framework by the relevant local planning authority. To help determine planning applications, local planning authorities will also use HRAs and MCZAs. For example, a cable route running from an offshore wind farm to a landing site is a single development, but traverses both marine and terrestrial areas. In such cases, both a marine licence and planning permission may be required, but the relevant marine plan and the overarching UK MPS provides the framework for consistent and integrated decision-making.

## 4.4 Collaborative and integrated management of MPAs

Collaborative management approaches help authorities to understand their duties in relation to sites, conservation objectives and management requirements, and encourage knowledge and resource sharing. Many schemes include governance arrangements that enable other stakeholders, including sea-user groups, to participate in management. For example, in Northern Ireland, the development of Conservation Management Plans (CMPs) enables the conservation objectives of SACs, SPAs, and ASSIs to be incorporated into a single, stakeholder-informed management plan aimed at identifying and implementing workable and realistic measures, at the appropriate scale, to deliver conservation measures.[94]

Many cross-organisational partnerships have been established in England and Northern Ireland to facilitate a proactive and coordinated approach to management. For example, in 2013 the 'Rathlin Island European Marine Site Management Scheme' in Northern Ireland was adopted in recognition of the significance of the SPA and SAC designations for the surrounding marine environment. The management scheme's purpose is to 'highlight how current and future activities might affect conservation features and how these activities might be managed to minimise their impact'.[95] Strangford Lough provides another example of a successful management partnership (Box 4).

Many collaborative management approaches were established in the late 1990s to manage the early designated marine SACs and have since expanded to cover more MPAs as the network has evolved. For example, the Berwickshire and Northumberland Coast Marine Nature Partnership[96] was originally established to bring the Scottish and English authorities together to manage the cross-border Berwickshire and North Northumberland Coast SAC, but it now provides integrated management across 11 MPAs, including SPAs and MCZs between Fast Castle Head in Scotland and the River Tyne in England.

[94] Northern Ireland Environment Agency: Conservation Management Plans
[95] Department of Environment: Rathlin Island European Marine Site Management Scheme
[96] Berwickshire and Northumberland Marine Nature Partnership

## Box 4: Strangford Lough case study

**Strangford Lough represents a marine area of international importance for a variety of wildlife and habitats that, due to multiple MPA designations, has required a collaborative environmental management scheme to support decision makers and local stakeholders.**

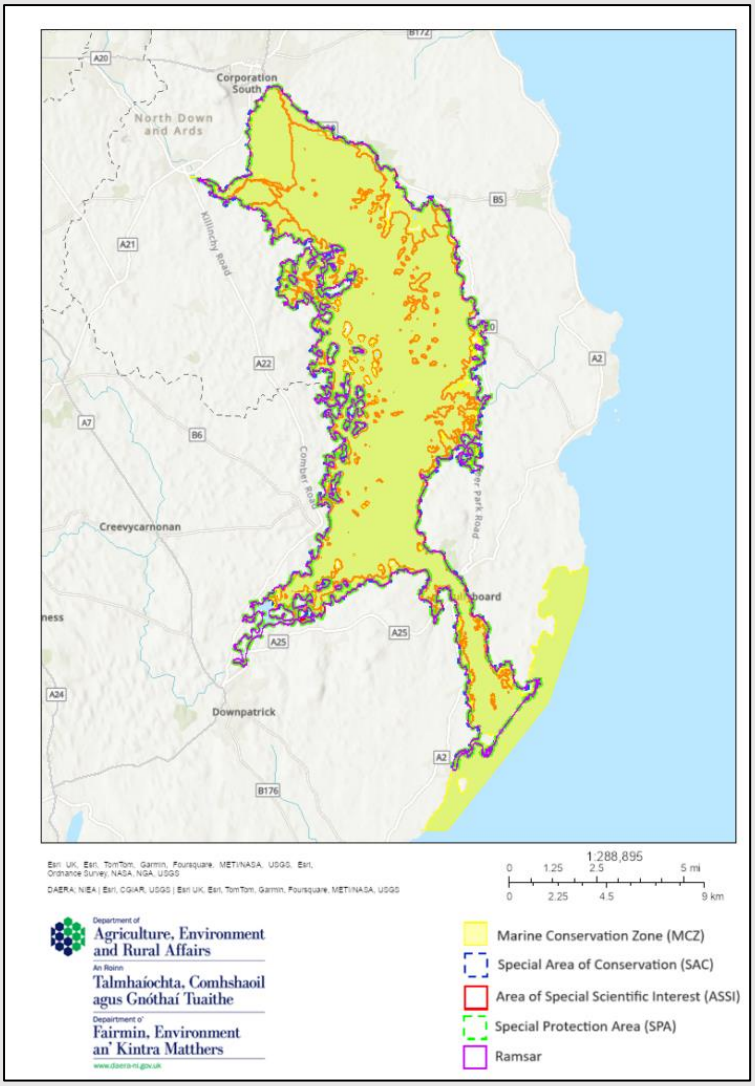


Figure D: Map of Strangford Lough MPA designations [j]

Strangford Lough is a large 150 km$^2$ inlet located on the east coast of County Down in Northern Ireland. It is almost land-locked, separated from the Irish Sea by the Ards Peninsula to the east and is bounded to the south by the Lecale coast. The Lough supports a diverse and extensive range of habitats and communities, with over 2000 recorded species.[k] Strangford Lough is one of the UK's and Europe's most important marine sites and is a designated MCZ, SAC, SPA, and Ramsar site, which collectively cover the entirety of the lough (Figure D). The shores of Strangford Lough are also protected through multiple ASSI designations.

[j] DAERA: Strangford and Lecale AONB – Strangford Lough MPA
[k] Strangford and Lecale AONB – Strangford Lough MPA

In 1995, Strangford Lough was designated as a Marine Nature Reserve, which has now been superseded by Marine Act (Northern Ireland) 2013, making Strangford Lough Northern Ireland's first MCZ. The MCZ boundary extends beyond the SAC and SPA boundaries to include areas outside the lough to the north and south.

In 1998, Strangford Lough SPA was designated, recognising its international importance as a breeding ground for populations of sandwich and common terns, as well as nationally important breeding ground for arctic tern. In winter, the Lough supports over 20,000 waterfowl, including the internationally important species light-bellied brent geese, knot and redshank.[l] The Strangford Lough SAC was later designated in 2007 to protect important marine features, considered to be the best examples in the UK.

Strangford Lough also qualifies as a Ramsar site because of internationally important wetlands, supporting wetland features and internationally important numbers of breeding wintering and breeding birds

In 2017, the Strangford Lough MPA Management Scheme was drafted.[k] It sets out the legal requirements of a management scheme for Strangford Lough. At the core of the Scheme are the MPA's conservation objectives, which provide guidance on the management of any activities or issues that could adversely affect the site's features.

The aims of the Scheme are to:

- Protect and conserve ecosystems and biological diversity of Strangford Lough MPA
- Assist statutory bodies to fulfil their duties set out in the Conservation Regulations (Northern Ireland) 1995
- Meet objectives set out in the European Habitats and Birds Directives
- Comply with the goals of the Convention of Biological Diversity

The Scheme aims to ensure the condition of the MPA is monitored and that any issues affecting Strangford Lough are reported and dealt with in the best way possible. The Scheme stresses the important role NGOs and voluntary organisations play in securing improved management of the MPA, and also recognises that many activities are unregulated and require voluntary cooperation to ensure that they remain sustainable.

The Strangford Lough Management Steering Group provides the mechanism for monitoring and management of the MPA. The draft Strangford Lough Management Plan and Action Plan are proposed to be voluntary agreements between statutory agencies and local communities that will identify ways to support local people and landowners to manage areas natural resources in a way that benefits the MPA.

At the time of writing, no information was available on when the Strangford Lough Management Plan and Action Plan will be formally adopted. The most recent assessments for the Strangford Lough SAC[m] indicate that two features (coastal lagoon (surveyed in 2016), and large shallow inlets and bays (2018)) are in favourable condition. The other two features (common seal (2023) and reefs (2018)) remain in unfavourable condition, although the reefs feature is considered to be 'recovering'.

[l] DAERA: Strangford Lough SPA
[m] DAERA: 2023/24 Summary Feature Condition Status

## 4.5 Whole Site Approach to MPA Management

In response to the growing interest in the whole site approach (WSA) to MPA management, driven largely by the implementation of HPMAs in England, this section of the report provides an examination of the WSA. Drawing on available literature and stakeholder interviews, an exploration of how the WSA has been defined and implemented, as well as associated benefits and challenges are presented.

The WSA is a relatively new term that refers to MPA management measures that go beyond a feature-led approach, by applying management to the entire MPA. The feature-based approach widely applied across England and Northern Ireland focuses on activities that pose a threat to the health of a designated feature or features. Subsequently, management measures usually involve prohibiting these activities from specific areas of the MPA where the designated feature has been detected[97], leaving the rest of the MPA accessible for other activities. The WSA differs from this approach by providing protection in a more comprehensive, ecosystem-based way that includes all habitats and species within the MPA.

While there is interest in the potential ecological benefits a WSA could provide, it should also be noted that a WSA can also result in knock-on socio-economic impacts, such as the cost to fishers of displaced fishing activity. These socio-economic impacts will vary depending on the type and level of activity taking place within the site and should be an important factor when considering the implications of applying a WSA. The socio-economic impacts of the WSA are, however, outside the scope of this study and therefore not considered in detail.

In 2018, the UK Government published its 25 Year Plan to Improve the Environment[98], which proposed to complete an ecologically coherent network of well-managed MPAs by "moving to a [WSA] to protect sites of greatest biodiversity interest." However, this was not a legal requirement, and the proposal was not echoed in the 2023 revision of the 25 Year Environment Plan (25YEP)[99], which instead set out the principle of "allowing sites to fully recover".

Despite its omission in the revised 25YEP, the WSA continued to be championed by environmental NGOs as the most effective approach to recovering marine ecosystems, with organisations such as the Marine Conservation Society urging the government to apply Defra's commitment under the 2018 Plan to all sites where a diversity of habitats is present.[100]

Despite the promotion of a WSA in the 2018 Year Plan, a definition of what the WSA is or how it could be implemented was not provided. Further, there is no internationally agreed definition or best practice to draw on. This has led to various interpretations of what a WSA is and what it means for MPA management.

The lack of definition leaves the WSA open to interpretation and, until an agreed definition for the UK is established, it might be better to consider Whole Site *Approaches* (WSAs),

[97] Davies, B.F.R., et al. 2022 Ecosystem benefits of adopting a whole-site approach to MPA management. *Fisheries Management and Ecology*, 29 (6)
[98] UK Government: Environmental Improvement Plan 2023
[99] UK Government: A Green Future: Our 25 Year Plan to Improve the Environment
[100] Marine Conservation Society: Marine Unprotected Areas

rather than *the* WSA, which can describe a range of MPA management approaches that adopt ecosystem-based principles. For example, some studies highlight that a WSA should focus on the full recovery of the marine environment and its ecological processes, for which the exclusion of all anthropogenic activities across an area is required.[101] Others note that a WSA should focus on protecting ecosystem function and connectivity between designated features, and thus the extension of some management measures across the whole site is sufficient.[102,103] While the differences in interpretations of the WSA may appear subtle, their implications for MPA management measures and conservation objectives could be significant: for example, excluding activities across the site that only pose a threat to certain features vs excluding all pressures with the aim of improving wider ecosystem functioning.

The three HPMAs (Allonby Bay, Dolphin Head, and North East of Farnes Deep) were chosen based on their ecological diversity, importance, and services, with the conservation objective of allowing marine ecosystems to recover to a more natural state. The draft byelaws and management measures for the sites prohibit all destructive, extractive, and depositional activities, which could be argued to be the closest to a 'true' WSA. However, it was considered by some interviewees that, although HPMAs implemented a WSA, the criteria for selecting sites were inadequate as the resulting HPMAs were too small to effectively deliver any meaningful benefits to the ecosystem within the site.

An alternative interpretation of a WSA is retrospectively extending management measures, for example fisheries byelaws, which have been applied for a specific feature, or features within an MPA, to the entire site. Through this approach, other species and habitats within the MPA, whether designated features or not, could potentially benefit from the management measures but the conservation objective remains focused on improving or maintaining the condition of the designated features.

To date, the implementation of a WSA in the UK has not been strategically applied and has evolved on a site-by-site basis, informed by the composition and type of features designated, human activities occurring in the area, and the conservation objectives of the site. It is worth highlighting that, in some cases, a WSA that focuses on prohibiting certain pressures may be sufficient for achieving the MPAs conservation objectives and that a more comprehensive ecosystem focused approach may be unnecessary. Table 6 provides some examples of the different types of marine spatial protection currently implemented across the UK and internationally and details on whether they are considered by the authors to be a WSA, based on the level and area of protection offered by each example.

[101] Wildlife and Countryside LINK: Road to success for new HPMAs 2022
[102] Blue Marine Foundation: Restoring our Seascapes
[103] Lyme Bay Fisheries and Conservation Reserve

Table 6: Overview of various UK and international MPA management approaches and assessment of whether they align with whole site approaches.[104]

| Level of Protection | Approach | Description | Example | Is approach a WSA? | Rationale |
|---|---|---|---|---|---|
| No Impact/No take MPAs | Strict Marine Reserves, Full site No Take Zones | MPAs/NTZs that are strictly managed to protect multiple important features and/or fully functioning ecosystems. Only minimal human use is permitted throughout the site to ensure protection of all features within. | English HPMAs Alaska Sitka Pinnacles Marine Reserve[105] | Yes | Strict marine reserves/full site no take zones apply the WSA to management as implemented measures ensure all potentially destructive and extractive activities are prohibited **throughout the site**, resulting in protection for all features and species within that area. |
| | Discrete No Take Zones (within MPAs) | Discrete zones within larger MPAs in which the removal or disturbance of any feature is strictly prohibited. These areas are usually designated to protect specific features/species from fishing activities. | Lamlash Bay NTZ[106] Flamborough Head NTZ[107] | No | Discrete no take zones (e.g. those within larger MPAs) do not apply the WSA to management as implemented measures ensure all potentially destructive and extractive activities are prohibited **within discrete areas** and not the entire site, resulting in protection for features and species within the discrete NTZ, but not the wider MPA. |
| Multiple use MPAs | Marine Nature Reserves (MNR) | MPAs designated to protect numerous features in which certain destructive activities are prohibited throughout the site, but other activities are still permitted. Feature-based management may also be implemented. | Some Isle of Man MNRs: e.g., Little Ness[108], Port Erin Bay[109] | Yes | Marine nature reserves apply a WSA to management as implemented measures ensure potentially destructive activities (e.g. bottom trawling, seabed extraction and deposition) are prohibited **throughout the site**. Other restrictions may or may not be in place for other activities, and management of these activities may still be feature-based. |
| | Extended habitat/species | MPAs designated and managed to protect specific species and/or habitats, but management | Lyme Bay Reserve | Yes | Extended habitat management areas apply a WSA as extended management measures ensure some potentially destructive activities (e.g. bottom |

[104] Northern Ireland and wider UK examples have been included where present.
[105] National Geographic: Marine Reserve: Sitka Pinnacles Marine Reserve Alaska
[106] COAST: No Take Zone Lamlash Bay
[107] North Eastern IFCA: Flamborough Head No Take Zone Byelaw
[108] Little Ness Marine Nature Reserve
[109] Port Erin Bay Marine Nature Reserve

| | | | | | |
|---|---|---|---|---|---|
| | management areas | measures have been extended across the entire site, providing protection to non-designated features. Some human activities still occur (usually non-damaging). | Dogger Bank SAC | | trawling) are prohibited **throughout the site**. Other restrictions may or may not be in place for other activities, and management of these activities may still be feature-based. |
| | National Marine Parks | Large MPAs that are designated to protect large-scale ecological processes, protecting fully functioning ecosystems, species and communities that require large areas of undisturbed habitat through the protection of smaller areas/zones that apply different management methods to protect the features within. | Great Barrier Reef Marine Park[110]<br>Plymouth Sound National Marine Park[111] | No | National marine parks do not apply a WSA to management as implemented measures ensure some or all potentially destructive activities are prohibited i**n discrete areas/zones** within the larger site, depending on the features within, and not across the whole site. |
| | Habitat/Species Management Areas | MPAs designated to protect particular species or habitats of importance in which specific management and removal of damaging activities is applied only on those specific features. | Some Nature Conservation MPAs in Scotland: e.g., Wester Ross NCMPA[112] | No | Habitat/species management areas do not apply a WSA as implemented measures ensure some potentially destructive activities (e.g. bottom trawling) are prohibited i**n discrete areas** within the site. Other restrictions may or may not be in place for other activities, and management of these activities may still be feature-based. |

[110] Australian Government: Great Barrier Reef Zoning Maps
[111] Plymouth Sound National Marine Park
[112] Wester Ross Marine Conservation Order 2016

The WSA examples highlighted in Table 6 suggest that the strength of management measures implemented is not necessarily dependent on the conservation objectives of the MPA (e.g. ecosystem vs feature-based). For example, strong levels of management were put in place for MPAs with both ecosystem-based objectives (e.g. HPMAs) and feature-based objectives (e.g. full-site NTZs). Similarly, some statutory feature-based sites, such as the Isle of Man MNRs, offer stronger protection than some of the feature-based MPAs in England, although there is potential for implementing stronger management measures, as seen, for example, with the implementation of the fisheries byelaw in the Dogger Bank SAC.

## Box 5: Lyme Bay case study

The Lyme Bay SAC, located in the South-West of England, contains nationally important Annex I reef habitats that support several species of conservation and commercial importance, including pink sea fans (*Eunicella verrucosa)*, king scallop (*Pecten maximus)*, Dover sole (*Solea solea),* and blonde ray (*Raja brachyura).*[n] The level of protection in Lyme Bay has increased incrementally, stemming from an initial concern over damage to sensitive reef habitats from scallop dredging and bottom-towed fishing gear. Initially, these fishing activities were voluntarily banned in three areas of Lyme Bay (Figure E).

In 2008, an area of 206 km$^2$ was closed to bottom-towed fishing gear through the implementation of a statutory instrument (SI) – legislation that allows the provisions of an Act of Parliament to be brought into force without having to pass a new act (Figure E). Following the introduction of the SI, Lyme Bay was designated as a candidate SAC, covering an area under protection to 312 km$^2$ and encompassing most of the area of the SI. Areas outside the SI but within the SAC were provided protection from bottom-towed fishing gear through the implementation of byelaws by the Devon and Southern IFCAs in 2013 – Lyme Bay straddles the jurisdictions of both IFCAs (Figure F). Although the IFCA byelaws do not apply to the entire SAC, the area they cover is a combination of the SI and the SAC. As can be seen in Figures 10 and 11, the IFCA byelaws go beyond the known distribution of the reef feature, thus encompassing a key component of a WSA.

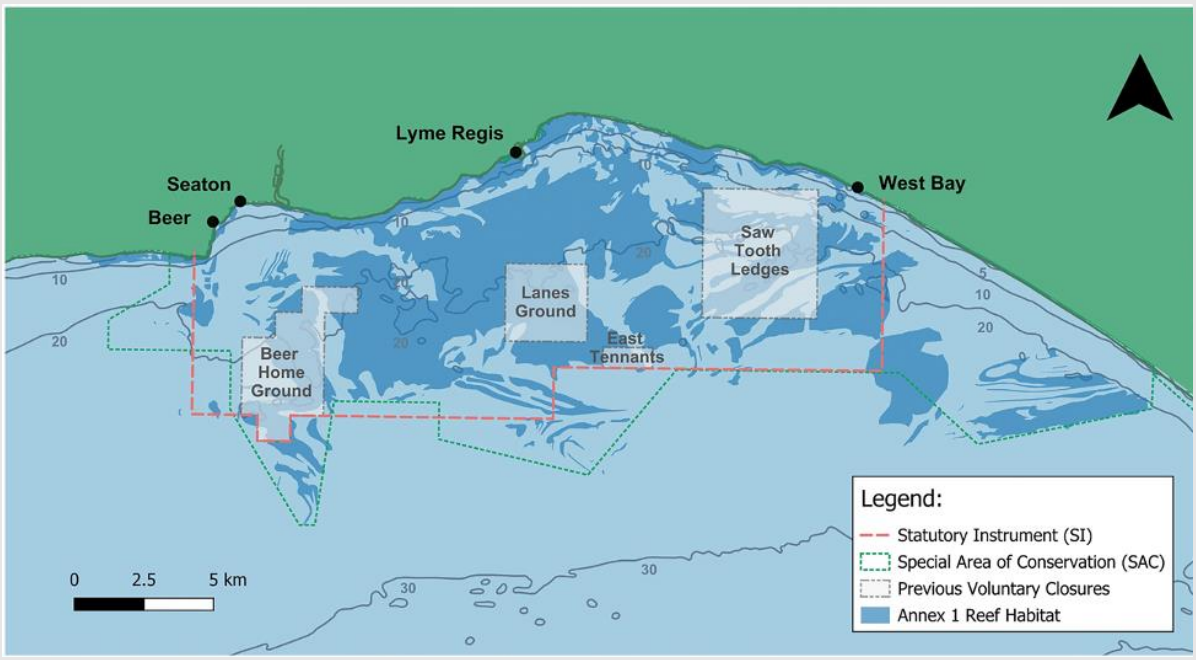


Figure E: Extent of the Annex I reef habitat and the different levels of protection over time in Lyme Bay: voluntary closues in 2001, the statutory instrument in 2008, and the SAC designation in 2017.[o]

[n] Davies, B.F.R., et al. 2022 Ecosystem benefits of adopting a whole-site approach to MPA management *Fisheries Management and Ecology*, 29
[o] Renn, C., et al. 2024 Lessons from Lyme Bay (UK) to inform policy, management, and monitoring of Marine Protected Areas. *ICES Journal of Marine Science*, 81

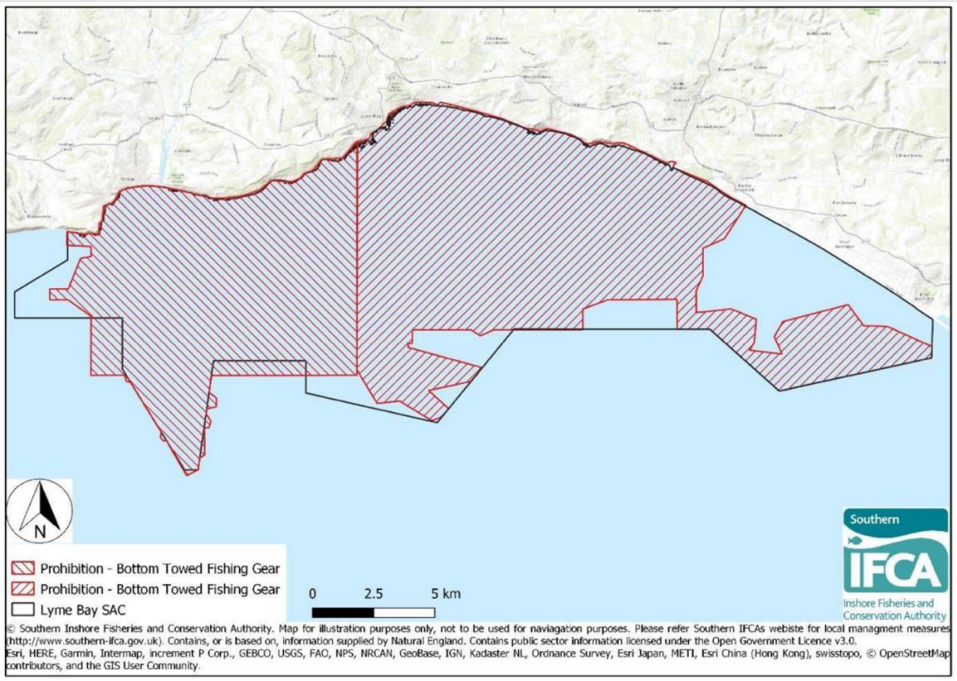


Figure F: Areas closed to bottom towed fishing gear in the Lyme Bay, split between the Devon and Severn IFCA district (west) and the Southern IFCA district (east).[p]

Lyme Bay provides an opportunity to compare species composition and diversity in an MPA before and after the implementation of a WSA and also to areas outside of the MPA with no management. For example, within the SAC a 430% increase in species richness and a 370% increase in total abundance of commercially exploited fish species was detected, when compared with unmanaged areas prior to its designation.[q] Further, the number of commercial species increased outside the SAC, potentially due to spillover effects. Conversely, however,the abundance of commercially exploited invertebrate species (e.g., crabs and lobsters) was found to have decreased within the SAC, when compared to outside the MPA, due to an increase in potting and netting activity following the introduction of the byelaw prohibiting bottom-towed fishing gear.[q]

The total species richness and abundance of sessile and mobile species was found to increase in the SAC, compared to outside it, further noting the recovery of 13 indicator species within the first three years of the SAC designation.[r] This included reef-associated species in areas previously defined as non-reef, suggesting that the removal of bottom-towed fishing gear in non-reef areas is facilitating the expansion and formation of new biogenic reef.[r]

[p] Southern IFCA: Fisheries Management Plan for the Lyme Bay area of the Lyme Bay and Torbay MPA
[q] Davies, B.F., et al. 2021 Ecosystem Approach to Fisheries Management works—How switching from mobile to static fishing gear improves populations of fished and non-fished species inside a marine-protected area. *Journal of Applied Ecology*, 58
[r] Sheehan, E.V., et al. 2013 Drawing lines at the sand: Evidence for functional vs. visual reef boundaries in temperate Marine Protected Areas *Marine pollution bulletin*, 76

The introduction of the WSA in Lyme Bay did not, however, result in increases in all marine species. For example, the diversity and abundance of non-commercially exploited fish species was found to significantly decrease within the SAC, but increase outside of it. This decrease was linked to an increase in predator abundance: the IFCA byelaws resulted in an increase of commercially exploited fish species within the SAC, which are likely to be larger, higher trophic predators.[q]

The introduction of the SI and IFCA byelaws were initially met with severe opposition from local fishers, as many had to sell their vessels, diversify into potting, or relocate to other trawling grounds. However, over time support for the measures increased with fishers stating that "had the reserve not come in, I would not be in business as a scallop diver".[s] Support from fishers increased further in response to the promotion of static-gear fishing by Blue Marine Foundation, who have provided facilities to optimise the quality of catch, such as chiller units, fish boxes, and a delivery van.[t] The creation of the Lyme Bay Fisherman's Community Interest Company (CIC) has also strengthened fishing in the area, providing support to local coastal communities and the fishing industry.[u]

Lyme Bay offers insights into the social, economic, and environmental impacts of applying a WSA to bottom-towed fisheries management in an area of ecological importance that has high levelsof fishing activity. Despite initial reservations from stakeholders, and the complex legislative process taken to implement the measures, Lyme Bay is widely recognised as a conservation and collaboration success, resulting in increased protection, improved feature condition, and thriving potting and diving fisheries.

[s] The Marshwood Vale Magazine: The Lyme Bay Marine Reserve – A story of success
[t] Blue Marine Foundation: Lyme Bay Reserve
[u] Lyme Bay Fisherman's CIC

### 4.5.1 Benefits and challenges of a whole site approach

The application of WSAs continues to be a live discussion in England and Northern Ireland, with many highlighting their value in supporting the restoration of the marine environment. However, in practice, the benefits and challenges associated with implementing WSAs are complex. Despite several MPAs in England and Northern Ireland applying some form of a WSA, the lack of guidance from government and agreement amongst marine practitioners and academics has created confusion over what WSAs are and how they can/should be applied. In this section, an overview of the benefits and challenges of WSAs, identified through a literature review and stakeholder interviews is provided.

#### 4.5.1.1 Benefits

There was general agreement across interviews conducted for this research that a WSA was not always required for achieving MPA conservation objectives and that a tailored management approach could suffice. However, there was agreement that a WSA would be a more effective approach at enhancing the health of the wider ecosystem. Further, it was suggested a WSA that focused on improving the health of natural capital assets and associated ecosystem services had the potential to provide a wider range of benefits, including ecosystem health and functioning, carbon sequestration, and coastal protection (Interview).

In cases where a WSA has removed a damaging activity from a site, such as bottom-towed fishing gear byelaws, protection is subsequently provided to non-designated features, which creates potential for increases in the number and abundance of many species within the MPA, including commercially important fish species. The recovery of non-designated features can also be beneficial for supporting the recovery of designated features. For example, if an MPA is designated for marine mammals, improvements to habitat condition can support a more diverse and abundant ecosystem, which could include important prey species.

Site-wide management measures that go beyond the distribution of designated features may also offer a simpler approach to MPA management. This is particularly relevant for MPAs with multiple features that are sensitive to a diverse array of pressures, where feature-based management approaches could become overly complex and unmanageable. A simple set of management measures would make it easier for authorities to implement management and for marine users to understand and comply with.

In addition to simplifying management measures, a WSAs could also offer an opportunity to streamline MPA monitoring. Moving away from discrete feature-based monitoring approaches and instead focussing on ecosystem diversity, abundance, and functioning could enable a more integrated approach and capture information on features not previously monitored.[113] Information collected on a wider range of features could also support GES reporting, which requires reporting against broad descriptors (e.g., biodiversity) rather than condition of specific features.

Providing greater protection across an MPA has also been shown to benefit species outside of MPAs, due to fisheries spillover effects.[114] While fishing activity may be prohibited within the MPA, for example, an increase in abundance of commercial species outside of the MPA would have positive implications for the fishing industry.

In some cases, the development of a WSA has incorporated extensive local stakeholder engagement. This localised approach has enabled the WSA to be developed on a case-by-case basis, enabling management to support the delivery of the MPA conservation objectives while also considering local socio-economic needs (Interview). By including stakeholders in the process, levels of acceptance of the management measures increase. Further, by working with local stakeholders, actions can be identified to promote and support alternative activities, such as the increase in potting fishing practices seen in Lyme Bay.

#### 4.5.1.2 Challenges

A key challenge identified within this review is the multiple interpretations of what a WSA is, ranging from fisheries byelaws that prohibit a single pressure to HPMAs that prohibit all extractive, destructive, and depositional activities. Although WSA is a widely used term and advocated for by some (e.g., Wildlife and Countryside LINK), without an agreed definition of the WSA it is difficult to determine what the benefits would be and where it could most

[113] Workshop participant

[114] Renn, C., et al. 2024. Lessons from Lyme Bay (UK) to inform policy, management, and monitoring of Marine Protected Areas. *ICES Journal of Marine Science*, 81 (2)

effectively be implemented. To support discussion on the potential future implementation of the WSA in England and Northern Ireland, it is essential the WSA is clearly defined.

A key criticism of the HPMAs designated in England is that they are too small for a WSA to be beneficial and that there needs to be greater ambition by designating larger HPMAs (Interview). The WSA would benefit large mosaics of habitats, where spaces in between important features are also protected. Further discussion is required on what size WSA MPAs should be and how to balance the ecological benefits against the socio-economic impacts.

A notable challenge to implementing a WSA to MPA management is the socio-economic impacts on the fishing industry, particularly if all fishing methods are prohibited. Although fishing activity is one of several potential human activities taking place in the marine environment (alongside, for example, shipping, aquaculture, and the extraction of marine aggregates), more often than not, the application of a WSA specifically involves the prohibition of fishing activity (or a type of fishing activity, e.g., bottom-towed fishing gear). Subsequently, it is considered that a WSA disproportionately impacts the fishing industry.[115]

The prohibition of bottom-towed fishing gear in MPAs that have high levels of fishing activity can be controversial, often resulting in opposition from the fishing sector due to lost fishing opportunities, displacement, and socio-economic impacts.[116] While efforts can be made to promote alternative fishing methods, in some cases this may not be possible due to low abundance of other commercial species or the financial cost of diversification. Further, the prohibition of one type of fishing can lead to increases in another, potentially to unsustainable levels.

The prohibition of certain types of fishing activity within an MPA can result in increased levels of fishing outside the MPA (i.e., displacement of activity), leading to greater pressure on habitats and species in unprotected areas. While the MPA management measures may benefit the designated features within the MPA, when considered over a larger, regional scale, the overall level of fishing pressure remains constant, just distributed differently across the region. This is important when considering ecosystem health across a region, such as the Greater North Sea Region GES is reported against. From a regional perspective, the impact of MPAs on removing fishing pressure is negligible (Interview).

A full-strength application of the WSA that considers all pressures on the marine ecosystem within the MPA (e.g., HPMAs) also includes the water column as a habitat. The inclusion of the water column creates additional challenges for managing pressures, such as pollution and noise that may be caused by activities outside of the MPA.

MPAs with a WSA that focuses on ecosystem health would require a different approach to monitoring, moving away from the feature-based approach currently used for MPAs in England and Northern Ireland (see Section 5). Firstly, a standardised set of species would need to be identified that provide an indication of the health of the ecosystem. Secondly, greater resources would be required to monitor all pressures that could impact ecosystem health within the site to ensure management measures were being effective. Such an

[115] Workshop participant
[116] The Lyme Bay Marine Reserve: a story of success

approach would require increased level of collaboration, data sharing, and resource use across SNCBs and public authorities (e.g., covering both marine and terrestrial activity).[117]

In cases where the conservation objective of a WSA is broad and focused on ecosystem health, such as HPMAs, it can be challenging to manage pressures from activities that take place outside of the MPA. This is even more challenging when the source of the pressures cannot be mitigated or moved, such as the noise from commercial shipping vessels. The Dolphin Head HPMA in the English Channel is one such example where the MPA is located in close proximity to an international shipping channel. In this situation, it is not possible to move or mitigate the noise impacts from shipping, raising the question of whether it is possible to meet the MPAs conservation objectives.

While broad support for the implementation of a WSA to MPA management was identified through the literature review and interviews with stakeholders, there were questions raised over whether a WSA was needed at all. It was suggested in one interview that the tools needed to effectively manage MPAs already exist, but we do not use them adequately. The strength of MPA management measures implemented should reflect the conservation objectives of the site and it may be that a full strength WSA is not appropriate. For example, implementing a WSA that prohibits all activities in an MPA whose main pressure comes from one activity (e.g., bottom-towed fishing gear) could be delivered equally as well by using a targeted byelaw. In this scenario, the implementation of a WSA could lead to unnecessary socio-economic impacts on other marine users that use the site, such as the static gear fishing sector.

The boundaries of MPAs are determined using the best available information at the time of designation. However, there is a general consensus that the amount of data available on habitat and species distribution is low, which risks MPAs being poorly placed or boundaries being poorly defined. For MPAs that implement a WSA that prohibits activities within a site, understanding the extent and condition of the habitats and species being protected will be important for assessing the additional benefit of the stronger management measures and confidently communicate these benefits to those who have lost access, e.g., fisheries (Interviews).

While the findings from this review suggest a WSA may not be appropriate for all MPAs, there are benefits to implementing a WSA that go beyond achieving MPA conservation objectives, such as increased species abundance and diversity, improved ecosystem functioning, and enhanced natural capital and ecosystem services. Identifying MPAs that would benefit most from a WSA should be considered on a case-by-case basis and the following section presents an initial approach to shortlisting MPAs in England and Northern Ireland that could be candidates for a WSA.

### 4.5.2 Which MPAs might benefit most from a whole site approach?

MPAs in England and Northern Ireland have been designated for a variety of reasons and, while it is recognised that WSAs have the potential to increase marine ecosystem health and functioning, it is important that, if a WSA is implemented, it is applied to an MPA that would benefit most. This section presents the findings from an initial, high-level assessment aimed

[117] Workshop participant

at identifying candidate MPAs. While the findings from this assessment are not considered to be definitive, they can provide a useful starting point to inform discussion on the applicability of a WSA across the MPA network in England and Northern Ireland.

The initial phase of this assessment was to identify a set of filters that could be applied to all MPAs in England and Northern Ireland that would help create a shortlist of candidate sites. Figure 6 provides five potential filters, the first two of which were applied in this rapid assessment:

- Filter one: number of features
  The review of the WSA suggested that a MPAs with more, diverse features could benefit most from a WSA.
- Filter two: feature condition.
  MPAs whose features are in an unfavourable condition could benefit most from the stricter protection measures of a WSA. For MPAs in good condition, it could be assumed that the existing management measures are sufficient for meeting the MPAs conservation objectives.

For the first filter, a scale was developed that categorised MPAs based on their designated features, ranked in the following order:

- Multiple species and habitat features – considered to benefit most from a WSA as the broad measures of a WSA would support all features and their interactions.
- Multiple habitat features – the broad approach would provide protection to all habitats, including spaces in between, that would support a more diverse ecosystem.
- Multiple species features – a WSA has the potential to prohibit a range of pressures that threaten all designated species.
- Single habitat feature – a WSA could provide some benefit by protecting spaces between protected habitats, however this could be achieved also through a feature-based approach.
- Single species feature – a WSA could provide some benefit but a feature-based approach to management may be sufficient for achieving conservation objectives.
- Single, highly mobile species feature – it was considered this type of MPA would benefit the least from the WSA as these features may be seasonal residents and targeted feature-based management measures may be sufficient.

The second filter focuses on the condition of the designated features in the MPAs: i.e., the percentage of features in a favourable or unfavourable condition.[118] The assumption is that those MPAs with features in an unfavourable condition would benefit most from the higher levels of protection and the subsequent benefits to the wider ecosystem would support the recovery of designated features.

Information from the NE Designated Sites tool for inshore MPAs[119] and JNCC MPA factsheets for offshore sites in England, and DAERA Conservation Objectives and Potential

[118] Available information on condition assessments was used however it is recognised that there are data gaps and, subsequently, low levels of confidence in assessment findings (see Section 5.2).
[119] In which feature condition can be found or advice on operations targets of 'maintain' or 'restore' can be used as proxies for favourable and unfavourable condition in the absence of condition assessments.

Management Options documents for MPAs in Northern Ireland was used to inform the assessment. The most recent condition assessments for each MPA were used.

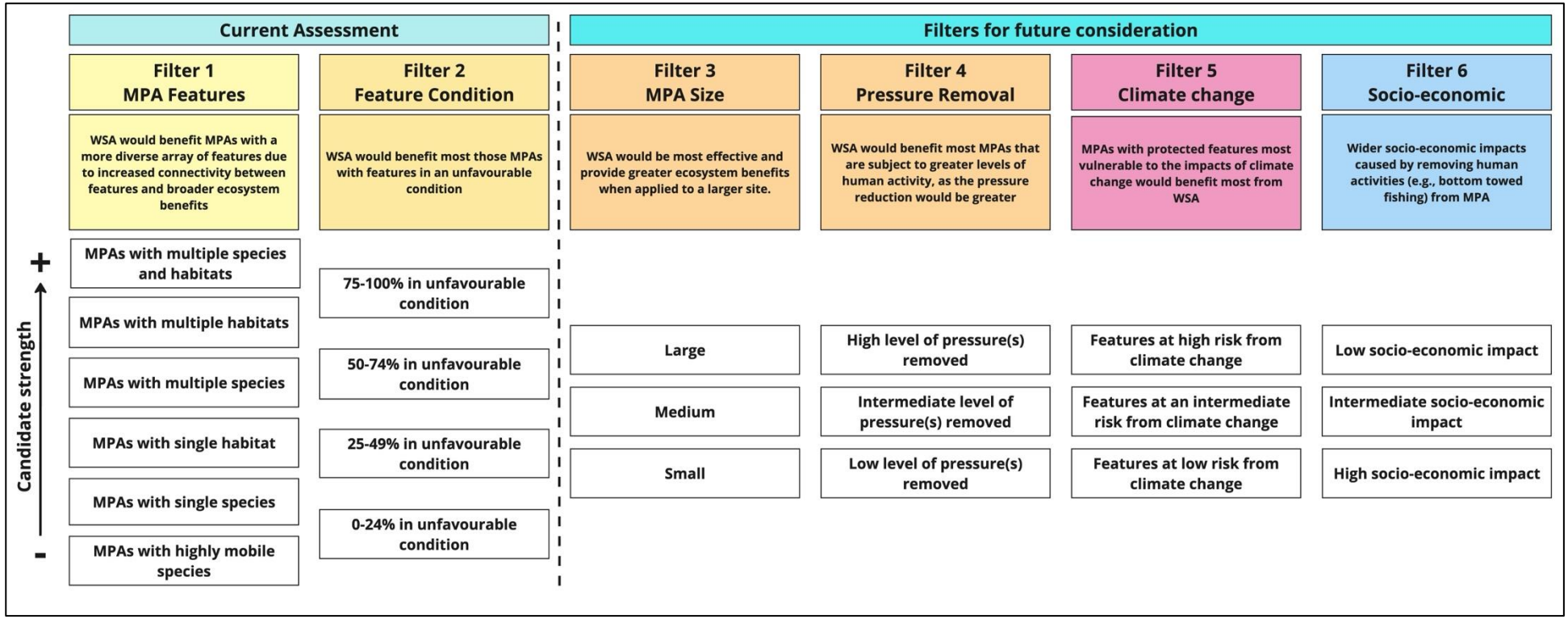


Figure 6: Filters applied to identify suitable candidate MPAs that would benefit most from a whole site approach. Filters 1 & 2 were used for the evaluation presented in this report. Filters 3-6 are potential filters that could be used to further refine the assessment but were out of scope of this study.

As an initial approach to reducing the number of MPAs being assessed, all MPAs with more than 50% of their features in a favourable condition were removed. Filter one was then applied to this shortlist to prioritise sites with the highest number of features, both species and habitats. Where MPAs have the same number of features, those with a greater percentage of features in an unfavourable condition were prioritised. Sites with the highest number of features with more than 50% of those features in an unfavourable condition were ranked (Table 7 presents the top 10 candidate MPAs).

Table 7: Shortlist of MPAs that would be benefit most from a WSA, as identified using the first two filters presented in Figure 6.

| Site name | Total number of features | % of features in unfavourable condition |
|---|---|---|
| Yarmouth to Cowes MCZ | 18 | 56 |
| Whitsand and Looe Bay MCZ | 16 | 50 |
| The Needles MCZ | 13 | 54 |
| Bembridge MCZ | 13 | 54 |
| The Wash and North Norfolk Coast SAC | 10 | 50 |
| Beachy Head East MCZ | 9 | 56 |
| Selsey Bill and the Hounds MCZ | 9 | 56 |
| Severn Estuary / Môr Hafren SAC | 8 | 75 |
| East of Haig Fras MCZ | 7 | 100 |
| Fal and Helford SAC | 7 | 57 |

This list of MPAs could be further refined using additional filters (Figure 6) including:

- **MPA size** – the WSA review (Section 4.5) indicated that the WSA would provide greater ecosystem benefits when applied to larger sites. This filter should, however, consider the habitat types contained within the site. For example, a large site that contains only mobile sand may not benefit as much as a smaller site with a more diverse array of habitats.
- **Pressure removal** – MPAs would benefit more from a WSA if the resulting management measures led to high levels of pressure being removed from the MPA. MPAs that currently experience low levels of pressure from human activity would benefit least from a WSA, except for very degraded sites with low levels of particularly damaging activities.
- **Feature vulnerability to climate change** – MPA features that are sensitive to warming sea temperatures, for example, may benefit more from a WSA due to a reduction in other pressures, which could increase feature resilience to environmental change (see Section 7) for further information on MPA resilience to climate change).
- In addition to environmental factors, **socio-economic filters** could also be applied which consider how management measures prohibiting human activities from the site would affect marine industries and communities within the region.

The results presented from this analysis provide a high-level starting point for assessing which MPAs would most benefit from a WSA. All MPAs identified in Table 7 are located in England[120], with the top two candidate sites containing 18 and 16 features, with 56% and 50% of the features, respectively, considered to be in unfavourable condition. Further analysis, as suggested above, would enable a more in-depth investigation into the benefits a WSA would provide in addition to the MPA management measures already in place and provide further insights into the wider impacts (e.g., socio-economic) of implementing a WSA.

## 4.6 Reflections on MPA management

**MPA network**

The MPA networks in England and Northern Ireland are well established and cover a percentage area that exceeds the OSPAR and CBD targets of 30%. However, although all MPAs are provided some form of protection through planning and licensing, many MPAs still do not have management measures in place (e.g., Stages 3 and 4 of England's MPA byelaws, and Strangford Lough Management Plan in Northern Ireland). Therefore, although the percentage area of England and Northern Ireland's seas covered by MPAs exceeds the 30% target, they do not yet have effective management in place.

The incremental and disjointed approach to designating MPAs in England and Northern Ireland, resulting from a fragmented history of developing and adopting different pieces of national and international legislation, has led to the creation of a network of MPAs with a mixture of conservation objectives, management measures, and assessment processes. This is further complicated in England where there are several different regulators involved in MPA management depending on the location of the MPA and the type of activity being managed. While there are examples of collaborative and integrated MPA management approaches, this divided approach can lead to gaps in management and knowledge as each authority works within its own remit, focusing on its own specific responsibilities (an issue raised in Interviews). This fragmented approach can result in inefficient use of resources and a lack of consistency across regulators, making it difficult to develop a coherent management approach for the MPA network.

Unlike in England, Northern Ireland has a more streamlined approach to MPA management, where DAERA is responsible for managing all marine activities in inshore and offshore (jointly with MMO) waters. A single-body approach enables greater oversight of marine activities across Northern Ireland's marine area and can result in more efficient and aligned decision making. Indeed, some interviewees highlighted that decisions and action on MPAs can happen quickly due to the internal process within DAERA.

At the point of designating an MPA, conservation objectives are already developed but it can take a long time to develop management measures; this is evident by the number of MPAs that are still without management. As highlighted in interviews, this delay can create several challenges. Firstly, staff turnover during this period can slow the process further, with new staff members joining at various stages of the development and implementation of

[120] MPAs in Northern Ireland were not selected due to either a low number of designated features, or the features being considered to be in a favourable condition.

management measures. Secondly, habitat maps used to inform management measures are based on surveys carried out years prior to the MPA designation. In some cases, the information available could be 10 years old, which may be sufficient for some features (e.g., exposed low-energy rock) but not for others that are more sensitive to environmental change (e.g., seagrass beds). It is possible that, in the time between the conservation objectives being developed and the management measures being implemented, the environment and condition of the feature(s) has changed. This is particularly relevant in the context of climate change and the subsequent impacts on marine habitats and species (explored further in Section 7).

**Fisheries**

The devolvement of fisheries management to IFCAs in inshore waters (0-6 nm) provides the opportunity to work closely with fisherman that operate in the local area and within MPAs. This can be beneficial for implementing management measures (e.g., byelaws) and ensuring compliance. However, IFCAs are only responsible for managing fisheries and while fisheries may be managed in alignment with MPA objectives, pressures from other activities may not be. The siloed approach to management can make it difficult to demonstrate that fisheries management measures in MPAs are being effective (Interview) and, without effective communication between relevant public authorities, there is a risk that measures put in place are ineffective due to the unmanaged pressures from other activities. This can lead to a lack of confidence in the use of MPAs as conservation measures.

In England, the aim to deliver Stages 3 and 4 MPA byelaws by 2024 was missed, which means the features of 46 offshore MPAs (approximately 40% of the total) continue to be exposed to potentially damaging fishing pressure. Without effective management in place that supports the delivery of MPA conservation objectives, the contribution of these MPAs to the health of the wider MPA network, particularly with regards to ecological coherence and connectivity, remains unfulfilled and restricts the network's ability to positively contribute to GES.

**Marine non-licensable activities**

The management of MNLAs can be carried out through a variety of methods, from voluntary measures developed with stakeholders through to statutory measures using byelaws. To date, co-developed voluntary measures have been successful, and statutory measures have not been required.

In England, NE and MMOs assessment of the impact MNLAs have on MPA features is valuable, but to date only one MPA assessment (Studland Bay) has been completed, along with voluntary management measures. The remaining six MPAs from the first phase of assessments are due to be completed in 2025 and there is no clear indication on which MPAs will be included in the next phase or when this will happen.

In Northern Ireland, MPA management groups are established to manage MNLAs in MPAs by developing management plans for their MPA. The establishment of specific MPA management groups that contain key stakeholders presents a different approach to England, where MNLA management measures are developed in a consultation process and implemented by already-existing coastal partnerships (such as the Studland Bay Marine Partnership). However, in both cases, the involvement of local stakeholders has been essential for ensuring measures are appropriate and complied with.

### Planning and licensing

There are eleven marine plans in place in England that provide guidance for decision makers at a regional level and set out how public authorities should carry out their duties, as set out in the MACAA 2009. While marine plans do not prescribe MPA management measures, they play an important role in ensuring they are set out alongside the statutory requirements for other sectors.

In Northern Ireland, the marine plan, which covers both inshore and offshore waters, is still in development (drafted in 2018), missing the 25 YEP aim of having all UK marine plans in place by 2021. Without a Northern Ireland Marine Plan, DAERA are required to look to the high-level guidance within the UK MPS to inform decision making, which may not provide the same level of detail as the marine plan. The timeframe for implementing the Northern Ireland Marine Plan is not clear but, once published, it will provide important guidance on the regulation, management, use, and protection of Northern Ireland's marine area.

The licensing process in England and Northern Ireland provides the framework for mitigating the impact of future marine activities on MPA features, which is carried out primarily through an HRA or an MCZA. More bespoke guidance for assessing impacts on protected features, such as the guidance on noise for harbour porpoise in SACs, have also been developed to address specific pressures.

### Reporting on management effectiveness

Both the CBD and OSPAR MPA 30 by 30 targets set out the need for *effective* management of sites. Whilst England and Northern Ireland have met the areal extent requirements, it is more difficult to determine if their respective networks is being effectively managed – the most recent UK MPA Assessment for OSPAR indicates that only 13% of MPAs have measures in place to achieve conservation objectives.[121] Further, some sites remain without management measures in place (e.g., Stages 3 & 4 MPAs and HPMA byelaws). The MMO sets out to review the effectiveness of its byelaws and manage adaptively,[122] but there appears to be no attempt at present across the ALBs to directly monitor and assess management effectiveness more broadly. Monitoring of MPAs in England and Northern Ireland focuses on whether the MPA has met conservation goals via condition assessments (see Section 5.2 – MPA condition assessments), but condition (an outcome of MPA designation) is only one of six attributes (context, planning, inputs, process, outputs, and outcomes) that are commonly used to assess Protected Area Management Effectiveness (PAME).[123] A full PAME assessment covers aspects such as whether there are adequate resources to manage the MPA, and if the management processes in place are appropriate, effective, and efficient. For example, WWF trialled a PAME approach in North Devon[124] and JNCC recently launched a management effectiveness indicator tool (MEPCA)[125], although it has only been trialled overseas. Further, the IUCN Green List[126] provides an international

[121] Information received by OEP through Freedom of Information request
[122] UK Government: Understand MMO marine conservation byelaws
[123] The Blue Belt PAME report provides more information on PAME assessments and their applications
[124] The Compass Pilot Report for North Devon, UK Seas Project, WWF UK
[125] JNCC: Management Effectiveness of Protected and Conserved Areas (MEPCA) Indicator
[126] IUCN Green List

benchmark for quality that motivates improved performance and achievement of conservation objectives that could be used to guide and inform future management of MPAs.

**Whole Site Approach**

The WSA has not yet been clearly defined despite the term being used in the literature: in government documents, academic papers, and NGO reports. The lack of a clear definition has created differing views over what a WSA entails and how (or even if) it should be implemented. Without a clear definition of what a WSA is, it is difficult to determine what the benefits and challenges are.

From across the literature and interviews with experts, there was general consensus that a WSA could have a positive impact on improving the condition of MPA features as well as the health of the wider ecosystem. However, it was also clear that a WSA may not be appropriate for all MPAs and that the targeted measures already in place may be sufficient for achieving conservation objectives.

The majority of MPA management measures across England and Northern Ireland have been developed using a feature-based approach, except for HPMAs. This is largely due to a feature-based approach being used for identifying sites, developing conservation advice, and conservation objectives. While a feature-based approach was prescribed by the EU Habitats Directives and the MACAA 2009 for identifying candidate sites for MPAs, it was not a requirement for developing conservation objectives or management measures.

The designation of HPMAs in England is significant as they are considered to be a full-strength interpretation of the WSA. Their designation demonstrates the potential to move beyond the feature-based approach to MPA management. However, the HPMAs in place are considered to be too small to provide meaningful ecosystem benefits. Therefore, if any additional HPMAs are to be designated, identifying larger sites should be a consideration.

It could be argued that the EU and domestic legislation, which has led to the UK's adoption of a feature-based approach to MPA designation and management, has resulted in a management regime that is not delivering the potential for broader protection and recovery of marine biodiversity. With the introduction of HPMAs and other MPAs adopting a form of WSA, it may be time to revisit MPA legislation to make it more enabling for these new approaches.

Further, the designation of HPMAs in England opens the discussion on what the overarching purpose of the MPA network should be and whether the current MPA conservation objectives and management measures are maximising the opportunities the MPA network presents. The MPA network in England and Northern Ireland was developed with a biodiversity recovery objective that focused on specific features. Little consideration was given to ecosystem recovery (i.e., beyond designated features), natural capital and ecosystem services, or how well the network would function in light of climate change. By continuing with a feature-based approach to management, there is a risk of limiting the benefits the MPA network could provide, for example, in terms of ecosystem health, socio-economic benefits, and climate change resilience.

# 5 Review of methodologies to monitor and assess MPAs

This section of the report provides an overview of the current approach to monitoring MPAs in England and Northern Ireland, focusing on how MPA monitoring is conducted, the challenges with monitoring MPAs, and how the resulting survey data is used to inform condition assessments of MPA features. The information provided was collected through a literature review of academic and grey literature, a series of interviews with experts and a workshop.

Monitoring can be defined as the systematic measurement of biotic (i.e., marine life) and abiotic (i.e., physical and chemical environment) parameters of the marine environment within a defined area and over a specific period of time. The purpose of monitoring is to produce datasets that can be analysed to determine whether the desired state is achieved or not and detect changes in the marine area of interest.[127]

Monitoring MPAs can provide a range of information on the site. More specifically, monitoring can inform on:

- the baseline condition of the MPA at the point of designation,
- the status of designated features and whether the site is meeting, or working towards meeting, its conservation objectives,
- whether human activities, and their associated pressures, are preventing a site from meeting its conservation objectives,
- whether management measures put in place are having the desired effect, and
- whether management measures are being adhered to (i.e., monitoring human activity within the MPA).

In addition to monitoring the effectiveness of management measures, MPAs that prohibit all human activities (e.g., HPMAs) can act as important reference sites if the MPA is of sufficient size for the measures to be effective and there is sufficient monitoring in place. These reference sites can provide important context for identifying natural variability, for example, ocean warming caused by climate change, in environmental and ecological condition and enable the effectiveness of management measures to be assessed against any changes taking place due to natural processes.[128]

While MPA monitoring programmes are essential for assessing if an MPA is delivering against its intended purpose, the information collected, e.g., baseline information and feature condition, can also provide a greater understanding of the interactions and relationships between species and habitats.[129] For example, relationships between habitat diversity and species abundance may be used to explain changes in mobile fish species abundance over previously trawled habitats.[130]

[127] Definition informed by Zampoukas, N. et al. 2013. Marine monitoring in the European Union: How to fulfil the requirements for the marine strategy framework directive in an efficient and integrated way. Marine Policy, 39.
[128] Cunningham, S. et al. 2024. Research Report 1292-Towards understanding the effectiveness of measures to manage fishing activity of relevance to MPAs in Scotland.
[129] Wildlife and Countryside LINK: Whole Site Approach to managing MPAs
[130] Elliott, S.A.M et al. 2017. Landscape effects on demersal fish revealed by field observations and predictive seabed modelling. PLOS One

The data collected through MPA monitoring programmes is used to determine the condition of designated features, and how the condition of these features change over time. These condition assessments are used to determine whether the MPA management measures put in place are being effective or whether they need adapting to bring designated features into a favourable condition. The following section provides an overview of how MPA condition assessments are conducted in England and Northern Ireland.

## 5.1 Current approach to monitoring

Dedicated monitoring programmes are essential for assessing the baseline condition of an MPA and for informing an adaptive management approach. At present, there is a range of monitoring activity happening across England and Northern Ireland to assess the condition and effectiveness of MPAs in inshore and offshore waters. The following sections provide an overview of the current approach to MPA monitoring, focusing on who is responsible for collecting and analysing monitoring data, monitoring activity, and what this information tells us about the state of England's and Northern Ireland's MPAs.

There are several Government departments and SNCBs responsible for monitoring the condition of MPAs in England and Northern Ireland. To support the collection of monitoring data, the joint Statement on Common Standards for Monitoring[131] aims to "provide consistency in approach across SNCBs and MPA types. The revised Statement (updated in 2022) defines the common standards, supports current monitoring, summarises the current approaches to protected area monitoring, and suggests potential applications of Common Standards Monitoring (CSM) whilst also ensuring alignment with a set of common standards". The intended purpose of the CSM is threefold:

1. at the site level, indicate the degree to which current conservation measures are proving effective in achieving the objectives of the designation, and identify any need for further measures,
2. at the country level, indicate the effectiveness of conservation action and investment, and identify priorities for future action, and
3. at the UK level, enable Government to undertake its national and international reporting commitments in relation to designated sites, and more widely, and help identify any areas of shortfall in implementation.[132]

The Common Standards Monitoring Guidance[133] recognises that reporting on MPA feature conditions may take several years, depending on the timing of the field studies for data assessment, but indicates that assessments should be carried out over a six-year reporting cycle.

As part of the UK Marine Monitoring Assessment Strategy (UKMMAS), JNCC leads the development of the UK Marine Biodiversity Monitoring Programme[134], which spans UK territorial and offshore waters and focuses on biodiversity in the wider marine environment,

[131] JNCC on behalf of the Common Standards Monitoring Inter-agency Working Group: A Statement on Common Standards for Monitoring Protected Sites (2022)
[132] JNCC: A review of monitoring and assessment of seabed habitats in UK inshore MPAs 199-2013
[133] JNCC: Common Standards Monitoring Guidance for Generic Introduction for Marine Feature Guidance
[134] JNCC: UK Marine Biodiversity Monitoring Programme

including within MPAs. The purpose of the Programme is to implement an efficient and integrated approach to monitoring marine biodiversity that will provide the evidence needed to support the delivery for all UK's policy drivers. The Programme consists of the following elements:

- Develop the UK Marine Biodiversity Monitoring Strategy (published in 2016)[135]
- Develop advice for Governments on options for monitoring seabirds, cetaceans, seabed habitats and marine protected areas.
- Through collaboration, carry out operational monitoring for seabed habitats, seabirds and cetaceans.
- Co-ordinate the overall monitoring strategy and vision

### 5.1.1 Inshore MPA monitoring in England

In England, monitoring and reporting are required at an individual MPA site level to determine whether MPAs are meeting their conservation objectives and to develop and inform effective management. For inshore sites in England, NE is responsible for carrying out MPA monitoring and condition assessments, which it publishes online[136] alongside the conservation advice and management measures. Monitoring needs are identified by NE and delivered with partners, including the Environment Agency, Cefas, IFCAs, and JNCC.

Monitoring of MPA benthic features is conducted each year, with MPAs selected for monitoring using a rolling risk-based approach. Currently, 12-16% of inshore MPAs are monitored each year, with 10-14% of habitat examples targeted in each MPA.[137]

Monitoring and reporting of MPAs has been acknowledged as a source of data information that could be used to assess progress towards the achievement of GES in UK waters (Interview) and to demonstrate progress against the Environment Act 2021 target for condition of protected features.

The 2024 Environmental Improvement Plan Annual Progress report[138] states that NE and JNCC are developing an MPA monitoring strategy to assess progress towards meeting the legally binding target of the Environment Act 2021, including whether necessary management measures are in place. The MPA monitoring and assessment strategy is expected to be completed by 2028, coinciding with the England EIP interim target date for 48% of designated features to be in favourable condition.

### 5.1.2 Inshore MPA monitoring in Northern Ireland

For inshore MPAs in Northern Ireland, DAERA's Marine and Fisheries Division is responsible for surveying, monitoring, and assessing marine and coastal habitats and species with the aim of ensuring that:

- Habitats, species and biodiversity are conserved,
- Ecological condition is protected,
- Human-induced eutrophication and contamination are minimised,

[135] JNCC: UK Marine Biodiversity Monitoring Programme
[136] Designated Sites View
[137] Defra: Marine Strategy Part Two 2022
[138] Defra: Environmental Improvement Plan annual progress report – April 2023 to March 2024

- The presence and spread of INNS are controlled,
- Marine food webs are in a healthy state
- Seafloor integrity is maintained,
- Marine and estuarine water quality is at an acceptable level, including that in areas important as bathing waters and shellfish waters.[139]

The Marine and Fisheries Division works in partnership with other research organisations to conduct a range of programmes and surveys, including seal, cetacean, and INNS monitoring, as well as habitat monitoring for example, for saltmarsh, seagrass and biogenic reefs. Designated features are monitored on a six-year rolling cycle[140], and the subsequent condition assessments inform whether the MPA meets favourable condition status and determine whether the management measures in place are sufficient or require adapting to improve the condition of the feature.

In Northern Ireland, DAERA determine the level of MPA monitoring required, which is delivered in partnership with AFBI. AFBI have monitored a selection of six sites in the Irish Sea annually since 1997, as part of the Clean Seas Environmental Monitoring Programme (CSEMP) as well as performing other ad hoc or research-focused monitoring.

Information on the condition of MPAs in Northern Ireland was most recently published by DAERA in the Northern Ireland Inshore MPA 2019-2024 Report, which provides a breakdown of feature condition for each MPA.[141] The Report states that currently, approximately 86% of inshore MPA features are in favourable condition.

### 5.1.3 Offshore MPA monitoring

JNCC is responsible for monitoring the condition of offshore MPA sites in UK waters and works with DAERA for Northern Ireland's offshore MPAs. Results are published online by JNCC alongside the advice on conservation objectives for each site.[142] JNCC works with a range of partners to deliver offshore MPA monitoring surveys, including NE, and Cefas. The evidence collected during these surveys is used in combination with other available evidence to:

- Assess the condition of habitats in the MPAs,
- Report on whether the MPAs are meeting their Conservation Objectives, and
- Produce advice on MPA management.

A variety of monitoring techniques are employed by JNCC to sample and survey offshore MPAs:

- Side-scan sonar and multibeam echosounder
- Sediment coring
- Grab sampling
- Drop-down video tows

[139] DAERA: Monitoring Northern Ireland's marine environment
[140] DAERA: Northern Ireland Inshore MPA Network 2019-2024
[141] DAERA: Northern Ireland Inshore MPA Network 2019-2024
[142] JNCC: Offshore Marine Protected Areas

Novel and more cost-effective techniques, such as autonomous underwater vehicles and environmental DNA analysis, are also being trialled and implemented.[143]

For offshore and deep-sea MPAs, there is a dedicated monitoring programme, which has taken place since 2014 (offshore) and 2016 (deep-sea). Since 2014, 28 out of a possible 65 offshore and deep-sea MPAs designated for habitat features have been monitored by JNCC and their partners. Four of these 28 sites have been monitored twice: Dogger Bank (2014 & 2018), North East Farnes Deep (2016 & 2018), Swallow Sands (2016 & 2018)[144], and Wight-Barfleur Reef (2017 & 2023)[145], and the remaining 25 have been monitored once.

Monitoring for offshore benthic habitats currently focuses on MPAs beyond 12 nm and in waters shallower than 200 m, which is conducted each year by JNCC and partners, including Cefas and Marine Scotland Science. For deep-sea habitats below 200 m water depth, monitoring is conducted by JNCC, Cefas, and the National Oceanography Centre. Long-term plans are currently being developed to monitor a limited number of representative MPAs in English offshore waters once every three years and deep-sea MPAs once every six years.

In 2023, JNCC provided written evidence to the UK Parliament[146] highlighting that JNCC conduct surveys for two offshore MPAs per year, one in Scotland and one in England (Interview), and that under current funding arrangements JNCC are only able to monitor at the "desired frequency to detect change"[147,148] in nine of the 76 offshore MPAs. Every four to five years, all nine sites will have been monitored. These nine sites have been selected to be used as 'sentinel' sites – strategically chosen sites that are representative of the broader network that can be used to monitor changes in key species, habitats, and environmental conditions as well as assess the effectiveness of management measures.[149] This approach, as noted by JNCC, is "designed to obtain the most useful information within the limited resources available."[150] Due to the low capacity to monitor offshore MPAs, the majority of condition assessments for these sites are conducted using a vulnerability assessment (Interview) (see Section 5.2).

JNCC published advice to the UK government in 2024, developed with partner organisations via the Healthy and Biologically Diverse Seas Evidence Group (HBDSEG), on future monitoring of marine biodiversity for the purpose of meeting national and international obligations.[151] The report highlights that the environment is going through rapid change and that, to understand these changes, it is essential a unified UK approach to monitoring is established that goes beyond the levels of monitoring suggested by policy representatives

[143] UK Parliament: Written Evidence from JNCC
[144] JNCC: MPA Monitoring Survey Reports
[145] Interview
[146] UK Parliament: Written Evidence from JNCC
[147] JNCC's evidence did not state what the desired frequency is, but it will likely vary depending on the biological traits of the species/habitat being protected. For example, slower growing habitats (e.g., Maerl beds) may not require annual monitoring.
[148] The lack of monitoring is reflected in the UK's MPA Network Assessment submission to OSPAR (2023), only 3% of MPAs assessed had high confidence in the findings – high confidence relates to MPAs with sufficient monitoring in place to assess the condition of the feature and only given to sites with regular site condition monitoring.
[149] Further information on sentinel sites can be found on NOAA's website
[150] JNCC: Evidence to Environment and Climate Change Committee
[151] JNCC: Report 765 The UK Marine Biodiversity Monitoring Programme: Development of advice on future monitoring (2019)

(Table 8). The report further emphasises the need to implement integrated, adaptive management plans in a coordinated way to be able to monitor the environment effectively.

Table 8: Summary of the monitoring suggestions by policy representatives and the additional monitoring advised by Healthy and Biologically Diverse Seas Evidence Group (2018)[152]

| Biodiversity component | Level of monitoring suggested by policy representatives (2018) | Additional monitoring advised by HBDSEG for meeting the basic evidence needs (2018) |
|---|---|---|
| (English) inshore benthic habitats | • An increase in current monitoring effort to ensure representation of a subset of high-priority benthic habitats located in Marine Protected Areas (32% of MPA features within 28% of MPAs).<br>• Inclusion of monitoring in representative areas of the wider environment. | • An increase in the spatial spread of monitoring to 43% of feature locations and 37% of MPA to enable improved understanding of trends and advise on management at regional scales. |
| Offshore (excluding deep sea) benthic habitats | • Monitoring of a representative subset of high priority benthic habitats within 60% of MPAs.<br>• Inclusion of monitoring in representative areas of wider environment. | • Inclusion of environmental data sampling and analysis to contextualise benthic habitats monitoring.<br>• Improved access and optimisation of industry data and facilitate join-up in monitoring protocols to enable better understanding of impacts of human pressures. |
| Deep sea benthic habitats | • Monitoring of a representative subset of high priority benthic habitats within ~35% of MPAs.<br>• Inclusion of monitoring in representative areas of wider environment. | • Monitoring is conducted at an ecologically relevant frequency to improve ability to attribute variability in condition to natural variability of anthropogenic impacts.<br>• Improved access and optimisation of industry data and facilitate join-up in monitoring protocols to enable better understanding of impacts of human pressures. |

## 5.2 MPA condition assessments

The conservation objectives for MPAs are informed by SACO, provided by NE (England inshore), JNCC (offshore) and DAERA (Northern Ireland inshore) prior to an MPA designation. The advice includes ecological attributes that describe the integrity of a site (e.g., extent, distribution, structure, and function) and detail specific targets. For species, this may also include attributes of the feature's population and distribution.[153] For example, see NE's conservation advice package for the Inner Dowsing, Race Bank and North Ridge SAC, which contains information on the condition of protected features, overarching conservation objectives, targets for the protected features, and a map of known distribution of features.[154]

Prior to designating an MPA, a site survey is conducted by the relevant SNCB to inform conservation advice and objectives for designated features. Subsequent condition assessments of MPAs, post designation, are fundamental for assessing progress towards conservation objectives and reviewing management measures.[155] Assessments of SAC and SPA feature condition and MCZ progress reports on the achievement of conservation objectives are required every six years.[156,157]

NE's condition assessment process follows four key stages (listed below) to determine whether the site-specific targets, as set out in the SACO, have been met[158]:

1. Evidence gathering and scoring
2. Attribute assessment
3. Sub-feature assessment

[152] JNCC: Report 765 The UK Marine Biodiversity Monitoring Programme: Development of advice on future monitoring (2019)
[153] Natural England: Conservation Advice for Marine Protected Areas 2019
[154] Natural England: Inner Dowsing, Race Bank and North Ridge cSAC (UK0030370A)
[155] JNCC: The UK Marine Biodiversity Monitoring Strategy
[156] JNCC: Special Areas of Conservation
[157] Natural England: Conservation Advice for Marine Protected Areas 2019
[158] Natural England: Assessment of the Condition of Features in MPAs

4. Feature assessment

In Northern Ireland, DAERA collect and analyse information for each MPA using JNCC's Common Standards Monitoring methodology[159,160] to assess the condition of features, which follows the following three key stages:

1. Identify and define any sub-features that are important components of the feature
2. Identify the attributes for the interest feature, and any sub-feature, which are considered on best judgement to be essential to assess its condition
3. Set site specific targets for those attributes.

The aggregated targets set in stage 3 then provide the evidence from which to judge favourable condition for the entire site.

If a feature is not considered to be meeting the conservation objectives, management actions may be required to recover the condition to meet the objectives. Similarly, if a feature is considered to be meeting its objectives, its condition should then be maintained, which may still require management action.

In cases where the condition of an MPA cannot be assessed using ecological evidence, a vulnerability assessment, which uses activity data (such as vessel monitoring systems (VMS) for fishing activity) and feature sensitivity evidence (using feature sensitivity tools such as MarESA[161] and FeAST[162]), is conducted. For their vulnerability assessments, JNCC use the sensitivity assessment of a species or habitat as well as the physical extent (footprint), length of time, and frequency of an activity. These assessments can then be tailored to specific activities within a specific area. DAERA adopted a vulnerability assessment approach for identifying and refining conservation objectives and management options for MCZs, using the process illustrated in Figure 7.

[159] DAERA: Protected Areas – Protected Areas Monitoring Results
[160] JNCC: Common Standards Monitoring Guidance for Marine 2004
[161] Marine Life Information Network: Marine Evidence based Sensitivity Assessment (MarESA)
[162] NatureScot: Feature Activity Sensitivity Tool (FeAST)

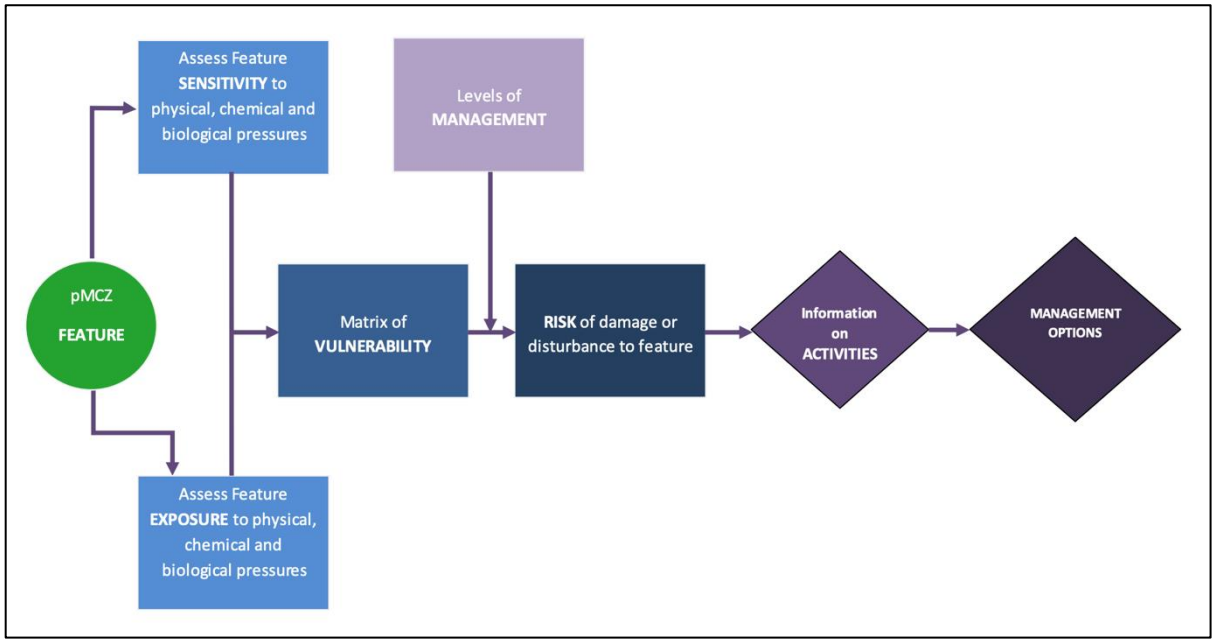


Figure 7: Flow diagram for assessing feature vulnerability and risk of damage used by DAERA for identifying MCZ management options[163]

NE, however, do not provide information on the vulnerability of features with their conservation advice. This is due to the relevant information on activity within an MPA being held by other authorities responsible for management of that activity, and because activities are constantly changing, which could result in vulnerability assessments becoming quickly out of date.[164]

The different approaches to the method and use of vulnerability assessments across SNCBs in England and Northern Ireland highlights an important divergence that has implications for the assessment and reporting on the condition of MPAs.

## 5.3 Potential weakness in the legislation for MPA condition reporting

Evidence used to set the MPA environmental targets concluded that environmental change, particularly climate change and invasive non-native species (INNS), were permanent pressures on the marine environment that would not be possible to remove from MPAs.[165] This has led to several clauses within the Environmental Targets (MPA) Regulations 2023 ('MPA Regulations 2023'), which could undermine genuine recovery to favourable condition of MPA features.

The first states that when determining whether a feature is in favourable condition "*any alteration to that feature brought about entirely by natural processes is to be disregarded*" (Section 3 (5) of the MPA Regulations 2023). The intention here was presumably to exclude climate change and, amongst others, damage to features from storm events[166], mass

[163] Department of the Environment: Guidance on the Development of Conservation Objectives and Potential Management Options
[164] Natural England: Assessment of the Condition of Features in MPAs
[165] Defra: Biodiversity Marine target. Detailed evidence report, 2022
[166] Emma Sheehan presentation: Storm impacts on the seabed in protected and fished areas

mortality events[167], and disease.[168] But this does not consider the impacts of human activity on these natural processes. For example, increased frequency and intensity of storms caused by climate change is already occurring in the UK.[169] Mass mortality events could have multiple human causes, including dredging, algal blooms driven by increased terrestrial run-off and chemical toxicity,[170] and there is evidence that human pathogens cause several tropical coral diseases[171,172] and change the biochemistry of sponges.[173]

Focussing on individual parts of the system (i.e., features) and decoupling impacts on these features from wider system processes that are, in part, being driven by multiple human activities could result in a situation where MPA targets are technically achieved, but there has been little to no positive impact on biodiversity within the sites.

This clause also has implications for reporting on favourable condition of mobile species. For SACs designated for species, the conservation status is considered favourable if the species population can maintain itself on a long-term basis, and the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future.[174] Should a site-attached mobile species, such as harbour porpoise, migrate out of the MPA due to climate change, it could be interpreted that the population has maintained healthy numbers and that its natural range has just moved rather than reduced, also leading to a situation where the feature is entirely absent, but the MPA has technically met its objectives.

Similarly, Section 3 (6) of the MPA Regulations 2023 states that if an INNS is present in an MPA, or its vicinity, and is so prevalent that it cannot reasonably be removed or managed to remove pressure on a feature, then it is not considered a relevant impact. There is no dedicated surveillance for marine INNS in Britain[175] so introductions are only picked up as a result of limited incidental monitoring by SNCBs, marine stakeholders, and the general public. Yet, marine INNS can grow at extremely rapid rates. For example, *Celtodoryx ciocalyptoides*, an encrusting sponge, is listed as a species with a high risk of entry to the UK, a low feasibility of eradication, and requiring rapid response under the UK contingency plan for INNS.[176] It has been shown to dominate macrofauna in shallow waters, outcompete microbenthic organisms, and overgrow sessile invertebrates, including pink sea fans (a feature of nine English MPAs[177]).

Additionally, climate change is increasing the risk of INNS introductions to UK waters[178,179], as is the increase in recreational boating and other water sports activities.[180] Unless routine

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[167] This example is for crabs and common lobster but could potentially apply to spiny lobster
[168] RSPB: Avian Influenza: a major threat to our struggling birds
[169] Manning, C. et al. 2024 Compound wind and rainfall extremes: Drivers and future changes over the UK and Ireland. *Weather and Climate extremes* 44
[170] Independent Expert Assessment of Unusual Crustacean Mortality in the North-east of England in 2021 and 2022
[171] Patterson Sunderland, K., et al. 2011 Human pathogen shown to cause disease in the threatened Eklhorn Coral *Acropora palmata PLoS One* 17
[172] Science: New clues to coral disease
[173] Batista, D., et al. 2018 Environmental conditions affect activity and associated microorganisms of marine sponges. *Marine Environmental Research* 142
[174] JNCC: Favourable conservation status: UK statutory nature conservation bodies common statement
[175] GB Non-native Species Secretariat: Contingency plan for invasive non-native marine species
[176] GB Non-native Species Secretariat: Contingency plan for invasive non-native marine species
[177] CABI Digital Library: Celtodoryx ciocalyptoides
[178] ABPMer: Invasive species and the climate crisis
[179] UK Climate Risk: UK Climate Change Risk Assessment Evidence Report 2021
[180] GB Non-native Species Secretariat: Recreational Boating PAP for GB

monitoring for INNS is established, especially in MPAs close to areas with high levels of human marine activity, there is a real threat that INNS could damage or destroy designated features within an MPA, and yet MPA targets could still technically be met.

In addition to the exemption of natural processes, the use of vague language in the legislation leaves regulations open to interpretation and, therefore, challenge through the legal system. For example, adverse impacts on MCZs can include "*anything which hinders the conservation objectives*", or "*any other thing which causes deterioration…*" (Section 110 (6) of the Environment Act 2021). Similarly, the MPA Regulations 2023 state that "*any temporary reduction in numbers is to be disregarded if the population is sufficiently thriving and resilient to enable its recovery*" (Section 3 (4)). The use of 'temporary' is problematic due to the broad range of species protected by MPAs that may have different, complex, and sometimes unknown life cycles and population fluctuations.

## 5.4 Challenges with surveying and monitoring in the marine environment

Surveying marine habitats is extremely challenging, when compared to terrestrial habitats, particularly collecting a sufficient amount of data to assess the condition of a feature, changes in a feature's condition, and determining the cause for a detected change. Surveying the marine environment is difficult, due largely to the inaccessibility of marine habitats and the need for specialised equipment, such as research vessels, remotely operated vehicles, and oceanographic tools for measuring, for example, salinity, temperature, and contaminants. The additional resources needed for working in the marine environment, such as time and qualified personnel,[181] create further difficulties with data collection. Offshore sites are more challenging to survey than inshore sites due to poor weather conditions and sea state, deeper waters being inaccessible for dive surveys, and increased turbidity and visibility inhibit camera surveys.

In addition to the technical challenges, offshore expeditions and sample analyses are very costly. For example, grab samples are used to survey offshore sites but cost approximately £1,000 to process and only provide information on the species living within 0.1m$^2$ of sediment.[182] The high costs of sample collection and analysis ultimately results in only a small amount of data being collected. For example, monitoring of the Hartland to Tintagel MPA involved a single grab sample taken every 7 km, which would be considered high intensity monitoring for an MPA.[183] Similarly, a survey of the Offshore Overfalls MCZ took grab samples for infauna of 0.0000003% of the surface habitat.[184]

In addition to the high cost and subsequent low level of data collection, grab samples and beam trawls can result in sample bias: grab samples can underestimate large species and those that are patchily distributed and mesh trawls can miss smaller species or those buried deep in sediments.

Due to the above factors, there are notable knowledge gaps on the presence and condition of inshore and, particularly, offshore marine habitats. This knowledge gap is exemplified by

[181] For example, Cefas' research vessel Endeavour costs approximately £24,000/day to charter (pers comms P Whomersley, HMC)
[182] Pers comms between H. Tillin & M. Young, NE)
[183] Pers comm between H Tillin & M. Young, Natural England
[184] Cefas & JNCC: Partnership Report Series Report 44

the UK's largest known seagrass bed in St Austell Bay, Cornwall (359.1 hectares) only recently being discovered in 2022.[185]

Detecting the presence of a species or habitat in an MPA is challenging, but this becomes increasingly challenging when information on abundance, condition, and any changes in condition are required. This is particularly difficult for those species that are slow growing (e.g., the coralline algae maerl, which forms important habitat for a range of species, grows at approximately 1mm per year[186]) and those with irregular reproductive cycles (e.g., echinoderms, such as sea stars and brittle stars, can experience irregular 'outbreak' and 'die-off' events[187]). To detect and demonstrate changes in the condition of these species, long-term monitoring is required, particularly when assessing whether MPA management measures have had an impact and are being effective in delivering the MPA's conservation objectives.[188] In some cases, particularly when monitoring an MPA shortly after management measures have been put in place, an assessment on the level of compliance with management measures, and the inferred reduction on pressure resulting from this action, can be informative.[189]

## 5.5 Reflections on MPA monitoring

**Current Approach**

The MPA monitoring programmes in place across England and Northern Ireland have been designed specifically to inform condition assessments of the designated features of each MPA. However, the most recent UK MPA Network Assessment submitted to OSPAR in 2023 indicates that monitoring of MPAs is lacking (only 10% have monitoring in place, 79% partial) and, therefore, only 3% of sites have a high level of confidence in the assessment findings on feature condition.

While important for assessing the effectiveness of MPA management measures in place, the feature-based approach to monitoring makes it difficult to assess the condition of the MPA network as a whole. Further, the variation in MPA monitoring frequency, with some MPAs being monitored more regularly than others, makes it challenging to get a clear, up-to-date assessment of the network's condition.

The feature-based approach to monitoring MPAs has led to a lack of monitoring taking place outside of MPAs. While monitoring data from outside of MPAs may not be required for condition assessments, they can provide a valuable reference for assessing the effectiveness of MPA management measures and detect any potential spill-over effects from the MPA to the surrounding environment. From an MPA management perspective, demonstrating management measures are being effective is vital for building confidence in

[185] Cornwall Wildlife Trust: One of the UK's largest known seagrass beds discovered in St Austell Bay
[186] MarLIN: Mearl Beds profile
[187] Uthicke, S. et al. 2009 A boom-bust phylum? Ecological and evolutionary consequences of density variations in echinoderms *Ecological Monographs* 79
[188] Solandt, J.L., et al. 2019 Managing marine protected areas in Europe: moving from 'feature-based' to 'whole-site' management sites *Marine Protected Areas*
[189] Langton, R., et al. 2020 Are MPAs effective in removing fishing pressure from benthic species and habitats? *Biological Conservation* 247

MPAs as conservation tools, particularly by those whose activities have been restricted/prohibited inside the MPA (e.g., the mobile fishing industry).

Further, data from outside of the MPA network will contribute towards GES reporting, which is reported on a regional scale. The integration of GES data requirements into MPA monitoring programmes could provide further insights into the contribution the MPA network is making towards the achievement of GES.

While there are several authorities conducting MPA monitoring activity, working to meet monitoring requirements set out in legislation such as the UKMS, several stakeholders indicated that there is a lack of strategic oversight, which has led to poor coordination of effort across the network. In their evidence to the UK Environment and Climate Change committee, JNCC state that "there is no current driver nor policy instrument for coherent or consistent reporting on MPA extent and condition covering the full breadth of designation types in any one of the four countries of the UK, nor at a UK-level".[190] The fragmented reporting of MPA monitoring creates further complexities for assessing the health of the network.

In Northern Ireland, there is only one authority, DAERA, responsible for setting conservation objectives, implementing management measures, monitoring MPAs, and performing condition assessments. While there are strategic benefits to having several MPA responsibilities within a single authority, it was suggested that DAERA's broad remit created a lack of transparency, which makes it challenging for decisions and processes to be scrutinised and evaluated by external stakeholders (Interview). This has, subsequently, created a lack of confidence in DAERA's messaging on the performance of MPAs, in particular the recent report on Northern Ireland's Inshore MPAs, which states that 86% of Northern Ireland inshore MPA features are in favourable condition.[191] This finding would suggest that Northern Ireland's inshore MPA network is already exceeding the EIP for Northern Ireland target for 85% of MPA features to be in favourable condition by 2030.

**Condition Assessment**

Where direct monitoring of an MPA is not feasible or appropriate and, subsequently, a condition assessment cannot be conducted, vulnerability assessments based on human activity and feature sensitivity are conducted. Vulnerability assessments are the best available option in these circumstances and can provide an indication of whether recovery is expected or not (Interview), but their findings should be treated with caution. Data gaps in feature distribution/extent and human activity within MPAs can lead to low levels of confidence in the findings. Further, as highlighted by NE, the activity data informing a vulnerability assessment can change, risking assessment findings quickly becoming out of date.

The need to monitor pressures within MPAs was raised several times by stakeholders in interviews and the workshop, highlighting its importance for attributing changes in feature condition to natural variability or management of human activities.[192] It was noted by one interviewee that monitoring is undertaken for certain pressures, such as fishing and

[190] JNCC: Written evidence to Environment and Climate Change Committee
[191] DAERA: Northern Ireland Inshore MPA Network 2019-2024
[192] Noble-James, T., et al. 2023 Monitoring benthic habitats in English MPAs: Lessons learned, challenges and future directions *Marine Policy* 157

underwater noise, but not for other pressures that could influence the potential for an MPA to achieve its conservation objectives (e.g., water quality). Without monitoring all pressures, it becomes challenging to determine the impact of management measures that focus on one pressure.

Other pressures, such as INNS, are not included in the design of MPA monitoring programmes, with their presence recorded only if they are detected during the monitoring of designated features. It is likely that INNS will become increasingly problematic as the impacts of climate change increase, potentially resulting in higher levels of dispersal and survival in MPAs (Interview).

Through the sustainable management or removal of human pressures, it can be assumed that impacted features will recover to a more favourable condition. However, this assumption relies on an understanding of what a favourable condition looks like under current marine environmental conditions. Due to persistent pressure on marine habitats and species, coupled with changing environmental conditions caused by, for example, climate change, it cannot be assumed that a feature, or ecosystem, will return to a previous state once pressures are removed. Therefore, without sufficient post-management monitoring, it is not possible to evidence that MPAs have been effective, and the designated features have recovered to a favourable condition.

To conduct an MPA condition assessment, data must be collected on associated indicator metrics/thresholds to measure if the desired feature condition has been achieved or maintained (such as areal extent of a habitat). However, several stakeholders interviewed highlighted that the majority of MPA features do not have associated indicator metrics/thresholds, therefore, creating a lack of clarity over what favourable condition actually looks like and whether or not an MPA is achieving its conservation objectives.

Finally, it was noted that the high-level condition assessments conducted for MPAs (Section 5.2) are challenging to translate into fisheries management measures implemented at a local scale. For example, the data informing the condition assessment and management measures may be based on data points several hundred kilometres away from where fishing activity is prohibited (Interview). However, despite these challenges, it was recognised that the cost and logistical difficulties of surveying the seabed mean data is scarce and, therefore, there must be discretion in decision-making.

**Challenges**

One of the key limiting factors facing MPA monitoring is the lack of resources for conducting surveys at the frequency and spatial scale required to detect meaningful change in feature or ecosystem status. In their evidence to the UK Environment and Climate Change Committee, JNCC note that “if greater resources were available, we would consider adjusting our monitoring activity to allow us to increase the confidence of our assessment of the condition of the MPAs across the UK”.[193]

The large number of MPAs across England and Northern Ireland further adds to the challenge of monitoring. As highlighted by JNCC in their evidence to the UK Parliament, monitoring in offshore MPAs is particularly lacking, where resources only allow for two

[193] UK Committee on Environment and Climate Change: An extraordinary challenge: Restoring 30 per cent of our land and sea by 2030

offshore MPAs in the UK, only one of which is in England, to be monitored per year.[194] At this rate, offshore MPAs in England will be monitored once every 42 years, if every MPA is monitored on rotation. This means the majority of condition assessments for offshore MPAs are conducted using a vulnerability assessment. However, some sites are monitored more frequently than others and are, therefore, used as sentinel sites. These sites are chosen for their monitorability, for example access, present features, and implemented management measures (Interview). This focused approach to monitoring does, however, mean that some offshore MPAs will not be monitored for many years, if at all.

In addition to the lack of resources for monitoring, it was also highlighted that there is often a significant time lag between the collection of field data, the analysis of samples, and the reporting on MPA condition (can be up to three years (Interview)). This time lag can result in a decrease in value of the data collected on MPA monitoring surveys, as the data used to inform the condition assessment may already be out of date. Further, any required changes to management measures in response to the condition assessment will also be delayed.

Several workshop attendees and interviewees highlighted the need to broaden the range of data sources used to inform MPA assessments. For example, it was noted that often site survey data (e.g., habitat data) collected by offshore wind companies within MPAs, such as Dogger Bank SAC, can be inaccessible and not collected in an integrated way with the monitoring conducted by SNCBs. There is, therefore, a risk that industry data is not being used to best effect, and other organisations may often be going to the same place to collect data, risking the duplication of effort and wasting resources. There is a clear need for data sharing between offshore sectors, such as offshore wind and oil and gas, and regulators, and for the monitoring data collected by offshore sectors to be compatible with MPA monitoring programmes and, potentially, GES reporting (Interviews).

In addition to improving collaboration with the private sector, one interviewee noted that citizen science monitoring data should also be considered in feature condition assessments, as some areas are heavily surveyed through citizen science projects, especially the inshore marine area. However, the challenge with these data is ensuring they are collected using compatible methods and are quality assured, but a standardised monitoring methodology that enabled others to feed-in could help.

Although not covered in this report, the need for monitoring socio-economic factors, in addition to feature condition assessments and activity monitoring, was suggested to enable the wider implications of MPA management measures to be understood, such as impacts on wellbeing or the value of fisheries. Identifying and managing these wider impacts could play an important role in ensuring compliance with management measures and communicating the benefits on the MPA.

# 6 Evaluation of the MPA network

The previous sections provide a high-level overview of the status of the MPA network in England and Northern Ireland, focusing on activity to date on MPA designation, objectives, effective management (as set out in both CBD and OSPAR targets), and monitoring. This

[194] UK Parliament: JNCC Written evidence

section provides a high-level evaluation of the ecological effectiveness of the MPA network, specifically exploring whether the MPA networks in England and Northern Ireland are meeting international commitments, assessing the contribution the MPA network towards the UK's achievement of GES, and assessing how well connected the network is.

## 6.1 Contribution of MPAs to Good Environmental Status

As set out in Section 3.2, the EU MSFD provides the framework for achieving GES, which is implemented in the UK through the Marine Strategy Regulations 2010. The MSFD defines GES as "the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive".[195] This means that the different uses of marine resources are conducted sustainably, ensuring continuity for future generations. The SoS must periodically review and update the characteristics of GES every six years using the eleven descriptors from Annex I of the MSFD:

The Marine Strategy Regulations 2010 require measures to achieve or maintain GES to be put in place and provide a UK-wide framework for meeting the requirements of the MSFD in the form of the UKMS. The descriptors used to determine GES include elements of environmental status and ecosystem functioning associated with marine biodiversity, marine food webs, and seabed integrity, as well as the assessment of pressures on marine systems, such as litter, contaminants and eutrophication.

The UKMS sets out a framework for assessing, monitoring, and taking action to achieve the UK's shared vision for clean, healthy, safe, productive and biologically diverse oceans and seas. It is made up of three key stages that collectively provide the framework for achieving GES:

1. Part One provides an assessment of state of the UK's seas (most recently updated in 2019)[196]
2. Part Two provides an update on the monitoring programmes used to gather data to assess the state of UK seas (most recently updated in 2022[197])
3. Part Three sets out the UK's programme of measures (PoM) that will help to achieve or maintain GES (most recently updated in 2025[198]).

The UKMS Part Two assessment is essential for monitoring the state of UK seas over time and informing the PoM for achieving GES. As stated in the most recent 2022 Part Two assessment:

> *"The purpose of the monitoring programmes is to provide sufficient evidence to demonstrate the extent that the revised objectives and targets set out in the updated UK Marine Strategy Part One have been met so we can provide a robust assessment of progress towards achieving GES in 2024 within the UK Marine Strategy area."*

The UKMS Regulations 2010 require monitoring programmes to address certain indicative ecosystem elements and pressures on the marine environment, which include:

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[195] European Commission: Marine Environment: Good Environmental Status
[196] UK Government: Marine Strategy Part One: UK Updated Assessment and Good Environmental Status
[197] Defra: Marine Strategy Part Two: UK updated monitoring programmes 2022
[198] Defra: Marine Strategy Part Three: 2025 UK programme of measures

- species, habitats and ecosystems that need to be considered if they are essential features and characteristics in UK seas;
- pressures and impacts which significantly affect marine species and habitats; and
- uses and activities which may affect the marine environment.

Although GES is reported at a regional seas scale: Greater North Sea and Celtic Seas (Figure 8), the development of a fully designated, strong, ecologically coherent and well managed network of MPAs is one of the measures identified within the MSFD/UKMS as having the potential to contribute to the achievement of GES.

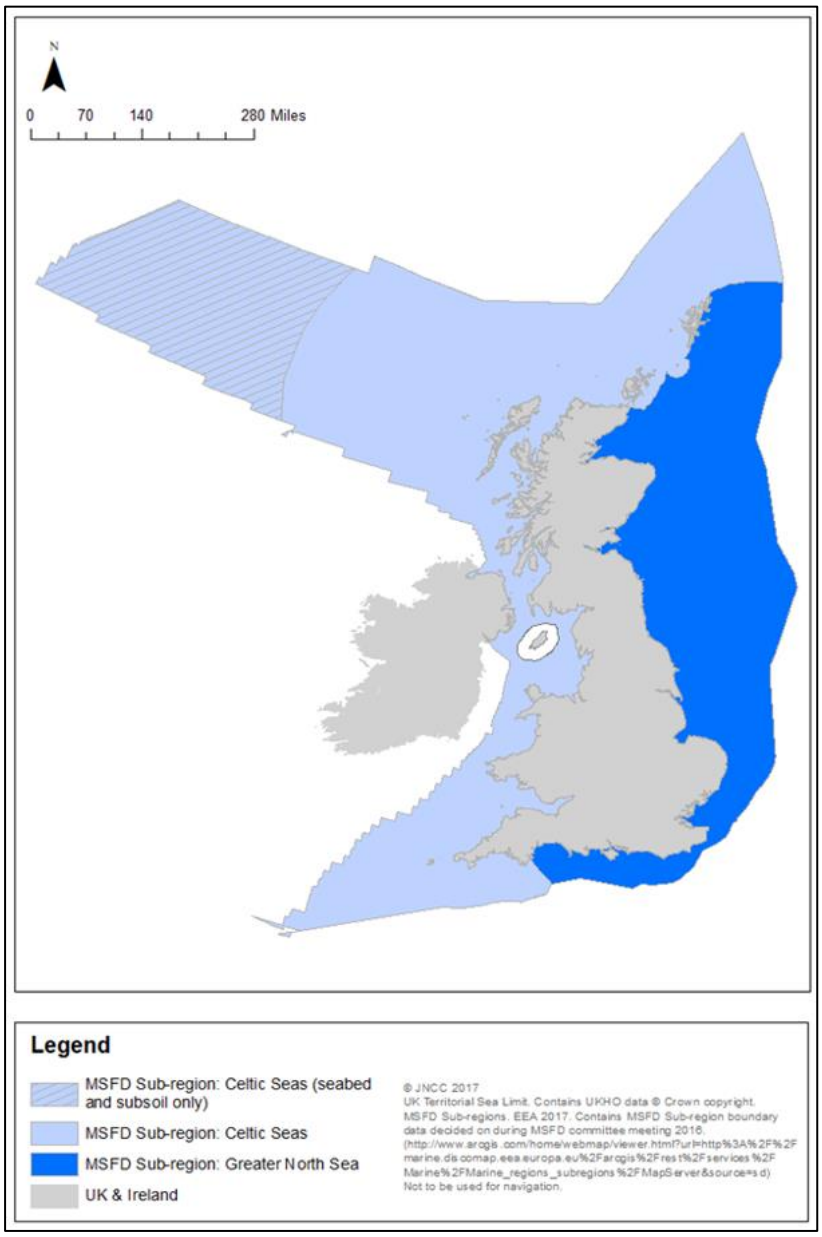


Figure 8: UKMS sub-regions for reporting Good Environmental Status.[199]

[199] UKMMAS: Introduction to UK Marine Strategy

The MPA network in England and Northern Ireland will play an important role in protecting marine ecosystems and maintaining biodiversity by safeguarding critical habitats and species and contribute towards achieving and maintaining GES, particularly the following descriptors[200]:

**Descriptor 1 – Marine Biodiversity**: *Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.*

**Descriptor 4 – Food webs**: *All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.*

**Descriptor 6 – Seabed integrity**: *Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.*

It is important to note that the MPA network will also contribute towards GES Descriptor 3: populations of commercial fish and shellfish are healthy, but to a lesser extent than the three descriptors identified above.

Further, this assessment on the contribution of the MPA network towards GES will focus on Descriptors 1 and 6 as both will contribute towards the achievement of Descriptor 4, as stated in Descriptor 4's definition: "marine food webs can only be in a good state if marine species and habitats are healthy and in a good condition."[201]

Under each of the GES descriptors are a set of criteria and methodological standards that should be used when determining GES. Under the Descriptor 1 on biodiversity, the criteria include:

- Criteria 1: The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured.
- Criteria 2: The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.
- Criteria 4: The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions.

The full list of criteria for Descriptor 1 can be found in Annex D.

For Descriptor 6, seafloor integrity is required to be at a level that ensures the structure and functions of the ecosystems are safeguarded and benthic ecosystems are not adversely affected. The criteria considered includes the following:

- Criteria 1: Spatial extent and distribution of physical loss (permanent change) of the natural seabed
- Criteria 2: Spatial extent and distribution of physical disturbance pressures on the seabed.

[200] European Commission: Descriptors under the MSFD
[201] European Commission: Descriptors under the MSFD

- Criteria 4: The extent of loss of the habitat type, resulting from anthropogenic pressures, does not exceed a specified proportion of the natural extent of the habitat type in the assessment area.

The full list of criteria for Descriptor 6 can be found in Annex D.

The recently published UKMS: Part Three (2025) report highlights where the UK is failing to meet GES. It also provides an overview of how MPAs are contributing towards achieving GES, by providing a means for managing key anthropogenic pressures, collecting data[202], and supporting the recovery of marine habitats and communities. More specifically, the UKMS Part 3 report details the contributions MPAs and HPMAs make to achieving GES:

- **Biodiversity Conservation**: MPAs have the potential to help stabilise marine biodiversity loss, they are considered particularly important for benthic habitats, which are often negatively affected by human activities, in particular bottom contact fishing.
- **Ecosystem Recovery**: By limiting or prohibiting destructive activities, MPAs and HPMAs could enable marine ecosystems to recover to a more natural state. This allows for the restoration of habitats and increased biodiversity which will contribute to overall ecosystem health.
- **Management Measures**: MPAs and HPMAs generally have associated management strategies that could contribute to achieving GES by restricting and sustainably managing certain damaging anthropogenic activities.
- **Marine monitoring** MPAs and HPMAs that are actively monitored provide data that is necessary to assess progress against GES descriptors and assess the effectiveness of MPA management strategies.
- **Climate Resilience**: By maintaining healthy and well-connected ecosystems, MPAs could help to mitigate the impacts of climate change and enhance the resilience of marine environments.
- **Fisheries Management**: MPAs and HPMAs can improve fisheries management by providing areas where fish stocks can recover and replenish surrounding areas therefore contributing to GES.

When assessing the contribution of MPAs to GES, it is important to consider the entire MPA network, rather than the each MPA individually. At a single-site scale, protection may be afforded to specific features (unless a WSA is applied) but collectively, on a network scale, MPAs can support and connect a wider, more diverse community of species, which supports a healthy, biodiverse and functioning marine communities and ecosystems. The Joint Administrations Statement[203] on establishing an ecologically coherent network of MPAs across the UK confirms the use of OSPAR's five principles to guide its development, which include:

- Features: "sites should represent a range of species, habitats, and ecological processes of the area"

[202] It should be noted that the contribution of data for areas outside the MPA network and for offshore MPAs will be small
[203] UK Contribution to Ecologically Coherent MPA Network in the North East Atlantic – Joint Administrations Statement

- Representativity: "…areas which best represent the range of species, habitats and ecological processes"
- Connectivity: "…ensuring the MPA network is well distributed in space and takes into account the linkages between marine ecosystems."

The ecological coherence of the MPA network is discussed further in Section 6.2.

Despite the range of potential contributions, the MPA network can make towards achieving GES, the UKMS Part Two identifies MPA monitoring data as contributing to only three GES descriptors: 1, 2, and 6. While Descriptor 2: Non-Indigenous Species has been included, management strategies focus on preventing their introduction through the management of human activity[204], rather than the management of MPAs. However, MPA monitoring data can be used to provide an indication of their presence/absence across the marine region if detected. MPA monitoring strategies are not, however, designed with the intention of detecting INNS. Therefore, if an INNS is detected in an MPA it is by chance, rather than through targeted monitoring effort. Further, identifying the presence of an INNS by chance could be an indication that the INNS has already become well established and, therefore, beyond the point where management can be effective.

The UKMS Part 2 further identifies key issues with using MPAs as part of the programme of measures, recognising challenges associated with monitoring, specifically highlighting the low number of MPAs being monitored and the lack of monitoring taking place in the wider benthic environment (Table 9).

Table 9. Contribution of MPAs to the latest assessment of GES as part of the Marine Strategy: Part Two.

| GES Descriptor | Key links to MPAs | Key Issues |
|---|---|---|
| D1: Biodiversity<br><br>D6: Seabed integrity | Data on habitat loss, condition, and adverse effects and disturbance caused by human activities will be collected by inshore, offshore and deep sea MPA monitoring programmes | Only a small selection of MPAs are monitored at a reasonable frequency, and there is no monitoring being undertaken within the wider benthic environment. |
| D2: Non-indigenous species (NIS) | Data is collected in relation to NIS during ongoing MPA monitoring programmes | |

The limited level of MPA monitoring taking place is largely due to the resources available to monitor MPAs, particularly in offshore sites, as discussed in Section 5.1.3. With insufficient levels of monitoring taking place across the MPA network, it becomes difficult to fully demonstrate the impact the entire network is having and determine the extent of its contribution to GES.

The lack of monitoring outside of MPAs is a particular challenge for identifying the contribution of MPAs to GES, largely because, without this data, it is not possible to assess the effectiveness of the MPA management measures (i.e., are the management measures

[204] European Commission: Descriptors under the MSFD

improving, or maintaining, the condition of designated features). Further, as GES is reported on a regional seas scale, which includes the marine areas outside of the MPA network, using monitoring data collected that mostly comes from within MPAs can give a biased impression of the health of the marine region (Interviews). Currently, about 80% of benthic data feeding into the GES assessment comes from MPA monitoring programmes (Interview), with the remaining 20% coming from a variety of other surveys conducted by SNCBs and academic institutions.[205]

At present, MPA monitoring strategies are designed to collect data on designated feature(s) within MPAs to inform a condition assessment. Therefore, MPA monitoring programmes are designed to report against the conservation objectives of the MPA, not to report on the condition of the MPA network as a whole or support wider reporting against GES descriptors (this is also true for marine licensing, where HRAs and MCZAs focus on the potential impact on designated features of MPAs). Further, the feature-based conservation objectives of MPAs do not align with GES indicators, which means the findings of condition assessments cannot feed straight into the GES assessment. At present, the raw data collected from MPA monitoring is pooled together with data from other available sources to conduct the GES assessment of the region – whether the data came from an MPA or not is not considered in the GES assessment (Interview).

In addition to the misalignment of MPA monitoring and GES reporting, the different scales at which MPAs are managed and GES is reported can also create challenges for reporting. For example, prohibiting the use of bottom-towed fishing gear from an MPA is a positive step towards meeting the MPA conservation objectives by relieving pressure on designated feature habitats. In theory, the prohibition of this would positively contribute towards Descriptor 6: Seafloor integrity. However, as set out in Section 4.1, prohibiting bottom-towed fishing activity from an MPA can lead to displacement of activity to outside of the MPA. Therefore, at a regional seas scale, the total amount of fishing pressure has not been significantly reduced but simply moved to another area within the region, increasing the pressure on habitats and species in unprotected areas (Interview). From a GES reporting perspective, the MPA management measures that restrict fishing activity within MPAs have done little to reduce pressure on the environment within the marine region.

The displacement of pressures from MPAs to other sites within a GES sub-region highlights a key issue when considering the contribution of the MPA network to GES: it is possible to have a fully functioning, well-managed, and effective MPA network, where all MPAs are achieving their conservation objectives, and still fail to achieve GES for Descriptors 1 and 6.

While the MPA network will play a role in the achievement of GES, it cannot achieve it alone. For example, the total area of the MPA network in England and Northern Ireland is 99,569km$^2$, which is 11.5% of the UK's total marine area (this increases to 38% if MPAs in Scotland and Wales are included[206]). Therefore, the contribution of the MPA network in England and Northern Ireland towards achieving GES will likely be small. The size of the contribution to GES comes further into question when considering the displacement, rather

[205] JNCC: All aboard the marine research vessel Scotia
[206] JNCC: UK MPA network statistics

than removal, of fishing activity to areas outside of the MPA network and that several MPAs are still without effective management measures in place.

Therefore, the MPA network must be considered as one of several complimentary tools, which includes marine planning and licensing, that can collectively deliver improvements to environmental health and support the achievement of GES. Ensuring that each of the tools' objectives and targets align with GES descriptors will be key to maximising their collective impact.

To maximise the contribution of the MPA network to GES, the following points need to be considered:

- The fundamental principles for designing an MPA network, as set out by OSPAR (see Section 3.1), align with relevant GES descriptors (i.e., descriptors 1, 4, and 6), but the feature-based conservation objectives of individual sites and, therefore, management and monitoring programmes, do not, which has created a disconnect between MPA monitoring and GES reporting. Theoretically, the MPA network is contributing to the achievement of GES, but demonstrating this contribution is challenging due to this misalignment.
- The feature-based approach to MPA management and monitoring does not align with GES descriptors – reporting focuses on the condition of designated features rather than wider ecosystem health. A WSA to MPA management that focus on ecosystem functioning and species diversity and abundance (e.g., HPMAs) could better align with GES descriptors.
- To date, MPA monitoring has focused on areas within MPAs, which has restricted the ability to assess the impact of MPA management measures or provide an indication of the health of the wider environment.
- At present, GES reporting is not a consideration when developing MPA conservation objectives, management plans, or monitoring programmes. Greater communication and better coordination with GES descriptors (e.g., identifying common indicators) in the early stages of MPA development would better align the MPA network with GES, maximise its contribution to achieving GES, and optimise the use of resources. This would be particularly relevant for monitoring, where additional environmental data collection from sites outside of the MPA network could be incorporated into regular MPA monitoring activity.
- It is often overlooked that GES is a framework with several targets, rather than a single target, and that the MPA network can contribute to achieving some of those targets. A greater understanding of how the MPA network can contribute towards GES, potentially by reviewing the MPA network (individual sites and collectively) in the context of GES descriptors, could prove useful for identifying opportunities to better align MPA objectives with GES descriptors.

In principle, the MPA network makes a positive contribution towards the achievement of GES by sustainably managing and reducing pressures on important marine habitats and species. However, it is not possible to determine the extent of this contribution to GES largely due to the misalignment between MPA conservation objectives and monitoring programmes, and the criteria against which GES is reported. Further, the differences in geographical scale at which MPAs are managed and monitored versus the regional scale of GES reporting make it difficult to link improvements to MPA features with the achievement of

broader GES targets. While the MPA network as a whole will contribute towards the achievement of GES, it must be considered as part a suite of complementary measures that collectively can achieve GES.

## 6.2 Assessment of ecological coherence and connectedness of MPAs

The concept of ecological coherence arose out of the recognition that a network of protected areas should ideally be regarded as a whole, greater than the sum of its individual protected areas. Accordingly, achieving ecological coherence has become part of UK marine policy, particularly with regard to MCZs. However, the exact origin of the term is unclear, and definitions vary.[207]

There is no single agreed definition of the term 'Ecologically Coherent Network', and different sets of practical design principles/ecological coherence assessment benchmarks have been defined under different UK jurisdictions and within different processes. [208]

A well-designed network will contain MPAs of a size appropriate to the different habitats and species, connected through movements of adult species and larvae, with a range of protection levels, to protect biodiversity.[209] A coherent network can, therefore, function to protect multiple habitats and species and support a variety of key habitats and life stages of species.[210] Greater protection of species and habitats in MPAs could have beneficial effects on ecosystems that rely on these species and habitats, thus potentially increasing the surrounding biodiversity.[211]

MPA network coherence and connectedness is often reported at a UK level, rather than for each of the UK's devolved nations. This is due to the UK being a Member State of international commitments that require reporting a regional scale. Therefore, this section provides detail on both the coherence and connectedness of the UK MPA network and, where possible, detail on the national networks in England and Northern Ireland where available.

**OSPAR Commission Guidance on ecological coherence**

OSPAR assesses the progress towards overall status, management, and ecological coherence of the OSPAR MPA network on a biennial basis. To do this, OSPAR recommended that the assessment of MPA ecological coherence should be centred around the following five key principles[212]:

- features
- representativity

[207] Lieberknecht, L. et al. 2014 Assessment of the ecological coherence of the UK's marine protected area network. A report prepared for the Joint Links.
[208] Lieberknecht, L. et al. 2014 Assessment of the ecological coherence of the UK's marine protected area network. A report prepared for the Joint Links.
[209] Joint Administrations Statement Defra, DOE, Scottish Government, Welsh Government 2012. UK Contribution to Ecologically Coherent MPA Network in the North East Atlantic
[210] Joint Administrations Statement Defra, DOE, Scottish Government, Welsh Government 2012. UK Contribution to Ecologically Coherent MPA Network in the North East Atlantic
[211] OSPAR 2006 Guidance on developing an ecologically coherent network of OSPAR marine protected areas (Reference number 2006-3)
[212] OSPAR 2006 Guidance on developing an ecologically coherent network of OSPAR marine protected areas (Reference number 2006-3)

- connectivity
- resilience
- management

The Intersessional Correspondence Group on Marine Protected Areas (ICG-MPA), established in 2013, developed the 'Madrid Criteria' (Table 10) to reflect the key network principles whilst acknowledging limitations of data concerning target species and habitats.

Table 10: The Madrid Criteria for assessing the ecological coherence of the OSPAR MPA Network

| Criteria | Description |
|---|---|
| A | OSPAR MPAs are geographically well-distributed, with a maximum distance of up to 250 km for nearshore/coastline, 500 km for offshore and 1000 km for the high seas areas between MPAs – links to OSPAR (2006) network principle of **connectivity.** |
| B | OSPAR MPAs, in combination with other relevant spatial measures as deemed appropriate, cover at least 10% in area of all Dinter biogeographic provinces* – links to OSPAR (2006) network principle of **representativity** |
| C | OSPAR MPAs represent all EUNIS Level 3 habitat classes and OSPAR threatened and/or declining species and habitats (for which MPAs are considered appropriate), more than once in all relevant Dinter biogeographic provinces[213,214] that the given feature is present – links to OSPAR (2006) network principles of **features** and **resilience.** |

### Inclusion of ecological coherence criteria in the UK MCZ designation process

The OSPAR Commission's five principles for ecological coherence were used by Defra and devolved administrations[215] in developing the MPA network in the UK. Table 11 provides Defra's interpretation of the principles.

Due to the complexity of defining ecological coherence in legislation, it was decided that coherence should be addressed through a ministerial statement[216] and guidance[217]. The key guidance document is the Ecological Network Guidance: NE and JNCC's statutory advice on how to meet the requirements of the MACAA 2009 and Defra policy.

The Guidance identified the 23 broad-scale habitat features (taken from Level 3 of the EUNIS habitat type classification scheme[218]) that should be protected within MPAs in each Regional MCZ Project[219] area to 'represent the range of features present'. Additional features of conservation importance (FOCI), habitats that are rare, threatened or declining, were also provided.

[213] Dinter, W.P. 2001 Biogeography of the OSPAR Maritime Area. A synopsis and synthesis of Biogeographical Distribution patters described for the North-East Atlantic. Federal Agency for Nature Conservation. Bonn, Germany

[214] The Dinter biogeographic classification is a comprehensive system for the entire OSPAR Maritime Area, including both pelagic and benthic classifications. The system divides the seafloor, deep sea, and open oceanic waters into biogeographic zones, each with specific oceanography and characteristic biological communities.

[215] DAERA: Assessing progress towards an ecologically coherent network of MPAs in the Northern Ireland inshore region

[216] UK Government: Written Ministerial Statement on MCZs

[217] Defra 2010. Guidance Note on selection and designation of Marine Conservation Zones (Note 1).

[218] European Environment Agency: EUNIS habitat classification

[219] Defra: MCZs: Consultation on proposals for designation in 2013

Table 11: Defra interpretation of the five OSPAR principles for guiding the process for developing an ecologically coherent network of MPAs in the UK[220]

| Element | Description |
|---|---|
| **Features** | Sites should represent the range of species, habitats and ecological processes in the area. The proportion of features included in the MPA network should be determined on a feature-by-feature basis, considering whether features that are in decline, at risk or particularly sensitive are of a higher priority and would benefit from a higher proportion being protected by MPAs. |
| **Representativity** | To support the sustainable use, protection and conservation of marine biological diversity and ecosystems, areas which best represent the range of species, habitats and ecological processes. |
| **Connectivity** | This may be approximated by ensuring the MPA network is well distributed in space and takes into account the linkages between marine ecosystems. |
| **Resilience** | Adequate replication of habitats, species and ecological processes in separate MPAs in each biogeographic area is desirable where possible. The size of the site should be sufficient to maintain the integrity of the feature for which it is being selected. |
| **Management** | MPAs should be managed to ensure the protection of the features for which they were selected and to support the functioning of an ecologically coherent network. |

The Guidance provided regional stakeholder groups with specific guidelines on how to identify sites that would protect the range of marine biodiversity within their MCZ Region. This approach was validated using independent review: JNCC and NE commissioned new research on adequacy[221], viability[222], and connectivity[223] to establish the basis for ecological coherence. This was further externally peer-reviewed by international scientists.[224]

### OSPAR assessments

UK waters contribute to the MPA network for OSPAR Region II Greater North Sea and Region III Celtic Seas. As set out in Section 3.1, in the most recent 2023 assessment[225], the UK nominated 389 OSPAR MPAs, with a coverage of 74,432 km$^2$ in transitional waters, 147,293km$^2$ in the Exclusive Economic Zone (EEZ), and 17,158 km$^2$ in areas beyond the EEZ. A total area of 238,88 3km$^2$. The 2023 OSPAR summary assessments for the two regions the UK MPA network contributes to are provided in Table 12.

Table 12: Overview of OSPAR MPA Network assessment (2023) against Madrid Criteria, Colours indicate progress against Madrid Criteria targets. (red = poor, yellow = Moderate/medium, green = good)

| | **Madrid Criterion A (Connectivity)** | **Madrid Criterion B (Representativity)** | **Madrid Criterion C (Representation and replication)** |
|---|---|---|---|

[220] UK Contribution to Ecologically Coherent MPA Network in the North East Atlantic – Joint Administrations Statement
[221] Rondinini, C. 2010. A review of methodologies that could be used to formulate ecologically meaningful targets for marine habitat coverage within the UK MPA network. JNCC Report No. 438. (Note 2010 here, 2011 in JNCC & NE, 2012).
[222] Hill, J., et al. 2010. Meeting the MPA Network Principle of Viability: Feature specific recommendations for species and habitats of conservation importance. NE Commissioned Reports, Number 043.
[223] Roberts, C.M., et al. 2010. Guidance on the size and spacing of Marine Protected Areas in England. NECR037, Sheffield: NE, 2010.
[224] JNCC & NE. 2012. Marine Conservation Zone Project: JNCC and NE's advice to Defra on recommended Marine Conservation Zones
[225] OSPAR 2023 Report and assessment of the status if the OSPAR network of Marine Protected Areas in 2023.

| | | | |
|---|---|---|---|
| II Greater North Sea | Well distributed | Good coverage | Gaps for reptiles, mammals and fish, invertebrates and habitats largely met |
| III Celtic Seas | Well distributed | Good coverage | Gaps for reptiles, mammals and fish, invertebrates and habitats largely met |

The assessment against Madrid Criterion A, which uses a proximity analysis of MPAs as a surrogate for connectivity, suggests that the OSPAR MPA network is well distributed network in both OSPAR Regions II (North Sea) and III (Celtic Seas).

**Assessment of ecological coherence – Secretary of State waters**

The most recent report on the MPA network[226] suggests that the adequacy and representativity of the network for England and Northern Ireland (SoS waters) is largely complete (See Annex C for a list of assessments of ecological coherence across the UK MPA network undertaken to date). Network completion was supported by the designation of the third tranche of MCZs in 2019, which was intended to address ecological gaps first identified by JNCC in 2014[227] and further in pre-consultation scientific advice from JNCC[228] and NE[229] in 2018.

At the SoS waters scale, based on the assessment by Carr et al., 2016, all broadscale habitat features are represented (i.e., included within the MPA network) and replicated (i.e., at least two examples within MPAs). However, at the biogeographic region scale, some shortfalls remain, particularly for the protection of broadscale sediment habitats in the Channel and Irish Sea regions.

For FOCI, 41 out of the 48 provided by JNCC and NE are represented in existing MPAs, with 26 sufficiently replicated across SoS waters. It was recognised that despite the designation of the third tranche of MPAs, there would still be some shortfalls for FOCI and that it would not be possible to address most of these gaps as:

- there are either no records of the feature or no records above and beyond those already protected in the SoS waters part of the region; or,
- there is limited or no evidence for viable patches/populations that are not already protected by MPA(s).

The Defra report finds that sites were generally well connected and distributed across the main depth zones, although there could be some improvement in the representation of deeper areas in three of the Charting Progress 2 (CP2) regions.[230]

**Assessment of ecological coherence – Northern Ireland (Inshore)**

[226] Defra 2024 Marine Protected Areas Network Report 2019 – 2024
[227] JNCC: Assessing progress towards an ecologically coherent network of MPAs in Secretary of State waters in 2014
[228] JNCC, 2018. Scientific advice on possible offshore Marine Conservation Zones considered for consultation in 2018
[229] NE 2018 Marine Conservation Zones. Summary of NE's confirmed advice provided to Defra on Marine Conservation Zones to be considered for consultation in 2018.
[230] UK waters are divided in to eight regions to assess how human use and other pressures affect the productivity of UK seas. These have been used to inform a variety of MPA designation, marine assessment, and reporting purposes.

Overall, the current suite of MPAs in the Northern Ireland inshore region was considered by JNCC to be very close to delivering an ecologically coherent network.[231,232] Fishing activities are managed in nine inshore MPAs with a prohibition on mobile, bottom contacting fishing gear and restrictions on static gears, such as pots and creel.[233]

Currently, approximately 86% of inshore MPA features are reported by DAERA to be in favourable condition, although some additional designations will be required to achieve the target of being ecologically coherent.[234] The majority of FOCI were represented and replicated across the MPA network, however, a small number of features did not meet the benchmarks set by the network criteria, with shortfalls relating to replication or the amount of habitat afforded protection.

All broad-scale habitats, Northern Ireland Priority Marine Feature (PMF) species, and all but one Northern Ireland PMF habitats are represented in MPAs at least once; native oyster (*Ostrea edulis*) beds were the only gap in network representativity. Although one of the 24 broad-scale habitats is not yet replicated in the Northern Ireland MPA network (low energy circalittoral rock), broad habitat types were considered well connected. Of the 12 subtidal broad-scale habitats assessed, shortfalls in the area of habitat protected were found for four habitats:

- Moderate energy circalittoral rock
- Low energy circalittoral rock
- Sublittoral coarse sediment
- Sublittoral mud

Six of the 22 PMF habitats and 19 of the 93 PMF species are not replicated in the network.

During the 2019-2024 reporting period, DAERA commissioned scientific projects to address evidence gaps for features, such as native oyster and common skate, but no additional designations or amendments to existing designations were made. Evidence gathering continues and consideration will be given to potential designations in the next reporting period. DAERA reported in 2024 that an updated MPA strategy will be published in 2025, which will set out a detailed action plan (Table 13).

Table 13: 2025 Action plan steps to be addressed in the DAERA MPA Strategy

| Step | Description |
|---|---|
| Management: | By 2028, develop and implement the management plans for the existing MPAs, applying an adaptive management framework to allow for further iterations when new or improved evidence becomes available.<br><br>Implement the recommendations from condition assessment reports in order to achieve conservation objectives. Where a feature is in unfavourable |

[231] Cornthwaite, A., et al. 2018. Assessing progress towards an ecologically coherent network of Marine Protected Areas in the Northern Ireland inshore region. Report for JNCC and DAERA.
[232] DAERA: Report on the creation of a Network of Conservation Sites in the Northern Ireland inshore region: progress toward establishing an ecologically coherent network of well managed MPAs
[233] NISRA, 2024. Northern Ireland Environmental Statistics Report 2024.
[234] NISRA, 2024. Northern Ireland Environmental Statistics Report 2024.

| | |
|---|---|
| | condition, management measures will be explored with the aim to return to favourable condition. |
| Future designations | By 2028, develop and implement additional designations to ensure an ecologically coherent network and to address the shortfalls as detailed in the JNCC Northern Ireland MPA Network Assessment 2018 Summary Report.<br><br>Consult on the designated features in Strangford Lough MCZ alongside the proposed management options.<br><br>Subject to SoS agreement, complete the classification process for the Carlingford Lough and East Coast SPAs |
| Research and Innovation | The Department will continue to explore how the Marine Environment and Fisheries Fund will be extended into future years to provide financial assistance for projects delivering nature recovery and research on new and improving technologies.<br><br>The Department will commission research to inform the development of policies and decision support tools that enable the incorporation of the value of biodiversity within MPAs into wider decision-making.<br><br>The Department will commission research to explore MPA monitoring systems and develop metrics to indicate MPA condition and explore the use of new technologies such as improved imaging systems, environmental DNA analysis and Artificial Intelligence for improving data quality and affordability, optimising Peace Plus and other funding streams |

**Is the UK Network coherent?**

The most comprehensive assessment of ecological coherence for the existing MPA network was undertaken by JNCC at the request of Defra.[235] The assessment considered SACs, Nature Conservation MPAs (Scotland), MCZs, and the tranche three recommended MCZ sites. JNCC developed specific targets for ecological coherence[236] tailored for SoS waters based on previous MPA network assessments and the MCZ Ecological Network Guidance (ENG). Overall, the analysis found that the MPA network for the UK meets the criteria for ecological coherence at the scale of SoS waters, however with some shortfalls when considered at a biogeographic region scale for:

- feature representation,
- adequacy (based on the spatial area protected rather than management effectiveness),
- replication, and
- connectivity for broadscale habitats.

Uncertainties were identified for some FOCI (both habitats and species). It is noted that there has not been an updated assessment of ecological coherence following the Tranche 3 MCZ designations, or one that includes all types of MPAs across the UK. It is possible that gaps for FOCI could be addressed to some extent by intertidal SSSIs and SPAs, as well as other sites, but it appears that this has not been analysed to date.

[235] JNCC: Assessing the progress towards an ecologically coherent MPA network in Secretary of State waters in 2016: Methodology

[236] Supplementary Documents – MPA Coherence Review

The assessments to date, conducted by the statutory agencies are detailed in Annex C.

**Is the UK Network connected?**

There are several aspects to ecological spatial connectivity, such as populations, genetics, community, and ecosystem.[237] The 80 km spacing used to assess connectivity by the statutory agencies (see Annex C and Supplementary Document – MPA Features Connectivity) was identified as a guideline for the greatest distance to ensure ecological connectivity between sites supporting similar habitats.[238] This minimum distance will support connectivity for many marine species that have prolonged pelagic larval stages. However, for FOCI species, ensuring connectivity is more problematic as many of these require distinct habitats that may be regionally restricted in distribution, i.e., examples do not exist in some regions or may be limited in size. This inhibits ecological coherence for the criteria representativity, replication, and adequacy. Following Tranche 3 MCZ designations, JNCC identified that this would result in some gaps for SoS waters for some FOCI, specifically littoral chalk communities, sheltered muddy gravels, and native oyster.[239] However, no assessment of MPA connectivity was provided that considers the dispersal ability of FOCI.

Connectivity assessments have only been conducted for habitats rather than species and typically at the very broadest scale[240] rather than the designated feature level.[241] For some FOCI, the way habitats are distributed in regions means it is not possible to fulfil the criteria for connectivity.[242] For species with extended larval life stages, including many of the common species occurring within broadscale habitats[243], the degree of connectivity established in the MPA network is likely to support population connectedness. However, the recruitment of species with greater dispersal potential may be limited by other factors, such as currents. For some species, dispersal and connectivity is not fully understood and ecological knowledge is unavailable for many species.

Analysis of FOCI[244] show that there are several habitats and species with a low dispersal ability (low connectedness), which is underpinned by, for example, an absent or short-lived larval stage, specificity of habitat, or rarity (species is confined to a single or very few sites). For these FOCI, connectivity cannot be supported by MPAs, further raising the importance of maintaining the sites where these features occur.[245]

The spatial analysis adopted to assess MPA connectivity assumes that linear distance (or proximity) between MPAs is the only factor acting on connectivity. In reality, connectivity is

[237] Carr, M.H., et al. 2017. The central importance of ecological spatial connectivity to effective coastal marine protected areas and to meeting the challenges of climate change in the marine environment. Aquatic Conservation: Marine and Freshwater Ecosystems, 27

[238] Roberts, C.M., et al. 2010. Guidance on the size and spacing of Marine Protected Areas in England. NECR037, Sheffield: NE, 2010.

[239] JNCC: Review of the MCZ Features of Conservation Importance 2016

[240] Based on depth zone and substrate type such as infralittoral rock and circalittoral rock

[241] Based on depth, substratum and energy for broad-scale habitats and more granular habitat and FOCI

[242] JNCC & NE. 2012. Marine Conservation Zone Project: JNCC and NE's advice to Defra on recommended Marine Conservation Zones.

[243] Hill, J., et al. 2010. Meeting the MPA Network Principle of Viability: Feature specific recommendations for species and habitats of conservation importance. NE Commissioned Reports, Number 043.

[244] Supplementary Document – MPA Features Connectivity

[245] Carr, M.H., et al. 2017. The central importance of ecological spatial connectivity to effective coastal marine protected areas and to meeting the challenges of climate change in the marine environment. Aquatic Conservation: Marine and Freshwater Ecosystems, 27

influenced by a number of physical factors, such as tidal and oceanographic currents[246] and biological factors (e.g. location and productivity of propagule source areas) and will vary between habitats and species. To date, this level of analysis has not been undertaken for the UK MPA network (or for England and Northern Ireland) and is not currently supported by monitoring. Understanding of connectedness of populations, often supported by DNA analysis, is increasing (e.g., horse mussel[247]) but available evidence is limited to a few species.

**Reflections**

The information provided in this assessment suggests that the MPA network in England and Northern Ireland (and across the UK) meets the OSPAR criteria for an ecologically coherent network. The addition of Tranche 3 MCZs were an important component of this achievement and, although an assessment of the MPA network's connectivity has not yet been conducted, it is likely that the addition of MCZs would have enhanced connectivity. The addition of HPMAs will have further enhanced coherence and connectivity, and the potential for additional sites (or extensions to existing MPAs) as strategic compensation measures for offshore wind development could further enhance the connectivity and coherence of the network – see Section 3.2.

The MPA networks in both England and Northern Ireland meet the OSPAR and CBD 30% area target, however the gaps in MPA management measures (see Sections 4.1 and 4.6) indicate that the network is not meeting the full requirements of the commitments, which call for MPAs to be effectively managed. Further, assessments for MPA management effectiveness (e.g., PAME – see Section 4.6) should consider other criteria in addition to outcome (i.e., feature condition), such as planning, resourcing, processes, and enforcement.[248,249]

As the MPA network is largely considered to be ecologically coherent, the six yearly reporting assessments are moving from the fundamental network coherence considerations (e.g., size, representativity) to assessments of condition, management, and wider aspirations for nature, such as capturing value in terms of functions and services. Therefore, an assessment of ecological coherence of the MPA network in SoS waters that includes the Tranche 3 MCZs[250] or all types of MPAs across the UK has not been conducted. Further, other additions to the network, such as designation of HPMAs, have not been assessed in terms of contribution to the MPA network and ecological coherence.

# 7 MPAs in the context of climate change

In light of the threat climate change poses to marine biodiversity, this section of the report presents a high-level investigation into how resilient the MPA network is to the impacts of

[246] Robinson, J., et al. 2017. Far-field connectivity of the UK's four largest marine protected areas: Four of a kind? Earth's Future, 5(5)
[247] Gormley, K., et al. 2015. Connectivity and dispersal patterns of protected biogenic reefs: implications for the conservation of Modiolus modiolus (L.) in the Irish Sea. PloS one, 10(12)
[248] IUCN: Evaluating Effectiveness – A framework for assessing management effectiveness of protected areas
[249] METT-4 – A guide to the online Excel version of the Management Effectiveness Tracking Tool (METT) for protected and conserved areas
[250] JNCC: Assessing the progress towards an ecologically coherent MPA network in Secretary of State waters in 2016: Methodology

climate change. The first part of the investigation assesses which MPA characteristics make them more resilient to climate change and the second part provides an overview of how an adaptive approach into MPA management can help maintain an effective MPA network in the context of climate change. The findings presented are informed by a literature review, stakeholder interviews, and workshop.

## 7.1 MPA resilience to climate change

MPAs were designated primarily for protecting specific species and habitats through the management of human activities via various consenting and authorisation processes. When considered collectively as a network, MPAs can function to protect multiple habitats and species, as well as key life stages of species. However, although informed by the distribution and connectivity of marine habitats and species, MPAs are designed in the context of current environmental and habitat conditions.[251] The static nature of MPAs assumes that the underlying environmental conditions will remain constant, at least over the timescale required for MPA conservation objectives to be achieved, which in some cases, could be decades.

We know, however, that the marine environment is not static and that there are several factors (both human and natural) that can affect the condition of the marine environment, which in turn can affect the potential for MPA features to recover. A key factor having an increasingly significant impact on the marine environment is climate change, which can affect the marine environment is several ways, most notably through:

- increasing water temperatures
- ocean acidification
- rising sea levels
- increasing storminess
- increasing frequency and intensity of marine heatwaves

In addition to the above impacts, there are associated indirect impacts, such as changes in hydrodynamics[252] and the increased potential for INNS to establish[253], that pose a threat to marine habitats and species.

To gain a better understanding of how climate change will affect the MPA network in England and Northern Ireland, it is essential to identify which species and habitats are most at risk from the effects of climate change. In 2020, JNCC, in collaboration with the Marine Biological Association, published a report on developing an evidence base to support climate smart decision-making for MPAs, which focused on ocean acidification, ocean warming, marine heatwaves, and sea-level rise.[254] One of the objectives of the project was to prioritise features at highest risk from climate change, which would then inform MPA climate profiles. The results, however, indicated that 85-95% of MPA features had some level of risk to climate change pressures. Further, it was not possible to associate a level of

[251] Gaines, S.D., et al. 2010 Designing marine reserve networks for both conservation and fisheries management *PNAS* 107
[252] Noisette, F. et al. (2022). Role of hydrodynamics in shaping chemical habitats and modulating the responses of coastal benthic ecosystems to ocean global change. Global Change Biology. Vol. 28
[253] Floerl, O. et al. (2013) Predicted effects of climate change on potential sources of non-indigenous marine species. Diversity and Distributions. Vol. 19
[254] JNCC Report 648: Developing the evidence-base to support climate smart decision making on MPAs

intensity of impact to the features, as most literature did not include this information or used a range of different terminologies. As the majority of MPA features were considered at risk, it was, therefore, not possible to identify which MPAs to prioritise for developing climate profiles. Subsequently, JNCC produced two case study climate profiles: The Canyons MCZ[255] and Studland Bay MCZ[256], to demonstrate how climate change could affect MPA features. For example, cold-water corals and coral gardens in the Canyons MCZ were identified as high risk from ocean acidification, whereas in the Studland Bay MCZ, seagrass beds were identified at high risk from marine heatwaves.

The Marine Biological Association have continued to build the evidence base on the effects of climate change on marine features, which is made available through the MarLIN website.[257] While the MarLIN dataset provides an extensive assessment of climate impacts on MPA features the multiple, and often combined, ways in which climate change can impact different species and habitats makes it difficult to determine which MPAs are most at risk from climate change. This becomes further complicated for MPAs with multiple features that have varying levels of sensitivity to certain impacts; for example, one feature may have a high tolerance for temperature increase, while another may already be at the upper limit of temperature tolerance. Further, as climate change can impact MPA features in multiple ways, for example temperature, storminess, sea-level rise, it is not possible to weight the impacts in a meaningful way. For example, the features of one MPA may have a high sensitivity to temperature increases, but the features of another are sensitive only to sea-level rise. The features of both MPAs are at risk, but through different means. In reality, MPA features will be under threat from several different impacts in varying intensities that could interact with other pressures resulting on cumulative impacts. The variability in pressures and feature sensitivity makes identifying MPAs most at risk highly challenging.

Identifying the impact of climate change on species and habitats can provide useful insights into the risks to MPAs, but it can be more challenging for MPAs designated for abiotic features, such as subtidal mixed sediment, rocky reefs, or subtidal mud. While climate change may have a minimal impact on these physical features, rocky reefs will, for example, continue to exist in warmer waters, the assemblage of species associated with the feature may be affected. Warming sea temperatures may cause some species within the community assemblage to move away from the MPA but others will move into the MPA, potentially filling the gap left by the exiting species. Therefore, if the rocky reef continues to support a healthy and diverse community of species, despite changes to the components of that community, it could be considered that the MPA is continuing to deliver against its objectives.

However, if preserving the specific assemblage of species present at the time of designation is the objective of the MPA, then climate change will pose a risk to the condition of designated features (although this would not be considered in the condition assessment as discussed in Section 5.3). To fully understand the impact of climate change on community assemblages, a more detailed study on community composition, the roles of each of those components in maintaining a functioning ecosystem, and the vulnerability of each of those components to climate change would need to be conducted.

[255] JNCC: MPA Climate Profile: The Canyons MCZ
[256] JNCC: MPA Climate Profile: Studland Bay MCZ
[257] MarLIN Habitats list

Taking a feature-based approach to identifying MPAs most at risk from climate change is, therefore, challenging largely due to the diversity of climate change impacts, the unknown intensity of these impacts on marine species and habitats, and the difficulty in determining their cumulative effect. Further, comparing levels of risk across MPAs is difficult due to the variety of type and number of features for which each MPA is designated. For example, comparing an MPA designated for rocky reef against an MPA designated for spiny lobster, or an MPA with one designated feature against another with 18 features, each of which respond differently to climate change impacts.

An alternative approach to assessing the risk of climate change on MPAs, and the MPA network, is to use specific characteristics of MPAs that increase conservation benefits and make them more resilient to climate change. These can include traits such as size and age.[258] For the purposes of this assessment, resilience can be defined as "the magnitude of the disturbance that a system can absorb without fundamentally changing".[259] With regard to ecological resilience to climate change, this can be considered a combination of "resistance to increasingly frequent and severe disturbances, capacity for recovery and self-organisation, and ability to adapt to new conditions."[260]

The following section provides an overview of some key characteristics, identified through a short literature review[261], that make MPAs more resilient to climate change, more specifically size, age, shape, management type, and connectivity. While it is important to consider each MPA on a case-by-case basis and acknowledge that the relevance of these characteristics will depend on the biological and ecological traits of the features being protected, they can provide a useful starting point for identifying points of vulnerability within the MPA network.

**Size**

The optimal size of an MPA will vary depending on the distribution of the designated feature(s) and the MPAs associated management objectives. For example, smaller MPAs may be more appropriate for protecting discrete features, such as fish spawning grounds, or species with short larval stages and, therefore limited dispersal potential. Larger MPAs may be more suitable for species with large ranges, such as marine mammals, or species with longer larval stages and, subsequently, a greater dispersal potential.[262]

Larger MPAs have a greater potential to provide protection to a more diverse array of habitats and support larger and more genetically diverse populations capable of producing more individuals.[263] A greater diversity increases the variety of responses to disturbance and the likelihood that species can compensate for one another[264], thus creating a greater capacity to re-establish following disturbance.[265]

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[258] Edgar, G.J., et al. 2014 Global conservation outcomes depend on marine protected areas with key features *Nature* 506
[259] CEC: Scientific Guidelines for Designing Resilient Marine Protected Area Networks in a Changing Climate
[260] Bernhardt, J.R. & Leslie, H.M. 2013 Resilience to Climate Change in Coastal Marine Ecosystems *Annual Review of Marine Science* 5
[261] A semi-structured thematic search of academic literature using Google Scholar and Scopus database.
[262] Laurel, B.J. & Bradbury, I.R. 2006 "Big" concerns with high latitude Marine protected areas (MPAs): trends in connectivity and MPA size. *Canadian Journal of Fisheries and Aquatic Sciences* 63
[263] Claudet, J., et al. 2008 Marine reserves: size and age do matter *Ecology Letters* 11
[264] Bernhardt, J.R. & Leslie, H.M. 2013 Resilience to Climate Change in Coastal Marine Ecosystems *Annual Review of Marine Science* 5
[265] McLeod, E., et al. 2008 Designing marine protected area networks to address the impacts of climate change *Frontiers in Ecology and the Environment* 7

With respect to management, a single larger MPA may be preferable to multiple smaller MPAs of the same total area due to the relative simplicity of implementing a single set of management measures and the challenges of monitoring and enforcing management across multiple sites.[266]

Therefore, small MPAs are in most cases more at risk from climate change impacts.

**Age**

Older MPAs, and particularly those with effective management measures in place, will have provided protection to designated features for a longer period of time and, therefore, the features should be in a better condition compared to when the MPA was designated. Healthier ecosystems are more resilient to the impacts of climate change due to their increased capacity to recover following disturbance.[267]

One of the most important determinates of no-take MPA success in conserving resource fish biomass was found to be years of effective protection.[268] Similarly, the positive effects of marine reserves on commercial fish species and species richness have been linked to the time elapsed since the establishment of the protection scheme[269] and that older reserves were more effective than younger reserves at increasing fish densities.[270] Overall, improved fisheries are associated with older marine protected areas, and higher levels of enforcement."[271]

**Shape**

The shape of an MPA can be important when considering edge effects – a notable decline in the impact of the MPA towards the boundaries of the site. For example, a decline in species abundance, which can occur when the boundaries of a site are extensively fished, and the adjacent habitats do not provide sufficient refuge for harvested species.[272]

In a meta-analysis of MPA performance[273], it was found that "prominent and consistent edge effect that extends approximately 1 km within the MPA, in which population sizes on the border are 60% smaller than those in the core area". For large MPAs, a 1 km edge effect may not have a significant impact, but could severely impede the performance of smaller MPAs, in particular MPAs with an elongated shape. Therefore, to reduce the impact of edge effects, MPAs should have a simple shape (e.g., a square or rectangle), with as short a boundary as possible, that maximises the size of the interior protected area.[274]

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[266] Wilhelm, T.A., et al. 2014 Large marine protected areas – advantages and challenges of going big *Aquatic Conservation: Marine and Freshwater Ecosystems* 24

[267] McLeod, E., et al. 2008 Designing marine protected area networks to address the impacts of climate change *Frontiers in Ecology and the Environment* 7

[268] Friedlander, A.M., et al. 2017 Size, age, and habitat determine effectiveness of Palau's Marine Protected Areas *PLOS One* 12

[269] Claudet, J., et al. 2008 Marine reserves: size and age do matter *Ecology Letters* 11

[270] Molloy, P.P., et al. 2009 Effects of marine reserve age on fish populations: a global meta-analysis *Journal of Applied Ecology* 46

[271] Ban, N.C., et al. 2017 Social and ecological effectiveness of large marine protected areas *Global Environmental Change* 43

[272] McLeod, E., et al. 2008 Designing marine protected area networks to address the impacts of climate change *Frontiers in Ecology and the Environment* 7

[273] Ohayon, S., et al. 2021 A meta-analysis reveals edge effects within marine protected areas *Nature Ecology & Evolution* 5

[274] McLeod, E., et al. 2008 Designing marine protected area networks to address the impacts of climate change *Frontiers in Ecology and the Environment* 7

### Management type

As discussed in Section 4, management measures in place for MPAs in England and Northern Ireland vary considerably, from HPMAs which provide the highest level of protection to MPAs without management plans that do little to remove existing pressures. Higher levels of protection that are well enforced within MPAs have been shown to increase organism biomass, increase reproductive outputs and growth rates, and increase biodiversity inside the MPA.[275] Therefore, MPAs that provide higher levels of protection, such as those with a WSA that goes beyond feature-based management, for example HPMAs or fisheries byelaws, increase the potential for ecosystem recovery and, therefore, should increase the resilience of the MPA to climate change. A study of Lyme Bay found that assemblages within the MPA were quicker to recover from storm damage than other areas where fishing activity continues.[276]

### Connectivity

The MPA network consists of a static patchwork of sites identified to provide protection for habitats and species. Ecological connectivity governs the exchange of individuals among spatially fragmented habitats and is often highlighted as an important element in the design of MPAs.[277]

High levels of connectivity between MPAs can enhance resilience to climate change by allowing movement of propagules, larvae, and adults between sites, enabling a disturbed site to be recolonised or replenished by populations from another site.[278] Connectivity between MPAs also supports genetic diversity within MPAs, which can maintain the adaptability of natural populations in response to pressures, further enabling them to recover from disturbance.[279,280]

Climate change will not affect the marine environment equally everywhere and, therefore, designating multiple MPAs that protect the same feature can help reduce the impact of climate change by spreading the risk. Further, designating MPAs to protect multiple examples of habitat types will minimise the risk of them being wiped out by the same disturbance event.[281] Ensuring connectivity between multiple sites protecting the same feature(s), will further support the recovery of one MPA following a disturbance event.[282]

Connectivity can be assessed using distance between MPAs, where MPAs that are closer together are considered more connected. However, this will depend on the dispersal

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[275] Hoppit, G., et al. 2022 Are marine protected areas an adaptation measure against climate change impacts on coastal ecosystems? A UK case study *Nature-Based Solutions* 2

[276] Sheehan, E.V., et al. 2021 Rewilding of Protected Areas enhances resilience of marine ecosystems to extreme climate events *Frontiers in Marine Science* 8

[277] Balbar, A.C. & Metaxas, A. 2019 The current application of ecological connectivity in the design of marine protected areas *Global Ecology and Conservation* 17

[278] Timpane-Padgham, B.L., et al. 2017 A systematic review of ecological attributes that confer resilience to climate change in environmental restoration *PLOS One* 12

[279] Kenchington, E., et al. 2003 Managing marine genetic diversity: time for action? *ICES Journal of Marine Science* 60

[280] Bernhardt, J.R. & Leslie, H.M. 2013 Resilience to Climate Change in Coastal Marine Ecosystems *Annual Review of Marine Science* 5

[281] McLeod, E., et al. 2008 Designing marine protected area networks to address the impacts of climate change *Frontiers in Ecology and the Environment* 7

[282] Carr, M.H., et al. 2017 The central importance of ecological spatial connectivity to effective coastal marine protected areas and to meeting the challenges of climate change in the marine environment *Aquatic Conservation: Marine and Freshwater Ecosystems* 27

potential of the species and habitats of interest.[283] MPAs that are geographically isolated, and particularly those whose features have short ranges/dispersal potential, could be considered most at risk from climate change impacts.

## 7.2 Ensuring MPAs remain effective in the context of climate change

The development of the MPA network across England and Northern Ireland was informed by OSPAR's five guiding principles, which provide the basis for creating a connected, coherent, and representative MPA network. While these principles could increase the MPA network's resilience to climate change impacts, they focus on protecting and enhancing what currently exists rather than considering what the marine environment will look like in 10, 20, or 50 years. It was highlighted in interviews that managers and planners need to assess whether the objective(s) considered when establishing MPAs and MPA networks today will be met in the future under different climate change scenarios.[284] Recognising the uncertain and dynamic nature of climate change further emphasises the need for adaptive management, both in terms of the tools available and management approach.

Many MPAs were conceived and created to address local-to-regional issues, such as pressure from fishing activities, but not with the intention of protecting against global-scale issues, like climate change.[285] And while MPAs can collectively support ecosystem connectivity and resilience at a larger scale, the rigidity within MPA designation, and the fixed boundaries associated, may not deliver the same benefits for all species and areas concerned when facing climate change. For example, MPAs in coastal regions could become less effective as sea levels rise, and mobile species may not receive the benefits of MPAs and HPMAs that sedentary species do.

In addition to the fixed nature of MPA designation, it can be challenging to remove or change them once designated, largely due to legislative issues. To ensure MPAs continue to deliver against their conservation objectives in the context of climate change, an adaptive approach to MPA designation and management is required, although there are several barriers to such an approach, from both an evidence base and governance perspective (Figure 9).

[283] Magris, R.A., et al. 2014 Integrating connectivity and climate change into marine conservation planning *Biological Conservation* 170

[284] CEC: Scientific Guidelines for Designing Resilient Marine Protected Area Networks in a Changing Climate

[285] Corelli, V., et al. 2024 The biodiversity adaptation gap: management actions for marine protected areas in the face of climate change *Conservation Letters* 17

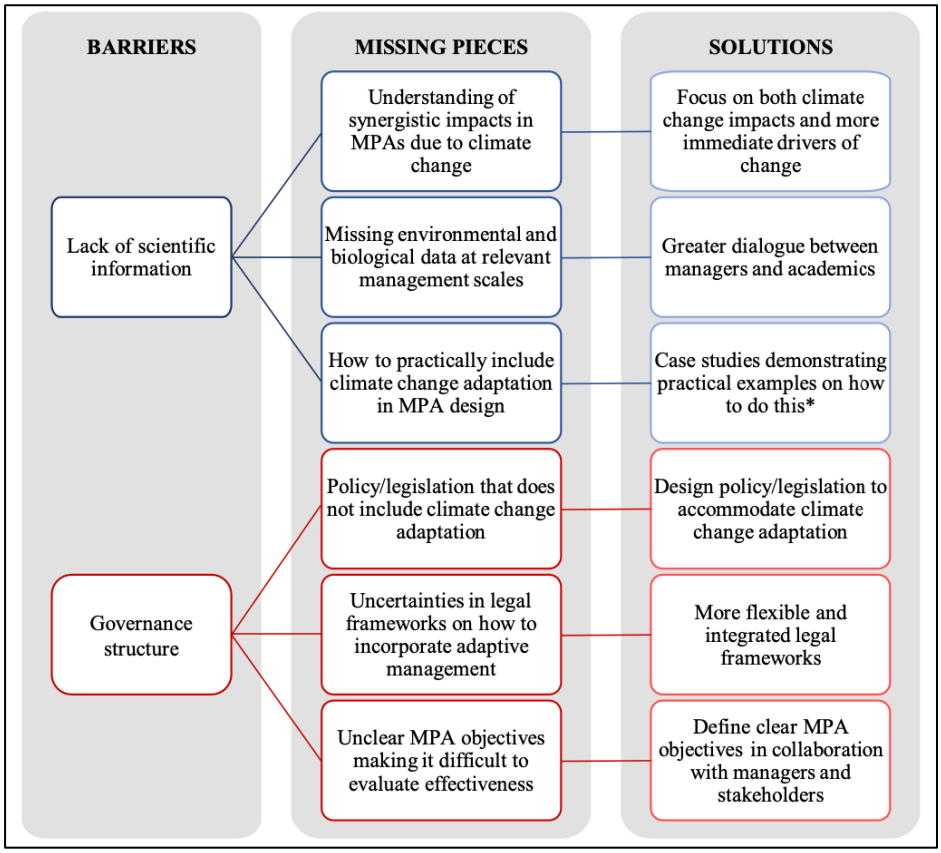


Figure 9: Barriers to climate change adaptation, missing pieces, and possible solutions[286]

An adaptive approach to MPA management could involve introducing flexible boundaries that would enable the shape and/or location of MPAs to adapt to changes in the distribution of the designated feature(s) or the power to review and adapt MPA conservation objectives, changing the conservation focus from one feature to another.[287] To create an adaptive approach to MPA management, climate change adaptation would need to be integrated into all stages of MPA planning, design, and management (Figure 10) and monitoring programmes would need sufficient resources to be able to detect changes in feature distribution.

[286] Wilson, K.L., et al. 2020 Incorporating climate change adaptation into marine protected area planning *Global Change Biology* 26

[287] Gormley, K.S., et al. 2015. Adaptive management, international co-operation and planning for marine conservation hotspots in a changing climate. *Marine Policy*, 53

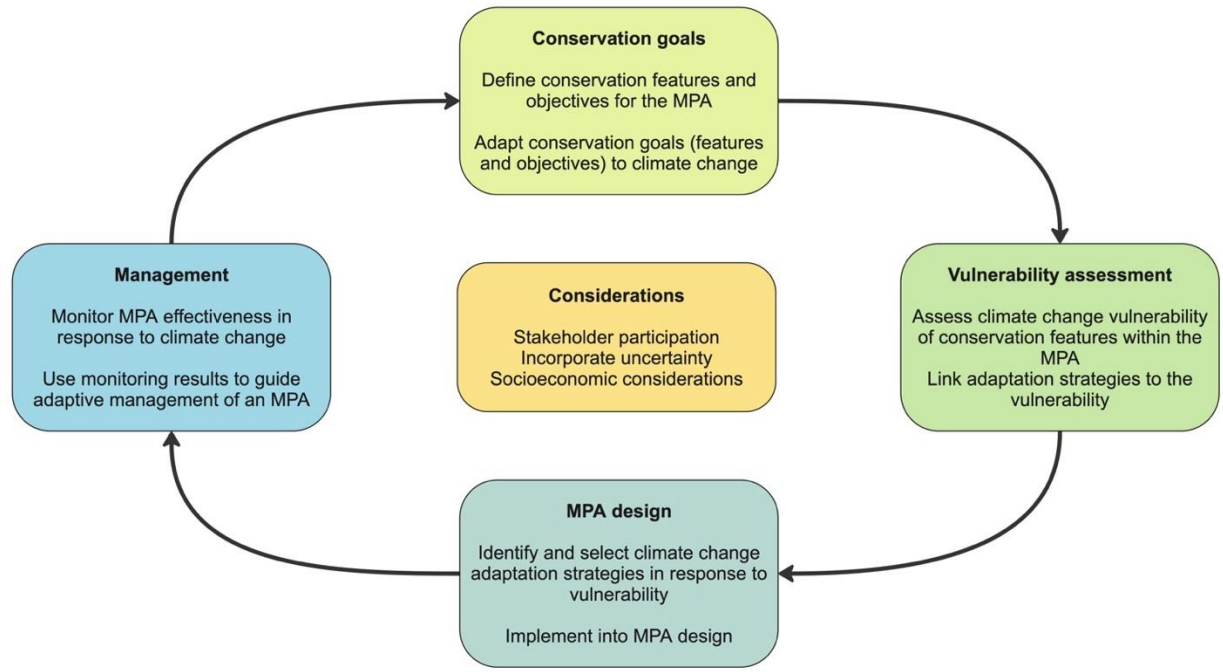


Figure 10: Integration of climate change adaptation in key stages of MPA designation, conservation objectives, and management[288]

A network of HPMAs has been advocated as the most promising approach for increasing climate change resilience because they provide the required mechanism to protect habitats, species diversity, and food webs.[289] The conservation objectives of HPMAs focus on ecosystem functioning, rather than the condition of specific features, which means that, even if the species and habitats within the site change, the HPMA could still deliver against its objectives. Further, the ecosystem-focus of HPMAs, and the potential for ecosystem components to change but still achieve conservation objectives, suggests that the potential weaknesses in legislation (discussed in Section 5.3) that exclude alterations caused by climate change, may be less relevant.

It was suggested by one interviewee that in-situ monitoring of MPAs is resource and time intensive and that a combination of modelling work that considered key climate-sensitive species combined with vulnerability assessments and direct sampling may be a middle ground approach for understanding and monitoring the impacts of climate change on a wider scale. Ongoing work by Cefas, coupled with the MSPACE marine planning tool[290] that identifies key indicator species/sites to monitor for climate impacts, could provide valuable insights (Interviews). Climate-focussed marine spatial planning tools, such as MSPACE, have the potential to, among other things, predict the potential success of MPAs as a management tool in response to different climatic conditions (Interview).

In addition to assessing how designated features respond to climate change impacts, an assessment of the effectiveness of MPA management measures across the network under

[288] Wilson, K.L., et al. 2020 Incorporating climate change adaptation into marine protected area planning *Global Change Biology* 26
[289] Bates, A.E., et al. 2019 Climate resilience in marine protected areas and the 'Protection Paradox'. *Biological Conservation* 236
[290] MSPACE: Marine Spatial Planning Addressing Climate Effects

different climate scenarios could assist with determining how well the network could absorb and adapt to environmental changes and subsequent changes to designated feature distributions. Such an assessment could identify those MPAs whose management measures might need strengthening. Further, the findings could provide insights into how well the current feature-based management measures across the MPA network would provide protection to features that have moved between MPAs. It was suggested by one interviewee that current MPA management by the MMO and IFCAs can be adaptive, but the ministerial process required for MPA designation is complex and time consuming. Therefore, regulatory management mechanisms may be key tools in facilitating MPA and feature resilience to climate impacts.

Those MPAs with management measures and monitoring already in place will be better placed to identify impacts of climate change and adapt management measures where necessary/possible to try to mitigate the impacts of climate change on protected features. One interviewee highlighted that, while using the vulnerability approach is sufficient for informing MPA management measures, it has limitations in terms of identifying climate impacts to features, emphasising the need for in-situ monitoring. For MPAs with little management and/or monitoring, the ability to detect the impacts of climate change on designated features will be difficult and, therefore, leave the MPA at greater risk from climate change. Further, two interviewees emphasised that, without long-term monitoring evidence, it is difficult to know feature locations and condition and, therefore, assess the impacts of climate change.

# 8 Recommendations

The recommendations set out below reflect the findings of this evaluation, informed by an extensive literature review, expert interviews, and a stakeholder workshop. They highlight specific gaps in MPA management, monitoring, and reporting that were identified as priorities to address and key considerations for the future of the MPA network. The recommendations have been grouped to aligned with the key topics covered within this report.

**Management**

- *Completion of MPA management measures*

  While there is an extensive network of MPAs designated in England and Northern Ireland, it is essential that all MPAs have appropriate management measures in place. As a priority, the implementation of measures for those remaining MPAs without management should be accelerated, in particular the Stage 3 and 4 MPA byelaws, and HPMA byelaws.

- *Review objectives of the MPA network*

  The MPA network has developed incrementally over time, delivering against several pieces of legislation, and has thus become a complex and diverse network of sites. While individual MPAs have clear conservation objectives, there is a need to reflect upon the network as a whole and consider the following key questions:

    - Should the overarching purpose of the MPA network be extended beyond the current legal requirements to protect and enhance

conservation to other objectives such as enhancement of natural capital and ecosystem services, climate change resilience?
- What is the network currently delivering?
- What is it not delivering?
- Which habitats and species (both designated and non-designated features) are present within the current network of MPAs?
- Are the MPA management measures currently in place adequate for maximising the ecological benefit?
- Where are the opportunities to optimise the impact of the MPA network?

- *Explore further the potential for integrating whole site approaches to MPA management*

  Identify which MPAs could benefit most from a WSA, with regard to achieving their conservation objectives, and assess the potential benefits for the network as a whole. Key to advancing this work will be to identify, through stakeholder engagement, an agreed definition of what a WSA is and how it could be implemented and enforced.

- *Integrate marine natural capital and ecosystem services into MPA conservation objectives*

  MPA management measures are largely focused on the condition of designated features but through broadening out conservation objectives to include marine natural capital and associated ecosystem services, the wider benefits of MPAs, such as carbon sequestration, coastal protection, and socio-economic benefits, can be protected and enhanced in addition to meeting the conservation objectives for designated features.

- *Explore opportunities for assessing the effectiveness of MPA management measures that provide insights beyond the condition of protected features.*

  As required by OSPAR and the CBD Target 3, MPAs are required to be effectively managed. Through the use of assessment tools that provide insights into MPA effectiveness, a strategic level PAME assessment would enable a regular, systematic approach to inform and improve all aspects of MPA management as well as ensuring that the UK is fully meeting CBD and OSPAR targets on the MPA networks in England and Northern Ireland.

**Monitoring**

- *Review the efficiency of the current approach to MPA monitoring*

  It is clear from the findings in this report that the resources available for monitoring MPAs is insufficient for confidently assessing the condition of protected features. However, while additional resources would be welcome, there is a more important question regarding the efficiency of which current resources are being used. The development of an overarching MPA monitoring strategy that incorporates and is co-developed by all public bodies responsible for monitoring MPAs could reduce duplication of effort and avoid missed opportunities for collecting additional data.

- *Develop condition indicator metrics and thresholds for all MPA features*

  As highlighted in the report, several MPA features do not have defined indicator metrics and thresholds to assess condition against. Without these metrics, it is not possible to confidently determine if a feature is in a favourable condition or, subsequently, if an MPA is delivering its conservation objectives. Addressing these gaps would enable a more comprehensive assessment of the status of the MPA network.

- *Monitor fewer sites but monitor them well*

  Due to the sheer number of MPAs across England and Northern Ireland, and the limited availability of resources for monitoring, it is not possible to monitor each site sufficiently to enable robust reporting on MPA feature condition, trends in condition, or MPA management effectiveness. To date, monitoring effort has been spread thinly across many sites, ultimately resulting in low levels of confidence in assessments of feature condition (or reliance on vulnerability assessments). Although some MPAs have been identified as sentinel sites that are representative of the network, particularly for offshore sites, a review of the entire network to identify optimal sites to use as sentinel sites could support a more efficient use of resources and provide greater insights into the effectiveness of management measures.

- *Increase monitoring outside of MPAs*

  Current MPA monitoring effort is largely focused on areas within MPAs, which creates challenges for assessing whether MPA management measures have been impactful and assessing the health of the wider marine environment. Focusing more monitoring effort on areas outside of the MPA network would provide a greater understanding of whether MPA management measures are working, enable their impact on marine species and habitats to be identified, and enable natural changes in environmental condition to be detected. Survey data from outside of MPAs would also increase the amount and range of data available to support GES reporting.

**Good Environmental Status**

- *Review how the MPA network contributes towards achieving GES*

  The MPA network contributes towards the achievement of GES, but it is not clear exactly how or to what extent. A review of the MPA network within the context of GES that identifies which MPAs contribute towards the different descriptors (e.g., MPAs with habitat features contribute to seafloor integrity) would provide a greater understanding of how the MPA network contributes to GES. Further, opportunities for maximising the contribution of MPAs to GES, through better alignment of MPA conservation objectives and management measures with GES descriptors, could be identified.

- *Better alignment of MPA monitoring programmes with GES reporting requirements*

  MPA monitoring effort currently focuses on surveying MPA designated features with the purpose of informing MPA condition assessments. The objectives of MPA monitoring programmes do not consider GES descriptors or the data requirements for GES reporting. To address this disconnect, a review of the current MPA

monitoring approach and the data requirements for GES reporting could identify opportunities to optimise MPA monitoring effort. This could, for example, include additional environmental data collection (e.g., water quality), targeted surveying for INNS, and surveying areas during transit between MPAs being monitored.

**Climate Change**

- *Identify MPAs most at risk from climate change*

  This report presented a high-level approach to identifying which MPAs in England and Northern Ireland are most at risk from the impacts of climate change, but it was acknowledged that a detailed assessment was beyond the scope of this project. Further research on the impacts of climate change on MPA features that identified MPAs most at risk would enable priority management actions to be identified for increasing MPA resilience to climate change (e.g., implementing a WSA to MPA management).

- *Review of MPA network resilience to climate change*

  In addition to identifying which individual MPAs are most at risk from climate change, a review of the extent to which the MPA network can absorb the impacts of climate change while still delivering effective conservation would be valuable for informing an adaptive management approach. Such a review should consider ecological coherence, connectedness, and representativity under different climate scenarios.

  While previous assessments by JNCC found assessing climate change impacts on individual MPAs challenging, taking a strategic, feature-based approach across the whole network could provide greater understanding of the points of weakness within the network, and identify adaptive management options. Features identified in the MarLIN database to be most at risk from climate change should be prioritised for assessment, which should explore how well the network can continue to provide protection to these features under different climate scenarios (i.e., connectivity across the network).

  Such a review could also include an assessment of legislative barriers in England and Northern Ireland that restrict the options for adaptive management (e.g., altering MPA shape, size, location, and/or conservation objectives).

**Socio-economic impact**

- *Explore opportunities to optimise stakeholder involvement in the MPA management process that focus on maximising socio-economic benefits.*

  Socio-economic impacts of MPAs were not a focus of this project but the importance of stakeholder engagement in the development of MPA management measures was clear, particularly regarding measures that prohibit activities (e.g., fishing byelaws). The requirement to incorporate social and economic impact/benefit into the development of management measures is featuring more strongly in the legislation (e.g., Fisheries Act 2020), which opens the potential for considering natural capital and associated ecosystem services in MPA conservation objectives (e.g., societal

wellbeing), as well as explore different approaches to MPA management, such as the potential role National Marine Parks[291] could play.

[291] See the Plymouth Sound National Marine Park as an example of incorporating local communities and businesses into management of the natural environment.

# 9 Annex A

**Legislation setting legal duties for developing MPA conservation objectives and providing management advice**

| MPA | English Law | Northern Ireland Law |
|---|---|---|
| SPA and SAC | The Conservation of Habitats and Species Regulations 2017 (as amended) (Section 37(3))<br><br>*As soon as possible after a site becomes a European marine site, the appropriate nature conservation body must:*<br><br>*a) advise other relevant authorities as to the conservation objectives for that site.*<br>*b) advise other relevant authorities as to any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which the site has been designated.* | The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (Section 28(2))<br><br>*As soon as possible after a site becomes a European marine site, the Secretary of State shall:*<br><br>*a) advise the relevant authorities as to the conservation objectives for that site.*<br>*b) advise the relevant authorities as to any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species for which the site has been designated.* |
| MCZs and English HPMAs | Marine and Coastal Access Act 2009 (Section 117(2)(b))<br><br>*The designation order must state the conservation objectives for the MCZ.*<br><br>Marine and Coastal Access Act 2009 (Section 127(1)) states:<br><br>*The appropriate statutory conservation body may give advice and guidance as to:*<br><br>*a) the matters which are capable of damaging or otherwise affecting any protected feature or features;*<br>*b) the matters which are capable of affecting any ecological or geomorphological process on which the conservation of any protected feature or features is (wholly or in part) dependent;*<br>*c) how any conservation objectives stated for an MCZ may be furthered, or how the achievement of any such objectives may be hindered;*<br>*d) how the effect of any activity or activities on an MCZ or MCZs may be mitigated;*<br>e) *which activities are, or are not, of equivalent environmental benefit (for the purposes of section 126(7)(c)) to any particular damage to the environment (within the meaning of that provision).* | Marine Act (Northern Ireland) 2013 (Section 14(2)(b))<br><br>*The designation order must state the conservation objectives for the MCZ.*<br><br>Marine Act (Northern Ireland) 2013 (Section 24(1)) states:<br><br>*The Department may give advice and guidance as to:*<br><br>*a) the matters which are capable of damaging or otherwise affecting any protected feature or features of an MCZ;*<br>*b) the matters which are capable of affecting any ecological or geomorphological process on which the conservation of any protected feature or features is (wholly or in part) dependent;*<br>*c) how any conservation objectives stated for an MCZ may be furthered, or how the achievement of any such objectives may be hindered;*<br>*d) how the effect of any activity or activities on any MCZ, or such zones generally, may be mitigated;*<br>e) *which activities are, or are not, of equivalent environmental benefit (for the purposes of section 23(7)(c)) to any particular damage to the environment (within the meaning of that provision).* |

| | | |
|---|---|---|
| SSSI and ASSI | Wildlife and Countryside Act 1981<br><br>No direct mention to conservation objectives but they are a requirement of the Statement on Common Standards for Monitoring<br><br>No direct mention of management advice provision, likely due to SSSI consent being required which is administered by a single decision-maker (NE) | Environment (Northern Ireland) Order 2002<br><br>No direct mention to conservation objectives but they are a requirement of the Statement on Common Standards for Monitoring<br><br>No direct mention of management advice provision, likely due to ASSI consent being required which is administered by a single decision-maker (DAERA) |
| Ramsar Sites | Requirements set through legislation associated with underpinning MPAs | Requirements set through legislation associated with underpinning MPAs |

## 10 Annex B

Environmental Targets (Marine Protected Areas) Regulations 2022

*(i) with respect to a protected feature in an MCZ, means—*

*(aa) that the feature, and its supporting habitat where this is included as part of its conservation objective in the relevant MCZ designation order specified in the fourth column of the Schedule, is in favourable condition within the meaning stated for that feature type in that MCZ designation order, or*

*(bb) where the protected feature is black seabream (Spondyliosoma cantharus) that the population (whether temporary or otherwise) is free of disturbance of a kind specified for that feature in the relevant MCZ designation order specified in the fourth column of the Schedule and its spawning habitat is in favourable condition within the meaning stated in that MCZ designation order;*

*(ii) with respect to a protected feature in an SAC which is a marine habitat or type of marine habitat, means that—*

*(aa) its extent and distribution is stable or increasing, and*

*(bb) the structures and functions, and natural supporting processes on which it relies, are such as to ensure that it remains in a condition which is healthy and not deteriorating;*

*(iii) with respect to a protected feature in an SAC which is a species of marine fauna or flora, means that—*

*(aa) the quality and quantity and distribution of its supporting habitat, the quality of the natural supporting processes on which it relies, the availability of prey and the composition of its population in terms of distribution and size are such as to ensure that the population is maintained in numbers which enable it to thrive, and*

*(bb) where the protected feature is grey seal (Phoca vitulina), harbour porpoise (Phocoena phocoena), or harbour seal (Halichoerus grypus) it is free of human disturbance of a kind likely to have a significant effect on its use of the site;*

*(iv) with respect to a protected feature in an SPA, means that—*

*(aa) the extent and distribution of its supporting habitat is stable or increasing,*

*(bb)the structures, functions and quality of its supporting habitat including its natural supporting processes are such as to ensure that its supporting habitat remains in a condition which is healthy and not deteriorating,*

*(cc) the distribution and size of its population (whether temporary or otherwise) are such as to ensure that it is maintained in numbers which enable it to thrive, and*

*(dd) its population (whether temporary or otherwise) is free of human disturbance of a kind likely to have a significant effect on the survival of its members, or their ability to breed or rear their young.*

# 11 Annex C

UK MPA network assessments conducted to date

| Country | Year | Description |
|---|---|---|
| **SoS waters** | *2019-2024* | Focus on reporting condition assessments only<br>*Department for Environment, Food and Rural Affairs (Defra) 2024 Marine Protected Areas Network Report 2019 – 2024. Presented to Parliament pursuant to Section 124 of the Marine and Coastal Access Act 2009* |
| **SoS waters** | *2012-2018* | Management and condition focus<br>*Department for Environment, Food and Rural Affairs 2018 Marine Protected Areas Network Report 2012 – 2018. Presented to Parliament pursuant to Section 124 of the Marine and Coastal Access Act 2009* |
| **SoS waters** | 2016 | *Carr, H., Cornthwaite, A., Wright, H. and Davies, J., 2016. Assessing progress towards an ecologically coherent MPA network in Secretary of State Waters in 2016 (JNCC report)* |
| **SoS waters** | 2014 | *JNCC 2014 (Ridgeway, A., Cornthwaite, A., Wright, H. and Davies, J., 2014). Identifying the remaining MCZ site options that would fill big gaps in the existing MPA network around England and offshore waters of Wales & Northern Ireland* |
| **SoS Waters** | 2014 | *Carr, H., Cornthwaite, A., Wright, H. and Davies, J., 2014. Assessing progress towards an ecologically coherent network of MPAs in Secretary of State Waters in 2014. (JNCC report)* |
| **SoS waters** | 2012 | *JNCC & NE. 2012. Marine Conservation Zone Project: JNCC and Natural England's advice to Defra on recommended Marine Conservation Zones.* |
| **Northern Ireland** | 2024 | *DAERA 2024. Report on the Northern Ireland inshore Marine Protected Area Network, 2019-2024* |
| **Northern Ireland** | 2018 | *DAERA 2018 Report on the creation of a network of conservation sites in the Northern Ireland inshore region.* |
| **Northern Ireland** | 2018 | *JNCC Northern Ireland MPA Network Assessment 2018 Summary Report.*<br>*Cornthwaite, A., Wright, H., Cioffi, R. and Davies, J., 2018. Assessing progress towards an ecologically coherent network of Marine Protected Areas in the Northern Ireland inshore region.* |
| **Northern Ireland** | 2014 | *Department of the Environment. 2014. Guidance on selection and designation of Marine Conservation Zones (MCZs) in the Northern Ireland Inshore Region* |

# 12 Annex D

Criteria for Descriptor 1: Biodiversity[292]

**D1C1 –** The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured.

**D1C2 –** The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.

**D1C3 –** The population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity, and survival rates) of the species are indicative of a healthy population which is not adversely affected due to anthropogenic pressures.

**D1C4 –** The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions. Member States shall establish threshold values for each species through regional or subregional cooperation.

**D1C5 –** The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species.

**Pelagic habitats (relating to Descriptor 1) Criteria, including**

**D1C6 –** The condition of the habitat type, including its biotic and abiotic structure and its functions (e.g. typical species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), is not adversely affected due to anthropogenic pressures.

Criteria for Descriptor 6: Sea floor integrity[293]

Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.

**D6C1 – Primary:** Spatial extent and distribution of physical loss (permanent change) of the natural seabed.

**D6C2 – Primary:** Spatial extent and distribution of physical disturbance pressures on the seabed.

**D6C3 – Primary:** Spatial extent of each habitat type which is adversely affected, through change in its biotic and abiotic structure and its functions (e.g. through changes in species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), by physical disturbance. Member States shall establish threshold values for the adverse effects of physical disturbance, through regional or subregional cooperation.

[292] https://mcc.jrc.ec.europa.eu/main/dev.py?N=19&O=118&titre_chap=D1%20Biological%20diversity
[293] https://mcc.jrc.ec.europa.eu/main/dev.py?N=24&O=135&titre_page=&titre_chap=D6%20Sea-floor%20integrity

**D6C4 – Primary:** The extent of loss of the habitat type, resulting from anthropogenic pressures, does not exceed a specified proportion of the natural extent of the habitat type in the assessment area.

**D6C5 – Primary:** The extent of adverse effects from anthropogenic pressures on the condition of the habitat type, including alteration to its biotic and abiotic structure and its functions (e.g. its typical species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), does not exceed a specified proportion of the natural extent of the habitat type in the assessment area.