EXPANDING IRELAND'S MARINE PROTECTED AREA NETWORK

A report by the Marine Protected Area Advisory Group
for the Department of Housing, Local Government and Heritage
October 2020

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Terms of Reference for the MPA Advisory Group

The Marine Protected Area (MPA) Advisory Group was established in December 2019 by the Minister for Housing, Planning and Local Government. This independent group of experts was invited to produce a report containing advice and recommendations that will support the expansion of Ireland's network of Marine Protected Areas such that it is coherent, representative, connected and resilient and meets Ireland's commitments under the Marine Strategy Framework Directive, the OSPAR Convention, the UN Convention on Biological Diversity Aichi target 11 and the UN Sustainable Development Goal 14, *Life Below Water* amongst others.

The group was made up of senior experts under each of three broad subject areas:

- Life and ocean sciences
- Economic, social, and cultural perspectives
- Governance and legislation

The primary roles and responsibilities of the group were:

To provide expert advice and recommendations on the processes required and the challenges to be addressed in the expansion of Ireland's MPA network in the form of a report to the Minister's Department of Housing, Planning and Local Government (DHPLG) – which was changed in October 2020 to the Department of Housing, Local Government and Heritage (DHLGH).[i]

To consider in an objective and balanced manner existing spatial protection measures, economic, social, and cultural needs, and the gaps in existing legislation that need to be addressed in order to underpin the expansion of Ireland's MPA network.

A key part of the group's responsibility and work was wide and effective consultation and information gathering with a diverse range of marine stakeholders. As part of the development of this report, consultation was undertaken with key marine stakeholders/groups/bodies (see Annex 1). The aim was to gather ideas, discuss approaches, methodologies and process issues, successes, failures, challenges, concerns and perspectives in an open constructive manner, in order that the group (a) was well informed and (b) was able to take such information into account, as appropriate in its deliberations and in its eventual output.

The work of the MPA Advisory Group was facilitated and supported by the DHLGH, which also provided secretariat and administrative support for group meetings.

[i] Functions and names of government departments have been changed in conjunction with the new Programme for Government (June 2020). Details of relevant changes are provided in Section 3.3.1. In this report, the names and responsibilities applicable before June 2020 are generally used, except where text describes current and future actions and responsibilities.

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Pádraic Ó Máille (Smácht Business Mastermind Alliance) facilitated the stakeholder engagement.

International reviews of the report were undertaken by Dr Jean-Luc Solandt (Marine Conservation Society) and Professor Simonetta Fraschetti (University of Naples).

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Invited stakeholders gave freely of their time to provide input and perspectives and are listed in Annex 1.

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Executive Summary

Ireland has an extensive marine environment, rich in habitats, species and cultural significance. It provides a wide range of ecosystem services which underpin health and well-being, regulate climate and support fisheries, aquaculture, recreation, tourism and biotechnology, all of which are significant contributors to Ireland's economy and essential to many livelihoods, especially in coastal and island communities. It is also an essential link to the wider world through shipping and increasingly hosts diverse energy infrastructure. Although much of Ireland's marine environment is in generally good condition, biodiversity loss and ecosystem degradation are of wide concern due to increasing pressures such as over-exploitation, habitat loss, pollution, and climate change.

Area-based protection through the use of Marine Protected Areas (MPAs) and related tools is one of a range of complementary approaches to maintain, conserve and restore marine ecosystems. Although definitions vary, MPAs can be thought of as marine areas that are managed over the long term, with a primary objective of conserving habitats and/or species and other natural features. Individual MPAs should form part of a network of sites intended to act synergistically to meet overarching objectives.

Conservation and sustainable management of the marine environment are mandated by a number of international agreements and legal obligations. Those which include specific requirements for area-based protection include the EU Marine Strategy Framework Directive (MSFD), the OSPAR Convention, the UN Convention on Biological Diversity and the UN Sustainable Development Goals.

A degree of area-based protection is already in place in Ireland, primarily through the Natura 2000 network of sites established under the EU Birds and Habitats Directives. There are, however, some important shortcomings in the current status of the marine environment and in terms of international targets for the total coverage and the level of protection for important species and habitats that are threatened or declining, either despite protection within Natura 2000 or in the absence of current protection.

At this point, Ireland's network of protected areas cannot be considered coherent, representative, connected or resilient or to be meeting Ireland's international commitments and legal obligations. There is no definition of MPA in Irish law and this is a gap which needs to be addressed. The provisions of the Wildlife Acts, as amended, are limited in terms of their geographic scope, applying only to the foreshore. This means that currently protection in marine areas beyond 12 nautical miles is limited to measures taken under the EU Birds and Habitats Directives or the OSPAR Convention. In effect, habitats and species that are not listed in the EU Directives, but which may be locally, nationally or internationally important, cannot currently be afforded the necessary protection. The flexibility to apply different forms and levels of protection is also limited under EU law, particularly where there are shared competences between the EU and Ireland. There is also scope to greatly improve the level of stakeholder engagement and participation in the site selection and management process to promote and support marine stewardship and the overall effectiveness of the network.

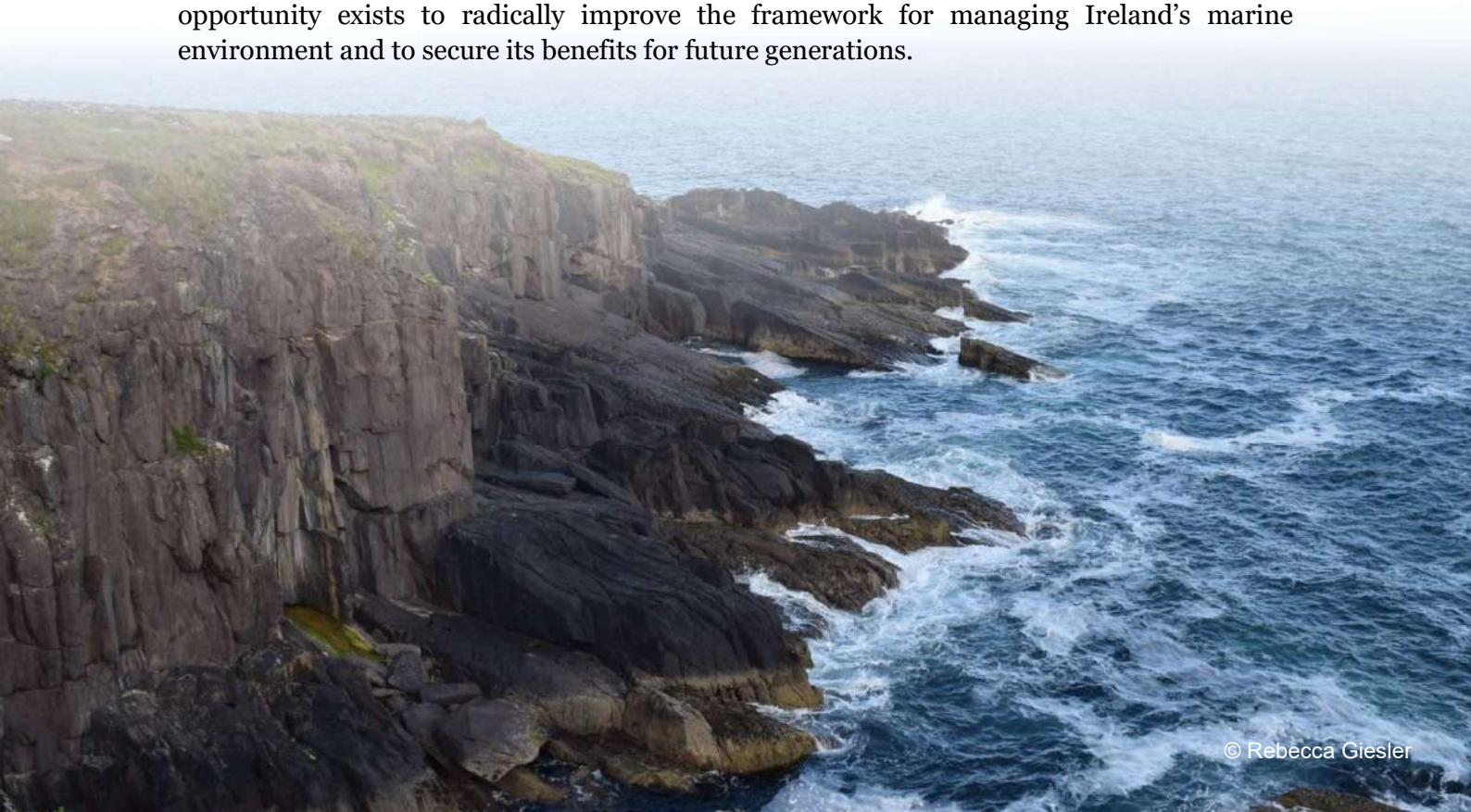
MPAs provide benefits not just for the marine environment, but also for society, including through enhancement and resilience of ecosystem service delivery. However, there are also costs. The accrual of socio-economic costs and benefits from MPA designation vary, both

within and across sectors and stakeholder groups, and depending on local socio-cultural contexts and their relationship to socio-political institutions at a variety of scales. MPA designations are likely to have the greatest influence on the capture fisheries, marine tourism and aquaculture sectors. Research suggests that the net impacts on fisheries could ultimately be either positive or negative and will depend on the type of fishery involved and a wide array of other factors. The marine tourism and recreation sector can substantially benefit from MPA designation but like other sectors the magnitude of the benefits will depend to a large extent on the location of the MPA sites within the network and the management measures put in place.

This report summarises relevant information and current thinking about MPAs in an Irish context and makes recommendations for the expansion of Ireland's network of MPAs based on the work of the MPA Advisory Group and its engagement with key stakeholders in Ireland's marine environment. Key stakeholders included members of coastal and island communities and representatives of sectors including fisheries, aquaculture, tourism, recreation, energy, shipping and biotechnology. The group was also informed by members of NGOs and the government departments and agencies with an interest in the marine environment. In addition, the draft final report was reviewed by external international experts on MPAs.

A proposed operational definition for MPAs is presented in the Box below, together with some guiding principles based on the conclusions of the group. Summaries of key points are presented at the end of each Part of the report. Detailed recommendations are listed in Section 3.6. The findings of the stakeholder engagement process are reported in Annex 1.

Although the expansion of the MPA network is primarily being driven by evidence and concerns about biodiversity loss enshrined in a range of international commitments, the network should also be recognised as contributing to a wider ecosystem-based management framework with the ultimate aim of achieving Good Environmental Status under the MSFD that combines a range of other objectives, including sustainable fisheries management, resilience to climate change including through enhanced carbon sequestration, and effective Marine Spatial Planning. In developing a mechanism to expand and improve Ireland's network of MPAs and its accompanying governance structures and processes, a great opportunity exists to radically improve the framework for managing Ireland's marine environment and to secure its benefits for future generations.



Proposed definition for MPAs in Ireland and recommended key principles

The following operational definition of an MPA is proposed for MPAs in Ireland.

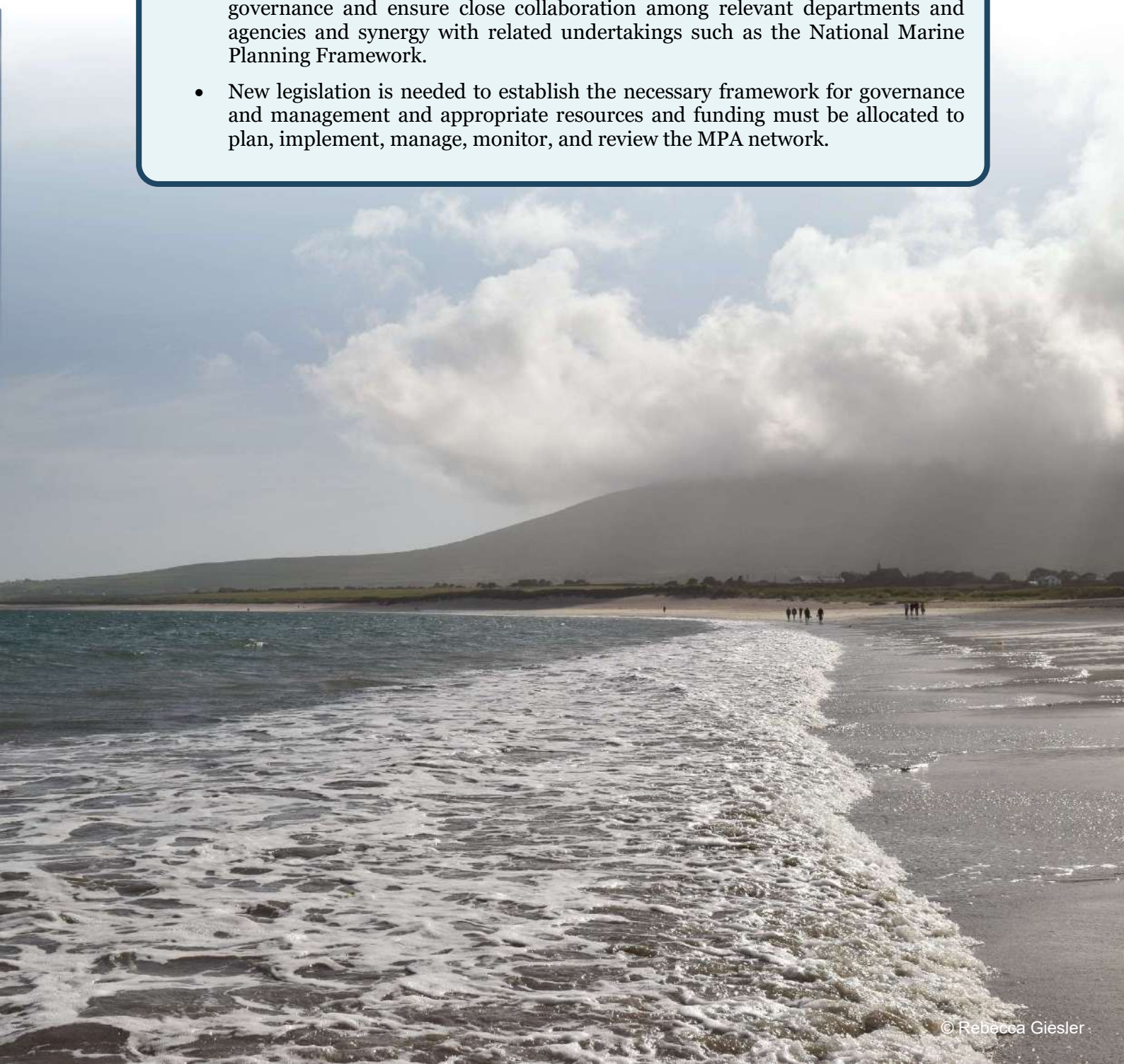
A geographically defined area of marine character or influence which is protected through legal means for the purpose of conservation of specified species, habitats or ecosystems and their associated ecosystem services and cultural values, and managed with the intention of achieving stated objectives over the long term.

Recommended key principles:

- MPAs should be designated and managed to form a network that is designed to be coherent, representative, connected and resilient and to meet Ireland's commitments under international instruments such as the EU's Marine Strategy Framework Directive, OSPAR Convention, UN CBD and Aichi Targets (particularly Target 11) and the UN Sustainable Development Goals (particularly Goal 14).
- Objectives for MPAs and the MPA network in Ireland may focus on the protection and recovery of:
    - Threatened or declining species or habitats
    - Important or ecologically significant species or habitats
    - Features representative of the range of features present in Irish waters
    - Areas of high biodiversity, naturalness or sensitivity
    - Areas contributing to maintenance of ecosystem functioning and ecosystem services including carbon sequestration
    - Areas with significant biocultural diversity value
- MPA site objectives may also focus on the prevention of impacts from specified pressures such as artificial light or noise or buffering against the effects of climate change.
- Conservation is taken here to mean maintenance of or restoration to a state that is as close as possible to the expected structure and functioning of the ecosystem given the general physiography and location of the area or as compared to selected reference sites or states. In MPAs designated for biocultural diversity value, conservation of this value would be the primary objective.
- Additional benefits of MPAs may include opportunities for research and environmental education and to create socio-economic added value, provided that these are not in conflict with the MPA site objectives.
- A Systematic Conservation Planning (SCP) approach should be followed for planning, implementation and management of the expanded network, with a provision also for proposal of individual site-based MPAs.
- In designing the network, consideration should be given to interactions with networks designated by other States in the same marine regions.
- Early and sustained stakeholder engagement should be integral to the selection and management processes for MPAs. Engagement should be inclusive and

equitable and the process should be designed to ensure that it is transparent, meaningful and facilitating.

- Management measures should be established as appropriate for each MPA to achieve its stated conservation objectives and taking account of socio-economic and cultural considerations.
- Management measures should be established as part of the designation process.
- Management of MPAs should be based on the best available evidence and on the precautionary principle.
- Carefully designed monitoring should be used to assess efficacy of the network and inform periodic reviews and adaptations of designations and management measures.
- It is recommended that a national coordinating body should be established with the authority to coordinate planning and implementation, to foster good governance and ensure close collaboration among relevant departments and agencies and synergy with related undertakings such as the National Marine Planning Framework.
- New legislation is needed to establish the necessary framework for governance and management and appropriate resources and funding must be allocated to plan, implement, manage, monitor, and review the MPA network.



Contents

Terms of Reference for the MPA Advisory Group iii
MPA Advisory Group structure iv
Acknowledgements v
Executive Summary vii
Contents xi
List of Figures xiv
List of Tables xv
List of Boxes xvi
Preamble xvii
1 Part 1: Why expand Ireland's network of Marine Protected Areas? 1
1.1 Introduction 2
1.1.1 Why conserve biodiversity? 2
1.1.2 Ireland's marine environment 4
1.1.3 Socio-economic and cultural importance of Ireland's marine environment 13
1.1.4 Pressures on Ireland's marine environment 18
1.1.5 Impacts of pressures and the status of Ireland's marine environment 23
1.1.6 Area-based and other approaches to conservation 27
1.1.7 What is a Marine Protected Area (MPA)? 29
1.2 Current protection of Ireland's marine environment 34
1.2.1 Agreements and legislation driving area-based protection 35
1.2.2 Other instruments and policy drivers directly relevant to area-based protection 53
1.2.3 National protected areas legislation 63
1.2.4 Ireland's current network of protected areas 68
1.2.5 Other instruments relating to marine environmental management 70
1.3 Gaps and opportunities in Ireland's network of protected areas 76
1.3.1 Size, coverage and properties of the network 76
1.3.2 Listed habitats and species for which Natura 2000 coverage is currently insufficient 77
1.3.3 Species and habitats not covered by Natura 2000 78
1.3.4 Flexible protection for mobile species and dynamic habitats 83
1.3.5 Protection in relation to specific pressures 83
1.3.6 Gaps in legislation 84
1.3.7 Scope for improved governance and stakeholder engagement 85

1.4 Summary of the case for expanding Ireland's network of MPAs 88
2 PART 2 - What are the likely benefits and costs for economy, society, and culture of expanding Ireland's network of MPAs? 93
2.1 Analysis of socio-economic benefits and costs of MPAs 94
2.2 The ecosystem service approach to estimate the benefits and costs of MPAs 98
2.3 The sectoral approach to estimate the benefits and costs of MPAs 102
2.3.1 Biotechnology 103
2.3.2 Coastal communities 103
2.3.3 Fisheries 104
2.3.4 Aquaculture 109
2.3.5 Tourism and recreation 111
2.3.6 Other ocean industries 113
2.3.7 Timing of accrual of benefits and costs 113
2.4 Summary of the likely costs and benefits of MPA designation 115
3 PART 3: How should we expand our network of Marine Protected Areas? 117
3.1 Considerations for site selection to expand Ireland's network of MPAs 118
3.1.1 Ecological considerations 118
3.1.2 Societal considerations 129
3.2 Stakeholder engagement 136
3.2.1 The importance of recognising differences in socio-ecological systems and stakeholder interests and perceptions 136
3.2.2 The importance of understanding local cultural contexts: a biocultural approach 136
3.2.3 Fostering societal stewardship through participation 138
3.2.4 General guidelines for stakeholder participation processes 141
3.3 Governance and management 142
3.3.1 Key marine responsibilities in different departments 143
3.3.2 Planning for MPAs as part of an overall strategy for ecosystem-based management under the MSFD and MSP 145
3.3.3 Establishment of a responsible authority to support designation and management of MPAs 148
3.3.4 Proposed site selection and designation process 149
3.3.5 Management and monitoring 163
3.3.6 Iterative cycle of review and adaptation 176
3.4 Legislation 178
3.4.1 Legislative options for MPAs 178
3.4.2 Definitions and Interpretation 178

3.4.3 Scope and application 180
3.4.4 Objectives 181
3.4.5 Governance and institutional arrangements 181
3.4.6 Regulation of activities 182
3.4.7 Enforcement duties and powers 183
3.5 Other considerations 185
3.5.1 Resourcing the MPA network 185
3.5.2 Research needs 187
3.6 Conclusions and recommendations 189
3.6.1 Proposed definition and key principles for MPAs in Ireland 189
3.6.2 An expanded network of MPAs in Ireland 191
3.6.3 Recommendations on how Ireland's network of MPAs should be expanded 193
3.6.4 Concluding remarks 200
References 202
Appendices 219
Appendix A – Glossary and Abbreviations 220
Appendix B – Potential pressures in Ireland's marine environment resulting from human activity 228
Appendix C – OSPAR List of Threatened and/or Declining Species and Habitats 230
Appendix D – Existing designated sites in Ireland with marine components 236
Appendix E – Reporting under European legislation 243
Annex 1 - Findings from the stakeholder consultation on expanding Ireland's marine protected area network 250

List of Figures

Figure 1.1 – Selected hydrographic features and dynamical processes in Irish waters of influence to resident ecosystems. 3
Figure 1.2 – Broad-scale seabed habitat map showing MSFD classifications from the EMODnet habitat map for Europe (EUSeaMap 2019). 9
Figure 1.3 – An annotated map of Arranmore Island, Donegal showing detailed names for coastal locations, compiled by Arranmore islander John McCafferty. 12
Figure 1.4 – The cascade model of ecosystem services and benefits, modified from Potschin and Haynes-Young (2016). 14
Figure 1.5 – An illustration of some of the human activities which take place in the marine environment and the potential pressures which result from them. 19
Figure 1.6 –Distribution of international commercial fishing activity in Ireland's EEZ 2014-18, vessels over 12m in length only. (a) By fishing gear (b) By country. 20
Figure 1.7 – Maritime zones established under the United Nation Convention on the Law of the Sea. 36
Figure 1.8 – Map showing the limits of Ireland's maritime jurisdictional zones and the boundary of Ireland's Maritime Area as described above. 38
Figure 1.9 – Ireland's Special Areas of Conservation (SACs) in red and Special Protection Areas (SPAs) in blue designated for marine features and clipped at the mean high water line to show only the maritime component of these sites. 69
Figure 1.10 – All of Ireland's Special Areas of Conservation (SACs) designated for marine features, including offshore and near shore sites, clipped to the mean high water line. 70
Figure 1.11 - Vulnerable Marine Ecosystem (VME) indicator species in relation to Natura 2000 Marine Protected Areas. 82
Figure 2.1 – Overview of the process of economic and social assessment of an MPA network. 95
Figure 3.1 - Percentage of responses rated as 'agree or strongly agree' to the proposition that 'governments should designate parts of the ocean as protected areas' by the Irish general public compared to the rated response from individuals across UK, Spain, Portugal, Poland, Italy, Germany and France. 131
Figure 3.2 - Overview of proposed systematic conservation planning (SCP) process for planning, establishing and managing an expanded MPA network. 150
Figure 3.3 - Proposed steps in a Systematic Conservation Planning process for Ireland adapted from steps proposed by McIntosh et al. (2017),[236] demonstrating how these steps relate to the phases identified in 151
Figure 3.4 - Existing and proposed new components of Irelands network of MPAs. 191

List of Tables

Table 1.1 –Irish coastal and marine ecosystem service benefits and their associated values.16

Table 1.2 – Marine Annex I habitats in Ireland and Annex II species for which SACs must be designated in Ireland. 46

Table 1.3 – The eleven qualitative descriptors for Good Environmental Status under the Marine Strategy Framework Directive 49

Table 1.4 – Sites nominated by Ireland to the OSPAR MPA network. These sites are designated as SACs under the Habitats Directive. 53

Table 1.5 – Statutory Nature Reserves in Ireland with marine elements 64

Table 1.6 – Refuges for Fauna in Ireland 64

Table 1.7 – Summary of legislation and policies requiring protected area designation in Ireland's maritime area 72

Table 1.8 – OSPAR List of Threatened and/or Declining Species and Habitats occurring in Ireland's maritime area that are not listed in the EC Birds or Habitats Directives. 78

Table 2.1 – Potential impact of MPA designation on Irish ocean economy sectors 96

Table 2.2 – Potential changes in marine ecosystem service benefits from MPA designation 99

Table 3.1 – Options for site designation criteria when proposing inclusion in the OSPAR MPA network 118

Table 3.2 – Site selection criteria from the Habitats Directive. 119

Table 3.3 – The 'Madrid Criteria' for assessing the ecological coherence of the OSPAR MPA network 120

Table 3.4 – JNCC design principles in support of an ecologically coherent network 121

Table 3.5 – General guidelines for a successful MPA stakeholder participation process 141

Table 3.6 – IUCN typology of protected area governance types. 142

Table 4.1 – Matrix of human activities and potential correlated pressures on the marine environment 228

Table 4.2 – Ireland's Ramsar sites with marine or coastal components 236

Table 4.3 – Ireland's Special Protection Areas (SPAs) with marine elements that have been selected for wintering waterbirds and breeding seabirds 236

Table 4.4 – SAC's in Ireland selected for Annex I and Annex II marine habitats and species. 239

Table 4.5 – Seabird species which regularly breed around Ireland's coastline 244

Table 4.6 – Regularly occurring wintering waterbirds which may occur at coastal sites in Ireland 245

Table 4.7 – National conservation status for each marine Annex I habitat for the last three reporting cycles. 247

Table 4.8 – Conservation status of marine species listed in Annexes II, IV and V for the last three reporting cycles 247

Table 4.9 – GES status report for Ireland's marine environment. 249

List of Boxes

Box 1: IUCN Protected Area categories....30
Box 2: Other Effective Area-based Conservation Measures (OECMs)....33
Box 3: UNCLOS Maritime Jurisdictional Zones....36
Box 4: Ireland's Maritime Area....38
Box 5: Lough Hyne Nature Reserve, Co. Cork....65
Box 6: Assessing the benefits of MPAs in Scotland....100
Box 7: Case study of a successful Spanish MPA with fisheries involvement....106
Box 8: Greencastle Codling Project....108
Box 9: Example of sectoral organisation to clearly identify and communicate issues and actions....140
Box 10: Terminology proposed for Ireland's MPA network and definitions....152
Box 11: Potential grounds and principles for proposing individual site-based MPAs....159
Box 12: Lamlash Bay – a case study of community-led marine protection....160
Box 13: Issues arising during the implementation of Natura 2000....167
Box 14: Dundalk Bay cockle fishery....169
Box 15: Lessons learned from successful community stewardship with integrated management in Australia....171
Box 16: Review of the Raised Bog Natural Heritage Area Network....177
Box 17: Proposed definition for MPAs in Ireland and recommended key principles....189

Preamble

In the context of the global biodiversity crisis and climate emergency, international policy encompasses commitments and strategies to conserve and sustainably use our terrestrial and marine ecosystems to the benefit of current and future generations. Marine Protected Areas (MPAs) are defined in a wide variety of ways, but can broadly be thought of as marine areas that are managed over the long term, with a primary objective of conserving habitats and/or species and associated ecosystem services and cultural values. Area based management tools like MPAs are widely used around the world and are specifically required under international legislation and agreements to which Ireland is committed, including the EU Marine Strategy Framework Directive, the OSPAR Convention, the Convention on Biological Diversity and the UN Sustainable Development Goals.

Individual MPAs are often intended to form part of a network of sites designed to meet overarching policy goals and have a strong track record in helping to sustain the diverse, clean, healthy and productive seas, that are critical to our society, economy and culture. Ireland does already have a number of protected areas with marine coverage. Primarily these are Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) declared under the EU Birds and Habitats Directives and which contribute to the EU Natura 2000 network to protect specific species and habitats. There are some sites designated under the Ramsar Convention, some which contribute to the OSPAR network of MPAs, and others that have national designation, but in fact all are also SPAs and/or SACs and are primarily protected and managed under the Natura 2000 framework. They cover 10,420 km^2, which is 2.13% of Ireland's total maritime area of nearly 488,762 km^2. This is far short of the international targets to which Ireland is committed. Current Irish legislation does not define Marine Protected Areas and is limited in its ability to enable the conservation of many of Ireland's threatened or important species, habitats and other marine features of biological or cultural significance.

As such, Ireland's current Programme for Government (2020) includes a commitment to expand Ireland's network of MPAs to 10% of its maritime area as soon as is practical and to meeting a higher target of MPAs constituting 30% of its maritime area by 2030, in line with the recently published EU Biodiversity Strategy. The expansion of Ireland's MPA network will contribute to protecting biodiversity in crisis, creating a sustainable future, and meeting the challenges presented by a changing climate. MPAs are one approach with which to achieve these aims, but their implementation can be contentious if not approached in a manner respectful of the needs of people and communities, as well as to the environment of which they are a part. In developing its own approach, Ireland has an opportunity to learn from MPA planning, selection and management processes in other parts of the world and from its own experience of area-based protection to date.

This report summarises relevant information and current thinking about MPAs in an Irish context and makes recommendations for the expansion of Ireland's network of MPAs based on the work of the MPA Expert Advisory Group and its engagement with key stakeholders in Ireland's marine environment. It does not make recommendations about the location of future MPAs. The report is divided into three parts: the first presents the rationale for expanding Ireland's network of MPAs, the second explores the consequences of doing so in societal and economic terms and the third addresses the processes that should be put in place to do so,

including ecological and societal considerations and recommendations for governance, management, and legislation.

Key messages establishing the context for expansion of the network are summarised at the ends of Parts 1 and 2; recommendations for the process of expanding the network are summarised at the end of Part 3.

Part 1: Why expand Ireland's network of Marine Protected Areas?

This Part of the report establishes rationales for conservation of biodiversity and sustainable ecosystem management and introduces Ireland's marine environment in terms of its oceanographic character, its range of habitats and species and its social, economic, and cultural significance. It documents the relationship between the marine environment and our economic prosperity and socio-cultural well-being, together with the capacity of the main pressures acting on our marine ecosystems to disrupt their integrity and productivity.

Area-based measures are introduced as one of a number of approaches to conservation and sustainable environmental management and the nature of Marine Protected Areas (MPAs) is examined. International and national legislative and policy drivers of area-based management in Ireland are outlined, together with other relevant frameworks and instruments. Having summarised the current status of Ireland's area based protection and its marine habitats and species, a section is then dedicated to gaps in Ireland's current network of protected areas, with scope for improvement in terms of coverage, target species, habitats and other marine features, the flexibility of designation types, the level of stakeholder engagement and the legal basis for expanding the network.

1.1 Introduction

Reports of biodiversity loss and a planet in crisis are increasingly widespread and there is rising public awareness of our environment and our dependency on it. Information is freely available and widely distributed, but it can be difficult to be clear about what is going on, why we should be concerned and what we should do about it. For many people, nature is a remote and intangible notion, for many it is regularly visited and appreciated and for others it is an integral part of their daily working lives, but still it holds mysteries and surprises. Ireland is especially blessed in its environment, particularly its rich seas and ocean territory, but what lies beneath the surface and why should we care?

1.1.1 Why conserve biodiversity?

Many species and wild places are highly valued by people because they are inspiring and beautiful. People expect that we should be able to visit natural environments, or simply know that they exist in the world, and many are deeply disturbed that we are degrading and damaging our natural heritage.

Natural and productive ecosystems are also hugely important to human well-being and prosperity. They bring many benefits to society through "ecosystem services", such as providing food and raw materials, and maintaining climate and water quality and the rich environments we rely on for recreation, tourism, and cultural well-being. As such, we are part of a socio-ecological system;[1] maintenance of the ecosystem services on which we depend requires us to recover and conserve the habitats, species and ecosystem processes on which they depend.

Some consider that the provision of benefits to humans only partially accounts for the broad spectrum of human-nature relationships. The meaning and aim of conservation can also encompass the rich cultural diversity that has evolved and continues to evolve through our social, economic, and cultural relationships with the natural environment. As such, conservation can be contentious, concerns can be heartfelt and potential restrictions may be feared or resented. It is important to recognise the complexity of human-nature relationships and ensure that a range of perspectives are taken into account in exploring rationales for and approaches to conservation.

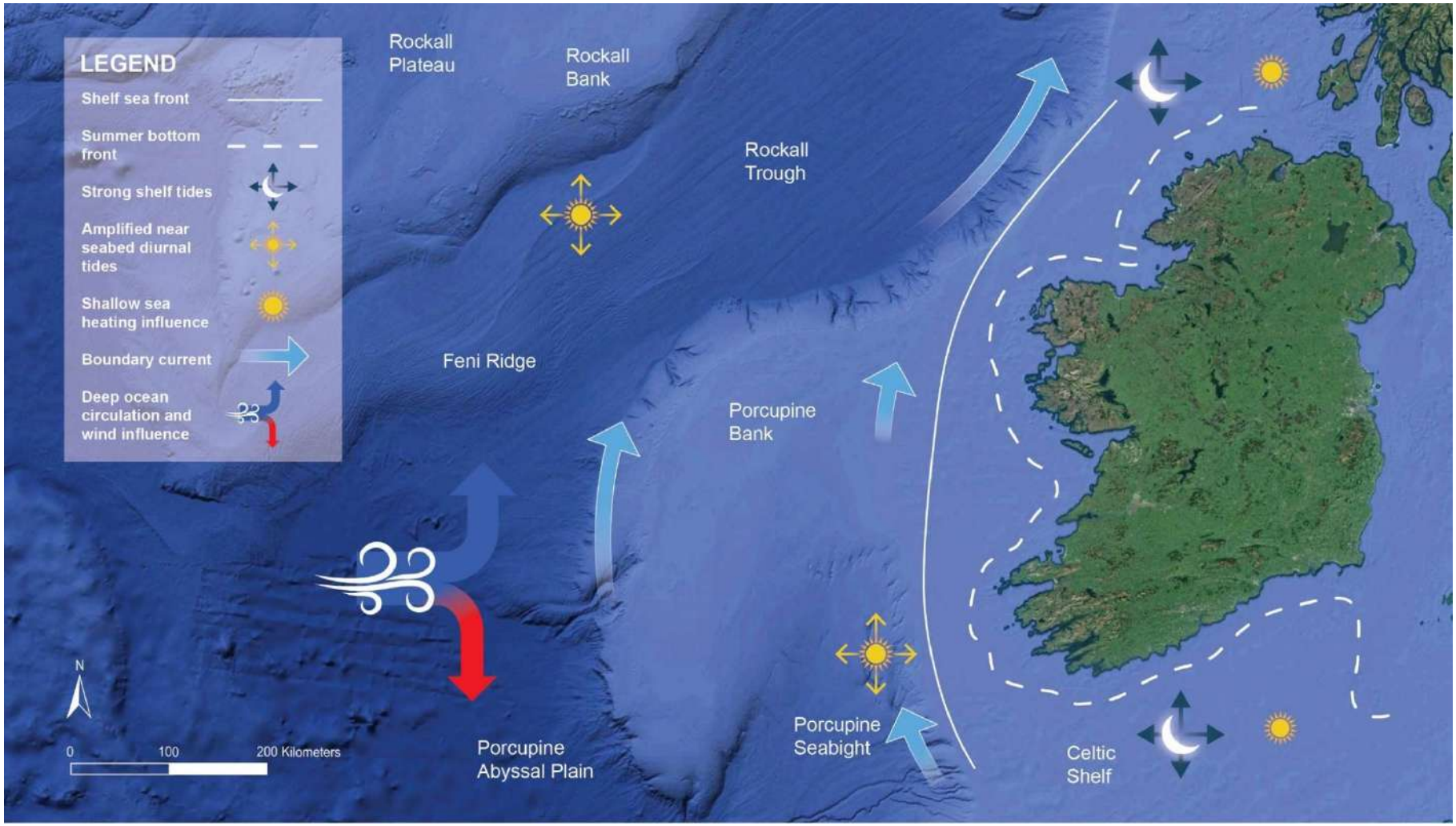


Figure 1.1 - Selected hydrographic features and dynamical processes in Irish waters of influence to resident ecosystems. Fronts are regions of increased biological activity, both of fisheries and plankton. Tidal energy mixes water constituents, such as nutrients, and produce hotspot locations of increased currents at the seabed. The continental boundary current brings the warmest most saline water to the region. Further offshore, climate driven basin scale atmosphere-ocean processes control the water column structure and strength of the ocean circulation.

1.1.2 Ireland's marine environment

1.1.2.1 Geography and ocean dynamics

Ireland is an island nation. Its Maritime Area of more than 480,000 km^2 encompasses coastal and transitional waters, relatively shallow (<200 m) shelf seas, deep ocean environments and numerous large seabed topographical features such as submarine banks, canyons, and seamounts. Coastal and transitional waters provide a direct link from land to sea and a source of freshwater and the nutrients and other constituents that water contains. Habitats and currents are complex and varied. The shelf seas are productive, and the dynamics are controlled principally by tidal action, seasonal heating and cooling, freshwater input, and wind. Deep ocean characteristics are controlled by global scale atmosphere-ocean interactions and large-scale ocean-climate circulation patterns that run over decades to centuries. The edge of the shelf, the Irish continental margin, is a connection and a barrier to both the deep and the shelf waters. It is a highly productive region and hosts important, vulnerable, and dynamic ecosystems.

1.1.2.2 Biological diversity

Ireland's marine flora and fauna is extremely diverse. To make sense of this biodiversity it is best to categorise it into five broad marine environments and then discuss the different distinct marine habitats and species found within them.

1.1.2.2.1 Rocky shores, sandy beaches and other coastal habitats

There is no marine environment more familiar to most people than our rocky and sandy shores. Even the casual beachgoer can recognise distinctive marine taxa such as starfish and crabs. However, few probably appreciate the great diversity that can be found on our shores. For example, over 480 taxa have been described on the rocky and sandy shores of County Wexford.[2]

Rocky shores and are often characterised by distinct bands of seaweeds (such as *Pelvetia canaliculata*, *Fucus spiralis* and *Fucus serratus*), growing at different heights. In fact, Irish shores host a rich diversity of seaweeds, many of which have cultural significance through their use in recipes and remedies, such as carrageen moss (*Chondrus crispus*) and dulse (*Palmaria palmata*).[3] These patterns are also evident in the distribution of animals on our rocky shores. For example, the rough periwinkle (*Littorina saxatilis*) is typically found high up on rocky shores whereas the dogwhelk (*Nucella lapillus*) and the barnacles and mussels they feed on, are found lower down the shore. Some other familiar and common animals found on rocky shores include edible winkles (*Littorina littorea*), colourful top shells (including the painted top shell (*Calliostoma zizyphinum*), mussels (*Mytilus edulis*) and limpets (*Patella vulgata*).

Within rock pools and under and on loose rocks and seaweed, a much wider range of organisms can be found, including diverse crabs, starfish, sponges, urchins, anemones, shrimps and fishes (such as gobies and blennies) and smaller more unusual taxa such as diatoms, copepods, polychaete worms, chitons, bryozoans and hydroids. Depending on the wave exposure and underlying bedrock, very different rocky shore communities can be encountered, and this rich mix attracts foraging seabirds such as turnstones and oystercatchers.

Skirting the lower boundary of most rocky shores is a band of large seaweeds, or kelp. Often these form dense canopies, referred to as **kelp forests**, which can be as much as 30 m wide. Kelp forests are among the most important marine systems for primary production as they grow new biomass each year and continuously shed detrital material and mucus from their blades. Two species in Ireland form extended kelp forests, *Laminaria digitata* and *L. hyperborea*, and they both support a rich flora and fauna,[4] including epiphytes such as dulse *Palmaria palmata* and the red seaweed 'sea beech' *Delesseria sanguinea,* and many fish species (especially wrasse) but also a great diversity of invertebrates such amphipods, gastropods and polychaetes.

In contrast to rocky shores, sandy shores appear at first to be barren deserts. On closer inspection, the surface reveals signs of life with casts of lugworms (*Arenicola marina*) and shells of dead animals washed up on the strandline. However, to truly appreciate the life in sandy shores you need to dig and sieve for the animals. Under the sand, widespread species include the masked crab (*Corystes cassivelaunus*), the hermit crab (*Pagurus bernhardus),* the sea potato (*Echinocardium cordatum*), the banded wedge shell (*Donax vittatus*) and sand hoppers like *Talitrus saltator*. Depending on the beach and the type and size of the sand grains, a great diversity of different shellfish can also be found, including razor clams (*Ensis magna*) and cockles (*Cerastoderma edule*). Seabirds such as sanderling and dunlin can be seen foraging on beaches, along the edge of the sea.

Although estuaries and mudflats may seem featureless, these habitats are highly productive and support large populations of invertebrates, mainly bivalve molluscs and polychaete worms. Some of the most important mudflats in Ireland are close to large urban centres such as Dublin, Tralee, Shannon and Dundalk. In estuaries, the tides mix salt and fresh water, supporting unique species which have adapted to life there and often occur in large numbers. Species such as cockles and razor clams support important fisheries in these habitats. Mudflats and estuaries are also critical habitats for juvenile fish, seabirds and migrating overwintering birds in particular. Familiar species include curlew, redshank, godwits and brent geese. Stable mudflats are also important areas of carbon storage, that is locked deep within the muds.

In some areas, especially where sand and mud are mixed, we can observe underwater meadows of seagrass. In Ireland, there are two species of seagrass, common seagrass (*Zostera marina)* which is more common and forms dense beds with leaves up to 1 m long in shallow sheltered bays,[5] and dwarf seagrass (*Zostera noltii)* which is an intertidal species and has much shorter and narrower leaves (< 20 cm). These **seagrass meadows** are rich in biodiversity as their blades provide habitat for organisms and their root-rhizome matrix increases the structural complexity of the sediment and therefore provides further habitat for organisms. Over 124 species, including amphipods, crustaceans, bivalve molluscs, sea anemones and brittlestars were found in association with seagrass meadows in a recent study in Counties Cork and Kerry.

Another unique shallow coastal habitat is **maërl reef.** Maërl is a general term used to describe several different species of red algae (coralline algae) that deposit calcium carbonate into a three-dimensional structure on which they live. Two coralline algal species (*Phymatoliton calcareum* and *Lithothamnion corallioides)* form most maërl beds around Ireland. Due to the great structural complexity of maërl beds, they provide countless nooks and crannies for meiofauna (fauna sized between 1 cm and 250 μm) to live, including crustaceans, echinoderms, and annelid worms. Such maërl reefs are also considered important nursery grounds for juvenile fish and other organisms such as king scallops. **Mussels**, **native oysters**, **serpulid worms** and **honeycomb worms** also create complex biogenic reef structures, which support a wide range of other species and are important features of Ireland's coastal marine environment. These biogenic reefs and habitats are also well-known for locking carbon into living structures, and within rich sediments around their formations.

Cliffs and islands are very important habitats for nesting seabirds, including puffins, guillemots, razorbills, cormorants, shags and a range of species of gull. Three seabird species breed here in internationally important numbers (storm petrel *Hydrobates pelagicus*, Manx shearwater *Puffinus puffinus*, and gannet *Morus bassanus*). Ireland also holds one of the largest breeding sites for the roseate tern (*Sterna dougallii*), which is the rarest breeding seabird in Europe. There are nine seabird colonies around Ireland with greater than 10,000 breeding pairs of seabirds on each.[6] Most tern hotspots are found on the east coast of Ireland whereas petrel, shearwater and fulmar hotspots are found on the west coasts within easy access to distant foraging areas in the shelf seas, as described below.[7]

1.1.2.2.2 Shelf seas

Irish shelf waters (waters < 200 m deep) are very productive and can be divided into two principal water types, seasonally stratified and permanently mixed waters. Shelf waters over the Celtic Sea, the western Irish Shelf and in a small region between Ireland and the Isle of Man become seasonally stratified by solar heating. A combination of shallow waters and strong tidal currents keep the water column permanently mixed in all coastal waters and in most of the Irish Sea.

Each water type hosts distinct **planktonic communities**, comprising phytoplankton (plant like organisms), which underpin marine foodwebs, and zooplankton (animals), which form the prey for many larger species, for example of fish and whales. Phytoplankton in the mixed waters of the Irish Sea features a higher abundance of dinoflagellates of the genus *Ceratium* and a lower frequency of diatoms. In terms of zooplankton the Irish sea has a higher count of chaetognaths (arrow worms) and smaller copepod (crustacean) species such as *Parapseudocalanus* spp., *Temora longicornis* and *Acartia* spp. In contrast, the warmer stratified waters of the Celtic sea have a higher occurrence of diatoms such as *Thalassiosira* spp. and *Chaetoceros* spp., and in terms of zooplankton, there is a much higher count of *Calanus* copepods, such as *Calanus helgolandicus*.[8] An average phytoplankton count during the month of April will produce ~700,000 individuals per m^3 and an average zooplankton count during the summer months will generate >4,500 zooplankton individuals per m^3.[9] When considering such remarkable numbers, it is hardly surprising that our shelf seas support the great diversity and abundances of fishes and megafauna so characteristic of Irish shelf seas.

Fishes are the most diverse group of vertebrates living in our seas with ~400 marine species found here.[10] As many form spectacular schools, they are often the most conspicuous component of our marine fauna. For example, blue whiting (*Micromesistius poutassou*), horse mackerel (*Trachurus trachurus*) and mackerel (*Scomber scombrus*) are planktivorous

shoaling fish that undergo extensive migrations in Irish shelf waters between spawning, feeding and overwintering areas. The adults are mainly found in deeper waters to the west of Ireland, while juveniles are encountered closer inshore. Pelagic species found closer inshore include sprat (*Sprattus sprattus*) and herring (*Clupea harengus*). Herring undergo migrations between spawning, feeding and overwintering grounds with adults primarily found to the northwest of Ireland and in the eastern Celtic Sea, while juveniles are only found in the Celtic Sea and to the west of Ireland close to the coast.

The abundance of small pelagic fishes supports a diverse array of **marine megafauna – i.e. larger species** including tuna (albacore *Thunnus alalunga* and bluefin *Thunnus thynnus*), pelagic sharks (including blue *Prionace glauca*, porbeagle *Lamna nasus* and mako *Isurus oxyrinchus*), seabirds and cetaceans. Blue sharks are probably the most abundant large predatory fish in Irish waters during the summer months with recent estimates indicating >15,000 individuals in shelf waters over the summer period.

Ireland hosts twenty-five **cetacean** species including the more common species such as the harbour porpoise (*Phocoena phocoena*), common dolphin (*Delphinus delphis*), bottlenose dolphin (*Tursiops truncatus*) and the seasonally present species such as the minke whale (*Balaenoptera acutorostrata*) and fin whale (*Balaenoptera physalus*).[7] As such, cetaceans make up >48% of all the native species of mammals recorded in Ireland.[11] Abundance estimates determined using aerial surveys suggests there are ~80,000 individuals of smaller dolphins (inc. short-beaked common dolphin, striped dolphin and common bottlenose dolphin) during the summer months.[7] There are also ~35,000 porpoises and ~8000 minke whales.[7] Over 100 individually recognisable humpbacked whales have been recorded in Irish shelf waters.[12] Other familiar marine mammals include common (or harbour) seals and grey seals, which breed in specific areas around the coast.

Several unusual megafauna species also occur in Irish shelf waters, most notably the ocean sunfish (*Mola mola*), the basking shark (*Cetorhinus maximus*) and the leatherback sea turtle (*Dermochelys coriacea*). All these species feed on plankton, with basking sharks feeding mainly on copepods, whereas both the sunfish and leatherback feed on the large abundance of gelatinous zooplankton found in these temperate waters.[13]

Irish shelf seas are internationally important foraging grounds for **seabirds**, many of which also nest on Ireland's islands and coastlines as described above. Fifty-two species of seabirds have been recorded in Irish waters,[7] and aerial surveys estimated that Irish shelf waters support 439,280 seabirds during the summer breeding season, and indicated that the composition of birds changes seasonally: more auks, petrels, northern gannets, northern fulmars and Manx shearwaters occur in the summer and black-legged kittiwakes and gull species and northern fulmars dominate during the winter. [7]

Our shelf waters are also notable for their great abundance of **cephalopods**. Veined squid (*Loligo forbesii*) is a commercially fished species abundant demersally, while neritic species such as little squid (*Alloteuthis* spp.) also frequently occur. Other demersal cephalopods commonly encountered include the common cuttlefish (*Sepia officinalis)* and species of bobtail squid. Oceanic squid such as *Todarodes sagittatus* may also be found in coastal waters.

1.1.2.2.3 Extensive seabed under our shelf seas

Ireland hosts one of the largest areas of continental shelf in the northeast Atlantic. As such, there is a great diversity of sea-floor habitats that have different depths, substrate types, light penetration, hydrography and histories (i.e. shaped by glaciation). Three broad habitat types can be considered to make up over 65% of the shelf sea floor. These are the offshore circalittoral sands (26%), offshore circalittoral coarse sediments (18%) and offshore circalittoral muds (21.5%). To put these areas into context, the offshore circalittoral sands make up an area equivalent to half the size of Ireland. These extensive seafloor habitats provide food and refuge for a great diversity of demersal fish species including the commercially important cod and related species.

Offshore circalittoral sands are characterised by having fine sands or non-cohesive muddy sands. They are characterised by a diverse range of polychaetes, amphipods, bivalves and echinoderms. Very few data are available on these habitats; however, they are likely to be more stable than their shallower counterparts.[14]

Offshore circalittoral coarse sediments are characterised by having coarse sands and gravel or shell. Such habitats are quite diverse compared to shallower versions of this habitat and generally characterised by robust infaunal polychaete and bivalve species. In some areas settlement of horse mussels (*Modiolus modiolus)* occurs.[14]

Offshore circalittoral muds are characterised by having mud and cohesive sandy mud, typically below 50-70 m. in these sediments, a variety of faunal communities may develop, depending upon the level of silt/clay and organic matter in the sediment. Communities are typically dominated by polychaetes but often with high numbers of bivalves such as *Thyasira* spp., echinoderms and foraminifera.[14]

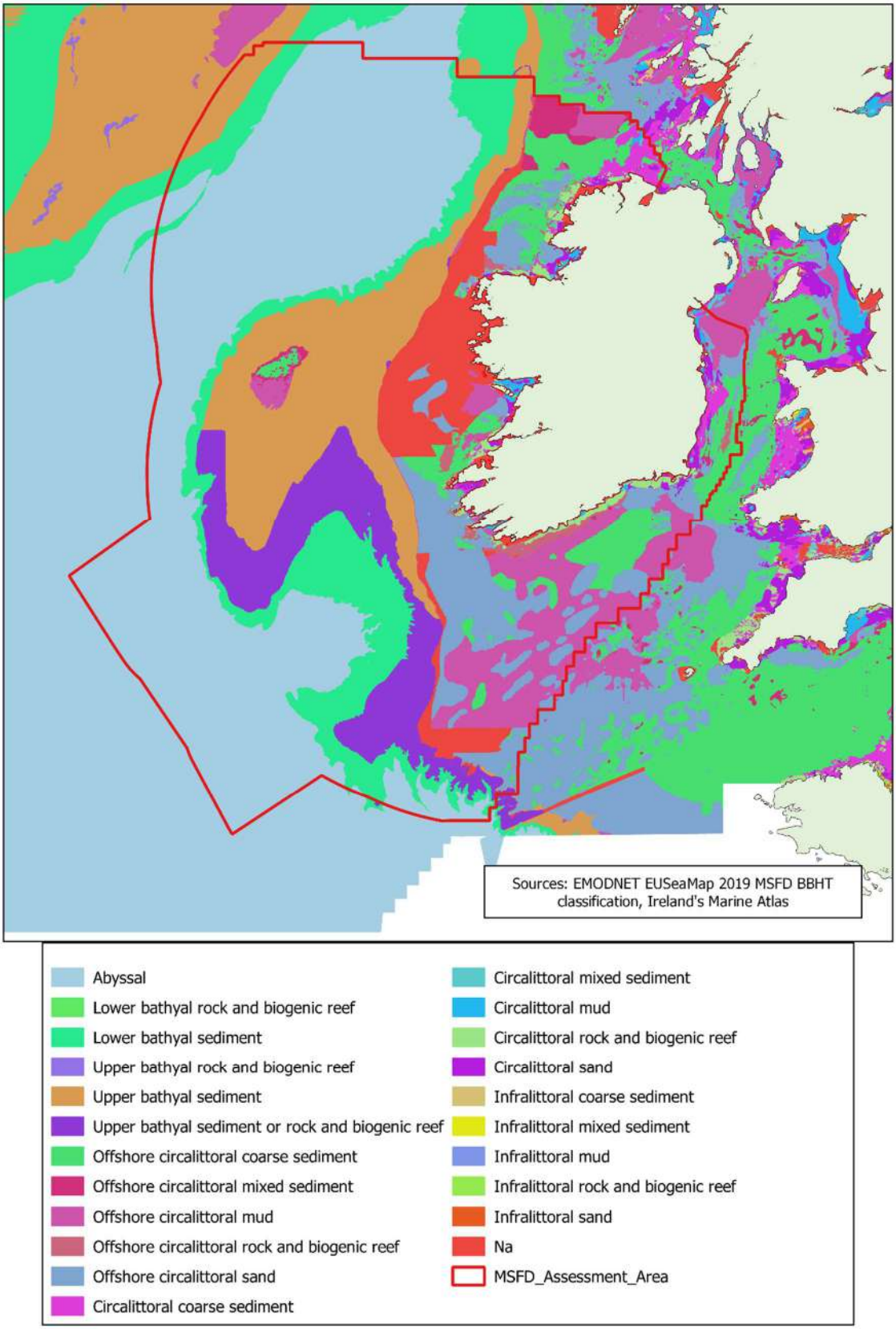


Figure 1.2 – Broad-scale seabed habitat map showing MSFD classifications from the EMODnet habitat map for Europe (EUSeaMap 2019).

1.1.2.2.4 Deep seas

The water column beyond the continental shelf edge can be as deep as 5000 m. Many animals below the sunlit epipelagic zone (top 200 m) depend on sinking food particles, or marine snow, which is composed of clumps of dead plankton, bacteria and faecal pellets, for their survival. Alternatively, many animals perform extensive diel vertical migrations between deep and shallow waters. For example, many deep sea crustaceans and siphonophores can migrate 100s-1000s of metres at dusk up into the epipelagic zone to feed only to migrate back down again during dawn to avoid becoming prey themselves.

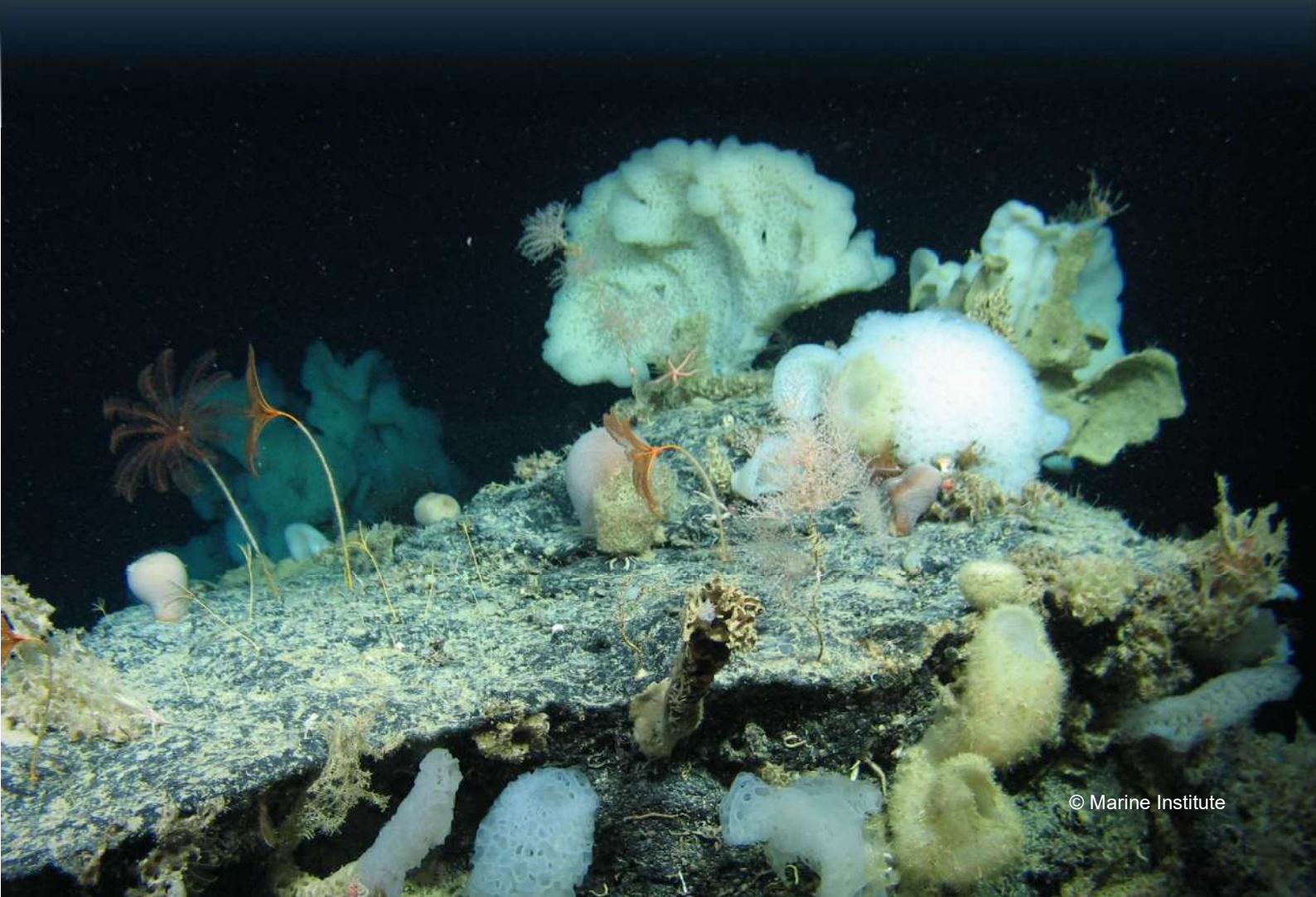
Immediately below the epipelagic zone lies the twilight zone or mesopelagic zone (200 – 1000 m depth), where very little light penetrates, and photosynthesis is not possible. Despite the lack of light, this region teems with fish biomass (especially bristlemouths and lanternfishes) now estimated to be ten times greater than previously thought.[15] Also, most of these fishes have developed some form of bioluminescence with at least 90% of its inhabitants producing light.[16] The bioluminescence is thought to help these fishes avoid predation by providing counterillumination in the dimly light waters of the twilight zone. In Irish deep sea waters there are many deep diving predators including the beaked whales and other cetaceans that exploit this abundance of fish.

Below the twilight zone is the bathypelagic zone (1000 m down to 100 m above the seafloor) which has no light and experiences relatively little change in temperature or salinity. The bathypelagic hosts a rich diversity of jellies, fishes, and cephalopods, all of which are highly specialised for this environment, with adaptations (including bioluminescence) to help them feed, escape predators, and reproduce.

1.1.2.2.5 Extensive areas of seabed under our deep seas, including shelf slope

Offshore, rocky substrate provides habitat for sensitive deep-water sponges, black corals, and octocorals. The longevity of some of these organisms is remarkable, with several octocoral genera (e.g., *Paramuricea*) estimated to reach ages of several hundred years and estimates for some black corals to be even greater. Many of these corals are extremely fragile (for example bamboo corals) having adapted to low water and sediment movent in their habitats. Highly sensitive biogenic reef comprising the reef-building corals *Madrepora oculata*, *Desmophyllum pertusum*, and *Solenosmilia variabilis* occurs on the continental slope, with species composition changing with depth. These cold-water coral reefs provide complex habitat and a hard substrate for many other species and consequently have very high diversity.

Soft sediment on the continental slope may be dominated by aggregations of other vulnerable marine ecosystem indicator species. For example, several genera of sea pens, including *Kophobelemnon* and *Pennatula* form large 'fields', while sponge species such as *Pheronema carpenteri* also form large aggregations on gentle slopes. Reefs of hexactinellid sponges have also been found to flourish on hard deep substrates.



1.1.2.3 Biocultural diversity

Maritime cultural identity is a key feature of many coastal and island communities in Ireland. Biocultural diversity in the Irish marine environment includes the maritime cultural heritage that is intertwined with the biophysical marine environment, such as people's living knowledge of the sea: of its place in their stories, histories and legends; of how they have made a living from the sea; of how they have named and renamed it to suit their needs on and from the sea; of how it has helped to shape their conduct and beliefs; of the change that technologies have brought to their relationships with it, and the intergenerational transfer of a particular way of knowing the sea, through stories and cultural representations, captured for example through the work of Séamus Mac an Iomaire or in collections of folklore such as *Cogar San Fharraige*.[17]

Traditionally, knowledge of the sea was gathered from careful observation and held in people's memories, for example as *marcanna na talamh* (landmarks) used to navigate to fishing grounds and which are captured in Ireland's permanent National Inventory of Intangible Cultural Heritage. Distinctive grammatical expressions related to the sea are also evident, such as fishing 'down' to the north and 'up' to the south or travelling 'in' to an island and 'out' to the mainland.[18] Evidence of past and present naming (often in Irish) in relation to the sea illustrates the depth of local people's connections to their marine environment with place names often charged with historical and legendary associations. For example, legend has it that *Staca Róise*, a rock off the island of Arranmore in Donegal, got its name when a local woman, Róise, spent three days and three nights waiting in vain for her husband and son to return from a fishing trip. Another rock on the island's Leabgarrow Strand is called *Carraig na mBeithí* (the rock of the horses) as it was a marker for horse races on the beach. This maritime cultural heritage is intertwined with the biophysical marine environment, creating a sense of belonging to, and responsibility for, place.[18]

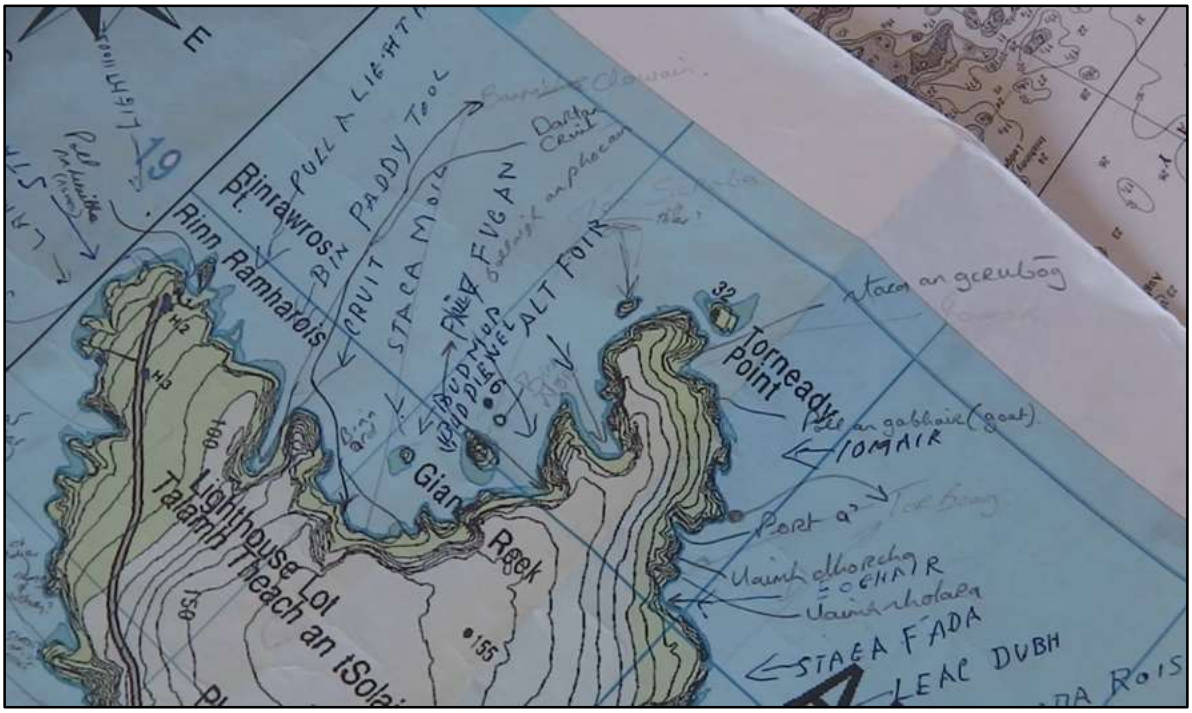


Figure 1.3 – An annotated map of Arranmore Island, Donegal showing detailed names for coastal locations, compiled by Arranmore islander John McCafferty. This is an example of Maritime Cultural Heritage. Image: Stephen Hurrel

1.1.3 Socio-economic and cultural importance of Ireland's marine environment

Ecosystem services flow from natural capital: the stocks of air, water, soil and mineral resources as well as the living components of ecosystems.[19] Several alternative frameworks have been proposed to describe and classify ecosystem services, including, most recently, their incorporation into Nature's Contributions to People[20] by the Intergovernmental Panel for Biodiversity and Ecosystem Services (IPBES). Here we use the UN Common International Classification of Ecosystem Services (CICES),[21] which has been adopted by the European Commission.

Under CICES, ***Provisioning services*** include those ecosystem resources that provide food, fuel and raw materials[22] ***Regulating services*** are defined as the benefits obtained from the regulation of ecosystem processes. Examples include carbon sequestration which helps to mitigate climate change, treatment of wastewater and its return to the hydrological cycle and flood and storm protection by sand dunes and saltmarsh which lessens the damage from winter storms. ***Cultural services*** flow from the intellectual, spiritual and emotional connection we have with the environment. They contribute substantially to health and well-being and underpin substantial recreation and tourism industries, including angling, bird and mammal watching, coastal walking and water-sports which all depend on rich, clean healthy seas (Figure 1.4).

All ecosystem services are underpinned by ***Supporting services*** such as primary productivity, nutrient cycling, decomposition, and other ecosystem processes. These are also the services on which the pressures of human activity tend to act directly, with subsequent cascades of consequences for the wider range of services that benefit society (Figure 1.4). IPBES reporting suggests that all types of ecosystem services have seen substantial decline in recent years – in terms of the marine environment the natural assets have been extensively used, and the associated ecosystems (e.g. seafloor habitats) have become less useful at providing regulating and provisioning services such as carbon capture, fish nursery habitat, biodiversity, ecological and functional redundancy. This loss in service value has generally not been considered as associated costs in EIAs and as such, has been ignored in much of the planned development of the marine economy.

Using the CICES classification system, Norton et al. (2020) estimated that on an annual basis, recreational service benefits provided by Ireland's marine ecosystems have an economic value of €1.6 billion; fisheries and aquaculture is estimated to be worth €664 million in terms of output value from Irish waters; carbon sequestration service benefits are valued at €819 million; waste assimilation service benefits €317 million; scientific and educational service benefits €11.5 million; coastal defence service benefits of €11.5 million; seaweed harvesting €4 million and the added value per annum to housing stock of being close to the shore (aesthetic services) was valued at €68 million.[23] Even though not all of the ecosystem service benefits provided by the marine environment could be monetized, the research did indicate that the value of those that can is substantial (Figure 1.4). Ireland's marine and coastal habitats also play a critically important role in regulating climate by capturing and then transporting over 40 million tonnes of CO_2 per annum from the surface to the ocean depths.[23] These figures only represent the benefit values received by society and not the intrinsic value of the ecosystems themselves.

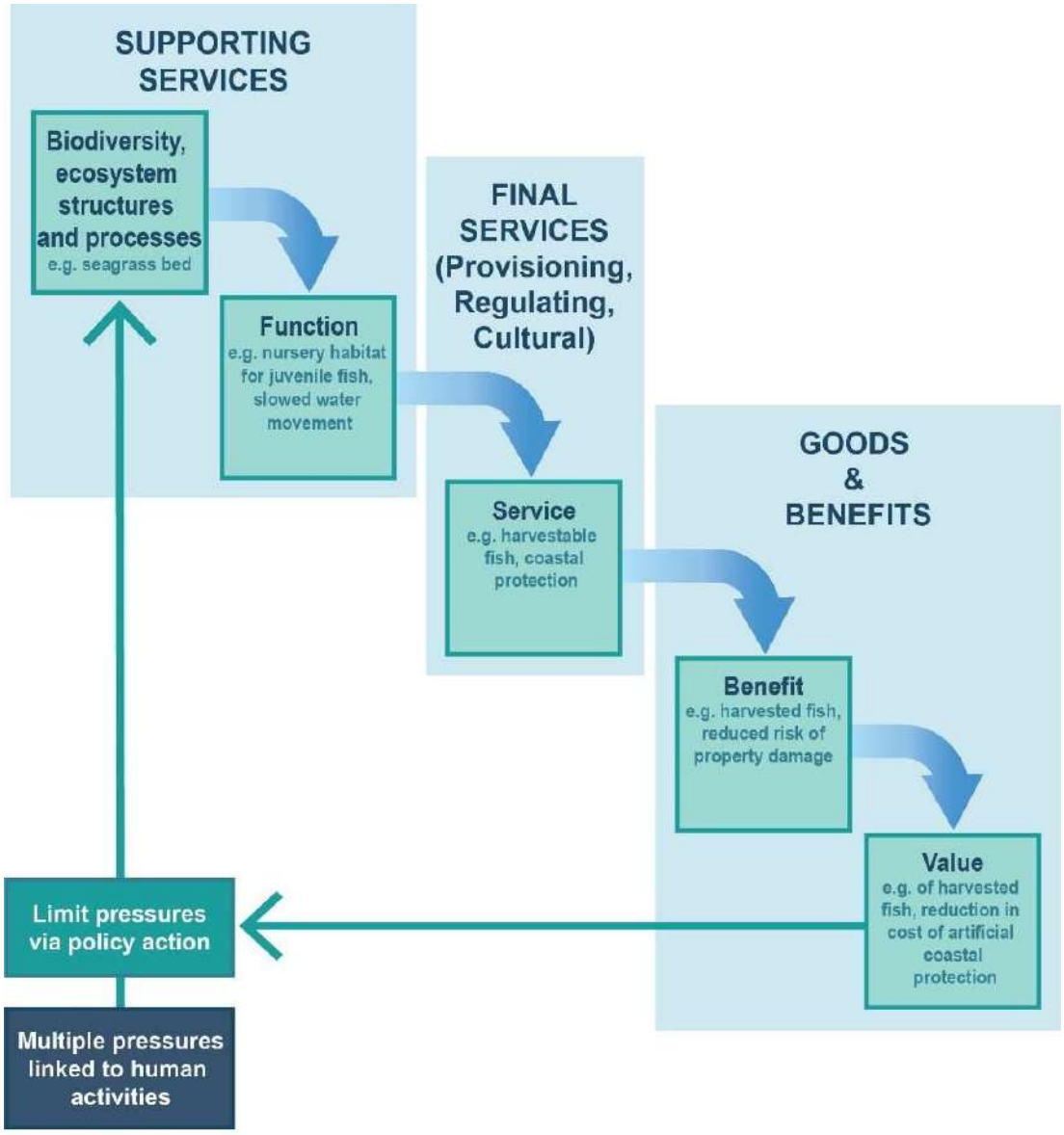


Figure 1.4 – The cascade model of ecosystem services and benefits, modified from Potschin and Haynes-Young (2016).[24] 'Value' does not necessarily imply monetary value. People can also express the importance they attach to benefits using moral, aesthetic, or spiritual criteria. It is by reference to these values that societies may choose to act to manage the pressures on ecosystems to maximise the overall benefits they deliver to society. This motivation is what is being highlighted in the arrow running from Values box back to the box indicating policy action to limit pressures.

While probably the most difficult to place a value on, the marine environment is particularly important in the delivery of regulating services. Regulating services provide benefits to humankind through the use of natural systems which regulate the environment in which we live and include services such as carbon sequestration, erosion prevention, waste-water treatment and the moderation of extreme events. For example, mussel beds, oyster beds, and sea grass beds, can influence hydrodynamics and protect shorelines from erosion due to increased storminess caused by climate change.[25,26] The benefits from these regulating services generate indirect use value as they tend to happen in the background (e.g. climate regulation and waste treatment) or infrequently (e.g. extreme event moderation and erosion prevention) and are not perceived by the majority of the population which benefits. Much work has been done to determine their value through their contribution to valuable production

activities or through the protection of property and other important economic assets from damages.[27] Nevertheless, marine regulating services in particular often remain undervalued or even ignored in marine and coastal planning.

Many industries also directly use, and rely on, Ireland's marine environment. The latest figures on Ireland's ocean economy suggest that the sectors connected with the marine environment has a turnover of €6.2 billion, with a direct economic contribution, as measured by gross value added (GVA), of €2.2 billion or 1.1% of GDP, and provided employment of 34,132 full-time equivalents. Taking into account indirect GVA generated from ocean related activity in Ireland total GVA is €4.2bn, representing an estimated 2% of GDP in 2018.[28] Shipping and maritime transport, tourism in marine and coastal areas and the seafood sector are the three largest contributors to Ireland's ocean economy in terms of output value and employment.

In terms of importance of the ocean to sectoral interests, the Irish seafood industry is arguably most reliant on a continuing healthy and productive marine ecosystem. Within the Irish Exclusive Economic Zone (EEZ), approximately 485,000 tonnes of wild fish were captured by fishing vessels in 2014, comprising at least 30 species including finfish such as whiting, mackerel and hake.[23] Inshore fisheries also target shellfish and crustaceans such as nephrops, edible crab, lobster, blue mussel seed, razor clams, oysters, scallops and whelks[29] and it is estimated that more than 30,000 tonnes of seaweeds are harvested annually on Irish coasts. Ireland also has an important aquaculture sector based mainly along the north, west and south coasts and focussing on blue mussel, Pacific oyster, and Atlantic salmon.

In 2019, the total production of Irish aquaculture was 38,000 tonnes with 278 production units engaged in the sector.[29] Farmed shellfish and farmed finfish production accounted for 65% and 35% of overall aquaculture production respectively. Salmon continued to be the most valuable seafood export in 2019 with a total production of 11,600 tonnes. In 2019 Ireland's seafood sector (fishing, aquaculture and processing) directly employed 9,187 people with an additional 6,963 employed indirectly.[29]

While still a small component in Ireland's overall energy portfolio, the offshore renewable energy industry is expected to see significant growth in the coming years. It is envisaged that an expansion of offshore renewables (particularly offshore wind) will be required if Ireland is to meet its renewable energy and emissions targets. A number of large-scale offshore wind farms are currently making their way through the planning process. These include, the Oriel wind farm project, off the coast of Co. Louth and the further development of the Arklow Bank Wind Park off Co. Wicklow. Including these two project in total eight offshore wind farms with a combined capacity of up to 3,480MW have been designated by the Department for Communications, Climate Action and Environment as "relevant projects" suitable to proceed in the planning process. The Programme for Government 2020 has also laid out a plan to increase offshore wind energy targets from 3.5GW to 5GW by 2030. How this sector can expand and operate alongside a network of MPAs will be an important consideration.

Another emerging sector in Ireland and within the EU that is reliant on a healthy and diverse marine environment is the marine biotechnology and bio-products industry.[28] It is one of the five sectors identified in the EU's Blue Growth Strategy considered to have high potential for sustainable jobs and growth.[30] This is a diverse industry, spanning different markets, such as food, pharmaceuticals, medical devices, and contributing to an array of novel products and processes. The harvesting and generating of additional value from the many varieties of

seaweeds along Irish coasts is also seen as an area that could see further growth in the future. The turnover generated by the marine biotechnology and bio-products industry in 2018 was estimated at €76 million, with total gross value added of €30 million and 545 full-time equivalent jobs.[28]

Table 1.1 – Irish coastal and marine ecosystem service benefits and their associated values (Reproduced from Norton et al. 2018). [23]

Ecosystem Service	CICES Classification	Quantity of ES per annum	Estimate of the Value of ES per annum
Provisioning ecosystem service			
Offshore capture fisheries	Wild Animals	469,735 tonnes	€472,542,000
Inshore capture fisheries	Wild Animals	14,421 tonnes	€42,113,000
Aquaculture	Animals - Aquaculture	39,725 tonnes	€148,769,000
Algae/ Seaweed harvesting	Wild Plants & Algae/ Plants & Algae from Aquaculture	29,500 tonnes	€3,914,000
Genetic materials	Genetic materials from biota	Not quantified	Not valued
Water for non-drinking purposes	Surface water for non-drinking purposes	1,189,493,326 m^3 of seawater used for cooling	Not valued
Regulating and maintenance ecosystem services			
Waste services	Mediation of waste, toxics and other nuisances	9,350,642 kg organic waste	€316,767,000
		6,834,783 kg nitrogen	
		1,118,739 kg phosphorous	
Coastal defence	Mediation of flows	179 km of coastline protected by saltmarsh	€11,500,000
Lifecycle and habitat services	Lifecycle maintenance, habitat and gene pool protection	773,333 ha protected through SACs	Not valued
Pest and disease control	Pest and disease control	Not quantified	Not valued
Climate regulation	Atmospheric composition and climate regulation	42,647,000 tonnes CO_2 absorbed	€818,700,000
Cultural services			
Recreational services	Physical and experiential interactions	96 million marine recreation trips per year	€1,683,590,000
Scientific and educational services	Scientific & educational	Marine education and training fees	€11,500,000
Marine heritage, culture and entertainment	Heritage, cultural and entertainment	Not quantified	Not valued
Aesthetic services	Aesthetic	Flow value of coastal location of housing	€68,000,000
Spiritual and emblematic values	Spiritual and/or emblematic	Not quantified	Not valued
Non-use values	Existence & bequest values	Not quantified	Not valued

Ireland also has a thriving recreation and tourism sector, which is contributed to significantly by its natural environment and maritime cultural heritage. According to the latest figures from Fáilte Ireland, expenditure by tourists visiting Ireland was estimated to be approximately €5.6 billion in 2018.[31] Combining the expenditure by overseas and Northern Irish tourists with the money spent by Irish residents taking trips at home and receipts paid to Irish carriers by foreign visitors, total tourism expenditure in 2018 was estimated by Fáilte Ireland to be €9.4 billion. Coastal and marine tourism and leisure is one of the key industries contributing to Ireland's ocean and coastal economies.[28] According to the latest figures, tourism and leisure in marine and coastal areas provides over 50% of all employment in Ireland's ocean economy. In terms of leisure activities sea angling has been shown to generate considerable economic value to the Irish economy,[32] and is particularly reliant on a productive marine ecosystem and the effective management of important habitats for target fish species.

A recent report on the Irish domestic marine and coastal tourism market also points out the growing body of research highlighting the many mental health and well-being benefits society receives by interacting with high-quality marine environments.[33] The marine environment enriches our daily lives, serves as inspiration for art and literature and give us a sense of place through family- and community-based memories and stories. These benefits are somewhat intangible and often overlooked, but are nevertheless important and may be influential in stirring concern and motivating environmental stewardship.[34]

Key messages

- Conservation of biodiversity is warranted to maintain our natural and cultural heritage and the socio-ecological systems of which we are a part.
- Ireland has an extensive marine environment that has a rich diversity of habitats and species and related cultural values and heritage.
- Ireland's marine environment provides many highly valued ecosystem service benefits including provision of food and raw materials, regulation of climate and water quality and underpinning of cultural activity, recreation, tourism, and well-being.

1.1.4 Pressures on Ireland's marine environment

1.1.4.1 Local and regional pressures

Ireland's natural heritage and its capacity to continue to deliver ecosystem services and benefits to society now and in the future depend on the maintenance of a healthy marine environment and its biodiversity. Pressures on the marine environment are driven by various sectors acting locally and regionally, including fishing, aquaculture, oil and gas extraction, newer developments such as offshore renewable energy, and globally by climate change (Figure 1.5). Such pressures have grown markedly over the past 20-30 years.

Generally, coastal waters are exposed to more pressures than offshore waters; multiple activities occur in coastal waters which are also affected by pressures originating from land-based activities. In that respect, coastal and shelf sea environments are more likely to be more heavily impacted.

Fishing activity is widespread in nearshore and offshore waters. There are just over 2000 fishing vessels registered in Ireland but about 1700 of them are small scale coastal vessels fishing in waters within 6 nm of the coast. Beyond the 12 nm limit, vessels from other EU countries fish in the Irish EEZ (Figure 1.6). The pressure and impact from fishing depends on the fishing gears used and management measures in place. Fisheries alter age and size structure, species guilds, and reduce the biomass of fish populations. Fishing gears also cause incidental mortality of non-target species including other species of fish, seafloor invertebrates, seabirds and marine mammals. Some fishing gears cause abrasion of the seafloor and alter the structure and function of seafloor habitats. Fishing can cause disturbance and displace species from preferred habitats.

Irish aquaculture production is mainly of Pacific oysters grown intertidally on trestles, mussels grown directly on the seabed or on long lines and salmon produced in sea pens. Seaweed culture is increasing. If sites are not chosen carefully, finfish aquaculture in coastal waters can increase nutrient loads, increase siltation, and cause smothering of habitats. Shellfish movement can act as a vector for the introduction of non-indigenous species. Eutrophication and smothering change the structure and function of habitats. Installations may displace species from habitats and attract species which might use installations as shelter or food.

Tourism, recreation, and small scale incidental commercial activity in the coastal zone particularly can cause displacement of species due to disturbance and habitat changes if not carefully managed. There is a range of activities involved here including walking, boating, eco-tourism, SCUBA diving, sea angling, collecting shellfish and seaweeds from the shore etc.

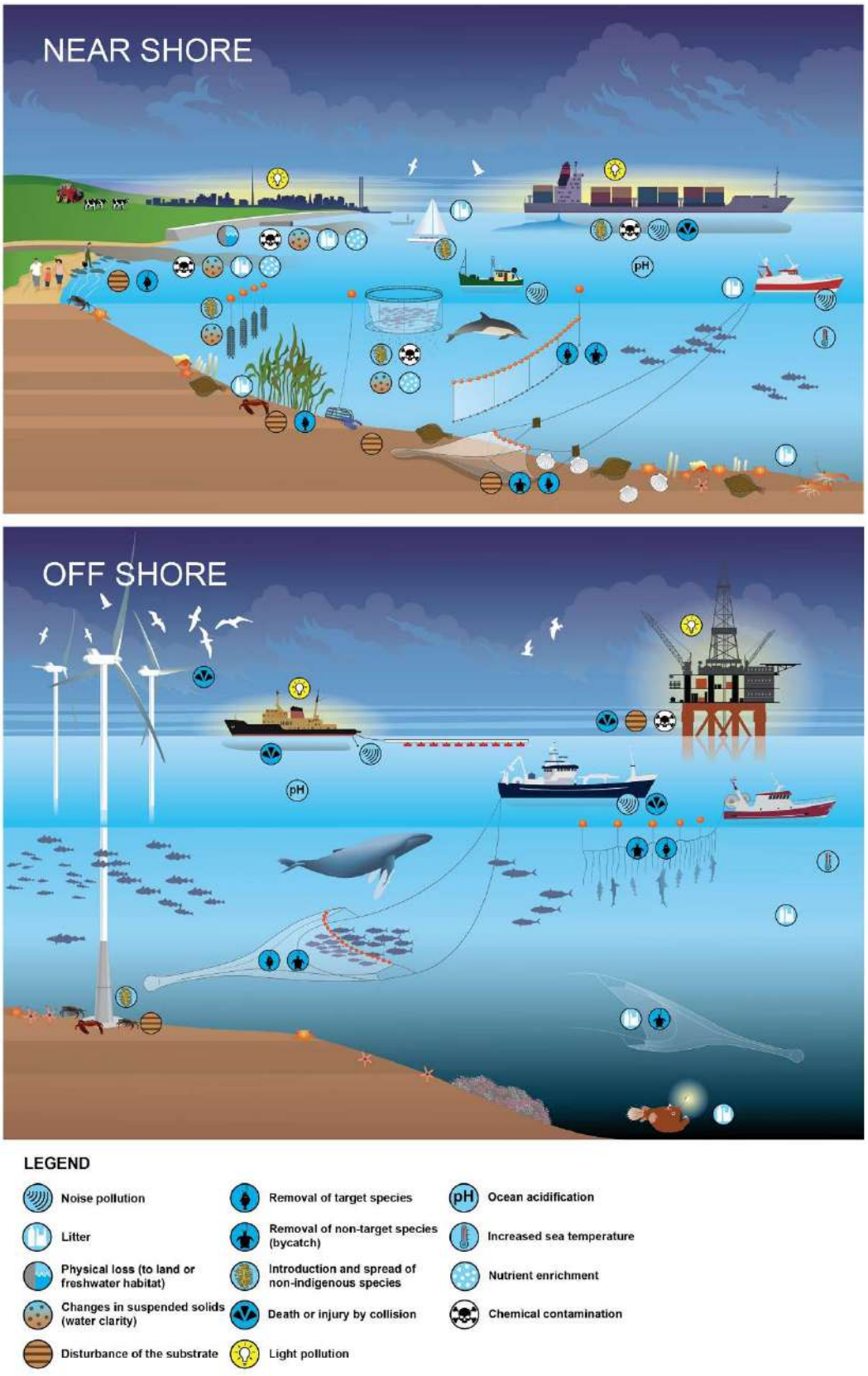


Figure 1.5 – An illustration of some of the human activities which take place in the marine environment and the potential pressures which result from them. This illustration is indicative of potential pressures and is not intended as a comprehensive account of all pressure-activity relationships. More detail is provided in Table 4.1.

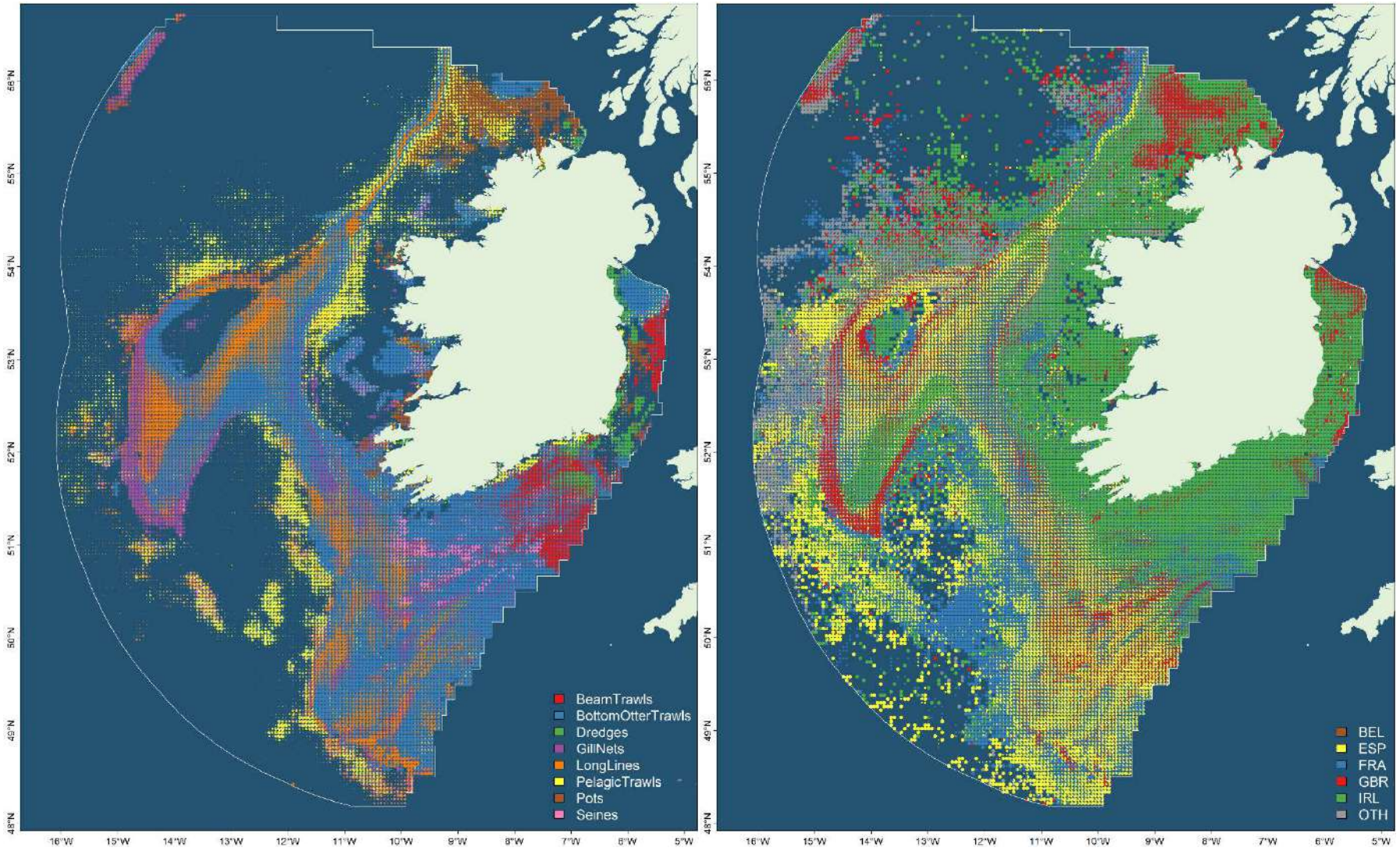


Figure 1.6 – Distribution of international commercial fishing activity in Ireland's EEZ 2014-18, vessels over 12m in length only. (a) By fishing gear. Bottom otter trawlers account for the majority (57%) of fishing effort inside Irish EEZ. (b) By country. Ireland is responsible for 45% of international fishing effort inside Irish EEZ followed by the UK (21%), France (18%), Spain (14%), Belgium and Germany (<1%). The vast majority of fishing effort (77%) by Irish vessels takes place within Irish EEZ.[35]

Development of infrastructure and coastal engineering cause changes to local habitats, often replacing them with surfaces and structures that are less suitable for biodiversity than natural habitats. Port development leads to oil and diesel leakage. Offshore, the placement of structures such as oil and gas rigs, and renewable energy devices, causes small scale habitat changes or loss and may also be associated with chemical contamination or disruptive electromagnetism. Deep-sea ocean mining for rare metals, if implemented, is likely to be particularly detrimental, destroying habitats, causing disturbance, and heavily increasing sediment loads.

Noise pollution in the marine environment is generated by shipping, offshore construction activities, and seismic surveying for oil and gas exploration, and can have significant effects on marine species.

A range of human activities, particularly commercial shipping and recreational boating, also facilitate the spread of non-indigenous species, some of which become invasive and can cause significant impacts to ecosystems and to activities, such as aquaculture, tourism and recreation. Examples present in Ireland include the naturalised Pacific oyster (*Magallana gigas*), the seaweed *Sargassum muticum* and the sea-squirt *Didemnum vexillum*.

The marine environment is also affected by land-based activity such as agriculture, forestry, marine aquaculture. Coastal development increases the amount of land-based pollution entering the ecosystem and has done so over the last century through sewage and wastewater. Much land-based pollution enters the ocean via rivers, leading to increased sediment loads, nutrient loads, introduction of contaminants such as pesticides, and inorganic and organic pollutants, including endocrine disruptors. Increased nutrient loading can lead to hypoxia and harmful algal blooms, while persistent organic pollutants can concentrate up the food chain, affecting higher predators such as fish, marine mammals, and seabirds. Some land-based pollution, e.g. litter including plastics, reaches the open ocean and deep sea. Light pollution is greatest near the coast, although it is also produced by ships and offshore installations.

1.1.4.2 Global pressures

The pressures associated with climate change are broad and far reaching and can add to, compound or modify the effects of local and regional pressures. Globally, changing climate can alter ocean currents, affecting local upwellings and thus the availability of nutrients, and changing temperature and salinity regimes, making habitats less or more favourable to certain species, and consequently changing the dynamics of the ecosystem.

In line with global warming trends, Irish waters have warmed, and are predicted to continue to do so. This rise is estimated as 0.3-0.4 °C since the 1980s and greater in the Irish Sea (0.6-0.7 °C). Increased ocean warming will strengthen the density stratification in shelf seas, in which less dense water sits above denser water, creating a stronger barrier to vertical movement and exchange of properties (nutrients, oxygen). The physiology, metabolism, growth and reproduction of all species is affected by environmental temperature. As such, species distributions are expected to change as a result of ocean warming. Species now at the southern end of their range in Irish waters may disappear from Irish waters. The recruitment of cod for instance is already more successful now in Norwegian waters than it is in Irish waters or in the southern North Sea where it once flourished. Species at the northern end of their range in Irish waters, such as hake, will increase in abundance. Changing temperatures may also allow new diseases to flourish.

Warming global temperatures lead to increased storminess and precipitation. This can disturb coastal habitats and alter freshwater and sediment input to coastal ecosystems, changes in precipitation may lead to seasonal changes in freshwater input, and less saline coastal waters. Increased nutrient input may lead to 'nutrient pollution' or eutrophication. Enhanced algal productivity associated with increased nutrient supply, combined with the global surface warming, may lead to hypoxia reduced oxygen levels in the lower layers of coastal waters harmful to resident fauna, which is becoming increasingly widespread on a global scale.

Ocean waters have absorbed a significant proportion of the anthropogenic CO_2 produced and as a result the carbonate chemistry of the ocean has changed and the acidity of the ocean has risen (lower pH), with potential impact on organisms that create calcium carbonate shells and skeletons, such as cold-water corals and molluscs, and further impact on the metabolism of organisms through hypercapnia (elevated CO_2 in body fluids). Irish ocean pH has fallen by 0.01 per decade in deep waters with the fall predicted to quicken depending on future atmospheric CO_2 concentrations, and by 0.02-0.05 units in surface waters.

Climate change can also have marked effects in the coastal zone through sea level rise. Sea level rise has been hard to quantify for Ireland but would appear to be rising in recent times by about 3.5 cm per decade.

Atmospheric pollutants that are not linked to climate change *per se* have decreased the thickness of the ozone layer in temperate latitudes, and the level of UV radiation to which marine organisms residing in the upper layers of the ocean are exposed is now higher.

1.1.4.3 Multiple pressures

In a given area, multiple overlapping pressures can result from the combination of different local, regional and global pressures (Appendix E). Where multiple pressures co-occur, their cumulative or combined effects on populations and ecosystems can be additive (equal to the sum of the effects of the individual pressures), dominant (primarily driven by one of the pressures), antagonistic (less than the sum of the effects of the individual pressures) or synergistic (greater than the sum of the effects of the individual pressures). The occurrence of these different outcomes varies among pressure combinations, concentrations/intensities, timings and contexts,[36] and can be difficult to predict, particularly when more than two pressures combine.[37]

Key messages

- In deriving benefits from our marine environment, society also imposes a wide range of pressures on it, including through fishing, aquaculture, coastal development, energy infrastructure, pollution and introduction of invasive species.
- Multiple local pressures combine with the global pressures of climate change and ocean acidification in complex ways to cause impacts on marine ecosystems.

1.1.5 Impacts of pressures and the status of Ireland's marine environment

1.1.5.1 Historical context and shifting baselines

When assessing the status of Ireland's marine environment under the influence of the pressures described above, we need a baseline against which to compare. However, this is complicated by shifting baselines, a concept which has become well-established in recent years, and it is clear that the threshold of what we consider to be a 'normal' ecological condition is being constantly lowered. The gradual but apparently inexorable change in accepted norms is due to people's lack of experience of earlier ecological conditions, and the lack of widely available information on past conditions. This effect is known as Shifting Baseline Syndrome.[38]

Aspects of our marine ecosystems are so changed that it is difficult to conceptualize. For example, in the 1980s, biomass estimates from the Atlantic coast of Canada were compared to historical information, which indicated that the fish and other exploitable organisms were, at that time, a mere 4-10% of what they had been 200 years previously.[38,39] The seabird nesting sites were 3% of what they once were, probably reflecting the collapse of the marine food chain on which the birds relied.[39] This was the 1980s normal. Since then, scientists have embraced a diversity of data sources to build a picture of historical ocean biodiversity and abundance, using historical fisheries records to delve into the near past, and archaeological and palaeontological data to extend knowledge even further back.

For marine mammals, examples of drastically changing population sizes include northern right whales, of which fewer than 400 survive today, compared with an estimate of 10,000 individuals around 1000 AD when whaling began. Similar population declines have been seen in North Pacific gray whales which were at 5-10% of their original abundance by the start of the 20th century, North Atlantic humpbacks which were estimated at between 2 and 20% of their original abundance by the 1920s, and even sperm whales, whose abundance had declined to 25% of original by the 1920s.[40] Even knowing the scale of this change, it is difficult to imagine quite how rich the seas were.

Fisheries began very early. By the 10th century there are records from several parts of Europe of fishers selling their produce.[41] There are thought to have been 30 times more Atlantic cod in the 1800s than there are now,[40] and it is thought there would be 100 times more large fish in the North Sea in the absence of fishing pressure.[40,42] Ireland was no different, there is evidence of expanding fishing activity around Ireland's coasts from the 11th century, which expanded further during the 14th century. There were fisheries for hake, herring, cod and haddock among others which exported to England. Shellfish were consumed locally including mussels and oysters. By the 15th century, fish were Ireland's main export. Documents from the early 16th century include complaints that Breton vessels were overfishing the salmon, herring, ling and hake, reports of 600 English vessels fishing herring in Carlingford, and more than 600 Spanish vessels fishing off the Irish Coast.[43] At the start of the 17th century King James I declared that foreign vessels required a licence from the king to keep Dutch vessels out of the mackerel fishery around Britain and Ireland.[44] Anecdotal evidence from later in the century suggested that hookers in Kinsale had their mackerel catches of 3000-4000 fishes a day severely depleted by the presence of 200 to 300 foreign vessels.[44]

Removal of target species can also affect the composition of marine communities. A comparison of the biodiversity seen in scientific surveys in the North Sea at the beginning and end of the 20th centuries showed filter-feeding bivalves declined in this period while scavenging and predatory crustaceans, gastropods and sea stars increased.[45] Elsewhere it has been shown that long-term dredging has caused communities dominated by sessile emergent fauna to be replaced by smaller infauna.[46] In many cases, we simply do not know what the ecosystem looked like pre-fishing, which in Europe mostly means at least pre-Medieval, but we do know it was likely profoundly richer and often quite different in composition.

A global study which reconstructed change in 12 seas and estuaries across Europe and North America showed that many wetlands, seagrasses, and other aquatic vegetation were lost before 1900, along with their ecosystem services: provision of nursery habitat, coastline protection, nutrient and sediment sinks.[47] The loss of the filtering and buffering services provided by these habitats contributed to eutrophication in the 20th century, acting synergistically with increased nutrient and sediment loads from land-based activities such as deforestation and farming, to change coastlines from their rich and productive baseline.[48] However, with shifting baseline syndrome, it is not always easy to recognize the magnitude of this change. Some key species act as 'ecosystem engineers', creating three-dimensional structures which provide habitat for other species and ecosystem services such as improving water quality, modifying hydrodynamics, providing shelter and substrate, acting as a carbon sink, and increasing biodiversity. Good historical data on the various marine ecosystem-engineer habitats is often lacking, especially where they were considered commercially unimportant, but these habitats tend to be very sensitive to human activity and are often slow to recover from impact.[49]

The European oyster (*Ostrea edulis*) is one such species, which once had an extensive distribution across much of the North Sea and other coastal areas, but was fished to functional extinction by the end of the 19th century, and by the 1940s, beds of wild oysters were rare in Europe.[50] The impact of 19th century fisheries on native oysters can been seen in records from Strangford Lough.[51] In the early 1800s, as many as sixty boats were each dredging between 600 and 3,000 oysters per day in Strangford. At this point, oysters had already been harvested in this region for hundreds of years – oyster middens from the late Mesolithic through to the early Medieval period have been excavated on the shores of the Lough. By the 1870s there were fewer than 20 boats, each catching fewer than 200 oysters per day. Within 30 years of that, the Strangford Lough oyster beds were gone, a pattern that was repeated throughout Ireland and Europe, with the accompanying loss of ecosystem services and biodiversity.[51] In cases such as these where ecosystems are so degraded that recovery is unlikely even when pressures are removed, it may be necessary to assist in the recovery process – this is known as ecosystem restoration. Oyster restoration projects are ongoing in Ireland, although we are still far from the bountiful reefs of the 18th century and before.

In summary, our baseline for almost every marine habitat has shifted, and we must be cognisant that the ocean's historical baseline is very different from that with which we are familiar.

1.1.5.2 Current status of Ireland's Marine Environment

As described in Section 1.1.4, Ireland's marine environment continues to be subject to numerous pressures, with a mixed picture emerging of the cumulative impacts of these pressures on the marine environment and its ecological components. Our knowledge of the

current status of Ireland's marine environment is patchy and incomplete. Periodic reporting required by EU Directives and international agreements (set out in Section 1.2), has progressed monitoring and assessment of the status of marine biodiversity, but does not present a comprehensive picture and there are many unknowns remaining (the most recent assessment reports are synopsised in Appendix E).

Commercially exploited fish stocks are improving in status as fishing mortality is reduced to re-build or maintain higher productivity.[29] Nevertheless, there are many species where the status is unknown and there are critically endangered species, such as Porbeagle, Angel Shark, Blue Skate, Flapper Skate White Skate, which are vulnerable to by-catch mortality.[52] The status of forage fish species (herring, sprat, sand eel), which are important prey for top predators such as marine mammals and seabirds, is either poor or unknown. Herring stocks have declined severely in recent years due to recruitment failure. The EU deep-sea access regulation[53] now protects many deep-water fish species below 800 m depth and indirectly habitats below these depths. Measures continue to be developed in the 400-800 m depth zone.

Populations of marine mammals (cetaceans, seals) are generally in favourable condition as are most seabirds. Surface feeding seabirds, however, such as kittiwake, are declining.[54] The most frequently identified pressures for breeding seabirds include the potential impacts of climate change on foraging habitats, offshore wind energy, fishing industry impacts on prey species and incidental bycatch, as well as mammalian predation, recreational disturbance, and plastic waste. Overwintering waterbirds, utilising mainly intertidal mud and sand flat habitats on Irish coasts, are showing catastrophic declines in numbers.[55] The most significant pressures and threats identified for individual waterbird species appear to be related to climate change and changes to migration patterns. However, energy production (e.g. wind farms), bycatch, hunting, recreational and other disturbance, shellfish harvesting and aquaculture, as well as water pollution may also affect waterbird populations.[56] Physical disturbance of the seabed by fishing is widespread, occurring in 13% of Ireland's maritime area,[56] although the impact of this disturbance depends on the sensitivity of receiving habitats and species and the intensity of bottom fishing activity. High levels of bottom fishing activity in mud and sandy-mud habitats and the low resilience of resident organisms may make these habitats particularly vulnerable. Emergent epifauna such as sea pens, sea fans and cold-water corals are also highly sensitive to such disturbance. Recent reporting on the subset of habitats mapped and assessed under the EU Habitats Directive, shows that many are in an unfavourable condition.[57–59]

Water quality is problematic in some coastal areas due to eutrophication caused by nutrient run off from land and from wastewater. The majority of coastal waters (80%) are in high or good ecological status, compared to the European average of 55%, probably reflecting the generally exposed natured of Ireland's coastal habitats as compared to the more sheltered estuaries. Transitional waters (estuaries and lagoons) had the poorest quality of all water bodies, with only 38% in good or better ecological status.[60] They are under pressure from Phosphorous (31%) and Nitrogen (16%) inputs from human activities in catchment areas, even after many years of reductions. The level of contaminants in edible tissues of seafood caught or harvested in the wild is regularly monitored, and between 2012-2017 showed a high level of compliance with the maximum allowed limits.[56] Low levels of contaminants in shellfish indicate that such contaminants are at a low level in the marine environment generally.

Underwater noise can cause physiological stress and affect the behaviour of marine animals, impacting key life functions such as mating, foraging, or migrating. These impacts have been studied most extensively in marine mammals, but there is still great uncertainty on what

population level effects noise pollution might have. Levels and intensity of impulsive noise in Irish waters, generated from seismic surveys for instance, was reported to be low over an assessment period between 2016-2018.[56] Marine animals may also be impacted by continuous low-frequency noise generated by human activity, but work to develop methods to assess the impact of this at a European level is ongoing.

Litter, mainly plastics, is an increasing concern in the marine environment. Impacts on seabirds especially are now well known. Seabirds can ingest plastic, become entangled in it, use it as nest material and feed it to chicks. In Irish waters for instance over 90% of fulmar have ingested plastic. Surface feeding seabirds, which are also declining, are more vulnerable in this respect. Evidence is also emerging that there may be much further-reaching effects on species and ecosystems and this is a very active area of research.

The pelagic marine environment is being altered by climate change. Temperature, salinity, pH are changing and associated changes in ocean currents will have significant effects on marine pelagic communities and their distribution. Ireland's marine foodwebs are changing but the extent to which they are being affected by human activity is unknown.[56] Marine foodwebs are driven by primary (phytoplankton) and secondary production (zooplankton) and ecosystem modelling now clearly shows the relationship between these ecological components, fish stocks and top predators. Future human use of the marine environment will need to adapt to changes occurring now in the marine food chain and enable as best we can marine communities to adapt their distribution.

The status reports on Ireland's marine environment show that many species and habitats remain under significant pressure. Further work to manage the impacts of human activities is needed. One essential way of mitigating pressures from human action and enabling marine ecosystems to adapt to future climate-driven changes is through an expanded network of MPAs.

Key messages

- Over the past centuries and decades, ecosystems have been impacted to a degree that can be hard to conceptualise. Their continuing degradation changes our perception of what constitutes a 'normal' ecosystem.
- Although much of Ireland's marine environment is in comparatively good condition, many species, habitats and ecosystems are in decline and continue to be threatened.

1.1.6 Area-based and other approaches to conservation

In view of the wide range of pressures and threats to biodiversity and the level of degradation of many ecosystems, environmental management require the combination of a range of approaches. These can be broadly classified as species-based, sector-based, pressure-based, ecosystem-based and area-based. Species-based forms of protection relate to individual species wherever they occur. Activities that might harm such species can be prohibited, or risk of harm can be mitigated through modifying the activity throughout the range of these species. Sector-based approaches deal with individual sectors, such as fisheries, aquaculture, or mining, in isolation from other sectors. For example, fisheries management may involve imposing restrictions on total catch of a particular species, by limiting the size of fish that can be taken or by limiting fishing effort. In general, projects, plans, and sectors can be subject to review and restriction through planning and consenting systems. Pressure-based approaches include strategies to limit pollution by particular chemicals or prevent spread of invasive species, for example, through regulations and other measures that may encompass a range of sectors and activities.

Ecosystem-based approaches consider the whole ecosystem and the range of species, sectoral activities and pressures simultaneously. Ecosystem approaches in the marine environment would consider the linkages between different ecosystem components such as food chain effects of fishing or cascade effects where, although activities might directly affect only one component or even one species in the system, there are consequential effects on others. These different approaches are not necessarily area-based, though they may include area-based components.

In area-based approaches, activities are restricted within a specified geographical area in order to meet stated objectives. Area-based approaches to environmental management encompass a range of measures, for example including fisheries closure areas and/or areas designated for renewable energy or cultural heritage. All of these may contribute to conservation but are not necessarily Marine Protected Areas (MPAs). **MPAs are a particular class of area-based approach with specific defining features (see Section 1.1.6), with a primary focus on conservation and recovery over the long term.** Conservation can involve a strategic focus on species or habitats selected for a range of reasons, for example targeting those that are rare or threatened, emblematic (e.g. to raise conservation awareness[61] or important for ecosystem functioning).[62]

As described above, either as a stand-alone sectoral approach or as part of ecosystem-based approaches, the activities of different sectors are subject to national or regional management, which can limit the pressures they impose and benefit species, habitats and ecosystems. Although conservation of a natural resource impacted by a sectoral activity may be achieved, the sector by sector approach to management has a number of potential weaknesses. For example, as sectoral activities are assessed separately (and potentially narrowly), declines in environmental quality may be missed. Missed impacts may also occur if some sectoral activities are not assessed or otherwise have an impact that is not recognised. Poor monitoring and survey budgets in the past have hampered understanding of impacts. The cumulative impacts of different sectors can be difficult to identify or assess. As sectoral assessments are based on impacts, they are not focussed on climate change resilience or the prospect of recovery.

The shortcomings of a sector-by-sector approach have been recognised in the development of marine spatial planning (MSP) as a means to better coordinate sustainable use of the ocean. Fisheries management also now includes a broader perspective (Ecosystem-Based Fisheries Management or EBFM). Rees et al. (2020) argue that the benefits and unique features of an area-based approach to management should be integrated into these wider governance frameworks to develop synergies that benefit both nature and society.[63]

Protected areas will be most effective when the ecological features that are to be protected are local and spatially persistent and where lists of species typically associated with protected habitats can also help to orientate effective management. In such cases local pressures and impacts can be appropriately managed. The spatially explicit nature of protection may also allow localised conservation benefits to spread more easily across species and habitats than is the case in broad scale sectoral approaches (e.g. single stock management in fisheries). Protected areas also offer the prospect of directed efforts to restore species and habitats, and the achievement of true unimpacted baselines which can be used as a benchmark for conservation reference points elsewhere. Protected areas are a fundamental component of conservation strategies since they usually form an integral part of both species-based approaches and ecosystem-based approaches. Particularly when used in conjunction with other approaches, they can effectively buffer the range of impacts of human use of the environment.

Where habitats are particularly degraded, reduction of pressures to allow recovery may not be sufficient and the option is available to actively intervene to restore the habitat, a solution being endorsed through UN Decade on Ecosystem Restoration which starts next year. Approaches to restoration can take many forms, including engineering the environment to change physical conditions, for example to alter the flow of fresh or salt water into a coastal lagoon, or biological interventions, for example re-planting salt-marsh vegetation. Such approaches can only work well if the pressures causing the original decline are also removed. As such, MPAs present a good opportunity for effective restoration projects.

Key messages

- Area based protection has a fundamental role to play in environmental management and conservation in combination with or as part of species-based, ecosystem-based and other approaches.
- Marine Protected Areas (MPAs) constitute a particular sub-set of area-based approaches to conservation.
- MPAs can enable protection, recovery and restoration of species, habitats and ecosystems.

1.1.7 What is a Marine Protected Area (MPA)?

The concept of what constitutes MPAs has developed over time in parallel with changes in environmental research and policy. As different governments and international organisations have designated protected areas in the marine environment, a plethora of different terms and types of MPA designation have been developed.

Broadly speaking, Marine Protected Areas (MPAs) are marine areas that are protected and managed over the long term, with a primary objective of conserving habitats and/or species. As such, they are distinct from protected areas established primarily for fisheries management or other purposes, though the terminology used can overlap. Widely used terms include 'parks', 'reserves', 'sanctuaries', 'refuges', 'monuments' and 'no-take zones' and attempts have been made to propose a universal definition. For example, the International Union for the Conservation of Nature (IUCN) defines a protected area as:

"A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values".

In practice, the definition of Marine Protected Areas varies between different protected area guidance documents and legislative instruments. These are presented alongside relevant legislation in Section 1.2.1 and summarised in Table 1.7. The criteria most commonly used for defining MPAs in policy and practice have been identified by Humphreys and Clark (2020) as:

- A geographical area of marine character or influence with defined boundaries including both water column and benthic components,
- Which is protected through legal or other means,
- For the purpose of conservation of specified features or systems, and
- Managed with the intention of achieving a higher level of protection than that of the surrounding area.[64]

Within these criteria, MPAs can differ substantially in their level of protection. In 1994, the IUCN established a categorical system that could be applied to both terrestrial and marine protected areas, with categories assigned based on management objectives (see Box 1 for more details). There is debate around the use of these categories considering more recent thinking on ecosystem-based approaches to conservation,[64] but they continue to be widely used and must be specified, for example, when reporting MPAs under the OSPAR Convention (see Section 1.2.1.3).

More recently, 'The MPA Guide' has identified the stage of establishment and maintenance and the level of protection as key in determining the likely conservation outcome of an MPA.[65] MPAs may be ranked on a four-point scale from 'minimally protected' with extensive extraction allowed to 'fully protected' with no extractive or destructive activities allowed[65] Four sequential stages in the multi-step process of MPA establishment are identified, starting with (1) MPA site proposal, through (2) designation, then (3) implementation, before ending at (4) an actively managed MPA with demonstrable monitoring, evaluation, management, and conservation outcomes. While each stage of MPA establishment is an essential part of the process, no conservation benefits will be attained until the MPA is implemented (Stage 3).[65]

Box 1: IUCN Protected Area categories

The International Union for Conservation of Nature (IUCN) is a membership union made up of government and civil society organisations which provides policy advice and guidance on nature conservation and sustainable development. The IUCN World Commission on Protected Areas (WCPA) publishes expert advice on the establishment and effective management of a network of protected areas, both marine and terrestrial.

The IUCN defines a protected area as:

"A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values."

For an area to be recognised as an MPA by the IUCN it must meet this definition. The IUCN recommends that protected areas should also meet the following standards:

- Conservation focus with nature as the priority
- Defined goals and objectives which reflect those values
- Suitable size, location and design that will enable conservation of values
- Defined and agreed upon boundary
- Management plan or equivalent
- Resources and capacity to implement

IUCN protected area management categories

MPAs can range from fully protected no-take areas, to areas that allow for some multiple uses, depending on the conservation objectives the MPA has been designated to achieve. MPAs may also be zoned, so that they contain a mix of no-take areas, and zones which allow certain activities. However, the primary objective of an MPA must be conservation of biodiversity.

The IUCN have identified seven categories of protected area, which fall on a spectrum of protection levels and are applicable to both marine and terrestrial protected areas. **Categories are applied based on the stated nature conservation objectives of an MPA.**

IUCN Category		Main objective or purpose
Ia	Strict nature reserve	Strictly protected for biodiversity and also possibly geological/ geomorphological features, where human visitation, use and impacts are controlled and limited to ensure protection of the conservation values
Ib	Wilderness area	Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition
II	National park	Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities.
III	National monument or feature	III Natural monument or feature: Areas set aside to protect a specific natural monument, which can be a landform, sea mount, marine cavern, geological feature such as a cave, or a living feature such as an ancient grove
IV	Habitat/species management area	Areas to protect particular species or habitats, where management reflects this priority. Many will need regular, active interventions to meet the needs of particular species or habitats, but this is not a requirement of the category
V	Protected landscape or seascape	Where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values
VI	Protected areas with sustainable use of natural resources	Areas which conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims

Where protected areas are zoned, the category should be based around the primary management objective(s), which should apply to at least three-quarters of the protected area. Different zones within a multiple-use MPA may have different categories provided that the zones are clearly mapped, that the zones are recognised by legal or 'other effective means', and that each zone has distinct management aims (Laffoley et al. 2019).[140]

Summarised from Day et al. (2019).[242] Please see the following report for more information:

Day et al. (2019) *Guidelines for applying the IUCN protected area management categories to marine protected areas*. https://portals.iucn.org/library/node/48887

1.1.7.1 What is an MPA network?

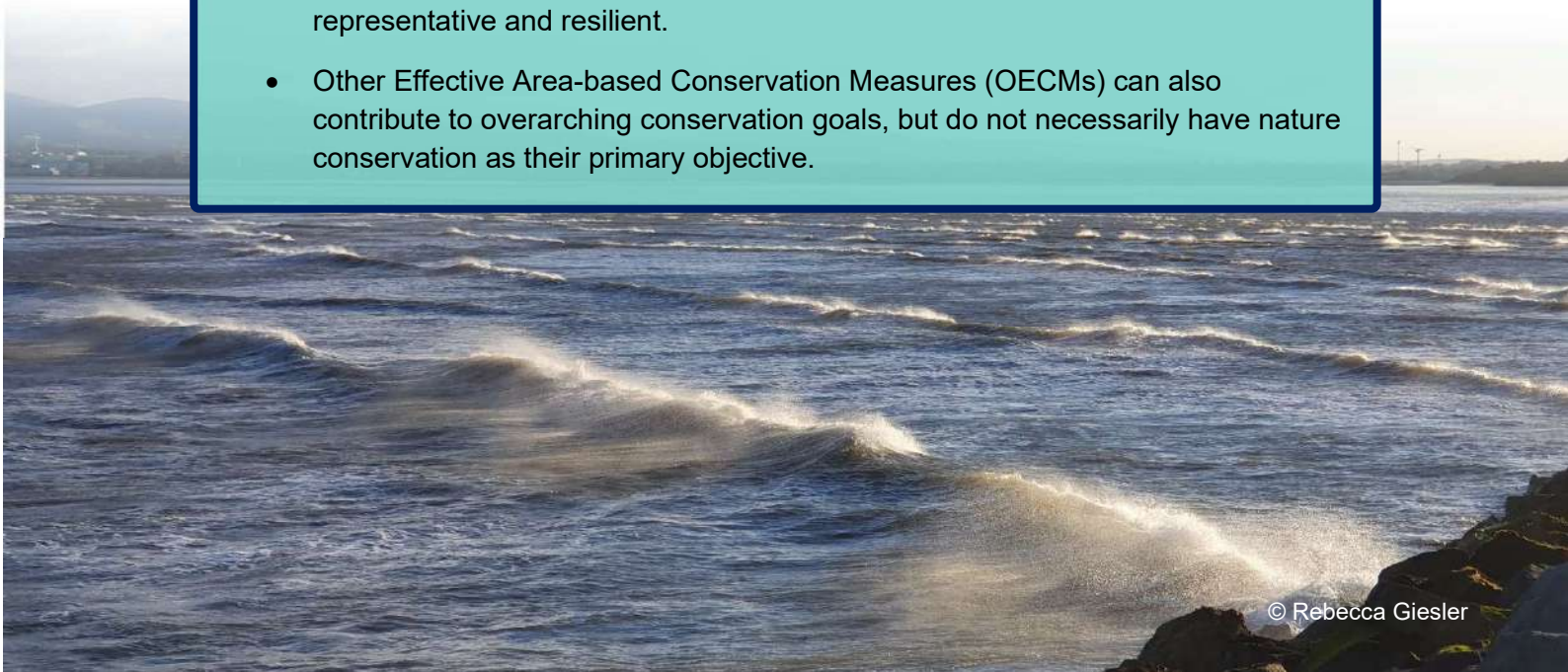
Individual MPAs are often intended to form part of a network. An MPA network is essentially a collection of individual non-contiguous sites among which there is some degree of connectivity driven by ocean currents or through behaviour of migrating organisms. Such networks act to conserve the range, distribution and genetic diversity of species or may variously support different life history stages of species or act as stepping-stones and refugia for migrating species. IUCN (2008) define an MPA network as "a collection of individual MPAs or reserves operating cooperatively and synergistically, at various spatial scales, and with a range of protection levels that are designed to meet objectives that a single reserve cannot achieve The network will also display social and economic benefits, though the latter may only become fully developed over long time frames as ecosystems recover". Considerations around the objectives and design of networks are complex and varied. The coherence, connectedness, representativeness, and resilience of the network are important criteria. These are discussed in more detail in Section 3.1.1.

A network may be defined at a number of scales, including at a national level but also at regional (EU or regional sea) and international level, such that several nations cooperate to establish an overarching network in which consideration is given to the overall network properties of the combined pool of protected areas from contributing nations. The Natura 2000 network and the OSPAR network are examples of this (see Section 1.2).

An MPA network can itself contribute to a wider network of areas which bring conservation benefits, including, for example, sites classified as Other Effective Area-based Conservation Measures (OECMs). These are sites which are not primarily managed for nature conservation but which still contribute to the long-term area-based conversation of marine biodiversity (see Box 2).

Key messages

- MPAs have a range of definitions but can be thought of as long-term area-based designations with conservation as their primary objective.
- Different activities may be permitted or restricted in different MPAs, depending on their specific conservation objectives.
- Individual MPAs may combine to form a network, which may be characterised as regional, national, or international and should be coherent, connected, representative and resilient.
- Other Effective Area-based Conservation Measures (OECMs) can also contribute to overarching conservation goals, but do not necessarily have nature conservation as their primary objective.



Box 2: Other Effective Area-based Conservation Measures (OECMs)

Formal protected areas are not the only area-based measures which deliver conservation outcomes. A variety of spatial management tools are used by coastal communities and indigenous people to help use ocean resources sustainably or conserve marine features. Some of these also provide significant biodiversity conservation benefits. Areas managed for renewable energy or to protect cultural heritage sites, or spatial measures introduced to ensure the sustainability of a fishery, can also deliver biodiversity protection. For example, the strict protection of historical ship wrecks in Scapa Flow in Orkney also provides a high degree of protection to the benthic ecosystem, allowing maërl beds, flame shell beds, horse mussel reefs and fan shells to thrive (IUCN, 2019).

Other Effective Area-based Conservation Measures (OECMs) are managed areas in which effective in-situ conservation is achieved but is not the primary objective. This may also include sites managed for conservation that do not have official protected area status.

In October 2010, the tenth Convention on Biological Diversity (CBD) Conference of the Parties adopted the Strategic Plan for Biodiversity 2011-2020 and 20 Aichi Biodiversity Targets (CBD Decision X/2). A target on protected areas was included, to help achieve Strategic Goal C, "improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity."

Aichi Target 11 recognises that areas outside of traditional protected areas may be managed in such a way as to result in effective biodiversity conservation. It states:

"*By 2020, at least 17 % of terrestrial and inland water areas and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.*"

Interpretation of what qualifies as an OECM varies. In order to provide clarification, the CBD 14th COP adopted a definition, guiding principles, common characteristics and criteria for the identification of OECMs in November 2018. OECMs are defined as:

"A geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity with associated ecosystem functions and services and where applicable, cultural, spiritual, socio-economic, and other locally relevant values." (CBD Decision 14/8).

The main distinguishing criterion between a protected area and an OECM is that the primary objective for protected areas ***must be*** nature conservation, whereas OECMs may have other primary objectives, such as the restoration of a sustainable fishery or the conservation of historic features, but also deliver effective in-situ conservation of biodiversity.

Dudley et al. (2018) state that "OECMs provide an opportunity to recognise and support existing efforts that already contribute to conservation, while respecting human rights and a diversity of worldviews and governance approaches. This includes those territories and areas conserved by indigenous people and local communities where the traditional owners do not wish to be within the protected areas system."

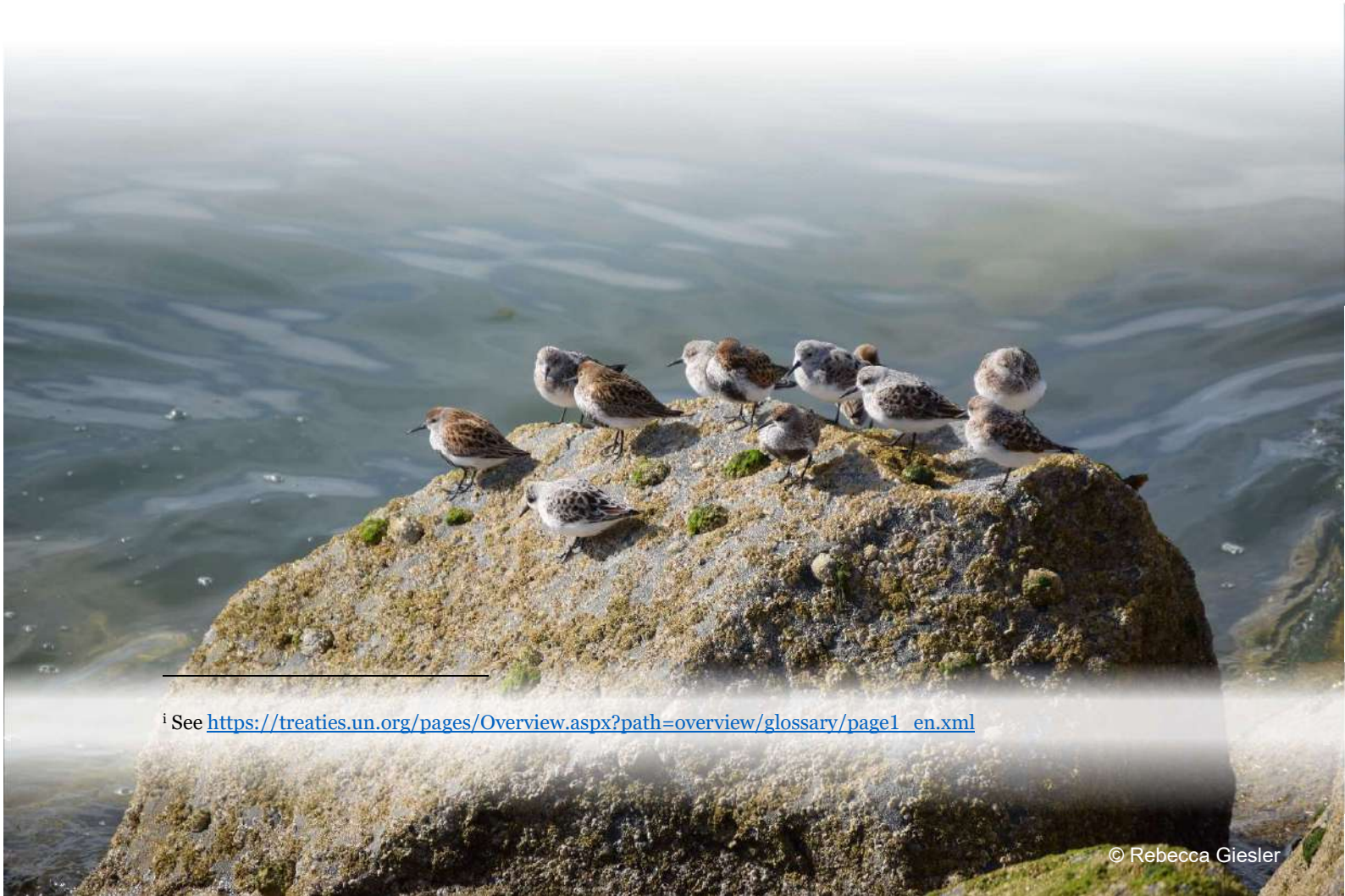
More information on OECMs is provided in the following report:

IUCN. (2019). *Recognising and reporting other effective area-based conservation measures*. IUCN WCPA Task Force on OECMs. https://doi.org/10.2305/IUCN.CH.2019.PATRS.3.en

1.2 Current protection of Ireland's marine environment

There are various international and regional agreements to which Ireland is a signatory that require the designation of MPAs and the implementation of appropriate management measures. International law is the term given to the rules which govern relations between States and includes treaties, conventions, custom and general recognised principles. It differs from national (domestic) law in that it primarily binds the country rather than individuals. Countries agree to be bound by such agreement through signature, ratification and accession.[i] In some countries, international agreements and treaties become part of national (domestic) law through ratification. In Ireland, international law does not become part of national/domestic law until incorporated in by Irish legislation. Ireland is a party to a number of international agreements including the UN Law of the Sea Convention and UN Convention on Biological Diversity (see below). In addition, there is a substantial range of other agreements and legislation that regulate marine activities and indirectly assist in the conservation of the marine environment. This includes international and regional agreements, EU legislation, and national legislation and policy. These can be categorised into regional approaches, species-specific approaches and activity-specific approaches.

The international legal and policy framework for the protection and conservation of the marine environment is composed of various sources such as international conventions (e.g. the UN Law of the Sea Convention/UNCLOS), customary law, soft law instruments (e.g. the Sustainable Development Goals and Agenda 21), multilateral environmental agreements (such as the Convention of Biological Diversity) and other global agreements on, for example marine pollution, as well as regional conventions such as OSPAR. Whilst the commitments deriving from these instruments may differ, there is commonality between them in that they address, encourage or require the use of MPAs or MPA-related concepts.



[i] See https://treaties.un.org/pages/Overview.aspx?path=overview/glossary/page1_en.xml

1.2.1 Agreements and legislation driving area-based protection

1.2.1.1 International agreements

Identifying and protecting important places to sustain species and habitats as well as nurture natural processes is not a new development. The first documented example of an MPA in the world was the Royal National Park near Sydney, Australia, which included regulations to protect a large tidal inlet and was designated in 1879. The Great Barrier Reef Marine Park, at 344,400 km^2, was the world's first large-scale MPA, designated in 1975 through site specific legislation. The world's first International Union for the Conservation of Nature (IUCN) congress on protected areas was held in 1962, and since then the need for protection of marine areas has been a consistent feature. The purpose of these congresses is to set the agenda for protected areas and assist national governments to create new protected areas.

The early 1970s saw the adoption of the Ramsar Convention on Wetlands of International Importance and the World Heritage Convention, both of which recognised the need for marine environmental protection through spatial protection measures. The 1972 Stockholm Declaration marked a turning point in terms of the development of treaties concentrated on the conservation of biodiversity and culminated in the launch of the Regional Seas Programme in 1974. The IUCN held its first international conference on MPAs in 1975 and called for the establishment of a system of MPAs that represented the world's marine ecosystems.

The UN Law of the Sea Convention opened for signature in 1982 (see below) and remains the key legal instrument governing seas and ocean spaces. In 1992 the UN Conference on Environment and Development adopted the Rio Declaration and Agenda 21. The latter called on coastal States to "undertake measures to maintain biological diversity and productivity of marine species and habitats under national jurisdiction".[i] They were also required to identify marine ecosystems "exhibiting high levels of biodiversity and productivity and other critical habitat areas and should provide necessary limitations on use in these areas, through, inter alia, designation of protected areas."[ii] Neither of these instruments are legally binding, but can encourage national action.

At the same time the UN Conference adopted the Convention on Biological Diversity (or Rio Convention) providing for both *in situ* and *ex situ* conservation of biological diversity. Parties are required to implement the Convention on Biological Diversity consistently with the rights and obligations of States under the Law of the Sea.

1.2.1.1.1 United Nations Law of the Sea Convention

The UN Convention for the Law of Sea (UNCLOS), opened for signature in 1982, established a legal framework for all activities in the ocean. The rights of coastal States to regulate and exploit sea areas under their jurisdiction are balanced with the freedom of navigation and access to resources outside State control. The Convention enables coastal States to establish several different maritime zones, which give coastal States different jurisdictional rights (Box 3). The Preamble to the UN Law of the Sea Convention explicitly lists the protection of the marine environment as one of its objectives. Articles 192 and 194 of the Convention place an obligation on States to "protect and preserve the marine environment" and to take measures

[i] Para. 17.7, Agenda 21 Available from: https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf
[ii] Para. 17.85, Agenda 21.

to protect and preserve rare or fragile ecosystems, as well as the habitats of depleted, threatened or endangered species and other forms of marine life. Due to the general nature of these provisions, they cannot be used as a legal basis for designation of MPAs in zones under national jurisdiction and in the EEZ.

Under the Convention, coastal States have responsibility for ensuring the long-term sustainability of living marine resources within the EEZ. Beyond this, on the high seas, States have a duty to cooperate with other States in adopting measures to manage and conserve living resources. These provisions were augmented by the 1995 United Nations Fish Stocks Agreement. This provides the legal regime for the conservation and management of straddling and highly migratory fish stocks. It establishes Regional Fisheries Management Organisations (RFMOs) as the key vehicle for cooperation between States. It also covers management of fishing capacity; prevention of Illegal, Unregulated and Unreported (IUU) fishing; and reduction of incidental catch of other marine species. The Fish Stocks Agreement entered into force on 11th December 2001 and was signed by both the EU and Ireland in 2003.

Box 3: UNCLOS Maritime Jurisdictional Zones

The UN Convention on the Law of the Sea (UNCLOS) sets out the rights and responsibilities of nations with respect to their use of the world's oceans. It also prescribes a number of maritime jurisdictional zones where coastal States have certain duties and responsibilities (Figure 1.7). Definitions of these zones can be found below.

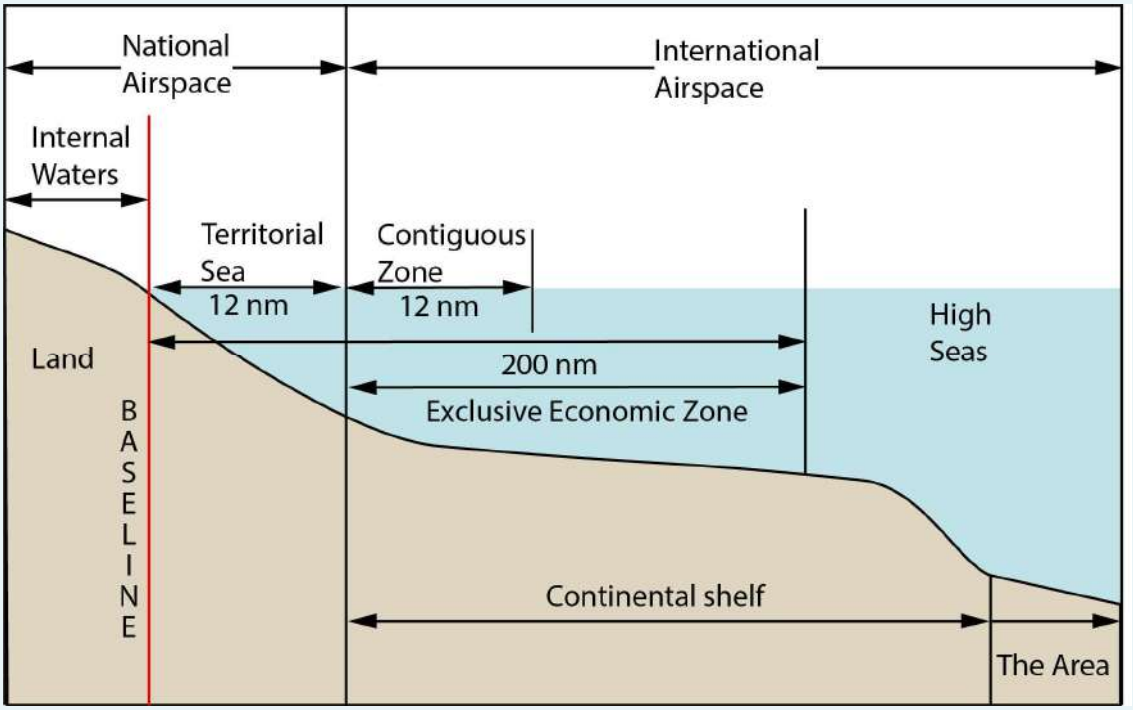


Figure 1.7 - Maritime zones established under the United Nation Convention on the Law of the Sea.

The zones are drawn from a "**baseline**", normally fixed at the Low Water Mark, except where the coastline is deeply indented, has fringing islands or is highly unstable, when a straight baseline system can be used, comprising of a straight line joining appropriate points. Ireland

uses a mix of normal and straight baselines in different areas of its coast, as specified in the Maritime Jurisdiction (Straight Baselines) Order 2016.

Internal Waters are waters on the landward side of the baseline. In this zone Ireland can make laws, regulate uses, and use any resource.

The **Territorial Sea** refers to an area from the baseline to a maximum distance of 12 nautical miles (nm). In this zone Ireland can also apply its laws, regulate use and use any resource subject to the right of innocent passage of vessels. Beyond 12 nm, there is a further 12 nm from the territorial sea, called the **Contiguous Zone**, where a coastal State can continue to enforce laws in relation to customs, taxation, immigration, and pollution.

The **Exclusive Economic Zone** is a unique zone that must be claimed by coastal States and extends from the outer limit of the Territorial Sea (12 nm) to a maximum distance of 200 nm. Within this area, the coastal State has sole exploitation rights over all natural resources. Other nations enjoy the freedoms of navigation and overflight, subject to the regulation of the coastal State.

The **Continental Shelf** is defined as the natural prolongation of the land territory to the continental margin's outer edge, or 200 nautical miles from the baseline, whichever is greater. It refers to the seabed and subsoil. A State's continental shelf may exceed 200 nautical miles until the natural prolongation ends, but it may never exceed 350 nautical miles. Ireland has sovereign rights over the continental shelf for the purposes of "exploring and exploiting its natural resources" (Article 77(1)). Natural resources refer to "mineral and other non-living resources" together with "living organisms belonging to sedentary species" (Article 77(4)). In exercising rights in the Continental Shelf, a coastal State must not infringe on navigation or other rights and freedoms of other States as provided for in the UN Law of the Sea Convention.

The ocean surface and the water column beyond the EEZ (or beyond the territorial sea in the absence of a claimed EEZ) is known as the High Seas. High seas are open to all States for freedom of navigation, freedom of over flight, freedom to construct artificial islands installation, freedom of fishing, and freedom of scientific research.

The seabed beyond 200 nm is known under the Convention as "the Area" and is considered "the common heritage of mankind". Non-living and living resources are treated differently in the Area. Non-living resources (minerals) are subject to a specified regime administered by the International Seabed Authority. Living resources, such as fish, can be exploited by any vessel from any State, though the Convention encourages regional cooperation to conserve those resources and ensure their sustainability for future generations.

Box 4: Ireland's Maritime Area

Ireland's Maritime Area currently refers to Ireland's internal waters, territorial sea, the Exclusive Economic Zone (EEZ) and in designated parts of the Continental Shelf. This Maritime Area represents the area to which the National Marine Planning Framework and the Marine Strategy Framework Directive will apply. However, while most maritime jurisdictional zones are drawn from the baseline, (Mean Low Water (MLW)), the Maritime Area under the NMPF will begin at the Mean High Water (MHW) mark. These zones represent the limits of Ireland's current jurisdiction in the sea (applicable to the seabed and subsoil only in the extended continental shelf beyond 200 nm) and cover an area of 488,762 km^2. On its own, Ireland's EEZ covers an area of approximately 426,872 km^2.

Ireland has made a number of claims for Extended Continental Shelf areas beyond 200 nm: in 2005 for the Porcupine Abyssal Plain resulting in 39,000 km^2 of additional seabed for Ireland; in 2006 a joint claim with the UK, Spain and France in relation to the Celtic Sea and Bay of Biscay area resulting in 80,000 km^2 for Ireland and in 2009 in relation to the Hatton-Rockall area, which is disputed with the UK, Denmark and Iceland and accordingly remains unresolved. Waters above the Irish Extended Continental Shelf areas are legally defined as High Seas.

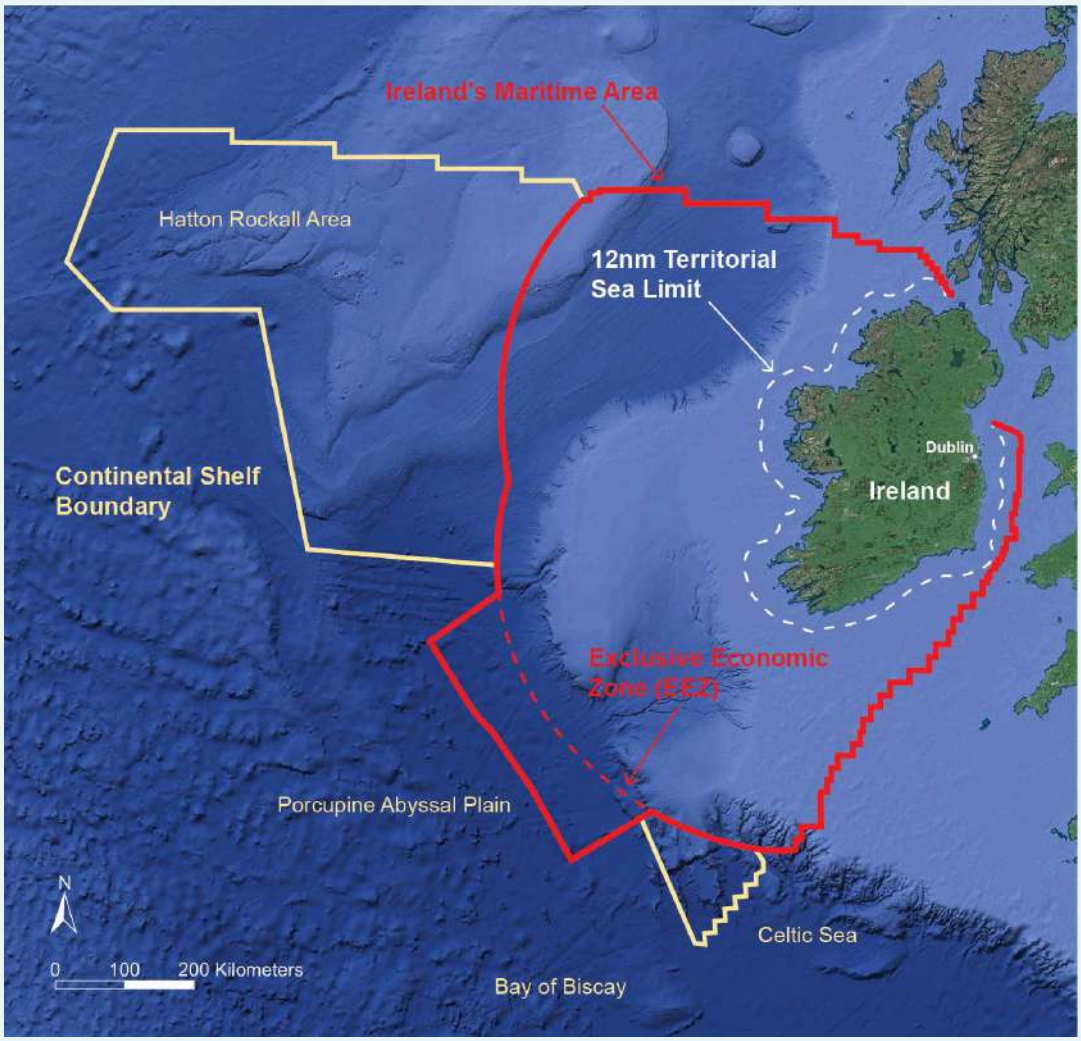


Figure 1.8 – Map showing the limits of Ireland's maritime jurisdictional zones and the boundary of Ireland's Maritime Area as described above. Yellow lines indicate boundaries of Ireland's claimed extended continental shelf area.

1.2.1.1.2 United Nations Convention on Biological Diversity (CBD)

Overview:

The Convention on Biological Diversity (CBD) was adopted in 1992, providing a global legal framework for the conservation of biodiversity. Ireland is a signatory to the CBD. The provisions of the Convention apply to components of biological diversity within the limits of national jurisdiction (Article 4). It also applies to processes and activities carried out under the control of Parties both within and beyond their national jurisdictions. The Convention calls for cooperation between its Parties, directly or through the appropriate international organisations to address areas beyond national jurisdiction for the conservation and sustainable use of biodiversity. Article 8(a) of the Convention provides that each Contracting Party shall establish *a system of protected areas or areas where special measures need to be taken to conserve biodiversity*. Article 2 defines a 'protected area' as 'a geographically defined area which is designated or *regulated and managed* to achieve specific conservation objectives.'

In 2004, the 7th Conference of Parties (COP) set a goal of creating marine and coastal protected areas that are "effectively managed, ecologically based and contribute to a global network", reflecting the view of the COP that MPAs were one of the essential tools for both conservation and sustainable use of marine and coastal biological diversity. The COP also agreed that such areas should include a range of levels of protection, encompassing both areas that allow sustainable uses and those that prohibit extractive uses (i.e. "no-take" areas). The COP adopted the target of developing such protected areas by the year 2012 (Decision VII/5 & VII/28) [i]. This was extended to 2020 by COP10.

A revised and updated Strategic Plan for Biodiversity, including the Aichi Biodiversity Targets, was adopted by COP10 in 2010. Aichi Biodiversity Target 11 calls on Parties to the CBD to achieve:

"By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes"

The requirement for the protected area system to be ecologically representative requires that protected area systems should contain "adequate samples of the full range of existing ecosystems and ecological processes, including at least 10% of each ecoregion within the country".

National waters represent 39% of the global ocean and at present, 17.22% of these waters are designated as protected areas. In contrast, only 1.18% of ABNJ, which makes up the remaining 61% of the global ocean, has been established as protected areas.[66]

Implementation in Ireland

Ireland's National Biodiversity Plan 2017-2021 sets out objectives and targets for conserving biodiversity in Ireland, and meeting commitments under the CBD and Sustainable Development Goals as well as the EU directives. Objective 5 is to conserve and restore

[i] https://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf

biodiversity and ecosystem services in the marine environment. Objective 6 is to expand and improve management of protected areas and species. Target 6.2 is for sufficiency, coherence, connectivity, and resilience of the protected areas network to be sufficiently enhanced by 2020 and details the ambition to expand MPAs and to ensure that protected areas are managed as a network.

There is an obligation to report on national progress towards meeting CBD Aichi Targets, which in Ireland is carried out by the National Parks and Wildlife Service (NPWS). The latest report[i] highlights the potential for climate change to induce changes in the distribution and status of mobile species. The historic legacy of over-fishing on the biodiversity of commercial fisheries, damage to benthic habitats from bottom trawlers, and problems with poor siting and management of aquaculture facilities are mentioned, with examples given of how recent changes in EU and national policy and management are working to address these issues.

1.2.1.1.3 Bonn Convention on the Conservation of Migratory Species of Wild Animals (CMS)

The Bonn Convention is an environmental treaty of the United Nations, which provides a global platform for the conservation and sustainable use of migratory animals and their habitats. It brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range. Migratory species that are threatened with extinction are listed on Appendix I of the Convention. CMS Parties are encouraged to strictly protect these animals, conserve or restore the places where they live, mitigate obstacles to migration and control other factors that might endanger them. Appendix II of the Convention lists the migratory species that need or would significantly benefit from international co-operation. Ireland has been a party to the Convention since November 1983. The legislation implementing the objectives of the CMS in Ireland include the EU Birds and Habitats Directives and transposing instruments as well as the Wildlife Acts, as amended.

1.2.1.1.4 Ramsar Convention

The Ramsar Convention on Wetlands of International Importance was adopted in the 1970s and recognised the need for marine environmental protection through spatial protection measures. The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development through the world". Wetlands includes mangroves, coastal areas, and coral reefs.

Implementation in Ireland

Ireland has identified a total of 45 sites as wetlands of international importance (Ramsar sites). Of these, 22 have marine and/or coastal elements (Table 4.2). All Ramsar sites also overlap with sites in the Natura 2000 network (see Section 1.2.1.3).

1.2.1.1.5 Bern Convention on the Conservation of European Wildlife and Natural Habitats

The Council of Europe's 1979 Bern Convention on the Conservation of European Wildlife and Natural Habitats is a binding international legal instrument in the field of nature conservation,

[i] DCHG (2019) Ireland's 6th National Report to the Convention on Biological Diversity. Department of Culture, Heritage and the Gaeltacht.

covering most of the natural heritage of the European continent and extending to some States of Africa. It aims to conserve wild flora and fauna and their natural habitats, as well as to promote European co-operation in this field. Both Ireland and the EU are contracting parties to the Convention. This means that they have to maintain biodiversity in the long term, according to different scientific and ecological requirements. The commitments of the parties are to promote national conservation policies; consider the environmental impact of planning and development; promote education and information on conservation; share practice and expertise on biodiversity management; harmonise legislation on biodiversity protection; and coordinate environmental research. The appendices to the Convention are constantly updated and renewed. These include lists of protected wild species (flora and fauna) and habitats, as well as a list of prohibited means and methods of killing, capture and other forms of exploitation. The EU Habitats Directive was adopted to enable the implementation of the Bern Convention in the EU and the Natura 2000 Network.

1.2.1.1.6 International Convention for the Regulation of Whaling

The International Convention for the Regulation of Whaling was signed in Washington DC on 2nd December 1946 with the purpose of providing for the proper conservation of whale stocks and more orderly development of the whaling industry that existed at that time. The Convention led to the creation of the International Whaling Commission (IWC). The Convention consists of a legally binding Schedule that sets out specific measures that the IWC has collectively decided are necessary in order to regulate whaling and conserve whale stocks. The measures include limits on catches (currently zero for commercial whaling) by species and area, designation of specified areas as whale sanctuaries, protection of calves and females accompanied by calves, and restrictions on hunting methods. Currently two sanctuaries have been designated by the IWC: one on the Indian Ocean (since 1979) and the other in the waters of the Southern Ocean around Antarctica (1994). Unlike the Convention, the Schedule can be amended and updated when the Commission meets. A change to the Schedule requires at least three quarters majority agreement.

Ireland became a signatory to this Convention and member of the IWC in 1985. Note, the Irish Whale and Dolphin Sanctuary does not derive from this Convention (see Section 1.2.3.1.5).

1.2.1.1.7 UNESCO Biosphere Reserves

Biosphere reserves are described by UNESCO as 'learning places for sustainable development'. As such they are not focused totally on nature conservation but focus on interdisciplinary approaches to understand and manage social and ecological systems, which includes management of biodiversity. They can be terrestrial, marine and coastal. Biosphere reserves are designed to integrate three key functions: a 'core area' to conserve biodiversity and cultural diversity; a 'buffer zone' surrounding the core area where activities that will not have significant impacts on the core zones are permitted; and a 'transition area' where communities foster socio-culturally and ecologically sustainable economic and human activities. Biosphere Reserves involve local communities and all interested stakeholders in planning and management. Biospheres have no legal standing on their own and UNESCO has no powers to enforce them. They are nominated by national governments and remain under the jurisdiction of the States where they are located but their status is internationally recognised.

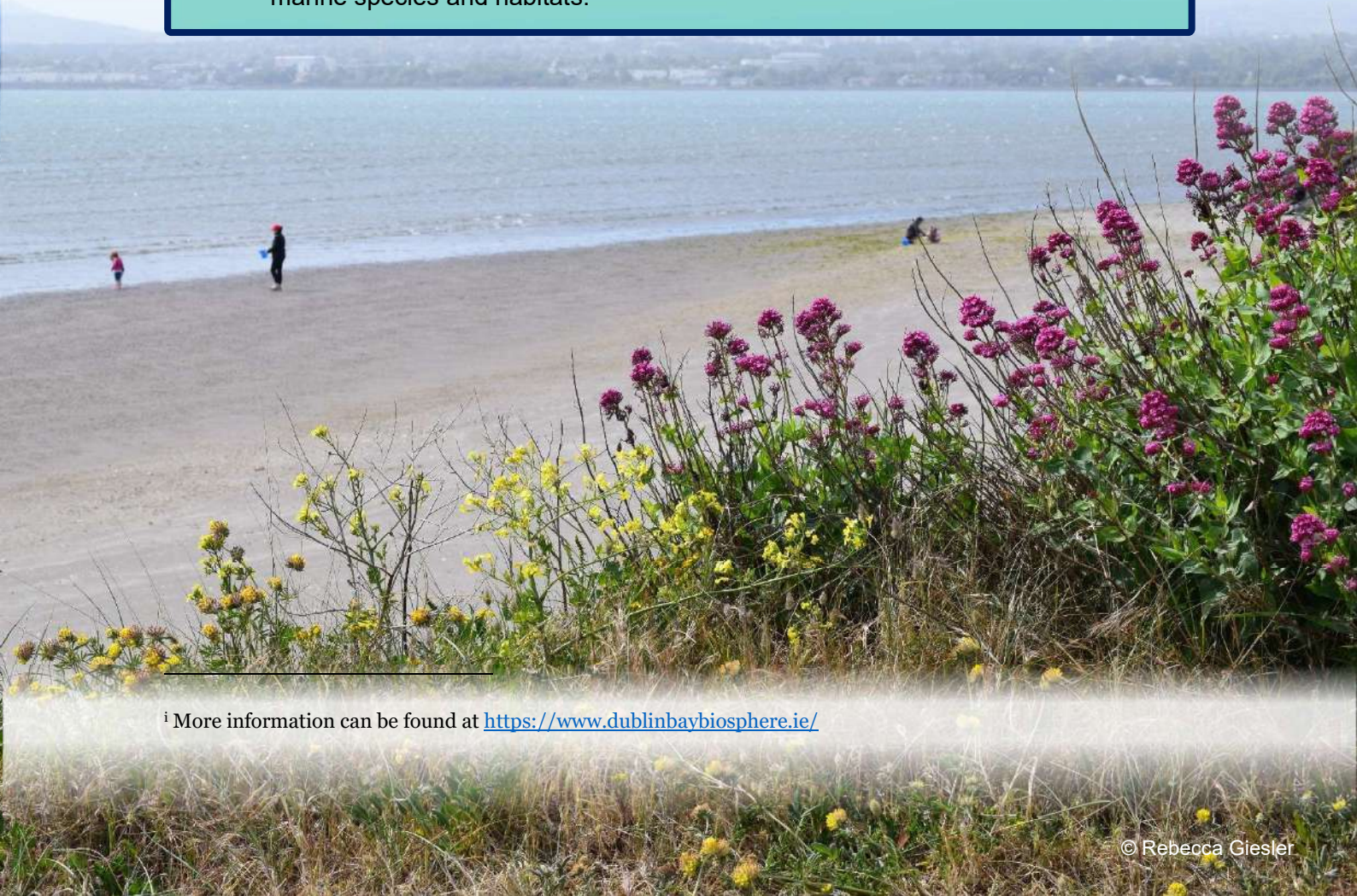
Implementation in Ireland

There are two biosphere reserves in Ireland: in Dublin Bay (formerly North Bull Island) and Kerry (formerly Killarney National Park, mountain and woodlands not marine or coastal). The

former North Bull Island site was nominated in 1981 but extended and renamed in 2015. It covers an area of over 300 km^2 comprising marine habitats in Dublin Bay, the salt marshes and dune system along the coast and terrestrial habitats inland. Parts of the reserve are covered by a range of other statutory and non-statutory designations. Dublin Bay Biosphere Reserve hosts 3 Ramsar sites: Sandymount Strand, North Bull Island and Baldoyle Bay. Parts of the Howth peninsula are designated as a Special Protection Area (SPA) and as a Special Area of Conservation (SAC) under the Birds and Habitats Directives respectively. A Special Area Amenity Order, under the Planning & Development Act, 2000, as amended, also applies to Howth.[67] A biodiversity conservation and research strategy for the site was published in 2017.[68] This aims to provide a coordinated framework for biodiversity conservation and research activities in the site and to provide clarity regarding the planned activities for all stakeholders within the biosphere reserve. The Biosphere Reserve is administered by Dublin City Council with the involvement of other local authorities, Dublin Port Company, Fáilte Ireland and the National Parks & Wildlife Service (NPWS), community groups, NGOs, local businesses, third level institutions and schools.[i]

Key messages

- Ireland's maritime area comprises a surface area totalling 488,762 km^2 which is divided into jurisdictional zones under international law, including the Territorial Sea which extends to 12 nautical miles (nm) from the baseline and an Exclusive Economic Zone extending to 200 nm. It also includes the sea bed in agreed extended continental shelf areas, but the waters over those areas are legally defined as High Seas.
- A number of international conventions oblige Ireland to take measures to protect marine species and habitats.



[i] More information can be found at https://www.dublinbaybiosphere.ie/

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1.2.1.2 EU policy and legislation

As a Member State of the European Union, Ireland has ceded certain competences to the EU in relation to specific areas. The competences of the EU are defined in the EU Treaties and can generally fall into one of three categories: exclusive competence (where only the EU can act); shared competence (between the EU institutions and the Member State – Member States can act only if the EU has chosen not to); or the EU has competence to support, coordinate or supplement the actions of the Member States (here the EU may not adopt legally binding acts that require the Member States to harmonise their laws and regulations). This is important in relation to the marine environment, as the EU has *exclusive competence* for the conservation of marine biological resources under the Common Fisheries Policy (CFP). The EU also has exclusive competence to conclude international agreements. Competence for agriculture and fisheries (excluding conservation of marine biological resources), the environment and energy for example, are all shared between the EU and the Member States. This means that both the EU and its Member States may adopt legally binding acts in the area concerned, however, the Member States can do so only where the EU has not exercised its competence or has explicitly ceased to do so.

The EU is a party to the CBD and Aichi Targets, and is therefore committed to designating 10% of EU waters as MPAs. However, EU environmental legislation predates these commitments and has evolved with developments in conservation approaches to encompass species-based, area-based and ecosystem-based approaches. The Birds Directive and Habitats Directive aim to protect vulnerable species and natural habitats including those considered rare or endemic. Protection is primarily achieved through the designation of area-based Special Protection Areas (SPAs) for birds and their habitats and Special Areas of Conservation (SACs) for other species/habitats. Together SPAs and SACs form the Natura 2000 network, which aims to be a coherent European ecological network covering both land and sea.[69]

The focus of the Birds and Habitats Directives on selected vulnerable species and habitats excludes aspects of the marine environment from formal protection. The Marine Strategy Framework Directive (MSFD) adopts a more holistic approach to marine protection, requiring implementation of measures to achieve 'good environment status' in the marine environment.[69] Many of the targets to achieve the criteria laid out in MSFD can be achieved by having expansive MPA networks.

EU legislation requiring marine area-based approaches does not exist in isolation. There is a wide variety of EU Directives and policy regulating marine activities and industries. A brief explanation of some of these with implications for MPA establishment and management can be found in Section 2.2.

1.2.1.2.1 The Birds Directive

The Birds Directive[i] is the oldest piece of EU legislation on the environment, dating from 1979 but amended in 2009. Wild bird populations are threatened by habitat loss and degradation, thus the Directive places great emphasis on the protection of habitats for endangered and migratory species. It applies to birds, their eggs, nests and habitats, covers the protection, management and control of these species and lays down rules for their exploitation.

[i] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

The Directive protects all wild bird species, 60 of which require marine site protection. Member states must classify Special Protection Areas (SPAs) for 194 species and sub-species that are particularly threatened (listed in Annex I of the Directive), as well as for migratory bird species.[70]

Implementation in Ireland

Ireland's SPA network encompasses more than 570,000 ha of marine and terrestrial habitats. The marine areas include some of the productive intertidal zones of bays and estuaries that provide vital food resources for wintering waterbirds. Marine waters adjacent to breeding seabird colonies and other important areas are also included in the network.

The majority of the breeding seabirds and wintering waterbirds are considered to be regularly occurring migratory birds. This is reflected in the fact that the majority (> 80%) of Ireland's SPAs are designated for these two bird groups.

SPAs are selected in Ireland according to four criteria:

- A site regularly supporting 20,000 waterbirds or 10,000 pairs of seabirds
- A site regularly supporting 1% or more of the all-Ireland population of a species listed in Annex I of the Birds Directive
- A site regularly supporting 1% or more of the biogeographic population of a migratory species
- A site considered to be one of the most suitable sites in Ireland for an Annex I species or a migratory species (number of sites depends on the importance of the Irish territory for the international conservation of the species)

A table showing the 89 SPAs with marine elements that have been selected for wintering waterbirds and breeding seabirds is provided in Appendix D.2 (Table 4.3).

Reporting on conservation status

Member States must report on the status of all bird species under Article 12 of the Birds Directive. This reporting process requires Ireland to submit, in a structured format common to all member states, contemporary population estimates for each species, along with population and range trend information over both the short- (circa 12 year) term and the long-term (circa early 1980s onwards) periods. Additionally, this Article 12 report seeks to compile associated information on pressures and threats and required conservation measures.[i]

Ireland submitted the latest Article 12 report to the European Commission in July 2019. The main groups of birds that utilise marine/coastal waters to a greater or lesser extent are breeding seabirds and wintering waterbirds. A detailed summary of their status is provided in Appendix E.1 and an overview is part of Section 1.1.5.

1.2.1.2.2 The Habitats Directive

The Habitats Directive[ii] seeks to contribute towards ensuring biodiversity through the conservation of a wide range of rare, threatened or endemic animal and plant species and

[i] See https://www.eionet.europa.eu/etcs/etc-bd/activities/reporting/article-12 for more information on the process.
[ii] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

habitats. This is achieved in a similar way to the Birds Directive. The Directive covers over 1000 animal and plant species, as well as 200 habitat types, which are listed in its annexes:

- **Annex I habitats**: terrestrial or aquatic areas distinguished by geographic, abiotic and biotic features, whether entirely natural or semi-natural, which are in danger of disappearance, have a small natural range or present outstanding examples of typical characteristic of one of more biogeographical region.[i]
- **Annex II species**: animal and plant species of community interest whose conservation requires the designation of Special Areas of Conservation for inclusion in the Natura 2000 network. These sites must be managed in accordance with the ecological needs of the species or natural habitat types present on the sites.
- **Annex IV species**: a strict protection regime must be applied across their entire natural range within the EU, both within and outside Natura 2000 sites. Most species listed in Annex II are also listed in Annex IV.
- **Annex V species**: Member States must ensure that their exploitation and taking in the wild is compatible with maintaining them in a favourable conservation status.

Natura 2000 requirements:

The primary mechanism for conservation under the Directive is the Special Area of Conservation (SAC). Each SAC is selected for one or more habitats listed in Annex I of the Habitats Directive and/or one or more species listed in Annex II. These are known as "qualifying interests" (QIs) for the site in question. According to Annex III of the Directive, Member States are required to select SACs that adequately represent the range, area and relative importance of each Annex I habitat and Annex II species within their territory.

An SAC is defined as a site of Community Importance designated by the Member States through a statutory, administrative and/or contractual act where the necessary conservation measures are applied for the maintenance or restoration, at a favourable conservation status, of the natural habitats and/or the populations of the species for which the site is designated. Article 6 of the Directive defines how Natura 2000 sites are managed and protected (see below).

Implementation in Ireland

In Ireland there are eight habitats listed in Annex I of the Habitats Directive that are regarded as marine and which have SACs selected. This includes seven 'Open sea and tidal' habitats and one (8330 Sea caves) included under 'other rocky habitats'. A description of these habitats is provided in Appendix D.3. There are four Annex II species in Ireland considered to be truly marine for which SACs must be designated. These habitats and species are listed in Table 1.2, along with the area and number of sites for each feature. The full list of 90 SACs that are selected for one or more of the habitats and species in Table 1.2 are listed in Appendix D.4 (Table 4.4) with the features for which they are selected.

There are other Annex I habitats within coastal systems, such as lagoons, saltmarshes, sand dunes and sea cliffs that are shaped by marine influences. The species listed below are considered to be truly marine, but there are others listed in Annex II, such as otter (*Lutra lutra*)

[i] Alpine, Atlantic, Black Sea, Boreal, Continental, Macaronesian, Mediterranean, Pannonian and Steppic

and sea lamprey (*Petromyzon marinus*) for which marine habitats form some elements of their range.

Table 1.2 – Marine Annex I habitats in Ireland and Annex II species for which SACs must be designated in Ireland. The estimated cumulative area of the 'qualifying interest' (QI) habitat is shown (note that this does not correspond to cumulative SAC area).

Code	Name	Number of sites	Estimated QI area (ha)
Annex I Habitats*			
1110	Sandbanks which are slightly covered by sea water all the time	4	11,197
1130	Estuaries	19	52,881
1140	Mudflats and sandflats not covered by seawater at low tide	43	42,285
1160	Large shallow inlets and bays	22	190,297
1170	Reefs	46	229,925
1180	Submarine structures made by leaking gases	1	30
8330	Submerged or partially submerged sea caves	12	1,356
Annex II species			
1349	Bottlenose dolphin (*Tursiops truncatus*)	5	n/a
1351	Harbour porpoise (*Phocoena phocoena*)	3	n/a
1364	Grey seal (Halichoerus grypus)	10	n/a
1365	Harbour seal (Phoca vitulina)	13	n/a
*Coastal lagoons are regarded as marine habitats, but for reporting purposes are classified as terrestrial habitat under Article 17 of the Habitats Directive.			

Reporting on conservation status

Under Article 11 of the Habitats Directive, each Member State of the EU is obliged to undertake surveillance of the conservation status of the habitats and species listed in the Annexes of the Directive. According to Article 17, Member States must report the national status of these habitats and species to the European Commission every six years. Ireland submitted the third national assessment for all terrestrial, freshwater and marine habitats (59 listed in Annex I) and species (60 listed in Annexes II, IV and V) in April 2019.[57–59]

According to the guidelines for reporting under Article 17 of the Habitats Directive,[71] for reporting purposes "habitats types 'always open to the sea' are classified as marine (e.g. estuaries). This is why coastal lagoons, which do not have a permanent opening to the sea, are classified as terrestrial for reporting purposes.

For the purposes of reporting on the marine area covered by SACs, the guidelines state that the "marine area of sites is the area on the seaward side of the coastline. The definition of the coastline used to define the marine boundary should follow international (i.e. UNCLOS) or national legislation.[i] This approach is the same as that adopted for the Standard Data Forms (SDFs) for individual Natura 2000 sites. Thus, a site located on the coast and stretching out

[i] In Ireland, the Mean High Water line is used.

into the sea should be counted as a 'marine site', although it might include a terrestrial component…".

A monitoring survey to assess the conservation status of six[i] of the inshore marine Annex I habitats was undertaken between 2016 and 2018.[72] This publication and NPWS (2019) give further information on how conservation status is assessed. [57]

Of the seven marine habitats reported on in Ireland (see Table 1.2 above), three were assessed as favourable in 2019, three as inadequate and one as bad. All cetacean species are listed in Annex IV and maërl is listed in Annex V of the Habitats Directive. The majority of marine mammals were assessed as favourable in 2019, with six species assessed as unknown, and maërl assessed as bad (Appendix E).

1.2.1.2.2.1 Natura 2000 Network

The Habitats Directive established the Natura 2000 network, combining Special Areas of Conservation (SACs) designated under the Habitats Directive, and Special Protection Areas (SPAs) classified under the Birds Directive. These are collectively termed 'European sites' in national (Irish) legislation. It is the largest network of coordinated protected areas in the world, applying on land and at sea to the limits of national jurisdiction (200 nautical miles).

Natura 2000 is not a system of strict nature reserves from which all human activities are excluded. Article 6(3) provides that any plan or project, which is not directly connected with or necessary to the management of a Natura 2000 site, but likely to have a significant effect on it, either individually or in combination with other plans or projects, shall undergo an Appropriate Assessment (AA) to determine its implications for the site. The competent authorities can only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site concerned.

Article 6(4) goes further to provide that in exceptional circumstances, a plan or project may still be allowed to go ahead, in spite of a negative assessment, provided there are no alternative solutions and the plan or project is considered to be justified for Imperative Reasons of Overriding Public Interest (IROPI). In these cases, the Member State must take appropriate compensatory measures to ensure that the overall coherence of the Natura 2000 Network is protected.

Implementation in Ireland:

The Birds and Habitats Directives have been transposed into national law by the European Communities (Birds and Natural Habitats) Regulations, 2011-2015[ii] ('the B&NH Regulations'). Ireland's designation process started in 1997. As of February 2019, 439 SACs have been selected (270 of which have been formally designated by Statutory Instrument) and 163 SPAs have been selected (160 of which have been formally designated by Statutory Instrument). The Minister for Housing, Planning and Local Government[iii] is responsible for

[i] 1110 Sandbanks which are slightly covered by seawater at all time, 1130 Estuaries, 1140 Mudflats and sandflats not covered by seawater at low tide, 1160 Large shallow inlets and bays, 1170 Reefs and 8830 Submerged or partially submerged sea caves

[ii] S.I. No. 477 of 2011, as amended by S.I. No. 290 of 2013, S.I. No. 499 of 2013, S.I. No. 355 of 2015. S.I. No. 477 of 2011 revoked the European Communities (Natural Habitats) Regulations 1997 (S.I. No. 94 of 1997), and its amendments, and also the European Communities (Birds and Natural Habitats) (Control of Recreational Activities) Regulations 2010 (S.I. No. 293 of 2010).

[iii] Previously with the Department of Culture, Heritage and the Gaeltacht.

designating SPAs and SACs following the procedure laid down in Part 3 of the Regulations.[i] Ireland has an established process for preparing detailed site-specific conservation objectives (SSCOs) for habitats and species for which Natura 2000 sites are designated. SSCOs are based on setting targets for attributes that together define favourable conservation condition at site-level. Attributes are based on the ecological requirements of the feature in question and are linked to the parameters that define Favourable Conservation Status at a national scale. Where detailed SSCOs are available for a habitat or species in a site or suite of sites, the SSCO targets are/will be used to identify the necessary measures required to achieve them. To date, SSCOs have been published for all marine SACs, except for offshore reef sites, as well as for 37 marine SPAs. There is an ongoing programme to complete the SSCO-setting process for Natura 2000 sites.[ii]

Key messages

- Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) have been designated in Ireland under the EU Birds Directive and the EU Habitats Directive respectively. These are part of the EU-wide 'Natura 2000' network.
- Each SPA and SAC affords protection to specified species or habitats (termed 'Qualifying Interests') which are listed under the Directives.

1.2.1.2.3 The Marine Strategy Framework Directive

The EU Marine Strategy Framework Directive (MSFD) (2008/56/EC) aims to more effectively protect the marine environment across Europe and was adopted in 2008. The MSFD aims to achieve Good Environmental Status (GES) of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. The MSFD applies to coastal waters (as defined under the Water Framework Directive) and to the territorial sea, exclusive economic zone, and the continental shelf, including the areas beyond 200 nautical miles (Art. 2 and Art. 3(1)(a)(b)). In extended continental shelf areas (i.e. beyond 200 nautical miles), the achievement or maintenance of a good environmental status is faced with complex legal barriers, given that the high seas regime applies to the water column above the seabed.

GES is defined as 'the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive.'

The Directive sets out, in Annex I, eleven qualitative descriptors which describe what the environment will look like when GES has been achieved (shown in Table 1.3). Under the MSFD all human activity that has an impact on the marine environment "is to be addressed" (Recital 5) yet it is explicitly noted that fisheries will continue to be regulated exclusively through the CFP (Recital 39).

[i] Further details on the site designation process as applied in Ireland can be found at: https://www.npws.ie/sites/default/files/publications/pdf/Site%20Designation%20Process%20%28October%202017%29.pdf

[ii] Conservation objectives and management plans can be found at https://www.npws.ie/protected-sites

The Directive takes a regional approach to implementation, with the four existing Regional Sea Conventions (i.e. the OSPAR Convention for the North East Atlantic)[i] forming the basis for cooperation of neighbouring countries. It establishes European marine regions and sub-regions on the basis of geographical and environmental criteria. Each Member State is required, in respect of each marine region or sub-region concerned, to develop a marine strategy for its marine waters. The MSFD implementation cycle takes 6 years to complete and covers different stages every two years with a reporting commitment to the EC.

Table 1.3 – The eleven qualitative descriptors for Good Environmental Status under the Marine Strategy Framework Directive. These describe what the environment will look like when GES has been achieved.

Descriptor	
Descriptor 1	Biodiversity is maintained
Descriptor 2	Non-indigenous species do not adversely alter the ecosystem
Descriptor 3	The population of commercial fish species is healthy
Descriptor 4	Elements of food webs ensure long-term abundance and reproduction
Descriptor 5	Eutrophication is minimised
Descriptor 6	The sea floor integrity ensures functioning of the ecosystem
Descriptor 7	Permanent alteration of hydrographical conditions does not adversely affect the ecosystem
Descriptor 8	Concentrations of contaminants give no effects
Descriptor 9	Contaminants in seafood are below safe levels
Descriptor 10	Marine litter does not cause harm
Descriptor 11	Introduction of energy (including underwater noise) does not adversely affect the ecosystem

Under the MSFD, a Programme of Measures (POM) designed to achieve GES, had to be developed based on the findings of an Initial Assessment, the targets and the types of measures listed in Annex VI. Article 13(4) provides that the POM includes "*spatial protection measures, contributing to coherent and representative networks of marine protected areas, adequately covering the diversity of the constituent ecosystems*". Examples listed are SACs under the Habitats Directive, SPAs under the Birds Directive, and MPAs "*as agreed by the Community or Member States concerned in the framework of international or regional agreements to which they are parties.*"

On the basis of the information provided by Member States, the Commission is required under Article 21 to report on progress made in the establishment of marine protected areas. This was completed in 2015. The report acknowledges that the MSFD does not define the term MPA and goes on to describe MPA as "geographically defined marine areas; whose primary and clearly stated objective is nature conservation; which are regulated and managed through legal or other effective means to achieve this objective" (EC, 2015). Annex II of the report provides

[i] The Convention for the Protection of the Marine Environment in the North-East Atlantic of 1992 (further to earlier versions of 1972 and 1974) – the OSPAR Convention (OSPAR); the Convention on the Protection of the Marine Environment in the Baltic Sea Area of 1992 (further to the earlier version of 1974) – the Helsinki Convention (HELCOM); the Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean of 1995 (further to the earlier version of 1976) – the Barcelona Convention (UNEP-MAP); and the Convention for the Protection of the Black Sea of 1992 – the Bucharest Convention.

information on the coverage of marine protected areas in European Seas but this is by region (not Member State) only.

Implementation in Ireland

In April 2015 Ireland submitted its MSFD Monitoring Programme and established targets and indicators relating to the achievement of GES. A Programme of Measures (POM) was also designed in order to address the factors that impact upon the achievement of GES and submitted to the Commission in 2016. The POM recognises the role that the existing Marine Protected Area network in Ireland, comprising Natura 2000 sites and sites designated under OSPAR, has in supporting the achievement of GES characteristics and targets, specifically Descriptor 1 (Biological Diversity) and Descriptor 6 (Sea-floor Integrity). The POM includes developing a national strategy to create and manage Ireland's network of MPAs as well as setting up increased protection areas using tools such as habitat protection orders and no-take zones (DECLG, 2016).

Key messages

- The EU Marine Strategy Framework Directive requires Member States to achieve or maintain Good Environmental Status of the marine environment under each of 11 Descriptors to establish a Programme of Measures (POM) to ensure this goal is met.
- Ireland's current POM recognises the importance of MPAs, particularly in relation to Descriptor 1 (Biodiversity) and Descriptor 6 (Sea-floor integrity).

1.2.1.3 The OSPAR Convention

In Europe, there are four Regional Sea Conventions which aim to protect the marine environment and coordinate actions between countries in the same region. They include the OSPAR Convention covering the North-East Atlantic, the Helsinki Convention (HELCOM) covering the Baltic, the Barcelona Convention covering the Mediterranean, and the Bucharest Convention covering the Black Sea. The Regional Sea Conventions facilitate coordination in meeting international and EU commitments, such as the EU Marine Strategy Framework Directive. Ireland is a party to the OSPAR Convention - the Convention for the Protection of the Marine Environment of the North-East Atlantic of 1992.

Overview:

The OSPAR Convention is the regional agreement which coordinates environmental protection in the North-East Atlantic between 15 countries (including Ireland) and the EU. The OSPAR Convention and its strategies are implemented through the adoption of decisions, which are legally binding on the Contracting Parties, recommendations and other agreements. In relation to fisheries, OSPAR has no competency to take fisheries management measures though it has Memoranda of Understanding with the three regional fisheries management organisations: the North-East Atlantic Fisheries Commission (NEAFC),[i] the International Commission for Conservation of Atlantic Tunas (ICCAT),[ii] and the North Atlantic Salmon

[i] North-East Atlantic Fisheries Commission (NEAFC)
[ii] International Commission for Conservation of Atlantic Tunas (ICCAT)

Conservation Organisation (NASCO).[i] The OSPAR Commission informs these fisheries authorities when it considers that actions are needed to protect and conserve the North-East Atlantic in relation to fisheries.

OSPAR adopted measures on biodiversity and ecosystems in 1998, adding to earlier measures covering marine pollution. Contracting parties must take:

> *"necessary measures to protect and conserve the ecosystems and the biological diversity of the maritime area, and to restore, where practicable, marine areas which have been adversely affected"* (Article 2(a), Annex IV).

The OSPAR Convention covers five marine regions – Arctic waters, the greater North Sea, the Celtic Sea, the Bay of Biscay and Iberian coast, and the wider Atlantic. Ireland's marine environment falls into the Celtic Sea and the wider Atlantic regions.

Under the OSPAR Biological Diversity and Ecosystems Strategy, the OSPAR Commission is tasked with assessing which species and habitats need to be protected. This list is known as the "OSPAR List of Threatened and/or Declining Species and Habitats" and is based upon information and nominations by Contracting Parties and observers to the Commission of species and habitats that they consider to be priorities for protection. This information is reviewed by the International Council for the Exploration of the Sea (ICES)[ii] for quality and accuracy. The purpose of the list is to guide the OSPAR Commission in establishing priorities for its future work on the conservation and protection of marine biodiversity. The inclusion of a species or of a type of habitat on this list has no other significance. A number of the listed species and habitats also appear in the annexes of the EU Habitats Directive, but it is important to note that not all the OSPAR habitats and species fall under the scope of the Habitats Directive. The consequence of this is that certain species and habitats that are recognised at regional sea level as being threatened or in decline have no protection under EU biodiversity law. The OSPAR List includes invertebrates, birds, fish, reptiles, marine mammals, and habitats (full list in Appendix C). The list also makes it clear that in certain instances it may be necessary to consider separate populations of species and consequently the list specifies certain populations of species where separate treatment is justified, because the different populations are subject to differing pressures.

<u>MPA requirement:</u>

Recommendation 2003/3 on a network of marine protected areas was adopted in 2003 and seeks to establish an ecologically coherent and well managed network of MPAs in the North-East Atlantic by 2016.

Article 2(1) states the purpose of the recommendation is to ensure that the OSPAR network of MPAs:

> *a. by 2012… is ecologically coherent, includes sites representative of all biogeographic regions in the OSPAR maritime area, and is consistent with the CBD target for effectively conserved marine and coastal ecological regions;*

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[i] North Atlantic Salmon Conservation Organisation (NASCO)

[ii] ICES is an intergovernmental marine science organisation that provides scientific advice to the European Commission, the Helsinki Commission (HELCOM), North Atlantic Salmon Commission (NASCO), North East Atlantic Fisheries Commission (NEAFC), OSPAR Commission and governments of other ICES countries.

b. by 2016… is well managed (i.e. coherent management measures have been set up and are being implemented for such MPAs that have been designated up to 2010).

The OSPAR network of MPAs aims to:

- protect, conserve and restore species, habitats and ecological processes which have been adversely affected by human activities;
- prevent degradation of, and damage to, species, habitats and ecological processes, following the precautionary principle;
- protect and conserve areas that best represent the range of species, habitats and ecological processes in the maritime area.

Contracting parties are required to nominate sites to include in the OSPAR network, which must then be reported on annually. OSPAR has published a number of guidance documents to support contracting parties, including guidelines on selecting and nominating sites to the network (covered in detail in Section 3.1.1).[i]

Regional implementation

Twelve of the 15 OSPAR Contracting Parties have nominated sites to the OSPAR Network of Marine Protected Areas since 2005, both in their national waters as well as collectively in areas beyond national jurisdiction. Four hundred of these are within waters under national jurisdiction, the largest proportion located in Territorial Seas (within 12 nm), with much fewer located in the Exclusive Economic Zone (200 nm) and only ten located in areas beyond national jurisdiction (ABNJ).

The Greater North Sea, the Wider Atlantic and the Celtic Seas are the best represented OSPAR regions with 18.6%, 8.3% and 15.3% coverage respectively whilst the Bay of Biscay and Iberian Coast and the Arctic Waters have the lowest.[73] This has implications for the coherence of the network.

There is also variation between the levels of active management across designated sites. Approximately 86% of the OSPAR MPAs have either full or partial management information in place which is publicly documented with 14% having implementation of management measures considered necessary to achieve the conservation objectives of MPAs.[73] The most recent status report states that future work should focus on the implementation of management measures considered necessary to achieve the conservation objectives of the protected features of OSPAR MPAs and long-term monitoring programmes designed to evaluate the effectiveness of such measures.[73]

Implementation in Ireland:

Ireland nominated 19 sites to the OSPAR MPA network in 2009; however, there is no Irish legislation to underpin designations deriving from commitments under international conventions. Ireland designated a number of Special Areas of Conservation (under the EU Habitats Directive) as OSPAR MPAs for marine habitats.

The sites are selected to protect biodiversity and particularly the following species and habitats that OSPAR has identified as being threatened or in decline: intertidal mudflats,

[i] Guidelines for the identification and selection of Marine Protected Areas in the OSPAR Maritime Area (Agreement 2003-17)

Desmophyllum pertusum (formerly *Lophelia pertusa*) reefs, maërl beds, *Zostera* seagrass beds and harbour porpoise *Phocoena phocoena*. The total area involved is c. 4,136 km², and the sites are located to the north, south, east, and west of Ireland and offshore on the edge of Ireland's inner Continental Shelf as follows:

Table 1.4 – Sites nominated by Ireland to the OSPAR MPA network. These sites are designated as SACs under the Habitats Directive.

Reference No. in OSPAR Data Base	Name of Area
O-IE-0002997	Ballyness Bay MPA
O-IE-0002987	Belgica Mound Province MPA
O-IE-0002984	Blasket Islands MPA
O-IE-0002973	Cummeen Strand/Drumcliff Bay (Sligo Bay) MPA
O-IE-0002971	Dundalk Bay MPA
O-IE-0002969	Galway Bay Complex MPA
O-IE-0002988	Hovland Mound Province MPA
O-IE-0002980	Kenmare River MPA
O-IE-0002979	Kilkieran Bay and Islands MPA
O-IE-0002985	Kingstown Bay MPA
O-IE-0002967	Malahide Estuary MPA
O-IE-0002972	Mullet/Blacksod Bay Complex MPA
O-IE-0002981	Mulroy Bay MPA
O-IE-0002968	North Dublin Bay MPA
O-IE-0002990	North West Porcupine Bank MPA
O-IE-0002965	Roaringwater Bay and Islands MPA
O-IE-0002989	South West Porcupine Bank MPA
O-IE-0002978	Tralee Bay and Magharees Peninsula, West to Cloghane MPA
O-IE-0002974	Tramore Dunes and Backstrand MPA

1.2.2 Other instruments and policy drivers directly relevant to area-based protection

1.2.2.1 Maritime Spatial Planning

In recent decades, increasing use and development of maritime space across Europe highlighted the need for a more coherent approach to management of marine waters. Maritime Spatial Planning (MSP) has been proposed as one way of more effectively managing activity across sectors and ensuring human activity in the sea is sustainable.

The EU Maritime Spatial Planning (MSP) Directive[i] was adopted in 2014, providing a framework for MSP in Europe, requiring Member States to establish maritime spatial plans

[i] Directive 2014/89/EC of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning.

by 2021. Plans must be reviewed by Member States at least every 10 years. The objectives of the MSP Directive are for Member States to consider economic, social and environmental aspects to support sustainable development and growth in the maritime sector, apply an ecosystem-based approach, and promote the coexistence of relevant activities and uses. The activities and uses covered are specified as offshore energy, maritime transport, fisheries and aquaculture, as well as the preservation, protection and improvement of the environment, including resilience to climate change impacts. There is flexibility to include other sectors such as tourism and extraction of raw materials.

Implementing an ecosystem-based approach to the management of maritime activities is an important part of securing healthy marine ecosystems. Member States are also required to identify the spatial and temporal distribution of relevant existing and future activities and uses in their marine waters during the development of maritime plans. One of the uses to be considered is nature and species conservation sites and protected areas.

Formal work on Ireland's approach to implementation of MSP began in 2016 with transposition of the Directive into Irish law.[i] The Minister for Housing, Planning and Local Government was designated as the competent authority for MSP. In Ireland MSP will apply to the "maritime area", namely the foreshore, territorial seas, EEZ and designated parts of the Continental Shelf and coastal waters. It will not apply to parts of the maritime area to which existing terrestrial planning legislation and policies apply.

Since transposition, the Department of Housing, Planning and Local Government (DHPLG) has published a roadmap on MSP;[74] a baseline report outlining the current status of various marine activities in Irish waters and the issues these could raise for implementation of MSP;[75] a Marine Planning Policy Statement that contains suggested high level priorities for MSP;[76] and finally a National Marine Planning Framework (NMPF) consultation draft.[77] These outputs have been produced with technical support from the Marine Institute. Public consultation opportunities and events have been carried out at all stages of the plan development process. Plan finalisation is expected in the first quarter of 2021.

The draft NMPF is structured around Overarching Marine Planning Policies (OMPPs) that will apply to all marine activities or development; and Activity-specific or Sectoral Marine Planning Policies (SMPPs) to guide decision-makers in assessing or dealing with specific proposals. The draft NMPF also includes information on the actions being taken in parallel to support the implementation of marine objectives and policies and the arrangements for implementation. Environmental – Ocean Health is one of the OMPPs. This is further subdivided into ten sub-categories that roughly reflect the descriptors contained within the MSFD, together with air quality and climate change. One of the sub-categories is Marine Protected Areas.

In Ireland, the majority of marine development activities are licensed or leased under the provisions of the Foreshore Acts, 1933-2011. In light of developments in Maritime Spatial Planning and the need to modernise and amend the existing marine consenting system, the Marine Planning and Development Management Bill was published in 2019, and according to the Programme for Government, will be enacted within nine months. The Bill defines Ireland's 'Maritime Area' and also seeks to introduce a new 'nearshore' area, designated for each coastal

[i] The MSP Directive was originally transposed by EU (Framework for Maritime Spatial Planning) Regulations 2016 (S.I. No. 352 of 2016) but since revoked in, and replaced by, Part 5 of the Planning and Development (Amendment) Act, 2018 (No. 16 of 2018).

local authority where they will then exercise certain planning permission and enforcement functions.

The forward planning element of the Bill will provide the statutory basis for marine planning. The Bill also proposes provisions enabling the designation of Strategic Marine Activity Zones, where part of the maritime area can be established as a zone for activities that are of economic, social or environmental importance. The Bill proposes a new and streamlined consenting system.

Maritime Area Consents (MACs) for offshore energy developments will be granted by the Minister for Communications, Climate Action and Environment, whereas MACs for all other development will be granted by the Minister for Housing, Planning and Local Government. An Bord Pleanála will be responsible for Strategic Infrastructure; development where an EIA is required; smaller-scale development located entirely beyond the nearshore; and Local Authority development that requires EIA and/or Appropriate Assessment. Whilst this new regime will operate separate to the Foreshore Acts, 1933-2011 all fisheries and aquaculture-related activity regulated under those instruments will remain so and will not be subject to the proposed new consenting regime. They will, however, be covered by the national marine spatial plan.

The Overarching Marine Planning Policies (OMPPs) and Activity-specific or Sectoral Marine Planning Policies (SMPPs) contained in the draft National Marine Planning Framework will be realised through this new consenting process.

1.2.2.2 Common Fisheries Policy

Fisheries are a specific case of marine activity as they are regulated under the EU Common Fisheries Policy. Under the Treaty on the Functioning of the EU (TFEU), the EU has exclusive competence to regulate 'the conservation of marine biological resources under the CFP' (Article 3(1)(d). This does not cover all aspects of fisheries, however, with the EU and Member States having a shared competence for 'fisheries (excluding the conservation of marine biological resources)' and the 'environment' (Article 4(2)(d) and (e)).

The CFP provisions apply in the Exclusive Economic Zone (EEZ) from 12 nm to 200 nm and also to fishing activities carried out outside "Union waters" by fishing vessels flying the flag of Member States and registered in the European Union. Between 6-12 nm Member States have some powers under the CFP to restrict access to fisheries by vessels from other Member States, provided that they allow in vessels from other Member States that have traditionally fished in those waters. In cases where a vessel from another Member State has a right to access fisheries between 6-12 nm, the coastal state is permitted to regulate those foreign vessels. Under the CFP, the fishing area of all EU states is considered one zone so as to ensure all European fishing fleets have equal access to EU waters thereby creating fair competition. The CFP covers fisheries management; international policy and co-operation; market and trade policy; and funding.

In terms of fisheries management, the CFP uses a combination of input and output measures to control and manage fisheries sustainably. Input controls include, for example, controlling what vessels can access different areas of the sea; limiting how long vessels can go to sea or how many vessels from a particular type of fleet can go sea at any one time; and also regulating the methods and types of gears used. Output control measures refer to limits on the amount

of fish that can be caught. The quotas set for each type of fish are known as Total Allowable Catches (TAC).

Quotas are set annually by the Agriculture and Fisheries Council based on scientific advice from the International Council on the Exploration of the Sea (ICES) and the Scientific, Technical and Economic Committee for Fisheries (STECF). The quotas set for commercial fish stocks must comply with the CFP's goal of meeting sustainability targets, known as maximum sustainable yield. When quotas are agreed Member States are given a percentage on the basis of relative stability, based in part on historical catches. Where stocks are shared with non-EU countries, quotas are agreed bilaterally or multilaterally, through Regional Fisheries Management Organisations, such as the North-East Atlantic Fisheries Commission (NEAFC).

1.2.2.2.1.1 Fisheries and nature conservation

The most recent reform of the CFP (EC Regulation 1380/2013) sets the objective of environmentally sustainable fishing through precautionary management of fishery stocks at maximum sustainable yield, and through other conservation and sustainable exploitation measures.[i] The wide range of EU environmental protection legislation has been generally perceived not to apply to fisheries– meaning that Member States did not take environmental protection measures if those measures infringed on the rights guaranteed under the fisheries regulations (CFP). In 2013, this was reformed such that the CFP was required to "be coherent with the Union environmental legislation, in particular with the objective of achieving a good environmental status by 2020 as set out in Article 1(1) of [the MSFD], as well as with other Union policies" (Article 2(5j)). This reform means that Member States can now take environmental protection measures under the CFP in relation to, for example, the MSFD and the Habitats Directive in their sovereign waters but primarily with regard to their own flagged vessels (Article 11(1)). A separate process exists under the CFP for measures beyond 12 nautical miles.

The Commission has the power to adopt stricter measures that will affect fishing activities of other Member States. Article 11(2)-(5) outlines the notification process whereby a Member State can initiate the need for further measures applicable to all vessels. It is up to the Member State to make such a case for protection. The proposing Member State and other Member States that have a direct management interest 'may' submit a joint recommendation, but they are not obliged to do so. The Commission is 'empowered' to adopt management measures but is not under any obligation to do so and even once this procedure is complete, the Parliament or the Council may object to the measure. As a result, since 2013, only two Regulations have been adopted by the Commission, covering 13 Natura 2000 sites in the North Sea[ii] and 7 in the Baltic Sea.[iii]

Article 12 of the Basic Regulation provides that the Commission can take measures in cases where there is a serious threat to the conservation of marine biological resources or to the marine ecosystem based on evidence, applicable for a maximum period of six months. Member States are able to take emergency measures under Article 13 for a maximum of three months

[i] Note sustainability under the CFP is defined by the requirements of relative stability and sustainable exploitation.
[ii] Commission Delegated Regulation (EU) 2017/1180 of 24 February 2017 amending Delegated Regulation (EU) 2017/118 establishing fisheries conservation measures for the protection of the marine environment in the North Sea [2017] OJ L 171/1.
[iii] Commission Delegated Regulation (EU) 2017/1181 of 2 March 2017 amending Delegated Regulation (EU) 2017/117 establishing fisheries conservation measures for the protection of the marine environment in the Baltic Sea and repealing Delegated Regulation (EU) 2015/1778 [2017] OJ L 171/30.

where there is a serious threat to the conservation of marine biological resources or to the marine ecosystem relating to fishing activities in waters falling under their sovereignty or jurisdiction that require immediate action. Where such measures are liable to affect fishing vessels from other Member States, they can only be adopted after consultation with the Commission, the relevant Member States and the relevant Advisory Councils. The Commission has the power to amend or repeal such measures.

These provisions should, however, be read in a wider context. The Law of the Sea Convention provides that all sea-going vessels are required to fly the flag of a single state ("flag state") and that that State exercises jurisdiction and control over that vessel wherever it may be. This extends to responsibilities of the flag state in relation to the protection and preservation of the marine environment. Despite collective regulation of fisheries in EU waters, Member States as flag states can exercise jurisdiction over their vessels, provided that complies with EU law. This is echoed by Article 19 of the Basic CFP Regulation which says that a "Member State may adopt measures for the conservation of fish stocks in Union waters provided that those measures … apply solely to fishing vessels flying the flag of that Member State … are compatible with the objectives set out in Article 2, …[and] they are at least as stringent as measures under Union law'. Whilst this provision narrowly applies to 'conservation of fish stocks', flag state jurisdiction is broader and could be used for environmental protection including the provisions of the Habitats Directive. This recognises again that the environment and fisheries are shared competences and aligns with Article 11(1) of the Basic Reg. which states that Member States "are empowered" to take measures to implement their obligations under the Habitats Directive.[78,79]

Article 20(1) of the Basic Regulation provides that Member States may take non-discriminatory measures for the conservation and management of fish stocks and the maintenance or improvement of the conservation status of marine ecosystems within 12 nm of its baselines. If those measures are liable to affect fishing vessels from other Member States, they can only be adopted after consultation with the Commission, the Member States concerned and the relevant Advisory Councils (Article 20(3)). This consultation is accompanied by an explanatory memorandum that demonstrates that the measures proposed are non-discriminatory. Ideally this type of approach should be extended to conservation measures affecting other EU vessels in the EEZ and continental shelf.

The Commission may establish fish stock recovery areas (Article 8, Basic Reg). Member States identify such **biologically sensitive areas (BSAs)** and put these to the Commission, who then put forward proposals for the creation of a recovery area. Biologically sensitive areas can also be created under multi-annual plans. Ireland has one such area: off the south west coast created under Council Regulation (EC) No 1954/2003. This created a specific fishing effort regime inside the BSA and outside the BSA for demersal fishing vessels as well as scallop and crab fisheries.

Regulation (EU) 2016/2336 establishes specific conditions for fishing for deep-sea stocks in the north-east Atlantic as well as provisions for fishing in international waters of the north-east Atlantic. This is known as the **deep-sea access regime**. This regulates the kind of operators that are allowed to target deep sea species and sets the conditions under which Member States can issue licences for deep sea fisheries. Fishing activities targeting deep-sea species are subject to a fishing authorisation, which specifies the deep-sea species that the vessel is authorised to target. If a vessel catches deep-sea species as a by-catch, this also requires a fishing authorisation (the 'by-catch fishing authorisation'). Vessels not holding either type of

fishing authorisation are prohibited from fishing for deep-sea species in excess of 100 kg in each fishing trip. No fishing authorisation can be issued for the purpose of fishing with bottom trawls at a depth below 800 metres. Article 9 covers specific requirements for the protection of **vulnerable marine ecosystems (VMEs)** and applies to fishing operations with bottom gears below a depth of 400 metres. Encounters by fishing vessels with vulnerable marine ecosystems that meet certain conditions must be reported to the competent national authorities who then notify the Commission.

The EC requires a competent scientific advisory body to carry out an annual assessment of areas where VMEs are known to occur or are likely to occur and this information is used by the EC to develop the list of VMEs for adoption, which is reviewed annually. By 13 January 2021, the Commission will, on the basis of Member States' reports and scientific advice, evaluate the impact of the measures laid down in this Regulation and determine to what extent the objectives have been achieved. On the basis of the evaluation, the Commission may make proposals to amend this Regulation. Article 19(3) specifies that if the evaluation suggests that fishing with bottom gears does not comply with the objectives, the Commission may submit a proposal to amend this Regulation with the aim of ensuring that targeting fishing authorisations for vessels using bottom trawls or bottom-set gillnets expire or are revoked and that any measures necessary regarding bottom gears, including longliners, are put in place to ensure the protection of the most vulnerable species and VMEs.

VMEs were given additional protection through revised technical conservation measures in EU Regulation 2019/1241. This provides for the adoption of technical measures that take account of the regional specificities of fisheries through the regionalisation process introduced by CFP reform. Article 12, on protection of sensitive habitats, states that it is prohibited to deploy gears specified in Annex II within the relevant areas set out in that Annex. Art 12(3) identifies that Member States may establish closed areas or other conservation measures to protect the habitats specified in Annex II or to other sensitive habitats including vulnerable marine ecosystems. However, this is pursuant to the procedures laid down in Article 11 of EU Reg 1380/2013 (CFP) and such measures proposed must be in compliance with the objectives of the CFP (EU Reg 1380/2013 Art 2) and be at least as stringent as measures in EU Law.

The vulnerable habitats established in Annex II of EU Reg 2019/1241 are:

- Belgica Mound Province
- Hovland Mound Province
- North-West Porcupine Bank Area I
- North-West Porcupine Bank Area II, and
- South West Porcupine Bank.

Within the above areas, which correspond to the offshore SACs, it is prohibited to deploy bottom trawls or similar towed nets, bottom set gillnets, entangling nets, trammel nets and bottom set longlines.

EU Reg 2018/2025 is the governing legislation for the allocation of TAC and quota of deep sea species to EU Member States. The lifespan of the Regulation is for a period of two years i.e. the fishing opportunities for 2019 and 2020. With specific reference to Orange Roughy and Deep Sea Sharks, Article 7 provides that it is prohibited for Union fishing vessels to fish for Orange Roughy in Union waters and international waters of ICES areas 1-10, 12 and 14. EU Regulation 1006/2008 governs access of third country vessels to EU waters. Article 22 of this regulation requires all third country vessels, for which fishing authorisations have been issued,

to comply with the provisions of the CFP, its control measures and other provisions governing fishing by Community vessels in the fishing zones in which they operate. Ultimately this gives effect to the Reg 2018/2025 prohibition on orange roughy as outlined in Article 7 to third country vessels in EU waters. With respect to deep sea sharks a prohibition also applies to EU fishing vessels in ICES areas 5-9 and Union and international waters of ICES area 10.

1.2.2.3 Lists of threatened species

The IUCN and other international, European, and Irish organisations regularly publish red lists of species that are threatened. Whilst these lists are not legally binding, they are a source of scientific information that can be utilised to inform policy development. The IUCN Red Lists are possibly the most widely known and highly regarded. The IUCN Red List Categories and Criteria are intended to be easily understood and provide a system for classifying species at high risk of global extinction. It divides species into nine categories: not evaluated, data deficient, least concern, near threatened, vulnerable, endangered, critically endangered, extinct in the wild and extinct. The lists provide information about range, population size, habitat and ecology, use and/or trade, threats, and conservation actions. The IUCN lists are also used by various secretariats of international agreements to revise and update their annexes, e.g., the Convention on Migratory Species (CMS), the Convention on International Trade in Endangered Species (CITES) and indicators used for CBD reporting and progress in Sustainable Development Goals (SDG) implementation.

The European Red List[80] synthesises the IUCN Red List and identifies those species that are threatened with extinction at the European level (Pan-Europe and the European Union) so that appropriate conservation action can be taken to improve their status. These cover amphibians, birds, freshwater fish, marine fish, molluscs and reptiles. Birdlife International has also produced a European Red List of Birds.[81]

Separately the NPWS and the Northern Ireland Environment Agency (NIEA) cooperate to produce regional Red Lists for the island of Ireland. This is an action under the Irish National Biodiversity Plan. Relevant for the marine area are the red list of cartilaginous fish (Sharks, skates, rays and chimaeras) and the red list of amphibians, reptiles and freshwater fish. BirdWatch Ireland also produce a 'Birds of Conservation Concern' report regularly.

1.2.2.4 UN Sustainable Development Goals

The 2030 Agenda for Sustainable Development (adopted in 2015) identifies 17 Sustainable Development Goals (SDGs) which are a call for coordinated action by all countries to improve human lives and protect the environment but are not legally binding targets.

Goal 14 aims to "conserve and sustainably use the oceans, seas and marine resources for sustainable development." This Goal is broken down into targets and indicators requiring conservation of "at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information" by 2020 (Target 14.5).

Implementation in Ireland

Ireland has agreed to implement the SDGs and has set out an initial framework for doing so, in the Sustainable Development Goals National Implementation Plan 2018-2020. This is the first in a series of plans in the period to 2030 and sets out the relevant government departments responsible for the respective SDGs and Targets [82].

1.2.2.5 IUCN calls for increased area of MPAs

In 2014, the World Parks Congress made a recommendation that coverage of MPAs be increased to 30%. In 2016 at the IUCN World Conservation Congress held in Hawaii in September, IUCN members approved a new global target for MPAs. This specifies "30% of each marine habitat" to be set aside in "highly protected MPAs and other effective area-based conservation measures" by 2030, with the ultimate aim being "a fully sustainable ocean, at least 30% of which has no extractive activities." Whilst this "30% by 2030" target is not binding on countries, it does represent the most ambitious target adopted so far for MPAs and could motivate governments to designate additional MPAs. At the World Conservation Congress, calls for 50% MPA coverage came from several high-profile speakers, including the executive secretary of the UN Convention on Biological Diversity.

1.2.2.6 EU Biodiversity Strategy

The EU launched its first EU Biodiversity Action Plan in 2006 through the Communication "Halting the loss of biodiversity by 2010 - and beyond - Sustaining ecosystem services for human well-being" (EC, 2006) in recognition of continuing global loss of biodiversity. This was followed by the 2011 EU Biodiversity Strategy (EC, 2011). The latter aims to halt the loss of biodiversity and ecosystem services in the EU and, in line with CBD commitments, help stop global biodiversity loss by 2020.

In May 2020, the European Commission published a Communication entitled "EU Biodiversity Strategy for 2030 Bringing nature back into our lives" (COM(2020) 380 final) setting out the actions the EU could take to ensure that Europe's biodiversity will be on the path to recovery by 2030, in line with the 2030 Agenda for Sustainable Development and with the objectives of the Paris Agreement on Climate Change. It addresses the five main drivers of biodiversity loss and proposes an enhanced governance framework to address the remaining gaps, ensure full implementation of existing legislation and existing efforts. In relation to a coherent network of protected areas, the proposed key commitments by 2030 include legally protecting a minimum of 30% of the EU's sea area and integrating ecological corridors, as part of a true Trans-European Nature Network; strictly protecting at least a third of the EU's protected areas, and effectively managing all protected areas, defining clear conservation objectives and measures, and monitoring them appropriately.

The Communication also proposes a new EU Nature Restoration Plan, including a proposal for legally binding EU nature restoration targets in 2021 to restore degraded ecosystems and a request for Member States to ensure no deterioration in conservation trends and status of all protected habitats and species by 2030 (i.e. those habitats and species listed under the Birds and Habitats Directives). The Communication also recognises that full implementation of the EU's Common Fisheries Policy, the Marine Strategy Framework Directive, Birds and Habitats Directives, Maritime Spatial Planning Directive is essential. The Strategy states that the Commission will propose a new action plan to conserve fisheries resources and protect marine ecosystems by 2021 and that fisheries-management measures must be established in all Marine Protected Areas according to clearly defined conservation objectives and on the basis of the best available scientific advice. .

With respect to governance, the Commission proposes to put in place a monitoring and review mechanism which will include a set of agreed indicators to enable regular progress assessment and set out corrective action if necessary. In terms of next steps, this Communication sets out the Commission's proposals for protecting and restoring biodiversity but it must be endorsed

by the European Parliament and the Council prior to action being taken on any of the commitments contained therein. The Communication outlines the commitments the EU could take at the Conference of the Parties to the Convention on Biological Diversity in 2021 and in line with the United Nation vision of "living in harmony with nature" by 2050.

1.2.2.7 Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (the BBNJ Treaty)

At a global scale, increased designation and management of MPAs has occurred primarily in nearshore coastal zones.[83] Almost 8% of the ocean is covered by some form of designation, with the largest proportion occurring in the Territorial Seas (12 nautical miles).[84] Marine areas under national jurisdiction (Exclusive Economic Zones [EEZ] to 200 nautical miles) have significantly more protection (18.4%) than Areas Beyond National Jurisdiction (ABNJs or the high seas).

Areas beyond national jurisdiction make up approximately 60% of the global ocean, yet only 1.2% are covered by protected areas.[85] This area can be described as a 'global commons', where the principle of freedom of the High Seas pervades. No State has unilateral jurisdiction in ABNJs and there are major governance gaps at international level, including the lack of international framework for the establishment of a coherent system of MPAs.[86] Currently, international discussions are seeking to establish ways of simplifying the process to create MPAs in ABNJ (among other issues), through the development of an international legally binding instrument under UNCLOS, the Agreement on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ Treaty). Negotiations began in 2018, and the second version of the BBNJ Treaty was published in January 2020. The new instrument will focus on four key areas: marine genetic resources; area-based management tools (ABMTs); environmental impact assessments; and capacity-building and the transfer of marine technology. Marine Protected Areas are dealt with under the ABMT theme.

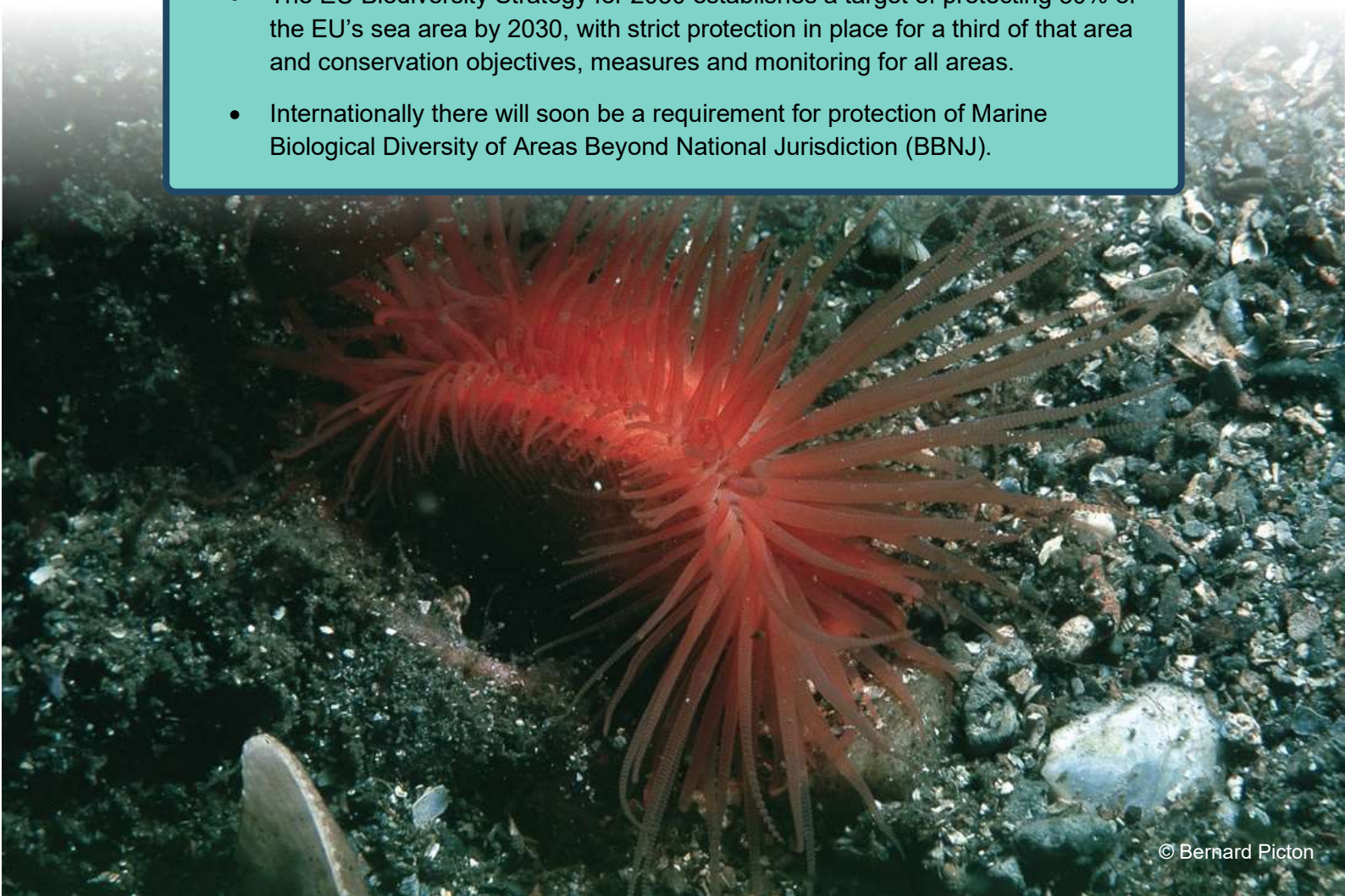
Currently a Marine Protected Area is defined in the draft text as "a geographically defined marine area that is designated and managed to achieve specific [long-term biodiversity] conservation and sustainable use objectives [and that affords higher protection than the surrounding areas]."[i] Draft Article 16 requires the identification of ABMTs on the basis of available scientific and traditional knowledge, the precautionary and ecosystem approaches. State Parties will be responsible for proposing areas to the Secretariat based on minimum elements that will be specified in the treaty. A process for monitoring and review of the ABMTs will also be included in the agreement. One recurrent issue is how designation of MPAs will work with the existing processes for designating ABMTs beyond national jurisdiction via Regional Fisheries Management Organisations and Regional Seas Programmes (such as OSPAR).

This process will have important consequences for Ireland as the waters over our agreed extended continental shelf areas are technically defined as 'high seas', as explained in Box 3.

[i] It should be noted that square brackets are used in the draft text to indicate (a) where there are two or more alternative options within a provision; and (b) where support has been expressed for a "no text" option, either within a provision or in relation to a provision as a whole.

Key messages

- The Maritime Spatial Planning Directive (MSPD) and the Common Fisheries Policy (CFP) have particular relevance to the operation of MPAs.
- The division of competences between the EU and Member States in relation to fisheries (exclusive - EU) and the environment (shared – MS + EU) takes on additional relevance in the context of MPAs and this needs to be understood by all actors when designing and implementing MPAs.
- Under the CFP Regulations, a Member State can request that the European Commission take conservation measures that apply to all vessels operating in its EEZ.
- The IUCN, European and Irish Red Lists provide recent information on threatened and vulnerable species that is more up-to-date than many legal instruments and should be used to inform specific policies and management actions.
- Target 14.4 of the UN Sustainable Development Goals is “By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.”
- Calls have been made by the IUCN for an increase in coverage of protected areas to 30% or even 50% of marine and coastal areas.
- The EU Biodiversity Strategy for 2030 establishes a target of protecting 30% of the EU’s sea area by 2030, with strict protection in place for a third of that area and conservation objectives, measures and monitoring for all areas.
- Internationally there will soon be a requirement for protection of Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ).



1.2.3 National protected areas legislation

In Ireland, management of the marine environment is complex and is divided between different governmental departments. The Wildlife Acts, 1976 is the original piece of nature conservation legislation and it has been amended to provide for more protection and conservation of wild fauna and flora. The Acts, as amended, also enable the designation of Natural Heritage Areas, Nature Reserves and Refuges for Fauna. There has been limited use of the provisions in the Wildlife Acts for the protection of the marine environment to date. The Act applies to land and foreshore so it is limited in that it cannot provide for protection beyond 12 nautical miles (i.e. beyond Ireland's territorial seas).

As a Member State of the EU, Ireland is required to designate SPAs and SACs under the Birds and Habitats Directives respectively. The provisions of both those Directives are transposed into Irish law by the European Communities (Birds and Naturals Habitats) Regulations 2011, as amended (B&NH).

The majority of existing conservation sites in Ireland (excluding European Natura 2000 sites) derive from the Wildlife Acts, 1976-2018. The aims of the Wildlife Act, 1976 are:

- to provide for the protection and conservation of wild fauna and flora,
- to conserve a representative sample of important ecosystems,
- to provide for the development and protection of game resources and to regulate their exploitation, and
- to provide the services necessary to accomplish such aims.

The original (1976) Act provides for different types of protected sites (outlined below), as well as more general provisions on the protection of wild birds, animals and flora; restrictions to protect wildlife; and controls on wildlife dealing. The Act was amended in 2000 to address the weaknesses in the habitat/site protection measures in the 1976 Act. As such, the 2000 Act provides a mechanism to give statutory protection to Natural Heritage Areas and for statutory protection of important geological and geomorphological sites. Significantly the 2000 Act also broadened the scope of the legislation to include fish and aquatic invertebrates, which had been excluded from the 1976 Act.

1.2.3.1.1 Statutory Nature Reserves

A Statutory Nature Reserve is a national designation established over State-owned land, inland waters or foreshore areas that form the habitat of a species or community of flora or fauna of scientific interest or that is part of an ecosystem of scientific interest, and which would benefit from protection measures.

The Wildlife Act, 1976, as amended, provides for the establishment or recognition of nature reserves, which are areas managed primarily for conservation of one or more species, communities, habitats or for any feature of geological, geomorphological or other natural interest which is provided for by the Minister.

Under Section 15 the Minister may *establish* land owned by the Minister or State as a nature reserve. The 'establishment order' issued must specify the reason why and the objectives for which the nature reserve is being established or recognised by the Minister and a copy must be sent to the Commissioners, An Bord Pleanála and to any planning authority within whose area the nature reserve is situated.

Similarly under Section 16, the Minister may *recognise* as a nature reserve land owned by organisations or private individuals having been satisfied, by the person interested in acquiring statutory protection of their land, that the land meets the criteria for recognition and that the person is in a position to manage the land as a nature reserve.

Section 12 places a general obligation on Ministers of State and other public authorities for the protection of land established or recognised as a nature reserve.

Section 59 provides that the Minister may make regulations permitting public access to and use of nature reserves in accordance with those regulations.

There are currently 78 Statutory Nature Reserves in Ireland. There are 13 that include marine elements, all of which overlap with Natura 2000 sites (Table 1.5).

Table 1.5 – Statutory Nature Reserves in Ireland with marine elements

Nature reserves		
Baldoyle Estuary	Great Skellig (Sceilg Mhichíl)	Puffin Island
Ballyteigue Burrow	Little Skellig	Tearaght Island
Capel Island and Knockadoon Head	Lough Hyne	The Raven
Castlemaine Harbour	North Bull Island	Tralee Bay
Derrymore Island		

1.2.3.1.2 Refuges for Fauna

A Refuge for Fauna is a national designation for areas where the specific protection of one or more species of animal is required. Section 17 of the Wildlife Act 1976, as amended by the Wildlife (Amendment) Act, 2000 provides that the Minster may designate land as refuge for fauna and flora and apply protective measures by Ministerial Order. Prior consultation with public authorities and the notification of the owner or occupier of the land and the general public is required in order to allow for objections to be made. Compensation may be paid to a person with an interest in or over the land for any decrease in its value following designation. Section 59 provides that the Minster may make regulations permitting public access to or use of the refuge to such extent as is necessary to enable the relevant designation order to have full effect.

There are currently seven Refuges for Fauna in Ireland and all are islands or cliffs of importance for breeding seabirds and overlap with sites in the SPA network.

Table 1.6 – Refuges for Fauna in Ireland

Refuges for Fauna		
Lady's Island	Rockabill	Old Head of Kinsale
Bull Rock	Horn Head	Cliffs of Moher
Cow Rock		

1.2.3.1.3 Natural Heritage Areas

A Natural Heritage Area (NHA) is an area that is worthy of conservation for one or more species, communities, habitats, landforms or geological or geomorphological features, or for

its diversity of natural attributes. Coastal/marine sites have been proposed as NHAs but none have yet been designated.

NHAs are designated by Order of the Minster under Section 18 of the Wildlife (Amendment) Act, 2000, following a public consultation with the land owner and general public. A Natural Heritage Order may include measures for the protection of the natural heritage area such as restrictions on carrying out certain works, and a requirement to seek permission for any work which might damage the protected features. NHAs that have not yet been designated but for which the Minister has issued a notice of intention to designate are also afforded some protection.

Box 5: Lough Hyne Nature Reserve, Co. Cork

Lough Hyne was declared as a nature reserve in 1981. The designation encompasses the 'foreshore, waters and seabed of Lough Hyne', and seeks to 'to ensure the conservation of the marine ecosystem'. This made Lough Hyne Ireland's first nature reserve to focus on a marine ecosystem. The reserve is covered by the Nature Reserve (Lough Hyne) Regulations, 1981 (SI No. 207/1981) that specify, for example, limits on boat use in the Lough, that permits are required for research, divers and some other leisure activities. Whilst taking any flora or fauna without a permit is forbidden, some specified types of recreational fishing are exempt from this. Until very recently, users had to report to an official caretaker of Lough Hyne, however, since his passing, this role has not been replaced. One family was granted traditional fishing rights to operate a small boat to capture prawns (*Palaemon serratus*) in Lough Hyne during a restricted season (September to Christmas each year). However, due to unpredictable and low catches of prawns, this fishing activity does not always occur.

The designation of the Lough Hyne reserve built on a long history of field research at the site, which means that several of the Lough's habitats were well characterised, including the tidal rapids and associated kelp forest. The Lough is a relatively deep basin (50m), with underwater cliffs, areas of sediment, and variation between current-swept and sheltered habitats. This level of habitat diversity occurs in a relatively small area (~0.5 km^2). Comparisons with other sites have suggested that the extensive species lists for the Lough reflect a genuine diversity hotspot and are not just reflective of a high collection effort (Bell and Barnes 2000).

A number of long-term studies show changes in the ecological communities of the Lough. Identifying a 'marine reserve' effect, however, is difficult. No intensive harvest was halted at the point of designation. The potential causes of changes in species numbers over time are difficult to untangle as factors like climate change, nutrient enrichment and the prevalence of disease interact. For example, Trowbridge et al. (2019) concluded that a number of processes were controlling purple urchin numbers, including some ongoing poaching.

One well-developed aspect of the Lough Hyne nature reserve are the cultural impacts and connections to the community in West Cork. These are evident in the exhibition on Lough Hyne at the Skibbereen Heritage Centre. Anecdotal evidence suggests that there has been an increase in recreational activities at the Lough since the introduction of the Wild Atlantic Way Initiative; however, it is difficult to know if this increase in activity has impacted negatively on the Lough.

1.2.3.1.4 Wildfowl Sanctuaries

A Wildfowl Sanctuary is an area over which shooting of wild birds is prohibited. The Wildlife (Wild Birds) (Open Seasons) Orders 1979 to 2012, permit the hunting of wild game birds at certain times of the year. These Orders are issued under Section 24 of the 1976 Wildlife Act[i].

The Orders *exclude* certain areas of land, meaning that it is not permitted to hunt wild game birds within the excluded areas. These areas allow game birds to be left undisturbed to rest and feed and are commonly called 'wildfowl sanctuaries'. To date, 68 areas of state and private land have been excluded from the wild birds open seasons orders, many of which are coastal sites.[ii]

1.2.3.1.5 National Parks

Ireland has established six National Parks[iii]. Currently none of the National Parks in Ireland have coastal or marine features. These have no legal backing except for Killarney National Park (via Bourn Vincent Memorial Park Act, 1932 and related statutory instrument). The national parks are almost entirely State-owned.

All of Ireland's national parks share the following characteristics recommended by the International Union for the Conservation of Nature (IUCN) in 1969:

- Where one or several ecosystems are not materially altered by human exploitation and occupation; where plant and animal species, geomorphological sites and habitats are of special scientific, educational and recreational interest or which contain a natural landscape of great beauty;
- Where the highest competent authority of the country has taken steps to prevent or eliminate as soon as possible exploitation or occupation in the whole area and to enforce effectively the respect of ecological, geomorphological or aesthetic features which have led to its establishment;
- Where visitors are allowed to enter, under special conditions, for inspirational, educational, cultural and recreational purposes.

The National Parks are managed, maintained, and developed by the National Parks & Wildlife Service (NPWS) of the Department of Culture, Heritage and Gaeltacht.

1.2.3.1.6 Creation of the "Whale and Dolphin Sanctuary 1991"

The Irish government declared a Whale and Dolphin Sanctuary on 7th June 1991 within the exclusive fishery limits of the State (i.e. 200 nautical miles), drawing on the legal provisions contained in the Wildlife Act, 1976 and Whale Fisheries Act, 1937.[87] Under the latter legislation the hunting of baleen whales was prohibited within 200 nautical miles. This was amended in 1982 to extend protection to all species of cetaceans. The Wildlife Act, 1976 also protects cetaceans from being hunting but this goes further in that it protects such species

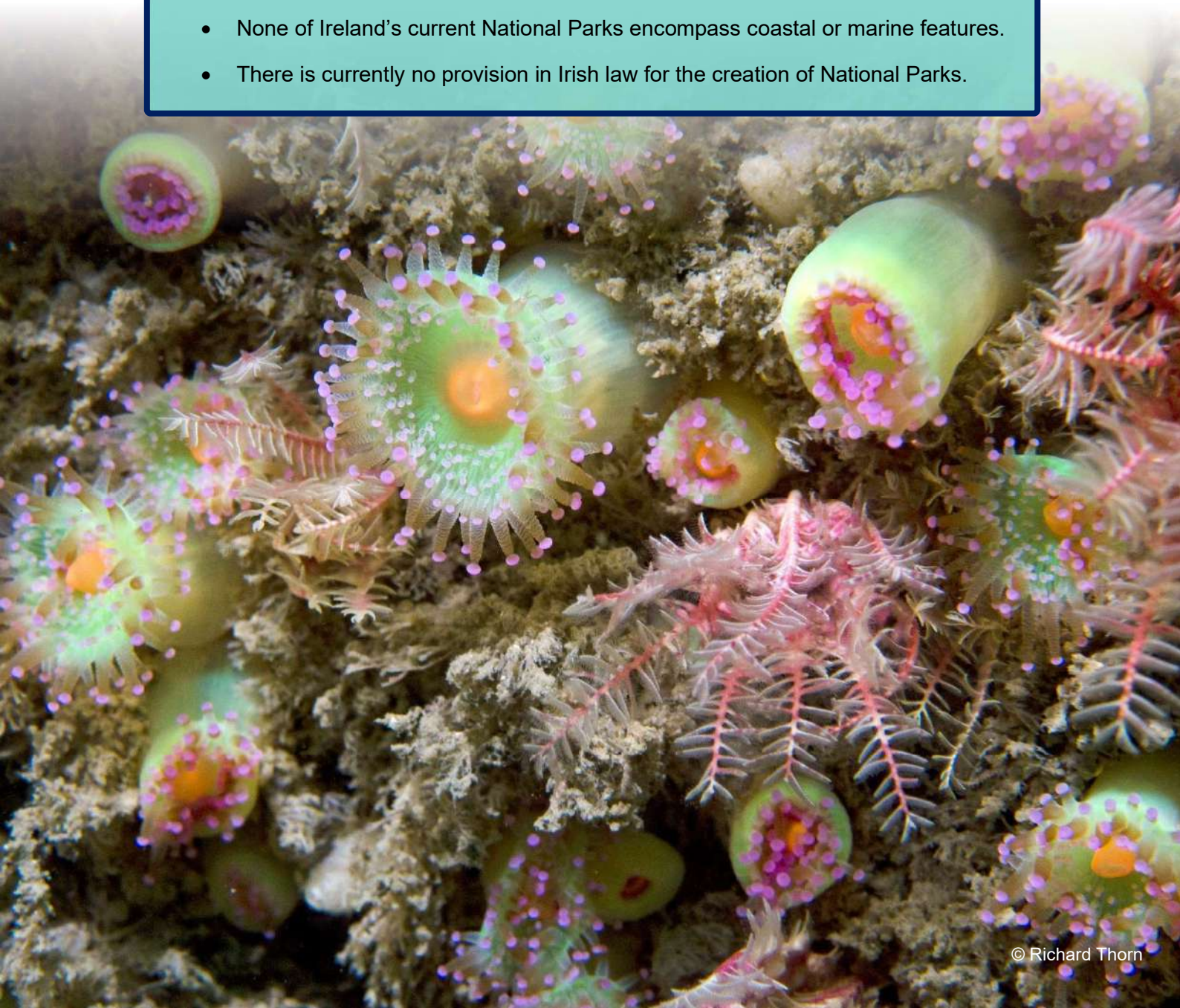
[i] As amended by Section 33 of the Wildlife (Amendment) Act, 2000.
[ii] These areas are specified in Part I of the Second Schedule of the 1979 Order (S.I. No. 192/1979), as amended by S.I. No. 229/1980, S.I. No. 266/1982 and S.I. No. 221/1989 (see list at https://www.npws.ie/protected-sites/wildfowl-sanctuaries). The Wildlife Acts do not set out the process for selecting and creating a new area to be excluded from the Orders. The last time a new area was added was in 1989, by the Wildlife (Wild Birds) (Open Seasons) (Amendment) Order, 1989 (S.I. No. 221/1989).
[iii] Ballycroy National Park (Co. Mayo), Burren National Park (Co. Clare), Connemara National Park (Co. Galway), Glenveagh National Park (Co. Donegal), Killarney National Park (Co. Kerry) and Wicklow Mountains National Park.

from “wilful interference” taken to include interference with their habitat and breeding areas, though these powers are limited to the foreshore (12 nautical miles). Now all cetacean species are included within the Annex IV of the Habitats Directive.

The Whale and Dolphin Sanctuary could be viewed as a misnomer in a number of respects: arguably the word sanctuary implies a high level of protection yet the declaration did not involve a formal site designation order (equivalent to what happens in designations currently) or any specific management measures, but relied solely on existing legislative provisions at that time.

Key messages

- The Wildlife Acts, as amended, provide for area-based designation for the purpose of conservation in the foreshore (high water mark to the 12 nm limit).
- Designations under the Wildlife Acts, as amended, appear to be under-utilised in terms of affording protection to the marine environment and are limited in terms of their geographic scope This may be partly attributed to implementation of the Birds Directive and Habitats Directive, which was occurring at a similar time.
- None of Ireland’s current National Parks encompass coastal or marine features.
- There is currently no provision in Irish law for the creation of National Parks.



1.2.4 Ireland's current network of protected areas

As a consequence of the policy drivers and legislative instruments above, primarily the Birds and Habitats Directives, Ireland already has a network of marine areas that are protected for conservation of species and/or habitats. These sites fit within the definitions discussed in Section 1.1.7 and most correspond broadly to IUCN Category IV.

The existing Irish network of protected areas in the marine environment includes those SPA and SACs sites with marine features. Sites have also been designated under the Wildlife Acts, nominated to the OSPAR network or designated under the Ramsar Convention. These offer varying degrees of protection to different habitats and species and not all would fit the definition of MPA. However, all of them are also designated as SACs and/or SPAs, which gives them legal protection. Thus, when calculating the area contribution towards MPA targets, the marine area of Ireland's Natura 2000 network can be used as a proxy for Ireland's total area of MPAs.

When reporting the marine area of Ireland's Natura 2000 network to the European Commission the total area of all Natura 2000 sites within the maritime area (i.e. below the mean high-water mark) is given. This results in a total of 9,867 km^2 for SACs, 1,717 km^2 for SPAs and a total area of 10,420 km^2 for marine Natura 2000 sites. The total area is not the sum of the SAC marine area and the SPA marine area because there are areas of overlap. A far greater proportion of coastal and estuarine areas are currently designated as protected areas, with fewer designations and limited coverage in offshore areas (Figures 1.9 and 1.10).

Natura 2000 sites are designated for the protection of specific habitats and species and managed for the protection of these qualifying interests. Some of these habitats and species can be considered truly marine (e.g. the four species listed in Table 1.2); however, there are many others which can either be found on the land/sea boundary (e.g. habitats such as coastal lagoons) or represent species where marine and terrestrial environments both form important elements of their habitat (e.g. breeding seabirds which nest on cliffs, or migrating fish).

In this inventory, we have limited inclusion of SACs/SPAs for species and habitats reported as marine in Natura 2000 reporting guidelines (Table 1.2), which has resulted in the lists of SACs and SPAs provided in Appendix D and summarised in Figure 1.9 and Figure 1.10 below. The contribution of existing SACs and SPAs designated for coastal habitats to Ireland's MPA network could be given further consideration, as there are a number of sites designated for coastal habitats and species which include both terrestrial and marine components (see Section 3.6.2).

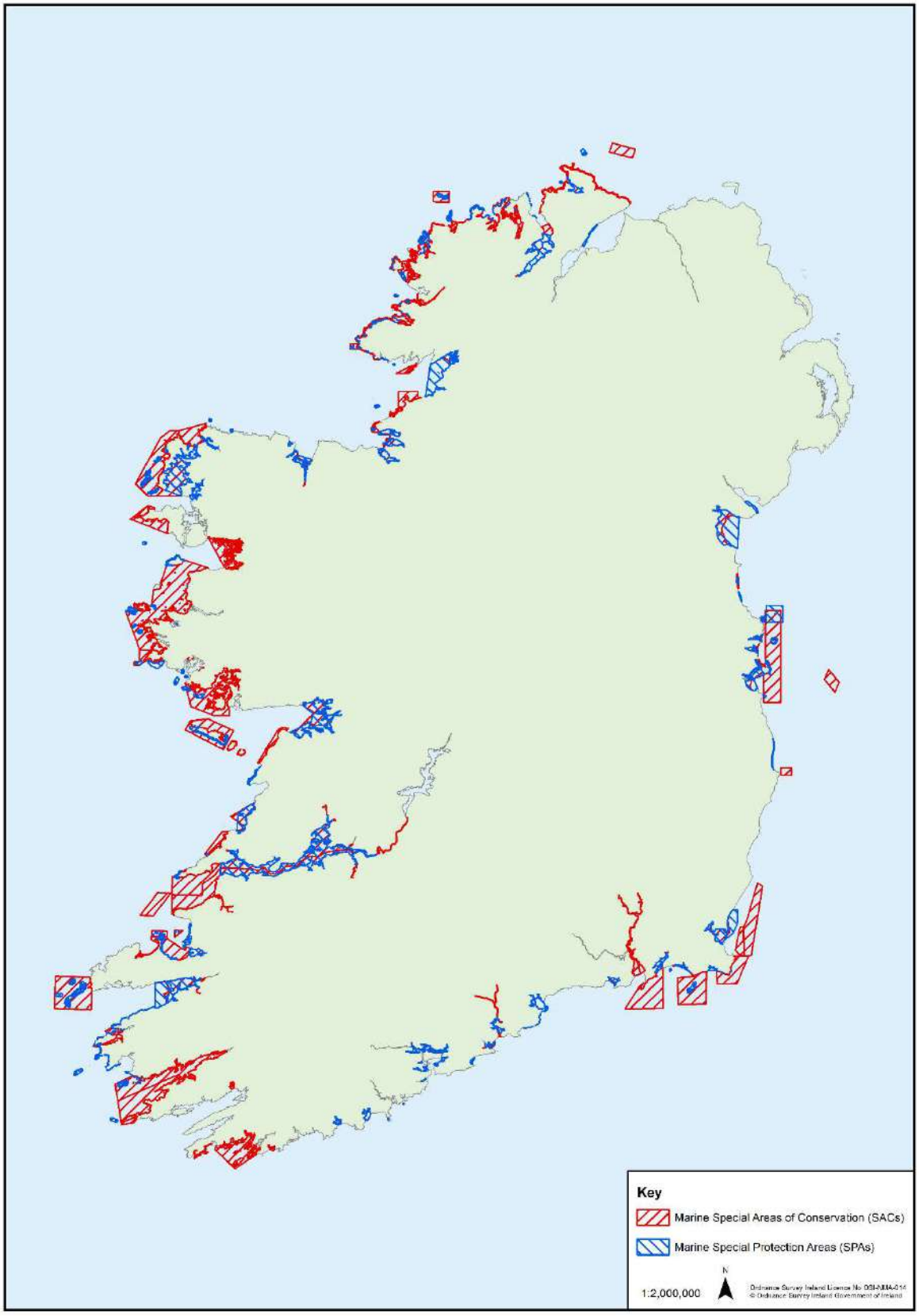


Figure 1.9 – Ireland's Special Areas of Conservation (SACs) in red and Special Protection Areas (SPAs) in blue designated for marine features and clipped at the mean high water line to show only the maritime component of these sites. Offshore sites are not shown to allow coastal detail to be seen and are instead included in Figure 1.10.

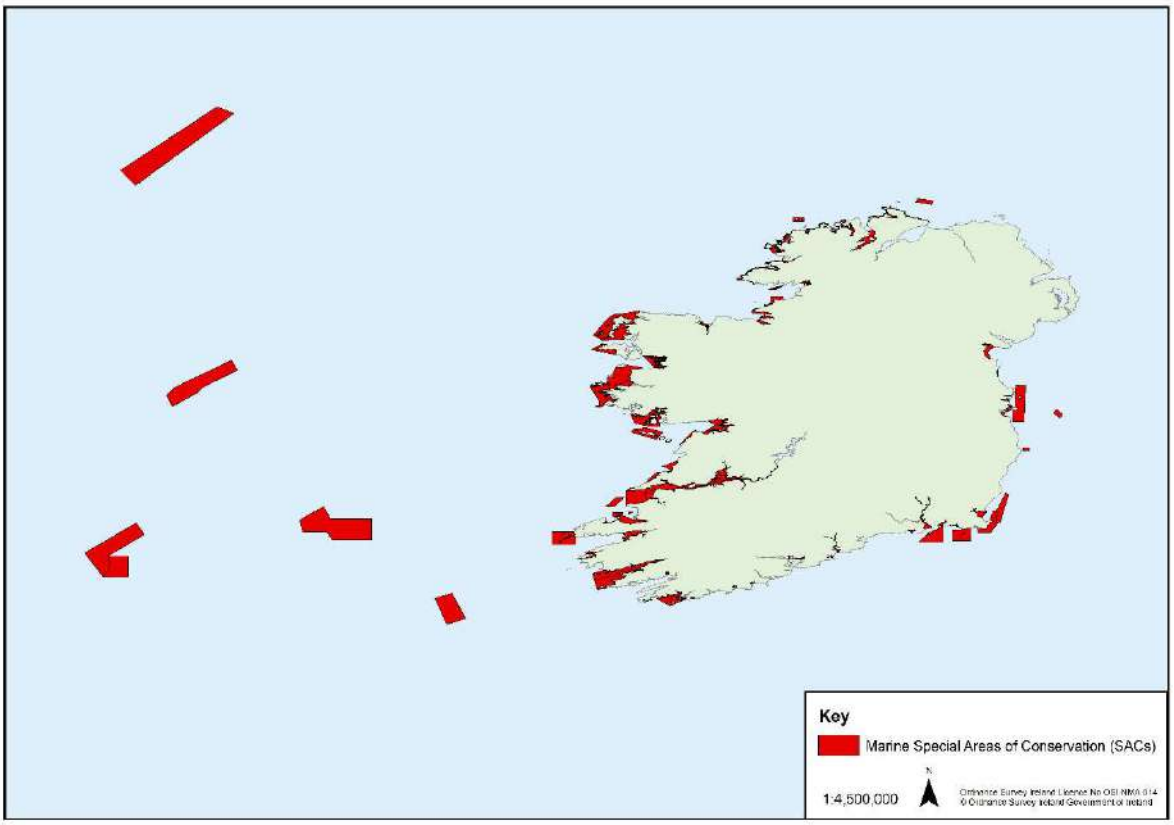


Figure 1.10 – All of Ireland's Special Areas of Conservation (SACs) designated for marine features, including offshore and near shore sites, clipped to the mean high water line.

Key messages

- Ireland currently has a marine protected area network of 10,420 km^2, encompassing 2.13% of its total maritime area of 488,762 km^2.
- All sites in this network are part of the Natura 2000 network, designated for specific qualifying interests and protected primarily by the EU Birds and Habitats Directives, though some areas are also covered by other national or other international instruments.
- A far greater proportion of coastal and estuarine areas are currently designated as protected areas, with fewer designations and limited coverage in offshore areas.

1.2.5 Other instruments relating to marine environmental management

There is a wide variety of international and national legislation and policy regulating marine activities and industries. This includes a considerable amount of EU legislation and policy, such as the Environmental Impact Assessment Directive, the Strategic Environmental

Assessment Directive, the Bathing Water Directive and the Shellfish Water Directive. Land-based activities can have negative impacts on freshwater and marine environments, and these are addressed through instruments like the Water Framework Directive, Nitrates Directive and the Urban Wastewater Treatment Directive.

MPAs are not isolated from the wider marine environment, and the interplay between different EU laws and policies, and connections with land-based activities and their management, is important for the establishment, management, and success of MPAs.

Key messages

- A wide range of legislation underpins management of activities influencing the marine environment through approaches that are not area-based but which may have implications for conservation of marine biodiversity.

Table 1.7 – Summary of legislation and policies requiring protected area designation in Ireland's maritime area

Source	Objectives and definitions	MPA target	Implementation in Ireland
United Nations			
Convention on Biological Diversity, 1992	To halt the loss of biodiversity. --- Protected area is "a geographically defined area, which is designated or regulated and managed to achieve specific conservation objectives" (CBD Article 2) --- Marine protected area: "Any defined area within or adjacent to the marine environment, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by legislation or other effective means, including custom, with the effect that its marine and/or coastal biodiversity enjoys a higher level of protection than its surroundings."	Representative and effectively managed MPA networks should be put in place by 2012, so as to effectively conserve 10% of each of the world's marine regions. Article 8(a) specifies that contracting parties should: "Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity"	Less than 2.5% of Ireland's marine area has been designated for conservation purposes. National Biodiversity Action Plan Responsible authority: DHLGH (NPWS)
CBD Strategic Plan 2011-2020		Aichi Target 11: "By 2020, at least 17 % of terrestrial and inland water areas and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes."	National Biodiversity Action Plan Responsible authority: DHLGH (NPWS)
UN Sustainable Development Goals (not legally binding)	Goal 14 Life Below Water	Target 14.5 - By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information	National Implementation Plan 2018-2020 Responsible authority: DCCAE / whole of government relating to their functions (DHLGH responsible for Goal 14)

UNESCO Biosphere Reserves	Biosphere Reserves are not strict nature reserves but are intended to facilitate sustainable development, within certain zones known as 'core areas' for nature conservation.	Worldwide network for research, education and training. Core zone for strict protection of natural ecosystems; a buffer zone intended to reduce impacts on the core zone and a transition zone for sustainable development.	Dublin Bay Biosphere Reserve Legal Backing: None* (but covered by provisions and designations in the Wildlife Acts, 1976-2012 and SPA designation) Responsible authority: DHLGH
UNESCO World Heritage Convention	Seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity.	World Heritage Sites protect the world's natural and cultural heritage. The World Heritage List includes 50 unique ocean places across 37 countries but none in Ireland. These are recognised for their unique marine biodiversity, singular ecosystem, unique geological processes or incomparable beauty.	Skellig Michael World Heritage Site Legal Backing: None* (but covered by National Monuments Acts 1930-2004, the Wildlife Act 1976 and 2000, Planning and Development Acts) Responsible authority: DHLGH
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention, 1971)	To conserve wetlands, especially for waterfowl	Contracting parties must select wetland sites of international importance for designation, either for their importance to waterfowl populations or as a good example of a specific wetland habitat.	Ireland has 45 Ramsar sites, 22 of which have marine or coastal elements. All Ramsar sites overlap with Natura 2000 sites. Legal Backing: None* (but protection derives from other designations usually EU Birds Directive SPA). Responsible authority: DHLGH (NPWS)
Regional Sea Convention			
OSPAR recommendation 2003/3 Set up an MPA network consistent with the CBD target for effectively conserved marine and coastal ecological regions	"Marine protected area" means an area within the maritime area for which protective, conservation, restorative or precautionary measures, consistent with international law have been instituted for the purpose of protecting and conserving species, habitats, ecosystems or ecological processes of the marine environment. (Source: OSPAR Recommendation 2003/03)	(1) by 2012, to ensure an ecologically coherent, representative network of MPAs incl. the High Seas; 2) by 2016, to ensure the network is well managed and that the appropriate measures are set up and are being implemented.	Ireland has 19 OSPAR MPAs, with a total area of c. 4,136 km2 (Appendix). The sites are selected to protect biodiversity, particularly for the following species/habitats: intertidal mudflats, Lophelia pertusa reefs, maërl beds, Zostera beds, and the harbour porpoise Phocoena phocoena. Legal Backing: None*. (No Irish legislation to underpin the designation of

			OSPAR sites but the 19 OSPAR MPAs are SAC sites). Responsible authority: DHLGH
EU legislation and policies			
Birds Directive 1979 (as amended)	Ensuring biodiversity through conservation of habitats and species. No definition of SPA, but describes it as an area for the conservation of the bird species listed in Annex I, in the geographical sea and land area where the Directive applies, and also for regularly occurring migratory species not listed in Annex I.	Set up a coherent, ecological network of special areas under the title Natura 2000. Designate Special Protection Areas (SPAs)	Ireland's SPA network encompasses 570,000 ha of marine and terrestrial habitat. Legal backing: Yes. Transposed into Irish national law by the European Communities (Birds and Natural Habitats) Regulations 1997 (amended 2011-2015) ('the B&NH Regulations'). i Responsible authority: DHLGH (NPWS)
Habitats Directive, 1992	Conserve biodiversity through a requirement to take measures to maintain or restore natural habitats and wild species listed in the Annexes to the Directive at a favourable conservation status.	Set up a coherent, ecological network of special areas under the title Natura 2000. Designate Special Areas of Conservation (SACs) for Annex I and Annex II.	There are 90 SACs selected for marine and coastal Annex I and II habitat/species present in Ireland. Legal backing: Yes. B&NH Regulations. Responsible authority: DHLGH (NPWS)
EU Biodiversity Strategy to 2030	Long-term plan to protect nature and reverse the degradation of ecosystems	Proposal to legally protect a minimum of 30% of the EU's sea area and integrate ecological corridors and an EU Nature Restoration Plan, including legally binding targets in 2021	Commission's strategy must be passed by European Parliament before there can be any implementation of its proposals.

[i] S.I. No. 477 of 2011, as amended by S.I. No. 290 of 2013, S.I. No. 499 of 2013, S.I. No. 355 of 2015. S.I. No. 477 of 2011 revoked the European Communities (Natural Habitats) Regulations 1997 (S.I. No. 94 of 1997), and its amendments, and also the European Communities (Birds and Natural Habitats) (Control of Recreational Activities) Regulations 2010 (S.I. No. 293 of 2010).

Marine Strategy Framework Directive	Achieve or maintain Good Environmental Status MPAs are not defined by the MSFD. In the report by the EC on progress made in the establishment of MPAs, MPAs are described as "geographically defined marine areas; whose primary and clearly stated objective is nature conservation; which are regulated and managed through legal or other effective means to achieve this objective" (EC, 2015).	Article 13(4) "Programmes of measures established pursuant to this Article shall include spatial protection measures, contributing to coherent and representative networks of marine protected areas, adequately covering the diversity of the constituent ecosystems, such as special areas of conservation pursuant to the Habitats Directive, special protection areas pursuant to the Birds Directive, and marine protected areas as agreed by the Community or Member States concerned in the framework of international or regional agreements to which they are parties."	Ireland's Programme of Measures includes the following relating to MPAs [and associated Descriptors]: Continue to ensure coherence of Ireland's network of marine protected areas by setting up increased protection areas using tools such as habitat protection orders, no-take zones etc. [1,4,6] Continue to consider whether sites justify selection as Marine Protected Areas. [1,3,4,6,7] Set up (temporary or permanent) Marine Protected Areas in functional zones for fish. [1,3,4,6] Develop a national strategy to create and manage Ireland's network of Marine Protected Areas. [1,4,6] Legal backing: EC (Marine Strategy Framework) Regulations 2011 and Amendment Regulations 2017 Responsible authority: DHLGH

* Note: The specific designation may not have legal backing per se but it may be covered by another legal designation or instrument (e.g. the B&NH Regulations), which helps ensure protection and prevent damage.

DHLGH – Department of Housing, Local Government and Heritage (formerly Department of Housing, Planning and Local Government)
NPWS – National Parks and Wildlife Service, falls under Department of Housing, Local Government and Heritage as of 30th September 2020
DCCAE - Department of Communications, Climate Action and Environment

1.3 Gaps and opportunities in Ireland's network of protected areas

1.3.1 Size, coverage and properties of the network

As described above, under the Convention on Biological Diversity and the UN Sustainable Development Goals, signatories, including Ireland, have committed to protecting 10% of their total marine area. This target also arises in the OSPAR Convention. The IUCN World Conservation Congress in 2016 called for a new target of 30% of each marine habitat by 2030, a target that is now reflected in the EU Biodiversity Strategy 2030, which also argues for strict protection for 10% of EU sea, focused on areas of 'very high biodiversity value or potential'.

The Programme for Government agreed in June 2020 contains a paragraph on Marine Protection Areas that states "we support the principles and ambition of the EU Biodiversity Strategy and will develop comprehensive legislation for the identification, designation and management of Marine Protected Areas (MPAs) in Irish … waters. We will realise our outstanding target of 10% … as soon as is practical and aim for 30% of marine protected areas by 2030. This will be done on the basis of scientific expertise and in close consultation with all stakeholders, in particular the fishing industry as well as environmental and community representatives. This consultation process will begin in the first 100 days of Government. We will examine the establishment of an offshore maritime area as Ireland's seventh national park. This would form part of the expanded MPA's and allow for a learning experience in the maritime environment."

In addition, the Programme for Government also states that the carbon sink potential of our marine environment based on the introduction of Marine Protection Areas will be evaluated and implemented. Separately to MPAs but related to the marine environment generally is a commitment to prioritise the Marine Planning and Development Management Bill across government and enacted within nine months (p.34). The Programme also foresees the creation of a marine planning oversight delivery board, similar to the model used for Project Ireland 2040, to provide leadership and oversight on the implementation of marine planning policies (p.84). A new, integrated marine sustainable development plan, to replace and update Harnessing Our Ocean Wealth, is to be developed under the central coordination of the Department of the Taoiseach.

The current network of protected areas encompasses only 2.13% of Ireland's total maritime area (Section 1.2.4), which is well short of international targets described above. Ireland's MPA coverage should not be increased solely to reach a specified target or 10 or 30% (via large, blanket designations) but expansion should be strategically targeted to meet requirements for Good Environmental Status (GES) under the MSFD and protect those species and habitats that are not currently sufficiently protected and are at risk (see below). Designations should be based on scientific knowledge, with appropriate and proportionate coverage and appropriate objectives and management such that the network is coherent, connected, representative and resilient (as described in Part 3).

Key messages

- A large increase in the coverage of MPAs is required to meet international targets and commitments in Ireland's new Programme for Government (June 2020) of 10% as soon as is practical and 30% by 2030.
- An expanded network should be strategically designed to fill gaps in existing coverage, be coherent, connected, representative and resilient and contribute to the requirements for Good Environmental Status under MSFD.

1.3.2 Listed habitats and species for which Natura 2000 coverage is currently insufficient

1.3.2.1 Offshore Reef

The current extent of offshore reef protected by SACs has been deemed insufficient by the European Commission and a process in currently being undertaken to designate additional areas. Carbonate mounds and living *Desmophyllum pertusum* and *Madrepora oculata* are well represented but other habitats which could be designated under the Natura 2000 legislation, such as deeper biogenic reef comprising the hermatypic coral *Solenosmillia variabilis*, and sponge and cnidarian (e.g., gorgonian coral and black coral) aggregations on geogenic reef, are currently not. The total area of offshore habitat protected is just under 5,000 km^2, which represents around 0.5% of the total offshore habitat. Recent EMFF-funded research surveys and other expeditions have highlighted the presence of these diverse benthic habitats.

1.3.2.2 Seabirds at sea

Despite the fact that many seabird breeding and foraging sites are protected by the Birds and Habitats Directives, seabirds often lack area-based protection at sea. This is especially the case for pelagic seabirds. For example, only 7% of the European storm petrel's projected at-sea distribution is protected by current protected areas. This is largely because most SPAs in relation to seabirds are extensions of the coastline surrounding their nesting colony site.[88] Another example is the Atlantic puffin which has only 20% of its at-sea distribution protected by protected areas.

Key messages

- Additional Natura 2000 sites are required for offshore reef and seabirds at sea in line with Habitats Directive requirements. A process is already underway to achieve this.

1.3.3 Species and habitats not covered by Natura 2000

The existing network of protected areas is limited to Natura 2000 sites with marine qualifying interests and accordingly. Although species associated with protected habitats also gain some protection strategic explicit protection of habitats and species that are not listed in the Birds and Habitats Directives cannot be delivered at the network level under those Directives. Whilst in principle these Directives provide a coherent approach to the protection of seabirds, turtles and marine mammals, in practice their ability to protect marine fish, invertebrates and a number of marine habitats is less coherent. The EEA (2015) has stated that this is particularly true for habitats such as sandbanks below 20 m or soft-bottom habitats, and their associated fauna and flora. The Directives thus exclude significant aspects of marine ecosystems from formal protection schemes. Some of these are covered in the more extensive lists under OSPAR; others are recognised at national level as being a priority for protection.

1.3.3.1 Species and habitats listed under OSPAR but not the Birds or Habitats Directives

The OSPAR convention to which Ireland is a signatory, includes a list of threatened and declining species to be protected by the OSPAR network of MPAs. As indicated in Section 1.2.1.3Ireland has established some MPAs to contribute to the OSPAR network, but their legal protection in Ireland stems only from laws established under the EU Habitats or Birds Directives. As indicated above, species not on those lists cannot be given formal legal protection under Irish law. A number of species and habitats that occur in Ireland fall into this category (Table 1.8). Latin names and further details are available in Appendix C.2.

Table 1.8 – OSPAR List of Threatened and/or Declining Species and Habitats occurring in Ireland's maritime area that are not listed in the EC Birds or Habitats Directives.

Fish species	**Invertebrate species**
European eel	Dog whelk
Portuguese dogfish	Flat oyster
Gulper shark	**Habitats**
Leafscale gulper shark	Carbonate mounds
Basking shark	Coral gardens
Common skate	Deep-sea sponge aggregations
Spotted ray	Intertidal *Mytilus edulis* beds on mixed and sandy sediments
Cod	*Lophelia pertusa* reefs
Long-snouted seahorse	*Modiolus modiolus* beds
Short-snouted seahorse	Oceanic ridges with hydrothermal vents/fields
Orange roughy	Ostrea edulis beds
Porbeagle	*Sabellaria spinulosa* reefs
Thornback ray / skate	Seamounts
White skate	Sea-pen and burrowing megafauna communities
[Northeast Atlantic] spurdog	*Zostera* beds
Angel shark	
Bluefin tuna	

1.3.3.2 Continental shelf soft substrates

There is a paucity of protection for continental shelf habitats (Figure 1.7) since Natura 2000 criteria only protect very shallow soft substrate habitats as components of large shallow inlets or bays or sandbank. Thus, although soft substrates in continental shelf with water comprises a vast area of Ireland's marine territory, none is afforded area-based protection, except in rare cases as part of designated large shallow inlets and bays.

1.3.3.3 Offshore VMEs (and other habitats) on soft substrates

Recent EMFF-funded research surveys and other expeditions have highlighted the presence of diverse benthic habitats including aggregations of the deep-sea sponge *Pheronema*, sea pen fields of a variety of species, glass sponge reef, and bamboo coral forests on sandy bottoms in deep waters (Figure 1.11). No criteria exist to designate soft substrate MPAs in deep water under the Habitat's Directive. OSPAR habitats that require protection but which are not protected under Natura 2000 include corals gardens on any substrate other than rock, deep-sea sponge aggregations on any substrate other than rock, and sea-pen and burrowing megafauna communities.

1.3.3.4 Pelagic and demersal species

1.3.3.4.1 Fish

Fish are the most diverse group of vertebrates and ~400 marine species are known to occur in Irish waters (Ferriss et al. 2009). They are often the most abundant and conspicuous component of our marine fauna. However, in terms of protection, less than 12% (116 species) of marine fish species are afforded some protective measures through either a fisheries management plan or designation of a protected area. The Habitats Directive protects only six species: the allis and twaite shads, the river and sea lampreys, the Atlantic salmon (though only included in the list of freshwater species), and the common sturgeon. They represent only 1.5% of marine species, are a distinct group as they are all anadromous, and therefore have an important freshwater component to their life history. As such, these species are only protected when within the confines of their freshwater and estuarine SACs, yet, some like the Atlantic salmon undertake migrations 1000s of km from their protected spawning grounds. However, other species like the twaite shad may only migrate into the coastal waters of the Celtic Sea where area-based extensions of existing SACs (and SPAs) boundaries may protect their entire life history.

Under the Common Fisheries Policy (CFP), 31 species of fishes are afforded partial protection using Total Allowable Catches (TACs) and national quotas. Most (23 species) are bony fishes and include many of the common commercial species, such as herring, mackerel, cod, blue whiting, haddock and plaice. The remaining nine species are elasmobranchs and include the common skate, undulate ray, cuckoo and thornback rays. Protection for rays and skates is normally in the form of catch advice, which can be ineffective, particularly for mixed fisheries where the capture of these species can be unavoidable and discard mortality can be very high.[89]

In addition to the species protected by the Habitats Directive or managed as a fishery under the Common Fisheries Policy, 70 species are listed by the European Red List of Marine Fishes [90] and/or by the Irish Red List for Cartilaginous Fishes.[52] While not requiring legal instruments to be enacted by Member States, red lists draw attention to species that require immediate conservation measures. Seven of these 70 species are also listed under OSPAR's List of Threatened and/or Declining Species: the porbeagle, the white skate, the angel shark, the

basking shark, the leafscale gulper shark, the Portuguese dogfish and the spiny dogfish. Some of these species are now listed as Critically Endangered as they have undergone significant declines during the last few decades due to commercial exploitation, for example, both the porbeagle and angel shark have declined by >90%.[52] Another species listed as Critically Endangered is the white skate which may only have two remaining localised populations left in the North East Atlantic, both of which are located off the west coast of Ireland. Deep-water species such as Portuguese dogfish have also experienced large declines and are listed as Critically Endangered because they are often taken as by-catch in mixed fisheries for deep-water species off the west and north of Ireland.[52] Considering these declines and threats, it is difficult to determine how Ireland can maintain this fish biological diversity and therefore achieve GES under Descriptor 1 (biodiversity) of the MSFD.

Blue sharks are a species of Least Concern in the Red List, but are also important, as they are probably the most abundant large predator in Irish waters during the summer months and therefore any decline in their population would likely alter the ecosystem functioning of these seas. Such a decline would be incompatible with GES in relation to Descriptor 4 (food webs) under MSFD. Without any clear protective measures, species like the blue shark will continue to be directly targeted in Irish waters.

While most fishes in Irish waters have no protection, some may very loosely be afforded incidental protection during different phases of their life history (e.g. as juveniles or adults, during migrations) when they temporarily reside in a protected area. For example, under the Habitats Directive, habitats such as 'Estuaries' and 'Shallow inlets and bays' which are defined by plants and benthic invertebrate communities, are often used as important foraging grounds and/or nurseries for fish species. One example is sea bass, which displays interannual fidelity to and localised residency in areas within Cork harbour and other areas that have SACs.[91] While they are not strictly protected in these SACs, they may indirectly benefit from the good status of these supporting habitats. However, they may still be inadvertently captured as by-catch by fisheries in some of these areas where fishing is allowed. Again, area-based extensions to some of these existing SAC (and SPA) boundaries may protect these species further. Indeed, such extensions may also offer some protection for widely roaming pelagic species as many display spatially restricted movements during key life stages. For example, during the summer months the southwest coast of Ireland is a major foraging area for juvenile female blue sharks with many sharks spending periods of months residing in the Celtic Sea. Similarly, the east coast of Ireland is a major hotspot for the seasonally resident tope shark (listed as Vulnerable by the Irish Red List for Cartilaginous fish), and area-based protection or seasonal area based protection could provide much needed added protection for these species.

1.3.3.4.2 Other pelagic and demersal species

Because they are often the target of commercial fisheries, fish represent a special case. However, other demersal and pelagic species are no more protected than fish and, in some cases, also suffer declines, whether as target or bycatch species. An example in Irish waters is the demersal deep-water finned octopus *Opisthoteuthis massyae*. This species has been taken as bycatch by commercial deep-water fisheries operating on the Northeast Atlantic margin and suffered consequent population declines, leading to it being assessed as Vulnerable on the IUCN red list of threatened species [92]. It remains unprotected.

1.3.3.5 Ecosystem engineers

There is also a need to protect 'ecosystem engineer' species. These are organisms that create, maintain or modify a habitat and so are particularly important in maintaining biodiversity and ecosystem processes. Marine examples include kelps, corals, mussels and reef-forming tube worms, although gaps in knowledge mean that there may be species with a role that is not currently appreciated. A pelagic example is the barrel jellyfish which form spectacular blooms of tens of thousands of large jellyfish. These aggregations act as nurseries for many fish species but also form consistent blooms that endangered leatherback sea turtles feed on. There are also pelagic habitats that have distinctive pelagic plankton communities (e.g. a cold-water community in the cooler mixed water of the Celtic Sea and a warm water community in the warmer stratified water of Celtic Sea) that are often defined by the development of seasonal thermoclines and fronts.

1.3.3.6 Oceanographic features

There is no capacity to designate oceanographic features in current criteria, yet certain oceanographic features may be associated with very high biodiversity. For example, aggregations of plankton are often associated with fronts generally, while seasonally generated density (temperature) fronts in shelf seas may form enclosed circulation cells which are important for benthic fauna such as *Nephrops* prawns. Similarly, certain near-seabed locations at the continental margin have amplified strong diurnal tides present: the two most prominent regions host the cold-water coral carbonate mound provinces at Rockall Bank and in the Belgica SAC.

Key messages

- There are gaps in the designation criteria of the Habitats Directive which prevent SACs from being designated for many threatened or important species, habitats and ecosystems. These include critically engendered elasmobranch fish, pelagic species, ecosystem engineering species, Vulnerable Marine Ecosystem indicator species, continental shelf soft substrate habitats and habitats associated with oceanographic features.

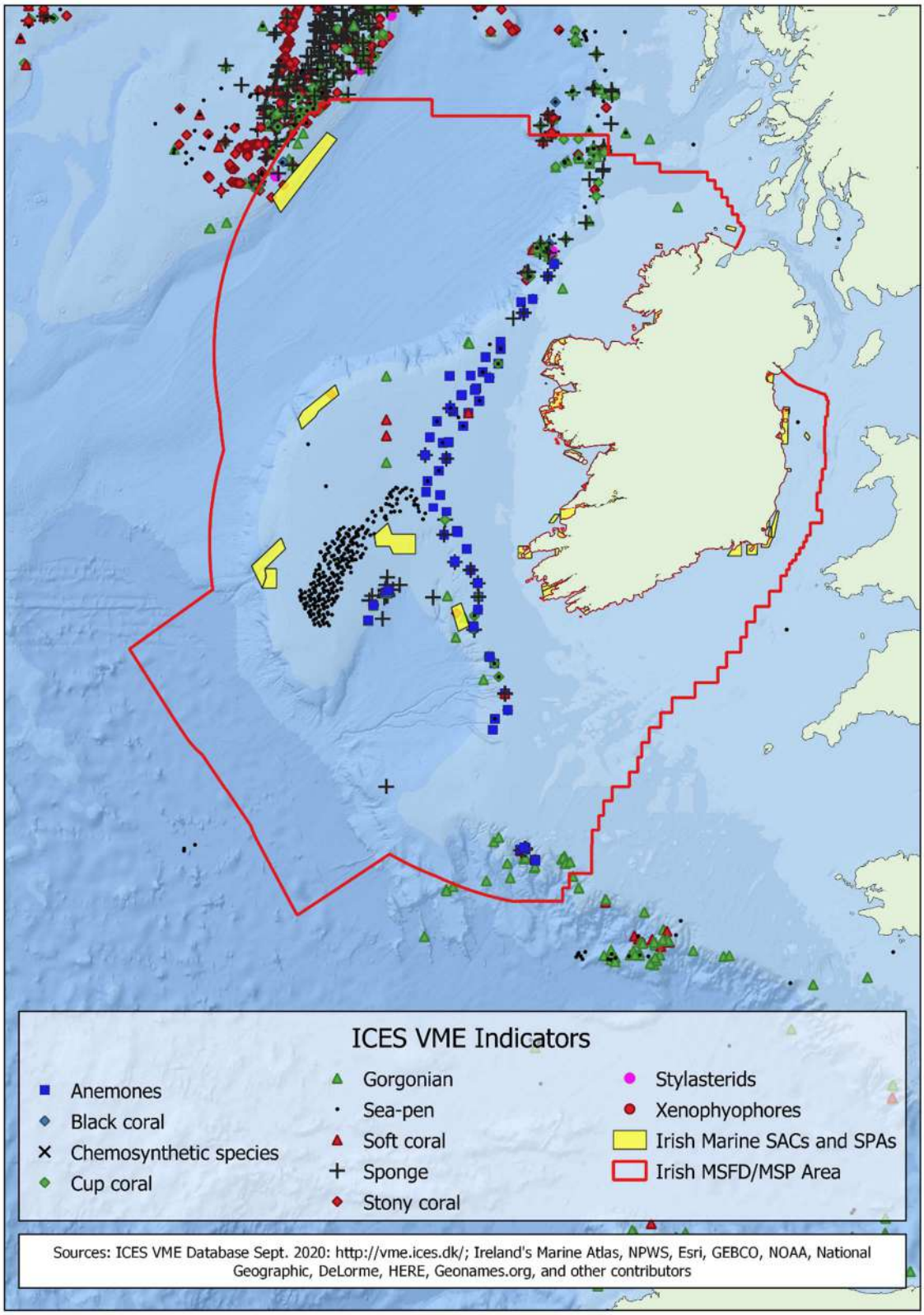


Figure 1.11 – Vulnerable Marine Ecosystem (VME) indicator species in relation to Natura 2000 Marine Protected Areas.

1.3.4 Flexible protection for mobile species and dynamic habitats

Mobile MPAs, with boundaries that can shift in space and time, are increasingly being advocated as a mechanism for protecting inherently mobile features, like fish, turtle and seabird populations and the dynamic ocean habitats they rely on.[93] Such approaches require technological capability to enable more responsive decision-making based on real-time data, but can be more efficient and effective than traditional MPAs with static boundaries. A degree of mobility of MPAs may also be desirable as part of an overall strategy to design and manage Ireland's MPA network for resilience to climate change.

1.3.5 Protection in relation to specific pressures

Threat mitigation is central to the MSFD and the achievement of GES. Given the nature of some pressures and the threats they pose, it would be of benefit to be able to designate MPAs whose express purpose is to protect systems from those pressures.

1.3.5.1 Dark sky reserves

Anthropogenic light is known to have many impacts on marine organisms. It can disorientate and attract birds, fish and squid,[94,95] affect foraging patterns of wading birds,[96] diel migration of zooplankton,[97] delay embryonic development,[98] and affect communication/camouflage that relies on bioluminescence.[99] Nearshore habitats are particularly exposed to light pollution. Davies et al. (2016) found anthropogenic light to be 'widespread and increasing in MPAs, particularly in those closer to coastlines.[100] To a degree, anthropogenic light can be reduced by shielding lights and limiting the use of certain spectra that either penetrate water further or are known to have ecological impacts, however, the introduction of marine dark sky parks, similar to those designated terrestrially under the International Dark Sky Association could more fully protect habitats and species against increasing light pollution.

1.3.5.2 Quiet seas reserves

Similarly, marine organisms are impacted by noise pollution. Many fishes, invertebrates and marine mammals use acoustic cues in their natural behaviour, and noise pollution can limit their ability to navigate, to detect prey or avoid predators, to recognise mates, and to recognise appropriate settlement cues.[101] While even subtle noise can interfere with some of these functions, more intense noise, or the sound pressure wave associated with intense noise (e.g., from military testing or seismic surveys) can do physical damage to internal organs such as statocysts (balance organs) and swim bladders. Including acoustic factors in management plans of MPAs could mitigate against noise impacts, but equally placing 'acoustic reserves' in locations known to be of ecological importance (see below) but which are not yet highly impacted by noise pollution is recommended.

1.3.5.3 Naturally resilient areas

Some areas are naturally more resilient to climate change than others. For example, their underlying geology may lead to waters being naturally buffered from acidification, or local variability may protect them from average temperature rises and heat spikes and from deoxygenation effects. There are currently no MPAs designated based on their natural resilience to climate change, yet such reserves could act as stepping-stones for species undergoing climate-induced range shifts in the future.

Key messages

- There is currently no provision for designation of MPAs based on criteria other than species, habitats, and ecosystems, to address specific pressures such as light and noise or to protect areas that are naturally resilient to climate change.
- The inclusion of mobile MPAs whose specific boundaries are able change in real time as target features move to would enable protection for dynamic habitats and species and enhance resilience to the effects of climate change.

1.3.6 Gaps in legislation

At present, protected areas can only be afforded legal protection in Ireland within the framework of the Habitats Directive (HD) and the Birds Directive (BD) or the Wildlife Acts. These instruments may not be fully capable of providing the type of protection needed for other important threatened and declining species, habitats and features. For this reason, new primary legislation is required.

The Wildlife Acts, as amended, are limited to providing for designations on land and in the foreshore. In other words, none of the designations provided for in that legislation can apply to areas beyond 12 nm. This means that beyond 12 nm, areas can only be designated as SPAs or SACs under the EU Birds and Habitats Directives and only for the habitats and species that are listed in their annexes. Many threatened or declining species and habitats of national, regional and local importance therefore cannot be explicitly legally protected through area-based measures in Ireland. New legislation is needed to address this gap and contribute to other international commitments deriving from OSPAR and the CBD.

National parks in Ireland have no legal backing, though the majority of land within national parks is State owned. Irish national parks correspond to the IUCN protected area category of the same name (Category II) and protecting natural biodiversity along with its underlying ecological structure and supporting environmental processes, and promoting education and recreation are their primary objective. The Programme for Government states the establishment of an offshore maritime area as Ireland's seventh national park will be examined. This would have to integrate with existing and surrounding sea uses and may require additional regulatory measures for controlling activities.

Global commitments necessitate an increase in MPA coverage and implementation. Current MPAs in Ireland are almost exclusively located within coastal habitats and river estuaries, leaving ocean species, habitats and features with limited protection. The current framework in Ireland means we are limited to using EU legislation to do this going forward. In line with European Commission advice Ireland will continue to expand its Natura 2000 sites for specific habitats and species. EU law is limited in terms of what it can protect hence there is a need to fulfil this legislative gap and put in place a robust and effective law and governance system that is more expansive in terms of its reach.

Scientific and legal requirements necessitate 'networks' of protected areas. In thinking about extending Ireland's MPA network, there is an opportunity to explore the possibility of transboundary designations which are important for coherence of protection between the Republic of Ireland and Northern Ireland and also with Britain, particularly in light of OSPAR

commitments and the potential implications of Brexit. This is also reflected in the most recent Programme for Government (July 2020). Transboundary protected areas offer opportunities for greater cooperation that involve national law as well as international agreements and may help to deliver ecosystem-based management objectives and the regional approach to implementation mandated by the MSFD.

New and increasing issues require special consideration in the law and governance frameworks for MPAs. For example, climate change necessitates flexibility in the design of protected areas and their legal frameworks so as to accommodate adaptation and mitigation, including the ability to create corridors to ensure connectivity within and among ecosystems.

Key messages

- At present, protected areas can only be afforded legal protection in Ireland within the framework of the Habitats Directive (HD) and the Birds Directive (BD) or the Wildlife Acts.
- The Wildlife Acts apply only to land and the foreshore, to a maximum of 12 nm.
- Beyond 12 nm, areas can only be designated as SPAs or SACs under the EU Birds and Habitats Directives and only for the habitats and species that are listed in their annexes. Many threatened or declining species and habitats of national, regional and local importance therefore cannot be explicitly legally protected through area-based measures in Ireland.
- Establishment of an offshore maritime area as Ireland's seventh national park may require additional regulatory measures for controlling activities.
- In delivering on the requirement for networks of MPAs, legislation should facilitate the creation of transboundary MPAs, recognising that this will require bi-lateral aspects.
- Climate change necessitates flexibility in the design of protected areas and their legal frameworks to accommodate mitigation and adaptation.

1.3.7 Scope for improved governance and stakeholder engagement

Irish wildlife legislation and the EU nature Directives were written at a time when stakeholder participation in environmental management was not a formal requirement and designations tended to follow a top-down approach whereby the national competent authority decided what should be protected on the basis of precise scientific criteria. As such, the Natura 2000 network in Ireland was designated with limited consultation and separately from other marine sectoral planning processes. No co-ordinated marine planning system was in place at the time and much of the work carried out to designate the sites was in response to EU Directive requirements and pressures to meet implementation deadlines. This resulted in shortcomings in the acceptance of the network and challenges for their management particularly in relation

to assessment and ongoing management of impacts of activity in relation to site conservation objectives.

In an EU context, Blicharska et al. (2016) found that generally, low levels of public participation in implementation of the Natura 2000 network and its management, negative public perceptions of the network, lack of flexibility of responsible authorities and insufficient consideration of the local context pose the greatest challenges to the network's functioning.[102] To date, in Ireland, there has been no effective mechanism for, or established practice of, engaging community institutions and networks to assess whether there is relevant local ecological and socio-cultural knowledge that could help to guide site selection, designation and management in a way that is sensitive to bio-cultural (as well as biological) diversity. Ultimately, as decisions to create MPAs will affect existing user rights, they can only be developed through a consultative process that takes into account the views and concerns of those who will be affected. This should also include the competent and regulatory authorities responsible for activities in and around MPAs.

Developing these kinds of practices in the early stages of the process are fundamental to encouraging, supporting and strengthening an ethos of marine stewardship amongst those who engage on a day to day basis with the area being considered for designation. Recognition of inequities and inequalities in site selection and designation processes (i.e. that not all voices may be equally heard as a result of power imbalances) can help to build trust and acceptance in the legitimacy in the MPA process (see Part 3). A bottom-up mechanism also allows for community concerns and barriers to be taken into consideration in the development process.

There is currently a significant shortfall in resourcing for the process of designation and management of protected areas, severely compromising their effectiveness. Protected area systems require sustainable long-term financing, from the initial site selection process to regular monitoring and enforcement activities. This may necessitate an array of innovative instruments and mechanisms implemented by institutions that are often not solely responsible for MPAs. This is compounded by the fragmented nature of marine governance in Ireland where many marine functions are split across various government departments and agencies (see Section 3.3.1).[103]

Preceding sections have highlighted the pressures placed on the marine environment by various marine sectors and activities. Effective and efficient protection and conservation of the marine environment requires an integrated management approach. There is limited utility in having a MPA to protect benthic species, corals, etc. if all forms of fishing activity are permitted, for example, which means that it is critical to have the government departments and agencies responsible for fisheries management and enforcement involved in any MPA designation process and its subsequent implementation, enforcement and monitoring. This is particularly relevant beyond 12 nm where EU fishing interests operate.

Success is also dependent on enforcement and compliance. MPA implementation does not stop after formal designation. Effectiveness requires regular monitoring, enforcement and review which necessitates long-term planning and resourcing. Designation of new MPAs will be further offshore hence monitoring and enforcement activity will necessitate sea-going vessels. To date the Irish Naval Service has performed this role in conjunction with other functions such as fisheries controls, drug interdiction, etc. Enforcement capacity is currently constrained by the shortage of resources and infrastructure. Stakeholders consulted during

the preparation of this report raised concerns about the level of illegal activity in many existing Natura 2000 sites.

Resourcing requires skilled personnel as well as infrastructure. Direct spending on biodiversity from 2010 to 2015 amounted to €1.49 billion or 0.31 per cent of government expenditure.[104]To further put the Irish figures into context, the IUCN has called for all OECD countries to contribute at least 0.3% of their GDP for biodiversity conservation compared to average 0.13% GDP that Ireland currently spends. Policy, plans and enforcement accounted for the least amount of expenditure between 2010 and 2015. This research also found that Aichi Target 6 – Sustainable Management of Marine Living Resources accounted for 0.3% of expenditure and Target 11 - Protected Areas Increased and Improved equated to 7.4% over the same period.[104]

Key messages

- To date, formal requirements and mechanisms for stakeholder involvement in MPA selection and management have been limited, greatly reducing their effectiveness
- Recognition of inequities and inequalities is fundamental to achieving meaningful community engagement and building legitimacy in the MPA selection, management, and monitoring processes.
- A shortfall in resourcing compromises the effectiveness of processes for site selection, designation and management, including enforcement.

1.4 Summary of the case for expanding Ireland's network of MPAs

MPAs are needed as part of a suite of approaches to reduce and reverse the degradation of the marine environment by protecting, recovering and restoring priority species, habitats and ecosystems. At this point, Ireland's network of protected areas cannot be considered to be coherent, representative, connected and resilient nor meeting commitments under the EU Marine Strategy Framework Directive, the OSPAR Convention, the UN Convention on Biological Diversity nor the UN Sustainable Development Goals. At present there is no legal mechanism to designate protected areas beyond 12 nm outside the restrictive framework of the EU Birds and Habitats Directives. Ireland needs to expand its capacity for designating and managing MPAs to help secure benefits for future generations.

Key messages

1.1 Conservation of biodiversity protects and maintains our natural and cultural heritage and the socio-ecological system of which we are a part.

1.2 Ireland has an extensive marine environment that supports a rich diversity of habitats and species and has a strong cultural resonance.

1.3 Ireland's marine environment provides many highly valued ecosystem service benefits including provision of food and raw materials, regulation of climate and water quality and underpinning of cultural activity, recreation, tourism and well-being.

1.4 In deriving benefits from our marine environment, society also imposes a wide range of pressures on it, including through fishing, aquaculture, coastal development, energy infrastructure, pollution and introduction of invasive species.

1.5 Multiple local pressures combine with the global pressures of climate change and ocean acidification in complex ways to cause impacts on marine ecosystems.

1.6 Over the past centuries and decades, ecosystems have been impacted to a degree that can be hard to conceptualise. Their continuing degradation changes our perception of what constitutes a 'normal' ecosystem.

1.7 Although much of Ireland's marine environment is in comparatively good condition, many species, habitats and ecosystems are in decline and continue to be threatened.

1.8 Area based protection has a fundamental role to play in environmental management and conservation in combination with or as part of species-based, ecosystem-based and other approaches.

1.9 Marine Protected Areas (MPAs) constitute a particular sub-set of area-based approaches to conservation.

1.10 MPAs can enable protection, recovery and restoration of species, habitats and ecosystems.

1.11 MPAs have a range of definitions but can be thought of as long-term area-based designations with conservation as their primary objective.

1.12 Different activities may be permitted or restricted in different MPAs, depending on their specific conservation objectives.

1.13 Individual MPAs combine to form a network, which may be characterised as national, regional or international and should be coherent, connected, representative and resilient.

1.14 Other Effective Area-based Conservation Measures (OECMs) can also contribute to overarching conservation goals, but do not necessarily have nature conservation as their primary objective.

1.15 Ireland's maritime area comprises a surface area totalling 488,762 km^2 which is divided into jurisdictional zones under international law, including the Territorial Sea which extends to 12 nautical miles (nm) from the baseline and an Exclusive Economic Zone extending to 200 nm. It also includes the sea bed in agreed extended continental shelf areas, but the waters over those areas are legally defined as High Seas.

1.16 A number of international conventions oblige Ireland to take measures to protect marine species and habitats.

1.17 Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) have been designated in Ireland under the EU Birds Directive and the EU Habitats Directive respectively. These are part of the EU-wide 'Natura 2000' network.

1.18 Each SPA and SAC affords protection to specified species or habitats (termed 'Qualifying Interests') which are listed under the Directives.

1.19 The EU Marine Strategy Framework Directive requires Member States to achieve or maintain Good Environmental Status of the marine environment under each of 11 Descriptors to establish a Programme of Measures (POM) to ensure this goal is met.

1.20 Ireland's current POM recognises the importance of MPAs, particularly in relation to Descriptor 1 (Biodiversity) and Descriptor 6 (Sea-floor integrity).

1.21 OSPAR MPAs in the Irish maritime area have no legal protection except through their designation as SACs under the EU Habitats Directive.

1.22 Certain species and habitats listed in the OSPAR List of Threatened and/or Declining Species and Habitats are not included in the EU Habitats Directive or otherwise protected under Irish legislation.

1.23 Certain fish species on the OSPAR list are affected by fishing activities but OSPAR has no competence for adopting fisheries management measures. Actions in relation to fisheries management must be taken under the applicable management framework e.g. the EU Common Fisheries Policy or through Regional Fisheries Management Organisations.

1.24 The Maritime Spatial Planning Directive (MSPD) and the Common Fisheries Policy (CFP) have particular relevance to the operation of MPAs.

1.25 The division of competences between the EU and Member States in relation to fisheries (exclusive - EU) and the environment (shared – MS + EU) takes on additional relevance in the context of MPAs and this needs to be understood by all actors when designing and implementing MPAs.

1.26 Under the CFP Regulations, a Member State can request that the European Commission take conservation measures that apply to all vessels operating in its EEZ.

1.27 The IUCN, European and Irish Red Lists provide recent information on threatened and vulnerable species that is more up-to-date than many legal instruments and should be used to inform specific policies and management actions.

1.28 Target 14.4 of the UN Sustainable Development Goals is "By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information."

1.29 Calls have been made by the IUCN for an increase in coverage of protected areas to 30% or even 50% of marine and coastal areas.

1.30 The EU Biodiversity Strategy for 2030 establishes a target of protecting 30% of the EU's sea area by 2030, with strict protection in place for a third of that area and conservation objectives, measures and monitoring for all areas.

1.31 Internationally there will soon be a requirement for protection of Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ).

1.32 The Wildlife Acts, as amended, provide for area-based designation for the purpose of conservation in the foreshore (high water mark to the 12 nm limit).

1.33 Designations under the Wildlife Acts, as amended, appear to be under-utilised in terms of affording protection to the marine environment and are limited in terms of their geographic scope. This may be partly attributed to implementation of the Birds Directive and Habitats Directive, which was occurring at a similar time.

1.34 None of Ireland's current National Parks encompasses a coastal or marine feature.

1.35 There is currently no provision in Irish law for the creation of National Parks.

1.36 Ireland currently has a MPA network of 10,420 km^2, encompassing 2.13% of its maritime area of 488,762 km^2.

1.37 All sites in this network are part of the Natura 2000 network, designated for specific qualifying interests and protected primarily by the EU Birds and Habitats Directives, though some areas are also covered by other national or other international instruments.

1.38 A far greater proportion of coastal and estuarine areas are currently designated as protected areas, with fewer designations and limited coverage in offshore areas.

1.39 A wide range of legislation underpins management of activities influencing the marine environment through approaches that do not require MPAs but which may have implications for conservation of marine biodiversity.

1.40 A large increase in the coverage of MPAs is required to meet international targets and commitments in Ireland's new Programme for Government (June 2020) of 10% as soon as is practical and 30% by 2030.

1.41 An expanded network should be strategically designed to fill gaps in existing coverage, be coherent, connected, representative and resilient and contribute to the requirements for Good Environmental Status under MSFD.

1.42 Additional Natura 2000 sites are required for offshore reef and seabirds at sea in line with Birds and Habitats Directive requirements. A process is already underway to achieve this.

1.43 There are gaps in the designation criteria of the Habitats Directive which prevent SACs from being designated for many threatened or important species, habitats and ecosystems. These include critically endangered species, pelagic species, ecosystem engineering species, Vulnerable Marine Ecosystem indicator species, continental shelf soft substrate habitats and habitats associated with oceanographic features.

1.44 There is currently no provision for designation of MPAs based on criteria other than species, habitats, and ecosystems, to address specific pressures such as light and noise or to protect areas that are naturally resilient to climate change.

1.45 The inclusion of mobile MPAs whose specific boundaries are able change in real time as target features move to would enable protection for dynamic habitats and species and enhance resilience to the effects of climate change.

1.46 At present, protected areas can only be afforded legal protection in Ireland within the framework of the Habitats Directive (HD) and the Birds Directive (BD) or the Wildlife Acts.

1.47 The Wildlife Acts apply to land and the foreshore, to a maximum of 12 nm.

1.48 Beyond 12 nm, areas can only be designated as SPAs or SACs under the EU Birds and Habitats Directives and only for the habitats and species that are listed in their annexes. Many threatened or declining species and habitats of national, regional and local importance therefore cannot be explicitly legally protected through area-based measures in Ireland.

1.49 Establishment of an offshore maritime area as Ireland's seventh national park may require additional regulatory measures for controlling activities.

1.50 In delivering on the requirement for 'networks' of MPAs, legislation should facilitate the creation of transboundary MPAs, recognising that this will require bi-lateral aspects.

1.51 Climate change necessitates flexibility in the design of protected areas and their legal frameworks to accommodate mitigation and adaptation.

1.52 To date, formal requirements and mechanisms for stakeholder involvement in MPA selection and management have been limited, greatly reducing their effectiveness.

1.53 Recognition of inequities and inequalities is fundamental to achieving meaningful community engagement and building legitimacy in the MPA selection, management, and monitoring processes.

1.54 A shortfall in resourcing compromises the effectiveness of processes for site selection, designation and management, including enforcement.

Stakeholders consulted in the preparation of this report widely shared a vision for healthy productive seas and almost all recognised the need for MPAs in achieving this and meeting Ireland's legal obligations. In addition to many of the points elaborated above, they also highlighted (a) the reputational benefits that could accrue for Ireland as a 'green nation' with rich natural environments, e.g. influencing tourists and seafood consumers, (b) the clarity that an established MPA network with a clear set of regulations could provide for industry and (c) the opportunity presented by MPAs for developing ocean literacy and public engagement with the marine environment, considered particularly important for

young people, with one participant highlighting the potential for MPAs to act as a 'classroom for the nation' (see Annex 1).

PART 2 - What are the likely benefits and costs for economy, society, and culture of expanding Ireland's network of MPAs?

Given the rationale for expanding Ireland's network of MPAs established in Part 1, this Part explores the potential benefits and costs of doing so from social, economic and cultural perspectives. We start by explaining how socio-economic analyses are undertaken and then present two socio-economic analyses, first in terms of ecosystem services and on a sector by sector basis, encompassing fisheries, aquaculture, tourism and recreation, biotechnology and other ocean industries as well as the particular case of coastal communities. Although these analyses benefit from some research done in Ireland, many of the projections are of necessity based on experiences in other nations.

Some of the topics raised in this Part are discussed in further detail in Part 3, particularly considerations about the distribution of costs and benefits among different sectors of society, engagement with stakeholders including coastal communities and of the consequences of MPAs for fisheries and their management and mitigation.

2.1 Analysis of socio-economic benefits and costs of MPAs

In this section the benefits and costs associated with the establishment of a network of MPAs are discussed, as a complement to the other considerations outlined in Part 1. This section should be read with Section 3.1.2 for a more in-depth discussion of how such costs and benefits can be distributed unevenly on the ground, depending on social, cultural, and political contexts. MPAs can lead to the curtailment of extractive activities resulting in costs for certain industries, for example fishing or deep sea mining, but MPAs have also been shown to produce ecological effects that can have long term benefits for the same and other activities. Taking into account the economic, socio-cultural and political contexts of MPAs is important to evaluate how the network of MPAs may operate to the net benefit or detriment of different sectors of society in socio-economic terms. Recognition of inequities and inequalities can open up conversations around networks of MPAs as socioecological systems and can help to engage communities in the stewardship of the marine environment. While a net welfare benefit to society should not be seen as a pre-condition to declaration of MPAs – undertaking benefit cost analysis can still provide useful information to policymakers in terms of the (measurable) benefits and costs. Understanding the economic benefits and costs that the establishment of a network of MPAs will bring about through changes in ecosystem services should also lead to better informed management and improved decision-making.

There have been relatively few comprehensive Cost Benefit Analyses (CBAs) of MPAs from either within or outside Europe, which as the European Commission noted in a review make "it difficult to draw comprehensive conclusions about the net benefits of individual MPAs or MPA networks in Europe".[105] The studies that do exist either follow an ecosystem services framework approach or examine the benefits and costs that directly impact the ocean economy industries. The ecosystem services framework approach is more common and suggests that a large proportion of the benefits are likely to relate to an increase in the non-market benefits rather than direct economic benefits to ocean economy industries.

Pascual et al. (2016) collated over 200 published studies on socio-economic impacts.[106] As shown in Table 2.1, those studies that have examined the direct impacts on the ocean economy industries and other stakeholders have tended to focus on marine tourism and sea fisheries, suggesting that MPA networks can have net beneficial effects on these two key sectors but largely ignoring the costs and benefits on other sectors along the supply chain such as seafood processing and aquaculture.[i] The review found that for fishing, the socio-economic impacts of MPAs could be negative or positive for both industrial scale fishing and artisanal fishing, with the effects on different fishers being contingent on a number of factors including individual MPA characteristics and local stakeholder acceptance and engagement.[106]

In what follows, both the ecosystem services framework approach and the sectoral approach will be discussed in the context of examining the potential benefits and costs of expanding the MPA network in Irish marine waters. Before that, however, we briefly outline the process of

[i] The literature reviewed by Pascual et al. (2016) and summarised in Table 2.1 is not specific to Ireland. Therefore, the reader should be cautious of directly transferring the findings to an Irish context as the situations will vary across international jurisdictions.

economic and social assessment that could be undertaken to examine the welfare impacts of expanding the MPA network. An overview of this process is provided in Figure 2.1.

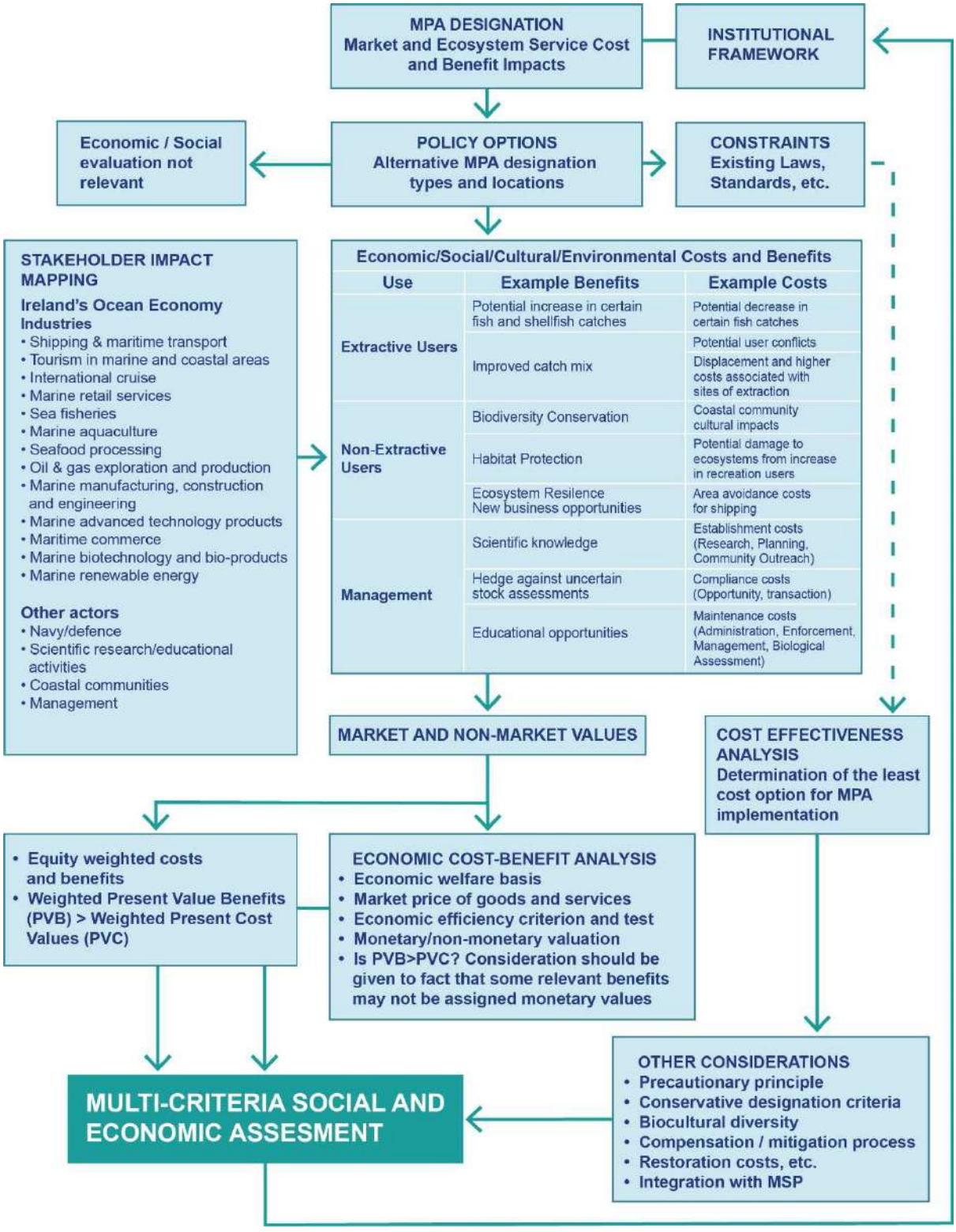


Figure 2.1 – Overview of the process of economic and social assessment of an MPA network.

Table 2.1 – Potential impact of MPA designation on Irish ocean economy sectors, based on reviews of international literature by Pascal et al. 2016 and EC, 2018.[105,106] NR stands for No evidence Reported. 'Positive studies' indicate studies that indicate predominately positive impacts of MPAs on a sector while 'negative studies' indicate studies that indicate predominately negative impacts of MPAs on a sector.

Ireland's Ocean Economy Industries	Overall Impact on sector	Number of positive studies	Number of negative studies
Shipping & Maritime Transport	NR	-	-
Tourism in Marine and Coastal Areas	+	129	35
International Cruise	NR	-	-
Marine Retail Services	NR	-	-
Sea Fisheries	+	178	121
Marine Aquaculture	-	-	-
Seafood Processing	NR	-	-
Oil and Gas Exploration and Production	NR	-	-
Marine Manufacturing, Construction and Engineering	NR	-	-
Marine Advanced Technology Products and Services	NR	-	-
Maritime Commerce	NR	-	-
Marine Biotechnology and Bioproducts	NR	-	-
Marine Renewable Energy	+	2	-
Other Activities		-	-
Navy/Defence		-	-
Coastal Communities		-	-
Scientific research/educational activities	+	5	-

Before the process of economic and social assessment can take place, the possible MPA design options, such as the existence or not of zoning and regulatory legislation, must be identified within given spatial and temporal scales (Figure 2.1). Following that, several scenarios and evaluative criteria need to be established. Once agreed, the MPA scenarios provide the framework within which the economic and social assessment can be carried out. As shown in Figure 2.1, feedback should also occur between all stages of the assessment process and deliberative systems should be set up with the stakeholders involved that can help facilitate refinement of the policy issues and scenarios that are of concern to stakeholders. Clearly identifying the stakeholders to be involved is also an important step in the process.

The economic assessment of a potential network of MPAs also relies on a clear understanding of the ecosystem functions and processes and on how changes in these affect the delivery of final ecosystem service benefits to society. Changes in the ecosystem functions and processes brought about by the designation of the MPA network can lead to both direct and indirect impacts on final ecosystem service benefits leading to welfare gains (benefits) and sometimes losses (costs). The distribution of the welfare gains and losses in society from alternative MPA designation options, together with existing policy measures and institutional frameworks will influence the policy response strategies. The economic value of changes in the supply of ecosystem services are founded in the principles of applied welfare economics which means that the changes in ecosystem service delivery brought about through MPA designation needs

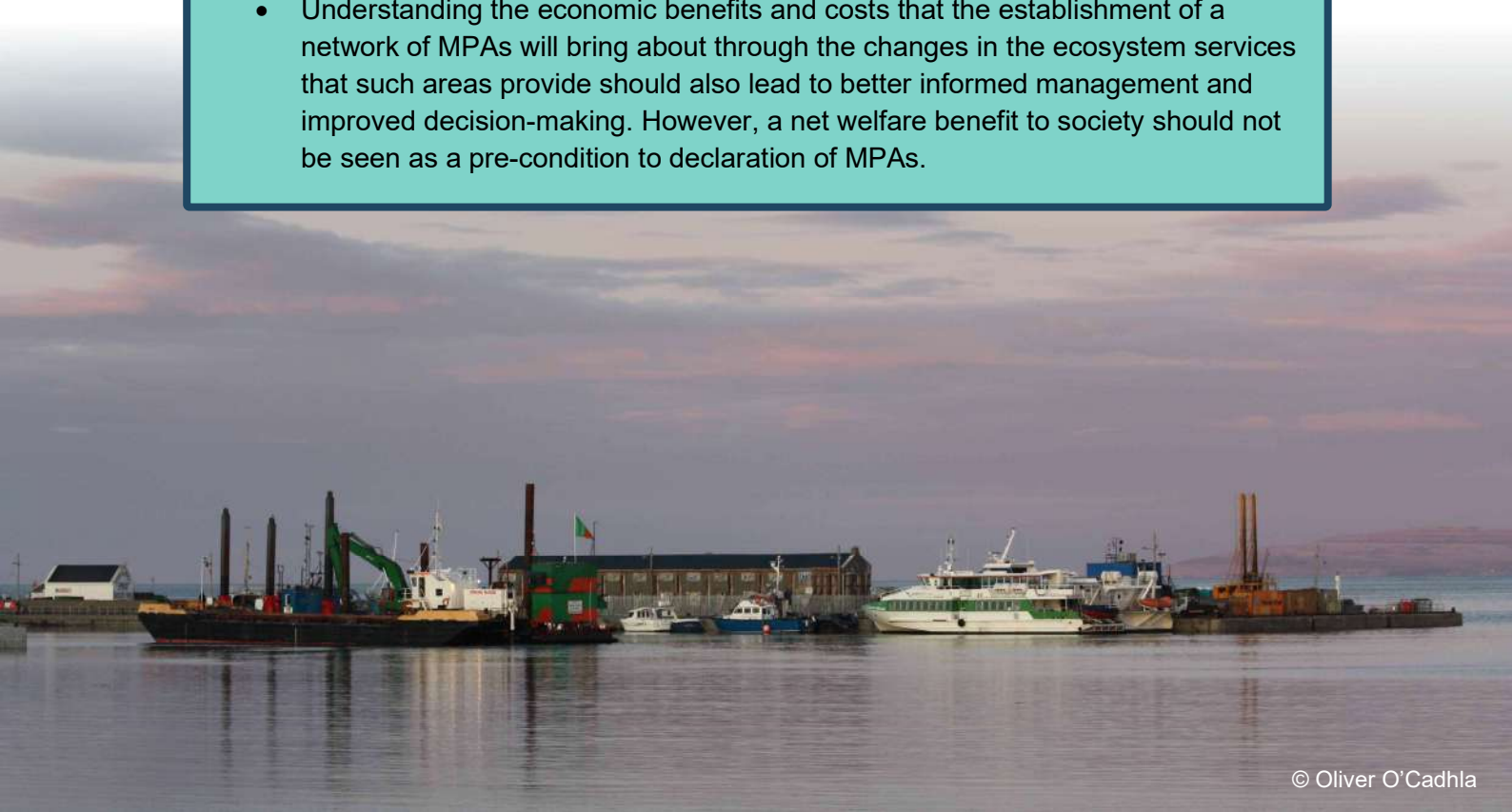
to have an effect on utility for at least one person in the relevant population for it to have economic value.

Whether the ecosystem services framework approach or the sectoral approach is being followed, the costs and benefits involved must next be clearly set out and, where possible, monetarised. The cost benefit analysis (CBA) and cost effectiveness analysis (CEA)) can then be carried out. These analyses seek to evaluate the social welfare gains and losses involved from an economic efficiency perspective, with due consideration for any relevant distributional equity considerations, other precautionary environmental standards, and regional social, cultural and economic constraints. The CBA attempts to establish if the net present value of designating a network of MPAs is positive while the cost-effectiveness analysis compares the relative costs of different MPA management options that achieve the same outcome (conservation objectives). As pointed out by Norton et al. (2018) CBA should not be the sole determinant of a decision.[23,107] It can only provide an aid to decision making and the most cost-efficient option may not be the most appropriate based on other criteria. In these situations, multi-criteria analysis (MCA) is recommended as an alternative assessment strategy as it permits the inclusion of measurable non-monetary criteria into the assessment and explicitly allows for stakeholder deliberation and dialogue.

To be useable, the economic and social framework outlined above thus requires that (i) the direct and indirect links between utility and the functionality and extent of ecosystems in the MPA network scenarios can be identified and parameterised (ii) that scientists can estimate how ecosystem service supply will change when there is a change in the functionality and/or extent of the ecosystem as a result of MPA designation (iii) that economists and ecologists can jointly identify how this change in ecosystem service supply will affect the flow of direct and indirect benefits and costs on society/relevant industry players or other stakeholders, once behavioural responses to the change in MPA designation have been taken into account; and (iv) that methods are available and applicable for measuring the monetary value of the change in both the market and non-market benefits and costs.[108]

Key messages

- Understanding the economic benefits and costs that the establishment of a network of MPAs will bring about through the changes in the ecosystem services that such areas provide should also lead to better informed management and improved decision-making. However, a net welfare benefit to society should not be seen as a pre-condition to declaration of MPAs.



2.2 The ecosystem service approach to estimate the benefits and costs of MPAs

In addition to their role in conserving nature for its intrinsic value, the protection and possible improvement in the quality of the natural environment provided by MPAs is expected to strengthen the capacity of marine ecosystems to deliver the classes of ecosystem services described in Section 1.1.3. From a socio-economic perspective, MPAs may therefore be seen as public investments in marine ecosystems conservation and service delivery.[109,110] Thus an important question is whether the magnitude of MPAs' contributions to individual and societal well-being (the benefits) outweigh the costs. Within the framework outlined in Section 1.1.3, the ecosystem service costs and benefits can be further broken down in terms of whether they impact extractive users of the marine environment, non-extractive users or management.[111]

Alternatively, ecosystem services are also often assessed in terms of whether the costs and benefits involved are market versus non-market.[112] Market benefits are the economic values for goods or services that are observed through a market transaction. MPA market benefits potentially include increased fisheries profitability, which can arise through increased recruitment of juveniles or spillover of adult fish from the MPAs to nearby fishing grounds,[113] or increased tourism expenditure in the local area due to the proximity to the newly designated MPA. Non-market benefits are the economic values for services that cannot be observed through market transactions, and they include the benefit to people from knowing that a threatened species is protected within the MPA (existence value), or that the environmental quality of the ecosystems within the network of MPAs will be maintained for future generations (bequest value). While it is theoretically straightforward to derive monetary values for benefits accruing from commercial ocean economy activities (market transactions), different approaches must be taken to provide economic values for non-market services such as aesthetic services, waste assimilation services, storm surge moderation, erosion prevention, recreation pursuits, etc. The approach used to value the non–market service depends on the types of services, whether the benefit being valued has use value or non-use value and if there is the data to use a revealed or stated preference technique.[i] As pointed out in Section 1.1.3 special consideration should be given to the many regulating services provided by marine ecosystems when designating MPAs as they are often overlooked in marine planning and associated cost benefit analysis. Spatial scale and spatial requirements for the effective delivery of different types of regulating services is also an important consideration in designing MPAs.[27]

An overview of the projected links between ecological change in MPAs and the resulting change in service provision is provided in Table 2.2. This was created using the list of Ireland's marine ecosystem services from Norton et al. (2018) (summarised in Section 1.1.3) and the review of the literature by Leenhardt et al. (2015) that establishes the expected suite of services that MPA designation may deliver.[23,110] While the majority of the provisioning service benefits listed are likely to be reflected in established markets, many of the other benefits highlighted are non-market in nature and can also be related to the enhancement of existence and bequest values. For example, society has been shown to be willing to pay to maintain deep-sea organisms as a source for future medicinal products.[114] This is an option value associated with

[i] A full review of these approaches is discussed in Hanley et al. 2015.[108]

future possible usage. Some of the other benefits listed reflect that fact that natural capital such as oyster reefs or kelp forests may protect other forms of capital on shore by lessening the worst effects of storm surges.

Table 2.2 – Potential changes in marine ecosystem service benefits from MPA designation

Ecosystem Service	CICES Classification	Expected change in ES benefits due to MPA network
Provisioning		
Offshore capture fisheries	Wild Animals	Increased production/stabilisation of target species biomass
Inshore capture fisheries	Wild Animals	Increased production/stabilisation of target species biomass
Aquaculture	Animals - Aquaculture	Healthier animals due to higher quality of environment
Algae/ Seaweed harvesting	Wild Plants & Algae/ Plants & Algae from Aquaculture	Increased production
Genetic materials	Genetic materials from biota	Protection of genetic and molecular diversity/ Protection of ecosystem for potential future discoveries
Water for non-drinking purposes	Surface water for non-drinking purposes	No change
Regulating and maintenance		
Waste services	Mediation of waste, toxics, and other nuisances	No change
Coastal defence	Mediation of flows	Protection of habitats that lessen the impacts of storm surges/coastal erosion (e.g. sea grasses, saltwater marches, kelp forests, oyster reefs).
Lifecycle and habitat services	Lifecycle maintenance, habitat, and gene pool protection	Protection of biological/genetic diversity
Pest and disease control	Pest and disease control	Managed to minimise risks from invasive species. Communities are more resilient to invasive species as other pressures have been removed
Climate regulation	Atmospheric composition and climate regulation	Protection of plants and calcifying organisms that lead to increased carbon sequestration
Cultural		
Recreational services	Physical and experiential interactions	Creation of marine tourism and leisure opportunities (e.g. eco-tourism boat tours, enhanced diving experiences, etc.)
Scientific and educational services	Scientific & educational	Creation of opportunities for research and education in environment of reduced human impacts
Marine heritage, culture and entertainment	Heritage, cultural and entertainment	Potential maintenance of traditional community based natural resource management depending on social and political contexts

Ecosystem Service	CICES Classification	Expected change in ES benefits due to MPA network
Aesthetic services	Aesthetic	Addition to property values due to fronting on to a designated MPA
Spiritual and emblematic values	Spiritual and/or emblematic	Maintenance of community marine related traditions
Non-use values	Existence & bequest values	Marine area protected for the use and enjoyment of future generations

Box 6: Assessing the benefits of MPAs in Scotland

In 2012 the Institute of Natural Resources and Spatial Planning at the University of Oviedo applied the ecosystem service approach to complete an economic valuation of the likely range of benefits of designating a network of MPAs in Scottish territorial and offshore waters. The study estimated the economic value arising from the designation of three theoretical networks of MPAs. Two different types of designations were also applied to MPA sites within each network scenario, i.e. 'Highly Restrictive' and 'Maintenance of Conservation Status' designations. The research focused on within MPA benefits in the form of changes in the provision of ecosystem goods and services as compared with the status quo (i.e. no MPA network designation) scenario.

The study involved two main steps. Firstly, the aggregate valuation of marine ecosystem services provided by the entire UK marine environment was estimated. This was achieved by following a Benefits Transfer methodology. This secondary approach involved transferring relevant valuation estimates from previous primary studies elsewhere to the MPA study. The next step involved distributing a share of the total value estimates to the biophysical changes associated with the implementation of each particular network scenario.

The overall benefit value of designating a Scottish network of MPAs range was estimated in total to be between £6.3 billion and £10 billion depending on the scenario. The report points out that only some of the ecosystem services from the MPA scenarios could be valued, as for many categories a lack of data or relevant previous studies meant that no estimates could be generated. This was the case for important services such as bioremediation of waste, biologically mediated habitats, resistance and resilience, cultural heritage and identity, and option use values. As such the authors suggest that the final aggregate benefit values estimated represent the minimum benefit value associated with MPA network designation in Scottish waters.

For more information see González- Álvarez J. (2012). Valuing the Benefits of Designating a Network of Scottish MPAs in Territorial and Offshore Waters.

Depending on the type of designation, MPAs may also lead to increases in fish sizes and increases in reproductive output and recruitment due to a lessening of fishing pressure. This in turn can result in spillover effects for fisheries that can bring about increases in catch per unit of effort of target species in surrounding fisheries' grounds. It has also been argued that spillover effects can also result in added value to fisheries through increases in total catch, catch per unit of area, species mean size in catch, and species diversity in [115].[115] These increases in turn can lead to increases in fishing effort along the MPA boundaries; what is referred to as "fishing the line".[116] Cau et al. (2019) reported definitive spillover effects for the European spiny lobster (30–50% increase in density and biomass Catch per Unit Effort outside three separate MPAs), although this did involve an active restocking programme inside the MPAs initially.[117] It should be noted however that there is much debate in the literature as to whether the increase in catch to local fisheries from spillover effects is enough to offset overall harvest losses, if the MPA designation involves a total closure.[110] The impact of MPAs on fisheries is

discussed in more detail below (in Section 2.3.3) and Section 3.1.2 provides a more in-depth discussion of how costs and benefits of MPAs can be distributed unevenly, depending on social, cultural and political contexts.

The overall magnitude of ecosystem benefits will vary among MPAs. In general, the closer the MPAs are to the coast, and even more so to large urban centres, the larger the ecosystem service benefit values associated with them are likely to be. This is particularly true for the cultural services connected to aesthetic values of property and recreational opportunities. Indeed it has been argued that recreationalists are perhaps the main beneficiaries of MPAs and that such designations relatively near shore can provide additional recreational service benefits reflected in increases in nature-based tourism revenue.[118,119] Human well-being can benefit from MPAs through a number of routes, but aspects of this remain understudied.[120]

Key messages

- The protection and improvement in the biophysical environment provided by MPAs is expected to strengthen the capacity of marine ecosystems to deliver ecosystem services.
- The magnitude of benefits will vary depending on the location, conservation goals, and management of an MPA.

2.3 The sectoral approach to estimate the benefits and costs of MPAs

MPAs or reserves which prohibit extractive activities have successfully been used as a management measure to mitigate impacts but can have knock on effects on the operations of key marine sectors. Indeed, debate still exists about the overall benefits of MPAs to the different entities using marine waters. The sectoral approach examines the benefits and costs that directly impact a single industry or stakeholder category or the ocean economy industries as a whole. In terms of single industry studies there have been a large number of studies that have focused on fisheries and marine tourism in particular.

As MPA management often restricts activities or places requirements upon those working within MPA boundaries, many sectors are perceived to incur costs from MPAs rather than benefits. A survey of perceptions of UK and French organisations potentially impacted by multiple-use MPAs found that NGOs, research centres, some local councils, managing organisation and nature conservation bodies tended to take a positive view.[121] In contrast, fishers, shipping, aggregate industries and recreational businesses perceived themselves to be negatively affected. Sectors that responded more neutrally included catering businesses, the energy industry, landowners, tourism boards and tourism operators as they did not consider themselves to be greatly affected. Elsewhere an in-depth report investigated the recreational use and non-use values from potential MPA network development in the UK showed non-use value benefits to anglers and divers.[122]

This was corroborated in a review which found no documented evidence indicating benefits from MPAs for sectors other than fisheries and tourism and even then the benefits to fisheries is seen as being mainly for larger commercial fleets with possible net negative effects for smaller inshore fleets.[123] In a pan European survey that accompanied this study, respondents largely agreed that no form of MPA (no-take, multiple use, fisheries SPMs and de facto refuges) provides benefits to sectors other than fisheries and tourism due to an absence of a link between these sectors and marine biodiversity and ecosystem services.[124] On further investigation, however, a limited number of benefits were identified, resulting primarily from opportunities to expand activities, but also resulting from MPA branding and association, reduced competition and changes in biodiversity and the wider environment.[125] For example, the growth of MPA coverage has supported an expansion of the conservation sector to manage MPAs with annual MPA management budgets ranging from €0.5-2.5 million/year; it has led to increased demand for MPA related consultancy and research services; a growing use of nature-based solutions and eco-engineering projects to improve or recover the natural environment within MPAs; the development of new technologies to support the management of MPAs (e.g. satellite-derived products and autonomous technologies); and the use of association with an MPA to demonstrate sustainability and best practice which can lead to preferential access in financial markets and reduced insurance costs. The economic value of many of these potential benefits, however, remains unquantified.

In the following section, we examine the potential benefits and costs, highlighted in the literature, to some of the key ocean economy industry and stakeholder groups in turn and report on the current size of these industries in the Irish ocean economy.

Key messages

- A varied mix of costs and benefits from MPA designation exist and are perceived for a number of sectors and stakeholder groups.
- MPAs can lead to the curtailment of certain extractive activities which will involve costs for industries such as fishing and aquaculture, but MPAs have also been shown to produce ecological effects that have long term benefits for these and other industries such as marine tourism.
- Benefits and costs can vary within as well as between sectors. For example, larger commercial fleets and smaller inshore fleets may be affected differently depending on the nature and location of MPAs.

2.3.1 Biotechnology

The marine biotechnology sector is an emerging sector within the EU and Ireland, primarily focused on micro and macro algae and the development of applications for the energy sector, food industry and agriculture, healthcare and pharmaceuticals, and industrial processes and manufacturing. Few studies have explored the impacts of MPAs on this sector, but it is anticipated that it can benefit from MPAs due to its dependency on biodiversity which benefits from healthy marine environments.[125–127]

2.3.2 Coastal communities

A small number of studies have explored the impact of MPAs on the well-being of coastal communities and MPA users. Through a systematic review of 118 articles focusing on 121 MPAs distributed globally, Ban et al. (2019) assessed the impacts of MPAs on well-being outcomes.[128] While many of the outcomes assessed were associated with fisheries, the focus was still on community impacts. They found that MPAs tend to increase conflict (79%) but can also provide positive benefits resulting from community involvement in MPA management. MPAs with a single zone, that were no-take, were well established and were managed by local communities, were reported to have numerous benefits for human empowerment and well-being, notwithstanding environmental outcomes.[128,129] In another interesting study, the MENE (Monitor of Engagement with the Natural Environment) dataset was used to explore recalled connectedness to nature and restoration following visits to rural, coastal and urban green spaces as well as to designated sites (e.g. protected areas) in England.[130] They found that respondents recalled greater connectedness to nature and restoration following visits to coastal and rural sites, and to protected areas more so than unprotected ones.

Recent research in Scotland found that the MPA designation process is highly important as regards the perception and impact of an MPA on a coastal community.[131] In this case, the Habitats Directive conservation approach, which reinforces the separation between humans and non-human nature, exacerbated a conflict between members of a small island community and the Scottish Government around the designation of a marine special area of conservation off the coast of the island. This research showed that a more complicated picture emerges when the relationship between the socio-natural environment and socio-political institutions are taken into account and that the local socio-cultural context is crucial as to how an MPA lands within a community. In addition, since coastal communities cut across marine sectors, it is

difficult to gauge an accurate reflection of the costs and benefits for coastal communities as a separately identified sector.

Key messages

- Care must be taken not to generalise the outcomes of (perceived) cost-benefit studies across different contexts. Although useful lessons can be learned from other experiences, to fully understand the perception and impact of MPAs on coastal communities, it is important to take into account local socio-cultural contexts and their relationship to socio-political institutions on a variety of scales.

2.3.3 Fisheries

Assessing the benefits of MPAs to fisheries is complex and several different approaches have been used, as pointed out in a recent study by the European Commission on the economic consequences of MPAs on the fishing sector[105]. These include analysis of data of catch and effort collected directly on-board commercial vessels, analysis of industry data collected from official records and logbooks and vessel monitoring systems and face to face surveys of fishermen and/or other key stakeholders.

The review by the EU listed the types of possible economic benefits to fishermen from MPAs. These included increased catch per unit area, increased catch per unit effort, increased yield (weight), increased revenue, reduced competition for unrestricted fleets, less risk to fishing gear and brand or quality certification for products linked to the MPA which can lead to higher prices for landed produce. A number of studies highlight the additional cost imposed on the industry associated with MPA designation. There could be loss of viability or reductions in profits, for example due to an increase in input costs if the fleet needs to travel further to catch fish post MPA designation or an increase in transaction costs to deal with the technological, reporting, legal, etc. requirements of operating within the MPA.[132] Spillover benefits from MPAs can be considerable, but will also come with time lags that could impose significant short-term costs on the industry.[133] This possible benefit may thus only be available to those operators who have the capacity to wait for it to materialise, who have access to other alternatives outside the MPA.

According to Davis et al. (2019) the ability of MPAs to provide net benefits to a fishery "depends largely on the state of the fishery (e.g. whether it is overfished), the interplay between the rate at which spillover benefits accrue to the fishery and the rate at which the value of those future benefits decays due to the discount rate".[112] However, this does not account for smaller operations which may be disproportionately affected by delays in accrual of benefits. The ability of MPAs to provide net benefits to a fishery is influenced by size of fishing vessel, gear-type, geographic location (e.g. mainland or island) type of infrastructure available (e.g. size and safety of pier, berths or moorings), ability of fishers to adapt or pivot, what kind of finance is accessible, what kind of representation is available at policy levels, and the social and political contexts that influence the ability of different groups to be seen and heard.

Generally, the closer an MPA is to the coast, the greater the effect on fisheries as a greater number of stakeholders are active in proximity to the shore. An MPA close to shore will have a greater effect on smaller operators who have limited alternatives and a limited ability to operate outside an area close to the home port. The size required for an MPA to be effective

varies depending on the species one wishes to protect; species with great mobility require MPAs of larger size while sedentary species such as scallops and lobsters can benefit from a smaller protected area. Thus, the impact on the stakeholder will reflect the stakeholders' dependence on the species or range of species to be protected. Large MPAs force stakeholders to move their activities to areas outside protection and often lead to fishers "fishing the line" such that the edge of the protected area is heavily fished. Thus, the siting of an MPA in relation to home port and alternative fishing grounds can have a significant effect on the impact of an MPA on fishers. These effects are not evenly distributed because, for example, smaller vessels and larger trawlers are incommensurable. Smaller vessels have more limitations than larger trawlers, and access fishing opportunities differently. Smaller vessels cannot fish in the same conditions or as far offshore as larger trawlers. Bad weather conditions limit their days at sea, choice of fishing grounds and result in shorter fishing seasons. As such, an MPA close to shore will have a greater effect on smaller operators who have limited alternatives and a limited ability to operate outside an area close to the home port. Larger vessels tend to be more adaptive in terms of gear and the species targeted and can travel far from their home ports.

In one way it can be argued that managed areas in marine space have been a component of fisheries management for many years, pre-dating the current MPA concept by several decades. The Common Fisheries Policy, first introduced in the 1970s, sets rules for managing European fishing fleets and for conserving fish stocks. Fisheries-specific instruments have mentioned the use of closed areas, seasons or zones since the early 1990s and Ireland's maritime area already contains extensive area-based measures for fisheries management.[134] In fisheries management, protected areas are generally considered to be temporally and geographically defined areas that afford natural resources greater protection than is afforded in the rest of an area as defined in relation to fisheries management, for example, a no-take area to protect spawning of a certain fish species targeted by a fishery, juvenile nursery areas or an area with specific gear prohibitions. With the increasing trend of applying an ecosystem-based approach to fisheries, MPAs with broader combined objectives for ecosystem management are likely to become more common. This is certainly the case with the Common Fisheries Policy which increasingly takes consideration of other European environmental policy and legislation such as The Birds & Habitats Directives and the MSFD. There are examples of working with the fishing sector to achieve the most balanced outcome meeting conservation requirements and sustaining fishing activity (see Box 14). More unusually, the Oz Minarzos Marine Reserve for Fishing Interests in Galicia (Box 7) is an example of a marine reserve that was established by fishers for fisheries management purposes. (e.g. see Box 7 and Box 8).

The cost/benefit perception of MPA designation by the fishing sector and their consequences for the industry needs to be carefully considered for this process and within an Irish context. While the literature describes a range of costs and benefits for the fishing industry, the potentially disproportionate impact on the small-scale fleet cannot be ignored. There is an assumption that such designations will result in full and permanent closures, creating fears for livelihoods and impacts on coastal communities reliant on the fishing sector, particularly within the inshore sector which makes up approximately 86% of the Irish fishing fleet in terms of numbers of vessels.[135] Bearing mind the potential for serious negative consequences for some, it is important to plan for a just transition for a just transition from pre to post protected status. Further detail on these considerations can be found in Sections 3.1 and 3.2.

Box 7: Case study of a successful Spanish MPA with fisheries involvement

In Galicia, Spain, the Os Minarzos Marine Reserve for Fishing Interests (OMMRFI), Galicia, Spain, created in 2007 combines both fisheries conservation and biodiversity conservation objectives, although, unusually, the emphasis is on the former.[55] It is a multiple-use MPA (IUCN Category VI), that includes two no-take zones (NTZs) (IUCN Category Ia) representing 6.75% of the total reserve area of 20.74 km^2.

The OMMRFI is underpinned by legislation that sets out its objectives:

- To protect and favour the regeneration of fishing resources.
- To promote artisanal fishing and sustainable development.
- To conserve and protect the flora and fauna of the marine environment and their diversity.
- To encourage environmental awareness about the marine environment.
- To promote the fishing and environmental values of Galician coast.
- To favour scientific studies about resource protection and fisheries management.

To facilitate the development and application of fisheries management models, with the participation of fishers and shell fishers in their design and implementation.

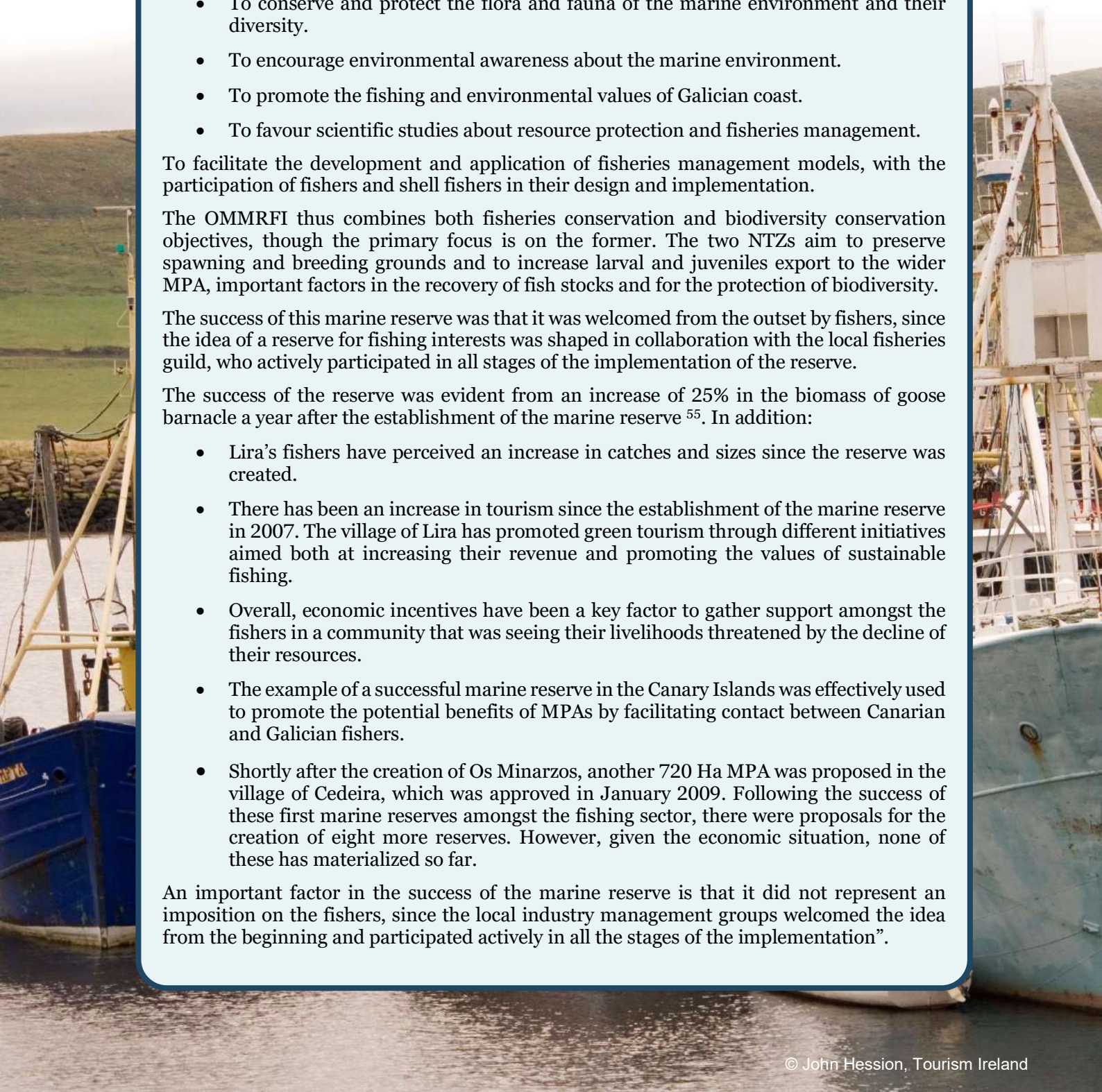
The OMMRFI thus combines both fisheries conservation and biodiversity conservation objectives, though the primary focus is on the former. The two NTZs aim to preserve spawning and breeding grounds and to increase larval and juveniles export to the wider MPA, important factors in the recovery of fish stocks and for the protection of biodiversity.

The success of this marine reserve was that it was welcomed from the outset by fishers, since the idea of a reserve for fishing interests was shaped in collaboration with the local fisheries guild, who actively participated in all stages of the implementation of the reserve.

The success of the reserve was evident from an increase of 25% in the biomass of goose barnacle a year after the establishment of the marine reserve [55]. In addition:

- Lira's fishers have perceived an increase in catches and sizes since the reserve was created.
- There has been an increase in tourism since the establishment of the marine reserve in 2007. The village of Lira has promoted green tourism through different initiatives aimed both at increasing their revenue and promoting the values of sustainable fishing.
- Overall, economic incentives have been a key factor to gather support amongst the fishers in a community that was seeing their livelihoods threatened by the decline of their resources.
- The example of a successful marine reserve in the Canary Islands was effectively used to promote the potential benefits of MPAs by facilitating contact between Canarian and Galician fishers.
- Shortly after the creation of Os Minarzos, another 720 Ha MPA was proposed in the village of Cedeira, which was approved in January 2009. Following the success of these first marine reserves amongst the fishing sector, there were proposals for the creation of eight more reserves. However, given the economic situation, none of these has materialized so far.

An important factor in the success of the marine reserve is that it did not represent an imposition on the fishers, since the local industry management groups welcomed the idea from the beginning and participated actively in all the stages of the implementation".



Recent studies were carried out to assess the value of proposed and alternative Marine Conservation Zones to the Northern Ireland fishing industry.[136,137] DEFRA also commissioned a study to enable further consideration of the proposed designation. The management proposals included the closure of MCZs to 'benthic fisheries', implying a ban on the use of bottom-trawled gear. For the Northern Ireland fleet this directly affects the prawn fleet, amounting to some 120 vessels (84% of the NI fleet over 10m). The study looked at a number of factors including current and historical landings values (this also accounted for distance, current, and alternative fishing grounds from home ports (affecting operating costs), and quality of prawns caught (whole or prawn tails) as these tended to vary by fishing ground). It also considered the impact on fleet performance, displacement and socioeconomic factors. The prawn fleet represents the great majority of jobs in the NI catching sector. It is based at the three main NI fishing ports where fishing accounts for 47% of employment in Portavogie, 20% in Ardglass and 15% in Kilkeel. Community dependence on fishing is higher still when upstream and downstream industries, such as vessel services and processing, are taken into account. Through detailed analysis of these factors and in consultation with the sector it concluded that while all of the proposed designations will impact the sector, there was a preferred option - Queenie Corner - that balances conservation and socio-economic impacts. While it is a confirmed productive ground that is fished by the NI prawn fleet, it is less valuable ground than the three rMCZs previously considered. Closure to fishing will still result in some displacement as the catch from this site would be sought elsewhere.

Costs and benefits of MPAs vary considerably depending on the designation and, as noted above, depending on the type of fishing vessel and its ability to adapt to displacement of fishing grounds. Experience with the Greencastle Codling Box off the Donegal coast, for example, showed that while the closure to demersal trawling within the protected area would impact the entire local trawler fleet, the impact would be more acute within the smaller sized vessels (see Box 8).[138] These vessels were more dependent on this local ground, especially in the winter months where travelling to more distant grounds was more difficult. Broadly speaking, a No-Take MPA will potentially have the greatest impact, while the impact of MPAs with specific conservation objectives that allow for stakeholder access will be less. The cessation or displacement of activity within an MPA may have a more acute impact on certain fishers depending on their capacity to alter their activity to compensate for the associated loss. With MPA designation it is important to consider the possible impacts on all stakeholders and to analyse each constituent group separately. The identification of the constituent groups requires careful listening to stakeholders, to avoid the inadvertent exclusion of distinct groups that might otherwise be subsumed within larger categories.

Key messages

- A large number of studies highlight the possible additional benefits and costs imposed on the fishing industry from MPA designations. Results are varied with some suggesting net benefits and others suggesting net costs. Ultimately, outcomes are case specific and dependent on the fishery involved, the health of the fish stock, the size of the MPA, etc.
- Engagement with the fisheries sector in the designation and management process is also a critical factor in achieving the best possible net outcome.

Box 8: Greencastle Codling Project.

The Cape Codling Box was a stakeholder led initiative initially designed to protect juvenile cod as they overwintered on a nursery ground off the north coast of Donegal. [1] The project which started in 2003 was an industry science partnership from inception. The industry wished to protect the cod and the scientists used this opportunity to carry out a cod tagging project where the results would have much further reach than the local Cape grounds.

The stakeholders used their extensive knowledge to map out an area that would give effective protection to the juvenile fish and at the same time minimise the potential impact on other fisheries. A Statutory Instrument (SI) was implemented to give the closed area a legal footing. While the ground was closed to demersal fishing a derogation was arranged for specific vessels in rotation to work with the scientists to tag and release cod within the closed area. As no compensation was offered to the stakeholders on the closing of the area the chartering of local vessels for the tagging project went some way toward alleviating the potential economic impact of the closed area. The local fleet agreed that the smaller inshore vessels would get double the number of charter days as the larger offshore vessels. This was a recognition of the greater potential impact of the closure of a local ground in winter would have on the smaller vessels.

The closed area was monitored both locally and by the protection authority using the vessel VMS. When some vessels recaptured tagged cod "fishing the line" on the eastward boundary of the closed area the fishermen requested that the area be extended, a subsequent SI reflected this request. A total of 13,000 cod were tagged during the project from 2003-05 and the results of the project show that cod from the Cape may be linked to the spawning grounds of North Channel, The Clyde and elsewhere. While the cod tagging protect has come to an end the Cape ground is still protected by the fishermen in the hope that it's protection will help rebuild the VIa cod stock. The Cape Codling Box is not an MPA as conservation is not its primary objective and it is a seasonal rather than a long term closure. It is hailed by many, however, as an example of how industry and science can and should work together.

2.3.4 Aquaculture

Similar to the fishing industry, there may be both benefits and costs for aquaculture from MPA designations. On the benefits side these will take the form of additional revenue opportunities through certification and branding of association with MPAs as well as perhaps reduced operating costs due to a healthier marine environment. On the other hand, there may be additional transaction costs and maintenance costs involved in operating in or alongside designated MPAs and certain types of aquaculture may not be able to operate at all or in a very restricted capacity.

Aquaculture can be viewed as being incompatible with MPAs due to the potential environmental impact of this sector, from habitat loss and disturbance, pollution, excess feed, and threats to local biodiversity from fish farm escapees and transport of invasive species.[139] The compatibility or otherwise of aquaculture and MPAs largely depends on the nature of the MPA and its conservation objectives and the type and intensity of aquaculture involved.[139] Different aquaculture systems will have different impacts on the natural environment, including habitat deterioration and disruption to ecosystem functioning. However, some aquaculture systems may have some positive effects for the biodiversity of the site under some circumstances and can be compatible with MPA targets.[140]

In Ireland, the aquaculture sector is highly regulated and beyond this has a high uptake of voluntary standards and certification to continually improve and demonstrate environmental performance. Aquaculture licences are issued on a 10 year basis and there is a high level of understanding and acceptance across the sector that licence conditions in response to EIA and AA must be adhered to across all operational procedures. As such, it should be possible to continue to manage much of the aquaculture in Ireland so that it is compatible with conservation objectives in many MPAs.

The entire mussel aquaculture sector in Ireland has achieved and retained Marine Stewardship Council (MSC) certification over two separate certificates: bottom grown mussels and rope cultured mussels. Much of this aquaculture activity takes place within and adjacent to Natura 2000 sites and activities have been responsive to the conservation objectives of the sites, for example through the development of fishing plans for mussel seed fishing and relaying. Additional measures, such as by-catch monitoring and alien species risk assessments have been adopted as part of the MSC retention and continual improvement practices by the sector.

When managed appropriately, shellfish culture can have some beneficial effects in coastal waters affected by terrestrial nutrient run-off. It can mitigate the effects of eutrophication because nutrients are removed when shellfish are harvested, shellfish enhance sedimentation rates, enhance bacterial denitrification, speed the sequestration of nutrients and reduce turbidity, which increases light penetration, which in turn deepens the oxic zone. As such, shellfish can increase water and habitat quality damaged by other pressures. In the Wadden Sea, the Netherlands, mussel producers have been encouraged to transition from seabed dredging to rope grown mussel production in protected areas where the environment is suitable to do so. Where this transition has occurred, it is reported to have benefited both the mussel industry, enabling them to obtain MSC certification, and the protected.[125] Similarly, in Poole Harbour, UK, an area with multiple marine protection designations, bottom culture bivalve production is recognised as being important for water filtration and chlorophyll a removal.[141]

In Ireland salmon aquaculture also takes place within and adjacent to Natura 2000 sites. At any one time >90% of Ireland's salmon production is certified organic in accordance with EU regulation definitions, meaning that fish are farmed at lower stocking densities, meeting strict dietary and treatment standards. In Ireland, coastal water bodies which contain salmon farms are of Good or High status for water quality parameters under WFD. As part of finfish farming in the marine environment, excess nutrients are artificially introduced into the water column through salmon excretion and uneaten food pellets, in the form of carbon, nitrogen and phosphorus.[142,143] Such nutrients can disturb the natural ratios of nutrient elements in seawater and can increase the availability of nutrients for macro-algal and phytoplankton uptake, which, in turn, can lead to eutrophication. However, it is generally considered that enrichment by fish farm nutrients at current scale is too small, compared to natural levels, to result directly in eutrophication, especially where sites are located within a well flushed, offshore environment.[144,145] This coupled with organic farming strategies in Ireland and the location of farms, which are in well flushed environments, can successfully mitigate this risk.

In Scotland, some MPAs have been designated around existing finfish aquaculture sites (e.g. the Fetlar to Haroldswick MPA, which contains 21 finfish sites within the boundary). Prior to designation, business and regulatory impact assessments were undertaken which suggested that the main costs to the aquaculture sector would be in terms of increased costs associated with future licencing as additional surveys would need to be undertaken and uncertainty around potential future developments. In an evaluation of the emerging impacts of the Scottish MPAs in 2017, no negative impacts were raised relating to existing measures, although there was concern about their ability to expand their activities in future.[146]

In Kosterhavet National Park (KHNP), Sweden, an area designated for the protection of the marine environment and cultural heritage, two seaweed companies currently operate, one selling approximately 75 tonnes of algae annually, the other 300 kg.[147] This cultivation can positively benefit supporting, regulating and provisioning services, although it may negatively affect some cultural services.[148]

Key messages

- While MPAs can limit aquaculture activity they can also help to contribute to its overall sustainability and aquaculture operators can in turn contribute to management of the MPAs.
- Through careful management of both the MPA designation process and the aquaculture activities situated within or adjacent to the site the potential benefits of designation can be maximised.

2.3.5 Tourism and recreation

After fisheries, the tourism and recreation sector is seen as the other main industry that can potentially see substantial benefits from MPA designation. However, whether a network of MPAs in Irish waters would add substantially to the tourism industry is debatable. As discussed previously the magnitude of the benefits from MPA designation for the tourism and recreation sector will depend on the location of the MPA site, its proximity to the coastline and urban centres and to a large extent of the climatic conditions. For example, in a study investigating the potential benefits of a network of MPAs in the UK to recreational divers and anglers, explored divers and anglers willingness to pay (WTP) for individual visits to hypothetical MPAs was explored as well as their WTP to protect a hypothetical site from harm and future degradation.[114] They found that divers and anglers had a positive WTP for individual visits to hypothetical MPAs and for MPA stewardship. Understandably, anglers and divers valued different attributes of the hypothetical MPAs, but both groups valued similar stewardship actions. They found however, that all respondents preferred sites closer to home, suggesting a need for MPAs close to larger population centres that may be able to attract greater visitor numbers as well as those in more remote locations that may attract smaller visitor numbers.

Many of the studies that highlight substantial benefits from MPA designation for local tourism operators and recreationalists come from regions of the world with more reliable sunshine than in Ireland and coastal waters that are often more suitable for diving and snorkelling. [123]

In more temperate climes, available evidence also suggests potential benefits to tourism and recreational sectors, although findings are typically associated with individual MPAs rather than networks as a whole. For example, in a study of the Lyme Bay MPA, England, recreational activities associated with diving and sea angling estimated to be worth approximately £4 million occurred within the boundary of the area initially closed in 2008 (206 km^2).[149] While no change in recreational activities was reported by stakeholders immediately after the designation,[150] within three years changes had occurred (2008-2011).[151] Recreational participants and providers increased their use of the closed area and recreational businesses reported an increase in turnover during this time (35% for dive businesses and 19% for charter boat operators). This study, however, did not take into account changes in weather or general trends in tourist or recreational behaviour (e.g. changes in domestic tourism patterns).

In an assessment less than 12 months after the introduction of management measures in Scottish MPAs, no direct changes to tourism resulting from the designations were observed, but participants in the study felt that it was too early for them to have emerged.[146] New tourism related plans and projects were in development e.g. snorkel trails but had not yet been launched. One example is the visitor centre in Lamlash Bay, Arran, designed for local residents as well as the growing number of visitors (national and international). Opened in August 2018, it attracted 11,000 visitors in its first year.[129] It is not clear however, whether the increase in visitors to the island is a result of the MPA or just a general trend in visitor numbers. Increases in the number of visitors following MPA establishment have also been attributed to the "designation effect", where the designation of an MPA leads to an improvement of the reputation of an area rather than due to notable changes in environmental quality.[123]

Benefits do not only accrue to the businesses supporting the tourism and recreational activities, but also to those participating in the recreational activities. In an assessment of the non-market recreational benefits associated with Lundy Island Marine Nature Reserve (part

of which is a no-take zone) the mean consumer surplus (the value of a trip over and above the cost of reaching the site) ranged from £229 to £350 per trip.[152] These values can be used as an indicator of the total value that an individual places on access to the marine nature reserve and the value of the tourism benefit associated with an MPA designation.

In a study of two existing MPAs and two potential MPAs in Canada, Lemelin and Dawson (2014) explored how the designation effect can be used to promote tourism and associated community benefits.[153] They suggest that the type of MPA, its location and accessibility will affect the extent to which the designation effect can and should be used. To capitalise upon the designation effect, they also recommend that sites be supported by marketing and tourism development strategies. One of the stakeholders consulted in the preparation of this report particularly stressed the need to enable and encourage access for sustainable recreational and tourist activities through infrastructure including boat ramps and marinas on the periphery of selected MPAs, web-based information, signage, maps, etc.

Encouraging visitors to MPAs can be a double-edged sword. In some MPA locations where tourism has been encouraged, damage to marine habitats from previously permitted fishing activities has been replaced by damage by trampling and boat anchoring and from divers.[154,155] High levels of tourism and coastal development have also been reported to have negative impacts on marine Natura 2000 areas.[127] Milazzo et al. (2002) recommend that tourism and recreational activities associated with MPAs need to be carefully managed.[156]

A major report to assess the socio-economic impact was done in concert with the development of English MCZs. This showed support from those sectors in both 'use' and 'non-use' value of nascent or pending protected areas at sea. A cost-benefit ratio of designation to value for anglers and divers was 1:3.

One mechanism that has been used to manage visitor access to MPAs and bring some financial benefit is the use of tourist taxes and access fees.[106] Although rare in Europe, examples do exist, such as a diver access fee in Medes Island marine reserve in Spain. In 2009, SCUBA divers paid €4 per dive, bringing a total of €235,000 to the reserve, contributing about half of the management costs of the reserve.[157] Egadi and Torre Guaceto MPAs in Italy also charge entrance fees. In 2016, the Torre Guaceto MPA generated a revenue of €233,000 from entrance fees, on-site activities and merchandise sales.[125]

Key messages

- While the tourism and recreation sector is seen as one of the main industries that can substantially benefit from MPA designation, the magnitude of the benefits will depend on the location of and access to the MPA site and its proximity to the coastline and urban centres.
- Consideration should be given during the designation process to potential opportunities for marine tourism development, keeping in mind that such developments can also bring their own pressures on the marine environment.

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2.3.6 Other ocean industries

There will also be costs involved from MPA designation on other industries within the ocean economy but these should be relatively minor in most cases and mainly involve avoidance costs for activities such as oil and gas; renewable energy; transport; offshore construction; submarine cables and pipe laying; maritime safety and security (navigation aids like lighthouses and buoys, coast guard and navy operations). Ireland currently has no marine aggregates sector, however, if there was to be development in the future this sector is unlikely to be allowed to operate in areas under an MPA designation.[124]

The review of the literature on the costs and benefits of MPA designation on different marine activities found just two studies for off shore renewable energy (see Table 7).[105,106] Both of the studies indicated that the socio-economic impacts of MPA designation could be broadly positive for the industry. The positive benefits highlighted though referred to the possible coexistence of offshore wind farms with other marine uses (energy and aquaculture).[158,159] Sanders et al. (2017) suggest that the construction of an offshore wind farm will inevitably have negative impacts on the benthic environment, water column and associated wildlife.[160] The authors do point out however that once operational, the impacts can in some instances enhance biodiversity, with positive effects recorded on the abundance of commercially important crustacean species in particular and other marine fauna and flora. Also recent development of floating wind turbines could help to reduce the negative impact of off-shore wind farms on marine ecosystems.

As well as impacting the existing ocean economy industries it should also be kept in mind that new activities will be created with the designation of a network of MPAs. Maritime monitoring, enforcement and inspection (i.e. monitoring and management of marine regulations e.g. MPAs, fisheries) and new positions in marine research will likely be created. Indeed, previous research in the UK (ICF GHK et al, 2012) has indicated that, for the Natura 2000 network (terrestrial and marine) every €1 billion of expenditure supports almost 30,000 jobs, with 60% of these on activities directly related to site management (e.g. designation, management, conservation actions, monitoring and research).

2.3.7 Timing of accrual of benefits and costs

The costs associated with new MPAs (e.g. research, implementation, loss of fishing grounds and associated displacement, loss of earnings, etc.) are mostly born in the short-term whereas many of the benefits take time to transpire.[161] The length of time depends on the benefit in question. Schratzberger et al. (2019)[162] provide this synopsis for marine reserves: "*Quantitative analysis of long-term data collected from highly protected marine areas (HMPAs) in tropical and temperate reef habitat showed that in the short to medium term (i.e., within 5 years) habitat quality is improved and pre-harvest population age and size structure is re-established.*[163] ***The restoration of food web complexity due to increased species diversity and recovery of top predators, which are often targets of major fisheries, may take considerably longer***".

MPAs from lower categories (e.g. SACs, SPAs, MCZs that allow some damaging activity) may not yield certain benefits at all, depending on what activities are permitted and how they are

managed. The following real-world examples illustrate the length of time it took certain benefits to transpire in different MPA types in temperate waters.

- **UK, Lundy Island**

  In Lundy, a marine reserve associated with a wider MPA, increases in sizes and numbers of lobster where detectable after only 18 months of full protection (est. 2003). Four years post-protection, legal-sized lobsters were 5 times more abundant within the reserve than in fished areas and there was evidence of spillover of sublegal lobsters from the no-take zone to adjacent areas.[164]

- **UK, Lyme Bay**

  In 2008, 60 nautical square miles of Lyme Bay were closed to bottom towed fishing to protect rocky reefs and their associated flora and fauna (e.g. corals and sea fans). Static fishing gears were allowed to continue. Significant increases in the abundance of reef associated species were apparent three years after protection.[165] In the same time frame, management measures for the no-trawling zone have "led to increases in mean monthly landings (weight and value) for crab and scallops which are both associated with the protected reef habitat suggesting management has been beneficial for both the reefs and the associated fishery". Job satisfaction and income of static gear fishermen within the managed no-trawl zone has been "high and increasing gradually showing that there have been both environmental and socio-economic improvements." In three years permitted commercial fishing activities [static gears] had proliferated within the no-trawl zone and recreation participants and providers had increased their use of the area.[166]

- **Spain, Columbretes Islands - a 44km² marine reserve since 1992.**
  In a traditional tangle net fishery, catch rates and size of spiny lobsters adjacent to the reserve boundary increased steadily over a period of 8 to 16 years after designation.[167]

A global review concluded that one of the key traits of successful MPAs, in terms of benefits to fisheries, is that they are older than ten years (the other traits being no take, well-enforced, large [>100 km²], and isolated).[168] Nevertheless, the above examples show that ecological, economic and social benefits can begin in a matter a years. For the longer term benefits, another recent global review concluded "that substantial recovery of the abundance, structure and function of marine life could be achieved by 2050" if action including tackling climate change and restoring habitats happens at a large scale (where substantial recovery is defined as species and habitats – including saltmarshes, seagrass, kelp, oyster reefs, fish stocks and megafauna - rebounding by 50-90%).[169] They argued that measures needed, which would include large, highly-protected MPAs, would bring benefits ten times as high as their costs in just three decades.

Key messages

- Most of the costs associated with MPAs are borne in the immediate to short term, whereas many of the benefits take time to develop. Examples from around the world show that some ecological, social and economic benefits can be expected in as little as five years. The long–term ecosystem service benefits from more substantial ecological recovery may however take decades.

2.4 Summary of the likely costs and benefits of MPA designation

In summary, the accrual of sectoral costs and benefits from MPA designation vary both within and across sectors and stakeholder groups. They will also vary depending on the local socio-cultural contexts and their relationship to socio-political institutions at a variety of scales. As noted above, the largest impacts from MPA designation are likely to be felt by the capture fisheries, marine tourism and aquaculture industries. The literature suggests that the net benefits to fisheries could ultimately be positive or negative and will depend on the type of fishery involved and a wide array of other factors. The marine tourism and recreation sector can substantially benefit from MPA designation but like other ocean economy industries the magnitude of the benefits will depend to a large extent on the location of the MPA sites within the network.

Key messages

2.1 Understanding the economic benefits and costs that the establishment of a network of MPAs will bring about through the changes in the ecosystem services that such areas provide should also lead to better informed management and improved decision-making. However, a net welfare benefit to society should not be seen as a pre-condition to declaration of MPAs.

2.2 The protection and improvement in the biophysical environment provided by MPAs is expected to strengthen the capacity of marine ecosystems to deliver ecosystem services.

2.3 The magnitude of benefits will vary depending on the location, conservation goals, and management of an MPA.

2.4 A varied mix of costs and benefits from MPA designation exist and are perceived for a number of sectors and stakeholder groups.

2.5 MPAs can lead to the curtailment of certain extractive activities which will involve costs for industries such as fishing and aquaculture, but MPAs have also been shown to produce ecological effects that have long term benefits for these and other industries such as marine tourism.

2.6 Benefits and costs can vary within as well as between sectors. For example, larger commercial fleets and smaller inshore fleets may be affected differently depending on the nature and location of MPAs.

2.7 Care must be taken not to generalise the outcomes of (perceived) cost-benefit studies across different contexts. Although useful lessons can be learned from other experiences, to fully understand the perception and impact of MPAs on coastal communities, it is important to take into account local socio-cultural contexts and their relationship to socio-political institutions on a variety of scales.

2.8 A large number of studies highlight the possible additional benefits and costs imposed on the fishing industry from MPA designations. Results are varied with some suggesting net benefits and others suggesting net costs. Ultimately, outcomes are case specific and dependent on the fishery involved, the health of the fish stock, the size of the MPA, etc.

2.9 Engagement with the fisheries sector in the designation and management process is also a critical factor in achieving the best possible net outcome.

2.10 While MPAs can limit aquaculture activity they can also help to contribute to its overall sustainability and aquaculture operators can in turn contribute to management of MPAs.

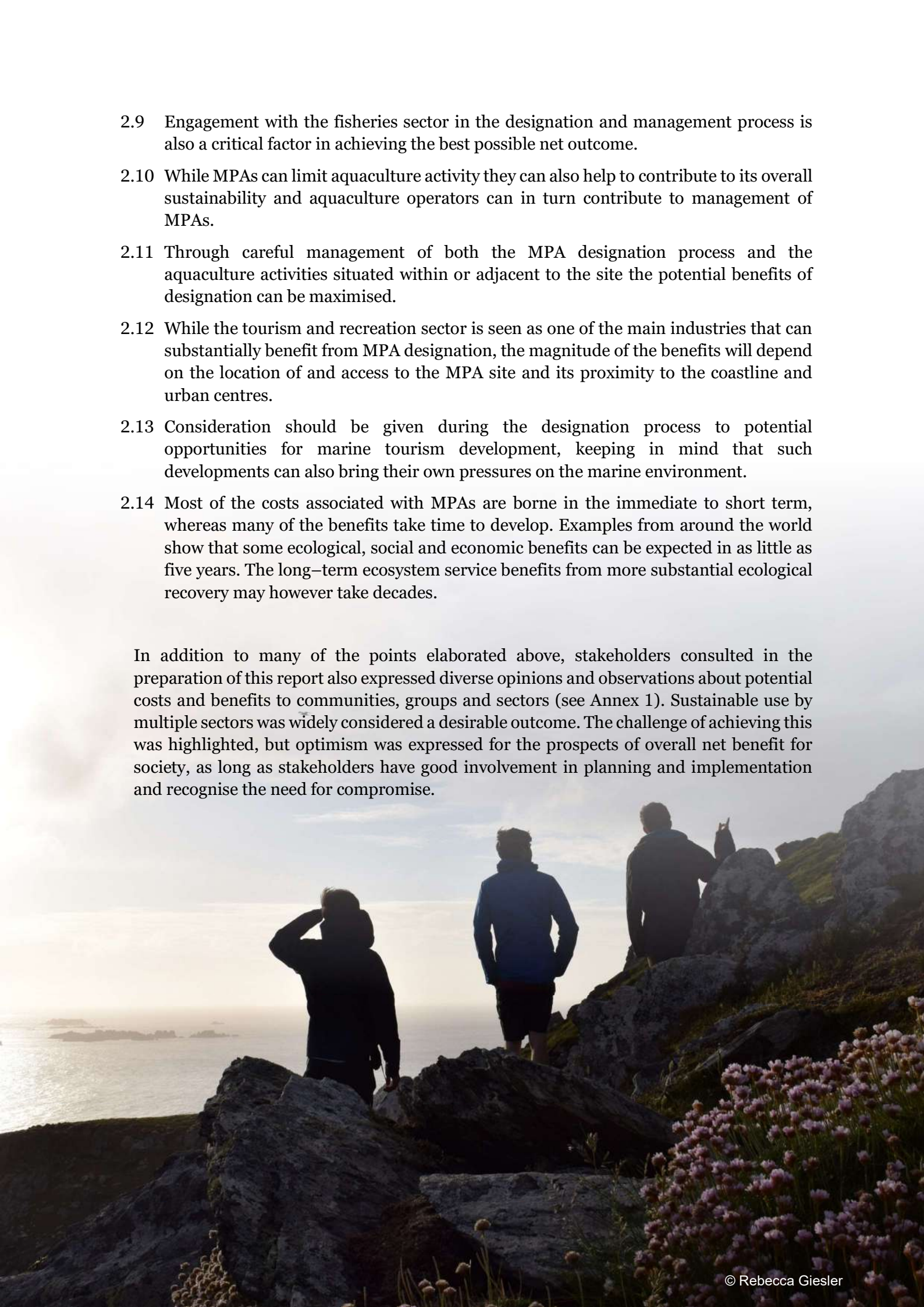
2.11 Through careful management of both the MPA designation process and the aquaculture activities situated within or adjacent to the site the potential benefits of designation can be maximised.

2.12 While the tourism and recreation sector is seen as one of the main industries that can substantially benefit from MPA designation, the magnitude of the benefits will depend on the location of and access to the MPA site and its proximity to the coastline and urban centres.

2.13 Consideration should be given during the designation process to potential opportunities for marine tourism development, keeping in mind that such developments can also bring their own pressures on the marine environment.

2.14 Most of the costs associated with MPAs are borne in the immediate to short term, whereas many of the benefits take time to develop. Examples from around the world show that some ecological, social and economic benefits can be expected in as little as five years. The long–term ecosystem service benefits from more substantial ecological recovery may however take decades.

In addition to many of the points elaborated above, stakeholders consulted in the preparation of this report also expressed diverse opinions and observations about potential costs and benefits to communities, groups and sectors (see Annex 1). Sustainable use by multiple sectors was widely considered a desirable outcome. The challenge of achieving this was highlighted, but optimism was expressed for the prospects of overall net benefit for society, as long as stakeholders have good involvement in planning and implementation and recognise the need for compromise.

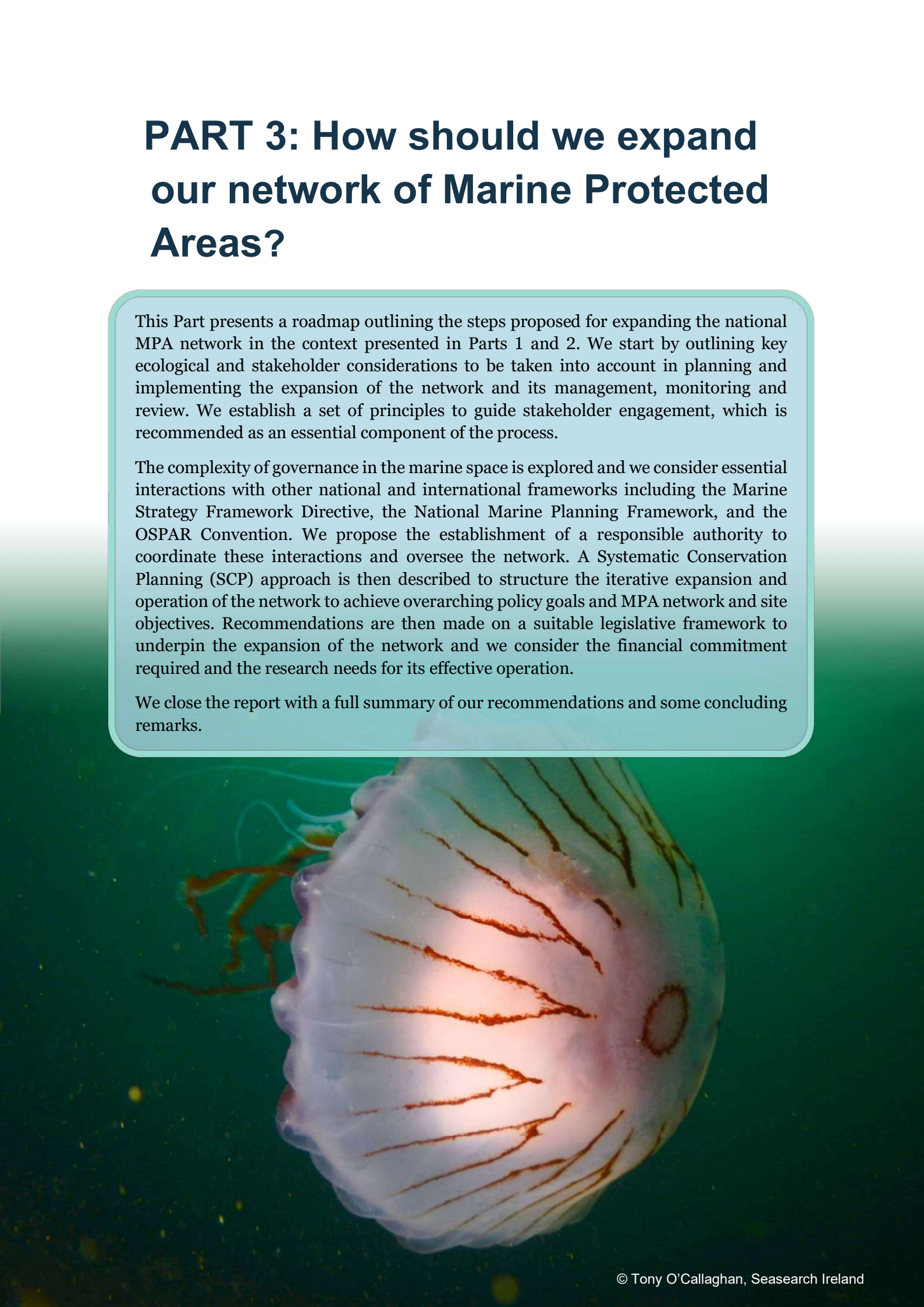


PART 3: How should we expand our network of Marine Protected Areas?

This Part presents a roadmap outlining the steps proposed for expanding the national MPA network in the context presented in Parts 1 and 2. We start by outlining key ecological and stakeholder considerations to be taken into account in planning and implementing the expansion of the network and its management, monitoring and review. We establish a set of principles to guide stakeholder engagement, which is recommended as an essential component of the process.

The complexity of governance in the marine space is explored and we consider essential interactions with other national and international frameworks including the Marine Strategy Framework Directive, the National Marine Planning Framework, and the OSPAR Convention. We propose the establishment of a responsible authority to coordinate these interactions and oversee the network. A Systematic Conservation Planning (SCP) approach is then described to structure the iterative expansion and operation of the network to achieve overarching policy goals and MPA network and site objectives. Recommendations are then made on a suitable legislative framework to underpin the expansion of the network and we consider the financial commitment required and the research needs for its effective operation.

We close the report with a full summary of our recommendations and some concluding remarks.



3.1 Considerations for site selection to expand Ireland's network of MPAs

3.1.1 Ecological considerations

3.1.1.1 Ecological criteria used in current practice

Individual marine protected areas are established in order to protect features within their boundaries that have value in the context of an overall conservation strategy. That value can be expressed in a number of different dimensions. For example, site characteristics nominated for the OSPAR MPA network include biological diversity, representativity and naturalness (Table 3.1).

Table 3.1 – Options for site designation criteria when proposing inclusion in the OSPAR MPA network. Criteria 8-13, shaded orange, are 'practical' criteria/considerations which have a human dimension. (From OSPAR Agreement: 2003-17)

Attribute	Description
1. Threatened or declining species and habitats/biotopes	Habitats/biotopes and ecological processes that appear to be under immediate threat or subject to rapid decline
2. Important species and habitats/biotopes	Species or habitats identified as important
3. Ecological significance	Examples: • a high proportion of a biogeographic population of a migratory species; • important feeding, breeding, moulting, wintering or resting areas; • important nursery, juvenile, or spawning areas; • a high natural biological productivity of the species or features being represented.
4. Level of biological diversity	Whether the area has a naturally high variety of species in comparison to similar habitat features elsewhere, or includes highly varied habitats or communities in comparison to similar habitat complexes elsewhere.
5. Level of representativity	Whether the area contains a number of habitat/biotope types, habitat complexes, species, ecological processes or other natural characteristics that are typical and representative for the OSPAR-Area as a whole or for its different biogeographic units.
6. Level of sensitivity	Whether the area contains a high proportion of very sensitive or sensitive habitats or species.
7. Level of naturalness	Whether the area has a high degree of naturalness and species and biotopes are still in a very natural state as a result of the lack of human-induced disturbance or degradation.
8. Size	The size of the area should be suitable for the particular aim of designating the area, including maintaining its integrity, and should enable the effective management of that area.
9. Potential for restoration	Whether the area has a high potential to return to a more natural state under appropriate management.
10. Degree of acceptance	Whether the establishment of the MPA has a comparatively high level of support from stakeholders and political acceptability.
11. Potential for success of management measures	Whether there is a high probability that management measures and the ability to implement them such as legislation, relevant

	authorities, funding, and scientific knowledge will meet the aims for designation.
12. Potential damage to the area by human activities	Whether in or around the area damage by human activity may happen in the short term.
13. Scientific value	Whether there is a high value for research and monitoring

The OSPAR attributes are reflected in other frameworks. For example, a Mediterranean Science Commission (CIESM) workshop gives pristine, nursery and representativity as "traditional objectives", but specifies uniqueness, rarity or endemism (which can be thought of as signifiers of importance). The process under the Convention on Biological Diversity (CDB) for identifying Ecologically or Biologically Significant Areas (EBSA) has criteria that are all reflected in Table 3.1, but with the additional specification of 'uniqueness or rarity' as a criterion. The EBSA process includes a list of some example areas matching criteria, such as frontal areas and convergences, and deep-sea habitats. The guidance for Marine Conservation Zones in the UK [170] also contains essentially the same ecological criteria as OSPAR, with the addition of a consideration of the connectivity between protected sites (while conceding that this is a secondary consideration as scientific evidence relating to connectivity is often lacking).

Some of the criterion descriptors, such as uniqueness and rarity, require a frame of reference. For OSPAR, the Texel-Faial criteria for the identification of species and habitats in need of protection define the degree of rarity or change for prioritisation, including use of the OSPAR area as the frame of reference.

In the context of Natura 2000, the habitats and species of interest are defined at a European scale by the annexes of the Habitats Directive. The Habitats Directive also sets out the criteria for selecting Special Areas of Conservation (Table 3.2). These criteria clearly express similar concepts to the OSPAR list.

Table 3.2 – Site selection criteria from the Habitats Directive.

Feature	Assessment Criteria
Habitat (listed in Annex 1)	(a) Degree of representativity of the natural habitat type on the site
	(b) Area of the site covered by the natural habitat type in relation to the total area covered by that natural habitat type within national territory.
	(c) Degree of conservation of the structure and functions of the natural habitat type concerned and restoration possibilities
	(d) Global assessment of the value of the site for conservation of the natural habitat type concerned
Species (listed in Annex II)	(a) Size and density of the population of the species present on the site in relation to the populations present within national territory.
	(b) Degree of conservation of the features of the habitat which are important for the species concerned and restoration possibilities.
	(c) Degree of isolation of the population present on the site in relation to the natural range of the species.
	(d) Global assessment of the value of the site for conservation of the species concerned.

A difference between the OSPAR and Habitats Directive is in the level of definition of marine habitats. For Ireland the seven 'Open sea and tidal' habitats and their corresponding codes in the Habitats Directive are 1110 Sandbanks, 1130 Estuaries, 1140 Tidal mudflats and

sandflats, 1150 Lagoons, 1160 Large shallow inlets and bays, 1170 Reefs, and 1180 Submarine structures made by leaking gases. A further marine habitat, 8330 Sea Caves, is included under 'other rocky habitats' in the Habitats Directive. These habitats are fixed in the Habitats Directive. Nevertheless, definition of these habitats is further elaborated in the specific conservation objectives listed for them. This provides for a more highly resolved definition of habitat (marine community) and identifies attributes of the habitat that is to be protected. While the broad categories allow for some interpretation of what marine features can be included in Special Areas of Conservation, there are likely to be some drawbacks to conservation planning with broad categories of habitat that contain subclasses of possibly distinct habitats. These issues are partially addressed by compiling an 'Interpretation Manual' to help use the habitat categories.[i]

3.1.1.2 Network properties

Identifying suitable sites is one step of conservation planning. The network of sites must also meet certain conditions. Ordinarily, the two features of the network given most importance are ecological coherence and percentage cover. The terms of reference for this group also include resilience.

3.1.1.2.1 Ecological coherence

Ecological coherence is an aim for both the Natura and OSPAR networks. Ecological coherence is a term associated with EU conservation networks that does not have a clear conceptual or empirical basis in ecological science.[171] It represents the idea that protected areas should complement each other and 'interact with and support the wider environment' (OSPAR 2006-3). Currently OSPAR makes a biannual assessment of ecological coherence using the 'Madrid Criteria' (Table 3.1, Table 3.3), but these simplistic tests are recognised only as a preliminary way to tackle the difficult task of assessing ecological coherence[172] As ecological coherence is multifaceted, and lacks a clear empirical basis, it is not possible to use targets to confirm that any network is ecologically coherent. However, failure to meet threshold targets can indicate that ecological coherence is clearly not met.[173]

Table 3.3 – The 'Madrid Criteria' for assessing the ecological coherence of the OSPAR MPA network. Dinter provinces are defined in an OSPAR report.[174] The provinces distinguish between benthal and neritopelagic (< 1000 m depth), pelagic and deep-sea habitats. As an example, the coast and shelf of the West of Ireland is in the Boreal-Lusitanian province, while the Irish Sea coast is Boreal.

Criterion	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 (OSPAR T&D) species and habitats for which MPAs are considered appropriate more than once in all relevant Dinter biogeographic provinces a given feature is present – links to OSPAR (2006) network principles of features and resilience.

[i] https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf

In contrast to the assessment of the network by OSPAR, the ecological coherence of the Natura network is not directly assessed. Instead, the target of a favourable conservation status (FCS) is assessed for the whole country every six years (Article 17 reporting), with protected areas contributing to the condition of each habitat or species, however, some national programmes have incorporated concepts of ecological coherence in network design.

In the UK, the Joint Nature Conservation Committee (JNCC) considers ecological coherence in terms of five network design principles:[175] representativity, replication, viability, adequacy, and connectivity (Table 3.4). How a network meets these criteria can be assessed qualitatively, and at least semi-quantitatively, although the criteria themselves do not cover all aspects of ecological coherence.

Table 3.4 – JNCC design principles in support of an ecologically coherent network. Reproduced from Rondinini et al. (2011).[175] These terms are also defined in the glossary.

Criterion	Description
Representativity	The MPA network should represent the range of marine habitats and species through protecting all major habitat types and associated biological communities present in our marine area.
Replication	All major habitats should be replicated and distributed throughout the network. The amount of replication will depend on the extent and distribution of features within seas.
Viability	The MPA network should incorporate self-sustaining, geographically dispersed component sites of sufficient size to ensure species and habitat persistence through natural cycles of variation.
Adequacy	The MPA network should be of adequate size to deliver its ecological objectives and ensure the ecological viability and integrity of populations, species and communities (the proportion of each feature included within the MPA network should be sufficient to enable its long-term protection and/or recovery).
Connectivity	The MPA network should seek to maximise and enhance the linkages among individual MPAs using the best current science. For certain species this will mean that sites should be distributed in a manner to ensure protection at different stages in their life cycles.

Representativity, replication, and viability, are all easily assessed with simple geospatial analyses. For these criteria, the granularity of the assessment is important. Should all species be assessed, or only those considered to be 'ecologically important' and how is the latter determined? For habitats, consideration also has to be given to the level of their definition. Marine habitats are commonly classified according to the EUNIS (European Nature Information System) habitat classification scheme, where level 1 separates benthic, pelagic and ice-associated habitats, level 2 separates habitats based on physical characteristics, level 3 introduces a geographic element, and level 4 introduces the first biological components. The scheme has six levels in total, with detailed community descriptors listing species present at levels 5 and 6. To ensure criteria such as representativity, replication and viability are truly met, habitats need to be considered at the most detailed level possible, recognising that information is not always available at levels 5 and 6. With respect to viability, there has been long-standing scientific debate about overall size of protected areas (SLOSS: single large or several small). Large protected areas support larger populations, which is particularly

important for larger organisms, and have smaller edge effects, but many interconnected MPAs can support more persistent metapopulations. [176] Shape also affects the impact of border effects.[i] Viability should also be investigated in terms of habitat patch size within MPAs. Estimates of minimum MPA size and minimum habitat patch size have been made but are dependent on the size and mobility of organisms.[177,178]

Where insufficient information exists with respect to individual species or habitats to properly assess adequacy, species and habitat distribution models can be used to generate predicted distributions.[179] Nuanced analyses have been applied around the concept of adequacy with respect to the question 'how much is adequate?' through examining the species-area relationship. Since this relationship varies among habitats (i.e., different habitats require more or less area to be sampled in order to capture the same number of species), it is not appropriate to assume that individual habitat coverage at the overall level of network coverage is adequate. When species-area relationships were considered with respect to the UK MPA network, large variations between EUNIS habitats were seen. For example, 20% of the habitat area of EUNIS habitat A6 (deep-sea bed) captured more than 80% of species, whereas 50% of habitat A2 (intertidal sediment) was required to capture more than 80% of species.[175]

Connectivity among reserves varies between species and also depends on the interactions with suitable habitat outside the protected areas. This means that there are no general rules. In the California Channel Islands, replication of protected areas within biogeographic regions was proposed as a way to plan for mutually supporting reserves.[180] Sale et al. (2010) reviewed connectivity science with a focus on coral reefs. [181] There are various tools and models that can be used to investigate target species. However, in the general absence of information, consideration of connectivity is still important as it can generate some guiding principles and identify suitable research or adaptive management to ensure that protected areas function as intended. [181] The Madrid Criteria assess connectivity in a very simplistic way by specifying a minimum distance between MPAs. This simplistic method has been followed in a number of other regional assessments, where it has been implemented by drawing a buffer of a certain size around MPAs and looking for 'gaps'.[182–184] Other studies have considered adult and larval movement, or genetic methods for inferring breaks in connectivity. The connectivity of MPAs in terms of adult movement has been assessed using graph theory,[185,186] while larval movement has been assessed through consideration of planktonic larval duration and modelling of planktonic dispersal through the environment.[187,188] Studies on the connectivity of intertidal molluscs in Ireland have shown how widely generated molecular data can be interpreted to provide insights on connectivity that are highly pertinent to assessments of ecological coherence in MPA networks.[189,190] An analysis of connectivity of Japanese MPAs advances the field by considering climate connectivity, investigating whether the network will continue to protect species adequately in the face of climate driven range edge dynamics.[191]

It is also important to consider connectivity in relation to MPAs in other nearby jurisdictions. The OSPAR Convention, for example, explicitly seeks to establish a network that meets its criteria at the regional scale rather than the national scale. The EU Biodiversity Strategy proposes that 'to have a truly coherent and resilient Trans European Nature Network, it will be important to set up ecological corridors to prevent genetic isolation, allow for species migration and maintain and enhance healthy ecosystems…cooperation among Member States should be promoted and supported.'

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[i] For a fuller discussion of the impact of size and shape of reserves see Piekäinen & Korpinen (2008).[176]

It should be noted that different authorities have interpreted the terms representativity, adequacy and viability differently. For example, an assessment of the Baltic Sea MPA network considers only four criteria: representativity, adequacy, replication, and connectivity.[183] Here, adequacy is equivalent to viability as used by JNCC and concerns whether individual MPAs are large enough, and representativity is equivalent to adequacy as used by JNCC and concerns the percentage of any feature included in the network. Despite the disparity in terms, the approach remains the same. The CBD does not consider ecological coherence as a concept, but guidance for site selection combines the concept of Ecologically and Biologically Significant Areas with (i) representativity, (ii) connectivity, (iii) replicated ecological features, and (iv) adequate and viable sites, using all these terms as in Table 3.4 above.

As mentioned previously, any approach which targets criteria of representativity, replication, viability, adequacy, and connectivity still does not cover all aspects of ecological coherence. Such an approach cannot, for example, test whether the MPA network maintains the "processes, functions, and structures of the intended protected features across their natural range" in line with aspirations of OSPAR[192] Consider an example where habitats sensitive to siltation may require adjacent sediment-accumulating habitats (e.g., salt marshes) to be included in protected areas in order for the protection to be effective. To date, no criterion-based test of ecological coherence has been sufficiently nuanced to test for such details, emphasising that even where a network 'passes' any or all of the specified ecological coherence criteria, this does not indicate that ecological coherence has been achieved.[173]

Where a criterion-based approach encompasses targets (e.g., OSPAR's Madrid Criteria), the thresholds to be met are often designed pragmatically by committee and based on limited scientific research, such that a 'pass' has limited ecological meaning. Although thresholds have been suggested for various criteria (see examples in Foster et al. 2017),[184] a better approach is to generate the metrics associated with each criterion, consider where the greatest weaknesses in the network lie, and then consider how these are best addressed with the available resources. For example, an assessment of the ecological coherence of MPA sites in the Celtic Seas found that 45% of 0-10 m depth habitat was captured in MPAs,[184] compared to just 4.9% of 75-200 m depth zone, and 1.6% of depths below 2000 m, and that 59% of the MPAs were smaller than the 10 km^2 minimum size recommended by Halpern and Warner (2003).[177] These data provide obvious pathways for the improvement of the ecological coherency of the network without the need for specific thresholds. Similarly, an assessment of the ecological coherence of the Northern Ireland MPA network highlighted some habitats that were rare and poorly replicated in the network,[182] and that deeper areas on the shelf were not well represented by the network, again identifying pathways for the improvement of the ecological coherency of the network.

Other indirect approaches to assessing and improving the ecological coherence of MPA networks have been studied. The Finnish MPA network was analysed using the Zonation software that was originally designed for terrestrial planning.[193] The analysis incorporated species data, habitat data, marine environment data, and marine pressure layers to produce a hierarchical prioritisation of the seascape. It showed that marine biodiversity was highly concentrated in small areas, and that by increasing the MPA network overall coverage from 10% to 11%, it would be possible to increase coverage of the most ecologically valuable features from 27% to 60%. While this method potentially provides a less thorough investigation of ecological coherence *per se*, it emphasises the usefulness of thorough spatial analyses of MPA networks.

3.1.1.2.2 Percentage habitat coverage

Once agreed upon, percent habitat coverage is an unambiguous target. As described in Section 1.3, international obligations currently commit Ireland to an expansion of its network to 10% coverage with further expectation of expansion to 30% by 2030 and prominent calls for further expansion to 50%. A review of 144 studies assessed the current UN target of 10% coverage to see whether that amount was sufficient to meet six objectives: (1) protect biodiversity; (2) ensure population connectivity among MPAs; (3) minimise the risk of fisheries/population collapse and ensure population persistence; (4) mitigate the adverse evolutionary effects of fishing; (5) maximise or optimise fisheries value or yield; and (6) satisfy multiple stakeholders.[194] Despite variation in context and level of protection, results indicated that on average 37% coverage by MPAs was required to meet these goals, reinforcing the findings of previous reviews which considered fewer studies and that found 20-40% coverage is required.[195,196].[195,196]

3.1.1.2.3 Resilience and climate change

Resilience has many definitions and dimensions, but can be thought of in this context as the capacity of the network of MPAs to accommodate changing environmental conditions and to recover from impact, e.g. damage to one or more individual MPAs, such that the network continues to meet its overall objectives in the long term. Resilience is promoted by network properties such as coverage, replication and connectedness (Section 3.1.1). These properties must therefore be considered carefully as part of the site selection process.

Given the climate emergency, it is particularly important to build resilience to climate change and changes to ocean chemistry (e.g. acidification) into the network. For example, in the northern hemisphere, many species' ranges are expanding at their northern edges and contracting at their southern edges. As such, there is a case for designing offshore reserves that are elongated to the north along their north-south axes to give room for such changes. Closer to the coast, however, Ireland does not span a large latitudinal range and climate-related parameters such as water temperature can vary from one bay to another to a greater degree than between the north and south of the country. As such, elongated reserves would not be necessary; instead provision for changing ranges can be made by ensuring that, where possible, MPAs designated for particular species or habitats are spread along the length of the coast, rather than concentrated in one region.

Under the framework proposed in this report, individual MPAs can also contribute to resilience through designation specifically for their potential to serve as a refuge from climate change – e.g. because of more stable temperature or pH, e.g. conferred by local geology, geomorphology or hydrodynamics. Climate change considerations should also contribute to finalization of management measures and could be the focus of explicit attention, e.g. through local vulnerability assessments and associated measures.

Of course, the protection of marine ecosystems afforded by the MPA network can also provide climate change related benefits in turn to society, in terms of mitigation (through carbon sequestration) and adaptation (e.g. through extreme event moderation and erosion prevention), as outlined in Sections 1.1.3 and 2.2. Marine shelf sediment areas are among the largest areas to potentially 'lock down' organic carbon in stable, deep sediments (>3m depth). Leaving these sediments alone, undisturbed, will have profound positive impacts on locking in carbon.[197]

With these considerations in mind, we recommend that resilience is explicitly built in to the network, particularly in relation to climate change and changes to ocean chemistry, and that societal benefits in terms of climate mitigation and adaptation are also secured and valued.

Key messages

- Individual MPAs are selected as part of an overall strategy on the basis of inherent criteria such as the species and/or habitats they contain, their rarity, importance or ecological significance and their level of representativity, sensitivity and naturalness.
- Other potential considerations in selecting MPAs include size, potential for restoration, degree of acceptance, potential for success of management measures, potential damage to the area by human activities and scientific value.
- Conservation planning also encompasses network properties including ecological coherence and percentage cover (of target habitats and of the overall maritime area).
- Ecological coherence can be difficult to define and assess, but includes properties such as representativity, replication, viability, adequacy and connectivity.
- A coherent network should maintain processes, functions, and structures of the intended protected features across their natural range.
- Planning for resilience requires that careful consideration is given to network properties such as coverage, replication, size, level of protection, and connectedness and that sites can be selected to provide a refuge from changes to climate and ocean chemistry.

3.1.1.3 Evaluating the existing criteria for site selection

While there is a consensus across existing legal and policy frameworks, ecological criteria for site selection are also similar in the scientific literature. Roberts et al. (2003) stress species diversity, the value of the site in comparison to what else is protected, and the protection of vulnerable or rare species as part of their criteria. [178] As there are several dimensions and scope for multiple definitions, it is difficult to assess the extent to which applying different ecological criteria find the best solution for conservation.

The ecological criteria in Table 3.1 are sufficiently broad to identify the value of features for conservation. Gaps are, however, inevitable when translating broad statements into specific policies. It is already acknowledged that information on marine habitats and species has changed since the Habitats Directive was drafted. Although a variety of habitats can be covered by a class like 'Reefs', the development of OSPAR Threatened and/or Declining Species and Habitats demonstrates the identification of gaps (Section 1.3). In England, the Marine Conservation Zones were partially proposed as a means of including newly defined species and habitats of interest in the existing reserve network. Furthermore, other approaches to protection are emerging (e.g., quiet seas reserves, trial protection, protection to attempt

restoration etc) that may require a different set of criteria than the species/habitat/ecosystem approach.

3.1.1.4 Gaps in the current ecological criteria

3.1.1.4.1 Species/habitats/ecosystems

As recognised in Section 1.3.3, there are species, habitats and ecosystems not covered by the current Habitats Directive designation criteria.

Recommendation

3.1. In expanding the MPA network, lists of species, habitats and other features for protection should be broad and there should be a process for adding to those lists when omissions become apparent.

3.1.1.4.2 Ability to designate based on pressures

As recognised in Section 1.3.4, there is sometimes a need to designate areas based on pressure criteria, which may reflect absence of a pressure, naturally low pressures at a site, or a site which is naturally buffered from climate change pressures. At its simplest, this could reflect acknowledgement of the value of dark skies [198] or quiet seas (see Section 1.3.4). Although MPA site choice may primarily be driven by the species and habitats present, there is a strong argument for assessing stressors at potential sites prior to designation. Spatial information on stressors can indicate areas not yet affected by stressors such as anthropogenic noise, light and fishing, or that are distant from point-source input of land-based pollution. There is also scope for recognising areas that may act as climate change refugia,[199] for example sites which are buffered from acidification by interactions with the underlying geology. Sites may have value as they act as stepping-stones on the projected range shift of a species or because local variability causes them to act as refugia from changes in average conditions. Where data are sufficient, temporal changes in stressors such as temperature, pH and deoxygenation may be assessed to locate such potential refugial sites. [200]

Recommendation

3.2. Enable designation of MPAs on pressure-based criteria, as well as the more conventional species-/habitat-/ecosystem-based criteria, to allow the designation of quiet seas, dark skies, and climate change buffered protected areas.

3.1.1.4.3 Criteria for functional and ecological coherence

The conservation of ecosystem services may be important for the integrity of the ecosystem and for society. Natural capital comprising individual habitats and species may underpin these services, but there may be cases where an alternative criterion is needed to capture the value of a functioning ecosystem (as opposed to its component parts). For example, a sea grass bed could be a poor example of a seagrass bed and therefore not suitable for designation under the Habitats Directive, but it might provide important ecological services (e.g., sediment stability, carbon export) to a nearby designated site, such that for functional coherence, its designation is paramount. Such MPAs may also assist in achieving GES in relation to descriptors such as seafloor integrity and food webs.

Similarly, it is not currently possible to designate a site based on its value to network coherence alone, despite network coherence being identified as an important criterion.

Recommendation

3.3. Enable designation of MPAs based on provision of important ecosystem services or on their contribution to ecological coherence of the overall network or achievement of GES under the MSFD.

3.1.1.4.4 Temporal flexibility, restoration and mobile MPAs

Current legislation provides for permanent designation and requires habitats to be brought to good ecological status. This disincentivises various activities, including restoration, trial protection, and community-led MPAs.

Restoration of degraded habitats forms part of the underpinnings of the Habitats Directive. However, some habitats (like oyster beds that were degraded and lost in the early 20th century) may not form part of the baseline for a Natura site, while still being realistic historical ecosystem states (see Section 1.1.5). Allowing a periodic review of progress (and thus allowing restoration attempts to be discontinued if an ecological shift does not seem possible) would incentivise restoration projects.

Because the framework for protected areas tends to focus on maintaining the existing ecological condition by excluding pressures, scope to trial potential conservation solutions or to identify novel conservation goals can be limited. Site selection criteria should allow assessments from adaptive management and trial protection to refine appropriate conservation approaches, which might be solved by temporal flexibility. This is a way of dealing with ecological uncertainty. An intervention can be proposed to test for an ecological impact or improvement. The aim here would be to have more flexibility than the current Habitats Directive legislation allows. It may be that trials or adaptive management lie outside protected areas legislation but are designed to complement it.

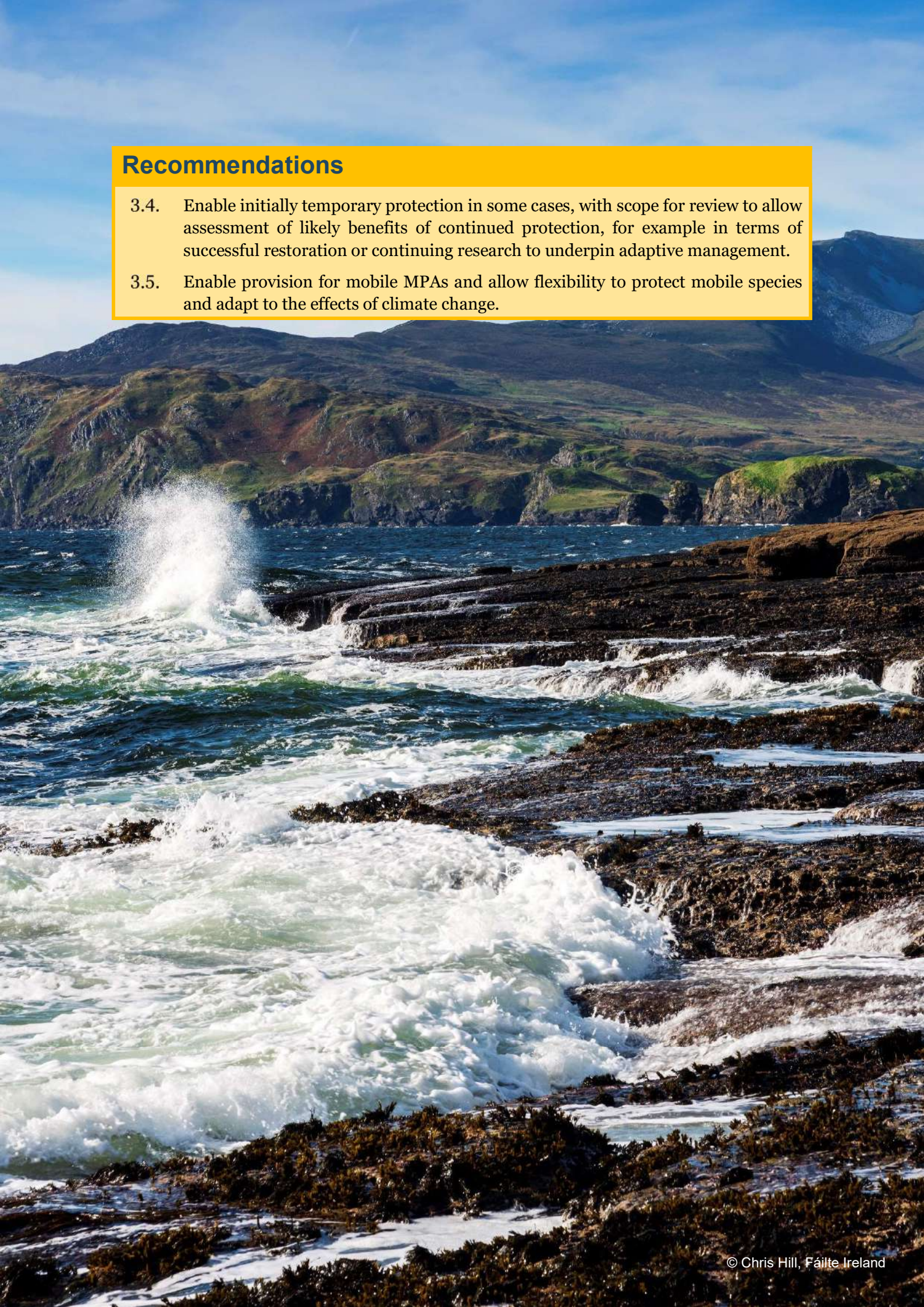
As described in Section 1.3.4, mobile MPAs, with boundaries that can shift in space and time, are increasingly being advocated as a mechanism for protecting inherently mobile features, like fish and cetacean populations and the dynamic ocean habitats they rely on.[93] If the necessary real-time data are available, such approaches can be more efficient and effective than traditional MPAs with static boundaries. A degree of mobility of MPAs may also be desirable as part of an overall strategy to design and manage Ireland's MPA network for resilience to climate change.

It is important to be able to make changes to the MPA network periodically to ensure that it continues to provide appropriate protection under changing environmental conditions, e.g. by moving MPA boundaries, designating new or alternative sites or revising management measures as appropriate. It is also important to consider that objectives may change for individual sites. If sites were set up with a single objective, such as for a habitat or species and its recovery or protection, and other species accrue, ecological and other criteria such as climate value may also improve with management that should not result in de-designation, or moving site. A provision for periodic review of the network is recommended in Section 3.3.5.

Recommendations

3.4. Enable initially temporary protection in some cases, with scope for review to allow assessment of likely benefits of continued protection, for example in terms of successful restoration or continuing research to underpin adaptive management.

3.5. Enable provision for mobile MPAs and allow flexibility to protect mobile species and adapt to the effects of climate change.



3.1.2 Societal considerations

MPAs are sometimes considered to be win-win situations in which both nature and society win. MPAs can be understood as protecting the health of ecological systems, which in turn supports social systems. However, it cannot be assumed that MPAs therefore benefit everyone. Spatial approaches to conservation, such as MPAs, represent a form of enclosure and exclusion so it is important to pay attention to who or what is being excluded and to address that carefully and in an equitable way. This becomes clearer if we understand MPAs as management tools that are situated within complex socio-ecological systems and that therefore shape, and are shaped by, prevailing social, cultural and political conditions. Not everybody can participate equally or can make their voices heard to the same extent in consultation and decision-making processes, as different groups and individuals have different forms of access to the decision-making table. The social and political context and established power relations mean that some voices are louder and more influential than others However, there is often a mismatch between expectations and knowledge about MPAs, conflicting interests and perceptions of unfair distribution of costs and benefits. The actual and perceived effects of MPAs on communities, groups and individuals are therefore complex, are influenced by values and emotions as well as social and political contexts,[120] and require careful consideration when planning, implementing, and managing MPAs. In July 2020, the Marine Institute initiated a public engagement process that recognises that seascapes are an important part of our identity and culture and seeks to capture people's sense of place and belonging to the sea. This initiative enables a deeper understanding of Ireland's seascape character to be part of the National Marine Planning Framework and will also be of value in relation to MPAs.[201]

Recommendations

3.6. A comprehensive assessment of the actual costs and benefits of an MPA network in Irish waters should be carried out rather than relying on information from other jurisdictions.

3.7. Any assessment of costs and benefits should capture unevenness of their distribution across different groups.

3.1.2.1 Public understanding and acceptability of MPAs

MPAs can be designated with a range of levels of restriction of different activities, from strict protection for biodiversity where no exploitation is permitted to MPAs that allow for a range of extractive uses, such as commercial fishing, trawling and mining (Section 1.1.7). There is often misunderstanding of these classifications and restrictions, and people may therefore associate a given MPA inaccurately with particular consequences. Thus, there is a task for authorities to clearly communicate the legal consequences of MPAs, because having an accurate understanding of MPAs is an important precondition to assess and oversee their consequences. Public understanding and acceptance of MPAs also depends on the perceived legitimacy of the public engagement process. Recent research into public engagement in Ireland found that:

> *"How the 'public' are incorporated, and when, matters to not only the success of engagement efforts by the state but also the legitimacy and trust that communities afford*

government agencies pursuing their active public participation.... We recommend that communities and individuals be valued and included for the experience and expertise that they bring from the beginning, be given meaningful control over the process and be involved in actual decision making".[202]

The consequences in terms of costs and benefits of MPAs for individuals, communities, and wider society and their distribution are important indicators for people's perceptions of and responses to MPAs.[161] As outlined in Part 2, costs and benefits include outcomes on a social, economic, and ecological level. It is not just the expected costs and benefits of MPAs that are important for people's attitudes to MPAs; the way these costs and benefits are distributed amongst groups in society is also important. MPAs are generally seen as unfair if certain groups face more costs, while others enjoy the benefits. There are different strategies to enhance the perceived and actual distributional fairness, which are not mutually exclusive. For example, sometimes technical solutions may be possible or those who face extra costs may be compensated for them. Compensation can be made on an individual level, or on a collective level, for example by investment in social structures or facilities in communities. The latter are often less likely to be seen as a bribe,[203] and may enhance feelings of ownership which can have a positive effect of community acceptance of MPAs.[204] Section 3.3.5.4 discusses issues of inequity (recognising that not all voices may be equally heard) and the importance of legitimacy in the MPA process in order to build trust and acceptance.

The perceived costs and benefits of MPAs and how they are distributed are strongly influenced by their value orientation.[161,205] Values are general desirable goals that serve as guiding principles in people's lives.[206] Values vary in their relative importance and behavioural choices are based on the value that is considered most important.[207] Typically, three value orientations are important, that is, egoistic values (reflecting a concern for one's own interests), altruistic values (reflect a concern with the welfare of other human beings) biospheric values (reflecting a concern for the environment for its own sake). The values that are endorsed and prioritised influence public perceptions of and responses to MPAs.[205,208] It is essential to acknowledge that different social groups hold different views about MPAs based on their underlying values. Getting in-depth knowledge of such core values can be difficult, as people often do not directly express them when asked.[209] Therefore, carefully designed indirect and in-depth analyses are needed to understand which motivational values drive people's perceptions and responses to MPAs.

One study of interest from an Irish perspective explored the values, concerns and preferences towards the Irish marine environment of 812 Irish individuals through a representative national survey. [210] Areas covered by the survey included concern about the threats to the marine environment, the level of support for marine planning and action, and views on the competence of different groups to manage the marine environment. Of interest to this report, the study also asked a question that first informed the respondents that some people have suggested that governments should designate parts of the ocean as protected areas, in the same way that they do with national parks on land. The respondents were then asked to what extent they agreed or disagreed with this suggestion. There was found to be relatively low agreement to this statement from the Irish general population compared to that in six other EU coastal states (UK, Spain, Portugal, Poland, Italy, Germany and France; Figure 3.1).[211]

Compared to other EU nations, the Irish public were also found to be more sceptical of the ability of both government and industry to make plans and policies about where and when different activities can happen at sea. Instead the respondents placed more trust in the

competency of scientists. Hynes et al. (2014) suggested that a greater, or more transparent, role for scientists in marine policy formation could result in greater support from the public.[210] The authors were of the belief that the public were largely unaware of the potential benefits that MPAs could provide to Irish society. They concluded that "with the establishment of MPAs likely to increase in the coming years the relevant Irish authorities will need to find a way to communicate the importance of such marine planning and protection approaches to the Irish public and to educate them on the benefits that could flow from any further MPA designations in Irish waters; benefits from both an economic and social as well as a conservation perspective".

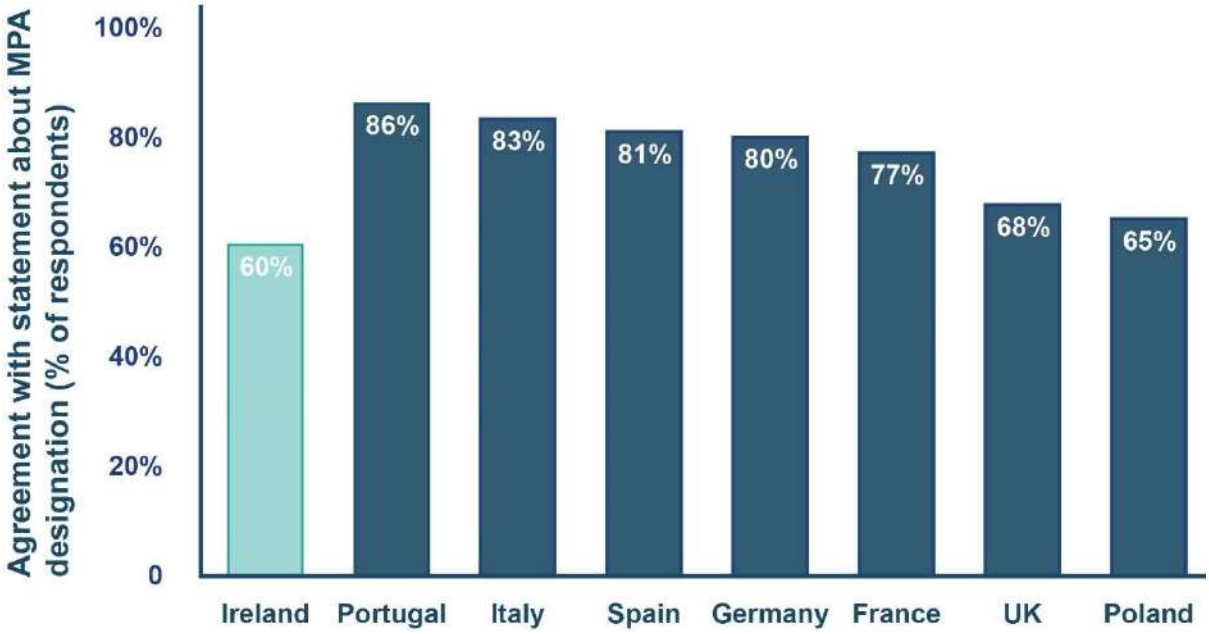


Figure 3.1 – Percentage of responses rated as 'agree or strongly agree' to the proposition that 'governments should designate parts of the ocean as protected areas' by the Irish general public compared to the rated response from individuals across UK, Spain, Portugal, Poland, Italy, Germany and France. Reproduced from statistics of Hynes et al. (2013). *Score of 4 or 5, from a scale of 1 to 5 where 1 means strongly disagree and 5 is strongly agree.*

Place attachment is another important factor influencing people's perceptions and responses to MPAs. Place attachment is a positive emotional connection with familiar locations.[212,213] MPAs are bound to result in changes in such familiar locations, and therefore evoke a response. This can be either a negative response, often referred to as place-protective actions, or a positive response, implying support for change. Often, it is assumed that disruption of a place will inevitably lead to a negative response, and although this is often the case, there are examples of positive responses to MPAs as well.[129] In fact, projects may enhance place attachment if communities feel that a development is a good "fit" or addition to their place, for example because it has a shared symbolic meaning or expresses their social identity.[214]

Recent research in Scotland found that the MPA designation process is highly important as regards the perception of an MPA on a coastal community.[131] This research showed that a more complicated picture emerges when the relationship between the socio-natural environment and socio-political institutions are taken into account and that the local socio-cultural context is crucial as to how an MPA lands within a community. In this case, the approach taken under the Habitats Directive, which reinforces the separation between

humans and non-human nature, exacerbated a conflict between members of a small island community and the Scottish Government around the designation of a marine Special Area of Conservation off the coast of the island. The values driving the MPA designation process appeared to collide with a rich maritime heritage and a distinctive way of knowing the sea that could not find expression within the designation process. While biological diversity was visible within the designation process, there was no visibility of the biocultural diversity and intangible cultural heritage of the area proposed to be designated. Social, historical and cultural forces that shaped the perceptions of landscape and seascape of many of the islanders were also key to perceptions of, and resistance to, the proposed MPA.

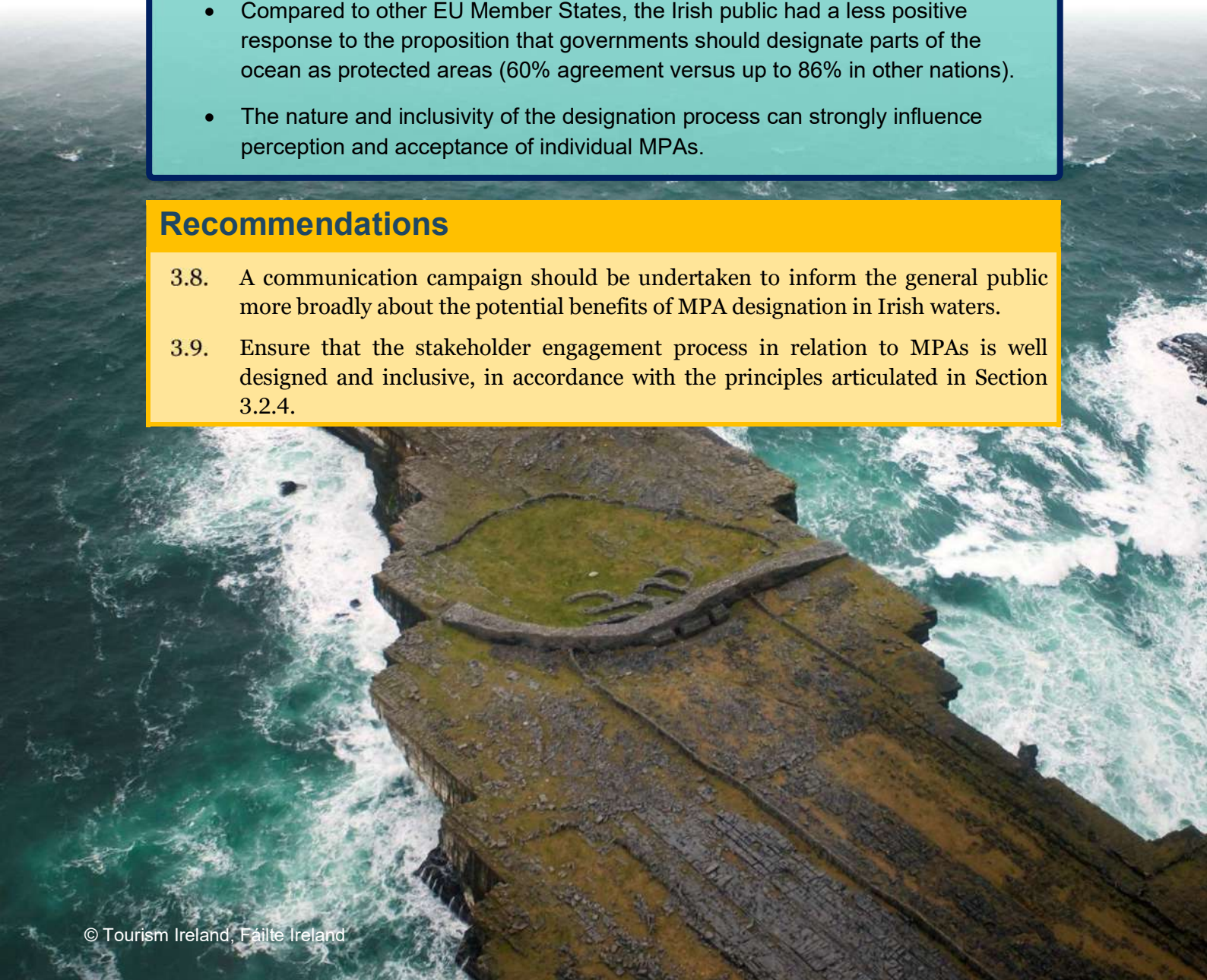
Key messages

- The nature and consequences of MPAs are not always well communicated to or appreciated by the public.
- Some people will be concerned about the impacts of MPAs on their livelihoods and the fairness of distribution of costs and benefits.
- People's value systems and sense of place can strongly influence their perception of MPAs as being positive or negative developments.
- Compared to other EU Member States, the Irish public had a less positive response to the proposition that governments should designate parts of the ocean as protected areas (60% agreement versus up to 86% in other nations).
- The nature and inclusivity of the designation process can strongly influence perception and acceptance of individual MPAs.

Recommendations

3.8. A communication campaign should be undertaken to inform the general public more broadly about the potential benefits of MPA designation in Irish waters.

3.9. Ensure that the stakeholder engagement process in relation to MPAs is well designed and inclusive, in accordance with the principles articulated in Section 3.2.4.



3.1.2.2 Addressing variation in costs and benefits among different groups in society

When it comes to the economic assessment of MPA networks the main concern is in determining the efficiency of the alternative options; that is which designation type and combination of sites increases overall welfare to the greatest extent. This focus on efficiency does not necessarily concern itself with questions of whether the benefits and costs fall on particular sectors, social classes or geographical regions. However, the development of a network of MPAs must consider both equity and efficiency. As shown in Figure 2.1, the standard economic assessment method of cost benefit analysis can be modified to incorporate equity issues by applying weights to the costs and benefits and the cost benefit analysis itself may be part of a wider multi-criteria assessment. As with all public investments and policies, the potential distributional effects of MPA network designation will be perhaps the critical consideration in the political process.[215] It is therefore important to question how assumed benefits from MPAs would actually play out on the ground: who (which groups, institutions, stakeholders) is likely to benefit from this, and who is not? Who could be marginalised and excluded?

Accounting for the equity issues involved in MPA designation is important to ensure a Just Transition process. A Just Transition process typically evolves around three types of justice. The first type is procedural justice, which refers to the perceived fairness of the procedures and processes used. When stakeholders feel they have been heard and taken seriously, potential future conflicts may be prevented or minimised. Ensuring procedural justice is another reason why the identification of, and engagement with stakeholders at the earliest possible point in the process is so important. Secondly, distributive justice refers to a fair distribution of costs and benefits and is also important. As discussed by Sancericho et al. (2002),[111] the socio-economic pros and cons of establishing a network of MPAs, can often be the deciding factor in determining whether the MPAs succeed or fail and therefore should be as seamlessly integrated as possible along with the ecological targets. Potential compensation of stakeholders for benefits foregone by the establishment of the MPA is another key consideration. This may include compensation of direct losses in the short term to repair an unfair distribution of outcomes (see Section 3.1.2.1). Finally, restorative justice refers to the potential of rehabilitation of those who are unproportionally harmed. This requires a long-term focus and include social and cultural aspects in addition to direct short-term compensation of losses.

If we are to take account of the different ways of understanding 'nature' and human-nature relationships, we also need to think about distributional impacts in a way that goes beyond questions of who wins, who loses, and how can the losers be compensated. Blount and Pitchon (2008) and Jones (2009) point out that that fishers often view their occupation as a 'way of life' rather than choosing a job based on economic rationality.[216,217] They therefore tend to view distributional fairness issues in terms of the effects of proposed MPAs on their way of life and their fishing communities rather than purely in terms of the distribution of costs and benefits.

While the Blue Growth paradigm aims to support 'sustainable' growth in the marine and maritime sectors as a whole it is generally accepted that the focus of the strategy is more on the development of the maritime industries rather than on the conservation of the marine

environment. It can be helpful to frame the ocean as a Blue Commons, whereby the ocean and marine resources are seen as a common good, to be protected, restored and managed equitably as a shared commons. This framework can change the way that conservation and societal costs and benefits are considered, particularly in relation to small coastal communities. For example, concerns arose around uneven access to benefits in the establishment of the Marine Harvest salmon farm in the Sound of Barra, Outer Hebrides, which is located adjacent to the Sound of Barra marine Special Area of Conservation, off the island of Barra. When the designation process was underway (2011-2013) and Marine Harvest applied for a licence for this salmon farm, several islanders pointed out that, due to the higher standards and additional red tape imposed by virtue of the Sound of Barra being designated, local aquaculture operators were effectively locked out of developing new local aquaculture businesses in that particular site. They argued that only large multinationals like Marine Harvest would have the resources to navigate the bureaucratic red tape and comply with requirements needed to get the licence.

Recommendation

3.10. The potential distributional effects of MPA network designation should be carefully considered at every stage of the process.

3.1.2.3 Planning for redistribution of fishing activity

Once implemented, an MPA will displace any prohibited or restricted activities to adjacent, non-protected areas. Without a concomitant reduction in total effort, these adjacent areas will experience an increased pressure proportional to the area now unavailable to the activity. There is therefore a trade-off involved with effort displacement: recovery of habitat/species inside the MPA versus increased pressure in adjacent, non-protected areas.[218]

In Irish marine waters, commercial fishing has the largest spatial footprint of any activity[75] (Figure 1.6), and so stands to be most affected by effort displacement after an expansion in the MPA network. In a relevant Irish study, Hynes et al. (2016) examined the possible spatial effects of closures of certain fishing areas on the Irish bottom otter trawl fleet.[219] The authors combined EU Vessel Monitoring System (VMS) data with other fishing site and vessel information in order to model the fishing site choice decision of Irish demersal otter trawlers. Using the model, a hypothetical scenario involving the closure of one of the fishing ground options was then simulated to examine the possible redistribution of fishing effort. The changes in fishing effort predicted around the closed area were found to be similar to those predicted from the phenomenon of 'fishing the line'- "a concentration of effort on the edges of a protected area thought to be a response to the availability of spill-over of stock migrating out of the protected area". The authors pointed out, however, that the observed clustering of effort reflected the model parameters underlying choice of grounds to fish at and the resulting behavioural response rather than any decision to catch spill-over stock from the protected area.

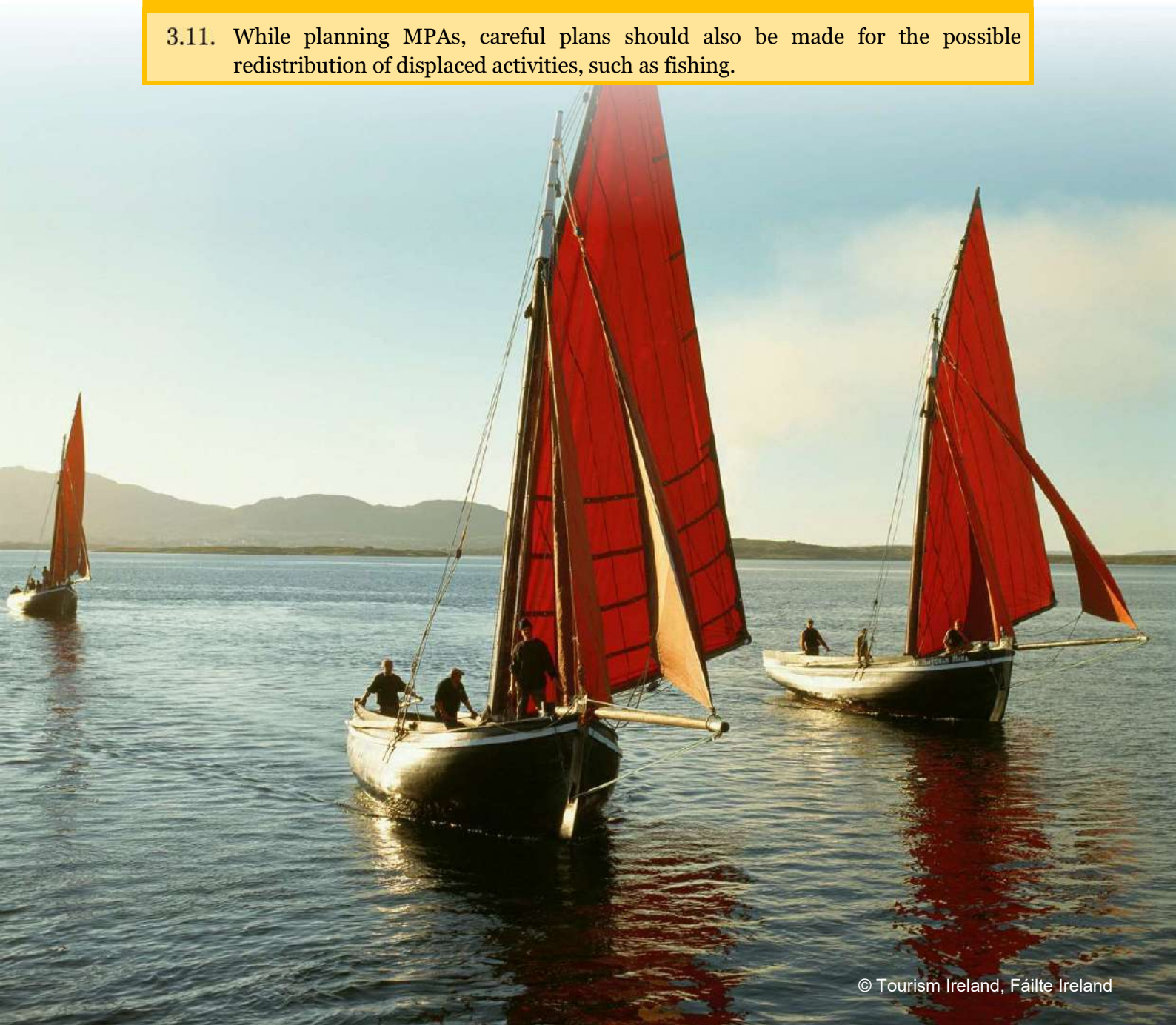
There are clearly key decisions to be made with regards to the optimal areas to close to mobile bottom-contacted gears (e.g. bottom trawls and dredges, the most impacting commercial fishing gears on the seabed) if the need to protect the substrates on which they predominantly operate is identified. Should the lightly fished - and therefore least impacted -areas be closed in favour of the core fishing grounds i.e. protect what is left? Or should parts of the most

heavily fished habitats be closed in an attempt to restore them from a degraded disturbed state? Or both?

In the absence of effort controls, closure of lightly trawled areas has been shown to have the strongest net positive effect on benthic ecological communities.[218] In terms of economic impact, the ICES WKTRADE workshop examined scenarios to evaluate the trade-off between the impact of mobile, bottom-contacting gear on the seafloor habitats and provisions of catch/value.[220] The work involved fisheries managers, industry representatives and scientists and evaluated a number of scenarios including overall effort reduction, different technical measures to reduce gear penetration into the substrate, and different MPA closure\effort displacement strategies. Among other things, the workshop concluded that redistributing fishing effort by closing the least fished areas and reallocating it to the remaining fishing grounds evenly had the weakest negative impact on catch rates. Of course, under such a scenario consideration also needs to be given to the distance from the home port to the new fishing grounds and the viability of different sized vessels to cover such a distance. Such a process was part of the UK process for selecting Marine Conservation Zones.

Recommendation

3.11. While planning MPAs, careful plans should also be made for the possible redistribution of displaced activities, such as fishing.



3.2 Stakeholder engagement

3.2.1 The importance of recognising differences in socio-ecological systems and stakeholder interests and perceptions

Although the environmental management literature recognises the importance of social acceptability of MPAs and the influence of social, economic and political factors on their implementation, such literature frames biodiversity and humans as separate categories, where the focus is on understanding the relationships linking and affecting biophysical nature and societies. This approach views both categories as zones of impact (biodiversity impacted by human activities, and 'communities' and 'human-use objectives' impacted by biodiversity conservation measures such as MPAs). However, human-nature relationships can also be understood as not fitting neatly into purely 'social' or 'natural' categories, where one category impacts the other. According to this understanding, human-nature relationships resemble entangled processes that are constantly changing and playing out in different ways, within specific social, cultural and political contexts.[221] Within the field of environmental management, attempts have been made to devise an ocean-zoning approach for conservation, fisheries and marine renewable energy that considers co-location opportunities. Yet, a zoning approach and trade-off analysis may work for one community but not be replicable for another. Different ways of understanding human-nature relationships outside separate 'social' and 'natural' categories can help to provide insights into these differences on the ground.

3.2.2 The importance of understanding local cultural contexts: a biocultural approach

Understanding and adapting to local cultural contexts is particularly relevant for inshore MPAs, as local cultural context has considerable influence on conservation outcomes and success. Three decades of practice, study and research show that cultural perspectives have been integrated into conservation efforts in four main ways: (i) for conflicts rooted in culture, by revealing the value-based assumptions that underlie perceptions and uses of the natural world; (ii) incorporating local cultural resources into conservation work through creatively applying the wisdom and insight of the past to present and future challenges; (iii) going beyond empirical research to include investigation into culturally defined, religious, spiritual and metaphysical realms that shape human/land/sea relations and (iv) hearing local voices speak by including them in academic writings. These biocultural approaches need to be integrated into conversations within and between sectors in order to transcend the polarised arena of nature vs development narratives and disputes.

Biocultural approaches recognise and investigate the interconnections between nature and culture. They understand biological and cultural diversity as dependent on each other, and view biological diversity as managed, conserved, and created by different cultural groups.[222,223] Biocultural approaches (including concepts such as biocultural diversity and biocultural refugia) are recognised and adopted by intergovernmental organisations and platforms such as the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), UNESCO and the Convention on Biological Diversity.[223]

A biocultural approach was used to understand a protracted MPA conflict in Scotland, where the research study found that local relationships with the biophysical environment (notably how people work and manage it) embodied and expressed distinctive cultural values. The fear of loss of local control over marine resources engendered by a proposed MPA was tied to a fear of loss of a distinctive way of knowing and sense of belonging to place. Making visible the biocultural diversity of the area proposed for designation as an MPA helped to connect to local understandings of conservation as something which included, rather than excluded, local people living and working with that environment on a daily basis. Careful relationships cultivated between Marine Scotland and key people within the local community laid the foundation for a community-led co-management process for the MPA, where a community organisation carried out work, funded by Marine Scotland, to integrate the marine policy environment into the local environment in exchange for leading on management of their marine resources. This required risks to be taken both by Marine Scotland (in facilitating leadership by the community) and by key members of the community (who, up to that point, had refused to engage with government agencies as part of the opposition to the MPA designation). Key to this process was the recognition and acknowledgement by policy-makers and policy-implementers of the relationship between cultural diversity and biodiversity expressed in local people's relationships with their marine environment. The emerging co-management process tried to find a way to articulate the management of local marine resources in a way that respected existing socio-cultural structures and processes and local relationships with the marine environment while meeting the needs of the policy environment to achieve biodiversity conservation objectives. For the purposes of the Irish context, the key message to be taken from this Scottish study is that understanding local relationships with the biophysical environment, and providing space to articulate people's sense of belonging to place, can help to establish legitimacy in the conservation process. For example, it can help to foster dialogue as to ways forward where local people feel that their lived realities are being acknowledged and integrated into decision-making and management processes.

In relation to Northern Irish fisheries, a process was carried out in the Irish Sea at the time of the development of Marine Conservation Zones (MCZ) to estimate the value of the proposed and alternative areas to the Northern Ireland Fishing Industry.[137] Proposed MCZs were acknowledged as being important fishing grounds and potentially having a significant impact on the NI fishing sector, especially if the management proposal to close the MCZ to benthic fisheries was to be implemented. Using a combination of electronic Vessel Monitoring System (VMS) data, landings data and seafood industry price data an analysis of the value to the NI fleet of the proposed and alternative sites was carried out. It included landing values, impacts on fleet performance, displacement consequences and socio-economic impacts. While the designation process is yet to be concluded, this level of involvement was welcomed by the sector as good practice and did reduce conflict potential.

MPAs should have clearly defined objectives and their focus should be transparent. While the primary focus of MPAs is conservation of biodiversity and ecosystems, engaging stakeholders in the setting of objectives allows different expertise and knowledge to contribute not only to shaping biodiversity-related objectives, but to set these within the relevant socio-cultural context. In this way, objectives can include protection of biocultural diversity, socio-economic development of regions, compensation for displacement and fostering societal stewardship. Establishing clear objectives is critical, builds trust and legitimacy in the process, and allows for appropriate assessment of an MPA's success. Having clearly stated objectives from the outset will facilitate public acceptance of MPAs. The objectives should form the basis of

management decisions and be used to open conversations with those who currently utilise and know the site about how best to manage the site and its features. It is important to value the knowledge and expertise of the current users, as these are often well placed to observe changes in the biophysical environment as they work in it on a daily basis. If users are engaged in the process from the outset in a meaningful way, where they have influence in shaping MPA objectives and management practices to achieve them, then it is more likely that they will actively participate in MPA management. MPA designation and management inevitably creates 'winners' and 'losers'. If management decisions are perceived as unfair, this damages legitimacy and creates incentives to undermine the established management system and can lead to undermining of MPA management.

Key messages

- It can be helpful to understand human-nature interactions as part of an intertwined relationship rather than in terms of use and impact.
- Consideration of local cultural contexts and meaningful dialogue can be critical to the uptake and effectiveness of MPAs, particularly coastal MPAs.

3.2.3 Fostering societal stewardship through participation

A stakeholder participation process is an integral part of the implementation and management process of MPAs and is an important factor to foster societal stewardship at a local level. However, before commencing the planning process, ensuring MPAs are politically feasible is an important enabling factor. That is, ensuring a legal mandate, political will, and adequate funding and resources is important, as political will and demonstrated commitment at a high level of government can be essential to carry a planning decision through to full implementation.[224] Another factor that is essential to lay the foundation for a successful planning and implementation process is the development of clear scientific guidelines.[224,225] These may include information on the ecological purposes, socio-economic and legal aspects of MPAs. This can be used as a knowledge basis for all involved and can be used to provide scientific advice and input throughout the planning and implementation processes.

The planning process involving stakeholders often combines information provision, consultation and stakeholder participation.[226] Which type of involvement is used depends on the aims that needs to be achieved and the stage the implementation and planning process is in. It is important that the aims of each type of stakeholder are clearly defined and the most suitable form of stakeholder involvement to achieve those aims should be chosen.[226] Information provision and consultation process are usually used in the early stages of the stakeholder process to ensure everybody has a clear understanding of the aims and objectives of the project, knowledge gaps are filled, to map the area, analyse socio-economic interests and dynamics among stakeholders. Stakeholder participation is the most recommended form of stakeholder involvement relating to value-based decisions.

Information provision is usually characterised by one-way communication where information flows from authorities and scientists to stakeholders in MPAs. This is usually used to build the foundations for future discussion and decision-making processes. For example, analysis of the planning processes of MPAs in California,[224] and the Great Barrier Reef,[225] indicated that providing information about the political and scientific objectives is an important factor to

enhance the coordination of the stakeholder process. An important political objective is to provide clarity about the political feasibility of MPAs. Communication that there was a legal mandate, political will and adequate funding was a key element for the success of the planning processes of an MPA in California.[224]

A consultation process is a one-way communication flow, in which information primarily flows from stakeholders to authorities or scientists. Using a consultation process can be very beneficial to analyse the local context of an area or region, map important stakeholders, socio-economic interests. People who live and work in a potential MPA often have very specific and detailed local knowledge.[227] Such local experiential knowledge may be used to manage conflicting interests among stakeholders and facilitate the future discussions in a stakeholder participation process.[224]

Stakeholder participation is characterised by a two-way exchange of information, with the possibility of transforming opinion on both sides, i.e. a dialogue.[228] That opinions can be transformed is crucial for a successful stakeholder participation process, as it means that stakeholders are given a "voice" in the discussions. Because they are able to express their concerns, opinions and values and interests of multiple stakeholders are taken into consideration, the process tends to be seen as more fair, which enhances public support.[161] Trust is another very critical factor to enhance in planning and implementing MPAs.[161,229] Efforts should be made to build trust from the beginning. Especially when there is distrust, this is not an easy thing to do. Well informed and trained third parties or intermediaries may play a role in ensuring that the process incorporates local concerns beyond what can be discovered at public hearings.

Successful stakeholder participation requires that stakeholders are involved in the process from the early stages of MPA development, when they can still exert influence on the process. When they are involved too late and too little, decisions are more often contested.[230] In fact, having stakeholder participation in place enhances belief that process are fair and trustworthy. This is even the case for stakeholders who are not directly involved in the decision-making process. The fact that a voice is given to stakeholders tends to build support across communities.[231]

The details of stakeholder participation processes are context-dependent. Every area, community and regions has its own ecosystem, governance, socio-economic context and historical background, which have to be analysed and mapped. However, there are a few general guidelines that should need to be taken into account to ensure that it is transparent, meaningful and facilitating (see Table 3.5).

In conclusion, the implementation of MPAs is a long-term process, that should include stakeholder participation from a very early stage and should be maintained throughout. Also, it is important to continue to analyse and monitor stakeholders' interests, as levels of support may change due to changes in interests, outcomes, or beliefs. Such ongoing analysis can also be used to build experience for the implementation of future MPAs, which is why careful evaluation and research about these processes, is highly recommended. Finally, although carefully planning the stakeholder engagement process does not guarantee success, public support, or societal stewardship, failing to do so is most likely to lead to conflicts and delays.[224]

Box 9: Example of sectoral organisation to clearly identify and communicate issues and actions.

CLAMS groups could be used for consultation and management design on proposed designations. The unique Co-ordinated Local Aquaculture Management Systems (C.L.A.M.S.) process is a nationwide initiative to manage the development of aquaculture in bays and inshore waters throughout Ireland at a local level.

In each case, the plan fully integrates aquaculture interests with relevant national policies, as well as: (1) Single Bay Management (S.B.M.) practices, which were initially introduced by salmon farmers to co-operatively tackle a range of issues, and have now been extended to all aquaculture species, (2) the interests of other groups using the bays and inshore waters and (3) County Development plans.

The process has been widely adopted in bays and inshore waters where fish farming is practiced around the Irish coast, as a further proactive step by fish and shellfish farmers, to encourage public consultation on their current operations and their future plans.

The groups actively participate in shore clean up operations, work together to mark their sites for navigational purposes, take part in training, develop interpretative signs, and adopt various standard operating procedures to improve the operation and management of their sites, over and above the requirements of their aquaculture licences.

The CLAMS process minimises conflict within the aquaculture sector and between the sector and others, and instead creates a positive platform to improve the actions and reputation of the sector and the area in which they work.

3.2.4 General guidelines for stakeholder participation processes

Table 3.5 – General guidelines for a successful MPA stakeholder participation process.[224,225]

General guidelines for successful MPA stakeholder participation processes
1. Identify and engage all relevant stakeholders early in the planning process.
2. Clearly define and communicate policy and scientific goals and objectives that are consistent with other legislative goals. This should also include clear communication both of what MPAs are and what they are not, generating a common understanding, as well as providing the political context.
3. Roles and responsibilities of all those involved in the planning need to be clearly defined and communicated.
4. Ensure that all involved understand the aim of the stakeholder participation process and provide clear rules, including aims and objectives, constraints, and codes of conduct (and consequences of not complying)
5. Providing science guidelines to ensure access to the best readily available scientific information, local knowledge, and spatial data by stakeholders, scientists, and decision-makers should be treated as a joint fact-finding approach.
6. Conflict among interests of stakeholders should be anticipated and acknowledged and discussions facilitated without bias (e.g. by using trained third-party facilitators), using an approach such as the Community Voice method.
7. Anticipate media attention and allocate media and communication to a dedicated spokesperson.
8. Accept that the process will take time and afford that time to the process. The process needs to engage appropriate groups early and ensure a just transition in the short and long term. Developing a model of community co-management has been proven effective to facilitate this, provided that it is properly resourced and appropriate responsibility and accountability for governance remains with the State.
9. Make use of the existing context in which an MPA is planned. This includes working with existing organised structures (e.g., CLAMS (see Box 9), Regional Inshore Fisheries Forum (RIFF), Irish Islands Marine Resources Organisation and use the National Marine Planning Framework and the mechanisms that it establishes.
10. Accept that the design of MPAs can change during the stakeholder process and keep in mind that the aim is to achieve policy goals and meet scientific and feasibility guidelines, while minimising potential socioeconomic impacts and find broad social support.
11. MPAs need to be carefully managed, monitored and evaluated. This involves detailed planning and financing.
12. Acknowledge that MPA development is not merely a "factual" process, but involves emotional, moral and value-based responses from all those involved.
13. Address potential power imbalances in the participatory process by facilitating an engagement/management model that acknowledges historical relationships and recognises inequities.

Recommendations

3.12. Early and sustained stakeholder participation should be integral to the processes of designating and managing MPAs and is an important factor to foster societal stewardship at a local level.

3.13. The details of stakeholder participation processes are context-dependent, but the general guidelines presented in Table 3.5 in Section 3.2.4 of this report should be taken into account to ensure that they are transparent, meaningful and facilitating.

3.3 Governance and management

Governance sets the stage within which management occurs and generally involves the government, the markets and civil society. Management refers to the process by which humans and resources are utilised to achieve explicit objectives within a specified institutional structure.[232] Governance can include formal and informal arrangements that structure how resources are used, how problems are dealt with, what actions are acceptable or not acceptable and what regulations should be used to achieve certain outcomes. The term 'good governance' typically refers to a process that leads to positive, lasting outcomes in accordance with key governance principles such as legitimacy, transparency, accountability, inclusivity, fairness, integration, and effectiveness. In an environmental context, good governance should also reflect principles relating to sustainable development, the ecosystem-based approach, the precautionary approach, and best available science.

The Aarhus Convention addresses many of these through its three pillars: access to information; public participation in decision-making and access to justice in environmental matters, which are already implemented through EU and Irish law.

Traditionally governance of protected areas has seen the State responsible for all types of decision making relating to formal protected areas. Internationally, this is changing as different types of protected areas necessitate different types of governance arrangements: for example, those for voluntary conservation areas or where local and indigenous communities are involved. The various forms of governance for protected areas are shown in Table 3.6. In reality, governance can involve a number of these different types depending on the local context. In Ireland governance has tended to be 'Governance by Government' though protected areas on land have involved voluntary agreements with private landowners. The IUCN World Parks Congress has repeatedly called for more use of co-management as a means to achieve conservation objectives, calling on governments to "create or strengthen enabling legal and policy frameworks for co-management of protected areas" (IUCN-WPC 2003 V.25, paras. (c),(g)).

Table 3.6 – IUCN typology of protected area governance types.[233]

Type	Characterisation as part of formal protected areas systems
Governance by government	Classic approach—state-owned or state-controlled
Governance by indigenous and local communities	New—voluntary conservation by indigenous and local communities
Governance by private property owners	New—voluntary conservation by private property owners (individual or corporate)
Co-management (shared governance)	Some elements are new—for example, arrangements expanded to partnerships with and among communities, NGOs, private individuals and corporations

Whilst marine responsibilities are divided across many government departments and state agencies in Ireland, responsibilities for nature conservation tend to be more centralised. However, as highlighted throughout this report, the MPA process cannot be limited to nature conservation considerations alone. As such, close coordination across a range of departments,

divisions and agencies is essential for implementation of the MPA process. In an MPA context this extends beyond the national institutions but will also have to involve entities and organisations that operate at EU and international levels, depending on the marine activity and area concerned. Regardless of the governance arrangements that exist for protected areas, powers and responsibilities must be clear to establish and ensure accountability. Governance arrangements may also have to change from time to time depending on the needs of the area in question and wider policy contexts.

3.3.1 Key marine responsibilities in different departments

The **Department of Culture, Heritage and the Gaeltacht (DCHG)** was responsible for the protection and preservation of Ireland's heritage and cultural assets. Under the heritage division of that Department rests responsibilities for both natural, built, and archaeological heritage. The National Parks and Wildlife Service (NPWS) sits within the heritage section of the Department. NPWS is responsible for Ireland's nature conservation requirements under EU and national law. This includes designating and protecting Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Natural Heritage Areas (NHAs), National Parks and Nature Reserves. NPWS is also responsible for implementing a range of international instruments relating to natural heritage, including the UN Convention on Biodiversity.

As a result of the formation of a new Government in June 2020, the Heritage function of this Department transferred to the Department of Housing, Planning and Local Government,[i] the name of which was then altered to the Department of Housing, Local Government and Heritage.[ii]

The **Department of Housing, Planning and Local Government (DHPLG)** has a number of responsibilities in relation to the marine environment. The Water Division of the Department has over-arching responsibilities for both the Water Framework and Marine Strategy Framework Directives, as well as other legislation dealing with water quality (bathing waters, shellfish waters and urban waste water) often in association with specified State agencies and local authorities. The Marine Environment Section is also responsible for Ireland's implementation of the OSPAR Convention. Under the Planning Division, the Marine Planning Policy and Development section of the Department has functions for both terrestrial and marine planning. The Department is the designated competent authority for Maritime Spatial Planning in Ireland. The Planning Division also hosts the marine legislation and foreshore consenting sections. In terms of the Sustainable Development Goals, under Goal 14 Life Under Water the DHPLG is identified as the lead stakeholder with other input from the Department of Culture, Heritage and the Gaeltacht, and the Department of Agriculture, Food and the Marine.

As referred to under the DCHG, the formation of a new Government in June 2020 resulted in the transfer of the Heritage functions of the DCHG to the Department of Housing, Planning and Local Government, the name of which was then altered to the Department of Housing, Local Government and Heritage.

[i] S.I. No. 339/2020 - Heritage (Transfer of Departmental Administration and Ministerial Functions) Order 2020
[ii] S.I. No. 408 of 2020 – Housing, Planning and Local Government (Alteration of Name of Department and Title of Minister) Order 2020.

The **Department of Agriculture, Food and the Marine (DAFM)** has key roles in relation to fisheries and aquaculture. The Sea-Fisheries Policy and Management Division is responsible for the strategic, economic and sustainable development of the seafood sector, and its regulation within the framework of the EU's Common Fisheries Policy, the Sea Fisheries and Maritime Jurisdiction Act 2006 and the Fisheries (Amendment) Act 2003. The Sea Fisheries Protection Authority (SFPA), Bord Iascaigh Mhara and the Marine Institute all come under the aegis of DAFM, and have specified functions under various legal instruments and policies. The SFPA, for example, advises the Minister in relation to policy on the effective implementation of sea-fisheries law and food safety law, as well as effective enforcement of sea fisheries and seafood safety law.

The **Department of Communications, Climate Action and Environment (DCCAE)** has responsibility for developing and implementing both the National Mitigation Plan and National Adaptation Framework for Climate Changes as well as coordination of sectoral adaptation planning processes across Government. This relates to its wider obligations under the UN Framework Convention on Climate Change. The Department also has responsibilities for national energy policy including offshore renewables and hydrocarbon exploration and licensing. Inland Fisheries Ireland sits within DCCAE. It is responsible for developing and advising the Minister on policy and national strategies relating to inland fisheries, including sea angling. Their responsibilities cover enforcement of the Inland Fisheries Acts[i] and conservation, protection and management policies related to these areas.

As a result of the formation of a new Government in June 2020, the name of the Department of Communications, Climate Action and Environment was altered to the Department of Environment, Climate and Communications.[ii]

The **Department of Defence** provides for the military defence of the State and contributes to national and international peace and security. It has over-arching responsibility for the Defence Forces including the **Irish Naval Service (INS)**. The INS is the State's principal sea-going agency and its defence roles include defending Ireland's maritime area, deterring intrusive or aggressive acts, conducting maritime surveillance, protecting marine assets including fisheries. The Naval Service is the official agency with responsibility for the operation of Ireland's Fisheries Monitoring Centre (FMC), carried out as part of a Service Level Agreement between the Department of Defence, Naval Service and the Sea Fisheries Protection Authority (SFPA). As such, the FMC conducts monitoring and surveillance of all vessels equipped with a Vessel Monitoring System (VMS) that are operating in the Irish EEZ; all Irish vessels operating in any jurisdiction; all vessels equipped with VMS that are operating in the waters of NEAFC adjacent to Irish waters. This monitoring and surveillance includes the entry and exit by all fishing vessels in any maritime areas where specific rules on access to waters and resources apply and any fishing restricted areas referred to in Control Regulations, including Natura 2000 SACs and SPAs. The FMC is the designated competent authority for receipt of all effort reporting and hail notification requirements from fishermen.

The **Department of Foreign Affairs and Trade (DFAT)** promotes and protects Ireland's interests in the world, including negotiating on Ireland's behalf on international legal matters and representing Ireland in international legal proceedings. The Minister for Foreign Affairs

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[i] https://www.dccae.gov.ie/en-ie/natural-resources/topics/Inland-Fisheries/Pages/related-legislation.aspx
[ii] S.I. No. 373/2020 - Communications, Climate Action and Environment (Alteration of Name of Department and Title of Minister) Order 2020

& Trade has primary responsibility for establishing the State's international boundaries, including its maritime boundaries.

As a result of the formation of a new Government in June 2020, the name of the Department of Foreign Affairs and Trade was altered to the Department of Foreign Affairs.[i]

The **Department of Transport, Tourism and Sport** has responsibilities relating to maritime transport, ports and navigation including maritime safety and the prevention of pollution of the marine environment from ship-based sources. The Department also contributes to the development of policies across Government that may impact on tourism and actions that may significantly impact on tourism. The latter may link to conservation in terms of visitor numbers and attractions.

As a result of the formation of a new Government in June 2020, the name of the Department of Transport, Tourism and Sport was altered to the Department of Transport.[ii] *The Tourism and Sport functions were transferred to the Department of Culture, Heritage and the Gaeltacht, the name of which was altered to the Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media.*[iii]

Other Departments and Agencies may have roles that will impact on the marine environment but in a wider sense, for example the Department of the Taoiseach has a Parliamentary Liaison Unit that seeks to ensure the timely delivery of the Government's legislative programme; and the Department of Rural and Community Development seeks to promote rural and community development and to support vibrant, inclusive and sustainable communities throughout Ireland, which obviously will impact on coastal areas.

Key messages

- Key principles for good governance include legitimacy, transparency, accountability, inclusivity, fairness, equity, integration, and effectiveness.
- Marine responsibilities are divided across many government departments and state agencies in Ireland. As such, close coordination across a range of departments, divisions and agencies is essential for implementation of the MPA process.
- Effective governance of MPAs will also require coordination with EU and international organisations.

3.3.2 Planning for MPAs as part of an overall strategy for ecosystem-based management under the MSFD and MSP

Although the expansion of the MPA network is primarily being driven by evidence and concerns about biodiversity loss (Section 1.1) enshrined in a range of international

[i] S.I. No. 382/2020 - Foreign Affairs and Trade (Alteration of Name of Department and Title of Minister) Order 2020
[ii] S.I. No. 351/2020 - Transport, Tourism and Sport (Alteration of Name of Department and Title of Minister) Order 2020
[iii] S.I. No. 403/2020 - Culture, Heritage and the Gaeltacht (Alteration of Name of Department and Title of Minister) Order 2020

commitments (Section 1.2), the network should also be recognised as contributing to a wider ecosystem-based management framework with the ultimate aim of achieving Good Environmental Status under the MSFD that combines a range of other objectives, including sustainable fisheries management, resilience to climate change including through enhanced carbon sequestration, and effective Marine Spatial Planning (cf. Lundquist et al. 2015 and see Section 1.2).[234]

Implementation of Marine Spatial Planning (MSP) requires an ecosystem-based approach and aims to achieve sustainable development. Under the EU Integrated Maritime Policy (IMP), which seeks to provide a more coherent approach to maritime issues, the Marine Strategy Framework Directive (MSFD) is the environmental pillar and is complementary to MSP. It provides a mechanism to ensure ecological protection at an ecosystem scale and should be viewed as a means to reconcile growth in marine activities with minimal negative impact on the marine environment. An expanded MPA network, as well as helping achieve global, regional, EU, and national biodiversity targets, should sit at the nexus between MSP and MSFD and serve as a key pillar helping to ensure environmental sustainability and underpinning holistic ecosystem based management.

Article 8 of the EU Maritime Spatial Planning Directive provides that when establishing and implementing MSP, Member States should identify the spatial and temporal distribution of relevant existing and future activities and uses in their marine waters and the interactions between them. One such use is "nature and species conservation sites and protected areas" (Article 8(2). Ireland's draft National Marine Planning Framework (NMPF) contains Overarching Marine Planning Policies, subdivided into environmental, social and economic policies, that will apply to all proposals capable of having impacts in the maritime area. The environmental policies in the NMPF have been further sub-divided into ten categories largely aligned to the descriptors of Good Environmental Status under the MSFD. The policies contained in the NMPF "seek to complement rather than duplicate" existing efforts to achieve Good Environmental Status under other mechanisms such as Natura site designations and Appropriate Assessment under the Habitats Directive; fisheries management measures under the CFP; and site level project consents under the Foreshore Consenting system.

With respect to MPAs, the NMPF states that "until the ecological coherence of the marine protected area network is confirmed, proposals for development in the maritime area should demonstrate that they will avoid, minimise, or mitigate adverse impacts on features that may be required to complete the network, or if it is not possible to mitigate adverse impacts, proposals should state the case for proceeding." Details on how this will actually be achieved in practice still need to be fully clarified, but this is an important consideration for the expansion of the MPA network in a wider context of ecosystem-based management. The State should therefore define the relationship between the process of selecting MPAs and the implementation of MSP under the NMPF. Such a definition will need to consider the integration of work in different administrative units, a means for deciding on conflicts between competing goals, and potential cross-referencing of activities. For example, it is feasible that Strategic Marine Activity Zones (SMAZ's) could be designated before the next tranche of MPAs[i]. To counteract this risk, sensitivity mapping could be conducted to identify areas of

[i] According to the Draft National Marine Planning Framework, arrangements are being made to include provisions in the Marine Planning and Development Management (MPDM) Bill to provide for a system of designation of Strategic Marine Activity Zones.

probable future MPAs. This knowledge could be used to preserve key areas from further degradation using the planning process until adequate MPA legislation is enacted.

Recommendation

3.14. The expanded national MPA network should be considered an integral component of implementation of the Marine Strategy Framework Directive (MSFD) and the National Marine Planning Framework (NMPF). This will necessitate clear guidance on how MPAs interact with marine activities and their planning and management.

3.15. Under the NMPF, Strategic Marine Activity Zones (SMAZ's) could be designated before the next tranche of MPAs. Sensitivity mapping could be conducted to identify areas of probable future MPAs so that they can be protected from further degradation until adequate MPA legislation is enacted.

3.3.3 Establishment of a responsible authority to support designation and management of MPAs

Designation and management of MPAs involves the coordination of different political structures and authorities established under a range of legal instruments and intersecting with the remits of a range of government departments (Section 3.3.1). Bodies with legal competence and the relevant actors involved in the selection and designation of MPAs varies among UNCLOS maritime zones (cf. Box 3**)**. Any work to establish MPAs must be enabled by structures that can work across Departments, EU and international counterparts and across maritime jurisdictions zones under UNCLOS.

To ensure the integrity of an expanded MPA network, coordination of the selection and designation process at national level will be required (Figure 3.2). Responsibilities for a new national MPA coordinating body could include, *inter alia*:

- Coordinating marine conservation across government and in consultation with other stakeholders, including associated procedural guidelines
- Coordinating a cyclic national systematic conservation planning exercise to identify gaps, inform the need for adaptive management measures, and bring forward recommendations for additional MPAs (see Section 3.3.3 below)
- Overseeing management, monitoring and enforcement of the national MPA network
- Carrying out national marine conservation audits when required under international and EC reporting obligations.

Recommendation

3.16. A national MPA coordinating body (e.g. a dedicated Section or team within a government Department) should be established with the authority and resources to coordinate planning and implementation of an expanded MPA network and to foster good governance and ensure close collaboration among relevant departments and agencies.

3.3.4 Proposed site selection and designation process

Deciding on the locations for protected areas is a process that can involve many goals and trade-offs. Even the ecological criteria outlined in Section 3.1.1 are multifaceted. If different goals and constraints are not recognised, this can reduce the effectiveness of protected areas. An extreme example on land could be a situation in which all the protected areas are located in remote 'wilderness' areas like deserts and mountains and so do not protect the full range of biodiversity present in a region.[235] The Systematic Conservation Planning (SCP) approach grew from a desire to improve the processes for selection of protected areas, so that it involves more transparent and accountable decision-making. An SCP process can be seen as a way of addressing the difficulty of making value-laden decisions in conservation.[236]

The practice of SCP has evolved over the years to include a greater focus on the context, stakeholder engagement and use of socio-economic data. The review of McIntosh et al. (2017) identified 11 stages that guide the process: through setting the scene, to formulating goals, suggestion of solutions that reflect the goals and finally implementation and monitoring for new protected areas. [236] As the setting of goals depends on the value placed on different aspects of conservation, this is explicitly recognised as something that is part of the process, and this aspect is one that involves stakeholder participation. The SCP process is iterative and may involve refining goals as new information becomes available. In practice, some of the stages may be carried out simultaneously. As the SCP process can be time-consuming and costly,[237] it may be practical to streamline the steps within the process.

One of the benefits of setting out an SCP process is greater transparency around the interrelationships between planning, site selection and implementation (Figure 3.2). The process is based on existing information but monitoring and review allow refinement of efforts and flexibility to ensure that evolving national conservation goals can be met in the coming decades. Note that early stakeholder engagement and participation is a key requirement in this process.

It is important to note that the process suggested here is distinct from and complementary to the ongoing Natura 2000 process, in which additional sites are being designated for offshore reef and seabirds at sea (see Section 1.3.2). The process described below refers to the development of new national MPAs. Natura sites (new and existing) will still be evaluated, to understand the properties of the entire Irish network of MPAs, which will incorporate both new national MPAs and Natura 2000 sites (Figure 3.4).

Recommendation

3.17. A Systematic Conservation Planning approach should be adopted, that can build on existing efforts, to ensure that evolving national conservation policy goals can be met in the coming decades.

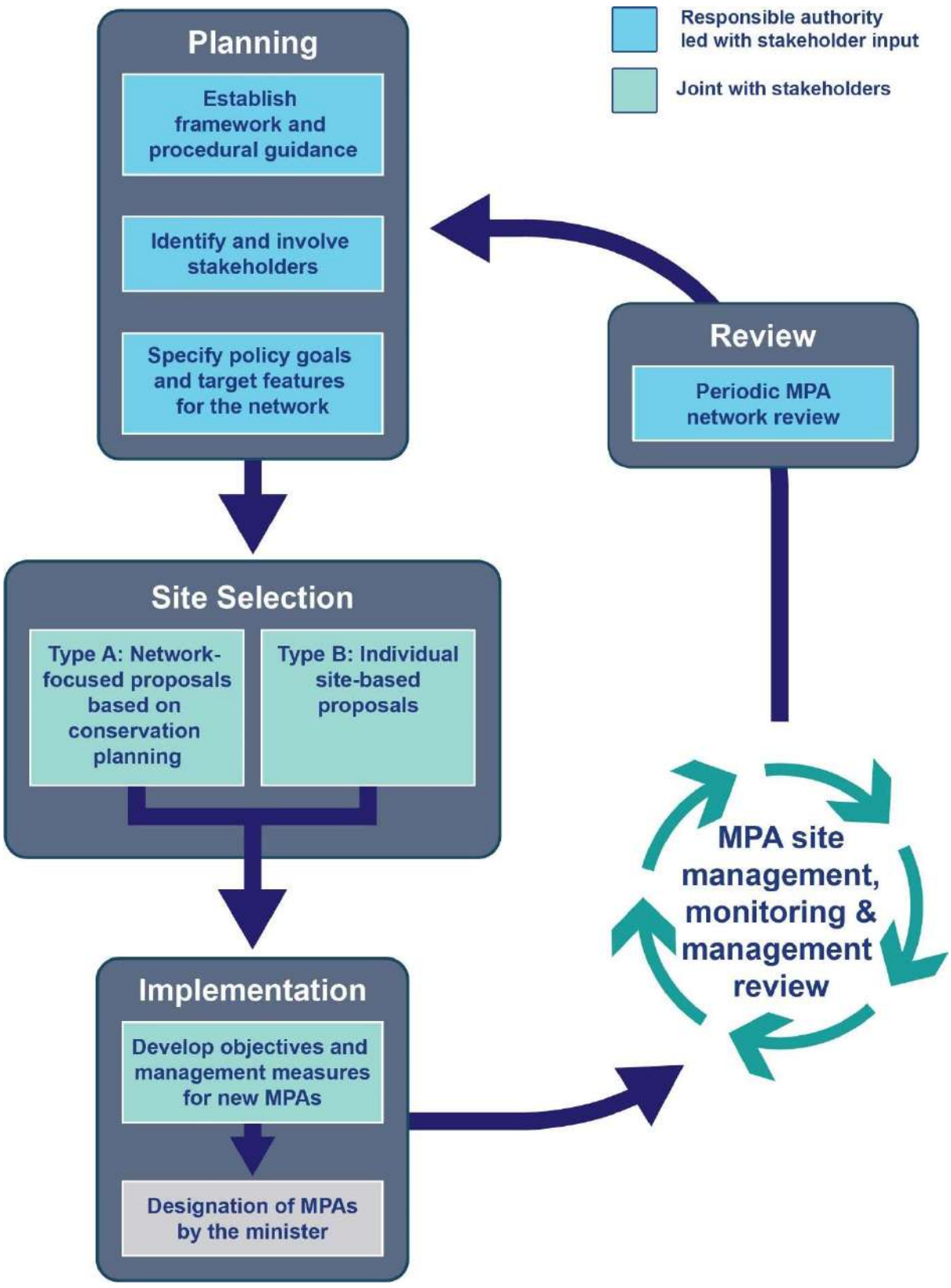

Figure 3.2 – Overview of proposed systematic conservation planning (SCP) process for planning, establishing and managing an expanded MPA network.

3.3.4.1 Applying Systematic Conservation Planning for Irish MPAs

The steps in a SCP process are meant to help coordinate the different activities in a way that reflects both the flexibility to be adaptive, and the structure to be transparent and practical to apply (Figure 3.3). Key features of the process are the facility to integrate information on existing protection, the possibility to expand protection to species and habitats not covered by the existing network, and new categories of MPAs. Existing Natura 2000 sites could also be further designated to support additional conservation objectives. For example, part of an existing SAC could be additionally designated as a dark sea MPA or a no take zone.

The phases and steps involved in the proposed process are described in more detail in the following sections.

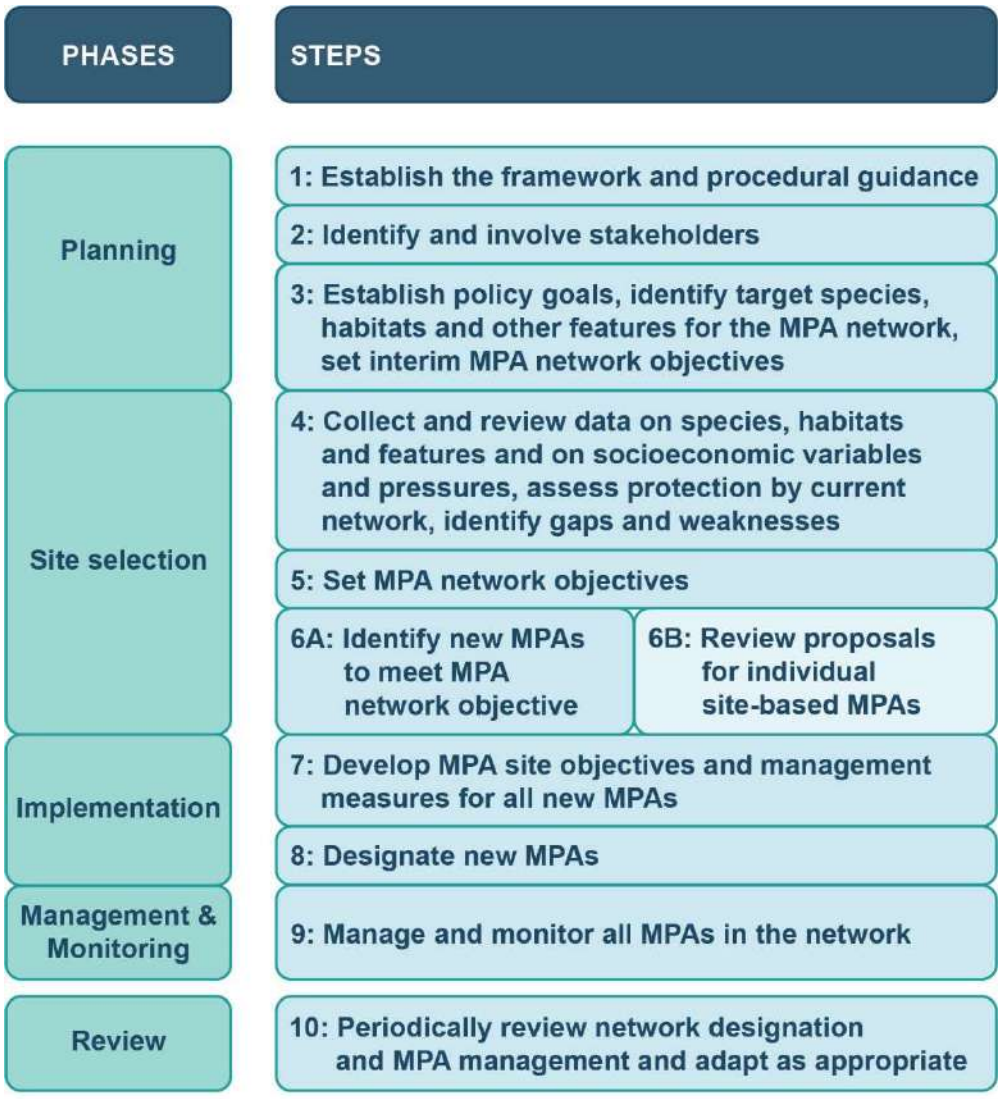

Figure 3.3 – Proposed steps in a Systematic Conservation Planning process for Ireland adapted from steps proposed by McIntosh et al. (2017),[236] demonstrating how these steps relate to the phases identified in Figure 3.2.

Box 10: Terminology proposed for Ireland's MPA network and definitions

Figures 3.2 and 3.3 and the text in the following section include terminology proposed for Ireland's MPA network, which can be defined as follows:

Proposed term	Proposed definition and explanatory notes
Policy goals	Overarching goals for the network, phrased in broad and not necessarily quantitative terms, for example of meeting international commitments, conserving and sustainably managing the marine environment, promoting understanding and stewardship of the marine environment, etc.
MPA network objectives	Quantitative, semi-quantitative or qualitative objectives for the network as a whole, for example relating to ecological coherence (e.g. in terms of representativity, replication and connectivity), percentage coverage and resilience (see Section 3.1.1.1). Interim network objectives should initially be set and subjected to evaluation and stakeholder consultation before being finalised.
MPA site objectives	Statements specifying the features to be protected by an individual site and setting the objectives to be achieved in relation to them, for example in terms of increase in population or areal extent, quality and/or function of a habitat, level of ecosystem service provision or maintenance of a particular biocultural value, etc. At sites declared as refuges from particular pressures, site objectives may include absolute or specified partial exclusion of noise or light, etc. This term would avoid confusion with 'conservation objective' which has a specific meaning under the Birds and Habitats Directives and is used in other contexts with other meanings (see Glossary).
Designation	The point at which a Minister signs an MPA into force.
Management measures	Regulations, restrictions or conservation or restoration actions that are put in place so that an MPA can achieve its site objectives. These can also encompass activities outside MPAs with potential to influence them, e.g. activities in the river catchment for an estuarine MPA.
Management plan	A set of management measures for a given MPA.

3.3.4.2 Planning phase

3.3.4.2.1 Step 1. Establish the framework and procedural guidance

The establishment of a national MPA designation framework could follow a similar process to that adopted during formulation of the National Marine Planning Framework (NMPF). Essential elements in an MPA framework include long-term political commitment and clarity around legal competence and governance authority through appropriate statutory mechanisms and adequate financial provisioning to ensure input from stakeholders in the MPA design process and for management, monitoring and enforcement of the MPA network once established (cf. Lundquist et al. 2015).[234]

In addition, such a framework should provide clear procedural and technical guidance to facilitate cooperative governance and management of the MPA designation and selection process. Inclusive community involvement requires participatory structures that set out clear rules of engagement, motive and understanding of roles whilst being cognisant of available human capital and capacity (see Section 3.2).

A framework for proceeding with site selection and designation needs agreement and funding at the start of the process. Procedural guidance needs to be agreed within the overall SCP scheme adopted, and for coordination across relevant state bodies. This framework should also include clarification of the interplay between new national MPAs and other spatial management within MSP and the NMPF as described in Section 3.3.3.1. It should also include a provision for engagement across national boundaries and with regional bodies such as OSPAR to facilitate regional coherence of MPA networks.

Recommendations

3.18. A national MPA designation framework should be established that provides certainty in terms of long-term political commitment, clarity around legal and governance authority and sets out clear procedural guidance.

3.19. The MPA framework should include clarification of the interplay between new national MPAs and other spatial management within MSP and the NMPF.

3.20. The MPA framework should also include a provision for engagement across national boundaries and with regional bodies such as OSPAR to facilitate regional coherence of MPA networks.

3.3.4.2.2 Step 2. Identify and involve stakeholders

Identifying stakeholders appropriately and engaging with them effectively will be critical to the success of the designation process. Stakeholders should be engaged following the broad principles laid out in Section 3.2, and, for transparency, the identification of stakeholders should follow processes defined by the authority and adopted as part of the procedural guidance. Such guidance should detail how stakeholders are defined, points of contact, and roles and responsibilities at different stages of the process. There should be a process for including additional stakeholders when omissions become apparent.

3.3.4.2.3 Step 3. Establish policy goals, identify target species, habitats and other features for the MPA network, set interim MPA network objectives

Overarching policy goals set the broad targets for the network in general terms. For example, they may include aspirations such as to protect endangered, threatened and endemic species; to protect and restore irreplaceable habitats and ecosystems with unique characteristics; to preserve areas of high natural and cultural significance; to support connectivity for Ireland's MPA network and its contribution to regional networks; to provide refugia and space for changing species ranges in light of climate change; to strengthen overall resilience of ecosystems and species; to facilitate research, public engagement and education. They may be explicitly underpinned by principles, such as sustainable development and good governance, as well as recognised best practice approaches like best available science and the precautionary approach.

Policy goals are dependent on the policy context, including commitments under international legislation and agreements, and the level and composition of species and habitat lists used as a reference. Considerable work has already been carried out to establish the Natura 2000 network for habitats and species in the relevant Directives. However, as outlined in Section 1.3, species and habitats additional to those protected under Natura 2000 can be suggested by referring to existing sources like the OSPAR List of Threatened and/or Declining Species and Habitats and Irish Red Lists of species and habitats, and through consultation with experts and stakeholders to identify species and habitats of national importance. Going through a process to identify potentially under-protected species and habitats of conservation importance is an important step in establishing policy goals.

Once a candidate list of additional species and habitats is produced, further refinement is needed. In Northern Ireland,[238] the process of refining species and habitat lists was to apply criteria that can be summarised as:

- ✓ Remove newly suggested species and habitats that are already protected within the existing network.
- ✓ Evaluate the suitability of MPAs as a conservation measure for newly suggested species and habitats. If the specific details of a species life cycle mean that an area-based approach is not suitable, or other measures like fishery management are more appropriate, then the species/habitat can be removed from consideration.
- ✓ An expert evaluation is needed for species suggested on the grounds of rarity. Rarity may reflect an artefact of survey effort, or taxonomic issues with identification. This may cause some species to be excluded.
- ✓ If data are deficient, it may not be possible to progress with an evaluation of the conservation of the species. This may cause a species to be excluded – but also suggests where further research is potentially needed.

A list of additional species and habitats may be reviewed and updated regularly. Such lists have played important roles in selecting new sites in the UK (as Priority Marine Features, PMFs; or Features of Conservation Importance, FOCI). The list review should happen periodically, as part of the overall cycle of network review and adaptation (see Section 3.3.6). An example of such a process (albeit with a slightly different purpose) is seen in the Quinquennial Review of Schedules 5 & 8 of the UK Wildlife and Countryside Act 1981 conducted by the JNCC. In this case, a five year cycle gave adequate time for additional research on species and habitats

between cycles allowing threatened species and habitats to be added to the list in a timely manner.

In addition to identifying species and habitats, policy goals could be used to identify further features[i] that should be the focus of coverage by the national MPA network, such as areas of cultural significance or areas underpinning particular ecosystem services such as essential fish habitat (EFH) or providing refuge from a particular pressure.[239]

At this stage, initial interim MPA network objectives should be set. These will guide Step 4 and will be subject to review and finalisation at Step 5.

Recommendations

3.21. Overarching policy goals need to be set to guide the expansion of Ireland's MPA network.

3.22. Stakeholders should be identified during the initial phase of planning the expansion of the network and engaged throughout the process. There should be a process for including additional stakeholders where omissions become apparent.

3.23. A process for identifying additional species, habitats and other features of conservation importance but not currently protected should be established and applied at an early stage. This process should be based on the gaps identified in this report and use set criteria for including species and habitats in an eventual consensus list.

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[i] 'Marine feature' is used here as catch-all term here that could refer to a species, habitat, ecosystem service, area of low stress or any other identifiable quality related to conservation value (this a slightly broader use than that originally used by others such as the JNCC, p 123).

3.3.4.3 Site selection

3.3.4.3.1 Step 4. Collect and review data; identify gaps and weaknesses

Translating policy goals into effective conservation needs more detailed evaluations of the protection achieved by the current network, of gaps and weaknesses in the coverage of the network and the socio-economic context and pressures acting on the marine environment. The status of the existing network can be summarised using evaluations of ecological coherence (see Section 3.1.1.2.1).

An audit of the ecological coherence of the existing network is a technical exercise, based on existing maps of species, habitats and protected sites – see Section 3.1.1.2.1 for details. Protected sites in this context should include existing and proposed Natura 2000 sites, any other sites designated for area-based conservation purposes, and potentially also OECMs (See Box 2 and Section 3.6.2). Included sites are therefore those used for calculating the areal coverage of Ireland's MPA network for standardised national estimates of marine area protected as outlined in Section 3.6.2. Suitable criteria can be drawn from the JNCC design principles in support of an ecologically coherent network (Table 3.4, Section 3.1.1.2.1) and metrics can be generated for each of these criteria.[175]

Other design principles found in the JNCC Marine Conservation Zone Ecological Network Guidance,[240] such as level of protection or vulnerability, are relevant to site selection, but less so for the initial ecological coherence audit. The audit should also cross reference with sites designated outside Irish waters (including OSPAR, Natura 2000, ABNJ, Regional Fisheries Management Organisations (e.g. NEAFC) and UK MPAs) as these potentially affect the interpretation of criteria like connectivity and replication, which also influence resilience.

Extensive data and qualitative information also need to be collected and collated to enable consideration of the socio-economic and cultural circumstances to be taken into account and the nature, distribution and intensity of current and future pressures to be evaluated.

It is recognised that many relevant data exist and are collected in a wide variety of contexts. It would be of considerable value to identify and these sources and data and establish a centralised system to access and combine them with inter-operable formats.

Recommendations

3.24. Extensive ecological, environmental, socio-economic and cultural data should be collected, collated and synthesised to assess protection by the current network and identify gaps, weaknesses and key pressures and so inform decisions about objectives and approaches in expanding the network.

3.25. A centralised system should be established to maximise the coherence and efficiency of data collection and use.

3.3.4.3.2 Step 5. Set MPA network objectives

When the audit of ecological coherence is complete and information is available about relevant socio-economic and cultural considerations and key pressures, the context exists for discussion about the network objectives for a phase of MPA designation. The ecological coherence audit will highlight weaknesses in the Irish MPA network for those habitats, species

and other features that are considered, and will suggest areas for improvements that can be considered by all stakeholders as interim network objectives. In the interests of transparency, established elsewhere in this document as an important feature of an effective designation process, the findings of the audit of ecological coherence, highlighting the network strengths and weaknesses, and the interim network objectives, should be made publicly available. It is possible that this process will find marine features not represented in the network, which would suggest that identification of replicated and viable candidate sites is a priority for such features. Each marine feature can be ranked against other features with respect to the ecological coherence audit metrics. It seems unlikely, however, that there will be a clear ranking of all marine features across separate metrics, and many network metrics may need further research (e.g. the importance of connectivity for particular species).

3.3.4.3.3 Step 6. Identify and select new MPAs

Selecting a representative set of areas to conserve biodiversity over extensive geographic areas that support numerous species is challenging.[241] Step 4 is intended to clarify the existing network status and areas of greatest weakness to inform site selection. Different marine features may need improvement in one coherence metric (e.g., replication), but not another (e.g., adequacy). Understanding how policy goals are likely to translate into potential MPAs requires an exploration of conservation scenarios, including estimates of trade-offs between different goals. Socioeconomic variables and pressures are also relevant to the values associated with different sites. In some cases, a need may be identified for a specific piece of research (e.g. connectivity analysis for a specific species) that can be completed within the timeframe for site identification.

The selection of new MPAs requires balancing between different MPA network objectives while minimising negative social and economic impacts and maximising overall benefits. Depending on the values and scenarios used, a wide range of options are likely. Several software tools have been developed to support the identification of alternative spatial scenarios to select conservation areas that meet certain objectives while minimising conflicts with existing human activities. Among the most well-known systematic conservation planning support tools are Marxan, PrioritzR and Zonation, which use a variety of strategies such as iterative selection, linear programming and simulated annealing.[234,241] These planning support tools can be used to explore what is achievable for any MPA network expansion and should be used to explore options with stakeholders.

The proposed scenario testing is intended to be flexible. Some network objectives may be reached by identifying all the suitable large and undamaged areas and choosing those that best represent the feature, without the need for software tools. Network objectives may be combined if synergies are possible between them (e.g., pelagic and benthic features of interest in the same area). Where conservation planning software is used, there are many options as to how trade-offs are specified and in the number of data types included. Trade-offs may occur between different network objectives and/or with the potential for costs and benefits in terms of societal and economic activity. Conservation planning software does not provide a single correct answer; it rather provides potential solutions, based on the input objectives and trade-offs, which it returns as raster cells in a GIS framework. Conservation planning software can consider multiple spatial layers of information simultaneously and also incorporate criteria such as size and boundary length of protected areas. It can weigh conflicting

data and evidence more objectively than expert decision, particularly where scenarios are complex. However, the overall process of moving from establishing the context and gaps through to interim and then agreed MPA network objectives and towards a round of site designations will involve judgement and consultation.

Step 6A. Select network-focused MPAs based on conservation planning ('Type A' proposed MPAs)

Steps 4 and 5 lead explicitly to a set of sites recommended to meet the agreed MPA network objectives and form the basis for Type A MPA proposals.

Step 6B. Review proposals based on individual sites ('Type B' proposed MPAs)

Systematic conservation planning is focussed on the properties of sets of protected areas (McIntosh et al. 2017). Such a focus on overall network properties can mean that individual site-specific values are overlooked. Many site-specific values are not amenable to consideration by algorithmic trade-offs. For example, a local community may place particular value on identities in their area shaped by history, culture and landscape or a local ecosystem could underpin a specific ecosystem service of particular value to the area e.g. in terms of flood protection or as a fishery nursery area. Similarly, some sites may be uniquely suitable for designation as a 'dark reserve' (see Section 1.3), for ecological resilience (e.g., buffered from acidification or as a climate stepping stone) or for research or educational purposes. As such, the site would not be interchangeable with other similar sites as the benefit is specific to a particular location. We therefore recommend that, in addition to the network-based approach described above, state agencies, local councils, community groups and third parties should also be invited to propose MPAs under guidelines developed for individual site-based approaches (Box 11).

MPAs designated for a trial or a restoration initiative will need clear resourcing support for monitoring and a timeline for decisions about whether to continue the conservation intervention. In the case of an adaptive or mobile MPA, such a cycle of monitoring, review and decision would also be necessary. This flexibility is relatively novel for MPAs, but as outlined in Section 3.1.1.4.4, there are cases where this approach can make a valuable contribution. The same considerations may be appropriate for community-led MPAs although it is difficult to be prescriptive as the initiatives of different communities may be quite diverse and would need to be considered on a case-by-case basis. For example, a community may be focussed on a particular level of designation such as a permanent no-take area or may be wishing to explore a local fishing gear restriction as an experimental trial. Particular attention may be needed to devise means of sustaining community-led MPAs, potentially involving some degree of state support.

The guidelines developed for some of the individual site-based grounds will need careful thought with regard to aspects like political power, equity and representation, and access to data. For example, consideration of biocultural diversity also means consideration of which views and voices are being heard. Some MPAs may be agreed with little discussion or difficulty; others may well involve a journey that takes some time and more extensive dialogue. Variable time scales provide another justification for establishing a separate process for individual site-based conservation. However, the cyclical process for proposing individual site-based MPAs should operate on the same periodicity as for Type A proposals, to emphasise the equal importance attached to both processes.

Box 11: Potential grounds and principles for proposing individual site-based MPAs

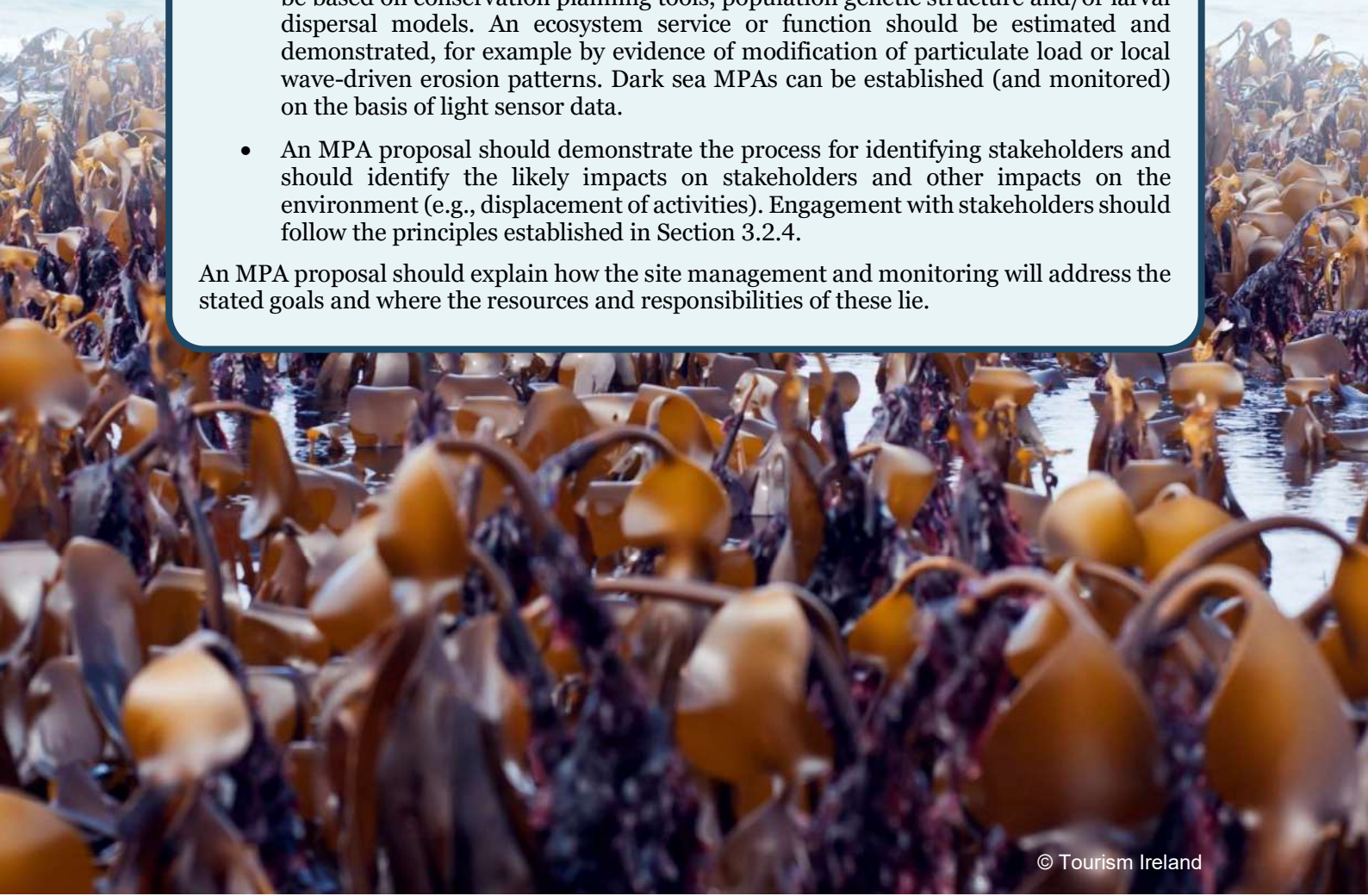
Grounds for proposing an individual site-based MPA could include:

- Protect a specific, localized ecosystem function or service
- Protect biocultural diversity
- Represent a community-led initiative aiming to improve the conservation status of the protected site
- Have specific benefits associated with protection of an ecosystem engineer.
- Protect a mobile species or dynamic habitat with a mobile MPA.
- Establish or protect a low-pressure zone (e.g. dark or quiet sea).
- Protect an area focussed on ecological resilience (e.g. a site buffered from acidification or a climate stepping stone).
- Protect a specific oceanographic feature and the associated ecological functions and biodiversity
- Facilitate experimental trials involving restoration of habitats or a trial regulation such as a no take zone.

Decision making principles could include:

- More than one reason can be given for proposing a new MPA, but one is sufficient.
- The evidence required to support the proposal should reflect the specific grounds included in an MPA proposal. For example, coherence arguments are more likely to be based on conservation planning tools, population genetic structure and/or larval dispersal models. An ecosystem service or function should be estimated and demonstrated, for example by evidence of modification of particulate load or local wave-driven erosion patterns. Dark sea MPAs can be established (and monitored) on the basis of light sensor data.
- An MPA proposal should demonstrate the process for identifying stakeholders and should identify the likely impacts on stakeholders and other impacts on the environment (e.g., displacement of activities). Engagement with stakeholders should follow the principles established in Section 3.2.4.

An MPA proposal should explain how the site management and monitoring will address the stated goals and where the resources and responsibilities of these lie.



A multiple route process for proposing MPAs would allow a diversity of approaches and rationales to be recognised and facilitated. This would be similar to approaches taken elsewhere (e.g. Scotland) and would enable initiatives such as the one described in Box 12. There is no reason why additional designations could not overlay existing designations. For example, a local community could propose a no take area within an existing SAC or an area where fisheries management objectives work alongside the conservation objectives. Of course place-based initiatives will also support the wider network, even while the aim is specific to a particular location, and, by their designation, individual site-based initiatives will contribute to subsequent audits of ecological coherence of the overall network.

Recommendations

3.26. Objectives for expanding the MPA network should be agreed as much as is practicable with stakeholders, combining the information from audits of the existing network with scenario testing.

3.27. A process for proposing individual site-based MPAs should be developed that is accessible to all stakeholders.

Box 12: Lamlash Bay – a case study of community-led marine protection

Local divers on the Island of Arran in the Clyde set up the Community of Arran Seabed Trust (COAST) in 1995 in response to perceived changes in seabed biodiversity and loss of commercial fish populations. This community group started to engage with certain groups of fishers and work towards the aim of a no take protected area in Lamlash Bay. Evidence on the site was built up by groups of divers and through citizen science and collaboration with third level institutes. In 2008, following a public consultation where 99% of 675 responses were positive, the Scottish Government set up a 2.67 km^2 no take marine protected area in Lamlash Bay. This was only the second no take marine reserve in the UK. Monitoring since designation has demonstrated recovery of seabed habitat and species, including increases in scallops and lobster. A subsequent much larger 'South Arran MPA' was set up in 2014 and subsequently protected a large area of the southern part of the island. The seabed is recovering, research is in place and tourists are bearing witness to the results in a converted building allowing remote access to the project.

https://www.arrancoast.com/

https://ffi.maps.arcgis.com/apps/Cascade/index.html?appid=70448e12ec3c45139beca33dfc990b7a

Stewart B.D., Howarth L.M., Wood H., Whiteside K., Carney W., Crimmins É., O'Leary B.C., Hawkins J.P., Roberts C.M. 2020. Marine Conservation Begins at Home: How a Local Community and Protection of a Small Bay Sent Waves of Change Around the UK and Beyond. Frontiers in Marine Science 7, 76

3.3.4.4 Implementation, management, monitoring and review

3.3.4.4.1 Step 7. Develop MPA site objectives and management measures

The aims of the network-focused (Type A) and individual site-based (Type B) processes are to develop site proposals based on overarching policy goals. Type A proposals are a development of the agreed MPA network objectives. The process of scenario testing and consultation with stakeholders should lead to a transparent link between MPA network objectives and the identification of specific sites. Both Type A and Type B processes should lead to site proposals with identifiable MPA site objectives. If the MPA site objectives are clear, it should be possible to agree suitable measures for site management. It may be possible and advisable to develop overarching guidelines that indicate what management measures are recommended for different marine features and ecosystem processes. It is also essential that resourcing is in place to uphold any regulations established. Some programmes of protected areas have been criticised for designating sites without clear management in place ('paper parks'), including significant aspects of the MCZ designation process in England.[172] This gap could be closed by including more information and commitments on proposed management at the proposal stage. Details of the proposed process for determining management measures to meet MPA site objectives are presented in Section 3.3.5.2 below.

3.3.4.4.2 Step 8. Designate new MPAs

Public consultation on the final proposals for MPAs should be followed by formal designation under the relevant legislation. To avoid opportunistic damage to features of interest during preparation for designation, candidate MPAs should be subject to the same degree of protection as full sites, in the same way as candidate SACs are.

3.3.4.4.3 Step 9. Manage and monitor all MPAs in the network

Following designation, sites require suitably resourced management and monitoring to determine whether MPA site objectives are being achieved and to inform adaptive management measures as appropriate.[234] Approaches to management and monitoring are discussed further in Section 3.3.5 below.

3.3.4.4.4 Step 10. Periodically review network designation and MPA management and adapt as appropriate

The socio-economic, cultural and policy context for Ireland's MPAs will change through time. International best practice can evolve and lessons can be learned from management and monitoring of national MPAs. The list of species, habitats and other features, and ecosystem processes to be protected may also need to be reviewed periodically, as previously unconsidered species and habitats may be recognised as needing to be conserved or restored. The total area protected is also likely to vary due to the likely variable pace of Type A and Type B MPA identification and proposal. New stakeholder organisations will emerge and others may cease to exist. As such, the entire MPA process should be iterative, with periodic reviews of current policy goals and guidance, lists of stakeholders, audits of network ecological coherence, changes to network objectives, proposals for new MPAs and changes to management plans (

Figure 3.2).

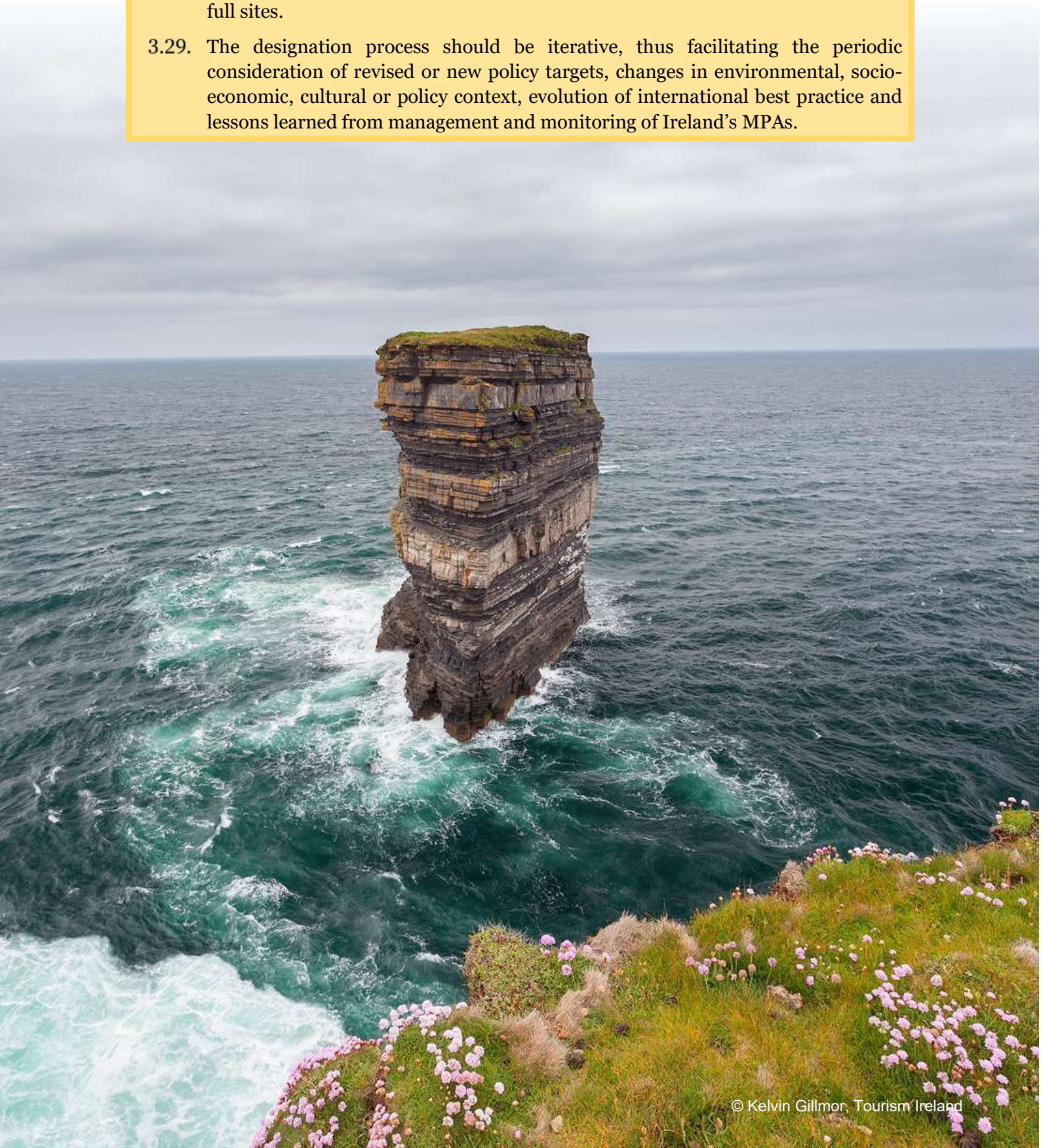
Feedback and repeated evaluation and network goal setting will facilitate iterative progress towards long term government policy goals (e.g. amount of coverage by 2030) and ensure that

they can be met. It will also allow periodic adjustment of the network in response to climate change if necessary. The proposed review process is considered in more detail in Section 3.3.6 below.

Recommendations

3.28. To avoid potential damage to features of interest during preparation for designation, proposed MPAs should be subject to the same degree of protection as full sites.

3.29. The designation process should be iterative, thus facilitating the periodic consideration of revised or new policy targets, changes in environmental, socio-economic, cultural or policy context, evolution of international best practice and lessons learned from management and monitoring of Ireland's MPAs.



3.3.5 Management and monitoring

3.3.5.1 Appraisal of different approaches to MPA management

The marine environment is heterogeneous, with variation in environmental stresses and anthropogenic pressures that affect different species and habitats in different ways in different contexts (Section 1.1.4)[242]. To alleviate pressures on marine features, MPAs can have diverse regulations, from prohibition of any human activities, to zoning or rules for specific sectors only. A number of classification frameworks for MPAs are in operation, which include specification of activities that are permitted or prohibited in a given category of MPA. Most prominent among these is the IUCN framework with seven categories of protection,[243] and more recently a simplified framework proposed in The MPA Guide,[65] with information on which of four levels of extraction and impacts is permitted.

In considering which approach to take for a given MPA or network of MPAs it is potentially informative to consider the effectiveness of different approaches in other contexts. However, a general systemic evaluation of different management approaches (including comparisons to no-take) is not straightforward. Ideally there would be replicated sites with different management schemes addressed in a replicated before-after-control-impact (BACI) framework to enable rigorous conclusions. Sustained ecological manipulations across replicated sites are logistically difficult to maintain. It is therefore difficult to assess how outcomes may differ between a fully protected or no-take reserve and one managed on a system of appropriately assessed consent, due to a lack of appropriate data and the individual nature of sites that make generalities difficult to draw. Nevertheless, there are now a number of European and international temperate MPAs with a wider array of management scenarios with similar habitats and species to those in Ireland's waters to warrant anticipation of what management can achieve (e.g. Isle of Man, Lyme Bay, Arran, Lundy). These sites have all had inshore MPAs with evidence of some recovery (e.g. in terms of biodiversity, seafloor integrity, essential fish habitat, biomass, fecundity, numbers, densities, etc.).

While the outcomes of alternative management frameworks are difficult to compare, there is better evidence for the success of individual management strategies relative to the unmanaged situation. For example, banning all types of fishing has been judged likely to be beneficial based on 29 studies, introducing some fishing restrictions have been judged likely to be beneficial based on four studies, and a zonation system of activity restrictions has been judged likely to be beneficial based on 13 studies.[i] Sciberras et al (2013) reviewed available evidence and concluded that 'no take' fisheries regulations are likely to provide better ecosystem outcomes than partially protected areas, but recognised that partially protected areas also conferred advantages in terms of increased density and biomass of fish and were a valuable tool, particularly in areas where exclusion of all activities is not appropriate for socio-economic or political reasons.[244]

For Natura 2000 sites, rather than specifying a blanket set of activities which are prohibited, the Birds and Habitats Directives require assessments of whether specific activities will damage the features for which the site was designated. These assessments are made under the precautionary principle that measures should be taken to restrict an activity even if there is not full scientific certainty around its impact (see Glossary). The approach to identification and avoidance of deterioration of habitats and species in Natura 2000 sites is specified in

[i] conservationevidence.com

Article 6 of the Habitats Directive; although this is an area-based approach, the process of Appropriate Assessment (AA) is similar to EIA and SEA, but AA has a legally binding outcome. Following AA, a project or plan can proceed if the findings of AA are benign but is prevented if not.

With respect to the current network of Natura 2000 sites, fisheries, aquaculture and other activities in the sites predated the designation of these sites as SACs and SPAs. The process of managing these activities so that conservation objectives are achieved is ongoing. No blanket measures were introduced which dictated which activities could continue and which could not. The management process considers the conservation objectives in these sites, how different activities might affect the achievement of these objectives and on that basis recommends which activities can continue as is, whether mitigation is possible and if not which activities should not continue. This process involves assessing risk using evidence from literature or directly from studies within the sites and also, given that there is always uncertainty in the assessment of risk, from ongoing monitoring of conservation status.

The requirement, as laid down in Article 6.2 of the Habitats Directive, is to avoid deterioration or loss of integrity of the site. The risk assessment framework and risk scores for all fisheries in all SACs and SPAs was completed during the period 2015-2020. Mitigation of the risks is now proceeding on a prioritised basis, whereby high risk scenarios are managed first. This has led to areas within SACs being closed to towed fishing gears for instance, or management plans for fisheries being developed that prioritise conservation over fisheries production or attempts to restore habitats and species where status is deemed to be unfavourable.

3.3.5.2 Proposed framework for developing management plans for new MPAs

We propose that the management measures for future MPAs should also depend primarily on what the MPA site objectives are, what conservation targets are identified for the protected features and ecosystem services and what effect different activities are considered to have in relation to the specified conservation objectives and targets. They should be discussed and initially established as part of the preparation for designation if possible. As emphasised in earlier sections and outlined below, we recommend a high level of stakeholder engagement in the process for determining management measures to meet MPA site objectives for each new MPA.

As indicated in the activity-pressure matrix in Appendix B, different activities exert different pressures which will have variable impacts on different species and habitats in different contexts and which can be mitigated to varying degrees (see also Crowe and Frid 2015).[242] Careful consideration of available evidence of potential impact will be a critical contributor to discussions around management measures. Demonstrating cause and effect relating to the impact of an activity on a feature that is to be protected is a high bar and will almost always lead to debate. In the absence of conclusive evidence, the precautionary principle should be applied as described above.

It is likely that areas which are proposed as MPAs in the future will have a number of activities already occurring within them. Although systematic conservation planning methods would seek to minimise the socio-economic costs of designation (to achieve a particular MPA network or site objective) it is unlikely that costs and associated disruption of some sectors would be avoided in all cases, though they may be offset and balanced to some degree by benefits and opportunities in other sectors (see Part 2). Given the potential for some

combinations of pressures to exacerbate or ameliorate each others' effects (Section 1.1.4), a holistic view should be taken of the combination of permissible activities in a given site in relation to its objectives. Knowledge of the range and accumulation of pressures in an area would therefore be a valuable resource to enable informed decision-making. A strong interface with the NMPF would provide clear benefits in this regard (Section 3.3.2).

Among the Type B designations outlined in Section 3.3.4.3.33.3.4.3 above, provision is suggested for potential designation of trial MPAs for research purposes. In order to identify how protected features develop in undisturbed environments and therefore to provide information on how to set targets and thresholds for different features, some areas might be completely protected from all activities. Such levels of protection may also be deemed appropriate to meet site objectives for some other MPAs designated under the Type A or Type B pathways. In others, a less restrictive set of measures may develop. Some site objectives may be met with little disruption to existing or future activity.

3.3.5.3 Classification of MPAs based on objectives rather than protection

We propose that classification of MPAs into categories of protection should not be a priority as part of the process of designation and management. This will allow scope for a bespoke set of management measures to be developed for each MPA without pre-judgement or constraint. For the purposes of international reporting, however, MPAs may be classified as necessary subsequent to agreement being reached on the management measures necessary to meet their objectives. For example, reporting under the OSPAR Convention requires sites to be classified into the IUCN protected areas categories summarised in Box 1.

This report recommends a range of rationales for which new MPAs may be designated. These rationales will be reflected in their MPA site objectives. To provide some simplification and clarity around the objectives for a given site, we propose that MPAs should be categorised on the basis of their objectives (rather than their level of protection). For example, MPAs could be identified as having been designated as a Nature Conservation MPA, a Biocultural MPA or a Research and Restoration MPA. These broadly correspond to the categories of MPAs in Scotland. Based on the consideration of gaps in Section 1.3 and ecological criteria in Section 3.1.1.4, a Nature Conservation MPA could be further described, for example, as a Threatened species or habitat MPA, Important species or habitat MPA, Biodiversity MPA, Ecosystem service MPA, Dark skies MPA, Quiet seas MPA, Climate refuge MPA, Mobile MPA, Essential Fish Habitat MPA, etc. A given MPA with multiple objectives could be described as belonging to multiple categories. Such descriptions would help to communicate the purpose of the MPA for stakeholders and members of the public and so improve understanding and buy-in.

Recommendations

3.30. Management measures for future MPAs should depend primarily on the site objectives for each MPA and the effects of different activities and pressures on the protected features.

3.31. Stakeholders should be involved in the process for determining management measures.

3.32. Management measures to meet site objectives should be discussed and established as part of the preparation for designation, with inclusion of stakeholders in decisions.

3.33. Careful consideration of available evidence of potential impact of particular activities will be critical to deciding which activities to restrict or permit.

3.34. In the absence of conclusive evidence, the precautionary principle should be applied.

3.35. Given the potential for some combinations of pressures to exacerbate or ameliorate each other's effects, a holistic view should be taken of the accumulation and combination of permissible activities in a given site.

3.36. Socio-economic and cultural factors should also be carefully considered in finalising management measures.

3.37. Classification of MPAs into categories of protection should not be an important priority as part of the process of designation and management.

3.38. Protection of MPAs may be categorised as necessary for international reporting, subsequent to agreement being reached on the management measures necessary to meet MPA site objectives.

3.39. To simplify communication around the broad objectives for a site, we recommend that a simple system of categorisation based on objectives should be applied. For example, MPAs could be identified as Nature Conservation MPAs, Biocultural MPAs or Research and Education MPAs.

3.40. Within the broad category of Nature Conservation, an MPA should be further described as being, for example, a Threatened species or habitat MPA, Important species or habitat MPA, Biodiversity MPA, Ecosystem service MPA, Dark skies MPA, Quiet seas MPA, Climate refuge MPA, Mobile MPA or Essential Fish Habitat MPA. A given MPA with multiple objectives could be described as belonging to multiple categories.

3.3.5.4 Stakeholder involvement in the management process

As described above, stakeholder involvement is considered an essential component of the process for managing new MPAs in an expanded network, building on involvement in the designation process and based on the principles established in Section 3.2.4.

3.3.5.4.1 Improving on the Natura process

The process for management of Natura 2000 sites is fundamentally top-down and has involved comparatively little stakeholder consultation and participation. Regulation 24 of the EC (Birds and Natural Habitats) Regulations 2011 provide that the Minister can establish the necessary conservation measures involving, if need be, appropriate management plans specifically designed for the European Sites or integrated into other development plans and appropriate statutory, administrative, or contractual measures. Such conservation measures include threat response plans, administrative agreements, and management agreements. These can be entered into with any owner, lessee or occupier of the land forming part of the site, adjacent to it or functionally connected to it, as well as any public authority that manages or controls such land or exercises functions in relation to it.

Within the State's Natura 2000 sites, conservation of natural habitats and species is prioritised to the extent that any human activity in or potentially impinging on such areas has to show absence of negative impacts on the ecological feature (habitat or species) identified in the designation of the site. Since 2008 a programme has been in place to identify how or if fisheries and aquaculture could continue to operate in these sites. As a result, a number of fisheries operating in SACs have adopted new procedures, mainly in the form of Fishery Natura Plans (e.g., Box 8) and restrictions on mobile fishing gears. These plans acknowledge the primacy of the conservation objectives for the sites in which they operate and fish production is a secondary and conditional objective. The process of engagement of stakeholders in developing mitigation of fisheries suggests that some improvements could be developed in any new MPA designation and management process to enable a greater degree of stakeholder participation and enablement of some activities in many MPAs without compromising their conservation objectives.

Box 13: Issues arising during the implementation of Natura 2000.

The experience of the aquaculture sector and to a lesser extent the inshore fishing sector in relation to the designation and management of Natura 2000 sites should be documented so we can learn from that process.

In Ireland, marine and coastal Natura 2000 sites were designated on the basis of limited mapping and baseline knowledge of the protected features. Site specific conservation objectives were not developed prior to or during the designation process.

In 2004, this was brought to the attention of the European Court of Justice in case C-418/04 (Failure of the Member State to fulfil obligations in the transposition and application of Birds and Habitats Directives), where aquaculture activities operating within an SPA without having been subjected to an appropriate assessment were cited.

Aquaculture licences in Ireland are typically issued for 10 years. As many licences were initially granted in the 1990's by the mid-noughties these were due for renewal. However, as a consequence of the ECJ case, no renewal decisions could be taken until the licence application underwent an assessment under Article 6(3) of the Habitats Directive. As Article 6(3) states:

Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the sites conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

The fact that no site conservation objectives were available created a significant problem. For plans and projects already operational that required once-off permission, this was not an issue. However, since aquaculture licences are renewed every 10 years, the assessments were required to be completed for both proposed (new licence applications) and existing (renewal applications) aquaculture activities located within or adjacent to Natura 2000 sites. This also applied to a number of fishing plans.

The two relevant departments worked together with their agencies to prioritise baseline survey areas and to fund the work. The National Parks and Wildlife Service (NPWS) and the Marine Institute (MI) completed new baseline surveys. NPWS compiled site-specific conservation objectives and the MI was then tasked with conducting the Article 6 assessments for fishing and aquaculture activities. These were carried out on an agreed bay by bay basis taking account of the cumulative effects of multiple licences and activities within an area. By 2009, licence decisions were being taken once again. However, there was a back log of hundreds of licence applications and renewals which were gradually addressed on a bay by bay basis. As of the end of 2019, the licence backlog for shellfish aquaculture has been cleared. There is still a backlog in relation to finfish aquaculture licensing.

During this time existing operators did retain the protection of their licence, which meant that they could continue to operate until a renewal decision was made (Section 19a of the Fisheries (Amendment) Act 1997). However, during this period the operators were ineligible for grant aid or bank loans and were not an attractive investment. This had serious consequences for many businesses, and it could even be argued impacted detrimentally on the environment as the businesses were unable to access sustainability focused grant assistance to modernise and improve their environmental performance.

3.3.5.4.2 Co-management approaches

Commenting on the EU Biodiversity Strategy 2030, the Director General of DG MARE recently stated that for MPAs to work, there needs to be investment into science and governance; proper management arrangements need to be identified and the process must be participative. Changes to conservation governance norms and to legislation may be needed to facilitate a genuinely participatory process where there is a desire and potential for properly resourced and supported community led co-management (e.g. through existing local-level institutional arrangements, or developed through new community facilitated initiatives).[245]

A precedent for the application of co-management approaches exists in Ireland in the form of the structures and processes for advising government on management of inshore fisheries. The Dundalk Bay cockle fishery co-management case study, where the conservation objectives of the SAC and SPA have not been compromised by the continuation of the cockle fishery, provides a good example of how this can operate in practice (see Box 14).

Other examples of changes to fishing practice in SACs include the exclusion of bottom towed fishing gears such as trawls and dredges from areas inside SACs to protect sensitive or degraded habitats. There are areas closed to mobile fishing gears in Roaringwater Bay, the Saltee Islands, Hook Head and Blacksod Bay SACs. This represents a nesting of management measures within a single site for a specific purpose where some habitats are given higher levels of protection than others based on sensitivity assessment and have been developed, in some cases following purposely designed control impact studies. These examples show successful co-existence of fisheries and protected sites based on explicit conservation objectives set out for these sites.

Box 14: Dundalk Bay cockle fishery

Dundalk Bay is an SAC and an SPA. Prior to 2006 its cockle fishery was unregulated and unmonitored. Although the statistics prior to 2006 are poor there were years with little activity because of cockle recruitment failure. Stock surveys began in 2007 and, following a number of single year fishery management plans and monitoring experiments, the fishery, since 2011, has operated under 5 year Fishery Natura plans (FNPs). This year, 2020, is the final year of the second five year FNP. The plans have been subject to Habitats Directive Article 6 Appropriate Assessments including public consultation.

In the past 10 years approximately 3000 tonnes of cockles, worth about €4.5m at first sale price to the local economy in Dundalk, have been landed from the Bay. Annual monitoring of the cockle population, benthic habitats and waterbirds and specific targeted field studies have shown that the conservation objectives, especially to maintain habitat quality for overwintering birds, have not been compromised. In this case, the designation of the site as SAC and SPA has been a driver for better fishery management which has stabilised fishery production.

The process includes strong stakeholder (fisheries) engagement in setting the conditions of the management plan, fishermen are actively involved in the annual cockle survey with scientists and provide local knowledge that is important for survey logistics. There is now a relatively seamless process of annual assessment, advice on the fishery and opening the fishery under various conditions as set out in the FNP.

The structure and process under which the FNP was established were part of the Shellfish Management Framework 2005. A Local Advisory Committee (LAC) of fishery licence holders was established and its role was formally recognised by the fisheries management authority. This was the forum for engagement between State agencies and industry. It also had a means to communicate to regional and national representative groups under that Framework.

The 10 years of experience in this site is regarded generally as a success story. The fishery has been productive and the site is not impacted. However, there is a mix of good management and good luck involved; nature has been helpful through strong cockle recruitment, especially in the past five years. It is easier to be successful in such a case and the resilience of the management process and its people is not heavily tested. Outcome is not the only indicator in judging success here, however, because natural systems are variable and unpredictable. Even where outcomes may be negative it's also important that the process of management of the site can be considered appropriate.

In the Irish context, there may be scope for identifying further opportunities for community involvement in site management through engagement with the community-level marine planning pilots that are currently being considered by the Marine Planning Policy and Development Division in the Department of Housing, Planning and Local Government. In particular, where a community-level marine planning pilot includes a focus on marine stewardship and co-management, it would be advisable to engage with the relevant members of the community to ensure that local ecological and socio-cultural knowledge is incorporated and reflected in a meaningful way as part of the MPA management process. This approach is particularly applicable for near shore MPAs with multiple stakeholders; care must be taken to avoid the undue influence of a small number of larger stakeholders. It may not be suitable for large offshore MPAs, with fewer stakeholders representing a few large sectoral interests.

A key consideration is communication. In planning mitigation of effects of fisheries in SACs it was apparent that there is often is a low level of awareness of a given SAC and its purpose in local user groups. Increasing public awareness is important from the start. Care should be taken that the concepts used to discuss MPAs with local communities reflect the material and

contextual realities of day to day engagement with the marine environment. The Eastern Scotian Shelf Integrated Management (ESSIM) Initiative in Canada provides an example of the importance of the accuracy of language. During the process, it was found that certain words had connotations for people that were unacceptable if consensus was required. A strict definition of what was meant by each objective or sub-objective overcame many terminology disagreements. Examples are the definitions of "conserve", "reduce" and "representative" described in the plan in Canada (Government of Canada, 2007, 37).

In fact, as long as lines of communication are clear, it is important to allow contention and dissensus to be part of the management process. Diverse perspectives and needs should be identified at the outset of the process (and revisited and redefined during the process, as parties discover different or changing needs), ensuring that equity of access to discussions and decisions is actively pursued. If controversial issues are not discussed openly among all parties at the beginning of the process, such issues will slow the process later on, potentially halting the momentum gained over time. Unacknowledged differences, in particular, can become a major barrier to progress, where instead they can provide insights and guide understanding as to how successful MPA management might be achieved.[246]

The IUCN defines co-management as 'a partnership in which government agencies, local communities and resource users, non-governmental organisations and other stakeholders negotiate, as appropriate to each context, the authority and responsibility for the management of a specific area or set of resources'.[247] Although the Irish Government is ultimately responsible for compliance with the provisions of the relevant conservation legislation, it is important that the legislative structure facilitates a genuine devolution of responsibility to local level where there is a desire and potential for community led co-management (e.g. through existing local-level institutional arrangements). It is also important that re-distribution of responsibilities to local communities and citizens address rather than reinforce inequalities of access and voice.[202,248–251]

Key messages

- The process of designation and management of Natura 2000 sites was 'top-down' and involved comparatively little stakeholder engagement.
- Nevertheless, some stakeholder engagement was undertaken to develop Fishery Natura Plans which enabled some successful co-existence of fisheries and protected sites within the framework of the conservation objectives for those sites.
- Co-management approaches have been used successfully in Ireland and other jurisdictions to facilitate effective stakeholder participation in MPA management and may be particularly applicable to near shore MPAs.
- Stakeholder engagement is improved where public awareness is high, language is framed and used carefully and diverse perspectives and needs are identified and discussed at an early stage.

Recommendations

3.41. Where appropriate, co-management approaches should be adopted, particularly for near shore MPAs.

3.42. Effective communication must be established to underpin effective co-management

3.43. Diverse community perspectives and needs should be identified at the outset, with provision for open discussion of controversial issues.

Box 15: Lessons learned from successful community stewardship with integrated management in Australia

The Australian experience of successful co-management initiatives shows that the keys to successful community stewardship with integrated management are as follows:

- Establish a policy community
- Create multi-skilled teams
- Develop a stewardship perspective
- Set up a networked communication base using transparent language delivered in accessible formats

In policy development, each initiative had established a policy community for stewardship of the oceans made up of (i) decision-makers from the market and regulatory processes and from the key community interests outside those processes; and (ii) the several levels of government and nongovernment contributing to policy development.

In professional practice, each initiative had created multi-skilled teams connecting social, economic and ecological expertise (rather than applying different specialist solutions on an independent basis).

In developing a stewardship perspective, each initiative had based policy and practice on achieving individual group goals, while managing for the good of all, including the resource itself.

In setting up a networked communication base, each initiative had accessed IT networks which have open access, a transparent use of language and two-way communication channels available to all players, especially community interests.

A report examining collaborative management and stewardship pointed to a particular weakness in the development of a strategy for encouraging collaborative management; this being the lack of attention given to encouraging social norms that will influences the requisite changes in behaviour that give effect to personal (and corporate) stewardship ethics (i.e. marine stewardship, marine citizenship).

Brown VA, Spink M, 1997. Australia's Ocean Policy - Caring for the Commons: Socio-Cultural Considerations in Ocean Policy Development and Implementation. Socio-cultural considerations Issue 4. Dept. of the Environment.

3.3.5.5 Compliance and enforcement

Coastal and marine areas present particular challenges for enforcement and compliance. An expanded network of MPAs will involve vast expanses of water, which makes routine monitoring and enforcement difficult and expensive. Aside from that is the need for highly trained personnel and access to appropriate vessels, aircraft and/or equipment.

Technological solutions should be explored to help reduce the cost and increase the effectiveness of enforcement. For example, a vessel monitoring system (VMS) for all vessels engaged in fishing should be implemented (and is likely to be required under the new Fisheries Control Regulation currently under negotiation in the European Parliament). The current lack of a comprehensive vessel monitoring system VMS for the under 12 m means that the activity imprint of those vessels is difficult to ascertain and requires a concerted effort to gather local data to a more national scale. This lack of effort imprint has two effects firstly it makes validation of legitimate claims to activity in an area difficult and secondly it makes monitoring of activity difficult. Modern technology allows for small scale VMS units to be cost effective and roll out of such a system should be considered priority. Indeed, VMS is already a legal requirement in some fisheries (e.g. for razor clams) irrespective of vessel size. Remote Electronic Monitoring devices and other technologies can also be used to access real-time location and catch information (e.g. using go pro cameras on board at sorting trays). Similarly, other industries can be monitored (such as dredge spoil dumping, dredging, port and marina activity, aquaculture facilities). Geo-fences can be (and are) used at MPA boundaries, warning skippers of activity boundaries.

Special attention also needs to be given to promoting a culture of compliance. This necessitates building more awareness and understanding of MPAs and their purpose across society and sectoral actors. It also requires building partnerships with key sectors, their competent authorities, and representative bodies not only in Ireland but with the UK and France and across the EU to take account of the transboundary nature of marine activities.

A culture of compliance would be particularly important with respect to near shore MPAs, with diverse community interests and activities. The co-management approach advocated above (Section 3.3.5.4) would greatly aid in developing a sense of stewardship and self-governance. Nevertheless, stakeholders consulted in the preparation of this report articulated a critical need for clear regulations and a recognised authority with resources to enforce them. It would be necessary to provide information to the community on why specific rules and regulations are needed, garnering their input on concerns, priorities and additional needs in order to improve compliance and ensuring that the provisions covering regulated activities are supported by appropriate provisions on offences, penalties and other disincentives for non-compliance. The greater the compliance, the less need there will be for enforcement.

Recommendations

3.44. Clear legislation and regulations are required for MPAs, together with a recognised authority and resources to enforce them.

3.45. Technological solutions such as Vessel Monitoring Systems (VMS) and Remote Electronic Monitoring devices should be considered as potentially valuable tools for ensuring compliance in some contexts and sectors.

3.46. Community engagement could foster a sense of stewardship and support enforcement, particularly in near shore MPAs.

3.3.5.6 Monitoring of effectiveness of MPAs

MPAs are created to achieve specified objectives. A monitoring programme is essential if the effectiveness of individual MPAs and the overall network is to be evaluated. It also provides the basis for review of management measures and decisions about how best to modify them if necessary (Section 3.3.6 below).

Monitoring should be designed and evaluated with respect to a stated monitoring goal and associated specific questions or hypotheses. Data on the effectiveness of MPAs could potentially be collected for a number of broad goals, such as:

- To demonstrate that an overarching policy goal such as the conservation and sustainable use of Ireland's marine environment is being met.
- To demonstrate that the network contributes to other national and international policy goals
- To determine whether a specific MPA or network is meetings its specific objectives.
- To determine whether management measures are being effectively applied
- To establish the scale of economic or social benefits and costs

3.3.5.6.1 Overarching principles for design of monitoring programmes

Addressing some of the questions or hypotheses linked to those goals can be resource intensive. For example, a formal test of the hypothesis that protection increases the abundance of a target species compared to other sites requires a 'beyond-BACI' design: with sampling before the intervention, sampling after the intervention and sampling in multiple reference sites.[252,253] As it may take time before conservation benefits are clear, there may be a requirement for an extended period of spatially replicated sampling inside and outside of reserves. As such, it may be appropriate to focus primarily on subsets of sites, with studies designed to address specific questions. In addition to national resourcing, external funding may also be sought to support this work, in collaboration with third level institutions, from sources such as the EU LIFE programme, the Packard Foundation, etc.

Selecting reference sites and deciding on the nature and number of samples to be collected and the timing of the work all require detailed consideration. Careful experimental design coupled with pilot studies and cost-benefit analysis can greatly increase the efficiency and effectiveness of the programme.

The approach taken for the MSFD and WFD avoids the expense of site-specific beyond-BACI programmes. The approach based on EU Directives sets thresholds for success (e.g., "good

status" that are applied in all surveyed sites). Under this approach, work is still needed to define indicators of status that can be applied across a range of areas.

3.3.5.6.2 Some specific considerations for different monitoring goals

Different goals and questions or hypotheses require a variety of techniques and vary in sampling design. For example, evaluation of habitat quality can be achieved with video analysis of benthic habitats relative to habitat-specific reference points. The contribution of a site or network to the conservation of a species is likely to involve a combination of approaches such as surveys of individuals, larval dispersal modelling, population modelling or genetics.

One area of monitoring that is very relevant to MPAs is to establish that any restrictions on activity or pressures at the site are being followed. Some pressures, like light or sound, can be monitored relatively easily with sensors. Community groups and/or citizen science initiatives may be able to report levels of activity at a site. Vessel Monitoring Systems, which log the position of boats at regular intervals, can indicate the use of a site and satellite data can provide a wealth of information.

If a particular ecosystem function is of interest, it may be possible to monitor this directly or by using a consequence of the function. For example, damping of waves by increased growth of submerged vegetation in the absence of other changes to the system may be apparent from wave records, or coastal erosion and sediment transport rates. Subsidies from one ecosystem to another may be established by using stable isotopes (e.g., showing the contribution of nursery areas to a fish population).

Although the potential ecological and social benefits and costs of MPAs are of interest, appropriate variables to capture these are not widely defined and may need to be further developed.

3.3.5.6.3 Coordination and alignment of overall monitoring effort

Monitoring of the state of Ireland's marine environment already occurs for reporting purposes to comply with the Birds and Habitats Directives, the Water Framework Directive, and the Marine Strategy Framework Directive. Results of this monitoring fed into the comments on the status of the marine environment in Section 1.2 of this report. The broad objectives for the different EU Directives and the aims of an MPA network overlap. Alongside these broad objectives, an MPA network may have a number of further objectives, including objectives that are at the site level rather than the network as a whole.

With EU Directives (e.g. WFD), the indicators and timescales for reporting are usually established in the legislation. With national legislation there is more freedom to decide which monitoring goals are a priority given that resources for monitoring are limited. There may not be complete freedom, as particular information may be requested under commitments to, for example, OSPAR and the CBD.

Coordination is required to maximise the efficiency of the overall monitoring effort for Ireland's marine environment by exploiting synergies among monitoring programmes associated with different Directives. Although each Directive has its own constraints and specificities, any possible overlap should be exploited if possible. For example, the EU Directives have all stimulated extensive research into ecological quality indicators for a variety of habitats. A recent review of these indicators as applied to the WFD found that eutrophication indicators were the most strongly developed group, with links to other

pressures not so clearly covered.[254] Questions about the viability of a species can't be directly addressed with indicators, but it may be possible to make use of data collected to underpin them or to collect the data required for MPA monitoring in conjunction with the data required for compliance monitoring to reduce logistical costs. Data storage and archiving should be streamlined, standardised, and centralised to maximise its accessibility and application as appropriate.

The Water Framework Directive makes a useful distinction about types of monitoring: Surveillance Monitoring leads to the long term evaluation of overall conditions and involves sampling distributed across sites, Operational Monitoring is more targeted at specific sites to establish the changes in status or the effectiveness of management, finally Investigative Monitoring refers to programmes where a change in conditions is suggested but the causes are unknown.

It is likely that operational, surveillance and investigational monitoring would all be needed to evaluate a MPA network. As with the current Natura 2000 monitoring,[72] surveillance monitoring could sample MPAs to track changes in ecological status. The Natura 2000 monitoring

could be expanded to address some of the surveillance needs for a selection of benthic habitats. There may be synergies with other programmes carried out by State agencies, including those relevant to fisheries and the MSFD. Further investment would be needed to address likely monitoring needs in establishing levels of compliance, responses to intervention, and the changes in species, habitat and social indicators not captured by current monitoring programmes.

Key messages

- Monitoring is required to assess whether MPAs are effective and as a basis for review of management measures.
- Surveillance, Operational and Investigative monitoring all have potential value in assessing MPAs and their management.
- Cost-effective monitoring requires careful design and the selection of appropriate response variables and sampling techniques.

Recommendations

3.47. A well-designed monitoring programme should be established to assess the effectiveness of new MPAs and the overall MPA network.

3.48. Where possible, monitoring of new MPAs should exploit synergies with monitoring programmes in operation for compliance with EU Directives such as the Birds and Habitats Directives, Water Framework Directive and Marine Strategy Framework Directive.

3.3.6 Iterative cycle of review and adaptation

As indicated in Section 3.3.3.4, there are many reasons for undertaking comprehensive periodic reviews of the MPA network and its management. Reviews should be informed by the results of monitoring, should involve stakeholder engagement and should take account of changes since the designation, for example, new scientific knowledge, developments in industry and changes in the environment, legislation or policy and the socio-economic and cultural context. Reviews will identify any sub-optimal, unexpected and unintended outcomes of designation and should be carried out with the intention of instituting change if necessary.

At a site level, the iterative process of evaluating results of monitoring, evaluating stakeholder feedback and taking account of changes since designation makes it possible to determine if the management measures in place are suitable and if there has been progress towards achieving conservation objectives or other unanticipated benefits. If necessary, the management of the designation can be adapted based on experience to date. As such, review facilitates the adaptive management of protected areas.

As indicated in Section 3.2, the implementation of MPAs is a long-term process that should include stakeholder participation throughout the designation and management processes, including at the review stage. The permanency of MPA designation can lead to stakeholder fears. Those fears may be alleviated if it is communicated from the outset that reviews will be undertaken, with potential for change in site objectives and management measures, and that stakeholders will be consulted at the review stage. Clearly, care must be taken to avoid introducing unnecessary uncertainty for stakeholders around the duration of designations and to avoid the possibility for review outcomes to diminish the overall effectiveness of the network in meeting its conservation objectives.

A review can identify unforeseen outcomes after designation is implemented. For example, some groups could be found to be dis-proportionately disadvantaged by the MPA designation due to the costs or barriers associated with applying for consent for restricted activities (see Section 3.1.2.3). Once these barriers are identified, measures (e.g. financial assistance, training, exemptions) can be put in place to facilitate disadvantaged groups while still maintaining the objectives of the designation.

The timing of reviews should be set on a case-by-case basis to ensure that 1) the review is carried out in a timely manner but that 2) there is a sufficient body of knowledge on which to base any recommendations for adaptation. It would be envisaged that national network reviews should take place on a cycle of approximately 5 to 10 years. A six year cycle would align with that for Article 17 reporting under the Birds and Habitats Directives. Reviews at the network level should include consideration of links and synergies with MPAs adjacent to Irish waters, including those in the OPSPAR network. Reviews at site level could be undertaken more frequently, by local management organisations to reflect more rapidly changing local circumstances.

Recommendations

3.49. Periodic reviews of the effects of MPA designation and management should be undertaken with a remit to affect change in designations and/or management measures and monitoring as part of an iterative process of adaptive management.

3.50. Reviews should be informed by monitoring, involve stakeholder engagement and take account of changes such as new knowledge, developments in industry and changes in the environment, legislation or policy.

3.51. Reviews should include consideration of links and synergies with MPAs adjacent to Irish waters, including those in the OPSPAR network.

Box 16: Review of the Raised Bog Natural Heritage Area Network

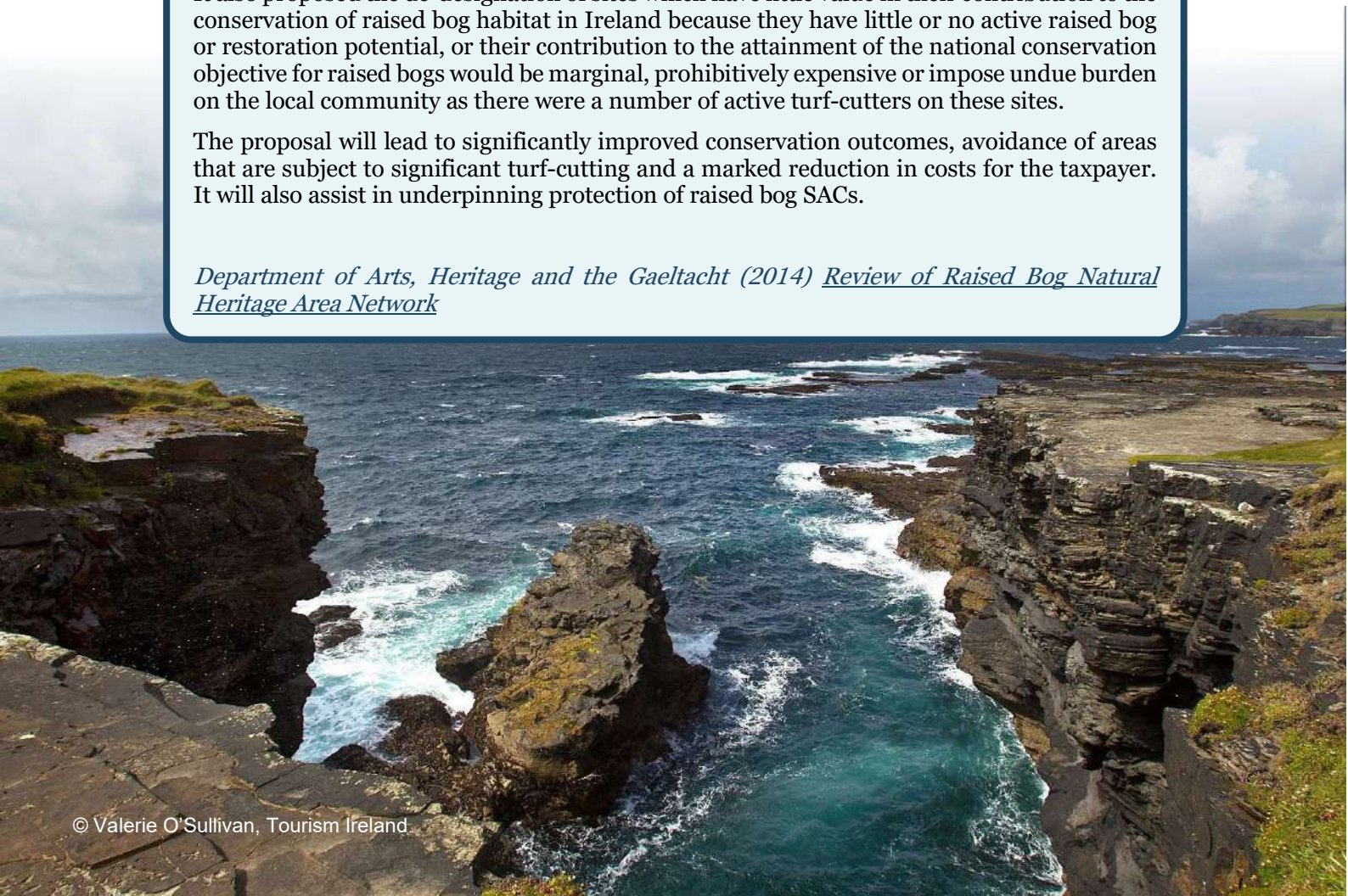
A comprehensive review of review over 270 designated raised bog sites (75 NHAs and 53 SACs) and over 100 non-designated sites of conservation value were examined. The objective was to meet nature conservation obligations while having regard to national and local economic, social and cultural needs.

The review proposed a significant reconfiguration of the NHA network. It proposed including a number of bogs owned by Bord na Móna (which had already been subject to focused conservation and restoration efforts) and other sites of conservation value (where there was little or no turf-cutting pressure).

It also proposed the de-designation of sites which have little value in their contribution to the conservation of raised bog habitat in Ireland because they have little or no active raised bog or restoration potential, or their contribution to the attainment of the national conservation objective for raised bogs would be marginal, prohibitively expensive or impose undue burden on the local community as there were a number of active turf-cutters on these sites.

The proposal will lead to significantly improved conservation outcomes, avoidance of areas that are subject to significant turf-cutting and a marked reduction in costs for the taxpayer. It will also assist in underpinning protection of raised bog SACs.

Department of Arts, Heritage and the Gaeltacht (2014) Review of Raised Bog Natural Heritage Area Network



3.4 Legislation

3.4.1 Legislative options for MPAs

The term Marine Protected Area does not exist in Irish law and is not defined in any of Ireland's legal instruments. It is recommended that new primary legislation, in the form of a dedicated Marine Conservation or Marine Protected Areas Act, is enacted. This should provide for the creation of new national MPAs and extension of the MPA network, define key terms and concepts, set out objectives and principles, identify who has authority to establish MPAs, provide for the selection and designation processes, involved public participation, along with essential supporting provisions relating to management, enforcement and compliance. The new legislation should clarify that the MPA network will consist of already designated SACs and SPAs, OSPAR MPAs and the newly designated sites, provided specified criteria are met. This is the approach that has been taken elsewhere in the EU (e.g. in Scotland and in Northern Ireland). New primary legislation is the preferred option so that current gaps can be addressed fully in one instrument, along with the necessary definitions and processes.

Currently, Ireland's protected areas in the marine environment consist of some SPAs and SACs designated under the EU Birds and Habitats Directives as implemented primarily by the European Communities (Birds and Natural Habitats) Regulations 2011and reported to the OSPAR Commission. This is a discrete subset of the wider network of protected areas under these Directives. Expanding the MPA network merely through the designation of additional marine SACs and SPAs is not sufficient to protect certain other species, habitats and features of Ireland's marine biodiversity that are recognised as needing greater protection (as explained in Section 1.3.6). The majority of Natural Heritage Areas, designated under the Wildlife Acts, as amended, are also designated as Natura 2000 sites and currently the only statutorily designated NHAs are for peatland sites. Protected areas deriving from other international and regional instruments (Ramsar sites, OSPAR MPAs) do not have explicit legal backing in Irish law so new national legislation would also address this weakness.

This section outlines what should be covered in new legislation including definitions and interpretation, scope and application, objectives, institutional arrangements, planning and management, regulation of activities, compliance and enforcement, and other miscellaneous provisions.

It should be stressed that any new legislative instrument will have to interact and operate with existing instruments on SPAs and SACs as these sites will need to be considered as part of Ireland's MPA network. It will also have to work with the framework of policies and legislation that deal with conservation and that influences use of the marine and terrestrial environment.

3.4.2 Definitions and Interpretation

This report has proposed defining an MPA as "A geographically defined area of marine character or influence which is protected through legal means for the purpose of conservation of specified species, features or ecosystems and their associated ecosystem services and cultural values, and managed with the intention of achieving stated objectives over the long term." This aligns with the IUCN definition of a protected area and is suitable for use in future Irish policy and legislation. For implementation and future reporting and evaluation processes it is important that the terminology used in Irish legislation and policy is the same, as far as possible, as that used internationally (e.g. Annex V of OSPAR, UNCLOS, CBD) and in an EU

context (Article 13(4) of the Marine Strategy Framework Directive, Birds and Habitats Directives). The Convention on Biological Diversity, for example, defines biodiversity, biological resources, ecosystem, and sustainable use, all of which are relevant to MPA implementation. Similarly scientific and technical criteria and guidelines produced under many international and regional agreements will define and explain other terms that are critical to implementation and management of the MPA network, and therefore will be required in the new legislation or the procedural guidance accompanying it. For ease of understanding and application, it is preferable not to over-define terms as this can make the legislation more difficult to implement.

Although we recommend that categorisation would take place after objectives and management plans have been established (Section 3.3.5.3), it is recommended that the legislation ensures that different categories of MPA can be recognised, aligned with the categories of protected areas defined by the IUCN and used internationally under various conservation agreements. This will ensure that the future Irish MPA system can be related to international standards, enabling more rigorous scientific interpretation of how effective the network is in meeting its objectives. Within the Irish context, the objectives of an MPA should be the primary basis for its classification rather than its level of protection. This report recommends that the legislation provides for the creation of Nature Conservation MPAs, Research and Restoration MPAs and Biocultural MPAs (Section 3.3.5.3). The legislation should provide that an MPA may be designated (by a designation order) to conserve inter-alia marine flora or fauna, marine habitats and ecosystems, climate buffering, and features of bio-cultural value. It should also enable designation of whole sites as refuges from pressures such as noise, artificial light and climate change and should provide for innovative approaches, such as mobile MPAs (see Sections 1.3, 3.1.1, 3.6). In considering sites for selection and designation, this will apply the process outlined in Section 3.3.

New legislation should be cognisant of changing environmental circumstances. In Scotland, for example, the Marine (Scotland) Act 2010 contains a provision stating that "in considering whether to designate an area, the Scottish Ministers may have regard to the extent to which doing so will contribute to the mitigation of climate change." This is an important provision to replicate in an Irish context and could help deliver on resilience and other, wider climate policy objectives. Also in Scotland, and elsewhere, legislation requires the responsible Minister to have due regard to any social or economic consequences of designation when deciding whether to designate a site, as appropriate. This is complex and would require substantial additional effort and resources though it could aid transparency in decision-making. Ireland's National Biodiversity Action Plan 2017-2021 commits to having national natural capital accounts developed and natural capital integrated into broader economic policy by 2021, reflecting what is also happening at EU level. Whilst there has been some criticism of the natural capital approach (saying that it leads to commodification and financialisation of natural assets), the intention is that it prevents benefits from nature and natural resources being perceived as "free" and in that way the value of natural capital can be incorporated into planning and management decisions ultimately resulting in less degradation and more restoration.

The legislation should not prescribe the exact workings of the selection and designation process so that it has the flexibility necessary for adaptation and amendment following evaluation of the process. The legislation should, however, contain a provision requiring the responsible Department or authority to prepare and publish scientific and technical guidance on this process, so that the scientific criteria to inform decision-making on whether an area should be considered for designation as a MPA are fully transparent and understood. Such

guidance should reflect the principles of good governance (Section 3.3) and public participation (Section 3.2) as previously explained. This guidance should assist other regulatory authorities in terms of how MPAs will interact with their core work areas, and also be useful to stakeholders. The legislation should specify that those tasked with implementing it should have regard to the guidance in exercising their functions under the legislation.

3.4.3 Scope and application

The new legislation should apply to Ireland's maritime area, namely internal waters (sea and tidal areas), the territorial sea, the Exclusive Economic Zone (EEZ) and the agreed Continental Shelf areas, where possible. This is the same as the definition used in the EU's Marine Strategy Framework Directive. It also aligns with what is proposed for inclusion in the Marine Planning and Development Management Bill, due for imminent enactment. Thought should also be given to how Ireland's agreed extended continental shelf areas could be included within the scope of MPA legislation, recognising that these comprise both continental shelf (seabed) and high seas (water column). The High Seas component will be subject to the provisions and requirements of the new Biodiversity Beyond National Jurisdiction instrument currently being negotiated at UN level, which is anticipated to facilitate the designation of MPAs in areas beyond national jurisdiction.

New MPA legislation should be put in context with other applicable conservation and sustainable use policy and legal frameworks and it should be clear how the MPA law will relate to these frameworks. This is particularly relevant in relation to legislation transposing the Birds and Habitats Directives where coastal and marine habitats are involved. Generally Irish legislation extends from the mean high-water mark seaward. The EU's Marine Strategy Framework Directive and Maritime Spatial Planning Directive both start at the baseline from which the territorial sea is measured. The Water Framework Directive applies to coastal waters, defined with reference to the baseline (low water mark or straight baseline) and transitional waters. These issues of scope are important when it comes to boundaries of MPAs and will become more significant in light of global changes such as sea level rise, increased rates of erosion etc. It is suggested that an MPA should be able to include areas above mean high water if this is necessary for protection of the species, habitat or feature for which the site is designated. In the OSPAR Convention, for example, Article 1(c) refers to a "freshwater limit" and defines it as "the place in a watercourse where, at low tide and in a period of low freshwater flow, there is an appreciable increase in salinity due to the presence of seawater."

Demarcation of boundaries is more difficult at sea than on land and tends to follow latitude and longitude coordinates so boundaries can be easily plotted on navigational charts. IUCN guidance recommends that "descriptions of MPA boundaries and maps should be available in digitised form using satellite technology such as geographic information systems (GIS) and GPS".[255] MPA boundaries must also recognise other boundaries, e.g. shipping lanes, that are in place, and rights of innocent passage under international law. Legislation on protected areas usually presumes that the provisions applying to terrestrial elements also applies to the airspace above the land, as well as the subsoil and any body of water connected with the land. Similarly, in marine areas it should include the airspace above the sea, the seabed and subsoil, as well as the water column, in line with applicable international law.

MPA legislation should include a provision that allows for the formal amendment of an MPA boundary, category or purpose, where such an amendment is necessary to achieve existing or revised MPA network or site objectives, subject to stakeholder consultation as appropriate.

This might also be necessary in light of changing climatic conditions, pressures on the habitats or species or new scientific information, for example. A provision enabling de-designation of a site under certain clearly defined circumstances is also recommended.

3.4.4 Objectives

The National Biodiversity Action Plan 2017-2021 states that Ireland's vision for biodiversity is "that biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally". Three of the Plan's objectives relate to MPAs: conserve and restore biodiversity and ecosystem services in the marine environment (Objective 5); expand and improve management of protected areas and species (Objective 6) and strengthen international governance for biodiversity and ecosystem services (Objective 7). Ideally policy documents should support legislative objectives. Limited objectives for MPAs in the Biodiversity Action Plan, mean that new MPA legislation may have to contain an expanded policy statement explaining the goals and purposes of the legislation. In future, national biodiversity policy should fully reflect the marine environment and specify goals for it, and thereby integrate all relevant policy objectives from other legislation (MSFD, WFD, OSPAR, CFP, UN and EU Biodiversity policy and law). New MPA legislation does, however, provide an opportunity to confirm and act on Ireland's commitments to ecosystem-based management, including sustainable fisheries management and achievement of Good Environmental Status under the MSFD, coherent with the framework of maritime spatial planning (Article 11), as well as other international commitments.

The objectives of the legislation need to be sufficiently clear to assist implementation. Targeted objectives to address specific purposes could be further refined in the guidance. The advantage of specifying targeted objectives in guidance, rather than in legislation, is that they can be amended relatively quickly to take account of changing conditions and circumstances. Examples of targeted objectives include: to protect and restore irreplaceable habitats and ecosystems with unique characteristics that cannot be replicated through the conservation of other areas; to protect endangered, threatened and endemic species, giving highest priority to locally, regionally and globally endangered species and their habitats in line with OSPAR list of Threatened and Declining Species and recognised Red Lists; to preserve areas of high natural and cultural significance; to use corridors to support connectivity as part of the MPA network; to protect important ecosystem functions such as natural carbon sinks; to provide refugia and space for changing species ranges in light of climate change; to strengthen overall resilience of ecosystems and species; to facilitate research, public engagement and education. The legislative objectives should also include principles to assist in achieving wider policy goals, such as sustainable development and good governance, as well as recognised best practice approaches like best available science and the precautionary approach.

3.4.5 Governance and institutional arrangements

In light of the recent change in government and decision to move the heritage portfolio into the Department of Housing, Planning and Local Government to form the Department of Housing, Local Government and Heritage, it is recommended that a the new MPA function be established within that Department. New MPA legislation should assign the powers and responsibilities to that Minister and should allow for the possibility of delegating various administrative, scientific, management, enforcement, financial and other responsibilities,

where necessary and appropriate. Ministerial functions should include formal designation of MPAs (following from the process outlined in Section 3.3.4) arbitration in the specification of MPA management plans, and pursuing cooperation and engagement across Government on all matters relating to MPAs.

Successful implementation of an MPA network will require the involvement and contributions of other Departments, agencies and stakeholders. New legislation should therefore contain a commitment to coordinate and consult on general and specific matters on an ongoing basis, through formal and informal means with all relevant government sectors and levels. Such horizontal and vertical coordination and cooperation is necessary to ensure MPAs and their implications for other policies and activities are understood and capable of application. A provision requiring decision-making bodies from other sectors that may impact on MPAs to regularly consult and coordinate with the Department in advance of decisions that may affect the MPA network or a specific site would provide an additional check and balance on other regulatory frameworks such as planning, licensing and environmental assessments, including those necessary from a transboundary perspective.

The process of extending Ireland's network of MPAs will require a significant body of work involving input from many specialised areas. MPA legislation should provide for the establishment of an MPA Scientific and Technical Committee by the Minister, to advise on scientific and technical matters, on an ongoing or issue-specific basis. This could include advice on criteria and methods; research and monitoring needs, and other matters relevant to MPA implementation.

Permitting approaches to MPA management should be considered. This can avoid overly burdensome 'byelaw' making procedures. Permit arrangements can be simply organised by modifying a current license with addendums including MPAs, and permitted uses in specified locations.

3.4.6 Regulation of activities

Depending on the site objectives of a given MPA, activities may have to be restricted or prohibited. This will necessitate the Minister, or other responsible authority, having the power to implement additional controls and regulations where needed. Provisions on regulated activities then become the basis for offences and penalties/punishments. Provisions relating to activities need to consider access to the area; the use of the area and its resources; and the prevention of damaging activities or behaviour that would threaten the site's objectives. This is complex in the marine environment as different activities come under different regulatory systems and different competent authorities. International and EU law also come into play here and may impact on the level of controls that may be applied. This is particularly pertinent to the case of fisheries under the CFP, as explained in Section 1.2.2.2. Ultimately, MPA legislation should indicate that any activities permitted in a specific site, whether by general rules or by licence, should be consistent with, and advance, the objectives of the site. In the absence of conclusive evidence in relation to the impacts of an activity and the possibility of substantial risk to the objectives of the site, the precautionary principle should apply.

For MPAs in near shore areas, certain activities could be controlled by licence or permit, as is currently the case under the Wildlife Acts for certain activities on State lands, administered by the NPWS. A requirement for a licence or a permit means that the competent authority has an opportunity to review each application on a case-by-case basis and make a risk-based

assessment on whether the proposed activity is in line with the MPA's objectives and management plan. Fees for licences and permits can be used to fund and manage MPAs. IUCN guidelines identify actions to promote ecologically sustainable tourism and these can be incorporated into associated MPA legislation where necessary.[256]

3.4.7 Enforcement duties and powers

MPA legislation must provide for enforcement duties and powers. This should define who is an 'Authorised Officer' for the purposes of the legislation and also their functions, duties and powers with respect to enforcement. For MPAs, authorised officers could be from the police, coastguard (or equivalent), naval and defence forces, customs and fisheries officers, as well as local authority or community officials who have had appropriate training. The main responsibility of an Authorised Officer is to safeguard the resources of the MPA and ensure the safety of those permitted to use the area. Common enforcement powers include powers to stop, search and arrest in accordance with criminal law. In many countries, local government authorities appoint their own officers for local enforcement which may be worth considering for near shore MPAs. This would also help to deliver a direct 'local' input into the operation of the MPA network. In other countries, authorised officers have a dedicated 'extension role' meaning as part of their work they carry out public education and outreach specifically on MPAs.

New legislation should consider the use and permissibility of satellite and remotely sensed data for monitoring and enforcement purposes. GPS, VMS and AIS data can be used to locate vessels within the boundaries of a MPA and in some cases also their activities, but these technologies have also raised questions about privacy.

As discussed in Section 3.3.5.5, a culture of stewardship should be actively engendered where possible to help reduce the need for enforcement.

Recommendations

3.52. New primary legislation, in the form of a dedicated Marine Conservation or Marine Protected Areas Act, should be enacted.

3.53. New legislation should provide for the creation of new national MPAs and extension of the MPA network, define key terms and concepts, set out objectives and principles, identify who has authority to establish MPAs and provide for the selection, designation and management processes and public participation in these.

3.54. The legislation should define what an MPA is and utilise terminology and definitions accepted in other international and EU legislation, where appropriate.

3.55. Legislation should not be overly-prescriptive, particularly in relation to the operation of the selection, designation and management processes so that these have the flexibility to adapt to changing conditions and following periodic reviews.

3.56. New legislation should be accompanied by technical and scientific guidance that details how the MPA planning and management processes will operate.

3.57. The new legislation should apply to Ireland's maritime area, namely internal waters (sea and tidal areas), the territorial sea, the Exclusive Economic Zone (EEZ) and the agreed Continental Shelf areas, where possible.

3.58. A new MPA function should be established within the Department of Housing, Local Government and Heritage.

3.59. MPA legislation should provide for the establishment of an MPA Scientific and Technical Committee by the Minister, to provide advice on an ongoing or issue-specific basis.

3.60. New legislation should consider the use and permissibility of satellite and remotely sensed data for monitoring and enforcement purposes.

3.61. Special attention needs to be given to promoting a culture of stewardship with and beyond government and State actors.

3.5 Other considerations

3.5.1 Resourcing the MPA network

One of the challenges facing MPAs globally, and their effective management, is access to sufficient financial resources.[257,258] To meet their objectives, MPAs require reliable, long-term sources of funding. Significant costs will be associated with overarching governance, local management arrangements, data collection, collation and stewardship, enforcement, cycles of monitoring and review and also communication and outreach. These costs are typically and appropriately met through government budget allocations and it is essential that a commitment is made to properly resource the process of expanding and managing Ireland's MPA network. Many stakeholders consulted in preparing this report expressed the view that proper resourcing is essential because the venture will fail without it. The point was made that investment in a properly functioning network would yield good value for money through the benefits that would flow from this public resource for the common good.

Given pressures on government budgets and their dependence on political will and public opinion,[259,260] there is growing interest in the field of conservation finance and how alternative financial sources can be utilised to support MPA objectives. Much of this interest focuses on the role of the private sector and its unrealised potential for investment in conservation efforts.[261] Enrolling the private sector in marine conservation (known as for-profit biodiversity conservation) has been widely critiqued, however, as a means of privatising the ocean by reframing and re-regulating the marine environment as a space for the 'blue economy', with far-reaching social and ecological consequences.[262] For example there is a clear shift in values involved in aligning conservation within the confines of an economic system that privileges profit-maximisation and market-driven logics above distributive values rooted in the idea of the public good.[263] Making conservation of biodiversity profitable to private investors can have implications that reach far beyond a simple diversification of finances. These include rejecting pre-existing values and rights of access/use, reinforcing apolitical explanations of biodiversity loss and excluding alternative approaches.[264] Connections have also been made between the increasing calls for private sector investment in conservation and public sector resources that have been diminished by financial sector bailouts.[263]

Options that have been applied to terrestrial protected areas are being explored in marine settings, such as payments for ecosystem services, offset markets, the production of green commodities (e.g. organic products) and philanthropy.[265] It is not clear, however, the extent to which lessons can be learnt from terrestrial protected areas. For example, MPAs are known to have higher operational costs than terrestrial protected areas, but not enough data are collected about establishment costs to make an effective comparison.[266]

Interest is also growing in the potential for impact bonds (e.g. social, resilience, catastrophe and blue bonds), long-term loans that are only repaid if they achieve their objectives.[260] These novel approaches are not yet fully tested and are only feasible for investments generating substantial economic returns (more than $50 million).[257] Critical scholars have warned of the dangers of transferring control of government performance on environmental policies to private sector "green financiers":

"The rationale is simple: the issuing government will have added incentive to ensure that national environmental (e.g. carbon emissions) targets are met because this will enable them to pay lower interest rates on bonds issued to investors. Investors in turn would provide

governments with cheaper debt as long as governments meet their targets. This would effectively shift responsibility for global environmental outcomes into the incentivising control of investment finance. Such index-linked bonds seem a counter-intuitive choice for environmental governance in that they entangle environmental management strategies with the unpredictable play of competing profitable domains of speculative investment and hedging activity. It is by no means clear that these would necessarily lead to environmentally (or socially) desirable outcomes."[263] Nevertheless, a growing appetite by for-profit organisations is reported for conservation finance, with investors demanding the inclusion of environmental metrics in financial statements.[267]

There are, however, relatively few examples of how private sector finance can be used to support MPAs in practice. IUCN guidance on protected areas legislation states that "in marine areas, tourism fees, a portion of fisheries licence or leasing fees, and fees for scientific research should be among the sources of additional revenues [for MPAs]. Where feasible, legislation should provide that such fees will be used for the management and maintenance of the marine and coastal protected areas network." and further recommends that "efforts could be made to interest private-sector businesses in supporting the MPA network through public-private partnerships for fund-raising and other cost sharing, including for data collection and scientific monitoring, in strictly protected MPAs with no-take zones as well as zones managed for sustainable use."

Within Europe, efforts are relatively small-scale and include mostly direct market initiatives, for example, funds raised from fines for illegal activities, permissions and licences, tourism entrance fees and merchandise alongside sponsorships and donations.[125] The Egadi MPA (Spain) self-generates approximately 50% of the total budget (approximately €350,000) through such mechanisms. The Torre Guaceto MPA (Italy) raises approximately a third of its annual budget (~€300,000) through an on-site café and is exploring how parking can be used to generate additional income.[125] Elsewhere there are examples of franchising wildlife watching activities, such as whale watching, where operators must bid for licences, the proceeds of which contribute to MPA budgets.[268] Similarly, small recreational boat owners can be asked to pay an MPA fee for mooring or anchoring in such a site.

Recommendations

3.62. Financial planning should accompany MPA network development to ensure that appropriate budget is allocated from public funds.

3.63. Consideration may be given to alternative sources of finance, but involving the private sector in marine conservation risks transferring control of performance on environmental policies from public hands to private investment financiers focussed on profit-maximisation.

3.5.2 Research needs

It has been repeatedly emphasised in this report and by stakeholders that the process of MPA designation and management should be evidence-based to provide objective grounds for decision-making. The evidence required includes data on the distribution and abundance of the marine features targeted for protection, understanding of their biology and ecology (e.g. dispersal patterns, critical habitats, sensitivity and resilience, etc.), their contributions to ecosystem functioning and the links between biodiversity, ecosystem functioning and ecosystem services and benefits. This is essential for making informed decisions about where to locate and how to design MPAs to most effectively meet objectives for particular habitats or species.

Effective networks will involve interactions with the surrounding habitat and connections between protected sites. Although some general principles can be invoked, these require augmenting with research on network function, including, but not necessarily limited to studies of connectivity. Understanding and optimising connectivity between MPAs is a complex challenge and remains poorly addressed. This network view will need to consider protected areas beyond Irish waters and is likely to require international collaborative programmes.

To inform decisions around the management of sectoral activities in MPAs, the impact of associated pressures, particularly in combination with other local and global pressures, on target biota and ecosystems must also be understood, together with the socio-economic costs and benefits linked with particular activities. Research is often needed to test and evaluate the success of different management measures (see Section 3.3.5).

While relevant data and knowledge are available to some degree, either in Ireland or in areas that are somewhat comparable, there are considerable gaps and the evidence base is by no means complete. Socio-economic and cultural contexts are variable, nuanced and influential, making it particularly important that they are subject to national and local research. To date, no comprehensive assessment has been made of the potential socio-economic costs and benefits of an MPA network in Irish waters. Any work that has been done simply points to evidence of the type of benefits and costs that have been observed in the setting up of such networks in other jurisdictions. Social science research is also needed to identify barriers to implementing MPAs, situations where implementation is likely to be successful and indicators which can be used to demonstrate any resulting social and well-being benefits. Cultural benefits from marine environments are also recognised as being very substantial but have received little attention to date.

The requirements of monitoring create a number of research needs. Given resource constraints, there is always a need to devise monitoring programmes that provide robust information in a cost efficient manner. This may include repurposing information and finding synergies between different ongoing programmes (e.g., across the MSFD). Some approaches may be focussed on refining the information that comes from diverse sources (e.g., remote sensing, information gathered by other sectors).

We recommend that a review is undertaken of the current state of knowledge and availability of data relevant to Ireland's MPA network and that the review explicitly identifies priorities for research to better inform future site selection and management. The recommended Research and Restoration MPAs would form a valuable platform for relevant research.

Recommendations

3.64. A review should be undertaken of the current state of knowledge and availability of data relevant to Ireland's MPA network. The review should explicitly identify priorities for research to better inform future site selection and management.

3.65. Topics requiring additional research may include the biology and ecology of target species and ecosystems, the pressures and impacts associated with sectoral activities and climate change, the socio-economic and cultural contexts for and consequences of MPAs, the properties of the network and its interaction with others and the methodology for cost-effective monitoring and management.

3.6 Conclusions and recommendations

3.6.1 Proposed definition and key principles for MPAs in Ireland

Based on the evidence presented in this report, the MPA advisory group recommends the definition and key principles for MPAs in Ireland presented in Box 17. The definition is intended to encompass a range of rationales for and approaches to MPA designation and management and aligns with the key features of existing definitions reviewed in Section 1.1.7. The key principles summarise a more detailed set of recommendations presented in Section 3.6.3.

Box 17: Proposed definition for MPAs in Ireland and recommended key principles

The following operational definition of an MPA is proposed for MPAs in Ireland.

A geographically defined area of marine character or influence which is protected through legal means for the purpose of conservation of specified species, habitats or ecosystems and their associated ecosystem services and cultural values, and managed with the intention of achieving stated objectives over the long term.

Recommended key principles:

- MPAs should be designated and managed to form a network that is designed to be coherent, representative, connected and resilient and to meet Ireland's commitments under international instruments such as the EU's Marine Strategy Framework Directive, OSPAR Convention, UN CBD and Aichi Targets (particularly Target 11) and the UN Sustainable Development Goals (particularly Goal 14).
- Objectives for MPAs and the MPA network in Ireland may focus on the protection and recovery of:
  - Threatened or declining species or habitats
  - Important or ecologically significant species or habitats
  - Features representative of the range of features present in Irish waters
  - Areas of high biodiversity, naturalness or sensitivity
  - Areas contributing to maintenance of ecosystem functioning and ecosystem services including carbon sequestration
  - Areas with significant biocultural diversity value
- MPA site objectives may also focus on the prevention of impacts from specified pressures such as artificial light or noise or buffering against the effects of climate change.

- Conservation is taken here to mean maintenance of or restoration to a state that is as close as possible to the expected structure and functioning of the ecosystem given the general physiography and location of the area or as compared to selected reference sites or states. In MPAs designated for biocultural diversity value, conservation of this value would be the primary objective.
- Additional benefits of MPAs may include opportunities for research and environmental education and to create socio-economic added value, provided that these are not in conflict with the MPA site objectives.
- A Systematic Conservation Planning (SCP) approach should be followed for planning, implementation and management of the expanded network, with a provision also for proposal of individual site-based MPAs.
- In designing the network, consideration should be given to interactions with networks designated by other States in the same marine regions.
- Early and sustained stakeholder engagement should be integral to the selection and management processes for MPAs. Engagement should be inclusive and equitable and the process should be designed to ensure that it is transparent, meaningful and facilitating.
- Management measures should be established as appropriate for each MPA to achieve its stated conservation objectives and taking account of socio-economic and cultural considerations.
- Management measures should be established as part of the designation process.
- Management of MPAs should be based on the best available evidence and on the precautionary principle.
- Carefully designed monitoring should be used to assess efficacy of the network and inform periodic reviews and adaptations of designations and management measures.
- It is recommended that a national coordinating body should be established with the authority to coordinate planning and implementation, to foster good governance and ensure close collaboration among relevant departments and agencies and synergy with related undertakings such as the National Marine Planning Framework.
- New legislation would be needed to establish the necessary framework for governance and management and appropriate resources and funding must be allocated to plan, implement, manage, monitor, and review the network.

3.6.2 An expanded network of MPAs in Ireland

The expanded network could include existing and new Natura 2000 and Ramsar sites, newly designated MPAs with conservation as their primary objective and OECMs that meet criteria for appropriate designation and inclusion.

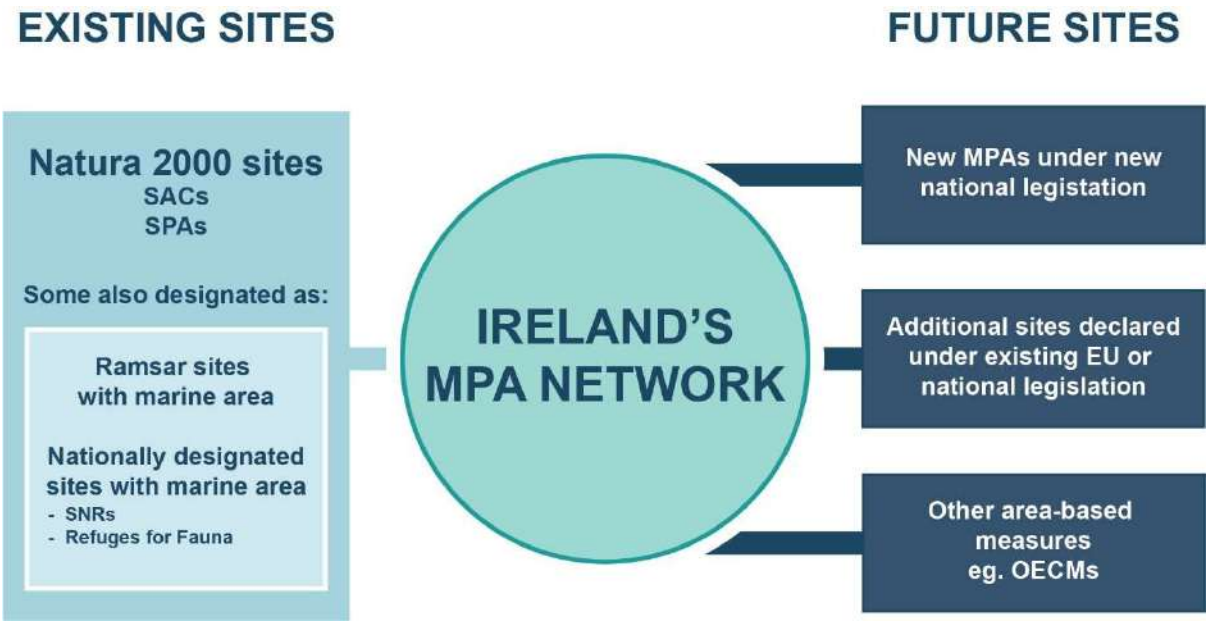


Figure 3.4 – Existing and proposed new components of Irelands network of MPAs.

The inventory of Natura 2000 sites used for the estimate of coverage in Ireland's maritime area in this report is currently based directly on reporting criteria under the Birds and Habitats Directives (Section 1.2.4). However, there are arguments in favour of recognising the contribution of coastal MPAs where the marine environment makes up a significant portion of the site. This would lead to a more comprehensive picture of protected sites in the marine environment, and a better understanding of the use of Ireland's maritime area and the different local constraints on marine activity.

For some habitats or species protected under the Birds and Habitats Directives, it may be necessary to make specific decisions about when they are counted as an MPA For example, in the UK, guidance recommends that sea cliffs for breeding seabirds which did not include an intertidal or subtidal habitat should not be included in the MPA network. Where Natura 2000 and Ramsar sites located in coastal habitats include both terrestrial and marine habitats, it will be necessary to report only the marine part of a site as contributing to the MPA network. As discussed above (Section 3.4) a decision on where to draw the land-sea boundary must be included in MPA network guidance. As Ireland's Maritime Area is defined in the NMPF as extending from the Mean High Water (MHW) mark it is likely to represent the best cut-off for this land-marine boundary. The same boundary should preferably be used for reporting on both national MPA network area, and where Natura 2000 sites are reported to the OSPAR network. This would also align with reporting to the World Database on Protected Areas and to the Aichi targets.

The above only refers to accounting for existing sites. Natura 2000 sites are managed only for their qualifying interests. Thus, new legislation which designates sites coinciding with or

overlapping Natura 2000 sites for other purposes or features may result in existing Natura 2000 sites being double badged with the new MPA designation.

Other Effective Area Based Conservation Measures (OECMs) may also contribute to the protection of biodiversity even though that is not their primary objective (Box 2, Section 1.1.6). OECMs are complementary to MPAs and can contribute to the coherence and connectivity of the overall network. Despite the fact that long term nature conservation is not their primary objective, there is scope to incorporate conservation objectives and measures into OECM management plans and in so doing, contribute to overall biodiversity protection. Recognising them as contributing to the network would also be a way of mainstreaming biodiversity into other coastal and marine uses. For example, there is evidence that wind farms support the regeneration of seabed biodiversity especially in arrays in other EU states (e.g. Netherlands and Denmark) where bottom trawling activities are restricted. They also provide hard substratum for reef communities and foraging opportunities for fish, seals and some seabirds. Nevertheless, they are inherently artificial and may have negative impacts on other seabird species and cetaceans and provide stepping stones for invasive species. As such, careful decisions should be made on a case by case basis, with consideration of how a prospective OECM could contribute to stated policy goals and MPA network objectives.

The IUCN and CBD SBSTTA have both issued voluntary guidance on how OECMs can be integrated with other protected areas. This recognises that by definition, OECMs contribute to both quantitative (i.e. the 17% and 10% coverage elements of the Aichi targets) and qualitative elements (i.e. representativity, coverage of areas important for biodiversity, connectivity and integration in wider landscapes and seascapes, management effectiveness and equity) of Aichi Biodiversity Target 11. OECMs could, therefore, strengthen the existing and future protected area network.

A number of the stakeholders consulted in the preparation of this report indicated a preference for the term Marine Conservation Area or similar over Marine Protected Area (MPA) for nationally designated sites as they felt that 'protected' had more exclusionary connotations (see Annex 1). The term MPA is internationally recognised and widely used. In some jurisdictions, however, it has been considered appropriate to describe the overall network as an MPA network, but the nationally designated sites within it as Marine Conservation Zones (in the UK) or similar. This can help with clarity in the sense that the 'MPA network' otherwise contains some sites that are specifically called MPAs and others that are not.

Recommendations

3.66. Ireland's expanded network of MPAs should include existing and new Natura 2000 and Ramsar sites, newly designated MPAs with conservation as their primary objective and OECMs that meet criteria for appropriate designation and inclusion.

3.67. The inventory of coverage by Natura 2000 sites should encompass the marine areas of sites with both terrestrial and marine components but not currently included in marine reporting criteria to the European Commission, e.g. sea cliffs with associated marine areas.

3.6.3 Recommendations on how Ireland's network of MPAs should be expanded

3.6.3.1 Ecological considerations

Key messages

- Individual MPAs are selected as part of an overall strategy on the basis of inherent criteria such as the species and/or habitats they contain, their rarity, importance or ecological significance and their level of representativity, sensitivity and naturalness.
- Other potential considerations in selecting MPAs include size, potential for restoration, degree of acceptance, potential for success of management measures, potential damage to the area by human activities, and scientific value.
- Conservation planning also encompasses network properties including ecological coherence and percentage cover (of target habitats and of the overall maritime area).
- Ecological coherence can be difficult to define and assess, but includes properties such as representativity, replication, viability, adequacy and connectivity.
- A coherent network should maintain processes, functions, and structures of the intended protected features across their natural range.
- Planning for resilience requires that careful consideration is given to network properties such as coverage, replication, size, level of protection, and connectedness and that sites can be selected to provide a refuge from changes to climate and ocean chemistry.

Recommendations

3.1 In expanding the MPA network, lists of species, habitats, and ecosystems for protection should be broad and there should be a process for adding to those lists when omissions become apparent.

3.2 Enable designation of MPAs on pressure-based criteria, as well as the more conventional species-/habitat-/ecosystem-based criteria, to allow the designation of quiet seas, dark skies, and climate change buffered protected areas.

3.3 Enable designation of MPAs based on provision of important ecosystem services or on their contribution to ecological coherence of the overall network or achievement of GES under the MSFD.

3.4 Enable initially temporary protection in some cases, with scope for review to allow assessment of likely benefits of continued protection, for example in terms of successful restoration or continuing research to underpin adaptive management.

3.5 Enable provision for mobile MPAs and allow flexibility to protect mobile species and adapt to the effects of climate change.

3.6.3.2 Societal considerations

Key messages

- The nature and consequences of MPAs are not always well communicated to or appreciated by the public.
- Some people will be concerned about the impacts of MPAs on their livelihoods and the fairness of distribution of costs and benefits.
- People's value systems and sense of place can strongly influence their perception of MPAs as being positive or negative developments.
- Compared to other EU Member States, the Irish public had a less positive response to the proposition that governments should designate parts of the ocean as protected areas (60% agreement versus up to 86% in other nations).
- The nature and inclusivity of the designation process can strongly influence perception and acceptance of individual MPAs.

Recommendations

3.6 A comprehensive assessment of the actual costs and benefits of an MPA network in Irish waters should be carried out (based on Section 2.1) rather than relying on information from other jurisdictions.

3.7 Any assessment of costs and benefits should capture unevenness of their distribution across different groups.

3.8 A communication campaign should be undertaken to inform the general public more broadly about the potential benefits of MPA designation in Irish waters.

3.9 Ensure that the stakeholder engagement process in relation to MPAs is well designed and inclusive, in accordance with the principles articulated in Section 3.2.4.

3.10 The potential distributional effects of MPA network designation should be carefully considered at every stage of the process.

3.11 While planning MPAs, careful plans should also be made for the possible redistribution of displaced activities, such as fishing.

3.6.3.3 Stakeholder engagement

Key messages

- It can be helpful to understand human-nature interactions as an intertwined relationship rather than in terms of use and impact.
- Consideration of local cultural contexts and meaningful dialogue can be critical to the uptake and effectiveness of MPAs, particularly coastal MPAs.

Recommendations

3.12 Early and sustained stakeholder participation should be integral to the processes of designating and managing MPAs and is an important factor to foster societal stewardship at a local level.

3.13 The details of stakeholder participation processes are context-dependent, but the following general guidelines (also presented in Table 3.5 in Section 3.2.4 of this report) should be taken into account to ensure that they are transparent, meaningful and facilitating:

1. Identify and engage all relevant stakeholders early in the planning process.
2. Clearly define and communicate policy and scientific goals and objectives that are consistent with other legislative goals. This should also include clear communication both of what MPAs are and what they are not, generating a common understanding, as well as providing the political context.
3. Roles and responsibilities of all those involved in the planning need to be clearly defined and communicated.
4. Ensure that all involved understand the aim of the stakeholder participation process and provide clear rules, including aims and objectives, constraints, and codes of conduct (and consequences of not complying)
5. Providing science guidelines to ensure access to the best readily available scientific information, local knowledge, and spatial data by stakeholders, scientists, and decision-makers should be treated as a joint fact-finding approach.
6. Conflict among interests of stakeholders should be anticipated and acknowledged and discussions facilitated without bias (e.g. by using trained third-party facilitators), using an approach such as the Community Voice method.
7. Anticipate media attention and allocate media and communication to a dedicated spokesperson.
8. Accept that the process will take time and afford that time to the process. The process needs to engage appropriate groups early and ensure a just transition in the short and long term. Developing a model of community co-management has been proven effective to facilitate this, provided that it is properly resourced and appropriate responsibility and accountability for governance remains with the State.
9. Make use of the existing context in which an MPA is planned. This includes working with existing organised structures (e.g., CLAMS (see Box 9), Regional Inshore Fisheries Forum (RIFF), Irish Islands Marine Resources Organisation and use the National Marine Planning Framework and the mechanisms that it establishes.
10. Accept that the design of MPAs can change during the stakeholder process and keep in mind that the aim is to achieve policy goals and meet scientific and feasibility guidelines, while minimising potential socioeconomic impacts and find broad social support.
11. MPAs need to be carefully managed, monitored and evaluated. This involves detailed planning and financing.
12. Acknowledge that MPA development is not merely a “factual” process, but involves emotional, moral and value-based responses from all those involved.
13. Address potential power imbalances in the participatory process by facilitating an engagement/management model that acknowledges historical relationships and recognises inequities.

3.6.3.4 Governance and management

Key messages

- Key principles for good governance include legitimacy, transparency, accountability, inclusivity, fairness, equity, integration, and effectiveness.
- Marine responsibilities are divided across many government departments and state agencies in Ireland. As such, close coordination across a range of departments, divisions and agencies is essential for implementation of the MPA process.
- Effective governance of MPAs will also require coordination with EU and international organisations.

Recommendations

3.14 The expanded national MPA network should be considered an integral component of implementation of the Marine Strategy Framework Directive (MSFD) and the National Marine Planning Framework (NMPF). This will necessitate clear guidance on how MPAs interact with marine activities and their planning and management.

3.15 Under the NMPF, Strategic Marine Activity Zones (SMAZ's) could be designated before the next tranche of MPAs. Sensitivity mapping could be conducted to identify areas of probable future MPAs so that they can be protected from further degradation until adequate MPA legislation is enacted.

3.16 A national MPA coordinating body (e.g. a dedicated Section or team within a government Department) should be established with the authority and resources to coordinate planning and implementation of an expanded MPA network and to foster good governance and ensure close collaboration among relevant departments and agencies.

3.17 A Systematic Conservation Planning approach should be adopted, that can build on existing efforts, to ensure that evolving national conservation policy goals can be met in the coming decades.

3.18 A national MPA designation framework should be established that provides certainty in terms of long-term political commitment, clarity around legal and governance authority and sets out clear procedural guidance.

3.19 The MPA framework should include clarification of the interplay between new national MPAs and other spatial management within MSP and the NMPF.

3.20 The MPA framework should also include a provision for engagement across national boundaries and with regional bodies such as OSPAR to facilitate regional coherence of MPA networks.

3.21 Overarching policy goals need to be set to guide the expansion of Ireland's MPA network.

3.22 Stakeholders should be identified during the initial phase of planning the expansion of the network and engaged throughout the process. There should be a process for including additional stakeholders where omissions become apparent.

3.23 A process for identifying additional species, habitats and other features of conservation importance but not currently protected should be established and applied at an early stage. This process should be based on the gaps identified in this report and use set criteria for including species and habitats in an eventual consensus list.

3.24 Extensive ecological, environmental, socio-economic and cultural data should be collected, collated and synthesised to assess protection by the current network and

identify gaps, weaknesses and key pressures and so inform decisions about objectives and approaches in expanding the network.

3.25 A centralised system should be established to maximise the coherence and efficiency of data collection and use.

3.26 Objectives for expanding the MPA network should be agreed as much as is practicable with stakeholders, combining the information from audits of the existing network with scenario testing.

3.27 A process for proposing individual site-based MPAs should be developed that is accessible to all stakeholders.

3.28 To avoid potential damage to features of interest during preparation for designation, proposed MPAs should be subject to the same degree of protection as full sites.

3.29 The designation process should be iterative, thus facilitating the periodic consideration of revised or new policy targets, changes in environmental, socio-economic, cultural or policy context, evolution of international best practice and lessons learned from management and monitoring of Ireland's MPAs.

3.30 Management measures for future MPAs should depend primarily on the site objectives for each MPA and the effects of different activities and pressures on the protected features and ecosystem processes.

3.31 Stakeholders should be involved in the process for determining management measures.

3.32 Management measures to meet MPA site objectives should be discussed and established as part of the preparation for designation, with inclusion of stakeholders in decisions..

3.33 Careful consideration of available evidence of potential impact of particular activities will be critical to deciding which activities to restrict or permit.

3.34 In the absence of conclusive evidence, the precautionary principle should be applied.

3.35 Given the potential for some combinations of pressures to exacerbate or ameliorate each others' effects, a holistic view should be taken of the accumulation and combination of permissible activities in a given site.

3.36 Socio-economic and cultural factors should also be carefully considered in finalising management measures.

3.37 Classification of MPAs into categories of protection should not be an important priority as part of the process of designation and management.

3.38 Protection of MPAs may be categorised as necessary for international reporting, subsequent to agreement being reached on the management measures necessary to meet MPA site objectives.

3.39 To simplify communication around the broad objectives for a site, a simple system of categorisation based on objectives should be applied. For example, MPAs could be identified as Nature Conservation MPAs, Biocultural MPAs or Research and Education MPAs.

3.40 Within the broad category of Nature Conservation, an MPA should be further described as being, for example, a Threatened species or habitat MPA, Important species or habitat MPA, Biodiversity MPA, Ecosystem service MPA, Dark skies MPA, Quiet seas MPA, Climate refuge MPA, Mobile MPA or Essential Fish Habitat MPA. A given MPA with multiple objectives could be described as belonging to multiple categories.

3.41 Where appropriate, co-management approaches should be adopted, particularly for near shore MPAs.

3.42 Effective communication must be established to underpin effective co-management.

3.43 Diverse community perspectives and needs should be identified at the outset, with provision for open discussion of controversial issues.

3.44 Clear legislation and regulations are required for MPAs, together with a recognised authority and resources to enforce them.

3.45 Technological solutions such as Vessel Monitoring Systems (VMS) and Remote Electronic Monitoring devices should be considered as potentially valuable tools for ensuring compliance in some contexts and sectors.

3.46 Community engagement could foster a sense of stewardship and support enforcement, particularly in near shore MPAs.

3.47 A well-designed monitoring programme should be established to assess the effectiveness of new MPAs and the coherence of the overall MPA network.

3.48 Where possible, monitoring of new MPAs should exploit synergies with monitoring programmes in operation for compliance with EU Directives such as Birds Directive, Habitats Directive, Water Framework Directive and Marine Strategy Framework Directive.

3.49 Periodic reviews of the effects of MPA designation and management should be undertaken with a remit to affect change in designations and/or management measures and monitoring as part of an iterative process of adaptive management.

3.50 Reviews should be informed by monitoring, involve stakeholder engagement and take account of changes such as new knowledge, developments in industry and changes in the environment, legislation or policy.

3.51 Reviews should include consideration of links and synergies with MPAs adjacent to Irish waters, including those in the OPSPAR network.

3.6.3.5 Legislation

Recommendations

3.52 New primary legislation, in the form of a dedicated Marine Conservation or Marine Protected Areas Act, should be enacted.

3.53 New legislation should provide for the creation of new national MPAs and extension of the MPA network, define key terms and concepts, set out objectives and principles, identify who has authority to establish MPAs and provide for the selection, designation and management processes and public participation in these.

3.54 The legislation should define what an MPA is and utilise terminology and definitions accepted in other international and EU legislation, where appropriate.

3.55 Legislation should not be overly-prescriptive, particularly in relation to the operation of the selection, designation and management processes so that these have the flexibility to adapt to changing conditions and following periodic reviews.

3.56 New legislation should be accompanied by technical and scientific guidance that details how the MPA planning and management process will operate.

3.57 The new legislation should apply to Ireland's maritime area, namely internal waters (sea and tidal areas), the territorial sea, the Exclusive Economic Zone (EEZ) and the agreed Continental Shelf areas.

3.58 A new MPA function should be established within the Department of Housing, Local Government and Heritage.

3.59 MPA legislation should provide for the establishment of an MPA Scientific and Technical Committee by the Minister to provide advice on an ongoing or issue-specific basis.

3.60 New legislation should consider the use and permissibility of satellite and remotely sensed data for monitoring and enforcement purposes.

3.61 Special attention needs to be given to promoting a culture of stewardship with and beyond government and State actors.

3.6.3.6 Other considerations

Recommendations

3.62 Financial planning should accompany MPA network development to ensure that appropriate budget is allocated from public funds.

3.63 Consideration may be given to alternative sources of finance, but involving the private sector in marine conservation risks transferring control of performance on environmental policies from public hands to private investment financiers focussed on profit-maximisation.

3.64 A review should be undertaken of the current state of knowledge and availability of data relevant to Ireland's MPA network. The review should explicitly identify priorities for research to better inform future site selection and management.

3.65 Topics requiring additional research may include the biology and ecology of target species and ecosystems, the pressures and impacts associated with sectoral activities and climate change, the socio-economic and cultural contexts for and consequences of MPAs, the properties of the network and its interaction with others and the methodology for cost-effective monitoring and management.

3.6.3.7 An expanded network of MPAs in Ireland

Recommendations

3.66 Ireland's expanded network of MPAs should include existing and new Natura 2000 and Ramsar sites, newly designated MPAs with conservation as their primary objective and OECMs that meet criteria for appropriate designation and inclusion

The inventory of coverage by Natura 2000 sites should encompass the marine areas of sites with both terrestrial and marine components but not currently included in marine reporting criteria to the European Commission, e.g. sea cliffs with associated marine areas.

3.6.4 Concluding remarks

In this report, we have outlined the imperatives for expanding Ireland's network of MPAs and the clear commitment made by the government to do so. In preparing the report, we consulted a diverse range of stakeholders who expressed fundamental support for an expanded MPA network contributing to the restoration and maintenance of clean, healthy, productive seas supporting vibrant coastal communities and maritime sectors.

Stakeholders also repeatedly emphasised that the process of expanding and managing the network needs to be done properly, so that the expanded network can make a real difference and be seen as something for everyone to feel proud of and to work together to support and protect. Caution was expressed against declaring MPAs in name only or trying to rush the process. It was recognised that there would be some costs to different sectors and significant challenges in balancing diverse interests, but there was a general sense that it should be possible to find compromises and acceptable outcomes if there is proper stakeholder participation within a well-resourced framework of good governance and management. Effective communication and meaningful community engagement will be essential. Decision making processes should be transparent and decisions should be evidence-based. People need to understand what MPAs are trying to achieve and why management measures are being put in place that may restrict their activities. It is also important to ensure that benefits and costs are distributed as fairly as possible and that the opportunities offered by an expanded network are recognised and grasped.

This report brings together extensive knowledge and experience from around Ireland and around the world. It is intended to provide a reasoned, balanced, well-informed basis for the expansion of Ireland's network of MPAs. If well planned, resourced and managed, an expanded MPA network would make an invaluable contribution to the stewardship of Ireland's wealth of marine life, culture and heritage, helping to underpin the long-term conservation and sustainable management of thriving marine ecosystems to the benefit of this and future generations.

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Appendices

Appendix A - Glossary and Abbreviations

A.1 Glossary

Activity – A human action which may have an effect on the marine environment e.g. fishing, energy production.

Adequacy - A feature of MPA networks in which the sites within a network should have size and protection sufficient to ensure the ecological viability and integrity of the feature(s) for which they were selected.

Appropriate assessment – Under Article 6(3) of the Habitats Directive "any plan or project not directly connected with or necessary to the management of the site [SAC or SPA] but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives".

Areas Beyond National Jurisdiction – Under UNCLOS, ABNJ areas beyond the limits of national jurisdiction include: the water column beyond the Exclusive Economic Zone (EEZ) (or beyond the Territorial Sea where no EEZ has been declared) called the High Seas (Article 86); and the seabed which lies beyond the limits of the continental shelf, established in conformity with Article 76 of the Convention, designated as "the Area" (Article 1).

Baseline – Under UNCLOS the normal baseline is the is the low water mark and it is from here where the breadth of the Territorial Sea and certain other maritime jurisdictional zones are measured. Where a coast is deeply indented, has fringing islands or is highly unstable, a straight baseline system can be used.

Benthic – A description for animals, plants and habitats associated with the seabed. All plants and animals that live in, on or near the seabed are referred to as benthos.[77]

Biological diversity (Biodiversity) - "The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems." (CBD Article 2)

Biocultural diversity - The idea that human knowledge, language and practices as intertwined with nature. It understands biological and cultural diversity as dependent on each other, and it views biological diversity as managed, conserved, and created by different cultural groups.[222] Biocultural diversity is implicit in the concept of biocultural refugia.

Biocultural approaches – A framework of shared understandings, values and methodologies that investigates the interconnections between nature and culture.[222]

Biocultural refugia – Places that contain place-specific social memories related to food security and stewardship of biodiversity, involving a diversity of human knowledge and experiences, value and belief systems.[269]

Biogeographic region – An area of animal or plant distribution having similar or shared characteristics throughout. [270]

Bycatch – The catch of non-target species and undersized fish of the target species.[77]

Closed area – An area within which fishing by one or more methods of fishing, or fishing for one or more species of fish, is prohibited. Such areas may be permanently closed or subject to closures over time.[77]

Connectivity – In the design of a network, connectivity allows for linkages whereby protected sites benefit from larval and/or species exchanges, and functional linkages from other network sites. In a connected network individual sites benefit one another.

Conservation objective – General usage: A statement of the nature conservation aspirations for the feature(s) of interest within a site and an assessment of those human pressures likely to affect the feature(s).[240]

Conservation objective – Specific to the EU Habitats Directive: Aims to define favourable conservation status/condition using suitable attributes with targets in line with Favourable Conservation Status parameters. For habitats, FCS parameters are: natural range and areas it covers within that range are stable or increasing; specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; conservation status of its typical species is favourable. For species FCS parameters are: the population dynamics data indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Consultation – One-way communication flow, whereby information primarily flows from stakeholders to authorities or scientists. The main aim is to extract information from stakeholders.

Continental shelf – Under the UN Convention on the Law of the Sea (UNCLOS), the continental shelf is that part of the seabed over which a coastal state exercises sovereign rights with regard to the exploitation of natural resources including petroleum deposits, as well as other minerals and biological resources of the seabed. The legal continental shelf (consisting of the shelf, the slope and the rise) extends out to a distant of 200 nautical miles from the coastline, or further if the shelf naturally extends beyond that limit (as it does in Ireland's case). [77].

Cultural and spiritual values - Include recreational, religious, aesthetic, historic and social values related to tangible and intangible benefits that nature and natural features have for people of different cultures and societies, with a particular focus on those that contribute to conservation outcomes (e.g. traditional management practices on which key species, biodiversity or whole ecosystems have become reliant or the societal support for conservation of landscapes for the maintenance of their quality in artistic expression or beauty) and intangible heritage, including cultural and spiritual practices. [271]

Cumulative impacts – changes to the environment that are caused by an action in combination with other past-, present and future human actions.[77]

Demersal – Demersal fish live on or near the seabed and feed on bottom-living organisms and other fish. Although fisheries may be directed towards particular species or species groups, demersal fish are often caught together and comprise a mixed demersal fishery.

Dispersal – The movement of individual organisms away from a starting location, such as the site where they were spawned. Dispersal may be active (movement created by the organism) or passive (e.g. carried by the wind, current or gravity).

Ecosystem – A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (CBD Article 2)

Ecosystem approach – The comprehensive integrated management of human activities based on the best available scientific knowledge about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of marine ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity (OSPAR definition)

Ecosystem functioning – How plants, animals, micro-organisms and the non-living environment that make up the ecosystem work together.

Ecosystem services - Processes by which the environment produces resources used by humans, such as clean air, water, food, and materials. Ecosystem services flow from **natural capital** (see below).[77]

> **Cultural ecosystem services** – These ecosystem services are the intangible, psychological and spiritual benefits that humans obtain from contact with nature.

Provisioning services – These ecosystem services are tangible goods and there is a direct connection between the ecosystem and the provision of these ecosystem services.

Supporting ecosystem services – These services uphold and enable the maintenance and delivery of the other ecosystem service categories.

Regulation and maintenance services – These ecosystem services regulate the world around us and often are consumed indirectly.

Exclusive Economic Zone (EEZ) - Under the UN Convention on the Law of the Sea (UNCLOS), the Exclusive Economic Zone comprises an area which extends from the 12 nm territorial sea limit to 200 nm.

Feature - A species, habitat, geological, geomorphological, or cultural entity for which an MPA is identified and managed.

Fecundity – The number of offspring produced by a female of the species in a determined time period.

Foreshore – refers to the area between the High Water Mark and 12 nautical miles. Originally defined in the Foreshore Act, 1933 (as amended).

Good Environmental Status (GES) – Defined through 11 Descriptors in the Marine Strategy Framework Directive (MSFD), the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive.[77]

Habitat - The place or type of site where an organism or population naturally occurs (CBD Article 2).

High seas - All parts of the sea that are not included in the Exclusive Economic Zone (EEZ), in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State (Article 86, UNCLOS 1982).

Hypoxia - Low or depleted oxygen in a waterbody. Hypoxia can be associated with algal blooms, as the increased growth, death and decomposition of certain algae can lead to oxygen depletion.

Information provision - One-way communication where information flows from authorities and scientists to stakeholders in MPAs. The main aim is to enhance knowledge or awareness among stakeholders.

Invasive non-indigenous species - Invasive non-indigenous animals or plants are those that have the ability to spread causing damage to the environment, the economy, our health and the way we live.

Marine Conservation Zones (MCZs) - MPAs designated in the UK under the Marine and Coastal Access Act (2009) to protect nationally important, rare or threatened species and habitats.

Marine reserves/no-take zone/grading of MPA types - Ocean or intertidal areas that are fully protected from activities that remove animals and seaweeds or alter habitats—such as fishing, aquaculture, dredging and mining—except as needed for scientific monitoring. PISCO Project From <http://www.piscoweb.org/sites/default/files/SMR_EU_LowRes.pdf>

Marine Spatial Planning - The identification of marine natural resources and the current and potential use of those resources. The National Marine Planning Framework defines the process of MSP as "A process that brings together multiple users of the ocean to make informed and coordinated decisions about how to use marine resources sustainably. It is a process by which the relevant public authorities analyse and organise human activities in marine areas to achieve ecological, economic and social objectives."[77]

Marxan – MARXAN (MPA Design using Spatially Explicit Annealing) was developed by Ball and Possingham at the University of Queensland to aid in the design of the Great Barrier Reef Marine Park. MARXAN software is a decision-support tool for reserve system design. MARXAN finds reasonably

efficient solutions to the problem of selecting a system of spatially cohesive sites that meet a suite of biodiversity targets.[270]

Mobile MPAs – MPAs with mobile boundaries that can shift based on real time data with defined constraints over time and space according to the needs of key species, typically migratory species whose conservation needs may shift spatially.

Monitoring – The regular and systematic collection of environmental and biological data by agreed methods and to agreed standards. Monitoring provides information on current status, trends and compliance with respect to declared standards and objectives.[240]

Natura 2000 sites – EU wide network of nature conservation sites, comprising Special Areas of Conservation (SACs) designated under the EC Habitats Directive (92/43/EEC), and Special Protection Areas (SPAs) designated under the EC Birds Directive (79/409/EEC).

Natural capital – The stocks of air, water, soil and mineral resources as well as the living components of ecosystems. Natural capital underpins the provision of **ecosystem services** (see above).

Nautical miles – The unit of length used in marine navigation. One nautical mile is slightly longer than a statute mile, equal to 1.15 statute miles and 1.85 kilometres. [77]

Near shore – The term is used loosely in this report to refer to marine environments that are within a few nm of the coast. They are particularly complex dynamic areas in hydrological and ecological terms and also accommodate a greater diversity of human activities with closer links to many coastal communities and likely to require more complex management than **offshore** areas.

Non-indigenous species – A non-indigenous species is a species, subspecies or lower taxon introduced (i.e. by human action) outside its natural past or present distribution.

Offshore – areas of sea and ocean that are further than a few nm from the coast. By contrast with **near shore** areas, there are comparatively fewer types of human activity that take place in them and they are more remote, such that different management arrangements may be required.

OSPAR - Refers to the Oslo-Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (http://www.ospar.org/).

Other Effective area-based Conservation Measures (OECM) - A geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity with associated ecosystem functions and services and where applicable, cultural, spiritual, socio–economic, and other locally relevant values. (CBD Decision 14/8)

Precautionary Principle – Precaution can be considered "caution practiced in the context of uncertainty". The Precautionary Principle is widely used in environmental policy and has various formulations. The CBD Rio Declaration (1992) proposes that “Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.” The most widely cited formulation is the Wingspread Statement on the Precautionary Principle (1998): “When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof.”

Protected Area – "A geographically defined area which is designated or regulated and managed to achieve specific conservation objectives." (CBD Article 2)

Pressures – The mechanism through which an activity has an effect on any part of the ecosystem. The nature of the pressure is determined by activity type, intensity and distribution.

Recruitment –The addition of a new cohort to a population, or the new cohort that was added. The magnitude of recruitment depends on the time and life history stage at which it is recorded [270]

Replicability – Replication of ecological features means that more than one site shall contain examples of a given feature in the given biogeographic area. The term "features" means "species, habitats and ecological processes" that naturally occur in the given biogeographic area.

Representative – Representative networks of MPAs contain examples of all habitats and ecological communities of a given area, thus providing a cost-effective means of safeguarding large-scale processes while delivering local benefits.[272]

Resilience – (Resilient network) "The ability of an ecosystem to maintain key functions and processes in the face of stresses or pressures by either resisting or adapting to change. Resilience can be applied to both ecological systems as well as social systems.'[270]

Restoration – Ecosystem restoration is the "process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed".

Special Areas of Conservation (SACs) – Sites protected under the EC Habitats Directive (92/43/EEC) for species and habitats of European importance, as listed on Annex I and II of the Directive

Special Protection Areas (SPAs) – Sites protected under the EC Birds Directive (79/409/EEC), for rare and vulnerable birds (listed on Annex I of the Directive) and for regularly occurring migratory species.

Spillover - The emigration of adult and juvenile organisms across the MPA borders and into surrounding habitats.[270]

Stakeholders - individuals, groups or organisations who are (or will be), in one way or another, interested, involved or affected (positively or negatively) by a particular project or action toward resources' - Pomeroy and Douvere, 'The Engagement of Stakeholders in the Marine Spatial Planning Process'.

Substrate/substratum – The surface or medium on which an organism grows or is attached (e.g. seabed sediment).[240]

Sustainable development –"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs".[77]

Sustainable use - "The use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations." (CBD Article 2)

Territorial sea - Under the UN Convention on the Law of the Sea (UNCLOS), a state's territorial waters extends from the baseline to a maximum of 12 nm.

The Area – Under UNCLOS, the Area refers to the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction.

UNCLOS – is the United Nations Convention on the Law of the Sea. It is an international treaty that provides a regulatory framework for the use of the world's seas and oceans, inter alia, to ensure the conservation and equitable usage of resources and the marine environment and to ensure the protection and preservation of the living resources of the sea. It was adopted in 1982 and entered into force in 1994.

Values – General desirable goals that serve as guiding principles in people's lives. Values vary in their relative importance and behavioural choices are based on the value that is considered most important.[207]

A.2 List of Acronyms

AA	Appropriate Assessment [Habitats Directive]
ABMT	Area-Based Management Tools
ABNJ	Areas Beyond National Jurisdiction
B&NH	European Communities (Birds and Naturals Habitats) Regulations 2011, as amended [IE]
BBNJ	Biodiversity Beyond National Jurisdiction
BD	Birds Directive
BIM	Bord Iascaigh Mhara
BSA	Biologically Sensitive Area [CFP]
CBA	Cost Benefit Analyses
CBD	UN Convention on Biological Diversity
CCAMLR	Convention for the Conservation of Antarctic Marine Living Resources
CCRF	Code of Conduct for Responsible Fisheries [UN FAO]
CEA	Cost Effectiveness Analysis
CFP	Common Fisheries Policy [EU]
CICES	Common International Classification of Ecosystem Services [UN]
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLAMS	Co-ordinated Local Aquaculture Management Systems
CMS	Bonn Convention on the Conservation of Migratory Species
COP	Conference of the Parties
DAFM	Department of Agriculture, Food and the Marine
DCCAE	Department of Communications, Climate Action and Environment
DCHG	Department of Culture, Heritage and the Gaeltacht
DHPLG	Department of Housing, Planning and Local Government
EBFM	Ecosystem-Based Fisheries Management
EBM	Ecosystem-Based management
EBSA	Ecologically or Biologically Significant Areas
EC	European Commission
ECJ	European Court of Justice
EEA	European Environment Agency
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMFF	European Maritime and Fisheries Fund
ES	Ecosystem Services
EU	European Union
EUNIS	European Nature Information System
FAO	Food and Agriculture Organization [UN]
FMC	Fisheries Monitoring Centre [INS]
FOCI	Features of Conservation Importance
GDP	Gross Domestic Product
GES	Good Environmental Status (MSFD)
GVA	Gross Value Added

HD	Habitats Directive
HMPA	Highly Protected Marine Areas
HWM	High Water Mark
ICES	International Council for the Exploration of the Seas
ICZM	Integrated Coastal Zone Management
IMO	International Maritime Organization [UN]
IMP	Integrated Maritime Policy [EU]
INS	Irish Naval Service
IPBES	Intergovernmental Panel for Biodiversity and Ecosystem Services
IROPI	Imperative Reasons of Overriding Public Interest (HD)
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee [UK]
LWM	Low Water Mark
MAC	Maritime Area Consent [MPDM]
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	Multi-Criteria Analysis
MCZ	Marine Conservation Zone [UK]
MHW	Mean High Water
MI	Marine Institute
MLW	Mean Low Water
MPA	Marine Protected Area
MPDM	Marine Planning and Development Management Bill
MS	Member States [EU]
MSC	Marine Stewardship Council [UK]
MSFD	Marine Strategy Framework Directive [EU]
MSP	Marine/Maritime Spatial Planning
MSY	Maximum Sustainable Yield [EU CFP]
NEAFC	North East Atlantic Fisheries Commission
NGO	Non-Governmental Organisation
NHA	Natural Heritage Area [IE]
NMPF	National Marine Planning Framework
NPWS	National Parks and Wildlife Service
NTZ	No Take Zone
OECM	Other Effective Area Based Conservation Measures [CBD]
OMPP	Overarching Marine Planning Policies
OSPAR	Oslo Paris Convention for the Protection of the Marine Environment of the North East Atlantic
PMF	Priority Marine Features [UK]
POM	Programme of Measures
PVB	Present Value Benefits
QI	Qualifying Interest
RFMO	Regional Fisheries Management Organisations
SAC	Special Area of Conservation [EU Habitats Directive]
SBM	Single Bay Management
SCP	Systematic Conservation Planning
SDG	Sustainable Development Goal

SEA	Strategic Environmental Assessment
SFPA	Sea Fisheries Protection Authority
SMPP	Sectoral Marine Planning Policies
SPA	Special Protection Area [EU Birds Directive]
SSCO	Site-Specific Conservation Objectives
STECF	Scientific, Technical and Economic Committee for Fisheries [EU]
TAC	Total Allowable Catch
UK	United Kingdom
UN	United Nations
UNCLOS	UN Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNFCCC	UN Framework Convention on Climate Change
VME	Vulnerable Marine Ecosystems
VMS	Vessel Monitoring System
WCPA	World Commission on Protected Areas [IUCN]
WFD	Water Framework Directive [EU]
WTP	Willingness To Pay

Appendix B – Potential pressures in Ireland's marine environment resulting from human activity

Table 4.1 – Matrix of human activities and potential correlated pressures on the marine environment, adapted from JNCC Pressures-Activities Database (PAD) 2018 and Crowe and Frid (2015, p.44).[242] *Pressures categorised as hydrological (H), chemical (C), physical (P), or biological (B). Activities grouped (in order) as climate, biological resource extraction, research, non-living extraction, non-extractive use, cultural, and land based.*

Pressure type	Pressure \ Activity	Fishing: pelagic, line, purse seine	Demersal fishing, trawling, dredging	Set (fixed) net, push nets, traps	Harvesting seaweed and other food	Extraction of genetic resources	Aquaculture	Marine research	Extraction/disposal aggregates/minerals	Gas storage operations	Oil and gas activity and exploration	Marine renewable energy	Shipping and vessel movements	Marine construction: cables/pipelines	Defence and military activities	Cultural and heritage sites	Marine recreation and leisure	Coastal Infrastructure	Coastal management activities	Industrial discharge /agricultural run-off	Sewage disposal
H	Ocean acidification																				
H	Sea level rise																				
H	Increased UV																				
H	Emergence regime changes (tidal level)								■			■					■	■	■		
H	Salinity change									■		■						■	■	■	■
H	Temperature changes								■			■		■			■	■		■	■
H	Water flow (tidal current) changes				■		■		■		■	■	■	■		■	■	■	■	■	■
H	Wave exposure changes				■		■	■	■			■	■		■	■		■	■		■
H	Deoxygenation	■	■	■	■		■	■	■			■	■	■	■			■	■	■	■
C	Nutrient enrichment		■		■		■		■			■	■	■	■			■	■	■	■
C	Organic enrichment	■	■	■	■		■		■				■				■	■	■	■	■
C	Radionuclide contamination							■	■	■	■							■		■	■
C	Synthetic compound contamination	■	■	■			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
C	Non-synthetic compound contamination	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
P	Habitat structure changes - removal of substratum (extraction)				■			■	■	■	■	■		■				■	■		■
P	Disturbance of the substrate	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
P	Physical change to seabed or sediment type		■				■	■	■	■	■	■	■	■		■	■	■	■	■	■
P	Physical loss (to land or freshwater habitat)						■					■	■	■				■	■	■	■
P	Barrier to species movement	■		■			■	■	■	■	■	■	■	■				■	■		■

Pressure type	Pressure \ Activity	Fishing: pelagic, line, purse seine	Demersal fishing, trawling, dredging	Set (fixed) net, push nets, traps	Harvesting seaweed and other food	Extraction of genetic resources	Aquaculture	Marine research	Extraction/disposal aggregates/minerals	Gas storage operations	Oil and gas activity and exploration	Marine renewable energy	Shipping and vessel movements	Marine construction: cables/pipelines	Defence and military activities	Cultural and heritage sites	Marine recreation and leisure	Coastal Infrastructure	Coastal management activities	Industrial discharge /agricultural run-off	Sewage disposal
P	Changes in suspended solids (water clarity)		■				■	■	■	■	■	■	■	■	■	■		■	■	■	■
P	Death or injury by collision	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
P	Electromagnetic changes										■			■							
P	Light pollution	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
P	Introduction of other substances (solid, liquid or gas)							■	■	■	■	■	■	■	■			■	■		■
P	Litter	■	■	■	■		■	■	■	■	■	■	■	■	■		■	■		■	■
P	Smothering and siltation rate changes		■				■	■	■	■	■	■	■	■	■	■		■	■	■	■
P	Noise pollution	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
P	Vibration							■	■	■	■	■		■				■			
P	Visual disturbance	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
B	Genetic modification & translocation of indigenous species						■		■									■			■
B	Introduction of microbial pathogens		■				■											■	■	■	■
B	Introduction or spread of invasive non-indigenous species (INIS)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
B	Removal of non-target species	■	■	■	■		■		■								■	■	■		
B	Removal of target species	■	■	■	■	■	■										■		■		

Appendix C - OSPAR List of Threatened and/or Declining Species and Habitats

(Reference Number: 2008-6)[i] [ii]

C.1 Introduction

1. The OSPAR Biological Diversity and Ecosystems Strategy sets out that the OSPAR Commission will assess which species and habitats need to be protected. This work is to guide the setting of priorities by the OSPAR Commission for its activities in implementing Annex V to the Convention ("On the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area").

2. This OSPAR List of Threatened and/or Declining Species and Habitats has been developed to fulfil this commitment. It is based upon nominations by Contracting Parties and observers to the Commission of species and habitats that they consider to be priorities for protection. The evidence in support of those nominations has been collectively examined by the OSPAR Commission and its subordinate bodies on the basis of the relevant Texel/Faial criteria for the identification of species in need of protection (*Reference number 2003-13*). The data used has been reviewed by the International Council for the Exploration of the Sea (ICES), in order to give assurance that its quality is suitable for the purpose for which it has been used[iii]. The information used has been compiled into a justification report, which is being published separately (Case reports for the OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR publication 2008/358).

3. The purpose of the list is to guide the OSPAR Commission in setting priorities for its further work on the conservation and protection of marine biodiversity. The inclusion of a species or of a type of habitat on this list has no other significance.

4. Fish species affected by fishing in this list are marked with an asterisk (*). These species are subject to management by an international or national fisheries authority or body. The OSPAR Commission has no competence to adopt programmes or measures on questions relating to the management of fisheries. Where the OSPAR Commission considers that action is desirable in relation to such a question, it is to draw that question to the attention of the authority or international body competent for that question. The inclusion of species affected by fishing in this list must be read in this context.

5. In order to avoid duplication of work, other international agreements (in particular, EC Directives (including the Council Directive 92/43/EEC on the conservation of natural habitats and wild flora and fauna and the Council Directive 79/409/EEC on the conservation of birds) and measures under the Berne Convention, the Bonn Convention (including its regional agreements) and the Ramsar Convention, amongst other relevant instruments) should also be taken into account by Contracting Parties to the extent that they are bound by them or committed to them.

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[i] Replaces agreement 2004-6. See OSPAR 08/24/1, §7.12

[ii] Corrections made by OSPAR 2014 to the naming of *Gadus morhua* stocks to align with the standard naming of the ICES cod divisions.

[iii] The assessments of that data by the OSPAR Commission and by ICES differ in respect of *Polysticta stelleri, Puffinus assimilis baroli, Thunnus thynnus* and Oceanic ridges with hydrothermal vents/fields. The justification for the OSPAR assessment of these species and habitats is set out in the justification report.

6. The OSPAR Biodiversity and Ecosystems Strategy makes clear that it may be necessary to consider separate populations of species for the purposes of the strategy on the same basis as whole species. This list therefore specifies certain populations of species where separate treatment is justified, because the different populations are subject to differing pressures. Where this is done, there is no implication that other populations of the same species may be threatened and/or declining.

7. The OSPAR Commission wishes to consider any information that could improve the basis for the judgements that have been made in drawing up this list.

8. This OSPAR List of Threatened and/or Declining Species and Habitats will be subject to further development. Species and habitats will be added to or removed from the list, in the light of changes to their conservation status and to the threats they face and in the light of the latest scientific assessments, according to the Texel/Faial criteria.

9. The footnotes form an integral part of the list.

Part I : Species

SCIENTIFIC NAME	Common name		OSPAR Regions[i] where the species occurs	OSPAR Regions where the species is under threat and/or in decline
	English	French		
INVERTEBRATES				
Arctica islandica	Ocean quahog	Cyprine d'Islande (Praire d'Islande) (Clam d'Islande)	I, II, III, IV	II
Megabalanus azoricus	Azorean barnacle	Balane des Azores	V	All where it occurs
Nucella lapillus	Dog whelk	Pourpre petite pierre	All	II, III, IV
Ostrea edulis	Flat oyster	Huître plate	I, II, III, IV	II
Patella ulyssiponensis aspera	Azorean limpet	Patelle des Azores	V	All where it occurs
BIRDS				
Larus fuscus fuscus	Lesser black-backed gull	Goéland brun	I	All where it occurs
Pagophila eburnea	Ivory gull	Mouette blanche	I	All where it occurs
Polysticta stelleri	Steller's eider	Eider de Steller	I	All where it occurs
Puffinus assimilis baroli (auct.incert.)	Little shearwater	Puffin de Macaronésie	V	All where it occurs

[i] The OSPAR Regions are:
I - **the Arctic**: the OSPAR maritime area north of latitude 62°N, but also including Iceland and the Færoes;
II - **the Greater North Sea**: the North Sea, the English Channel, the Skagerrak and the Kattegat to the limits of the OSPAR maritime area, bounded on the north by latitude 62°N, on the west by longitude 5°W and the east coast of Great Britain, and on the south by latitude 48°N;
III - **the Celtic Seas**: the area bounded by, on the east, longitude 5°W and the west coast of Great Britain and on the west by the 200 metre isobath (depth contour) to the west of 6°W along the west coasts of Scotland and Ireland;
IV - **the Bay of Biscay/Golfe de Gascogne and Iberian coasts**: the area south of latitude 48°N, east of 11°W and north of latitude 36°N (the southern boundary of the OSPAR maritime area);
V - **the Wider Atlantic**: the remainder of the OSPAR maritime area.

Puffinus mauretanicus	Balearic shearwater	Puffin des Baléares	II, III, IV, V	All where it occurs
Rissa tridactyla	Black-legged kittiwake	Mouette tridactyle	I, II, III, IV, V	I, II
Sterna dougallii	Roseate tern	Sterne de dougall	II, III, IV, V	All where it occurs
Uria aalge – Iberian population (synonyms: *Uria aalge albionis, Uria aalge ibericus*)	Iberian guillemot	Guillemot de Troïl	IV	All where it occurs
Uria lomvia	Thick-billed murre	Guillemot de Brünich	I	All where it occurs
FISH				
**Acipenser sturio*	Sturgeon	Esturgeon d'Europe	II, IV	All where it occurs
**Alosa alosa*	Allis shad	Alose vraie ou Grande Alose	II, III, IV	All where it occurs
**Anguilla anguilla*	European eel	Anguille européenne	I, II, III, IV	All where it occurs
**Centroscymnus coelolepis*	Portuguese dogfish	Pailona commun	All	All where it occurs
**Centrophorus granulosus*	Gulper shark	Squale-chagrin commun	IV, V	All where it occurs
**Centrophorus squamosus*	Leafscale gulper shark	Petit squale	All	All where it occurs
**Cetorhinus maximus*	Basking shark	Requin pèlerin	All	All where it occurs
Coregonus lavaretus oxyrinchus (Linnæus, 1758)	Houting	Corégone oxyringue	II	All where it occurs
* *Dipturus batis* (synonym: *Raja batis*)	Common Skate	Pocheteau gris	All	All where it occurs
* *Raja montagui* (synonym: Dipturus montagui)	Spotted Ray	Raie douce	II, III, IV, V	All where it occurs
* *Gadus morhua*– populations in the OSPAR regions II and III[i]	Cod	Cabillaud (morue)	All	II, III
Hippocampus guttulatus (synonym: *Hippocampus ramulosus*)	Long-snouted seahorse	Cheval de mer(hippocampe) à long bec	II, III, IV, V	All where it occurs
Hippocampus hippocampus	Short-snouted seahorse	Cheval de mer (hippocampe) à museau court	II, III, IV, V	All where it occurs

[i] That is, the populations/stocks referred to in ICES advice as the North Sea, Eastern Channel and Skagerrak cod stock; Kattegat cod stock; Cod west of Scotland; Cod in the Irish Sea; Cod in the Celtic Sea. (The naming of the stocks was corrected by OSPAR 2014 to align with ICES cod divisions).

**Hoplostethus atlanticus*	Orange roughy	Hoplostète orange	I, V	All where it occurs
**Lamna nasus*	Porbeagle	Requin taupe	All	All where it occurs
Petromyzon marinus	Sea lamprey	Lamproie marine	I, II, III, IV	All where it occurs
**Raja clavata*	Thornback skate / ray	Raie bouclée	I, II, III, IV, V	II
**Rostroraja alba*	White skate	Raie à bec pointu	II, III, IV	All where it occurs
**Salmo salar*	Salmon	Saumon de l'Atlantique	I, II, III, IV	All where it occurs[i]
**Squalus acanthias*	[Northeast Atlantic] spurdog	Aiguillat commun	All	All where it occurs
**Squatina squatina*	Angel shark	Ange de mer	II, III, IV	All where it occurs
**Thunnus thynnus*	Bluefin tuna	Thon rouge	V	All where it occurs[ii]
REPTILES				
Caretta caretta	Loggerhead turtle	Tortue caouanne	IV, V	All where it occurs
Dermochelys coriacea	Leatherback turtle	Tortue luth	All	All where it occurs
MAMMALS				
Balaena mysticetus	Bowhead whale	Baleine franche boréale	I	All where it occurs
Balaenoptera musculus	Blue whale	Baleine bleue	All	All where it occurs
Eubalaena glacialis	Northern right whale	Baleine franche noire	All	All where it occurs
Phocoena phocoena	Harbour porpoise	Marsouin commun	All	II, III

Part II - Habitats

DESCRIPTION	OSPAR Regions where the habitat occurs	OSPAR Regions where such habitats are under threat and/or in decline
HABITATS		
Carbonate mounds	I, V	V[iii]
Coral Gardens	I, II, III, IV, V	All where they occur
Cymodocea meadows	IV	All where they occur
Deep-sea sponge aggregations	I, III, IV, V	All where they occur
Intertidal *Mytilus edulis* beds on mixed and sandy sediments	II, III	All where they occur
Intertidal mudflats	I, II, III, IV	All where they occur
Littoral chalk communities	II	All where they occur
Lophelia pertusa reefs	All	All where they occur
Maërl beds	All	III

[i] In accordance with the comments of ICES in its review, the varying states of the numerous different stocks have to be taken into account.

[ii] The main threat is the high rate of catch of juvenile fish of the species (SCRS Report, page 59).

[iii] To be confirmed in the light of further survey work being undertaken by Ireland

Modiolus modiolus beds	All	All where they occur
Oceanic ridges with hydrothermal vents/fields	I, V	V
Ostrea edulis beds	II, III, IV	All where they occur
Sabellaria spinulosa reefs	All	II, III
Seamounts	I, IV, V	All where they occur
Sea-pen and burrowing megafauna communities	I, II, III, IV	II, III
Zostera beds	I, II, III, IV	All where they occur

C.2 OSPAR List of Threatened and/or Declining Species and Habitats occurring in Ireland's maritime area that are not covered by the EC Birds or Habitats Directives

- Species

SCIENTIFIC NAME	Common name	OSPAR Regions where the species occurs	OSPAR Regions where the species is under threat and/or in decline
INVERTEBRATES			
Nucella lapillus	Dog whelk	All	II, III, IV
Ostrea edulis	Flat oyster	I, II, III, IV	II
FISH			
Anguilla anguilla	European eel	I, II, III, IV	All where it occurs
Centroscymnus coelolepis	Portuguese dogfish	All	All where it occurs
Centrophorus granulosus	Gulper shark	IV, V	All where it occurs
Centrophorus squamosus	Leafscale gulper shark	All	All where it occurs
Cetorhinus maximus	Basking shark	All	All where it occurs
Dipturus batis (synonym: *Raja batis*)	Common Skate	All	All where it occurs
Raja montagui (synonym: *Dipturus montagui*)	Spotted Ray	II, III, IV, V	All where it occurs
Gadus morhua (populations in OSPAR Regions II and III)	Cod	All	II, III
Hippocampus guttulatus (synonym: *Hippocampus ramulosus*)	Long-snouted seahorse	II, III, IV, V	All where it occurs
Hippocampus hippocampus	Short-snouted seahorse	II, III, IV, V	All where it occurs
Hoplostethus atlanticus	Orange roughy	I, V	All where it occurs
Lamna nasus	Porbeagle [shark]	All	All where it occurs
Raja clavata	Thornback ray / skate	I, II, III, IV, V	II
Rostroraja alba	White skate	II, III, IV	All where it occurs
Squalus acanthias	[Northeast Atlantic] spurdog	All	All where it occurs
Squatina squatina	Angel shark	II, III, IV	All where it occurs

Thunnus thynnus	Bluefin tuna	V	All where it occurs

- Habitats

DESCRIPTION	OSPAR Regions where the habitat occurs	OSPAR Regions where such habitats are under threat and/or in decline
HABITATS		
Carbonate mounds	I, V	V
Coral Gardens	I, II, III, IV, V	All where they occur
Deep-sea sponge aggregations	I, III, IV, V	All where they occur
Intertidal *Mytilus edulis* beds on mixed and sandy sediments	II, III	All where they occur
Lophelia pertusa reefs	All	All where they occur
Modiolus modiolus beds	All	All where they occur
Oceanic ridges with hydrothermal vents/fields	I, V	V
Ostrea edulis beds	II, III, IV	All where they occur
Sabellaria spinulosa reefs	All	II, III
Seamounts	I, IV, V	All where they occur
Sea-pen and burrowing megafauna communities	I, II, III, IV	II, III
Zostera beds	I, II, III, IV	All where they occur

Appendix D – Existing designated sites in Ireland with marine components

D.1 Ramsar sites with marine components

Table 4.2 – Ireland's Ramsar sites with marine or coastal components

Ramsar site no.	Site name	Ramsar site no.	Site name
291	Wexford Wildfowl Reserve	834	Dundalk Bay
333	The Raven	835	Tramore Backstrand
406	North Bull Island	836	Blackwater Estuary
412	Rogerstown Estuary	837	Cork Harbour
413	Baldoyle Bay	838	Inner Galway Bay
440	Tralee Bay	839	Dungarvan Harbour
470	Castlemaine Harbour	840	Bannow Bay
830	Ballycotton Bay	841	Trawbreaga Bay
831	Ballymacoda	842	Cummeen Strand
832	Sandymount Strand/Tolka Estuary	843	Killala Bay/Moy Estuary
833	The Broadmeadow Estuary	844	Blacksod Bay and Broadhaven

D.2 Birds Directive: Ireland's SPAs with marine elements

Table 4.3 – Ireland's Special Protection Areas (SPAs) with marine elements that have been selected for wintering waterbirds and breeding seabirds.

Site code	Site name	Site code	Site name
004002	Saltee Islands SPA	004093	Termoncarragh Lake and Annagh Machair SPA
004003	Puffin Island SPA	004100	Inishtrahull SPA
004004	Inishkea Islands SPA	004111	Duvillaun Islands SPA
004005	Cliffs of Moher SPA	004113	Howth Head Coast SPA
004006	North Bull Island SPA	004114	Illaunonearaun SPA
004007	Skelligs SPA	004115	Inishduff SPA
004008	Blasket Islands SPA	004116	Inishkeel SPA
004009	Lady's Island Lake SPA	004117	Ireland's Eye SPA
004013	Drumcliff Bay SPA	004118	Keeragh Islands SPA
004014	Rockabill SPA	004119	Loop Head SPA
004015	Rogerstown Estuary SPA	004120	Rathlin O'Birne Island SPA
004016	Baldoyle Bay SPA	004121	Roaninish SPA
004019	The Raven SPA	004122	Skerries Islands SPA
004020	Ballyteigue Burrow SPA	004124	Sovereign Islands SPA
004021	Old Head of Kinsale SPA	004125	Magharee Islands SPA
004022	Ballycotton Bay SPA	004129	Ballysadare Bay SPA
004023	Ballymacoda Bay SPA	004132	Illancrone and Inishkeeragh SPA
004024	South Dublin Bay and River Tolka Estuary SPA	004135	Ardboline Island and Horse Island SPA
004025	Malahide Estuary SPA	004136	Clare Island SPA
004026	Dundalk Bay SPA	004144	High Island, Inishshark and Davillaun SPA

004027	Tramore Back Strand SPA	004145	Durnesh Lough SPA
004028	Blackwater Estuary SPA	004150	West Donegal Coast SPA
004029	Castlemaine Harbour SPA	004151	Donegal Bay SPA
004030	Cork Harbour SPA	004154	Iveragh Peninsula SPA
004033	Bannow Bay SPA	004158	River Nanny Estuary and Shore SPA
004034	Trawbreaga Bay SPA	004159	Slyne Head to Ardmore Point Islands SPA
004035	Cummeen Strand SPA	004170	Cruagh Island SPA
004036	Killala Bay/Moy Estuary SPA	004172	Dalkey Islands SPA
004066	The Bull and The Cow Rocks SPA	004175	Deenish Island and Scariff Island SPA
004068	Inishmurray SPA	004177	Bills Rocks SPA
004069	Lambay Island SPA	004182	Mid-Clare Coast SPA
004072	Stags of Broad Haven SPA	004186	The Murrough SPA
004073	Tory Island SPA	004192	Helvick Head to Ballyquin SPA
004074	Illanmaster SPA	004194	Horn Head to Fanad Head SPA
004075	Lough Swilly SPA	004212	Cross Lough (Killadoon) SPA
004076	Wexford Harbour and Slobs SPA	004219	Courtmacsherry Bay SPA
004078	Carlingford Lough SPA	004221	Illaunnanoon SPA
004080	Boyne Estuary SPA	004230	West Donegal Islands SPA
004081	Clonakilty Bay SPA	004152	Inishmore SPA
004082	Greers Isle SPA	004188	Tralee Bay Complex SPA
004083	Inishbofin, Inishdooey and Inishbeg SPA	004032	Dungarvan Harbour SPA
004084	Inishglora and Inishkeeragh SPA	004031	Inner Galway Bay SPA
004087	Lough Foyle SPA	004077	River Shannon and River Fergus Estuaries SPA
004090	Sheskinmore Lough SPA	004037	Blacksod Bay/Broad Haven SPA
004092	Tacumshin Lake SPA		

D.3 Habitats Directive: Annex I Habitat descriptions

Eight habitats listed in Annex I of the Habitats Directive and categorised as marine habitats are found in Irish waters. Habitats are defined according to the *Interpretation Manual of European Union Habitats - EUR28*, which is a scientific reference document.[273] The following are definitions based on this manual. Scally *et al.* (2020)[72] and NPWS[57,58] provide descriptions in an Irish context.

Sandbanks which are slightly covered by sea water all the time [1110]

This habitat comprises sandbanks that are permanently submerged (but seldom more than 20m below chart datum). They are elevated, elongated, rounded or irregular topographic features and are predominantly surrounded by deeper water. They consist mainly of sandy sediments, but larger grain sizes, including boulders and cobbles, or smaller grain sizes, including mud, may also be present on a sandbank. Banks where sandy sediments occur in a layer over hard substrata are classed as sandbanks if the associated biota are dependent on the sand rather than on the underlying hard substrata.

Estuaries [1130]

Estuaries consist of the downstream parts of river valleys, subject to the tide and extending from the limit of brackish waters. Estuaries are coastal inlets where, unlike 'Large shallow

inlets and bays' there is generally a substantial freshwater influence. The mixing of freshwater and sea water and the reduced current flows in the shelter of an estuary leads to deposition of fine sediments often forming extensive intertidal sand and mudflats. Where the tidal currents are faster than flood tides most sediments deposit to form a delta at the mouth of the estuary. Other Annex I habitats such as "Mudflats and sandflats not covered by seawater at low tide" can occur within footprint of the Estuaries habitat.

Mudflats and sandflats not covered by seawater at low tide [1140]

This habitat consists of sands and muds of the coasts of the oceans, their connected seas and associated lagoons, not covered by sea water at low tide, devoid of vascular plants (with the exception of eelgrasses), usually coated by blue algae and diatoms. They are of particular importance as feeding grounds for wildfowl and waders. This habitat can overlap with "Large shallow inlets and bays" and "Estuaries".

Coastal Lagoon [1150]

Lagoons are expanses of shallow coastal salt water, of varying salinity and water volume, wholly or partially separated from the sea by sand banks or shingle, or, less frequently, by rocks. Salinity may vary from brackish water to hypersalinity depending on rainfall, evaporation and through the addition of fresh water from stroms, temporary flooding of the sea in winter or tidal exchange. With or without vegetation from *Ruppetea maritimae, Potametea, Zosteretea* or *Charetea.*

Large shallow inlets and bays [1160]

Large shallow inlets and bays are large indentations of the coast where, in contrast to "Estuaries", the influence of freshwater is generally limited. They are generally sheltered from wave action and contain a great diversity of sediments and substrates with a well-developed zonation of benthic communities. As this habitat generally comprises a large physiographic feature it may wholly or partially incorporate other Annex I habitats such as "Reefs" and "Submerged or partially submerged sea caves".

Reefs [1170]

This Annex I habitat can be either biogenic concretions or of geogenic origin. Reefs are hard compact substrata on solid and soft bottoms, which arise from the sea floor in the sublittoral and littoral zone. Reefs may support a zonation of benthic communities of algae and animal species as well as concretions and corallogenic concretions.

In Irish waters, Reefs range from the intertidal to depths of 4500m and more than 400km from the coast.

Submarine structures made by leaking gases [1180]

This habitat consists of structures formed by aggregation of carbonate cement arising from microbial oxidation of gas emissions, mainly methane. The formations are interspersed with gas vents that intermittently release gas. The methane most likely originates from the microbial decomposition of fossil plant material.

Submerged or partially submerged sea caves [8330]

Submerged or partially submerged sea caves are caves situated under the sea or opened to it, at least at high tide, including partially submerged sea caves. Their bottom and sides support

communities of marine invertebrates and algae. This habitat can occur within the footprint of "Large shallow inlets and bays".

D.4 Habitats Directive: Ireland's existing SACs

Table 4.4 – SAC's in Ireland selected for Annex I and Annex II marine habitats and species.

Code	Site name	Annex I and II Features	1110 Sandbanks which are slightly covered by sea water all the time	1130 Estuaries	1140 Mudflats and sandflats not [illegible]	1160 Large shallow inlets and bays	1170 Reefs	1180 Submarine structures made by leaking gases	8330 Submerged or partially submerged sea caves	1349 Tursiops truncatus	1351 Phocoena phocoena	1364 Halichoerus grypus	1365 Phoca vitulina
000020	Black Head-Poulsallagh Complex SAC								✓				
000077	Ballymacoda (Clonpriest and Pillmore) SAC			✓	✓								
000090	Glengarriff Harbour and Woodland SAC												✓
000091	Clonakilty Bay SAC				✓								
000097	Lough Hyne Nature Reserve and Environs SAC					✓	✓		✓				
000101	Roaringwater Bay and Islands SAC					✓	✓		✓		✓	✓	
000111	Aran Island (Donegal) Cliffs SAC								✓				
000133	Donegal Bay (Murvagh) SAC				✓								✓
000147	Horn Head and Rinclevan SAC											✓	
000181	Rathlin O'Birne Island SAC						✓						
000189	Slieve League SAC						✓						
000190	Slieve Tooey/Tormore Island/Loughros Beg Bay SAC											✓	
000191	St. John's Point SAC					✓	✓		✓				
000194	Tranarossan and Melmore Lough SAC				✓								
000197	West of Ardara/Maas Road SAC			✓	✓	✓							✓
000199	Baldoyle Bay SAC				✓								
000204	Lambay Island SAC						✓					✓	✓
000205	Malahide Estuary SAC				✓								
000206	North Dublin Bay SAC				✓								

Code	Site name	Annex I and II Features	1110 Sandbanks which are slightly covered by sea water all the time	1130 Estuaries	1140 Mudflats and sandflats not [illegible]	1160 Large shallow inlets and bays	1170 Reefs	1180 Submarine structures made by leaking gases	8330 Submerged or partially submerged sea caves	1349 Tursiops truncatus	1351 Phocoena phocoena	1364 Halichoerus grypus	1365 Phoca vitulina
000208	Rogerstown Estuary SAC			✓	✓								
000210	South Dublin Bay SAC				✓								
000212	Inishmaan Island SAC						✓						
000213	Inishmore Island SAC						✓		✓				
000268	Galway Bay Complex SAC				✓	✓	✓						✓
000278	Inishbofin and Inishshark SAC											✓	
000328	Slyne Head Islands SAC						✓			✓		✓	
000343	Castlemaine Harbour SAC			✓	✓								
000455	Dundalk Bay SAC			✓	✓								
000458	Killala Bay/Moy Estuary SAC			✓	✓								✓
000470	Mullet/Blacksod Bay Complex SAC				✓	✓	✓						
000472	Broadhaven Bay SAC				✓	✓	✓		✓				
000495	Duvillaun Islands SAC									✓		✓	
000507	Inishkea Islands SAC											✓	
000622	Ballysadare Bay SAC			✓	✓								✓
000625	Bunduff Lough and Machair/Trawalua/Mull aghmore SAC				✓	✓	✓						
000627	Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC			✓	✓								✓
000671	Tramore Dunes and Backstrand SAC				✓								
000696	Ballyteige Burrow SAC			✓	✓								
000697	Bannow Bay SAC			✓	✓								
000704	Lady's Island Lake SAC						✓						
000707	Saltee Islands SAC				✓	✓	✓		✓			✓	
000710	Raven Point Nature Reserve SAC				✓								
000764	Hook Head SAC					✓	✓						
000781	Slaney River Valley SAC			✓	✓								✓

Code	Site name	Annex I and II Features	1110 Sandbanks which are slightly covered by sea water all the time	1130 Estuaries	1140 Mudflats and sandflats not [illegible]	1160 Large shallow inlets and bays	1170 Reefs	1180 Submarine structures made by leaking gases	8330 Submerged or partially submerged sea caves	1349 Tursiops truncatus	1351 Phocoena phocoena	1364 Halichoerus grypus	1365 Phoca vitulina
001021	Carrowmore Point to Spanish Point and Islands SAC						✓						
001040	Barley Cove to Ballyrisode Point SAC				✓								
001058	Great Island Channel SAC				✓								
001090	Ballyness Bay SAC			✓	✓								
001141	Gweedore Bay and Islands SAC						✓						
001190	Sheephaven SAC				✓								
001230	Courtmacsherry Estuary SAC			✓	✓								
001275	Inisheer Island SAC						✓						
001482	Clew Bay Complex SAC				✓	✓							✓
001680	Streedagh Point Dunes SAC				✓								
001957	Boyne Coast and Estuary SAC			✓	✓								
002012	North Inishowen Coast SAC				✓								
002034	Connemara Bog Complex SAC						✓						
002070	Tralee Bay and Magharees Peninsula, West to Cloghane SAC			✓	✓	✓	✓						
002074	Slyne Head Peninsula SAC					✓	✓			✓			
002111	Kilkieran Bay and Islands SAC				✓	✓	✓						✓
002158	Kenmare River SAC					✓	✓		✓				✓
002159	Mulroy Bay SAC				✓	✓	✓						
002161	Long Bank SAC		✓										
002162	River Barrow and River Nore SAC			✓	✓		✓						
002165	Lower River Shannon SAC		✓	✓	✓	✓	✓			✓			
002170	Blackwater River (Cork/Waterford) SAC			✓	✓								

Code	Site name	Annex I and II Features	1110 Sandbanks which are slightly covered by sea water all the time	1130 Estuaries	1140 Mudflats and sandflats not [illegible]	1160 Large shallow inlets and bays	1170 Reefs	1180 Submarine structures made by leaking gases	8330 Submerged or partially submerged sea caves	1349 Tursiops truncatus	1351 Phocoena phocoena	1364 Halichoerus grypus	1365 Phoca vitulina
002172	Blasket Islands SAC						✓		✓		✓	✓	
002250	Carrowmore Dunes SAC						✓						
002259	Tory Island Coast SAC						✓		✓				
002261	Magharee Islands SAC						✓						
002262	Valencia Harbour/Portmagee Channel SAC				✓	✓	✓						
002263	Kerry Head Shoal SAC						✓						
002264	Kilkee Reefs SAC					✓	✓		✓				
002265	Kingstown Bay SAC					✓							
002268	Achill Head SAC				✓	✓	✓						
002269	Carnsore Point SAC				✓		✓						
002274	Wicklow Reef SAC						✓						
002283	Rutland Island and Sound SAC					✓	✓						✓
002287	Lough Swilly SAC			✓									
002327	Belgica Mound Province SAC						✓						
002328	Hovland Mound Province SAC						✓						
002329	South-west Porcupine Bank SAC						✓						
002330	North-west Porcupine Bank SAC						✓						
002953	Blackwater Bank SAC		✓										
002998	West Connacht Coast SAC									✓			
002999	Hempton's Turbot Bank SAC		✓										
003000	Rockabill to Dalkey Island SAC						✓				✓		
003001	Porcupine Bank Canyon SAC						✓						
003002	South-east Rockall Bank SAC						✓						
003015	Codling Fault Zone SAC							✓					
	Total		**4**	**19**	**43**	**22**	**46**	**1**	**12**	**5**	**3**	**10**	**13**

Appendix E – Reporting under European legislation

E.1 Ireland's conservation status under the Birds Directive

Ireland submitted the latest Article 12 report to the European Commission in July 2019. The main groups of birds that utilise marine/coastal waters to a greater or lesser extent are breeding seabirds and wintering waterbirds.

Breeding seabirds

Twenty-four seabird species regularly breed around Ireland's coastline (Table 4.5). Their preferred breeding habitats are principally found on mainland cliffs and on offshore marine islands, while continental shelf waters provide rich foraging habitats. Cummins *et al.* (2019) summarises the status of 20 of these species in Ireland for the period between 2013 and 2018. [54] Over the short-term it was estimated that 85% of the 20 species assessed were increasing with only two species (i.e. 10%) showing stable trends and one species (Kittiwake) showing a negative trend since the turn of the century. When this analysis was repeated over the long-term on 19 species approximately 68% were estimated to have increased, 21% decreased and 11% showing more stable trends.

Of the four species that were deemed to have decreased over the long-term (Black-headed Gull, 11%; Common Gull, 25%; Herring Gull, up to 33%; and Kittiwake, 35%) only Kittiwake, the most abundant breeding gull species, is also declining over the short-term and thus is of particular cause for concern.

With regard to species showing largely positive trends, some species have shown spectacular long-term increases (e.g. Roseate Tern, 579%; Common Tern, 201%; Lesser Black-backed Gull, 145%; Gannet, 94%; and Fulmar, 68%). Additionally, two seabird species have successfully colonised Ireland since approximately the turn of the century (i.e. Mediterranean Gull and Great Skua).

There are four burrow-nesting species that are not covered by Cummins *et al.* (2019),[54] namely: Storm Petrel (*Hydrobates pelagicus*), Leach's Storm Petrel (*Hydrobates leucorhous*), Manx Shearwater (*Puffinus puffinus*), and Puffin (*Fratercula arctica*). Due to their cryptic breeding ecology, they require specialised survey methods, and survey is ongoing. However, there is currently insufficient data to produce contemporary breeding assessments for these species.

Table 4.5 - Seabird species which regularly breed around Ireland's coastline

Common Name	Latin Name
Fulmar	*Fulmarus glacialis*
Manx Shearwater	*Puffinus puffinus*
Storm Petrel	*Hydrobates pelagicus*
Leach's Storm Petrel	*Hydrobates leucorhous*
Gannet	*Morus bassanus*
Cormorant	*Phalacrocorax carbo carbo*
Shag	*Phalacrocorax aristotelis aristotelis*
Great Skua	*Catharacta skua*
Mediterranean Gull	*Larus melanocephalus*
Black-headed Gull	*Larus ridibundus*
Common Gull	*Larus canus*
Lesser Black-backed Gull	*Larus fuscus*
Herring Gull	*Larus argentatus*
Great Black-backed Gull	*Larus marinus*
Kittiwake	*Rissa tridactyla*
Sandwich Tern	*Thalasseus sandvicensis*
Roseate Tern	*Sterna dougallii*
Common Tern	*Sterna hirundo*
Arctic Tern	*Sterna paradisaea*
Little Tern	*Sternula albifrons*
Guillemot	*Uria aalge*
Razorbill	*Alca torda*
Black Guillemot	*Cepphus grylle*
Puffin	*Fratercula arctica*

Wintering waterbirds

The importance of coastal wetlands for overwintering waterbirds has long been recognised in Ireland. The majority of species that occur here migrate from breeding grounds in the north and north-west (principally Canada, Greenland and Iceland) or from the north-east (Scotland and northern continental Europe, including Scandinavia, Russia and Siberia) [274]. While many waterbirds remain in Ireland for the duration of the winter, others occur on passage before migrating further south.

Lewis *et al.* [55] provides a single comprehensive account on the current population status of wintering waterbirds in the Republic of Ireland for the period 2009/10 – 2015/16. This report compiles and analyses data from the Irish Wetland Bird Survey (IWeBS), along with data from other sources such as targeted species surveys. Of the 694 wetland sites that were surveyed between 2009/10 and 2015/16, 69 are classified as "estuary" and 34 as "non-estuarine coast". The five top sites in the country are coastal, namely Cork Harbour, Dublin Bay, Dundalk Bay, Lough Swilly, and Wexford Harbour and Slobs. These each supported over 20,000 wintering waterbirds, a criterion under the Ramsar Convention used to identify sites of international importance.

Of the 19 wildfowl and ally species (swans, geese, ducks, and their allies) that were assessed, 17 species are showing declining trends over the recent five-year period, with Scaup showing the greatest decline (>80%). Over the recent 22-year period, three species (Goldeneye, Pochard and Scaup) have declined by >50% and a further seven species have declined by 25–50% (Mallard, Pintail, Red-breasted Merganser, Shoveler, Tufted Duck and Wigeon). Conversely, Little Egret and Gadwall have increased by >50% over the 22-year period, and Grey Heron and Little Grebe have increased by 25–50%. Light-bellied Brent and Barnacle geese populations have increased in the long-term but shown population declines in the short term. Greenland White-fronted Goose, Icelandic Greylag Goose and Bewick Swan populations show continued declines while Whooper Swan have increased across all time periods assessed.

Nine of the 10 wader species assessed are showing declining trends over the recent five-year period, with Knot showing the greatest decline (48%). Four wader species have declined by >50% over the 22-year period (Dunlin, Grey Plover, Lapwing and Purple Sandpiper), while three others (Black-tailed Godwit, Greenshank and Sanderling) have increased by >50% during the same period.

Table 4.6 - Regularly occurring wintering waterbirds which may occur at coastal sites in Ireland

Common Name	Latin Name
Mute Swan	*Cygnus olor*
Bewick's Swan	*Cygnus columbianus bewickii*
Whooper Swan	*Cygnus cygnus*
Pink-footed Goose	*Anser brachyrhyncus*
Greenland White-fronted Goose	*Anser albifrons flavirostris*
Greylag Goose	*Anser anser*
Barnacle Goose	*Branta leucopsis*
Light-bellied Brent Goose	*Branta bernicla hrota*
Shelduck	*Tadorna tadorna*
Wigeon	*Mareca penelope*
Gadwall	*Mareca strepera*
Teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Pintail	*Anas acuta*
Shoveler	*Spatula clypeata*
Pochard	*Aythya ferina*
Tufted Duck	*Aythya fuligula*
Scaup	*Aythya marila*
Eider	*Somateria mollissima*
Long-tailed Duck	*Clangula hyemalis*
Common Scoter	*Melanitta nigra*
Goldeneye	*Bucephala clangula*
Smew	*Mergellus albellus*
Red-breasted Merganser	*Mergus serrator*
Goosander	*Mergus merganser*
Red-throated Diver	*Gavia stellata*
Black-throated Diver	*Gavia arctica*
Great Northern Diver	*Gavia immer*

Little Grebe	*Tachybaptus ruficollis*
Great Crested Grebe	*Podiceps cristatus*
Slavonian Grebe	*Podiceps auritus*
Cormorant	*Phalacrocorax carbo*
European Shag	*Phalacrocorax aristotelis*
Little Egret	*Egretta garzetta*
Grey Heron	*Ardea cinerea*
Water Rail	*Rallus aquaticus*
Moorhen	*Gallinula chloropus*
Coot	*Fulica atra*
Oystercatcher	*Haematopus ostralegus*
Ringed Plover	*Charadrius hiaticula*
Golden Plover	*Pluvialis apricaria*
Grey Plover	*Pluvialis squatarola*
Lapwing	*Vanellus vanellus*
Knot	*Calidris canutus*
Sanderling	*Calidris alba*
Curlew Sandpiper	*Calidris ferruginea*
Purple Sandpiper	*Calidris maritima*
Dunlin	*Calidris alpina*
Ruff	*Calidris pugnax*
Jack Snipe	*Lymnocryptes minimus*
Snipe	*Gallinago gallinago*
Black-tailed Godwit	*Limosa limosa*
Bar-tailed Godwit	*Limosa lapponica*
Whimbrel	*Numenius phaeopus*
Curlew	*Numenius arquata*
Common Sandpiper	*Actitus hypoleucos*
Spotted Redshank	*Tringa erythropus*
Greenshank	*Tringa nebularia*
Redshank	*Tringa totanus*
Turnstone	*Arenaria interpres*
Little Gull	*Hydrocoloeus minutus*
Mediterranean Gull	*Larus melanocephalus*
Black-headed Gull	*Larus ridibundus*
Common Gull	*Larus canus*
Ring-billed Gull	*Larus delawarensis*
Lesser Black-backed Gull	*Larus fuscus*
Herring Gull	*Larus argentatus*
Iceland Gull	*Larus glaucoides*
Glaucous Gull	*Larus hyperboreus*
Great Black-backed Gull	*Larus marinus*

E.2 Ireland's conservation status under the Habitats Directive

National conservation status of habitats and species is determined using a rules-based approach and according to guidelines.[i] For a habitat, status is evaluated by conducting a separate assessment of range, area, structure and functions and future prospects. These parameters are then combined to reach an overall assessment of that habitat. For species, the parameters are range, population, habitat for the species and future prospects.

Ireland submitted the third national assessment for 59 marine, terrestrial and freshwater habitats (listed in Annex I) and 60 species (listed in Annexes II, IV and V) in April 2019.[57–59]

Table 4.7 – National conservation status for each marine Annex I habitat for the last three reporting cycles.

Code	Habitat name	2007	2013	2019
1110	Sandbanks which are slightly covered by sea water all the time	Inadequate	Favourable	Favourable
1130	Mudflats and sandflats not covered by seawater at low tide	Inadequate	Inadequate	Inadequate
1140	Mudflats and sandflats not covered by seawater at low tide	Inadequate	Inadequate	Inadequate
1160	Large shallow inlets and bays	Inadequate	Inadequate	Bad
1170	Reefs	Inadequate	Bad	Inadequate
1180	Submarine structures made by leaking gases	Not assessed	Not assessed	Favourable
8330	Submerged or partially submerged sea caves	Favourable	Favourable	Favourable

Table 4.8 – Conservation status of marine species listed in Annexes II, IV and V for the last three reporting cycles.

Code	Species name	Annex	2007	2013	2019
1376	Maërl (*Lithothamnium coralloides*)	V	Inadequate	Inadequate	Bad
1377	Maërl (*Phymatholithon calcareum*)	V	Inadequate	Inadequate	Bad
1223	Leatherback turtle (*Dermochelys coriacea*)	IV	Inadequate	Unknown	Unknown
1364	Grey seal (*Halichoerus grypus*)	II, V	Favourable	Favourable	Favourable
1365	Harbour seal (*Phoca vitulina*)	II, V	Favourable	Favourable	Favourable
1345	Humpback whale (*Megaptera novaeangliae*)	IV	Unknown	Unknown	Unknown
1349	Common bottlenose dolphin *(Tursiops truncatus)*	II, IV	Favourable	Favourable	Favourable
1350	Common dolphin (*Delphinus delphis*)	IV	Favourable	Favourable	Favourable
1351	Harbour porpoise (*Phocoena phocoena*)	II, IV	Favourable	Favourable	Favourable
2027	Killer whale (*Orcinus orca*)	IV	Unknown	Unknown	Unknown
2029	Long-finned pilot whale *(Globicephala melas)*	IV	Unknown	Favourable	Favourable
2030	Risso's dolphin (Grampus griseus)	IV	Unknown	Unknown	Favourable

[i] DG Environment. (2017) Reporting under Article 17 of the Habitats Directive: Explanatory Notes and Guidelines for the period 2013-2018. Brussels. Pp 188

2031	White-sided dolphin (Lagenorhynchus acutus)	IV	Favourable	Favourable	Favourable
2032	White-beaked dolphin (Lagenorhynchus albirostris)	IV	Unknown	Favourable	Favourable
2034	Striped dolphin (Stenella coeruleoalba)	IV	Unknown	Favourable	Favourable
2035	Cuvier's beaked whale (Ziphius cavirostris)	IV	Unknown	Unknown	Favourable
2038	Sowerby's beaked whale *(Mesoplodon bidens)*	IV	Unknown	Unknown	Favourable
2618	Minke whale (Balaenoptera acutorostrata)	IV	Favourable	Favourable	Favourable
2621	Fin whale (Balaenoptera physalus)	IV	Favourable	Favourable	Favourable
5020	Blue whale (Balaenoptera musculus)	IV	Unknown	Unknown	Unknown
2624	Sperm whale (Physeter macrocephalus)	IV	Unknown	Unknown	Favourable
5033	Northern bottlenose whale (Hyperoodon ampullatus)	IV	Unknown	Unknown	Unknown
2619	Sei whale (Balaenoptera borealis)	IV	Unknown	Unknown	Unknown
1348	Northern right whale (Eubalaena glacialis)	IV	Vagrant	Vagrant	Vagrant
2028	False killer whale (Pseudorca crassidens)	IV	Vagrant	Vagrant	Vagrant
2037	True's beaked whale *(Mesoplodon mirus)*	IV	Vagrant	Vagrant	Vagrant
2622	Pygmy sperm whale (Kogia breviceps)	IV	Vagrant	Vagrant	Vagrant
5029	Beluga/White whale (Delphinapterus leucas)	IV	Vagrant	Vagrant	Vagrant
5034	Gervais' beaked whale (Mesoplodon europaeus)	IV	Vagrant	Vagrant	Vagrant

E.3 Reporting under the Marine Strategy Framework Directive

Table 4.9 – report for Ireland's marine environment (Source: DHLGH, 2020).[56]

Descriptor	Common name	Achievement of Good Environmental Status (GES)
Descriptor 1	Biodiversity	Ireland has achieved GES for some elements of biological diversity within its maritime area (e.g., the majority of larger marine vertebrates assessed in 2019). For other elements (e.g. marine reptiles and 41% of non-commercial fish species assessed) the environmental status is currently unknown, while in the case of some elements (i.e. 18 of 56 non-commercial fish species assessed) GES has not been achieved.
Descriptor 2	Non-indigenous species (NIS)	Ireland has achieved GES within its maritime area for non-indigenous species. There have been three newly introduced species identified in Ireland's maritime area during the assessment period 2013-2018. While there are no established threshold values for this criterion at present, this number of introductions is considered low based on expert judgement and is comparable with the numbers of new NIS described in the OSPAR Intermediate Assessment (2017).
Descriptor 3	Commercial fish and shellfish	A total of 34 stocks (19%) have achieved GES, while the environmental status of 99 stocks (56%) is currently unknown. In the case of 44 other stocks (25%), GES has not been achieved.
Descriptor 4	Food webs	The environmental status of Ireland's marine food webs is currently unknown. There was evidence that components of the food webs are changing but it was not clear how they are affecting each other or the extent to which this is due to anthropogenic influence or associated pressures.
Descriptor 5	Eutrophication	Ireland has achieved GES for eutrophication within its maritime area, for the three primary criteria assessed; nutrients, chlorophyll a and dissolved oxygen.
Descriptor 6	Sea-floor integrity	Ireland has achieved GES for some elements of sea-floor integrity within its maritime area (e.g. under criteria for physical loss of the seabed). For other elements (i.e. criteria for physical disturbance to the seabed), the environmental status is currently unknown.
Descriptor 7	Hydrographical conditions	Ireland has achieved GES for the spatial extent and distribution of permanent hydrographical changes within its maritime area.
Descriptor 8	Contaminants	Ireland has achieved GES for concentrations of contaminants within its maritime area, for the criteria assessed which are contaminants in water and biota, acute pollution events and biological effects of contaminants. There are threshold values associated with the concentrations of contaminants and biological effects. There is no threshold value for acute pollution events.
Descriptor 9	Contaminants in seafood	Ireland has achieved GES for concentrations of contaminants in fish and seafood for human consumption within its maritime area.
Descriptor 10	Marine Litter	Ireland has achieved GES for the amount of litter on coastlines with the median number of litter items ≥2.5cm found on beaches in quarterly surveys between 2013 and 2018 decreasing from 73.5 items per 100 metres in 2013, to 46 items per 100 metres in 2018.
Descriptor 11	Energy, including underwater noise	Ireland has achieved GES for the anthropogenic impulsive sound element of underwater noise. The level of impulsive underwater noise causing activities within Ireland's maritime area were low overall during the assessment period of 2016-2018.

Annex prepared for the MPA Advisory Group reporting findings from the stakeholder consultation on expanding Ireland's marine protected area network

16 October 2020

Submitted to:

MPA Advisory Group,
Chaired by Prof. Tasman Crowe,
UCD Earth Institute,
University College Dublin,
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This report was prepared by ICF on request of the Department of Housing, Local Government and Heritage. It draws on data collected through stakeholder consultation that was undertaken specifically for the purpose of supporting the MPA advisory group in the preparation of their report on expanding Ireland's marine protected area network. This report is designed to be an Annex to the main report prepared by the MPA advisory group and not a standalone document.

A report submitted by ICF Consulting Services Limited

Date: 16 October 2020

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Contents

1 Findings from the Stakeholder Consultation 1
1.1 Preamble 1
2 Summary of findings 1
2.1 Why expand Ireland's network of Marine Protected Areas 1
2.2 What are the likely benefits and costs? 2
2.3 How should we expand our network of Marine Protected Areas? 5
3 Stakeholder Survey Analysis 8
3.1 Section 1: Respondent background 9
3.2 Section 2: Perceptions of Ireland's marine environment and Marine Protected Areas 10
3.3 Section 3: Expansion of the MPA network 12
3.4 Section 4: Achieving an expanded MPA network 21
4 Focus Group Analysis 31
4.1 What is your long-term vision for Ireland's marine environment? 32
4.2 What are the key benefits of MPAs? 41
4.3 What are the main concerns about MPAs for the sector or group that you represent and what challenges do you see for the expansion of the network? 44
4.4 What do you think is the most appropriate way of managing and monitoring the MPA network? 53
5 List of organisations invited to participate in the stakeholder consultation process. 58

1 Findings from the Stakeholder Consultation

1.1 Preamble

This Annex provides an overview of the evidence gathered through the stakeholder consultation exercise. Wide and effective consultation and information gathering from a diverse range of marine stakeholders was specified as a key part of the Expert Advisory Group's work. As part of this effort, a list of over 100 stakeholders was compiled by the Advisory Group including representatives from the fisheries, aquaculture, recreation, tourism, energy and shipping sectors as well as from environmental NGOs, community groups, government departments, agencies and advisory bodies (listed on page 58).

Due to Covid-related restrictions, consultation was undertaken online during August and September 2020. Stakeholders were invited to participate in an online survey and/or through independently facilitated online focus groups. The survey presented a range of specific and general questions as well as providing opportunities for comment. The focus groups were structured around four main questions to enable a more discursive approach to the topics. Focus groups were attended by between five and eight participants alongside representatives of the Advisory Group and the Department of Housing, Planning and Local Government.

These approaches were carefully designed to provide a platform for stakeholders to freely express their views on the potential costs and benefits of MPAs, the challenges that may arise and possible approaches to management and monitoring. While every effort was made to gather a range of different views from across the main stakeholder organisations, it must be recognised that participants were not randomly selected, but were invited to participate in both the online survey and focus groups. Participants cannot, therefore, be considered representative of all stakeholders who would potentially engage in the MPA network expansion process.

This Annex aims to provide an accessible, balanced and accurate representation of findings from the online survey and the discussion points raised by the participants in the online focus groups. To this end it is divided into three parts:

1. A summary of findings from both the online survey and focus groups structured around the Sections of the main report.
2. A detailed presentation of the findings from the online survey.
3. A detailed presentation of the key themes emerging from the online focus groups.

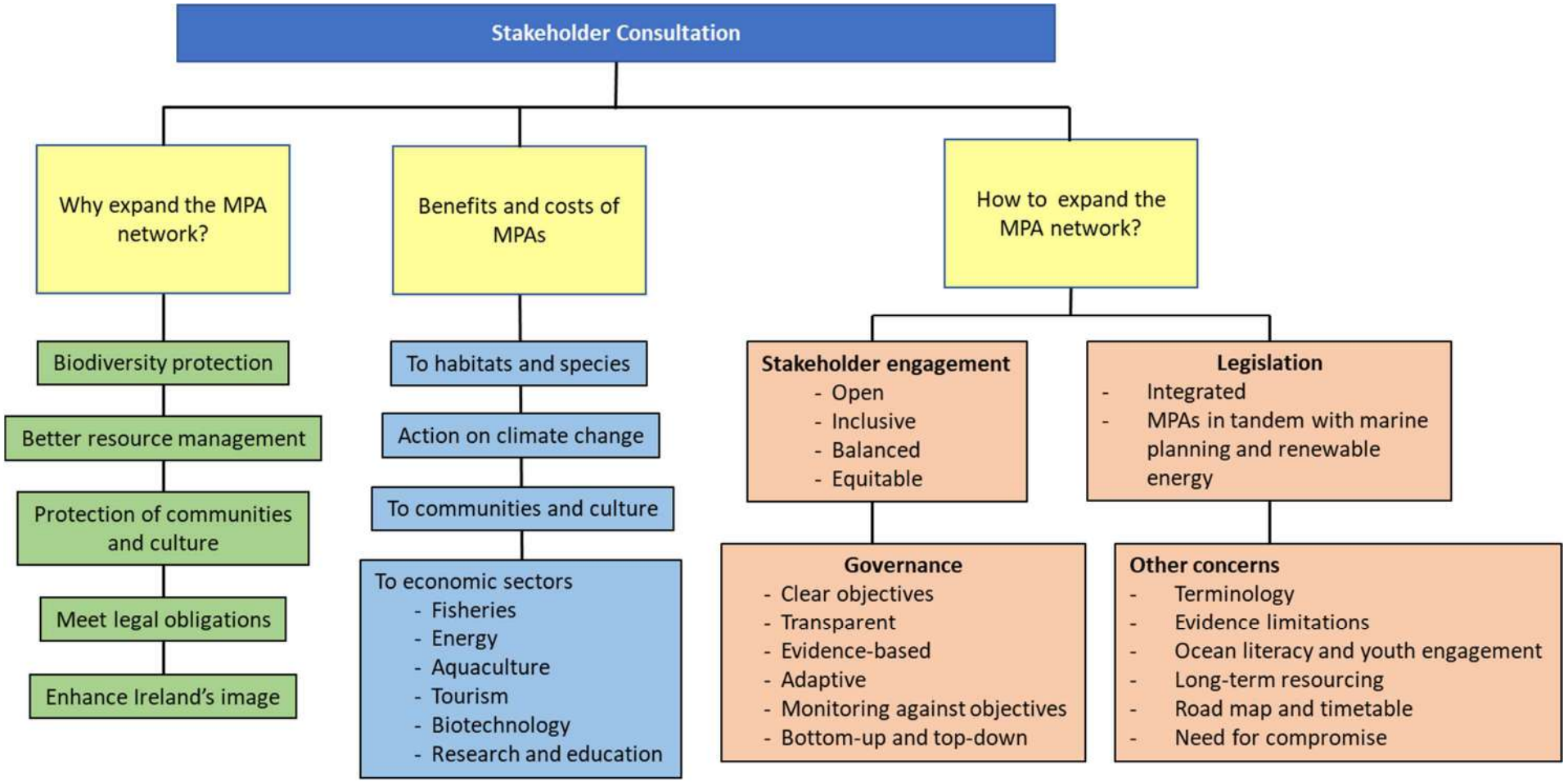

Figure 1.1: Summary of findings from the stakeholder consultation

2 Summary of findings

2.1 Why expand Ireland's network of Marine Protected Areas

Although stakeholders were not directly consulted on why Ireland should expand its network of marine protected areas (MPAs), responses received give some indication as to the value different participants hold for Ireland's marine environment and the vision they have for it.

When survey respondents were asked what they value most about Ireland's marine environment, the most highly scored attributes of those offered to respondents included marine wildlife, climate regulation, opportunities for leisure and recreation, cultural heritage, opportunities for research and education, natural beauty and wildness, and provision of food. The final question in the survey, which solicited views about the expansion of the MPA network included comments about the urgency to designate MPAs to protect Ireland's marine biodiversity which underpins many of these valued attributes.

The first question asked of focus group participants was what was their vision for Ireland's marine environment. While discussing their vision, issues relevant to the expansion of the MPA network were also voiced. This included recognition that Irish waters contain rich biodiversity and natural resources, but that this biodiversity is in decline. It was suggested that the marine environment needs to be better appreciated as a source of sustainable wealth and that it needs to be carefully managed for the benefit of all. MPAs were recognised as one of the tools through which this could be achieved.

Only one focus group participant questioned the effectiveness of MPAs at managing the pressures faced by the marine environment and therefore the expansion of the network. They were not convinced that area-based measures would be effective at managing pressures that are not spatially fixed. This view was not expressed by any other participants, indicating broad acceptance that the expansion of the MPA network would occur.

Another reason suggested by focus group participants for expanding the MPA network was to provide a mechanism for the protection of communities and their culture through support for resources that some coastal communities depend upon for their livelihoods. This viewpoint, however, was contested, with others suggesting that MPAs would be a threat to coastal communities.

On a broader scale, it was suggested that the MPA network will help Ireland meet its legal obligations through, for example the Marine Strategy Framework Directive. It was also indicated that the MPA network would contribute to Ireland's political aspirations to be recognised as a "green country". It was highlighted, however, that the legal pressure to expand MPA designations needs to be set within the context of marine spatial planning and obligations to expand the renewable energy sector with a view to meeting decarbonisation targets.

2.2 What are the likely benefits and costs?

2.2.1 For habitats and species

In an open question about the potential benefits of expanding Ireland's MPA network, "identification, protection, restoration and management of biodiversity (including species, habitats and ecosystems)" was the potential benefit most frequently reported by survey respondents. This was followed by "protection of resources" including fish stocks, "mitigating the effects of climate change" and "the protection of ecosystem services, marine mammals, reefs and other features".

Focus group participants were able to give more nuanced responses and caveated their responses with the recognition that the benefits will depend on the MPA purpose (i.e. what is being protected) and the management measures implemented. Halting the loss of biodiversity and contributing to climate action through effective management was also considered an important benefit by focus group participants.

No costs were envisaged for marine habitats and species, but the ability of MPAs to protect highly mobile marine species was questioned. Concern was also raised as to whether the MPA network would protect the "right" 30% of Ireland's marine waters (i.e. that which would maximise the benefits).

2.2.2 For communities and culture

In general, survey respondents anticipate that the net impact of the expanded MPA network will be positive for coastal and island communities and cultural heritage. When given the opportunity to describe the benefits coastal communities would receive, respondents indicated that these would include the protection of local fish stocks upon which they depend, greater input into MPA and environmental decision-making, general economic support, the potential for new opportunities, especially through tourism, and improved quality of life. Nevertheless, respondents also suggested that coastal and island communities would incur costs including loss of livelihoods, reduced incomes and increased operating costs due to shifting access to the sea and restrictions on their activities. Divergent views on the benefits of MPAs were also anticipated to increase tensions within coastal communities.

Focus group participants echoed these perceptions, recognising that MPAs could both support and hinder coastal livelihoods. Participants suggested that MPAs may support coastal livelihoods through the protection of species of commercial interest and their breeding grounds. It was also suggested that these benefits could potentially be felt beyond the boundaries of the MPAs. To achieve these impacts, however, it was stated by focus group participants that MPAs would need to be effectively managed in partnership with communities.

On the other hand, if MPAs restrict access to the fishing sector through the creation of no-take zones or make other developments unfeasible, it was recognised by participants that the impacts of the MPA network could be detrimental to coastal communities. It was also reported that MPAs are viewed by some to be an interference to communities and their lifestyles. This led some focus group participants to call for better recognition of intangible cultural heritage and for the engagement of communities in MPA management (e.g. through co-management or community ownership).

2.2.3 For economic sectors

As a general point, focus group participants suggested that a positive outcome from the designation of MPAs with developed management plans could be the clarity it would provide to marine users about what activities can occur where. It was also thought that the process could get people working together.

2.2.3.1 Fisheries

Survey respondents indicated that fisheries could benefit from the MPA network through more sustainable fish stocks now and in future, which could in turn contribute to food security. However, findings from the survey suggest that respondents consider that the fishing sector would, in net terms, be negatively affected. These negative impacts were anticipated to result from the restriction in activities leading to a loss of income, increased costs (due to displacement) and knock on effects for communities. Whether long-term gains would outweigh short-term costs was contested.

Focus group participants also recognised the potential for the fisheries sector to benefit through improved fish stocks but considered that the extent to which they would benefit would depend upon what activities would be permissible within an MPA. No-take zones and highly protected areas were reported to be of particular concern, especially for inshore fishers who would be unable to use alternative fishing grounds on the basis of the size of their vessels and their inability to travel long distances.

It was recognised by focus group respondents, however, that not all fisheries would be affected the same way. Unlike inshore fishers, the pelagic fleet would likely be displaced elsewhere if their access to fishing grounds is restricted. This would have knock-on effects for costs and incomes.

It was also acknowledged by focus group participants that MPAs are one of many pressures facing the sector. Expansion of the aquaculture and renewable energy sectors is also impacting their access to the marine environment.

2.2.3.2 Tourism

Potential benefits to tourism identified through the survey include the creation of opportunities for new activities such as ecotourism and science tourism supported by changes in wildlife. However, respondents reported that negative impacts could arise if access restrictions limit visitor numbers. Nevertheless, the net impact on the tourism and leisure sector was anticipated to be positive.

These beneficial and negative impacts were mirrored by focus group participants.

2.2.3.3 Aquaculture

No benefits were identified by survey respondents for this sector and the net impact of the MPA network was anticipated to be negative. Potential impacts on the aquaculture sector were thought to include the loss of access to sites, higher costs for planning, and difficulties in obtaining licenses.

These concerns were also reported by focus group participants who highlighted the dysfunctional nature of the current licensing system and the need for it to become more transparent.

2.2.3.4 Energy

The only benefit identified for the energy sector by survey respondents was that the establishment of MPAs would provide greater security to renewable energy plans as developers would know where installations could or could not go. However, most impacts on the sector (oil and gas as well as renewables) are expected to be negative as a result of restrictions to timely development, inaccessibility of sites and planning hurdles.

Again, these beneficial and negative impacts were also raised during the focus group discussions. Focus group participants representing the energy sector raised particular concerns about MPAs becoming non-activity zones and what the implications of this might be for new developments, including cable laying.

2.2.3.5 Biotechnology

The only potential benefit of the MPA network for the biotechnology sector identified through the survey was that MPAs may offer improved research opportunities. However, one respondent also stated that MPAs may restrict access to resources (e.g. seaweed). Nevertheless, survey respondents generally agreed that the net impact of the MPA network on the sector would be positive.

This sector was not discussed further by the focus groups.

2.2.3.6 Ports and shipping

Only two respondents to the online survey commented on the benefits of the MPA network to the ports and shipping sector. They identified better sea lines of communication and the potential to develop secondary businesses around MPAs relating to tourism as benefits. Negative impacts were reported by survey respondents to include restrictions on anchoring, re-routing of vessels resulting in coastal congestion, concerns over the safety of navigation if vessels are re-routed, and restrictions on port developments impacting employment. Despite this, the overall effect on the sector reported by survey respondents was expected to be neutral.

Shipping and ports were not extensively discussed by focus group participants. The main concern raised by participants was restrictions on existing and planned developments and the implications of this for coastal communities.

2.2.3.7 Research, science and education

Research, science and education was not one of the sectors included in the online survey, although a comment was made by one respondent that research institutions could benefit from the expanded MPA network.

The potential for MPAs to support education was discussed by most focus groups. MPAs were seen as an opportunity for research, science and education with one participant calling them “the classroom for the nation”. Participants also suggested that the MPA designation process could encourage the development of ocean literacy, the level of which was considered low among some stakeholder groups.

2.3 How should we expand our network of Marine Protected Areas?

2.3.1 Stakeholder engagement

From a list of 19 possible options, survey respondents were asked to indicate up to ten attributes that they considered should form part of the process for expanding Ireland's network of MPAs. Stakeholder engagement was the second most highly selected attribute (35 responses), following an evidence-based approach, which was most selected (37 responses).

The development and implementation of the stakeholder engagement process was considered to be the greatest challenge by survey respondents in achieving an expanded and effective network of MPAs in Ireland. Getting buy-in from all potentially affected stakeholders in a balanced way without powerful lobbies overshadowing their voices was a concern. They identified a need for a fair and honest process and acknowledged that previous designations (SACs and SPAs) came with a poor stakeholder engagement track record.

When asked how to overcome the challenges related to the expansion of the MPA network and reduce any negative impacts, the majority of survey respondents stated it could be achieved by having an effective stakeholder engagement process that was transparent and open to all on an equal basis.

Focus group participants also raised the need for an equitable stakeholder engagement process. How to structure and resource the engagement process was recognised to be a big challenge. Focus group participants considered that it needs to be open and inclusive and able to juggle different perspective while not becoming unwieldly. They also suggested that it should be able to minimise conflict and reduce tensions, introduce balance and not give way to well-resourced special interest groups.

Focus group participants indicated that the mechanism to enable stakeholders to engage in MPA designation and management was not clear. The need for this to be robust and transparent was highlighted, however. One suggestion was to create stakeholder forums, following successful models used elsewhere.

Focus group participants further suggested that experts on complex consultation processes should be engaged to help design and facilitate the process to ensure genuine participation, even if it introduces a delay to the designation process. Rather than create a new body to undertake the engagement (which could be costly), one suggestion was to base it on existing resources, although other participants indicated that a dedicate body should be established.

2.3.2 Governance and management

Survey respondents identified that having "clear objectives for the network", "transparency", "provision for periodic review and an adaptive approach" and "an inclusive approach" were important attributes of the process for expanding the MPA network forward. However, issues relating to MPA governance were frequently reported as challenges to achieving an expanded and effective MPA network. These included lack of leadership, management, enforcement and resources as well as a lack of co-ordination between government departments.

A further challenge identified through the survey related to the availability of evidence. Ensuring that the expansion process was evidence-based was the most important attribute selected by survey respondents for how to expand the network.

When asked “who should be involved in the stewardship of our MPAs?”, the most highly ranked groups or bodies included the Irish government, state agencies, coastal communities and local stakeholders. The inclusion of stakeholders was also the most frequent response to “what do you think would be the most appropriate way of managing and monitoring future MPAs?”. This was followed by ensuring that managing and monitoring was adequately resourced and provision for constant monitoring to enable revision of MPA objectives and adaptable management. Respondents were divided over whether management and monitoring should be undertaken by a dedicated state agency or whether to draw on existing agencies.

Focus group participants offered similar opinions on governance, management and monitoring to those gathered through the survey. Getting MPA governance right in terms of structuring management and monitoring as well as resourcing was considered a challenge by focus group participants. Both bottom-up and top-down approaches were suggested as a solution, as well as a mixture of the two. Learning from existing successful models from elsewhere in Europe and further afield (e.g. the US and New Zealand) was proposed.

In terms of management, concerns were raised about what MPAs would look like with the assumption among some that exclusion or restrictions of users will occur. There was also concern that MPAs might be very fragmented with designations and management for different features or issues, while others suggested the need for a common approach to MPA management.

It was recognised by focus group participants that effective management will be essential to the success of the MPA network. It would set the MPAs apart from “paper parks” (areas protected in name only) and ensure that MPAs deliver on their objectives. Despite the urgency to designate the MPA network, it was suggested by participants that it would be better to do it properly than to rush and fail to achieve MPA objectives.

Clear MPA and network objectives were suggested as necessary by focus group participants. This would enable users to know what can and cannot occur inside an MPA, ensure a yardstick against which progress can be measured and help with the establishment of a clear regulatory environment. The need for adaptable objectives was also highlighted by participants as a mechanism for enabling MPA management to respond to changing environmental circumstances and user needs.

Engaging stakeholders, from both the private and public sectors, in management, monitoring and enforcement was recognised as important by focus group participants. However, it was suggested that clear delineation of responsibilities would be needed alongside a clear overarching authority that could arbitrate when necessary. While community engagement in this process was considered essential by many focus group participants, it was also recognised that not all communities would be well equipped to participate as they may lack to necessary institutions and community ties.

2.3.3 Legislation

Survey respondents made little comment on the legislative framework for the expansion of the MPA network. It was reported, however, that protection needs to

be defined against legal processes to ensure compliance and enforcement can be achieved.

Focus group participants questioned how MPA legislation would work with existing legislation. They recognised the need to integrate the MPA network expansion with marine spatial planning, but also plans for the expansion of offshore wind farms and other marine renewables.

Overall, the need for a less fragmented approach to manging the marine environment was highlighted as important to the success of the MPA network.

2.3.4 Other considerations

Focus group participants raised a number of considerations that may contribute to the success of the MPA network:

Terminology: Concern was raised by some participants over the use of the term "protected". While it was recognised that "marine protected area" is a globally recognised term, "protection" was considered by some to be exclusive. One participant suggested that protection could be replaced by conservation.

Use of evidence: It was considered important by focus group participants that designations be driven by the best available evidence to justify the scientific rationale for protection. It was thought that a lack of baseline data will hamper designation and subsequent monitoring. Caution was suggested over the use of expert opinion and the use of data for purposes other than that for which it was gathered.

Levels of ocean literacy and youth engagement: Focus group participants suggested that the current level of understanding by some stakeholders about the marine environment is insufficient, meaning that the stakeholder engagement process could be asking people to do something for which they are not equipped. They suggested the need to raise levels of ocean literacy, especially among young people, and to celebrate the ocean. The MPA designation process was suggested as a platform for achieving this.

Long-term resourcing: Focus group participants questioned where the resources to support stakeholder engagement would come from, recognising that to do it well could be costly. The need to resource long-term management, monitoring and enforcement was also recognised. One suggestion was to introduce a green levy on those who benefit from the MPA designations.

Need for a roadmap: Protecting the ocean was recognised by focus group participants as a long-term objective; however, they indicated that a start is needed, together with a clearly articulated ambition that is accompanied by a timeframe to enable progress to be measured.

Need for compromise: Focus group participants stated that achieving something that will benefit everyone will require trade-offs. They encouraged the need to be realistic and open about this. While they recognised that not everyone will see the need for MPAs and they anticipate some level of tension and conflict, they highlighted the importance of sectors working together. They further suggested that finding the right balance will require compromise.

3 Stakeholder Survey Analysis

This section presents the findings from the short online survey used to collect feedback from a range of stakeholders with interest in the expansion of Ireland's MPA network.

The survey comprised a mixture of tick box and open-ended questions (20 in total) aimed at understanding respondents' opinions on and understanding of:

- The concept of marine protected areas;
- The anticipated benefits and negative impacts from the expansion of Ireland's MPA network and for which sector;
- The characteristics of the process needed for the expansion of the MPA network;
- The challenges facing the expansion of the MPA network and any necessary mitigating actions; and
- Who should be involved in the stewardship of Ireland's MPAs and how they should be managed and monitored.

An invitation to participate in the survey was sent to 120 stakeholders (Table 3.1) from 85 different organisations (see section 5) during August and September 2020. A total of 50 usable responses were received by the 2nd October 2020. In addition, two written responses were received not through the survey.

Table 3.1. Number of respondents invited to participate

Sector	Number
Environment sector	13
Public sector	55
Economic/Industrial	48
Social and economic development	2
Political Ecology (academia)	2
Total:	**120**

In this report, summaries are provided for each question. Closed questions with tick box responses are represented below through graphs and tables, while open ended narrative responses were analysed to identify key themes and areas of agreement and disagreement. Key themes are described below.

Care is needed in the interpretation of the findings. The sample of respondents is small and respondents were not randomly selected. Rather they were selected to represent a range of interests and sectors. Some groups are represented by more individuals than others, which may not reflect the size of their sector or group or their importance with regards the expansion of the Irish MPA network. Furthermore, some groups are absent from this sample.

3.1 Section 1: Respondent background

3.1.1 Which sector or group do you mainly represent?

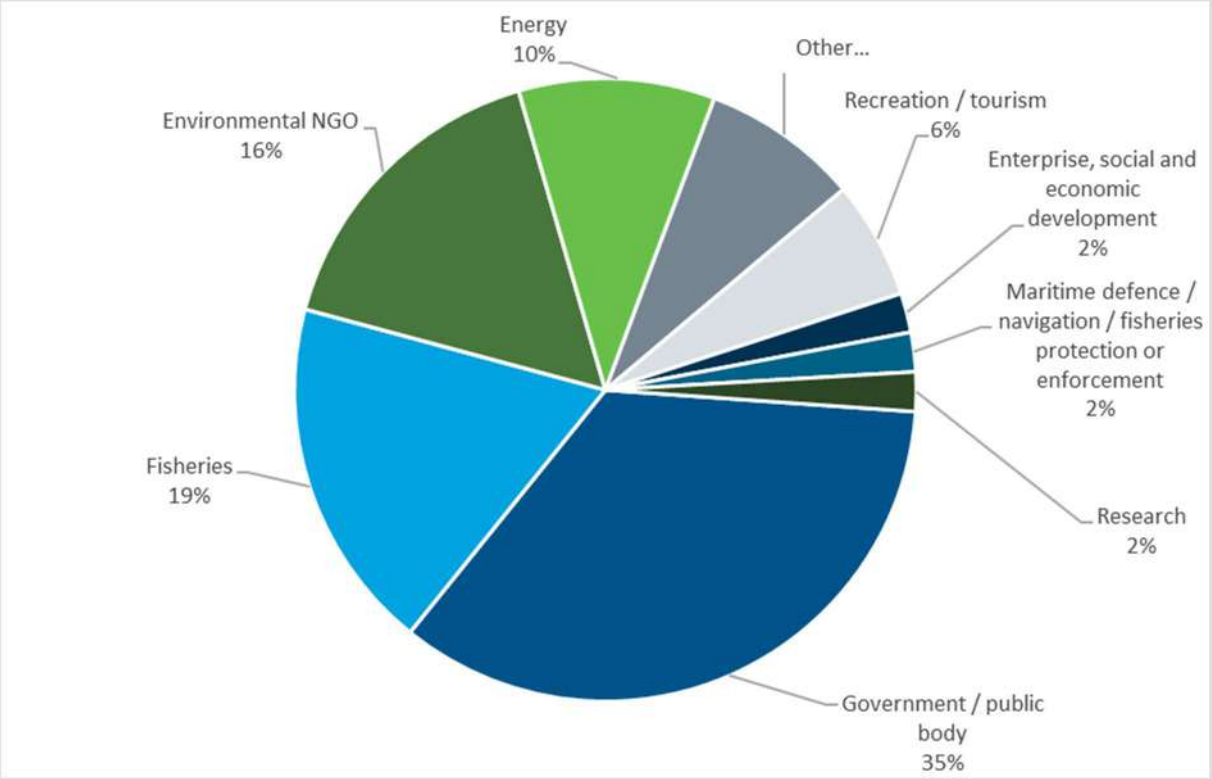

Figure 3.1: Sector representation of respondents

Of the 50 respondents, 49 responded to this question (Figure 3.1). The majority (17) represented **Government or public body sectors**. The second highest response rate came from stakeholders in the **fisheries sector** (9), followed by **environmental NGOs** (8). Only five responses were received from the energy sector, three from recreation/tourism, and one each from research, maritime defence and enterprise, social and economic development respectively. An additional 4 respondents were from 'other sectors', including seaweed harvesting and processing, maritime transport, a fisheries agency with both marine and freshwater remit and offshore islands of Ireland. The two responses not received through the survey came from the Government or public body sector.

3.1.2 What is your gender?

49 out of 50 respondents recorded their gender (Table 3.2). The majority of respondents identified as male (53%).

Table 3.2. Respondent gender

Gender	Frequency
Female	12
Male	26
Other	8
Prefer not to say	3

3.2 Section 2: Perceptions of Ireland's marine environment and Marine Protected Areas

3.2.1 What do you value most about Ireland's marine environment?

Respondents were asked to indicate what they valued most about Ireland's marine environment. Up to five options could be selected. 49 respondents completed the question choosing between one and five options each (Figure 3.2).

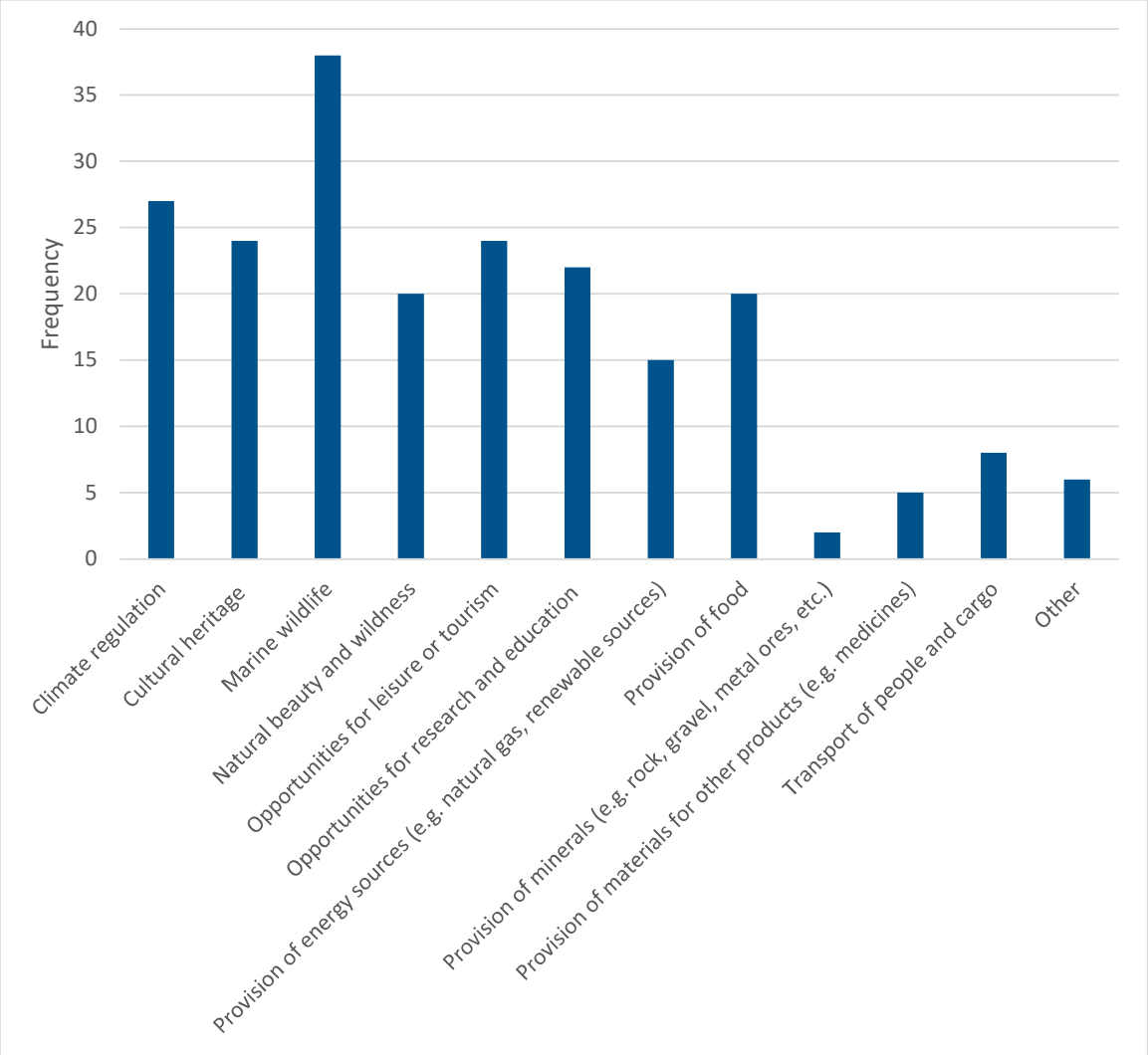

Figure 3.2: Respondents' most valued attributes of Ireland's marine environment in terms of the frequency with which each attribute was selected by a respondent

Ireland's **marine wildlife** was selected most frequently (37 times) which was a significantly higher response than any other option. The second highest option selected was **climate regulation** (27 times). A number of options received similar response rates, including **opportunities for leisure or tourism** (24), **cultural heritage** (23), **opportunities for research and education** (21), **natural beauty and wildness** (20) and **provision of food** (20).

Characteristics selected least by respondents included the provision of materials for other products (e.g. medicines) (4) and provision of minerals (2). A further 6

respondents provided other options including ecosystem function, angling opportunities, and community.

A subsequent question enabled respondents to elaborate on their answers. Eight respondents provided a written answer. Comments included:

- That all options provided were valuable and that the options that they selected were not comprehensive of the full value of Ireland's marine environment.
- That ecosystems and maritime resources (including food and bioactive compounds) were highly valued. Bioactive compounds were particularly valued by one respondent due to the role of marine resources in the human and animal health sectors.
- Two responses noting that the potential use of energy resources (including gas, oil and renewable) is highly valued within Ireland's maritime environment, and that energy security and sustainable energy resources were particularly essential.
- One respondent who, given the organisation that they represented, stated that they selected the options that support the creation of employment and local development opportunities.

3.2.2 What do you consider a Marine Protected Area (MPA) to be?

A range of opinions were expressed by respondents as to what they considered an MPA to be. Of the 46 respondents who completed this question, the majority (41) were in agreement that an MPAs is a **geographically defined space**. The remaining 5 were not necessarily in disagreement, just did not mention geography in their responses.

The next most commonly reported themes where:

- That the purpose of MPAs was to **manage and safeguard species, habitats and biodiversity** (21 respondents).
- That MPAs are areas that are **managed through legal or other effective means** (17 respondents).
- That MPAs **restrict certain activities** to maintain or enhance features such as marine life, flora, fauna and heritage (12 respondents).
- That MPAs should be considered **part of wider sustainable development** and should allow sustainable use of marine resources as long as they do not compromise conservation objectives (10 responses).
- That MPAs need to take account of, and where necessary, support and protect **heritage and cultural concerns** (7 responses).

This is summarised by respondent #38:

> "*A legally protected, actively managed, spatially defined area, comprised of marine habitats (from coastal to deep sea/ intertidal to subtidal), overlying water, flora and fauna, and cultural heritage where the primary aim is the protection and conservation of marine biodiversity. An MPA would take account of social, economic and cultural activities, ensuring sustainable use of the marine resource*."

A number of other issues were also identified by between one and four respondents such as:

- A need to focus on ecosystems, whole sites, resources of interest (e.g. nursery areas) or ecosystem health rather than species or features.
- The need to coexist with sustainable fisheries and aquaculture and that they should not be automatic no-take or no-fish sites.
- That they should exclude fishing.
- That they should be evidence-based, adaptively managed and devised through stakeholder engagement.
- That the ICUN or Convention on Biological Diversity definition should be used or that for existing designations (e.g. SACs or SPAs).
- That they should be the pride of the local community and support local economic opportunities.

The main area where conflicting views were expressed was on the access of commercial fisheries to MPA sites.

3.3 Section 3: Expansion of the MPA network

The remaining questions focused on issues relevant to the expansion of the MPA network such as potential benefits,

3.3.1 What would you consider to be the potential benefits of expanding Ireland's network of MPAs?

Forty-five respondents provided at least one potential benefit of expanding Ireland's network of MPAs. The most frequently mentioned benefits anticipated from the expansion of Ireland's MPA network included:

- the **identification, protection, restoration and management of biodiversity (including species, habitats and ecosystems)** (22 respondents),
- the **protection of marine resources** (13), although which resources considered was not always identified
- the **protection of fish and their habitat** was specifically mentioned by 11 respondents.
- **protecting against and mitigating the effects of climate change** (10 respondents).
- **opportunities for research and education** (8 respondents)
- the **protection of seascapes and heritage** (7 respondents)
- **improved quality of life for coastal residents** (5 respondents).

Other possible benefits were also identified included benefits to recreational fisheries, improved management including of existing regulations, a balance between protection and use, stopping pollution, no fish zones, improved decision-making regarding offshore energy (oil, gas and wind) and the encouragement of technological innovation and maritime digital interconnectivity.

Some respondents answered this question identifying many potential benefits, for example:

> "*Expanding Ireland's MPA network would deliver a range of positive environmental and socio-economic benefits. The network should be central to our efforts to protect and restore marine biodiversity and marine ecosystem health including rebuilding marine food webs. The network should restore the conservation status of threatened marine habitats and species. The network should contribute positively to the health of the broader marine environment, enhancing its capacity to deliver essential ecosystem services like commercial fisheries and climate mitigation as well as rebuilding resilience against pressures like overfishing and climate change.*" (Respondent #26)

> "*The potential benefits are myriad and complex, depending on the specific criteria chosen for particular MPAs. They include the protection of important subsea features, fish life, marine mammals, contributing to commercial fish stocks within and outside these areas (spawning ground protection) and the economic benefits to be derived therefrom, supporting a balanced coastal marine economy by improving marine tourism opportunities, enhancing biodiversity and marine life populations such as marine mammals and birds. This represents a series of societal and environmental benefits in terms of contributing to marine conservation.*" (Respondent #48)

Others took a more sectoral perspective, for example:

> *"MPAs will place environmental protection and socioeconomic values at the heart of development in the marine space, allowing developers to ensure appropriate protections are in place to prevent damage to natural or cultural assets. The management of MPAs must be prescribed to allow appropriate levels of recreational and development activity*." (Respondent #18)

> "*As inshore fishers anything that improves the renewable biological resources and their habitats protects our livelihoods therefore if MPAs mean that every effort will be made to strengthen efforts to have a healthy ecosystem this should have a positive impact. Also protecting the inshore prey species such as sprat and herring from over exploitation will have beneficial impact in the long term."* (Respondent #30)

> *"Well managed MPAs can foster healthy marine ecosystems and help address biodiversity loss which will be of benefit to the seafood sector"* (Response not through survey)

One respondent cautioned, however, that no benefits will emerge unless the management of MPAs is clear:

> "*We see little potential benefit to the expansion of Ireland's network of MPAs unless there is a clear, scientifically proven necessity to protect vital marine ecosystems the further degradation of which would cause long-term damage to existing fishing grounds and associated ecosystems both inshore and off-shore*." (Respondent #19)

3.3.2 What possible benefits would you envisage for up to three named sectors/groups other than the one you represent?

Respondents were given the option to select up to three sectors and identify possible benefits for those sectors. Benefits to fisheries were most frequently selected by respondents (24 respondents) followed by leisure and tourism (22 respondents) and coastal and island communities (17 respondents) (Figure 3.3).

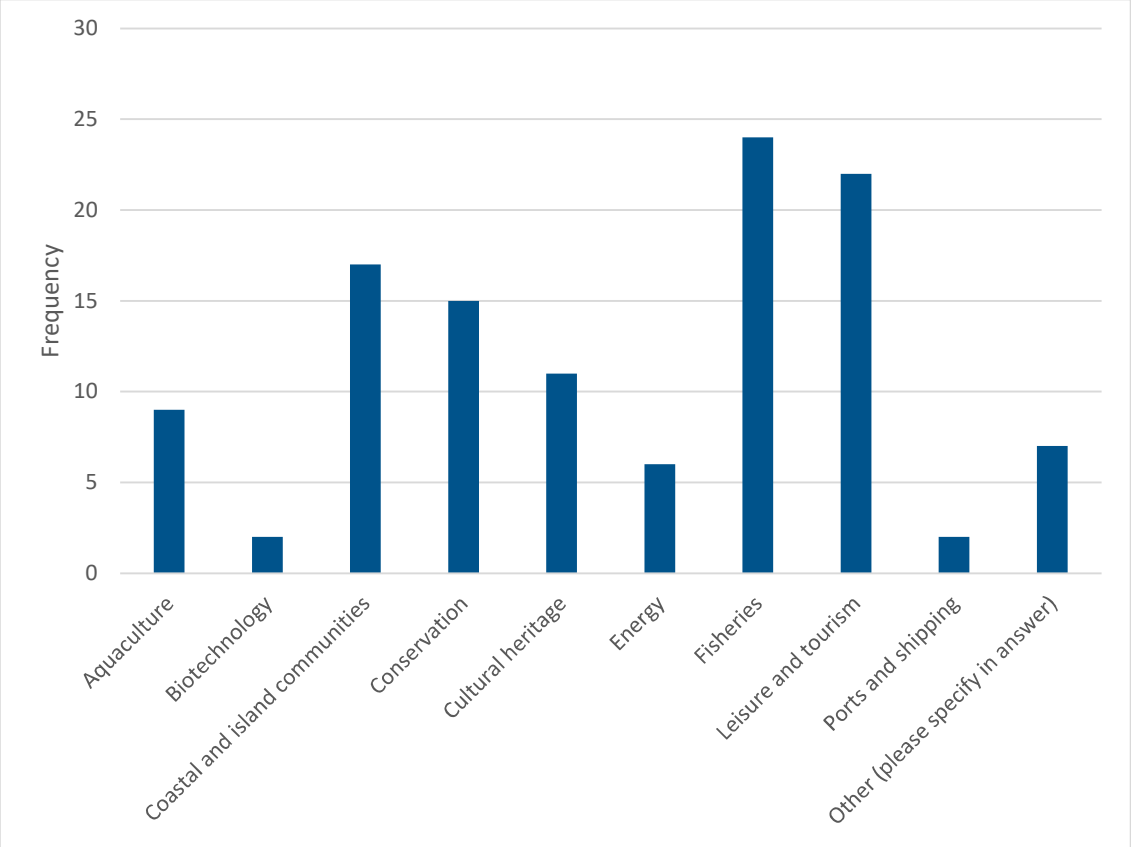

Figure 3.3: Sectors for which benefits were identified by respondents

Fisheries: Of the 24 respondents who provided benefits to fisheries, the majority were from environmental NGOs (7 respondents) and Government or public bodies (7 respondents). Eighteen respondents noted that the greatest benefit would be **sustainable fish stocks**. Respondents also identified that the protection of fish through MPAs would not only improve ecosystems and habitats but would also result in an abundance of resources for future commercial fishing and consequently future food security.

Leisure and tourism: A total of 22 respondents provided benefits to leisure and tourism, of which the largest number were from the fisheries sector (6) and Government or public bodies (6). The main benefit reported (12 respondents) was that MPAs could provide opportunities for ecotourism, science tourism and general tourism (including hospitality). This would be supported by changes in wildlife, but also factors such as cleaner seas and beaches. As a consequence of tourism development, it was noted by 5 respondents that local communities would reap both social and economic benefits as well as greater appreciation of the benefits of the marine environment to civil society and fisheries.

Coastal and island communities: Seventeen responses were given for coastal and island communities, of which the majority were from Government or public bodies (8) and environmental NGOs. The most commonly reported benefit was protection of local fish stocked on which local communities are dependent (6). They were also expected to benefit from tourism opportunities (5) and greater input into MPA and environmental decision making (5). Other issues mentioned included general support for the local economy, the potential for new opportunities (unspecified) and improved quality of life.

Conservation: 15 respondents split fairly equally across different sectors identified benefits to this sector primarily emphasising the benefits to biodiversity and ecosystem functions. There was recognition that the quality of marine biodiversity also impacts the livelihoods of communities dependent on the marine environment.

Cultural heritage: Of the 11 respondents who selected cultural heritage, six were provided from the fisheries sector. Five responses explicitly recognised the link between fisheries and local heritage and MPAs would "*Protect the habitats and stocks upon which the culture and identity of inshore fishers has been built for generations*" (Respondent #29)

Aquaculture: there were 9 responses for aquaculture, of which 6 were provided by Government or public bodies and the remaining 3 from the fisheries sector. The responses included increased clarity regarding licensing, improved water quality for aquaculture, opportunities for innovation, research and education, although one respondent noted that the benefits will depend upon the management regime of the MPA.

Respondents provided less possible benefits for sectors such as energy (6) biotechnology (2) and ports and shipping (2). Respondents noted the energy sector may benefit from greater security in terms of renewable energy plans; biotechnology may experience improved research opportunities and ports and shipping may experience better sea lines of communication and possible associated tourism benefits.

Seven respondents also anticipated benefits to other sectors including

- Research and education, when located in areas serviced by colleges, allowing the creation of "centres of excellence".
- General public, highlighting the importance of marine biodiversity with attendant improvements in well-being associated with conservation and heritage.
- Long-term protection of marine mammals, reef systems and other ecological features.
- Strengthened enforcement protecting inshore stocks.
- Protection of ecosystem services.

3.3.3 What are your concerns about the possible negative impacts of MPAs?

Forty-two responses were received to this question. While five respondents could see no potential negative impacts from the designation, all other respondents identified at least one possible negative impact. The concerns most commonly raised were:

- about the **designation process not being fit for purpose** (12 respondents),
- that there is **insufficient scientific evidence resulting in mis-designation** (10 respondents),
- that there is a **lack of stakeholder engagement during the designation process** (8 respondents),

As one respondent summarised:

> "*I would be concerned that Ireland will fail to learn from Ireland's past experiences in designation and management of protected areas or that we will fail to learn from international best practice. There is a risk that Ireland's MPA network will lack ambition, lack of leadership or a lack of financial backing. Based on our own stakeholder engagement inshore fishers have clearly said that they are not against spatial closures and that they are used to them in fisheries management. They just want the scientific basis and need to be made clear to them and that communities should be involved in every step. I would be concerned that due to a lack of leadership we will end up with a network that is based on the path of least constraint rather than based on what are the best places to protect and what areas and management could deliver the most benefits*." (Respondent #25)

In terms of impacts on specific sectors or stakeholder groups, impacts on the **fishing sector** and **coastal communities** (largely through their links to the fishing sector) were most commonly raised (8 and 7 respondents respectively), although 7 respondents highlighted that MPAs could lead generally to restrictions on activities. Concerns were also raised for the energy sector and shipping.

For example:

> "*The Irish fishing industry is exposed to constant erosion of fishing opportunities which is steadily undermining its value as a major generator of wealth for Ireland, socially as a supplier of food which is beneficial for human health and culturally as the basis of community life in the maritime regions of Ireland and particularly remote rural locations. Existing MPAs have had negative consequences for many of the small pot-fishers already and extension of the network of MPAs is quite likely to render this particular sector "extinct*". (Respondent #19)
>
> *"The access needs of fisheries are varied due to the diverse nature of stocks which are fished, varying from year-round to seasonal to intermittent. Unnecessarily restricting access to fishing grounds could negatively impact the economic viability of rural coastal communities which rely on these areas for fishing. There is also the likelihood of the fishing effort in a certain area being displaced to an adjacent area where there could be adverse impacts."* (Response not received through survey)
>
> *"The understanding of Marine Protected Areas in Ireland needs to be considered in this regard [expansion of renewable energy] and be mindful of national policy, targets and the multifunctionality of the sea. The seascape will be used more intensively than ever before and support different functions at the one time. From a multifunctional perceptive, one area of sea can have ecological, environmental, economic, socio-cultural and aesthetic functions that are of benefit to many. It is important that the assessment to expand the Marine Protected Areas is cognisant of the simultaneous spatial integration of*

functions, which result in interaction among local economies, the environment and social objectives." (Respondent #17)

Other factors highlighted included:

- differential impacts on stakeholders and the perceived fairness of this;
- that conservation will be prioritised over all other uses;
- that there is a lack of management of MPAs and measurement of their impact;
- that there is increased activity outside of MPAs as a result of displacement of activities no longer permitted within the MPA, potentially leading to conflict and increased competition;
- that operating within and around MPAs becomes burdensome in terms of the permitting process;
- that MPAs effectively allow sectors to privatise an area for their use;
- concern for safe navigation of maritime vessels and additional operational and legal requirements for the shipping sector.

These concerns are summarised by Respondent #47:

"*The possible negative effects of MPAs are conflict between and with pre-existing users of an MPA area, the loss of economic opportunities in the short term displacement of effort into non-MPA areas. The biggest negative effect is to develop MPAs and not to follow through on the actions required to achieve their objectives - a common failing in public policy terms in Ireland. The concern is less about the fact of MPAs in themselves than the process of basic analysis development, genuine consultation and transparent decision-making - such as the fundamentally anti-democratic processes engaged in in relation to previous environmental designations which has caused deep public scepticism - with good reason in my view."*

3.3.4 What possible negative impacts would you envisage for up to three named sectors/groups other than the one you represent?

Respondents were given the option to select up to three sectors and provide possible negative impacts for those sectors. Similar to responses on the possible benefits of MPAs, the fishery sector was most frequently selected regarding negative impacts, followed by aquaculture and coastal and island communities (Figure 3.4).

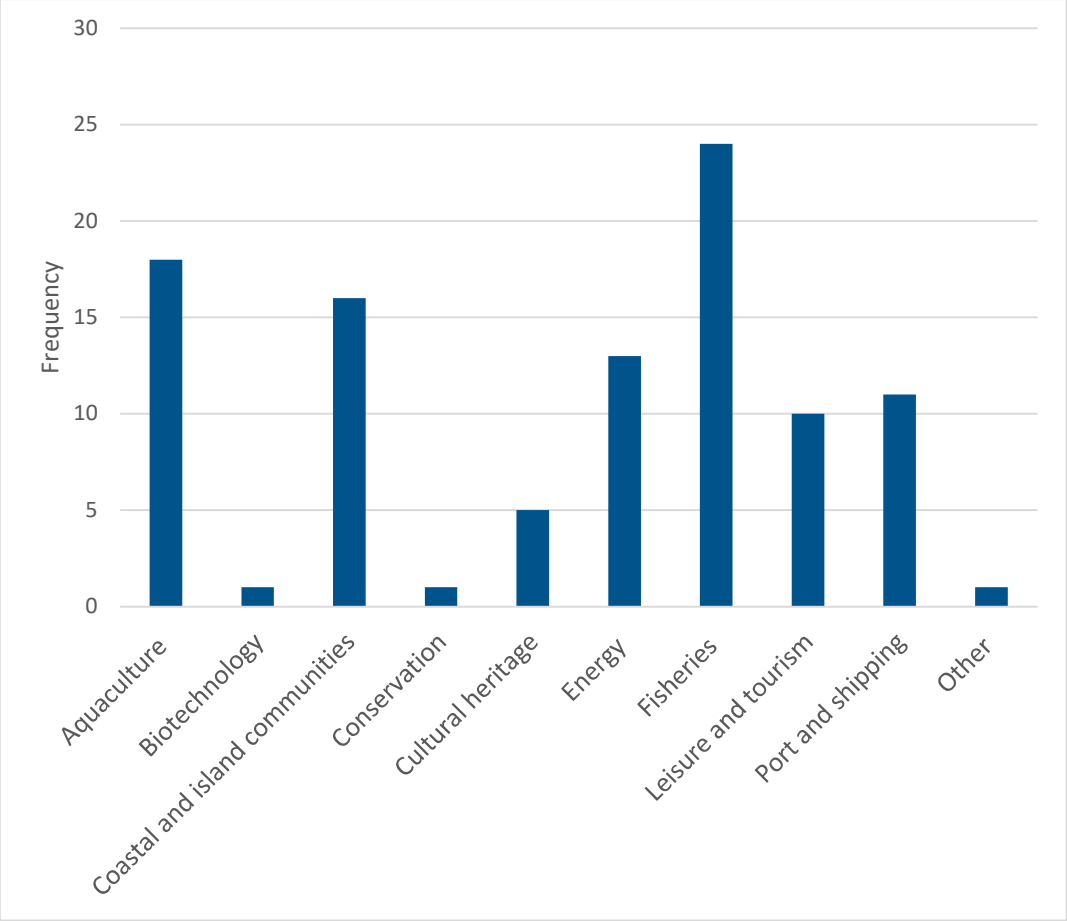

Figure 3.4: Sectors for which negative impacts were identified by respondents

Fisheries Twenty-four responses were received for the fishery sector of which environmental NGOs, fisheries and Government/public bodies were the highest to respond. The most common negative impact reported related to restricted access to sites resulting in loss of income, increased costs and reduced contribution of the sector to coastal communities, although one respondent noted that this would depend on the management measures introduced. Concerns about displacement were also raised and how effort could be shifted to other vulnerable areas. Smaller vessels may also be forced to travel further out to sea to earn a living. While one respondent thought that the long-term gains could outweigh the short-term costs, another thought that such a situation may never be reached.

Aquaculture: Seventeen responses were provided on possible negative impacts regarding the aquaculture sector. The majority of responses were from Government or public bodies (6 responses) and fisheries (5 responses) Negative impacts highlighted included loss of access to or limits on the availability of suitable sites (even when the activity has proven potential to coexist with other uses and precipitate environmental improvements); higher costs, especially at the planning stage; foreshore licences being difficult if not possible to obtain. One respondent highlighted that intensive finfish or shellfish will have impacts that are not compatible with conservation objectives meaning mitigation measures need to be developed. While this is not a negative impact in itself, it does have cost implications.

Coastal and island communities: were selected by 16 respondents, 7 of which were from the fisheries sector and a further 4 were from Government or public

bodies. Impacts on employment was the most frequently stated negative impact. Other concerns included Loss of livelihood, reduced income and increased operating costs due to shifting access to the sea and restrictions on activities including traditional activities. Concerns were raised for the offshore islands and that irresponsible designations could result in costs, and especially if MPAs are not managed properly. Limited input at planning stage and conflict among stakeholders resulting from divergent views of MPAs were also considered potential negative impacts.

Energy: A total of 13 respondents selected the energy sector, the majority of which were from Government or public bodies (6 responses). Key concerns raised include restrictions to timely development of renewable energy, inaccessibility of sites and potential resources for development due to protection, and increased planning hurdles.

Ports and shipping: Eleven stakeholders split across numerous sectors selected the port and shipping sector. Negative impacts were considered to be restrictions to anchoring, changes to routes potentially resulting in coastal congestion, impacts on safety of navigation and curtailment of commercial activities resulting in loss of employment and livelihoods. There was also concern that port development may be impacted.

Leisure and tourism: Ten respondents split across numerous sectors selected leisure and tourism. Restrictions on activities through, for example, limits to visitor numbers or access to a site, depending on the level of protection given to a site was the main concern.

Cultural heritage: Five respondents, four of which were from the fisheries sector, selected cultural heritage reporting a number of potential negative impacts including: loss of livelihoods, prevention of access to resources that may be part of the local community, and loss of intangible cultural heritage as communities are displaces by large-scale developments (e.g. offshore energy, aquaculture, mining etc.). Concern was also raised about the natural capital approach and how it may obscure many important natural and cultural treasures.

Biotechnology: Only one from an environmental NGO respondent commented on the biotechnology sector stating that MPAs could restrict access to marine resources such as seaweed.

Conservation: One respondent from a Government or public body selected the conservation sector, however, they reported that the impacts were likely to be positive, especially if sustainable and climate benefiting activities are developed alongside.

Other: One respondent selected other and reported that restrictions on the sectors listed above could lead to negative sentiment to government departments and agencies.

3.3.5 Please indicate your views on the overall net impact of an expanded network of MPAs for each (or a subset) of the following.

Respondents were invited to score the net impact of an expanded MPA network on different maritime sectors and marine attributes using a scale from strong negative impact (1) to strong positive impact (5). Forty-five responses were received, although not all respondents scored all sectors or attributes.

In terms of negative impacts (Figure 3.5) oil and gas energy was most frequently selected (16 respondents) as being strongly negatively impacted, with no respondent regarding oil and gas energy to be strongly positively impacted. Aquaculture (19 respondents), renewable energy (18 respondents), fisheries with vessels under 12 m (19 respondents) and fisheries with vessels over 12 m (13 respondents) were also considered to be among those most negatively impacts. Concerns were also identified for ports and shipping, sea angling and coastal communities (on islands and rural mainland). Environmental attributes were generally not considered to be negatively impacted by the expansion of the MPA network.

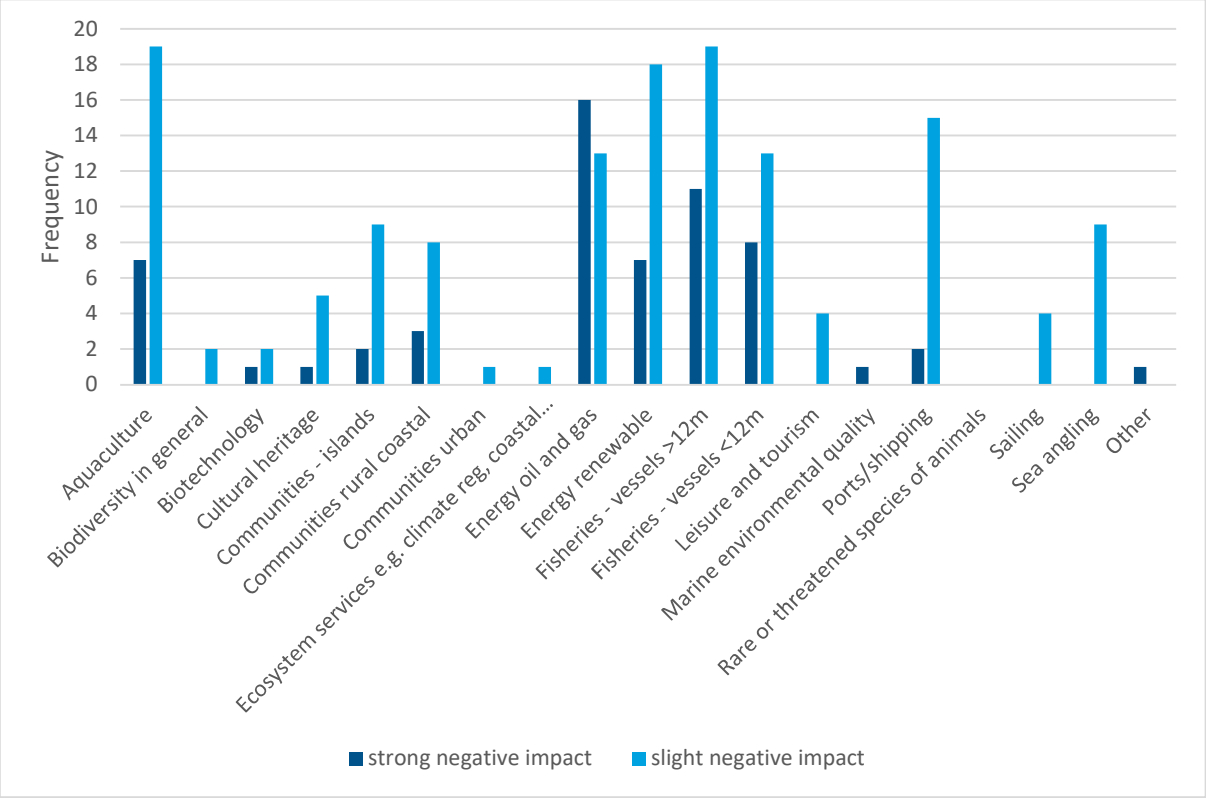

Figure 3.5: Frequency of net negative impact scores given by respondents for marine sectors and attributes

In terms of net positive impacts, marine attributes were selected most often (Figure 3.6). Twenty-seven respondents through the expanded MPA network would have a strong positive impact on rare or threatened species of animals, with no respondents considering that MPAs would have a strong negative or slight negative impact on such species. Similarly, marine environmental quality (26 respondents), biodiversity (24 respondents) and ecosystem services (20 respondents) were all anticipated to receive a strong positive impact, with no or few respondents selecting these issues as being strongly or slightly negatively impacted.

The impacts of the expanded MPA network on biotechnology (22 respondents), urban communities (18 respondents), ports/shipping (18 respondents), sailing (18 respondents) and sea angling (12 respondents) were considered to be more neutral.

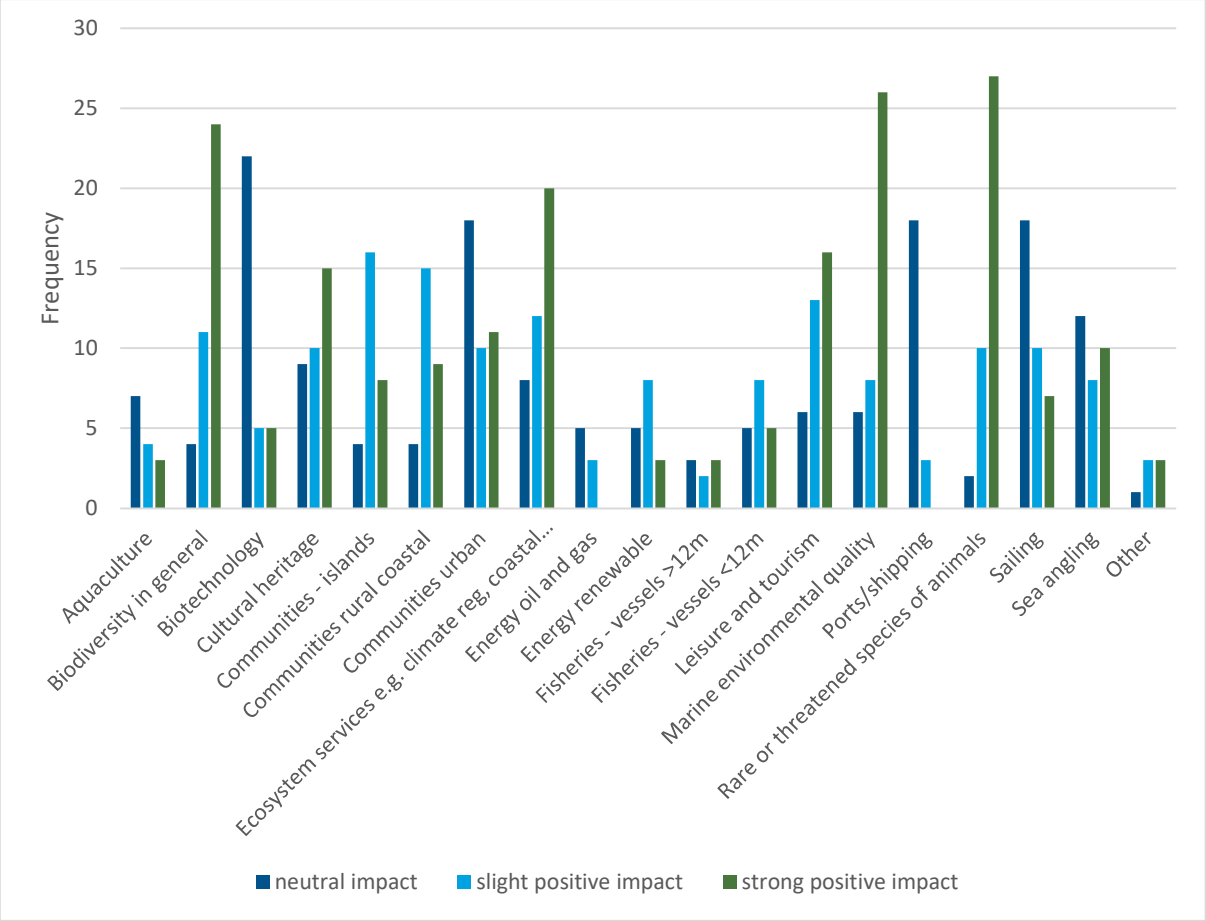

Figure 3.6: Frequency of net positive and neutral impact scores given by respondents for identified marine sectors and attributes

Seven additional comments were received. Two reported strong positive impacts for scuba diving and snorkel tourism, and for education. The remainder commented on the challenge of responding to this question, highlighting that the impacts felt will be highly dependent upon the restrictions implemented:

> *"It is impossible to answer this question in the absence of detail on the proposed designation and management processes. If it is a finely tuned evidence-based approach and not a blunt instrument there will be potentially wins [for] all sectors."* (Respondent #38)

3.4 Section 4: Achieving an expanded MPA network

3.4.1 Which attributes do you think should be part of the process for expanding Ireland's network of MPAs?

Respondents were given the option to select up to 10 attributes (Table 3.3) that should be part of the process for expanding Ireland's network of MPAs.

Table 3.3: Attributes that could form part of the process for expanding Ireland's network of MPAs

	Attributes
1	A systematic approach
2	Adequate financial resourcing
3	An equitable approach
4	An evidence-based approach
5	An inclusive approach
6	Careful consideration of socio-economic benefits and costs
7	Clear objectives for the network
8	Detailed guiding principles
9	Emphasis on compliance with international objectives
10	Emphasis on stakeholder participation
11	Establishment of a dedicated agency or unit
12	Flexibility to designate for biocultural features *(aspects of nature that are intertwined with human knowledge, experience or cultural traditions)*
13	Flexibility to enable community-led initiatives
14	Local experience and expertise is valued as an integral part of the process
15	Provision for effective enforcement of management measures
16	Provision for periodic review and an adaptive approach
17	Specification of objectives and management measures as part of the designation process
18	Transparency
19	Other

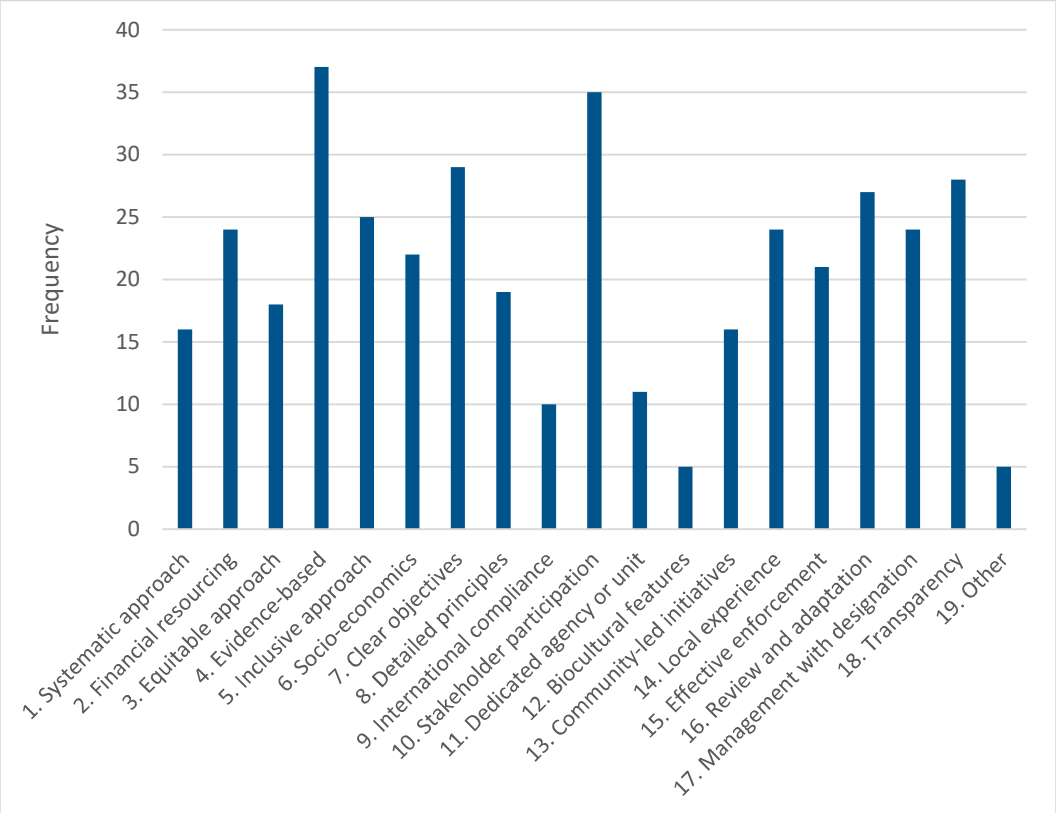

Figure3.7: Frequency of selection by respondents of attributes that should form part of the process for expanding Ireland's network of MPAs

The most frequently selected option (Figure 3.7) was the need for **an evidence-based approach** (37 respondents). Second to this, receiving 35 responses, was the need for **stakeholder participation**. Other highly selected attributes included **clear objectives for the network** (29 respondents), **transparency** (28 respondents), **provision for periodic review and an adaptive approach** (27 respondents) and an **inclusive approach** (25 respondents).

Attributes that were less frequently were establishment of a dedicated agency or unit (11 respondents), an emphasis on compliance with international objectives (10 respondents) and flexibility to designate for biocultural features (5 respondents).

Respondents who commented further on the attributes that should be part of the process for expanding Irelands network of MPAs noted that all the attributes provided were important. In addition, two respondents noted the importance of local level engagement and a further respondent noted there is no need to develop another governmental department.

3.4.2 What do you see as the main challenges in achieving an expanded and effective network of MPAs in Ireland?

Of the 50 respondents to the survey, 40 provided an answer to this question. By far the greatest concern was **development and implementation of the stakeholder engagement process**. In particular, there was concern about getting buy-in from all potentially affected stakeholders in a balanced way that doesn't lead to the concerns of powerful lobbies and sectoral interests overshadowing the concerns of less vocal sectors. The need for a fair and honest process was highlighted alongside acknowledgement previous designations (SACs and SPAs) come with a poor track-record on stakeholder engagement.

For example:

> "*MPAs will need clear objectives and be delineated with clear community engagement. Successful MPAs must have full stakeholder buy-in*." (Respondent #21)

> "*The main challenges will be to satisfy all stakeholders while establishing a network of MPA's that actually protect "something". Dilution of the network to areas not really protecting or offering benefits to society would be a pointless exercise or to be so far offshore to be unprotectable. To this end the commercial fishing organisations are a powerful professional lobby group who will grind down opposition. Getting them on board will be not impossible but critical…"* (Respondent #6)

Issues related to **MPA governance** including a lack of leadership, management, enforcement and resources (including financial resources) were also frequently mentioned. There was concern that there is a lack of co-ordination between government departments with remits within the marine environment and a lack of leadership from any one body taking the MPA network expansion forward.

> *"Lack of real genuine engagement with stakeholders and consideration for traditional practices - perception that the expanded MPAs will be put in place one way or the other with [no] regard for the above….Lack of co-ordination or a lead between relevant Government Departments that are responsible for MPAs, offshore Wind farms and fisheries and aquaculture. The current offshore Wind farm onslaught is an example of this where fishers are being left to deal with*

large multinational companies with no verification or back up support from the state bodies to verify the accuracy of statements made the wind farm industry on the their potential impact on fisheries and aquaculture." (Respondent #37)

"*The poor record of Ireland's ability to manage the current Natura 2000 network has many causes. Lack of political will resulting in poor financial resourcing of key agencies, lack of clarity who is in charge of MPA management and enforcement, lack of stakeholder participation and community buy-in are but a few of the main challenges. Building an effective network of MPAs would require a complete overhaul of current governance processes*." (Respondent #20)

There was also concern expressed about the **availability of evidence** on which to designate MPAs:

"*Getting the evidence needed to support the decision making and getting buy in from affected stakeholders*." (Respondent #2)

"…Data Generation, Analysis and Consumption - unlike terrestrial environments the marine environment can regarded as less tangle to the vast majority of people. Ensuring we have the right data to make informed decision is crucial…" (Respondent #27)

Other challenges raised included:

- The need for effective communication to help overcome long entrenched perspectives as well help understand the need for an expanded MPA network;
- Ensuring that the MPA network delivers something meaningful, with concern for quantity over quality insofar as the target of reaching 30% of Irish waters under protection takes precedence over what is being protected.
- Ensuring that the expansion of MPAs is planned in context and while planning for other sectors.
- Too many restrictions on activities limiting buy-in by stakeholders and impacting upon compliance.
- Resistance to the establishment of MPAs and the need for a bottom-up approach as a mechanism to overcome resistance.
- The need for legislative changes.

3.4.3 What could be done to overcome any challenges you identified in the previous question?

Thirty eight respondents provided suggestions as to how to overcome some of the challenges identified in the preceding. **An effective stakeholder engagement process** was highlighted by 22 respondents as a mechanism to overcome the challenged identified in question 19. Respondents commented that this needs to be **transparent** and **enable all to participate** on an equal basis:

"*Involvement of all key marine stakeholders and avoidance of interest groups and NGOs dominating process*" (Respondent #13)

Emphasis was also given by some respondents to ensuring that the local fisheries sector is engaged in the process.

It was also highlighted that the **objectives of the MPAs need to be made clear** and be **based on evidence**, as opposed to opinions:

> *"Clear objectives (e.g. conservation, research, or recreational fishing goals etc) to be established for sites and inclusion of models for over-spill effects. Full engagement with all stakeholders is important. To this end transparency is required and easy processes to assimilate to supporting information for any proposed designation. Current planning requirements and supporting documentation are difficult to assimilate. Clear evidence supporting the designation must be presented and be available for scrutiny."* (Respondent #15)

> *"A clear outline of the MPA and its conservation objectives should be established using an evidence-based approach."* (Response not received through survey)

Five respondents also suggested the **establishment of a single body** with a remit for MPA designation and implementation or for marine space as a whole. What this body should look like differed. The was some suggestion that it should be a government body, while other suggested regional committees including sectoral stakeholders and coastal communities.

Other suggestions included:

- Agreement on **how MPA objective should be monitored and measured**.
- **Ensuring funding is available** to enable management and enforcement of MPA objectives.
- Greater **education on MPA successes**.
- Ensuring that **MPA objectives are reviewed** and enable **adaptive management**.
- Ensuring that the **designation process is linked with EU processes.**

3.4.4 What could be done to reduce any negative impacts of MPAs?

Suggestions for how to overcome the negative impacts of an expanded MPA network were given by 31 respondents. As for the question about how to overcome the challenges, the dominant suggestion was for **an effective, transparent stakeholder engagement process** in which the costs and benefits are clearly communicated and stakeholders are able to provide input as to what should be protected, where and how. **Communication and education** were seen as an important part of this, as was ensuring that the designation and management process is based on evidence:

> "*Engage and educate the public and stakeholders. Assess the long-term benefits versus short-term issues. Ensure the MPA network is based on evidence, benefits of conservation, stakeholder and community backing and effective management, monitoring and mitigation*." (Respondent #44)

> "*A set of clearly defined, scientifically based, management guidelines should be put in place to ensure that activities in MPAs are regulated and undertaken in a sustainable manner*." (Respondent #30)

The idea of regular reviews of MPA objectives and management was suggested by three respondents, alongside the idea of case studies in which the effectiveness of MPAs is explored in more detail. The potential to de-designate an MPA if the evidence is available was also put forward:

"Making sure

(1) the criteria are based on sound ecological and scientific standards

(2) the effects of the implementation of a MPA are examined in depth for both short and long-term outcomes

(3) there is a plan to measure the effects at agreed intervals

(4) The MPA order can be rescinded if (a) the standards have been achieved and (b) if unforeseen consequences become apparent.

(5) All stakeholders identified at the outset shall continue to be part of an oversight plan which can advise regarding the above points." (Respondent #17)

Case by case reviews for different sectors were also suggested by one participant to identify how they can be encouraged to engage with MPAs:

"*For example a state owned port which has a TOR [terms of reference] which only covers the economic development and compliance with laws will look on paper as though it failed if it decides not to keep up with the rat race for larger ships and deeper shipping channels.*

But if the Port TOR had a special MPA provision to contribute to habitat restoration then there is an incentive to look at wider options. An MPA or Heritage and MPA port system might be considered for those higher up estuaries whose expansion plans are in direct conflict with MPA restoration." (Respondent #7)

Other ideas were also suggested including:

- Allowing the use of MPAs for compatible activities, which may include fisheries, aquaculture, energy projects and study areas.
- Lessening the burden on fisheries through, for example, allowing limited access for vessels under a certain size and/or allowing temporal access.
- *"Ensure legislative clarity to avoid "legislative fatigue" or dismissal of MPAs as yet another layer of bureaucracy"* (Respondent #21)
- Alignment with other practices in the marine environment, especially the Marine Spatial Plan.

3.4.5 Who do you think should be involved in stewardship of our MPAs?

Respondents were asked to rank which group/organisation should be involved in stewardship of Ireland's MPAs, with 1 being the highest rank and 8 being the lowest. Not all participants ranked all options and forty-seven respondents provided at least one answer. Answers from one respondent were removed as they contained rank scores outside of the 1-8 range.

Table 3.5 shows how many times each group/organisation was ranked. The Irish Government and local stakeholders were ranked most often, with the United Nations being ranked least often.

Table 3.5: Number of times each organisation was ranked and their mean rank score (lower scores indicate greater importance given for involvement in stewardship)

Stakeholder	Times ranked	Mean rank score
The Irish Government	34	2.7
State Agencies	31	2.8
Coastal communities	29	3.1
Local stakeholders	34	3.4
Local authorities	24	3.8
The European Union	25	4.5
OSPAR and other regional bodies	21	5.1
The United Nations	17	5.9

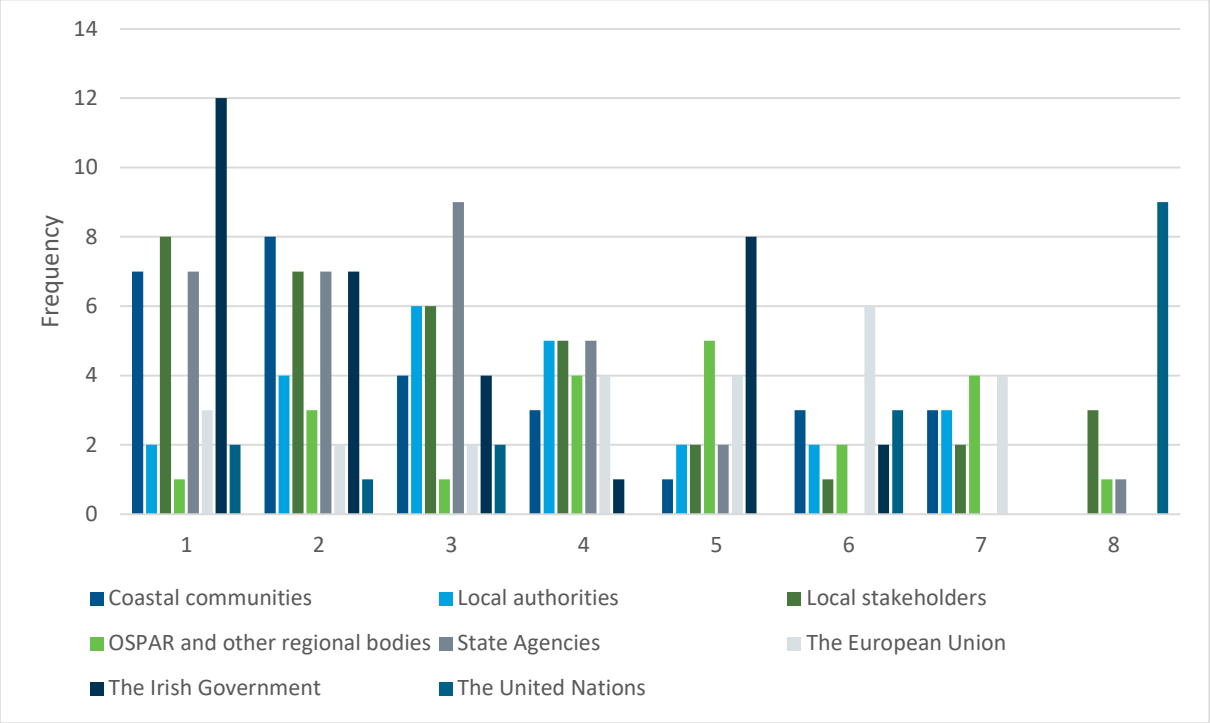

Figure 3.8: Frequency with which different rank scores were awarded by respondents for each organisation/stakeholder group as a contributor to stewardship (1=high importance, 8=low importance)

The Irish Government was most commonly ranked the highest (Figure 3.8) in terms of who should be involved in the stewardship of the Irish MPA network (i.e. they were ranked as 1), followed by local stakeholders, coastal communities and state agencies. These same agencies were also most commonly ranked as 2. Local authorities were also given relatively high importance.

Opinions do seem to be quite split over the role of the Irish Government, however, with eight respondents only ranking them at 5. Opinions are also divided over the role for OSPAR (and other regional bodies)

The European Union, and The United Nations were more commonly ranked as above 6, indicating that respondents perceived that they should have a lesser role in the stewardship of Ireland's MPAs.

Eight respondents chose to rank other organisations. These included environmental NGOs, all stakeholders, island communities and a dedicated state agency with a remit for MPAs.

The following question enabled respondents to provide a written explanation for their rankings. Twelve respondents provided a response and generally coalesced around the idea that a variety of stakeholders at different levels will be needed for effective stewardship. For example:

- Who is involved will depend on the circumstances (e.g. inshore or offshore) or issue to be resolved (e.g. planning, policy-making, legislation, licensing, monitoring and community-level issues).
- It is essential to have a bottom-up and objective approach with all relevant stakeholders to ensure acceptable and effective MPAs:

"State agencies / the Government should have the main powers to protect and restore the marine environment and ensure proper management and enforcement of activities inside MPAs. However, coastal communities and local stakeholders must have a sense of guardianship over their local stretch of sea and feel as though it is to their benefit that the area is protected. Any designations along with management decisions should therefore be in close collaboration with the community." (Respondent #21)

3.4.6 What do you think would be the most appropriate way of managing and monitoring future MPAs?

Thirty-five respondents provided suggestions about the most appropriate way to manage and monitor future MPAs.

The need to **include stakeholders in the management and monitoring of MPAs** was the most common response (11 respondents). This included suggestions such as retraining those who can no longer harvest within an area to support monitoring and research, the use of scientific surveys as well as citizen scientists, the engagement of local community members and liaison officers. Respondents also reported that it will be important to ensure than management and monitoring is **adequately resourced**, but that developers working in the marine environment may be able to supply existing baseline data against which change can be monitored**.** The idea of a dedicated state agency or regional committees to support monitoring and management was also suggested:

"*A dedicated State Agency with a remit for MPA management or a fully resourced existing State Agency with staff mobilized to manage and enforce the legislation. This agency also needs to empower coastal communities to be fully engaged (employed) to manage and monitor existing and future MPAs. This local investment will engender full engagement with the local MPA by communities and a level of stewardship that will remain focused, informed and aware because of the economic and heritage value of the MPA to the area, which will be reinforced by the employment created.*" (Respondent #15)

However, other respondents suggested that existing agencies could also support or play a role in the delivery of MPAs:

"*Is best practice the establishment of an independent body (like UK IFCA)?*

It would be important to be seen as not "reinventing the wheel" or duplicating effort that is already there. Do the likes of SFPA, IFI, Civil Defence, Coast Guard, Revenue, Naval service, harbour authorities, all who have a seagoing

presence have a role to play? Do they have spare capacity? Could these be harnessed without inter agency rivalry etc.

It would be seen as a great use of resources to protect the environment with creating an agency with a seagoing presence seconded from current resources. From my limited experience it would be important to be seen to actively protect MPA's as they are likely to be ignored or exploited if not monitored and protected". (Respondent #3).

Ensuring that there is **constant monitoring to enable revision of MPA objectives** and **adaptable management** was also highlighted (8 respondents), built upon robust and well constructed management plans. Allowing for changes in designation and even the rescinding of a designation was also suggested. For example:

"*It will be important to put in place a mechanism that clearly outlines how sites will be designated and what it will mean to stakeholders when a site is designated (what activities will/will not be permitted).*

The mechanism should also allow for ongoing review of the designation of the sites and the success of the programme. There will also be a need to agree how this success will be measured and there will be a need for continuous data collection to monitor this.

Finally there will need to be agreement on long-term management of the sites- and what will trigger a change in the designation of the sites". (Respondent#10)

Other suggestions made include:

- Protection needing to be defined against legal processes to ensure compliance and enforcement can be achieved.
- Ensuring MPAs are clearly mapped and delineated
- That approaches may need to differ depending on areas/cases
- That renewable energy needs to be better represented in MPAs
- That an effective licensing system is needed

"…All marine and coastal activities such be regulated and come under effective licensing systems. If MPAs are not designed to accommodate and manage licensed activities, it is likely that such activities may continue to operate in an unregulated and unmonitored fashion, which could have environmental implications." (Respondent #30)

3.4.7 Do you have any further comments or views you would like to express in relation to the future expansion of Ireland's network of MPAs?

The final question of the survey enabled respondents to note any other comments. Twenty-two respondents added additional comments ranging from "Let's get it done!" (Respondent #3) to more comprehensive remarks.

Key themes emerging include:

- **Designation is urgent**. Biodiversity is being lost and Ireland is currently not compliant with the EU target of 10% marine space under MPA designations.
- MPAs should be considered as an **opportunity**.

- **Communities** and their way of life, such as based on fishing activities must **not be disproportionately disadvantaged** by the process.
- **Biocultural diversity and values** need to be incorporated into the designation process and any ongoing MPA management
- MPAs should be **built around existing activities** to avoid detrimental societal and economic impacts
- **Limit the number** and make them relevant to all stakeholders to ensure buy-in.
- There is a need for a range of **different MPAs to address different challenges** and there should not be a one-size fits all approach.
- OSPAR **priority habitats need to be mapped** and identified as candidate MPAs.
- There is a need to **examine and evaluate existing measures** including fisheries special measures such as the “Dunmore box”.
- **Scientific evidence** is necessary for informing MPAs and access should be given to existing users as long as they do not seriously damage the ecosystem
- The EU process is working well and there is no need to deviate from these processes, however, **clarity is needed on the alignment of the new MPAs with marine SACs and SPAs** as a minimum.
- Designation needs to be **proportionate around the Irish coast** and not focused in any one area
- **No-take zones are an essential part of wider MPA management** acting as reference zones and buffer reserves.
- The **code of practice for scientific surveys in SACs** and should be applicable to commercial work both inside and outside SACs and supersede lower requirements of standard mitigation protocols.
- **Marine spatial planning should be considered in tandem** to the MPA expansion process.

4 Focus Group Analysis

This section presents the findings from seven two-hour online focus groups and one interview held between the 9th and 16th of September 2020.

The stated purpose was "*To come together as a group of people with diverse interests to discuss, challenge and provide ideas to the MPA Advisory Group that will inform their thinking and deliberations in preparing their report.*"

An independent, professional facilitator hosted the focus groups and invited participants to discuss four main questions:

1. What is your long-term vision for Ireland's marine environment?
2. What are the key benefits of MPAs?
3. What are the main concerns about MPAs for the sector or group that you represent and what challenges do you see for the expansion of the network?
4. What do you think is the most appropriate way of managing and monitoring the MPA network?

Of the 120 people invited to participate, a total of 44 joined focus groups in groups of five to eight people, representing 40 different organisations. One participant, who was unable to join the focus groups, was interviewed separately. The rationale was to seek representation from all of the major groups of stakeholders, spanning a wide range of sectors and groups (Table 4.1). All the invited participants represented wider groups, rather than representing themselves or their own interests.

Table 4.1: Focus group participants categorised by sector

Sector	Number of participants
Environment sector	7
Public sector	17
Economic/Industrial	16
Social and economic development	3
Political Ecology (academia)	1
Total:	**44**

The focus groups also included two representatives of the MPA Advisory Group and one to two representatives of the Department of Housing, Planning and Local Government. The preamble to the discussions included a video address by the Minister for Housing, Planning and Local Government Darragh O'Brien TD and a brief outline of the rationale and objectives of the MPA Advisory Group presented by Prof. Tasman Crowe.

The focus groups and the interview were held using Zoom and were automatically transcribed through the Zoom platform. Where necessary, the transcriptions were cross-checked against the recordings for accuracy. The transcripts were coded to identify the issues arising during the discussion. Codes were then grouped into key themes. What follows presents a summary from across all focus groups and the interview of the key themes arising from each question.

To illustrate the issues described, anonymised quotes were taken verbatim from the transcriptions. On a small number of occasions, where a participant has hesitated whilst speaking, repeated words have been removed from quotations to enhance readability. Key words have also been inserted into quotes (indicated by square

brackets […]) to enhance readability or to prevent identification of one of the participants.

It should be noted that, as for the online survey, participants were not randomly selected, but were invited to participate in the focus group discussions. While a range of stakeholder organisations took part, with the intention of consulting with representatives of all relevant sectors and groups, they cannot be considered to be representative of all stakeholders who would potentially engage in the MPA expansion process.

Participants were not asked whether they considered MPAs to be a good idea. In general participants acknowledged that MPAs were going to happen and that this was the starting point for constructive discussion about how that expansion should occur.

4.1 What is your long-term vision for Ireland's marine environment?

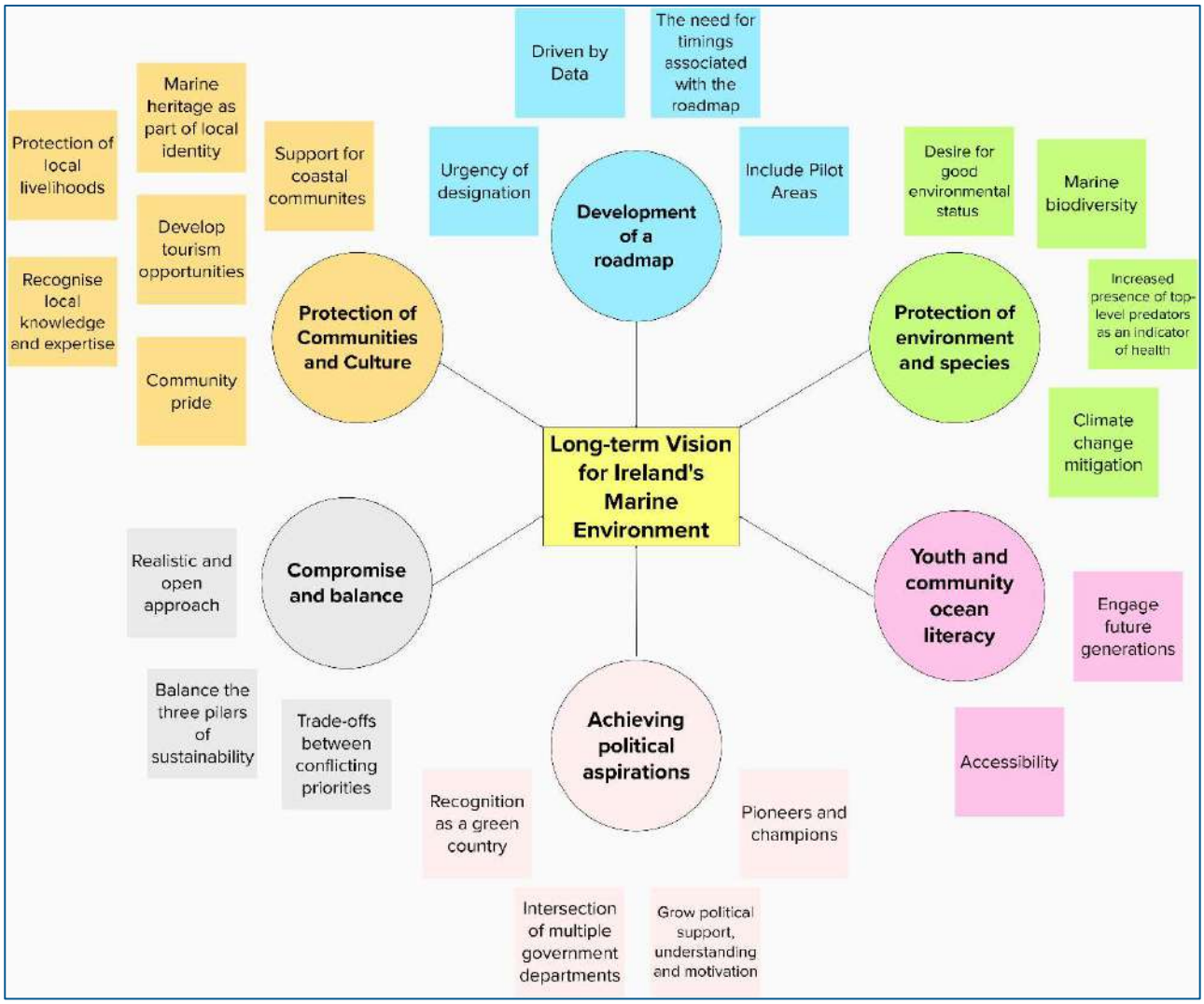

Figure 4.1: Summary of themes identified from focus group participants' discussions about their visions for Ireland's marine environment.

Stakeholders presented a positive vision for the future of Ireland's marine environment (Figure 4.1). It focused on the protection of the marine environment and the resources that it contains, the links between environmental protection and communities and culture, the role that the marine environment can play in meeting Ireland's political aspirations and the need for a roadmap to ensure these aspirations were met. Engaging with young people and the public was highlighted as a core component of the vision, if it were to be sustainable in the long-term. Participants were, however, realistic about the challenges achieving this vision would face and, in particular, the need for compromise.

4.1.1 Protection of the environment and species

4.1.1.1 Desire for good environmental status

Participants in more than one focus group recognised that Ireland has a legislative requirement under the EU's Marine Strategy Framework Directive to work towards Good Environmental Status and reported that currently Ireland is a long way from reaching that, especially in transitional waters. One focus group participant therefore reported that for the organisation that he represented the long-term vision was to have full compliance with the legislation.

For others, good environmental status was summed up as a vision for healthy seas and ones that support marine industries and sectors:

> *"So think when I'm taking a long term vision for an for the marine environment… I'm hoping for a healthy environment."* FG7 participant

> *"My long-term vision was summed up by the Minister at the very beginning of the session when he said, clean, healthy and productive. Now, of course, when I talk about productive. I mean, fish, it's where I'm coming from. But it's not, you know, you can't just say fish and fishing industry in isolation, because it is part of the big tapestry of activities that are going on."* FG7 participant

4.1.1.2 Marine biodiversity

The rich marine biodiversity of Irish waters featured heavily in many participants' visions alongside the recognition that biodiversity is in decline and that action is needed to halt the loss. The vision for biodiversity protection includes everything from sessile cold water corals to highly mobile cetaceans and fish.

Some stakeholders were keen to highlight that biodiversity protection should cover all marine species including commercial fish stocks:

> *"And quite often, I think in any plans, the protection of commercial fish species gets forgotten"*. FG1 participant.

There was a sense among some participants that Ireland's marine biodiversity is not well appreciated but that their future vision would see a shift in how marine biodiversity is viewed:

> *"Ireland is unique in Europe with amazing marine waters incredible biodiversity incredible resources. And I think it's been seen as a burden, rather than an advantage"* FG 1 participant.

"Marine biodiversity is an essential part of Ireland and I'd love to see people in Ireland, everybody treasure it, have value for the marine environment and marine biodiversity…" FG1 participant.

Many focus group participants recognised that marine biodiversity is a finite resource and so their visions included biodiversity being viewed as a source of sustainable wealth that needs to be managed for everyone's benefit.

"I suppose from my own perspective, I'd see the environment has been the foundation [on which] society and the economy is based on" FG7 participant.

4.1.1.3 Increased presence of top-level predators as an indicator of health

Protection of mobile species also comprised part of the vision for some participants, although it was acknowledged that this would be a challenge. An abundance of top-level predators was highlighted some participants as a good indicator of ecosystem health:

"I would say, long term vision for the marine environment is that the, the, the seas are clean, that the habitat [is] healthy sustaining lots of species, and especially large predators" FG5

4.1.1.4 Climate change mitigation

Participant visions also recognised that marine biodiversity has a role to play in protection against the impacts of climate change. However, it was noted that climate change brings extra pressures, furthering the need for protection for biodiversity, but also the requirement in some places for habitat restoration.

More than one participant highlighted, however, that protection does not necessarily mean exclusion:

"My long-term vision for the marine environment, which is the marine protected areas, but having access to the marine protected areas." Interview participant.

4.1.2 Protection of Communities and Culture

4.1.2.1 Community pride

Participants in two focus groups stated that in their visions for Ireland's marine environment, the marine environment would be the pride of local communities and that it should be something for everyone to enjoy:

"And it should be the pride of the local community…I think there should be signs, people should be happy to go and visit. That they'd be proud of it" FG5

Participants highlighted that their visions should demonstrate that they cared about the well-being of Ireland's coastal communities and that the MPA expansion process could be a mechanism to create a sense of ownership for the marine environment and for creating partnerships.

4.1.2.2 Support for coastal communities

A prominent theme through all focus groups was the need for the marine environment and the MPA network to support local coastal and island communities. It was recognised that coastal communities need to be sustainable, providing places

where people can live and work all year round, raise their families and obtain an economic return:

> *"First of all, that we can all work and live together. That's really the bottom line on this here."* FG3 participant.

There was also acknowledgement in more than one focus group that many coastal communities are currently undergoing transition in terms of economic sectors (e.g. from fishing to renewable energy) and that this transition needs to be accommodated in the vision:

> *"Transition from traditional economic players, fishing, plus environmental protection activities of one type or another, into a more diverse sort of community involving particularly energy"* FG7 participant.

4.1.2.3 Protection of local livelihoods

Participants recognised in their visions that there is a need to ensure that coastal communities are involved in the discussion about the expansion of the MPAs and to ensure that the expansion provides them with opportunities. The MPA expansion should support diverse, resilient, vibrant communities that are engaged in the MPA process. On participant cautioned, however, that no site should be designated until its potential benefits have been proven.

Others highlighted that while new industries are also coming along that will provide livelihood options for coastal community members, these industries need to be engaged within the MPA network expansion to ensure that developments are undertaken sustainably:

> *"There are new industries coming along. We can't just allow them to plunder to sea, but… coastal communities need to prosper economically on this and I think I'd also like to add that I think the MPA Goal of 10% on 30% are very achievable goals is just how we find that balance between the various activities and the introduction of that…"* FG5 participant.

Participants in more than one focus group recognised that a healthy functioning ecosystem is needed to support the traditional as well as emerging industries. They envisioned an environment that supports all coastal communities based on the inter-linkages not only between the environment and industry/economic sectors, but also between sectors themselves, as well as a thriving industry based around the protection of the environment.

> *"we would like to get to a situation whereby there was room for us all and that there would be yep sustainable fishing for people feeding into tourism and so on so forth"* FG4 participant.

One focus group participant suggested that it is important that this support from the marine environment should be for Irish coastal communities, as opposed to those from elsewhere.

4.1.2.4 Recognise local knowledge and expertise

It was acknowledged in the visions for the future of Ireland's marine environment that the incorporation of local knowledge and expertise would be important to the success of the MPA network expansion:

> *"…Engaging with local stakeholders and then they become part of the solution, not part of the problem"* FG1 participant.

One participant also highlighted that is will be important to recognise the shared vision of many local experts:

> *"And people don't always kind of associate fishmen with environmentally conscious catches, but the truth is we're acutely aware that we do need a healthy environment for fisheries and fish stocks."* FG4 participant

Mechanisms to engage such local experts may already exist and could facilitate future engagement:

> *"Look at the inshore fisheries forums, you know, they've worked really, really well in in empowering the inshore small fishermen who are such an important part of our coastal communities. So there are mechanisms there, you know, and I think this is just a little way of getting people together and becoming stakeholders in the long-term interests of these MPAs…"* FG1 participant.

More than one participant recognised the need for both a top down and bottom up approach to the expansion of the MPA network:

> *"…our vision would be you know that the community would be sort of central to any marine protected area that there would be co-management in place and that it wouldn't be like a once off process that you would have an ongoing consultation and that the MPAs would be able to adapt if something wasn't working"* FG3 participant.

4.1.2.5 Marine heritage as part of local identity

That marine heritage is part of the local identity of many coastal and island communities was also recognised across all focus groups. It was identified as an important part of Irish identity in general and that this connection needs to be celebrated more:

> *"Marine biodiversity is an essential part of Ireland… [and] is part of what they [communities] are and who they are. And, you know, remember we are all Islanders, we often joke that the people in Offaly, you know, or Cavan, do they consider themselves as islanders, and they should do because, you know, nowhere in Ireland is more than a couple of hours, an hour and a half from the sea. So we need to make that connection"* FG1 participant.

> *"And I think that's very important. The culture and heritage around maritime is definitely something which I think has largely been ignored in Ireland... That's something needs to be rectified as well"* FG1 participant.

4.1.2.6 Develop tourism opportunities

The link between maritime culture and the marine environment was made by more than one focus group, as well as the contribution both make to tourism. Protection of the marine environment was considered important to maintain this contribution:

"*We're looking at coastal MPAs and which are particular interest I supposed to the tourism industry, as opposed to the offshore near shore ones*" FG1participant.

The status of the waters and the visual landscape were also deemed important to tourism. Furthermore, it was suggested that MPAs could provide marine tourism locations and be used to provide tourists the opportunity to see the diverse marine biodiversity the site has to offer.

One focus group participant cautioned, however, that tourism needs to be developed sensitively to avoid over-crowding and that tourists need to be educated to ensure they do not damage the features of the site.

4.1.3 Achieving political aspirations

4.1.3.1 Recognition as a green country

Moving beyond environmental, community and cultural issues, participants visions also highlighted Ireland's political aspirations and the role of the MPA network in these. It was felt that the development of the MPA network would support the Ireland's contribution to the sustainable development goals and the UN biodiversity targets, as well as encourage recognition of Ireland as a 'green country':

> *"… we have to move from that and gradually improve so that we develop our MPAs into what should be I suppose showcases or benchmarks for an international standard that matches the pretensions that we have to be a green country… The future of our MPAs has been a really good example of for those ambitions and it's a goal that we need to get to"* FG 1 participant.

There was recognition in one focus group that this aspiration also involves supporting the marine renewable energy industry with a view to enabling a transition to a zero carbon economy. Making this compatible with environmental protection would require considerable effort:

> "*You know so and there's a lot of work needs to go into, into the marine spatial planning side of things and the coexistence side of things [between energy and environmental protection]. So we so we just yeah that that's what we'd like to see the sustainable coexistence."* FG6 participant.

4.1.3.2 Need to grow political support, understanding and motivation

It was felt by more than one focus group that achieving the visions would require greater political support and for the state to take its responsibilities more seriously. As one participant highlighted, the Minister in his introductory presentation, said that the aim was to reach 10% of Irish waters under protection as soon as possible, but the deadline through the Marine Strategy Framework Directive was supposed to be by 2020. As one participant stated:

> ***"****And what the long term vision is that our state, I guess, takes its responsibility seriously that, that legislation that we have begun, but it is it is inaccurate and we've made a lot of promises … licensing legislation for example that's, that's been rumbling through for a long time now over or feels like a decade and at least so****"*** FG5 participant.

4.1.3.3 Intersection of multiple government departments

A further impediment to the visions was considered to be the loss of the department of the marine, despite the marine environment being one of Ireland's biggest resources. Furthermore, the management of the marine environment is fragmented:

> *"… the different sectors within the marine are managed across a number of different departments and this I think is very, very challenging because we don't see it like we see other resources ."* FG1 participant

In future it was suggested that cross government agreement is needed with goals and objectives shared across government.

4.1.3.4 Pioneers and champions

Despite these concerns, participants stated that Ireland is unique in that it has an extraordinarily wealthy marine environment. One participant indicated that it would be good for Ireland to be reactive rather than proactive and move towards being a champion of the marine environment. This could instil a national sense of pride and celebration for what it is that is being protected and why:

> *"Addressing the requirements that we're supposed to do, so it'd be nice to get ahead of the game, for once, and actually be the leaders in the marine space."* FG3 participant

> *"My vision is that given the size of our, he [the facilitator] said, a big huge economic and sea area around Ireland, that we would be seen as the leaders and the champions of MPAs in Europe."* FG2 participant

4.1.4 Development of a roadmap

4.1.4.1 Urgency of designation

Focus group participants acknowledged that the government is under pressure, political and legal, to expand the MPA network. One focus group highlighted that this is also accompanied by pressure to expand renewable energy generation from the marine environment with considerable potential for tension and clashes between the two. Nevertheless, participants in one focus group cautioned that in the rush to achieve targets, inappropriate decisions could be made:

> *"there might be a rush to … accomplish [targets and] to get softer treatments over the line and maybe we could resist that a little bit. I'm not saying drag it off for the rest of our lives, but you know, just make sure everything is properly teased through when properly negotiated between the stakeholders"* FG7 participant

It was felt that the goal of 10% of Irish waters under protection or even 30% is achievable:

> *"The MPA goal of 10% on 30% are very achievable goals it's just how we find that balance between the various activities and the introduction of that marine protected area."* FG5 participant.

However, the whole process needs to be set within the wider context of marine spatial planning and given a sensible timeframe:

> *"I would also be a bit concerned at the having made very little headway on our targets up to know that we're going to reach 30% in 10 years and I would be afraid that's because our target is set, that we would go hell for leather as us, and maybe do was without thinking through all the designation of different areas for us as MPAs. I would like to see a really strong regional based process in place where the potential sites would be examined"* FG7 participant

4.1.4.2 Include pilot areas

One suggestion from a participant in focus group 6 was that the designation process could begin in inshore areas with multiple users through a few pilot areas. However,

another participant cautioned that it may not be possible to replicate what works in one location to another due to their specific qualities or conditions:

> *"They [pilot areas] are very successful and effective, but they are so because of quite specific qualities or conditions in those projects and they can't simply be copied and pasted everywhere else"* FG6 participant

4.1.4.3 The need for timings associated with the roadmap

Fully protecting the marine environment was recognition by focus group participants as a long-term objective that will likely outlive the working lives of many people involved in the discussions in 2020. There was a feeling that a start needs to be made together, but with an understanding of the ambition and the associated timeframe to enable progress to be measured.

> *"I'd like to see some roadmap to progress this whole issue… I'd like to see some tangible deadlines and timelines to see, you know, how we're going to progress this."* FG1 participant

4.1.4.4 Driven by data

Focus group one participants suggested that in achieving the vision, efforts need to be focused, rather than scatter gun, and based on the best available evidence with lessons learnt from other countries who may be ahead of Ireland.

"And the more data we can gather the better it is that we have a chance to protect what we need to protect including jobs." FG1

4.1.5 Youth and community ocean literacy

Participants from across the focus groups highlighted that engaging with young people was part of their vision. Managing the marine environment should not just be about economic prosperity, but also about protected the environment for future generations:

> *"And to boil it down at the, at to the end of the day, it would be something that would be beneficial to our future generations, not belong to our own generation, but to our future generations because the people actually who would benefit from protection of those areas, those particular coastal areas and fisheries, are the families and the future generations there … The coastal communities and the fishermen themselves. They actually want to be able to pass on a safe way of living in the coastal communities."* FG 3 participant

Participants' visions for how to engage future generations varied from education in schools, public awareness campaigns around the value and the role of the ocean, using MPAs as a "classroom for the nation", but also through informal education such as recognising the links between land and sea (e.g. the harvesting of seaweed for fertiliser):

> *"Quite simply, significantly improve education and public awareness around the value and the role of the ocean. Generally, and then Irish water specifically, and that should start in schools. I mean, how many kids know that every second breath they take comes from the ocean?"* FG3 participant.

> *"Getting through to young people is really essential. I think that's what we're doing. The groundwork hopefully for next generation, you know, and the idea of*

building up to ocean literacy, which is taken on huge strides in recent years..." FG1 participant

4.1.6 Compromise and balance

4.1.6.1 Trade-offs between conflicting priorities

One element of the vision for the future of Ireland's marine environment that was common across all focus groups was the need to recognise that marine resources are shared and finite, and that different users may have competing interests. Participants indicated that achieving something that will benefit everyone will require trade-offs:

> *"It's a finite resource, even though it's an important resource. So there's always going to be trade-offs and discussions as to how we use the marine environment for the benefit of everybody."* FG4 participant

One participant suggested that recognising that resources are finite will also require a change of mindset:

> *"We would kind of have to go and change your mindset little bit and look at something that is a finite resource and we need to use this to everybody's benefit not just for people, but for nature as well."* FG5 participant

4.1.6.2 Realistic and open approach

Participants also highlighted the need to be realistic and open and to recognise at the outset that there will always be trade-offs, as well as some people who disagree with the need for MPAs. Participants suggested conflict could be anticipated between the fishing, tourism and energy sectors; all sectors that directly benefit from the marine environment and all sectors that need to work together for a healthy marine environment that can sustain their activities:

> *"'There is going to have to be some give and take in maintaining the quality of our waters… I don't know what the, what the right way to say it other than to say we are all going to have to be very realistic"* FG1 participant

4.1.6.3 Balance the three pillars of sustainability

Focus group participants reported that finding the right balance will require compromise. One participant suggested, however, that the aim should be to optimise use, rather than maximise use, while others indicated that balance and trade-offs will occur between the three pillars of sustainability:

> *"So my vision is that we can get the right kind of trade-offs between the economic, social and environmental imperatives, if you like, the three pillars of sustainably, harnessing what is a huge resource." FG1 participant*

> *"We think it's really important that the three pillars of sustainability are taken into consideration the environment, the economy and the community" FG6 participant*

4.2 What are the key benefits of MPAs?

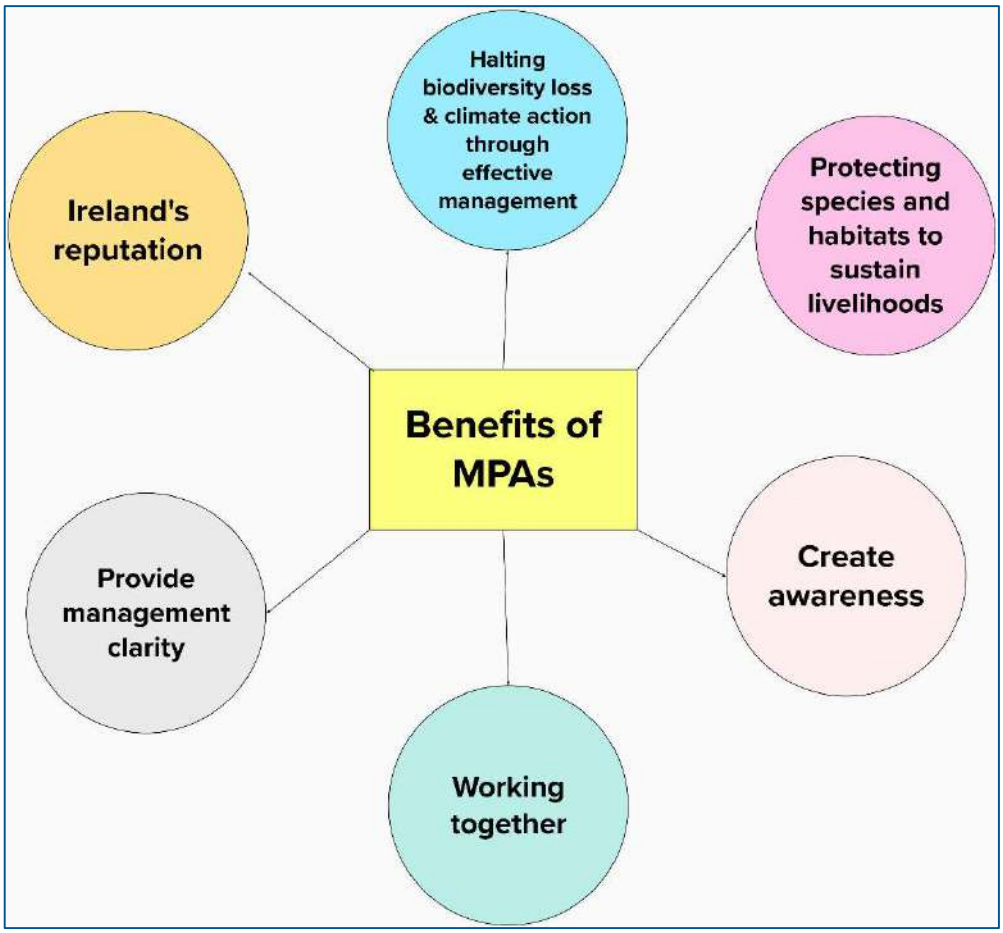

Figure 2: Benefits arising from MPAs, as discussed by focus group participants

The discussion around the benefits of MPAs focused on how effective management through MPAs could support biodiversity and climate action; protect species and habitats that sustain livelihoods, as well as create awareness of the marine environment among less familiar publics (Figure 2). It was also suggested that MPAs would provide clarity to marine users about who can operate where in the marine environment, an opportunity for diverse stakeholder groups to work together and create a mechanism to improve Ireland's reputation as a maritime nation.

Participants did caution, however, that benefits will vary according to the purpose of the MPA:

> *"Then the benefit depends, you know, are you protecting cultural heritage, are you protecting wildlife, are you protecting visual amenity or whatever."* FG1 participant

4.2.1 Halting biodiversity loss and climate action through effective management

Common to all focus groups was the perception that MPAs can help to improve the health of the marine environment and increase biodiversity and resilience to hazards such as coastal erosion and climate change:

"I think that the… benefits in terms of halting biodiversity loss marine biodiversity loss, you know, making contributions to climate action be it coastal defences or increasing productivity or the more esoteric things, that will come" FG1 participant

"We also have the issue of climate change and the MPAs can actually be a huge… catalyst for carbon sequestration" FG2 participant

"MPAs have to be the cornerstone. They're not the be all and end all but definitely they have to be the cornerstone of our recovery and adaptation strategy" FG6 participant

It was acknowledged by participants that obtaining these benefits would be highly dependent upon the management regime implemented, but that successful MPAs would also provide benefits to coastal communities:

"Increased biodiversity increased resilience of the ecosystems. Those would be the key benefits. But absolutely, it has to be managed. [A] paper park has no benefits." FG5 participant

"To protect [the] environment. And, you know, if done properly, that the communities that live in them as well are going to benefit and in terms of maybe climate change mitigation and sort of resilience to storms and that is going to help down the road." FG3 participant.

4.2.2 Protecting species and habitats to sustain livelihoods

The role of MPAs in supporting coastal livelihoods through the protection of species and habitats was also recognised across all focus groups.

"Well, I think, [another participant] nailed it there and the opening statement that it's a mechanism to protect and restore biodiversity and obviously that would be important in terms of the long term, short term and long term goals because there are there are habitats that definitely are impacted" FG4 participant.

There was an explicit recognition of the potential for MPAs to protect breeding grounds and juvenile fish species of interest to the commercial and recreational fishery, but also acknowledgement that protection of habitats and species would be of benefit to other sectors:

"[It could be] done in such a way that the, you know, fishing interest or renewable energy interest or tourism or recreation interest can all benefit from a, from an extensive and a high level of protection" FG3 participant

"Protected Area close to the shore with great biodiversity, but for diving is good for kayaking, you know, there's that there is a positive tourism potential there for a nice MPA but of course the most important would be that the planet and biodiversity contribution." FG3 participant.

"And, and I think it's important as well to remember that this is not just about protecting fish stocks. There's lots of other types of wildlife and biodiversity natural resources in the marine environment" FG4 participant.

For these benefits to be achieved, however, focus group participants stated that MPAs must be effectively managed and together with communities. This perspective was voiced by participants from diverse backgrounds:

"It must work alongside the local community, and it must be managed correctly. That might sound odd from an industry perspective but… we need a viable

marine environment to be able to sustain aquacultural activities and I'm sure our friends and fisheries would say the same" FG5 participant.

One participant from focus group seven suggested that these benefits would not be limited to MPAs, but would be felt more widely across Ireland's marine area:

"*…by protecting those species, by enhancing their populations and having a network, that enables us to have healthier populations across the marine area.*" FG7 participant.

4.2.3 Create awareness

It was also suggested by focus group participants that MPAs could form a platform to help create awareness among the wider population about the marine environment:

"Referencing the Marine Institute map which shows that 90% of Irish territory is ocean. And that's something which I mean the opportunity to create awareness around that and celebrate that… few jurisdictions have that" FG3 participant.

To ensure MPAs can support education and learning, however, one participant highlighted that MPAs need to be accessible and this may mean not excluding people and activities within them.

It was also suggested that education about the marine environment through MPAs could support increased compliance among marine users:

"One of my backgrounds is enforcement and a lot of the time when the non-compliance arises its lack of understanding, not so much regulation, but understanding of the benefits the marine environment can bring" FG6 participant

4.2.4 Providing management clarity

Participants from three focus groups discussed how the implementation of MPAs and their associated management plans would provide clarity to marine users about what activities can happen where and this would also support enforcement actions.

"I think one of the functions, particularly from an overall management perspective is so people know what's what." FG6 participant.

"Benefits, I think, are providing clarity around the areas of our environments that needs a greater level of protection. So providing clarity for other sectors when they're considering developments, to be able to factor that in when planning and to provide some certainty around that." FG6 participant.

It was also felt by some participants that MPAs should help to deliver legal obligations, that resources would be properly managed:

"Of benefit to fishermen within the MPAs would be the fisheries would... be properly managed, they'd be properly regulated." FG7 participant

"The key benefit is in the management identification and the management of the resources." FG 2

One participant suggested that management should go beyond resource management to include habitat restoration.

4.2.5 Working together

A further benefit highlighted by one participant was the role that MPAs could have in bringing stakeholder groups together:

> *"I also think one of the benefits will be that it will require agencies, NGOs and communities to work more closely and it will enhance I think natural capital around our coast"* FG6

4.2.6 Ireland's reputation

Linking to the political aspirations identified as part of participants' visions for Ireland's marine environment, one participant suggested that the implementation MPAs would also enhance the status of Ireland:

> *"It kind of enhances the country's reputation across a number of areas, it kind of closes that gap between the actions and the rhetoric. So if we are presenting ourselves as a Green Island in terms of food production in terms of ecotourism"* FG4 participant.

4.3 What are the main concerns about MPAs for the sector or group that you represent and what challenges do you see for the expansion of the network?

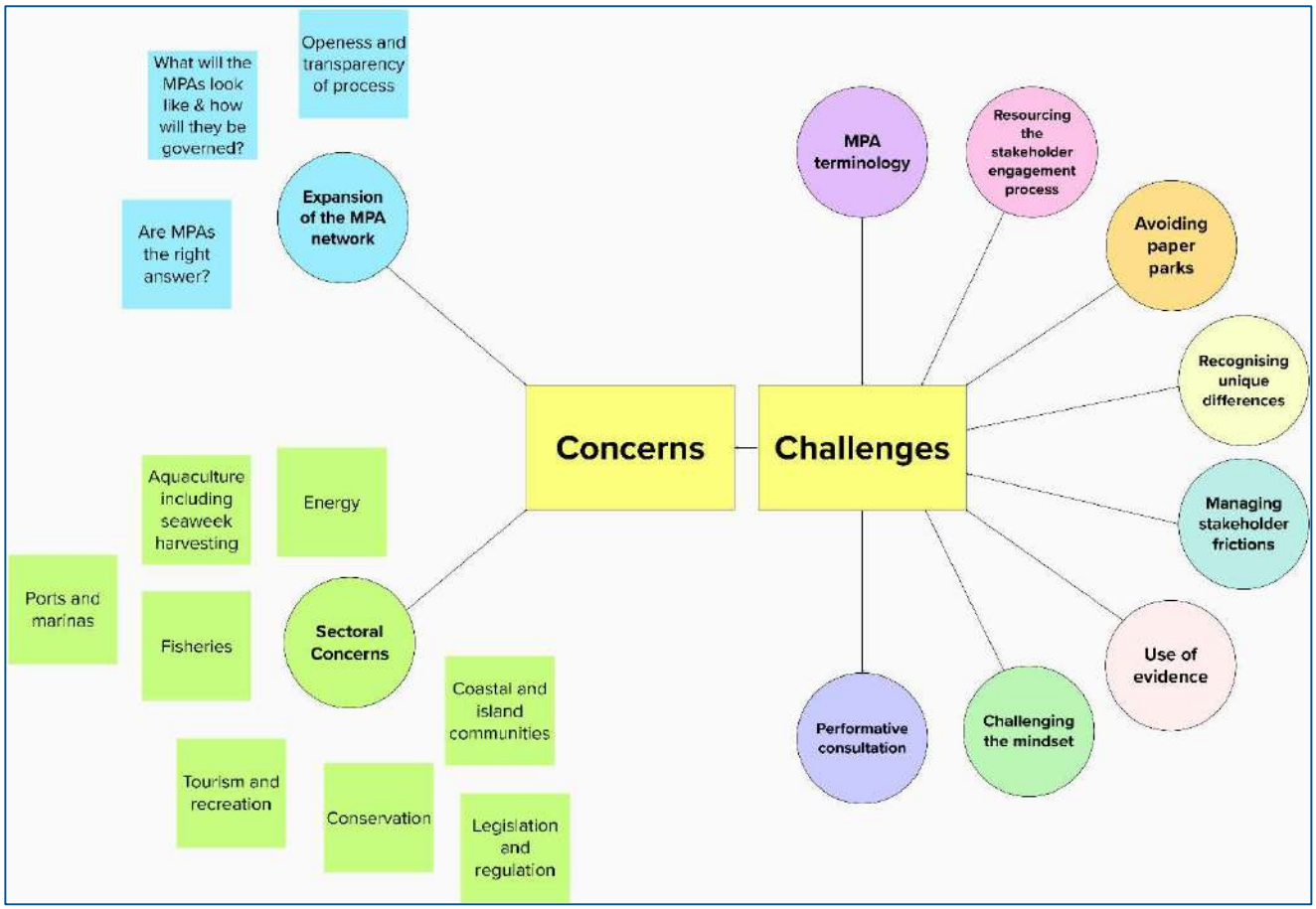

Figure 3: Concerns and challenges relating to MPAs and the expansion of the MPA network, as discussed by focus group participants

When asked about concerns and challenges (Figure 3), focus group participants raised some generic questions about what MPAs would look like and whether the process of designation would be open and transparent. Focus group six participants also questioned the appropriateness of MPAs as a tool to support biodiversity protection. Participants from across the focus groups highlighted a number of sector specific concerns as well as concerns regarding the legislative and regulatory environment.

In addition to these concerns, challenges to the MPA network expansion were expressed including the use of terminology, the need to avoid "paper parks" (unmanaged parks that exist on paper alone), performative consultation, the use and need for evidence, managing stakeholder frictions, resourcing the stakeholder engagement process, the need for a long-term approach, the need to change mindsets and recognising unique differences.

4.3.1 Concerns about the expansion of the MPA network

4.3.1.1 Are MPAs the right answer?

Whether MPAs were the correct tool for protecting marine resources was questioned by some participants in focus group six,

> *"It's [the MPA network] not the solution because you know the drivers of degrading marine environments or overuse of resources and so on are not spatially fixed"* FG6 participant..

MPAs were thought to be potentially less relevant for the protection of highly mobile marine resources and in situations where pressures are transboundary. The spatial characteristic of MPAs was thought to be both a strength and limitation. It was also considered to be unclear how MPAs would guarantee connectivity between areas.

One participant in focus group six, however, suggested that the answer to whether MPAs are an appropriate tool would be demonstrated through changes in the environment:

> "*And, you know, the measures as regards conservation will be communicated with the quality of the environment and the reasons why the measures are in place.*" FG6 participant.

4.3.1.2 What will the MPAs look like and how will they be governed?

A commonly discussed concern in all focus groups was what MPAs would actually look like, how they would be governed and who would be affected by their *management:*

> *"So there's a lot of concerns around once say sites were established, how they get managed how interactions … can occur, you know, with those sites, what needs to be done. What types of assessments, except so i think they're the main concerns"* FG 1 participant.

> *"The main concerns, really, I think, is how does it affect existing users and to what extent are they either excluded or restricted as to what can actually happen within that zone*. FG 1 participant.

There was concern among some participants that the approach might be very fragmented, with MPAs being designated for different things. Participants also questioned whether existing designated marine areas would come under one MPA network umbrella. They also raised questions about the management approach. Would it, for example, contain thresholds for management action?

More than one participant suggested that it would be valuable to consider MPA management alongside discussions about the expansion of the MPA network:

> *"…unless we change our approach in the future we are not going to get anywhere. The MPAs will not actually deliver what they're set out to deliver and therefore, I think it would be very, very valuable to look at the management now"* FG4 participant.

MPA governance was recognised by at least one participant to be a considerable challenge for conservation actions:

> *"And I suppose the governance that everything to do with how they're structured, how they're managed, how they're monitored and of course political leadership and financing is always a massive issue and conservation."* FG7 participant.

4.3.1.3 Openness and transparency of process

Concerns were raised by participants about the openness and transparency of the designation process. It was felt that success would only be achievable if all stakeholders were to be brought along with the process, respected and listened to. Some participants also suggested that stakeholders should be given some power in the decision process:

> *"But you listen to them. You hear their concerns, you're not always going to keep all the people happy all the time. But you'd be amazed how many people come on side."* FG1 participant.

> *"…talk to the stakeholders directly and to take away that fear because otherwise there would be a lot of opposition."* FG1 participant.

4.3.2 Sectoral concerns

Concerns were expressed for different sectors including fisheries, energy, aquaculture, tourism and recreation, ports and marinas, coastal and island communities and the conservation sector. These sectors reflect the diversity of the participants, it does not mean that concerns felt by other sectors are in any way less important.

4.3.2.1 Energy

An expansion of offshore marine renewable energy sector, especially offshore wind farms, is planned for Irish waters. Concerns were raised that MPAs might be no activity zones and whether this would mean that cable laying could not occur in MPA side:

> *"Offshore wind has to be a very important part of our decarbonisation of the economy"* FG6 participant.

"[For the] energy sector, I suppose the main concerns will be back to how they're going to be defined and what's going, what kinds of activities are going to be allowed in those areas." FG1 participant.

4.3.2.2 Fisheries

The fishing sector requires marine space in which to operate. Similar to the energy sector, concerns raised about what activities would be permissible inside designated zones:

"The industry directly is very concerned that they will be excluded from 30% of the marine area around Ireland, if the coverage of MPAs comes up to 30%." FG1 participant

No-take zones and highly protected areas were of particular of concern:

"It is envisaged that existing users would be excluded. I think that's the concern. It may not be the reality, but it's certainly the concern." FG1 participant.

If vessels are excluded from sites, participants representing the fishing sector stated that it is necessary to recognise that displacement will happen and that it needs to be planned for and the health and safety implications acknowledged.

There was recognition, however, that not all fisheries will be affected in the same way. For example, displacement may not be an option for island community fisheries:

"You know they are small scale and they're limited by weather and season and that so that they don't have the opportunity to move very far when they're fishing" FG3 participant.

And pelagic and inshore fisheries will also respond differently:

"Pelagic fishing… is in a completely different scenario to say inshore fisheries, which could probably thrive within marine protected areas. We [pelagic fishing] probably could not because of the types of gear that are used and just general conditions that would probably be pushed on the marine protected areas which would mean that's really probably, probably be excluded from a lot of those" FG7 participant.

One fisheries representative indicated that MPAs are not the only pressure facing the sector. Inshore fisheries are also being displaced by aquaculture farms and concerns about the expansion of marine renewables meaning that fisheries are beginning to feel boxed in:

"There's no doubt that some of these projects will go ahead and obviously it's a good thing, we all want clean, green renewable energy, we're not denying that. But there are those projects are ultimately going to limit the area that we will be allowed to fish in to some degree." FG4 participant.

4.3.2.3 Aquaculture including seaweed harvesting

Two focus groups discussed potential concerns for the aquaculture sector. Both raise the issues of expansion of the sector and the extent to which this would be possible within MPAs. The second concerns focused on the existing licensing system, which was reported to be functioning poorly. It was suggested that a more transparent licensing system would enable the sector to work more effectively with MPAs:

"It doesn't matter if we have 2% MPAs or 10% or 30% MPAs, for aquaculture that won't work without a functioning aquaculture license" FG5 participant.

4.3.2.4 Tourism and recreation

Concerns for tourism and recreation were not widely discussed, however, one focus group raised concerns about access to the foreshore contribution and whether restrictions would be introduced in terms of, for example, launching from a beach or anchoring in coastal sites. An example from the UK was highlighted:

"And they're a little bit ahead of us over there [in the UK] and an access has been reduced or entirely cut off for some recreational users, for example, and simple things like launching from a beach no longer became allowed and then anchoring in coastal areas that also was suddenly forbidden" FG5 participant.

It was noted, however, that a subsequent study led to restrictions on anchoring being overturned, which led the participant to emphasise the need for adaptive management of sites.

4.3.2.5 Ports and marinas

Implications for ports and marinas were raised in focus group five. The concern was that MPAs would restrict existing and planned developments:

"There are a number of sites earmarked around the country and around the coast and you know will MPAs simply make that development completely unfeasible and so and then that, that has a knock on effect on the local economy unemployment and not just the recreational side" FG5 participant

4.3.2.6 Coastal and island communities

Concerns for Ireland's coastal and island communities were aired in at least three focus groups. One participant suggested that there would be hostility towards MPAs and that discussion about the expansion of MPAs injects tension into communities:

"*So as there's a fear that it's part of an inexorable generally negative long standing creeping process of interfering with their amenity and their lifestyles.*" FG2 participant

While another stated that there is a need for greater recognition of intangible cultural heritage and the impact of MPAs on this:

"Intangible Cultural Heritage is not high on the list, but it's very important for people, you know, living on the islands And the sort of way of life that's been developed over whatever millennia, that you know that that's maintained and conserved." FG3 participant

With many island communities already found within Natura 2000 designations, concern was raised about what this would mean if they were turned into no-take zones, especially in terms of accessibility for the fishing sector. There was also concern that MPAs could affect the local economy and employment if they were to make development unfeasible.

One participant suggested that a clear role for communities within their local MPAs would be important:

"So I suppose the community ownership would be central I think and co-management." FG3 participant.

4.3.2.7 Conservation

While benefits were primarily highlighted for conservation, two concerns were raised. First relating to how would you know that the right 30% of Irish waters is being protected and second, what would new legislation look like and how would it ensure that habitats are much better managed.

> *"But there's vast areas where very little activity is ever going to happen… designation will have very little economic impact for a very long time, but they're the very areas where it has probably the most work remains to be done in terms of gathering evidence. How are you, do you know that you're protecting the right 30%?"* FG1 participant

4.3.2.8 Legislation and regulation

While the need for bottom-up approaches to MPA management was discussed across focus groups, top-down governance was also highlighted:

> *"It has to, in my opinion, it has to be done on a national level, I don't think it can be broken down to local area and it has to be oversight and then there has to be, you know, whether some of it's delegated in terms of boots on the ground."* FG5 participant

There was concern about how MPA legislation would work with existing legislation and it was suggested that any MPA related legislation needs to be integrated with other maritime legislation that is currently in the pipeline, such as marine planning legislation. There was also concern about how any MPA regulation would impact planned future activity:

> *"See how can they be regulated properly and process designed to regulate them properly and then a system in place to allow for planned future activity."* FG2 participant

4.3.3 Challenges

Wide ranging challenges to the MPA network expansion process were discussed across the focus groups. These covered themes such as the MPA terminology, the need to avoid "paper parks" and recognising that each MPA will be different. Stakeholder engagement was highlighted as a particular challenge in terms of ensuring that it is not simply performance, that it can manage friction between stakeholders and that it is sufficiently well resourced to be effective. The use of evidence was also considered challenging, as was the need to help change mindsets about the marine environment. Some of these themes also emerged during the discussion of participants' visions for the marine environment.

4.3.3.1 MPA Terminology

Two focus groups identified that the terminology of marine *protected* area, despite it being a terms used globally, is quite exclusive and even aggressive.

"And the main one, there is something that I've already said earlier, which is that they, they represent a form of enclosure. The form of exclusion. And so the question there is, you know who or what is being excluded." FG6 participant.

One participant suggested that the term conservation would be preferable to protection:

" … I agree with [another participant] I don't like the word protection. I prefer the word conservation, that there is a need for conserving" FG1 participant.

4.3.3.2 Avoiding paper parks

The challenge of MPA designation was recognised by focus group participants, alongside the urgency for completing the MPA network. The greater challenge, however, was identified as making sure MPAs deliver their conservation objectives through effective management. It was felt that many MPAs in Europe do not deliver on the promise of biodiversity protection or their potential benefits to commercial fisheries other sectors in part because they are "paper parks" which are MPAs only in name, but not in function:

"…so having a real management plan. I think is something that I would really like to see going forward for these MPA because we're under such pressure to designate areas. I wouldn't want them to be designated just as random spaces, but rather get a plan in place." FG1participant.

"*they can't be just paper parks and that they actually have some functioning regulations and controls in place*." FG5 participant.

Lessons learnt from the MPA designation process in the UK were highlighted. MPAs were designated in the UK prior to their management being established. It was suggested that discussions about their management should go hand in hand with discussions about MPA location as it will support the legitimacy of the process, especially as existing marine protected areas have very low levels of management:

"Of the very low level of management that has been applied so far in terms of those areas which have been designated and it's one of the issues that will come to later on in terms of the legitimacy of establishing future such areas." FG2 participant

4.3.3.3 Recognising unique differences

When discussing management, focus group three in particular, raised the issue of how each MPA will be different in many ways and so each will require different management and monitoring. It was suggested that management tailored to each MPA location would be needed:

"A large offshore reef in 2000 [meter] deep water is going to take a lot of different managing and monitoring than a seagrass bed close to the shore." FG3 participant

"I think it's important that we don't go with a one size fits all approach and that different areas are tailored for specific concerns in that location." FG3 participant

4.3.3.4 Performative consultation

Ensuring that the consultation processes is effective was recognised as a considerable challenge across focus groups. Despite the urgency to designate, it was suggested that the decision to designate MPAs should not just be taken centrally, that an equitable approach needs to be developed to ensure that all stakeholders are able to voice their concerns. It should not be just a tick-box exercise. One participant suggested that local people need to have power to make decisions, and not just be consulted. It was thought that ineffective consultation would lead to failure and the need for getting the consultation process "right" is important.

> *"Often consultation or stakeholder participation is a token… ticking a box exercise. So I would say that the most important thing is that the process in terms of bringing to the surface, what the different interests are recognizing that this is a very power laden context in which stakeholders are not all equal. This is the equity point that I made that you know some stakeholders have a lot more resources, a lot more authority than others and how you address that question of equity is a is a really important one to get in from the beginning.."* FG6 participant

One suggestion was to bring in experts with experience in designing complex consultation processes to ensure genuine participation. It was also recognised that could slow down the designation process, but it would introduce an acceptable delay:

> *"It [MPA designation] may seem on the surface to be a great thing to do, but it has consequences, and we really need to look at those consequences really carefully before we commit to them. And if that slows down or signing up to the targets then [it would] still be yes. I would prefer to see if done properly."* FG7 participant.

4.3.3.5 Managing stakeholder frictions

Putting the stakeholder consultation process in place was considered a particular challenge by focus group participants, but it was recognised that an accompanying challenge would be how the process minimises conflict and does not raise tension.

> *"But I see the challenge is that [stakeholder engagement] structure, to put that structure in place and the second challenge is to minimize conflict."* FG2 participant.

> *"The biggest challenge in this is that it is a process that needs to be carried out with people, rather than on people."* FG2 participant.

While the need to be as inclusive and open as possible was recognised, it was also acknowledged that juggling different perspectives would be a challenge. One suggestion was to identify early wins and so build trust and confidence among stakeholders.

Balancing voices was also recognised as a challenge, especially when some groups are backed by powerful lobby groups. It was highlighted that care would be needed to ensure that it is not a case that those who shout loudest win.

> *"And I can see the biggest challenge is getting over the big powerful lobby groups that are fairly strong and that will turn something that has the potential to be great."* FG4 participant.

"… I think the big challenge will be, I suppose, facilitating the different interests, such as renewables sustainable energy and protected areas and can the two live side by side" FG4 participant.

Concerns were also raised about misinformation and the challenge of presenting balanced arguments:

"These things can be really, really challenging for people to get their heads around and the person who says the worst case scenario will generally have loudest voice" FG5 participant.

4.3.3.6 Resourcing the stakeholder engagement process

Resourcing the stakeholder engagement process was highlighted as a real challenge alongside avoiding it becoming an unwieldy process.

"I would say one of the main challenges as being the resourcing of this as a system as a process. First of all, to establish the MPAs." FG4 participant.

It was recognised that there will be a lot of people wanting a voice at the table but that groups may be quite fragmented:

"And there's a lot of us [recreational anglers] there, but we're quite fragmented… We do have a couple of organizations, but those organizations really wouldn't represent the, the vast majority… out there fishing." FG4 participant

It was also suggested that there needs to be some sort of authority to deal with problems that arise during the consultation and subsequent designation phases:

"I suppose it's fair to say that it must be something that's got teeth, that's robust enough to deal with problems. I'd like to think that maybe existing resources could be used to rather than establishing another body with huge amounts of money" FG4 participant.

4.3.3.7 Use of evidence

Having adequate data to support designations was highlighted as a particular challenge across the focus groups and the need for science to trump politics. One participant highlighted that and area three times the size of Ireland would need to be designated in Irish waters and that this would require vast amounts of data to be gathered.

"They're really, really, really needs to be a very strong scientific rationale behind us and there needs to be clear benefits for them [MPAs] as well." FG4 participant

It was suggested that the lack of baseline data would hamper the ability to designate the right places and that caution should be used when using data for purposes for which it was not intended and in the use of expert opinion:

"And then there's expert opinion to underpin this and I would agree with [another participant] that very often the expert opinion isn't based on sufficient up to date information." FG4 participant

"…if you're not using the science the way the science was intended to be used, you won't actually achieve your objective." FG4

4.3.3.8 Challenging the mindset

One additional challenge to ensuring an effective consultation process was suggested to be the current level of understanding of many people about the marine environment. While describing their visions for the future of Ireland's marine environment, many focus group participants raised the need to increase ocean literacy (see also section 4.1.5). It was thought that the absence of knowledge about the marine environment may mean that some stakeholders are not well equipped to participate in the consultation process.

> *"…the real challenges … going back to the same thing and creating awareness of that world under there and …why we're doing this. And that's a real challenge is to make people see what's underneath the water."* FG3 participant

> "*We would go a long way to informing and equipping Irish people ourselves to celebrate the ocean better if we knew more about it. So to some extent we're asking people to do something that they're not equipped to do and that should start with basic education"* FG3 participant

4.4 What do you think is the most appropriate way of managing and monitoring the MPA network?

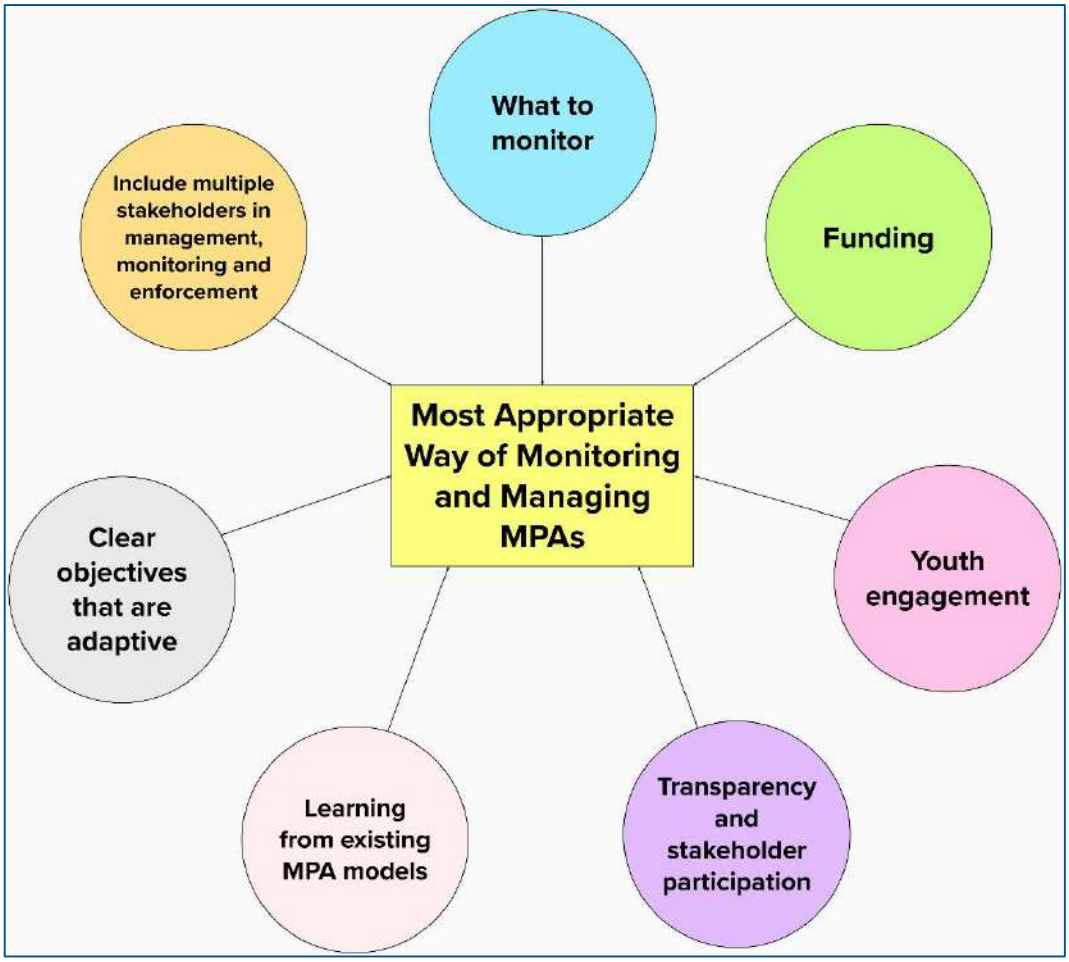

Figure 4: Topics discussed by focus group participants regarding the most appropriate way to manage and monitor the MPA network

Focus group participants made a number of suggestions about how to manage and monitor the MPA network (Figure 4). These included learning from MPA models elsewhere, ensuring that objectives are clear and adaptive, and the need for effective monitoring. Participants also made suggestion as to who should be engaged in the management, monitoring and enforcement of MPAs and how this process should be transparent and requires adequate funding. Improving ocean literacy was also suggested as a mechanism to ensure buy-in to the MPA network.

4.4.1.1 Learning from existing MPA models

Focus group participants acknowledged that functioning MPAs exist in other parts of the world. Focus group 2 participants in particular suggested looking to other countries in Europe, especially France and Sweden, as well as further afield in the US and New Zealand to learn lessons about what has worked well and what has not.

> *"We don't have to create the systems from scratch. The systems are already in place in France and in many countries across Europe. [It's] easier to copy something and tweak it than starting from scratch. So let's not try to reinvent the wheel."* FG2 participant.

4.4.1.2 Clear objectives that are adaptive

A common theme across focus groups was the need for clarity: clarity in MPA boundaries and rules so that users understand what can and cannot occur inside an MPA; clarity in management objectives so that the goal of the MPA is known and progress can be monitored; and clarity in the regulatory environment which stipulates what needs to be managed and monitored and is easy to navigate. There were also suggestions that objectives should be measurable and adaptable as environmental conditions will change as will users needs:

> *"It shouldn't be too complex, you know, to comply with the requirements of MPA shouldn't be very complex for the people that are living on the ground."* FG3 participant.

> *"I think in in terms of the management plan and the process, there should be very clear objectives which could be measurable."* FG1 participant.

> *"I think it's really important to bear in mind that these may need to be flexible because the environmental conditions are changing."* FG1 participant.

> *"A clear regulatory environment [will] make life easier for everybody."* FG2 participant.

> *"And, you know, an active management model for this, which takes into account, whether [a sector] wants to do some [activity]."* FG2 participant.

There was also the suggestion, again, that management of the MPA network should be streamlined with other plans, such as those for marine spatial planning:

> *"Maybe a heightened level of management, which in content and in consultation or in conjunction with marine spatial planning."* FG2 participant.

4.4.1.3 What to monitor

There was agreement across all focus groups that monitoring and enforcement would be important to the success of the MPA network and what would separate the network from "paper parks" (see also section 4.3.3.2). There was recognition by

some participants that MPAs are likely to be multiple use and that there would need to be careful management of the different users within the MPAs. While some participants suggested there is the need for a common plan across MPAs to ensure that everyone knows what they should or should not be doing, other participants suggested that management needs to be tailored for each MPA, given their different conditions and characteristics (see also section 4.3.3.3).

There was general recognition that monitoring would be complex, but that guidance needs to be worded in such a way to ensure that monitoring is meaningful (which is not always the case with existing planning conditions):

> *"It's a complex area and it's something that will require, I think, constant monitoring and in terms of MPAs to be appropriate and fit for purpose in the long term."* FG6 participant.

> *"… the wording around environmental monitoring and planning conditions is often so loose that no meaningful monitoring arises."* FG2 participant.

Defining key performance indicators was a suggestion from focus group one, along with annual reviews of how the MPA is doing and what it has achieved. It was also suggested that this performance monitoring should be measured against a baseline of evidence and articulated in the management plans:

> *"And to really articulate the benefits and what the objectives are, and how the objectives are being met, are not being met. It's almost like it would need some, some performance indicator to show that it is working or it's not working."* FG1 participant.

There was also recognition of the cost associated with monitoring and the need to identify whose responsibility monitoring should be:

> *"Delineation of who's responsible for the monitoring and then clear guidance on who's going to fund the monitoring and management because it's going to be expensive."* FG3 participant.

4.4.1.4 Include multiple stakeholders in management, monitoring and enforcement

In terms of who has the responsibility for management, monitoring and enforcement, suggestions included communities, economic sectors, scientist, government agencies as well as citizen scientists as well as technology (e.g. satellites). Participants differed in the balance between these actors with some suggesting a bottom-up approach, some indicating a more top-down approach, while others were in the middle. For example:

> *"The community as custodians will take responsibility as well. I think grassroots conservation is what works best."* FG7 participant.

> *"I think there are some good models in Galicia, Spain where they've involved local stakeholders, particularly local fishers in terms of managing the areas. But again, it needs to be backed up by, you know, by the state by resources and by oversight and by enforcement, obviously, otherwise it's a waste."* FG4 participant

From the top-down perspective, there was concern that responsibility for the marine environment at the government level is currently fragmented (see also section 4.1.3.3) and that this needs to be addressed:

> *"At the moment, it's spread across multiple agencies and departments. And so I think that needs to be addressed. You know that there's a coherent approach."* FG3

Two focus groups suggested the potential for the development of stakeholder forums. One participant indicated that a possible model could be based on the coastal partnerships being established in the UK. These were reported to be permanent institutions involving stakeholders with an interest in the coast

The suggestion that industry should be involved in MPA monitoring was made by two focus groups and how that may support the co-location of industry within MPAs:

> *"You know, within Irish waters, I think there's going to be, there is an onus on wind farm owners for monitoring and managing the ecosystems there and again and it potentially ties into how we might allow marine protected areas and offshore wind to coexist."* FG6 participant

The importance of enforcement was recognised in one focus group and how this can also guide monitoring to areas of need as well as encourage stakeholder participation in the MPAs:

> *"Enforcement is critical. And for me, [and other participants] and the Navy and, and the fishers themselves and the community's needs to be involved in the management of those ecosystems"* FG2 participant.

4.4.1.5 Transparency and stakeholder participation

Engaging stakeholders including communities in the management and monitoring was suggested to be important by many focus group participants.

> *"Self policing, self enforcement, self monitoring and what to do that. I think that needs to be as if somebody mentioned a kind of a bottom up. People need to buy into it. They need to be sold on the idea that and they need to see it as the future for their own"* FG4 participant

However, there was concern that the mechanism for achieving this is not yet known:

> *"There's too many activities and unless there's a cooperation and abiding by stakeholders to collectively manage and monitor the MPa and I don't see this as being successful."* FG7 participant.

> *"We're moving from a very simple maritime model …to a much more complex environment where we'll have big changes in the rules surrounding fishing, if only because of Brexit, and where we're going to have over the next 20 years very significant offshore renewable activities taking place. So we need to find a mechanism which allows all of the key stakeholders to talk about the various issues that arise on an ongoing basis and with government involved, and I don't think we have found that mechanism yet."* FG7 participant.

Whatever the mechanism created, focus group participants highlighted that it needs to be transparent:

> *"Developing a robust and transparent system for decision making in this area is key to reducing the level of potential conflict."* FG2 participant.

But caution was advised by one participant that stakeholder interests may prevail or that community may not be equipped for effective monitoring or enforcement:

> "*[We] have to be careful. And this is where the oversight as needed. We have to be careful that we don't have a situation where various interest groups are basically trying to prioritize… a public resource themselves.*" FG4 participant.

"*… there's a lot of talk about local community but you know you need institutions, you need strong community ties relationships.*" FG6 participant

4.4.1.6 Funding

Success of the MPA network was also linked by focus group participants to the need for an adequate long-term funding plan. There was concern about where funding would come from and a need to recognise that stakeholder engagement in the designation process as well as the development of management plans would be costly (see also section 1.3.3.6)

"…but I don't think it can be underestimated the amount and the intensity of people time it takes to develop something like management plan." FG4 participant

Focus group participants also highlighted the necessity of funding for management, monitoring and enforcement once MPAs have been designated:

"Well, [another participant] mentioned about the costs of enforcement, protection and managing MPAs. I'd see that as a huge, huge factor in all of this in terms of considering the future." FG4 participant.

One participant commented on the poor track record for funding nature protection, comparing funding for national parks to that of the greyhound racing industry. They suggested that if this is true, then Ireland still has some way to go in terms of supporting protected sites.

Another participant suggested that to support funding, a green levy could be introduced, whereby those who benefit from the MPA contribute. It was noted, however, that if a sector is hindered from using an MPA in some way, they will be unwilling to support the MPA financially.

4.4.1.7 Youth engagement

A final issue that was raised throughout the focus groups was the need to get the public and especially young people involved and how this needs to be integrated within monitoring and management (see also sections 4.1.5, 4.2.3 and 4.3.3.8). It was recognised that to do this, different mechanisms would be needed from engagement through mixed media and with diverse groups from churches to schools:

"I think it's important that there's an educational aspect to all the MPAs and maybe this is something that should be written into the management plans" FG1 participant.

"Environment or media or a certain section of the Sunday paper is not going to be read by the masses, or by the children, and we need to work out a way of getting all this wonderful work being done and hitting that mass audience, bring them on board." FG3 participant.

5 List of organisations invited to participate in the stakeholder consultation process

An Bord Bia
An Bord Iascaigh Mhara
An Bord Pleanála
An Taisce
Ascophyllum nodosum Processors Group
Birdwatch Ireland
Change by Degrees
Coastwatch
Coiste Chearta Cladaí Chonamara
Comhdháil Oileáin na hÉireann / Irish Islands Federation
Commissioners of Irish Lights
County and City Management Association (CCMA)
Department of Agriculture, Food and the Marine - Marine Programmes Division
Department of Agriculture, Food and the Marine - Sea Fisheries Policy and Management Division
Department of An Taoiseach
Department of An Taoiseach - Economic Infrastructure & Regulation
Department of Communications, Climate Action & Environment - Environment Advisory Unit
Department of Communications, Climate Action & Environment - Petroleum Affairs Division
Department of Communications, Climate Action & Environment - Strategic Energy Policy
Department of Culture, Heritage and the Gaeltacht - Islands Unit
Department of Culture, Heritage and the Gaeltacht - National Parks & Wildlife Service
Department of Defence - Aviation and Maritime Unit
Department of Foreign Affairs and Trade
Department of Foreign Affairs and Trade - Legal Division
Department of Housing, Planning and Local Government - Marine Legislation
Department of Housing, Planning and Local Government - Marine Planning & Policy Development
Department of Housing, Planning and Local Government - Water Advisory Unit
Department of Transport, Tourism & Sport
Department of Transport, Tourism & Sport - Irish Coast Guard
Department of Transport, Tourism & Sport - Nautical Service
Dublin Bay Biosphere Partnership (c/o Dublin City Council)
EirGrid
Enterprise Ireland
Environmental Protection Agency
European Parliament PECH committee
Federation of Irish Sport
Food Safety Authority of Ireland
IBEC
Inland Fisheries Ireland
Irish Association for Adventure Tourism
Irish Charter Skipper Association
Irish Environmental Network
Irish Farmers Association - Aquaculture Section
Irish Federation of Sea Anglers
Irish Fish Producers Organisation
Irish Marine Federation
Irish Maritime Development Office
Irish Native Oyster Fisheries Forum

Irish Naval Service
Irish Offshore Operators Association
Irish Ports Association
Irish Sailing Association
Irish South and East Fish Producers Organisation
Irish South and West Fish Producers Organisation
Irish Surfing Association
Irish Tourism Industry Confederation
Irish Underwater Council (CFT)
Irish Whale and Dolphin Group
Irish Wildlife Trust
Irish Wind Energy Association
Killybegs Fishermen's Organisation
Marine Institute
Marine Renewables Industry Association
Maynooth University - Department of Geography
Mike Walker (Environmental consultant)
National Economic and Social Council
National Inshore Fishermans Association
National Inshore Fishermans Forum
National Offshore Wind Association of Ireland
North Western Waters Advisory Committee (NWWAC)
Office of Public Works
Queens University Belfast - School of Natural and Built Environment
Regional Inshore Fisheries Forums: North
Regional Inshore Fisheries Forums: North East
Regional Inshore Fisheries Forums: North West
Regional Inshore Fisheries Forums: South East
Regional Inshore Fisheries Forums: South West
Regional Inshore Fisheries Forums: West
Sea Angling Ireland
Sea Fisheries Protection Authority
Seasearch Ireland
Sustainable Energy Authority of Ireland (SEAI)
The Heritage Council
Údarás na Gaeltachta