County Down – County Louth Marine Protected Areas Management Plan

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Glossary of Terms

AFBI Agri-Food and Biosciences Institute

AMR Antimicrobial resistance

AONB Area of Outstanding Natural Beauty

ASSI Area of Special Scientific Interest

BTO British Trust for Ornithology

BSAC British Sub-Aqua Club

CEDaR Centre for Environmental Data and Recording

DAFM Department of Agriculture Food and the Marine

DAERA Department of Agriculture, Environment and Rural Affairs

DECC Department of the Environment, Climate and Communications

DECCL Department of Energy and Climate Change London

DfE Department for the Economy

DfI Department for Infrastructure

DGNSS Differential Global Navigation Satellite System

DHLGH Department of Housing, Local Government and Heritage

DoD Department of Defence (RoI)

EC European Commission

ECC Environment European Commission

EEZ Exclusive Economic Zone

EPG European Programmes and Gateways Unit

EU European Union

EWL Extreme Water Levels

FCL Fish Culutre Licence

FWC Fast Watercraft

GLS Global Location Sensor

GPS Global Positioning System

GSM Global System for Mobile

HPAI Highly Pathogenic Avian Influenza

HRA Habitats Regulations Assessment

ICES International Council for the Exploration of the Seas

ICPS Irish Coastal Protection Strategy

IMO International Maritime Organisation

INNS Invasive Non-Native Species

IPCC Intergovernmental Panel on Climate Change

IRBD International River Basins District Management Plan

IUCN International Union for the Conservation of Nature

IWGD Irish Whale and Dolphin Group

iVMS Inshore Vessel Monitoring System

JNAPC Joint Nautical Archaeology Policy Committee

JNCC Joint Nature Conservation Committee

JSP Joint Service Publication

LA Local Authority

LPG Liquid Petroleum Gas

MarPAMM Marine Protected Area Management and Monitoring

MCA Maritime and Coastguard Agency

MCRT Marine and Fisheries Division Marine Conservation and Reporting Team

MCZ Marine Conservation Zone

MEPC Marine Environment Protection Committee

MLS Minimum landing size

MMO Marine Mammal Observer

MoD Ministry of Defence

MPA Marine Protected Area

MIB Multiple Intertidal Bars

NBDC National Biodiversity Data Centre

NGO Non-Governmental Organisation

NHA Natural Heritage Area

NI Northern Ireland

NIW Northern Ireland Water

NMPF National Marine Planning Framework

NPWS National Parks and Wildlife Service

NWSMP National Wastewater Sludge Management Plan

OPW Office of Public Works

OSPAR Oslo and Paris Conventions

PADI Professional Association of Diving Instructors

PAM Passive Acoustic Monitoring

PWMP Port Waste Management Plan

PWC Personal watercraft

REM Remote Electronic Monitoring

RLG Regional Locational Guidance

RoI Republic of Ireland

SAC Special Area of Conservation

SPA Special Protection Area

SLR Sea-Level Rise

SSA Sub-Aqua Association

SWOT Strengths, Weaknesses, Opportunities and Threats

TDR Temperature Depth Recorder

TENs Trans-European Networks

UK United Kingdom

UNESCO The United Nations Educational, Scientific and Cultural Organisation

Executive Summary.

The Marine Protected Area Management and Monitoring (MarPAMM) project developed tools for monitoring and managing Marine Protected Areas (MPAs) within Northern Ireland (NI), the Republic of Ireland (RoI) and Western Scotland.

Through the development of six management plans, MarPAMM aimed to increase capacity in and collaboration between Northern Ireland, the Republic of Ireland, and western Scotland for MPA management planning. This will help to enable wider integrated marine planning and management. The following objectives were created to achieve this aim:

- Collate existing best practice on the production of MPA management plans including those on governance, stakeholder engagement, management planning and communications; and
- Use MarPAMM Management Plans within the island of Ireland to:
    - Provide recommendations on MPA management which could deliver benefits to the condition of designated features under conservation.
    - Deliver benefits from MarPAMM scientific outputs, management guidance and co-management recommendations for marine activity participants, stakeholders and local communities.
    - Promote greater integration between MPAs management and wider marine management frameworks; and
    - Focus on the connections between MPAs in the three different jurisdictions.

This management guidance plan delivers outputs from the EU funded INTERREG VA Objective 2.2, through the production of a regional MPA Management document for the MPAs within the County (Co.) Down – County (Co.) Louth area. This management plan aims to support the delivery of strategic conservation, building on existing best practice approaches to MPA management (e.g., risk-based, adaptive management) and aid adaptation. This can effectively create resilience and adaptability to protect, maintain and enhance the environs of the Co. Down – Co. Louth MPAs region.

Key recommendations and considerations from stakeholder engagement have helped to identify and devise strategic guidance for current and future management of MPA designated features and adjacent areas within this management plan area. Examination of the rationale behind the guidance has identified key areas for

management considerations, such as renewable energy development, recreation and tourism practices and climate change.

Key areas include:

1. **Long-term monitoring of impacts**: Results from MarPAMM research has indicated that noise disturbance of marine mammals (i.e., common seal (*Phoca vitulina*)) through human and shipping interactions is contributing to heightened risk to large mobile marine species. This has become an increasing problem through the growth of human recreational activity within marine and coastal areas during and post Covid-19 Pandemic.
    a. A key requirement for future management would be long term monitoring of the impact of human interactions with the marine environment, especially via noise from shipping and recreational pleasure boating.
    b. This long-term monitoring should focus on the use of non-invasive Passive Acoustic Monitoring (PAM) to aid interrogation of temporal dynamics and species presence.

2. **Growth of recreation and tourism**: Future MPA management should provide marine recreational activity users with appropriate guidelines to help support environmentally friendly practices.
    a. Areas of identified concern include impacts from FWCs, jet skis and recreational dog walking. This management plan recommends users follow codes of conducts such as the WiSE Scheme, Leave no trace and Share the Shore.

3. **Growth of anthropogenic climate change**: Increasing coastal risk (i.e., flooding and erosion) will have significant effects on coastal developments, infrastructure, and designated features. Future MPA management strategies should migrate from an Engineered (Hold the Line) response to regimes focussed on 'Nature Based Solutions' with Managed Realignment.

4. **Blue Carbon restoration:** This could represent a key mitigation tool for climate change within marine and coastal areas. The potential of carbon sequestration from Blue Carbon (i.e., native oyster (*Ostrea edulis*) bed restoration) can work as effective carbon sinks.
    a. A key output would be the mapping *O. edulis* presence throughout the entire MPAs management plan area which could establish potential areas for restoration.
    b. These areas would need to undergo detailed monitoring schemes to minimise knock on effects on the shellfish industry.

These recommendations were used to form strategic guidance areas detailed in the management plan. The recommendations are expected to be hierarchical to enable issues to be addressed appropriately at either local or regional scales.

1. Regional setting: location, boundary & context.

1.1. Overview and context of the Co. Down – Co. Louth MPAs management plan area.

The marine environment is under increasing pressure through the impacts of anthropogenic climatic change and changes in maritime activities (e.g., growing interest in offshore renewable energy generation). These pressures and/or activities require a strategic management approach to enable environmental, economic, and social resilience. Further pressures have been identified through the MarPAMM stakeholder engagement groups, such as increasing pressures of tourism and recreation since the Covid-19 pandemic. These pressures impact designated habitats and features in MPAs. MPAs and adjacent areas play an important role for biodiversity through supporting ecosystem service delivery i.e., nutrient recycling. Additionally, these areas have economic and social importance through industry, trade, recreation, spirituality, energy production and cultural heritage.

The Co. Down – Co. Louth region is in the north of the island of Ireland and encompasses all the transboundary inshore marine areas from Belfast Lough in Co. Antrim to Dundalk Bay in Co. Louth. This boundary for the Co. Down – Co. Louth MPAs management plan extends only into terrestrial areas that include designated features that experience seawater inundation/direct influence i.e., saltmarsh and foredune complexes. Designated terrestrial features such as hinter dunes are not included in the plan area. The region hosts a diverse range of unique, important and/or threatened species and habitats which are reliant on the presence of the biological and physical features contained within the boundary.

This management plan was developed as a collaborative effort between Northern Ireland (NI) and Republic of Ireland (RoI) in a mirrored cross-border approach with a focus on MPA designated species and habitats selection and working with key marine stakeholders in each jurisdiction. This document presents policy for coastal and marine designated features from a strategic level between all MPAs and adjacent areas from the mean high water spring tide mark. The management plan aims to support marine activities while enhancing the conservation and resilience of designated features and species.

The ethos behind the development of the Co. Down – Co. Louth MPAs management plan was to provide additional support for delivery of conservation benefits from MPAs

whilst working in parallel with local communities and stakeholders. Input from a Steering Group comprising of stakeholders from industry, government, environmental non-governmental organisations (eNGOs) and the local community contributed to the development of a stakeholder-led management plan with strategic guidance recommendations for the cross-border Co. Down – Co. Louth region. The information presented in this document is a combination of aspirational targets and existing legislation that are presented as guidance for interested parties. This guidance is not statutory and as such cannot be fully enforced as a management plan. For ease of reference and discussion it is hereafter referred to as the 'Co. Down – Co. Louth MPAs management plan'.

The management plan will inform and assist marine managers within NI and RoI by supporting statutory marine management through the Marine Act (Northern Ireland) 2013 and the Maritime Area Planning Act (2021).

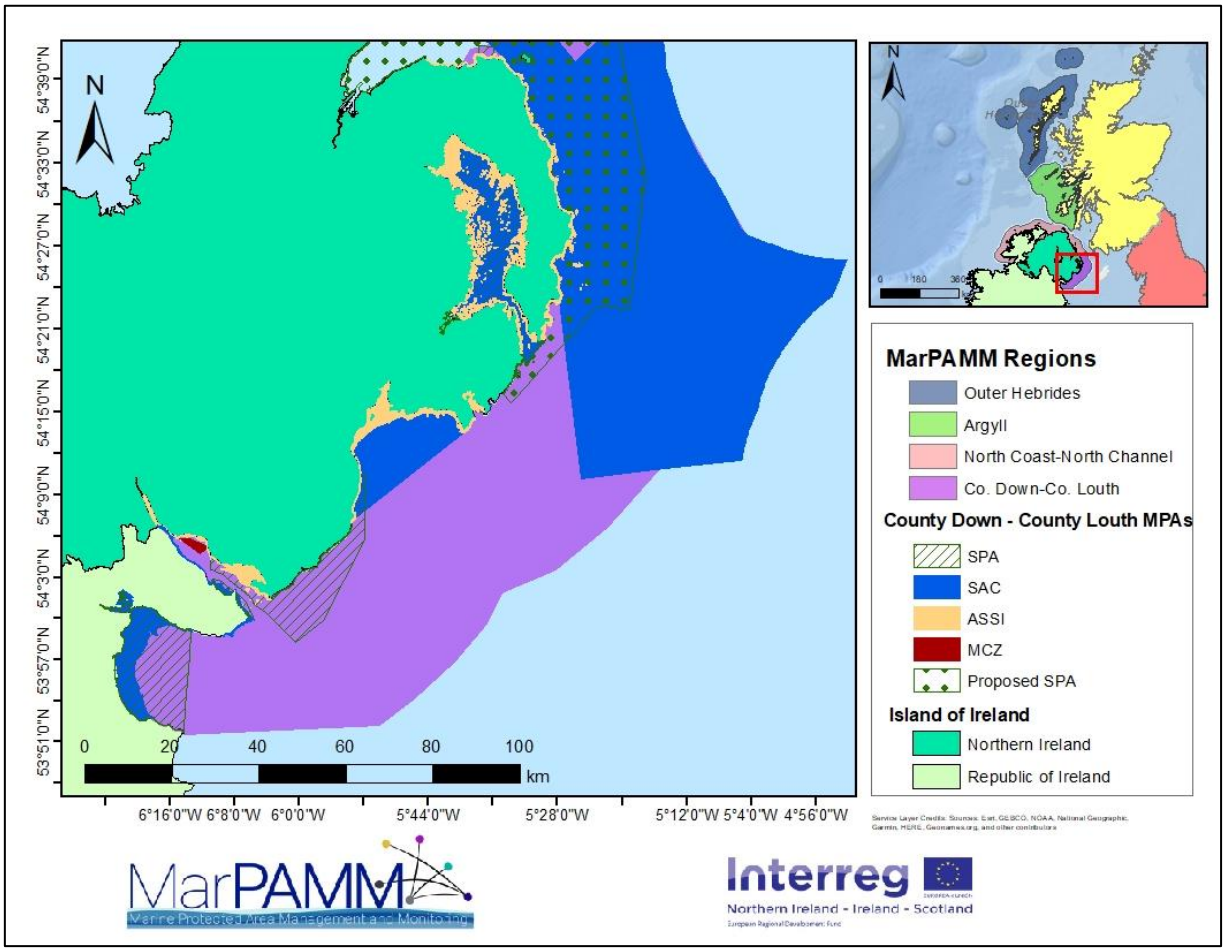

Figure 1: Co. Down – Co. Louth MPAs Management Plan Area (Source: AFBI, 2022).

1.2. Overview of what the plan seeks to achieve.

The Co. Down – Co. Louth MPAs management plan supports the sustainable use of the marine environment within the Special Protected Areas (SPAs), Special Areas of Conservation (SACs), Marine Conservation Zones (MCZs) and Areas of Special Scientific Interest (ASSIs). The focus of the management plan is on designated species and features. This requires collaboration between stakeholders and those involved in the wider governance of marine planning and management. This is achieved through the objectives below:

a. Support the delivery of strategic conservation benefits and identify aspirations of activity users/ local communities for site-specific guidance which may fall outside of legislation, particularly in relation to how they may benefit from the MPAs.
b. Planning at a scale which enables site-specific and strategic actions (i.e., climate change adaptation) to be applied to create enhanced integration with wider marine management.
c. Ensure a focus on the connections between MPAs, assisting stakeholders' understanding that these protected areas are part of an interconnected network and that actions outside of MPAs can influence the designated features within MPAs; and
d. Share lessons learned from this innovative approach of management planning at a regional scale.

Successful and effective management needs to be underpinned by the best available evidence, be widely supported and be subject to regular reviews and updates based on monitoring outcomes and new knowledge.

The Co. Down – Co. Louth MPAs management plan will assist decision makers in developing a consistent approach and understanding of MPA management at a regional scale, improving communication of decisions from relevant authorities. The management plan could be used advantageously as a marine management tool and in planning marine orientated development. The guidance approaches used to inform the management plan were developed by adapting existing best practice from across the European Union (EU), the United Kingdom (UK) and the Republic of Ireland. Innovative guidance approaches were also developed using MarPAMM project partner outputs from the four science focused work packages.

The management plan outputs will inform, and aid decisions made by marine managers operating within the management plan area by supporting wider marine

management associated with marine spatial planning. Relevant marine planning policy and legislation is in Table 1.

Table 1: Marine Spatial Planning within the island of Ireland.

Northern Ireland	Republic of Ireland
Marine and Coastal Access Act 2009	Marine Strategy Framework Directive
The Marine Strategy Regulations 2010	
Marine Policy Statement 2011	EU Maritime Spatial Planning Directive (2014)
Marine Act (Northern Ireland) 2013	Maritime Area Planning Act 2021
Draft Marine Plan 2018	

This management plan is non-statutory but is being produced in collaboration with the Irish Regional Steering Group and the statutory authorities, the Department of Agriculture, Environment and Rural Affairs (DAERA) and the Department of Housing, Local Government and Heritage (DHLGH). The stated guidance and monitoring from the Co. Down – Co. Louth MPAs management plan should continue to have effect (where relevant) unless and until such guidance is updated, revised, or replaced by new Departmental (NI & RoI) guidance or a statutory policy.

OSPAR and Next Steps.

The OSPAR convention considers MPAs as sites for which conservation measures have been created, making use of protective, restorative, and precautionary governance to protect and conserve species, habitats, ecosystems, or ecological processes in the marine environment (OSPAR, 1998). The OSPAR commission provides a mechanism through collaborative governance with EU and non-EU members to protect the marine environment of the North-East Atlantic. This encompasses a wide array of marine issues from work on pollution and dumping at sea to the conservation of marine biodiversity (OSPAR, 2006).

RoI has committed to establishing a series of MPAs to protect Irish marine biodiversity. Ireland has established several SACs and SPAs as OSPAR MPAs for marine habitats of qualifying interest (NPWS). These are specific areas where it is mandatory to cultivate and sustain a ‘favourable conservation status’ where there is a presence of a registered species of ‘qualifying interest’ protected under the EU Habitats and Birds

Directive (Classen, 2020). Currently there are 248 identified SACs and SPAs in Irish waters, comprising 2.4% of Irelands Exclusive Economic Zone (EEZ) (Classen, 2020).

In parallel, NI's commitment to the objectives of the OSPAR commission is through marine conservation work undertaken by DAERA within SACs, SPAs and MCZs (DAERA, 2021a). NI has committed to developing and maintaining a network of well-managed MPAs through the application of management plans to help steer activity use approaches within the area. The actions developed through the Co. Down – Co. Louth MPAs management plan will operate alongside other management plans developed by the MarPAMM project which can act as an essential tool in delivery of the OSPAR objectives.

1.3. Co-management, social-ecological system, and stakeholder engagement.

Conventional approaches to marine protection and management (SPAs and SACs) across the island of Ireland are often based on top-down resource management. However, this approach is considered "*often blind to users social, economic and cultural conditions*" (Berkes, 2009). Increasingly, co-management is implemented into governance regimes due to failures of historical approaches; this provides a mechanism for engagement and collaboration with fishers and other stakeholders in governance (Wilson *et al*., 2003 & Kooiman *et al*., 2005). Co-management refers to shared authority and decision making between parties, often a combination of local communities and stakeholders, non-governmental organisations (NGOs) and the government (Berkes, 2010).

Part of the work within MarPAMM was to develop strategic policies for a MPA management plan focusing on the ecological and transboundary significance of the area as situated within the island of Ireland. A co-management governance approach was taken as it enables the sharing of authority and decision making on use of local resources between all involved parties and maintains sustainability between government departments and local stakeholders instead of a regionalised government approach (Berkes, 2010). This management plan was developed in conjunction with existing best practice methods for marine management and delivers conservation benefits by providing a tool to apply efficient and sustainable marine management practices, which in turn will lead to the enhancement of a structured, ecologically coherent, well-managed network of MPAs.

The Social-Ecological Systems Framework (Ostrom, 2009) has been used as a tool for factors that affect the management of sustainable resources to aid examination of challenges faced in human-environment interactions (Nagendra and Ostrom, 2014). In this context, MPAs can be viewed as complex social-ecological systems where human activities and nature overlap and interact. Implementation of conservation measures in MPAs needs to be examined simultaneously with social factors. The complexity of different designations, spatial dynamics and activity within designated areas overlaps between economic and social sectors and requires a governance framework that embeds co-operation and collaboration. Mounting evidence suggests that organisational, economic, and social factors determine the overall success or failure of a MPA (Chaigneau and Brown, 2016; Bennett *et al.*, 2020). To enable examination of the complexities associated with dynamic social-ecological systems (e.g., MPAs) there needs to be greater inclusion through increased stakeholder engagement (Freeman *et al*., 2018). Co-management was applied to the MarPAMM project to enhance critical stakeholder engagement. To achieve this, MarPAMM project officers created a stakeholder engagement strategy for the plan area (Appendix 1).

The stakeholder engagement strategy focussed on a pool of stakeholders with regional and local knowledge of marine and coastal functions within the Irish region (Irish Regional Steering Group). There was a focus on those with knowledge of the Co. Down – Co. Louth area to work on the Co. Down – Co. Louth MPAs management plan. It was essential that stakeholders held roles with direct association to this region to better shape and evolve management guidance and aspirations, agree potential benefits with other organisations working on the plan and identify potential gaps within datasets. The role of the Irish Regional Steering Group was to advise on spatial use of designated areas by sectors, illustrate perceived and observed interactions and provide detail on any formal/informal management practises implemented within the sectors. The Steering Group also examined the development of guidance approaches by interpreting modelling and scientific discussions from MarPAMM's technical work packages and providing critical comment on plan drafts. This helped create innovative solutions to relevant issues in areas within and adjacent to MPAs in the Co. Down – Co. Louth area and provided an opportunity for stakeholders to draw on their experience and knowledge. In September 2020, stakeholder mapping (Figure 2) was undertaken to ensure wide representation of marine stakeholders.

From September 2020, the members of the Irish Regional Steering Group worked with MarPAMM MPA management policy officers to explore and examine the critical issues and pressures that should be addressed to support effective and robust management of the Co. Down – Co. Louth MPAs management plan area. These discussions led to the identification of key themes that were developed into stakeholder objectives. These

objectives represent the key components that Steering Group members wanted for the Co. Down – Co. Louth MPAs management plan to achieve and include:

a. The creation of policy that is evidenced on robust species data, creating a dynamic tool to aid biodiversity restoration and promote resilience,
b. The application of a proactive ecosystems approach to enhance healthy biodiversity and seas,
c. The development of effective stakeholder consultation and engagement to balance activity challenges with competing priorities within MPAs,
d. Improve awareness and information sharing with marine/coastal users on the impact from activities within and adjacent to MPAs, and
e. The creation of a strategic management plan which fosters empowerment of stakeholders at the core of the process whilst bestowing local ownership.

These objectives were further developed into a stakeholder benefits mapping exercise which was analysed through a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. The analysis examined issues/pressures identified through Steering Group meetings in terms of frequency and consensus for relevant management considerations. The SWOT analysis outputs were modelled into a 'Benefits Realised' infographic (Appendix 2), which was reviewed and refined by stakeholders. The threats and weaknesses were subsequently modelled into 12 key management guidance criteria areas:

- Commercial Fishing,
- Aquaculture,
- Benthic Dredging and Disposal,
- Offshore Renewable Energy,
- Recreation and Tourism,
- Ballast Water and Accidental Runoff,
- Land use sediment run-off,
- Wild seaweed foraging and cultivation,
- Research and Education,
- Military and Defence,
- Marine Infrastructure and Shipping, and
- Climate Change.

These criteria form the policy areas that will provide additional support for delivery of conservation benefits from MPAs and surrounding areas in the Co. Down – Co. Louth region. The intention of this plan is to provide management guidance that is applicable to MPAs and their designated features, as well as adjacent areas outside of designations to help achieve the sustainable use of the marine environment and

resources. This is a principal output from the MarPAMM management planning process.

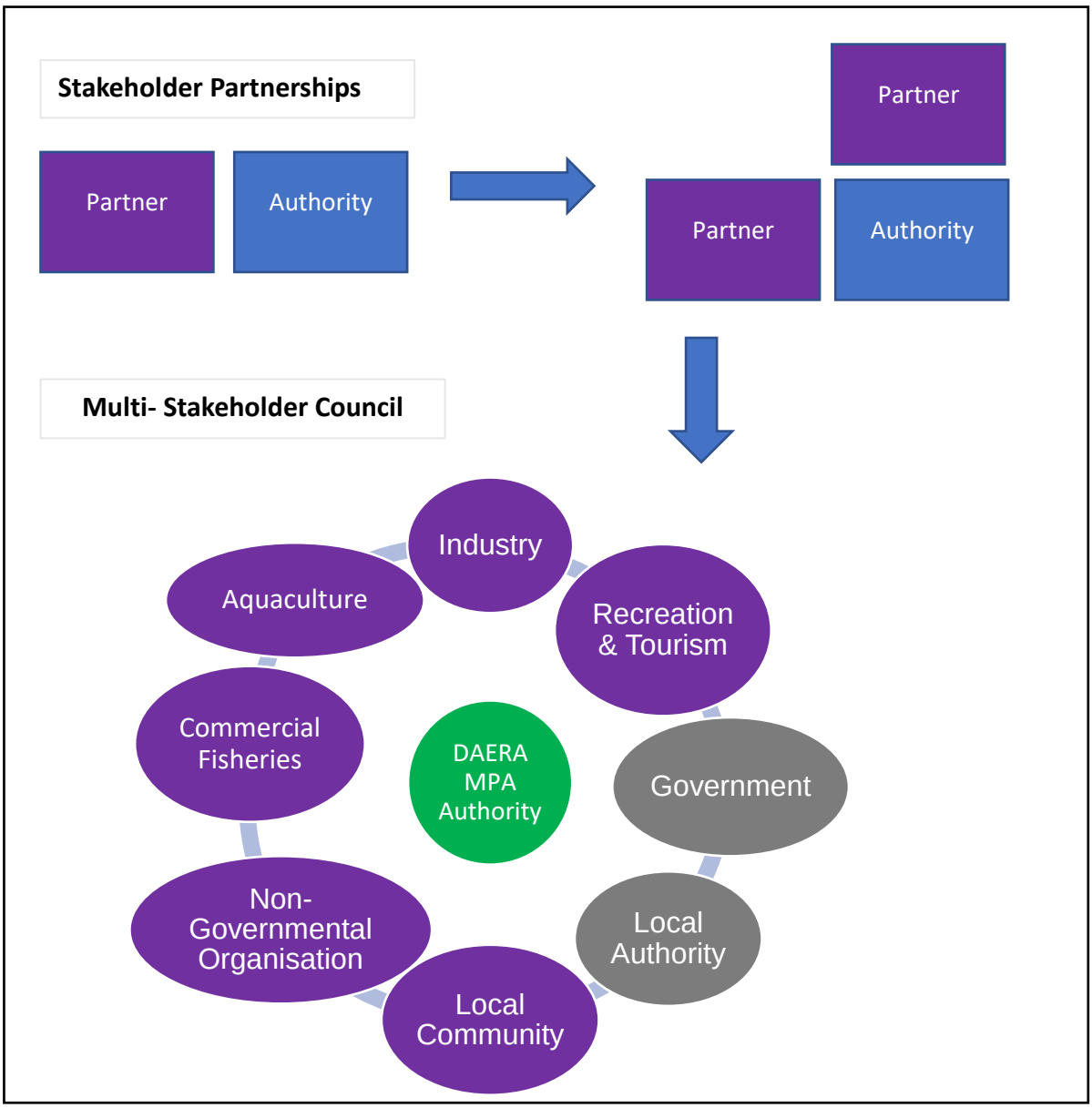

Figure 2. Evolution of the Co. Down – Co. Louth MPAs management plan Steering Group (Adapted from Brumbagh, 2017).

2. Description of Features.

MPAs is an umbrella term dedicated to a collective group of designated coastal and offshore marine locations that are protected by either international, national, or voluntary agreements (Classen, 2022). They have been defined by the International Union for the Conservation of Nature (IUCN) as -

> "*Any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment*" (Kelleher, 1999 & IUCN, 2021).

On the island of Ireland there are several different MPA designation mechanisms in place for the protection of important local and cross-border species under both NI and RoI jurisdictions; SACs, SPAs, ASSIs, MCZs and Ramsar Sites. The definitions of these MPAs are shown below in Table 2.

The management plan encompasses all inshore marine areas from Belfast Lough, Co. Antrim to Dundalk Bay, Co. Louth. This document presents guidance on the appropriate management of coastal and marine features, and adjacent areas from the mean high water spring tide mark.

Table 2: Description of current MPAs within the island of Ireland.

Current MPA designations in the island of Ireland	
Island of Ireland Special Areas of Conservation (SACs)	Marine areas that have been designated for the protection of habitats and species of '*qualifying interest'* listed under Annex I and II of the European Habitats Directive due to identified threats to habitat conditions and species safety (JNCC, 2020a).
Island of Ireland Special Protected Areas (SPAs)	Areas on land or at sea that have been designated for the protected of avian species of '*qualifying interest*' as determined under Annex I of the Birds Directive (2009/147/EC) (JNCC, 2020b).
Northern Ireland Areas of Special Scientific Interest (ASSIs)	Coastal/marine transitioning areas within this management plan designated for the protection of important species, habitats, or geological features

	that have been considered to contribute to the conservation of important locations (DAERA, 2019a).
Northern Ireland Marine Conservation Zones (MCZs)	Protected areas designated for the protection of important marine species in English, Welsh, and Northern Irish territorial and offshore waters (JNCC, 2019a).
Island of Ireland Ramsar Sites	Wetlands of international importance designated for protection under qualifying criteria from the Ramsar Convention of Wetlands due to the presence of rare or unique wetland types and their contribution to the conservation of biological diversity (JNCC, 2019b).

It is important to note that a strict, legal status for the designation of MPAs does not yet exist in the RoI (Classen, 2020). Instead, SACs and SPAs are used and have been designated to any sites of concern within the RoI. For this management plan, these SPAs and SACs will be considered as official RoI MPAs.

The aim of the Co. Down – Co. Louth MPAs management plan is to provide guidance on the protection of feature designations from a holistic trans boundary perspective, acknowledging that marine species do not adhere to political spatial boundaries. This management plan will attempt to create guidance that will complement each jurisdiction's methods of conservation to enhance sustainability for vulnerable habitats and species.

As this is a regional MPA management plan, the focus is not on the individual species, habitats, or single site designation but about the strategic and interconnected management of similar features between different MPAs and adjacent areas, including international boundaries between western Scotland, NI and RoI. To achieve this, similar species or habitats in different designations are excluded as the management considerations will be the same across the entire Co. Down – Co. Louth MPAs management plan area.

Examples of SPAs, SACs and MCZs within the Co. Down – Co. Louth Management Plan Region.

Belfast Lough SPA.

Belfast Lough SPA (Figure 3) is a large intertidal sea lough located at the mouth of the river Lagan on the east coast of NI (DAERA, 2015a). Site features include mudflats, shell dominated banks and various man-made lagoons. Belfast Lough SPA connects to part of the East Coast (NI) Marine SPA and does not include marine areas below the mean low water mark. The main species of interest within the Belfast Lough SPA are the breeding colonies of both Common Terns (*Sterna hirundo*) and Arctic Terns (*Terna paradisaea*) and the large populations of wintering Redhanks (*Tringa tetanus*), Bar – Tailed Godwit (*Limosa lapponica)* and Black – Tailed Godwit (*Limosa limosa*) (DAERA, 2015a).

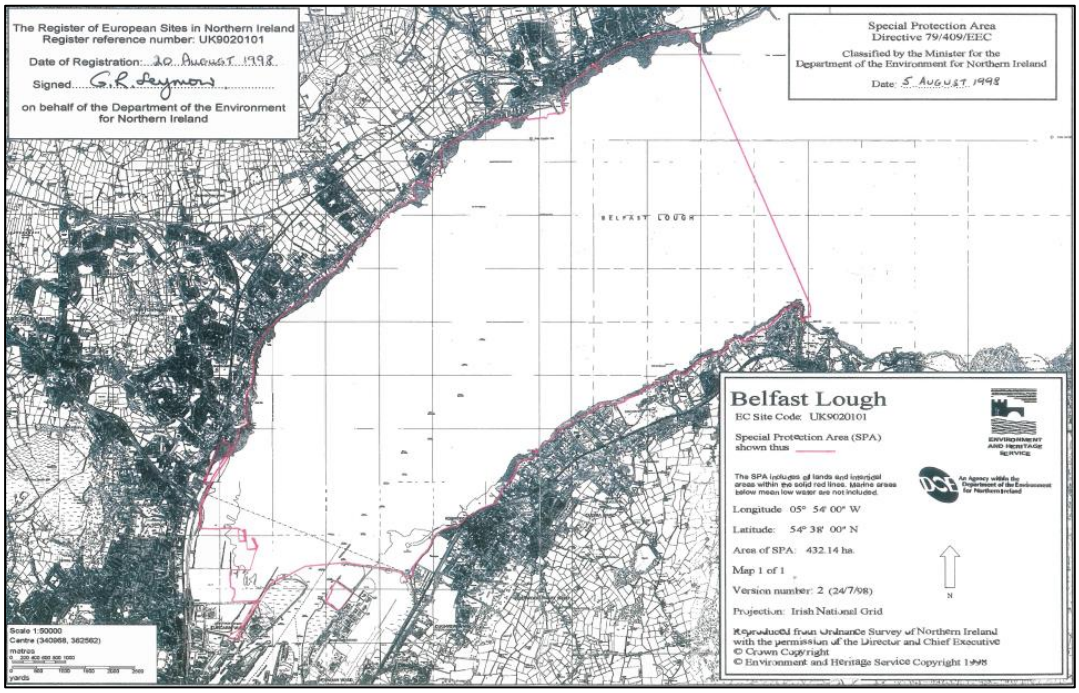

Figure 3: Site map of Belfast Lough SPA (DAERA, 2015a).

Mourne Coast ASSI.

The Mourne Coast ASSI is located along a moderately exposed shoreline dominated by large boulders, with intermittent shallow rocky ridges along the upper shoreline (DAERA, 2015b*).* This site was designated due to the presence of a variety of important and unique geological site features including intertidal rock communities, saltmarsh, grasslands, and the best example of biogenic reefs constructed by the Honeycomb Worm biogenic in NI (DAERA, 2015b). It is also an important haul out site for both common seal *(Phoco vitulina*) and grey seal (*Halichoerus gyrpus*) populations and hosts internationally important bird populations of Black – legged Kittiwake (*Rissa tridactyla)* and Black Guillemot (*Cepphus grylle)* (DAERA, 2015b).

Figure 4: Black Guillemot (*C. grylle)* **(© Bird Watch Ireland, 2021**).

Dundalk Bay SPA.

Dundalk Bay is a large shallow and east facing bay, The SPA extends approx. 16 km from Castletown River along the Cooley Peninsula in the north to Annagassan/Salterstown in the south. The shallow bay is slightly sheltered by the Cooley Peninsula along the northern side and Dunaney Point along the southern side, and opens out towards the Irish Sea (NPWS, 2011). The area includes saltmarshes, estuaries, sandflats, and mudflats as well as boulder and shingle beaches. The mudflat features host diverse fauna including molluscs, polychaetes, and crustaceans - important prey resources for wintering bird populations (NPWS, 2011). This is an important area for wintering waterfowl, supporting more than 20,000 including Greylag Goose *(Anser anser),* Light Bellied Brent Goose *(Branta bernicla hrota)*, Red breasted Merganser *(Mergus serrator),* Great Crested Grebe (*Podiceps cristatus*), Oystercatcher *(Haematopus ostralegus)* and Golden plover *(Pluvialis apricaria)* (NPWS, 2011).

Figure 5: Light Bellied Brent Goose (*B. b. hrota*) (© Bird Watch Ireland, 2019).

Boyne Estuary SPA.

The Boyne Estuary SPA is located on the border of Co. Louth and Co. Meath, west of Drogheda and is mainly comprised of the Boyne River estuary. The SPA includes a variety of vegetation from intertidal flats, salt marshes (*Puccinellia maritima*), eelgrass *(Zostera marina*), Sea-purslane *(Halimione portulacoides)*, sea plantain (*Plantago maritima),* lax-flowered sea-lavender *(Limonium humile*) and Glasswort *(Salicornia europaea)* (NPWS, 2013). The Boyne Estuary SPA is considered the second most important estuary location (RoI) for returning internationally important population levels of wintering birds, including Black -Tailed Godwit *(L. limosa)* and nine other designated species (NPWS, 2013). Other species of note recorded here include Shelduck (*Tadorna tadorna*), Oystercatcher *(H. ostralegus*)*,* Golden Plover *(P. apricaria*), Grey Plover, *(Pluvialis squatarola*), Turnstone (*Arenaria interpres*) and Little Tern (*Sternula albifrons)* (NPWS, 2013).

2.1. Seabirds.

To help achieve the conservation objectives and favourable status for designated SPAs within this management plan, species are examined from a strategic transboundary perspective. This is justified as many individual species occur within multiple SPAs and experience common threats and pressures either in breeding locations or in foraging areas of the sea (Howells *et al.,* 2022). The work undertaken through the MarPAMM Seabird modelling work package has highlighted that colonies within each region may be also subject to a meta-population process, forming a network of interconnected breeding or foraging sites which can be

managed through combined actions, although this can be challenging (Howells *et al.,* 2022). Thus, management interventions implemented at a regional, rather than site level may benefit multiple species across a suite of SPAs within a given area (Oppel *et al.*, 2018). As such, conservation outcomes and management plans may be more successful and cost-effective for seabird populations through regional actions across these SPA networks.

Figure 6: Little Tern (*Sternula Albifrons).*

Coastal locations along the Co. Down – Co. Louth management area collectively support various internationally important populations of breeding seabirds (Table 3 & 4; Johnston *et al.,* 2021). As part of MarPAMM, Bird Watch Ireland (BWI) has carried out a wide variety of research from 2018 to 2022. This work included surveys of a variety of species of wintering wetland/ground nesting species and inland gulls.

Designated protected areas along the coast, such as the Mourne Coast ASSI, host a diverse range of important breeding and wintering populations of birds including the Kittiwake (*R. tridactyla)*. Wetland locations such as Killough Bay SPA are extremely important ornithological sites that support internationally important populations of multiple avian species including the Light – Bellied Brent Goose (*B. b. hrota*) (NPWS, 2015).

Table 3: Co. Down – Co. Louth seabirds.

Area	Feature Type	Feature	Latest Condition Status
East Coast* (*covers Larne Lough SPA, Belfast Lough SPA, Outer Ards SPA, Copeland Island SPA, Strangford Lough SPA, and Belfast Lough Open Water SPA)	Species	Great Crested Grebe (*P. cristatus*) - wintering population	**Favourable** Maintain
	Species	Red-throated Divers (*G. stellata*)	Data not available
	Species	Sandwich Tern (*S. sandvicensis*)	**Favourable** Maintain
	Species	Common Tern (*S. hirundo*)	**Unfavourable** Restore
	Species	Arctic Tern (*S. paradisaea*)	**Favourable** Maintain
	Species	Manx shearwater (*Puffinus puffinus*), breeding	**Favourable** Maintain
	Species	Eider duck (*Somateria mollissima*)	**Favourable** Maintain
	Species	Roosting/loafing sites	Data not available
Killough Bay SPA	Species	[Canada/Ireland] - Light-bellied brent goose (B. *bernicla hrota*)	**Unfavourable** Restore
Outer Ards ASSI	Species	Great Cormorant (*Phalacrocorax carbo*)	**Unfavourable** Restore
	Species	Purple Sandpiper (*Calidris maritima*)	**Unfavourable** Restore
	Species	Ringed Plover (*Charadrius hiaticula*)	**Unfavourable** Restore
	Species	Turnstone (*A. interpres*)	**Unfavourable** Restore
Ballyquintin Point ASSI	Species	Breeding bird assemblage	**Favourable** Maintain
Strangford Lough Parts 1, 2 & 3 ASSI	Species	Greylag Goose (*A. anser*)	**Favourable** Maintain
Murlough Coast ASSI	Species	Common Scoter (*Melanitta nigra*)	**Unfavourable** Restore
	Species	Red-breasted Merganser (*M. serrator*)	**Unfavourable** Restore
Mourne Coast ASSI	Species	Kittiwake (*R. tridactyla*) breeding population	**Favourable** Maintain

Table 4: Co. Down – Co. Louth seabirds Republic of Ireland.

Area	Feature Type	Feature
Carlingford Lough SPA (RoI)	Species	Red-throated Diver (*Gavia stellata*)
	Species	Great Crested Grebe (*P. cristatus*)
	Species	Cormorant (*P. carbo*), breeding
	Species	Light-bellied Brent Goose (*B. bernicla hrota*)
Dundalk Bay SPA	Species	Red-breasted Merganser (*M. serrator*)
	Species	Black-headed Gull (*Chroicocephalus ridibundus*), wintering
	Species	Common Gull (*Larus canus*), wintering
	Species	Herring Gull *(Larus argentatus*), wintering
	Species	Common Scoter (*Melanitta nigra*), wintering
Boyne Estuary SPA	Species	Little Tern (Figure 6; *Sterna albifrons*)
	Species	Great Black-backed Gull (*Larus marinus*), wintering

(*NB* Data for the condition status of species within the SPAs in RoI was unavailable).

2.2. Marine mammals and benthic species.

To help achieve the conservation objectives and favourable status for all marine mammal species designated within this management plan, species are examined from a strategic transboundary perspective. Many individual species occur within multiple SACs and experience similar common threats and pressures either in breeding locations or in foraging areas of the sea (Howells *et al.,* 2022). Marine mammal species travel to and from the multiple coastal locations along the coast of the Co. Down – Co. Louth MPAs management plan region throughout various times of the year in order to breed and search for food. Two important protected areas for marine mammals located within this management plan are the Strangford Lough SAC and the North Channel SAC.

Strangford Lough SAC is considered an area of high importance due to the presence of a high diversity of habitats and species of international importance (DAERA, 2015c). These features include shallow inlets/bays, annual deposition of vegetation along the drift line, Atlantic salt meadows, various reef systems and exposed mudflats and sandflats.

Figure 7: Harbour Porpoise (*Phocoena phocoena*) (© Campbell, 2008).

Areas within the Co. Down – Co. Louth region, including Strangford Lough are important habitats for the common seal (*Phoca vitulina)*. There are important haul-out sites in Strangford Lough and Dundrum Bay for breeding and pupping, with the Murlough SAC having the highest count of common seals across the coastline of NI (Morris and Duck, 2018).

The North Channel SAC is an offshore marine location within the Irish Sea and is an area of high importance for a variety of habitats and marine mammal species due to the nutrient rich waters (DAERA, 2016). The area has been designated as an SAC for the protection of Harbour porpoise *(*Figure 7 & Table 5; *Phocoena phocoena)*. Data modelling over an 18-year period to 2019 indicates that there is a high population density of the species (JNCC, 2019c).

Table 5: Co. Down – Co. Louth SACs designated for marine mammals Northern Ireland.

Area	Feature Type	Feature	Latest Condition Status
Strangford Lough SAC	Species	Common seal (*P. vitulina*)	**Unfavourable** Restore
North Channel SAC	Species	Harbour porpoise (*P. phocoena*)	**Favourable** Maintain

Horse Mussel *(Modiolus modiolus*) can occur as isolated individuals and/or accumulative beds in the forms of scattered clumps, in thin layers or as dense raised mounds (Marine Scotland, 2014). This feature can be located within MPAs within the management plan, including the Outer Ards proposed MCZ. *M. modiolus* can attach themselves to each other and to the substratum through byssus threads which can evolve into an intrinsic biological reef that enables stabilisation of seabed sediments (Marine Scotland, 2014). These reefs increase biodiversity levels within the ecosystem and provide benefits to a variety of benthic species by providing settling grounds for bivalves (Figure 8 & Table 6), such as queen scallops (*Aequipecten opercularis*) as well as provide habitat for prey species for fish (Marine Scotland, 2014).

Figure 8: Image of a horse mussel (*M. modiolus*) beds (Marine Scotland, 2014).

Table 6: Co. Down – Co. Louth benthic species and habitats.

Area	Feature Type	Feature	Latest Condition Status
Outer Ards Proposed MCZ	Species	Biogenic reef – Horse Mussels (*Modiolus modiolus*)	**Favourable** Maintain (AFBI, 2016a)

2.3. Intertidal.

Much of the nearshore areas within the Co. Down – Co. Louth region are composed of intertidal rocky coastlines supporting species which rely on the secure rocky outcrops and tidal pools they form. Such species include chitons, barnacles, and seaweeds. Strangford Lough is a marine inlet located on the east coast of Co. Down and is connected to the open sea by the Strangford Narrows (DAERA, 2015c). The area contains extensive tidal flats within the northern and north-eastern shorelines of the lough. This feature supports a variety of marine habitats and species including marine invertebrates, algae, and saltmarsh plants. These in turn support large populations of wintering and breeding waterbirds as well as marine mammals (Table 7 & 8; DAERA, 2015c).

The Outer Ards coastal area is an important location for its unique geological features that host a variety of plant and animal communities (DAERA, 2015d). As one of the most sheltered stretches of rocky coast in NI there is high variety of species present, with at least 17 rare and local plant species recorded. The intertidal mudflats in the area support a variety of wetland plants such as eelgrass *(Zostera marina)*, saltmarshes, dodder (*Cuscuta epithymum)*, spring squill (scilla verna), and seal pearlwort *(Sagnina maritima)* (DAERA, 2015d). The intertidal features and surrounding terrestrial grasslands (including waxcaps (*Hygrocybe*) etc.) support internationally important population levels of wintering seabirds, including Light Bellied Brent Geese *(B. bernicla hrota)* and Ringed Plover *(C. hiaticula)* (DAERA, 2015d).

The Murlough ASSI is located within the area covered by the Murlough SAC management guidance plan and contains features including sand dunes, coastal salt marsh, and over wintering wildfowl and waders. The SAC features include shoreline dunes which are important habitat for flora and fauna in the area. Sand dunes develop where sand is blown from the terrestrial beach and deposited above the high-water mark, accreting into large geomorphological structures (DAERA, 2017a).

Dundalk Bay is a large open shallow sea bay and features extensive intertidal sand/mudflats that extend approx. 16 km from Castletown River on the Cooley Peninsula to Annagassan (NPWS, 2014a). These habitats provide a home to a rich

fauna of bivalves, molluscs, marine worms and crustaceans, important food resources for wintering waterfowl (NPWS, 2014a).

Table 7. Co. Down – Co. Louth intertidal species and habitats Northern Ireland.

Area	Feature Type	Feature	Latest Condition Status
Strangford Lough SAC	Habitat	Mudflats and sandflats not covered by seawater at low tide	**Favourable** Maintain
	Habitat	Intertidal rock	**Favourable** Maintain
	Habitat	Coastal lagoons	**Favourable** Maintain
	Habitat	Large shallow inlets and bays	**Favourable** Maintain
	Habitat	Salicornia and other annuals colonising mud and sand	**Unfavourable** Restore
	Species	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	**Unfavourable** Restore
Ballymacormick Point ASSI	Habitat	Mudflats	**Favourable** Maintain
Outer Ards ASSI	Habitat	Coastal Saltmarsh	**Favourable** Maintain
	Habitat	Intertidal mudflats	**Favourable** Maintain

Table 8. Co. Down – Co. Louth Intertidal Species and Habitats Republic of Ireland.

Area	Feature Type	Feature
Carlingford Lough Shore SAC	Habitat	Annual vegetation of drift lines
Dundalk Bay SAC	Habitat	Estuaries
	Habitat	Mudflats and sandflats
Clogher Head SAC	Habitat	Vegetated sea cliffs of the Atlantic and Baltic coasts

2.4. Subtidal.

The Co. Down – Co. Louth management plan area extends to pelagic and benthic habitats and the species that inhabit the area (Table 9). Species found within the marine areas are highly mobile, with the wind influencing conditions on the water's surface and ocean currents below the surface. Many benthic species rely on ocean currents as a means of dispersing their eggs and larva. The reef systems found within the Strangford Lough SAC are some of the most important of their type in the United Kingdom and form habitats for a diverse range of biological communities, especially species characterised by 'encrusting animals and attached seaweeds' (DAERA, 2015c).

Saltmarsh is found in the sheltered parts of the upper intertidal mudflats in the inner portion of Dundrum Bay (part of the Murlough SAC and ASSI). The saltmarsh commonly shows a progression from lower marsh communities to upper marsh communities, depending on tidal inundation (DAERA, 2017a).

Table 9. Co. Down – Co. Louth subtidal species and habitats Northern Ireland.

Area	Feature Type	Feature	Latest Condition Status
Murlough SAC	Habitat	Sandbanks which are slightly covered by sea water all the time	**Favourable** Maintain
Carlingford Lough MCZ (NI)	Species	*Philine quadripartita* and *Virgularia mirabilis* in soft stable infralittoral mud (Figure 9)	**Favourable** Maintain

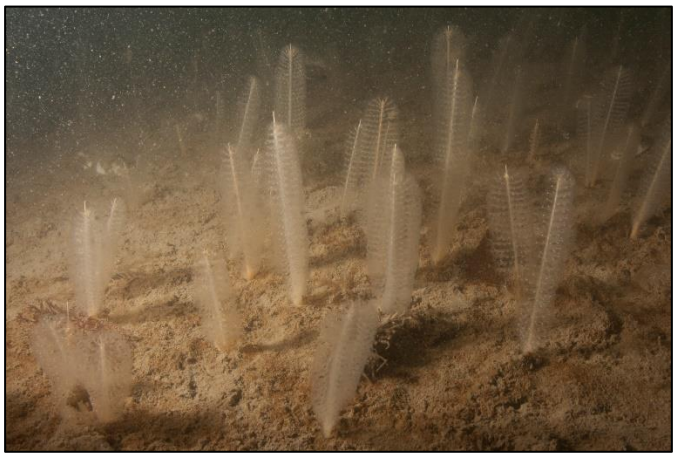

Figure 9. Sand slug (*Philine aperta)* and Sea pens (*Virgularia mirabilis)* in soft stable infralittoral mud in Carlingford Lough MCZ (DAERA, 2017c).

Designated areas and their objectives per region in Ireland.
SPA: Northern Ireland component objectives.

- To continue to enhance the current population of qualifying species.
- Improve fledgling success to enhance/maintain current populations.
- Ensure conditions of all surrounding habitats used by the qualifying species are properly maintained.
- Safeguard the integrity of the site.
- Prevent significant disturbances of the qualifying species, and
- Provide long term protection for:
    - Species populations within the site,
    - Species distribution within the site,
    - Species habitat distribution, and
    - All other supporting processes of habitats positively supporting the species (DAERA, 2015e).

SPA: Republic of Ireland component objectives.

- To maintain the favourable conservation conditions of water bird species listed by the Birds Directive.
- To maintain the favourable conservation condition of wetland habitats as a resource for the regularly occurring migratory water birds that may utilise it.
- To maintain site-specific conservation objectives of habitats and species within Natura 2000 sites at favourable conservation conditions.

SAC: Northern Ireland component objectives.

Reefs:

- Maintain and enhance, as appropriate, the extent of the reefs.
- Allow the natural processes which determine the development, structure, function and extent of the reefs, to operate appropriately.
- Maintain and enhance, as appropriate, the species diversity within this habitat.

Submerged or partially submerged sea caves:

- Maintain and enhance, as appropriate, the extent of the submerged or partially submerged sea caves.

- Allow the natural processes which determine the development, structure, function and extent of the submerged or partially submerged sea caves, to operate appropriately.

Vegetated sea cliffs of the Atlantic and Baltic coasts:

- Maintain the extent of vegetated sea cliff subject to natural processes. Allow the natural processes which determine the development and extent of vegetated sea cliffs to operate appropriately.
- Maintain and enhance, as appropriate, the range of maritime rock crevice and cliff ledge communities.
- Maintain and enhance, as appropriate, the range of sea-bird cliff communities.
- Maintain and enhance, as appropriate, the range of maritime grassland communities.
- Maintain and enhance, as appropriate, the range of maritime heath communities.
- Maintain and enhance, as appropriate, the range of transitions and other communities.
- No increase in status of non-native species, undesirable invasive species, and species not characteristic of typical communities.
- Maintain and enhance, as appropriate, the status of rare and notable species.
- Monitor cliff top or near cliff top management activities to ensure they do not lead to loss or enrichment of associated sea cliff.

Sandbanks, which are slightly covered by seawater:

- Allow the natural processes which determine the development, structure and extent of sandbanks that are slightly always covered by sea water to operate appropriately.
- Maintain and enhance, as appropriate, the species diversity within this habitat.
- Maintain the extent and volume of sandbanks, which are slightly covered by seawater all the time, subject to natural processes (DAERA, 2020).

SAC*:* Republic of Ireland component objectives.

- To maintain or restore favourable conservation status of habitats or species of community or conservational interest.
- To maintain site-specific conservation objectives of habitats and species within Natura 2000 sites at favourable conservation conditions

MCZ: Northern Ireland component objectives.

These differ between the different MCZs within the Co. Down – Co. Louth MPAs Management Plan area. An example from the Carlingford Lough MCZ is highlighted below:

- **Conservation Objectives** (DAERA, 2016b):

Subtidal (sublittoral) mud containing *P. quadripartite* and *V. mirabilis* communities in Carlingford Lough MCZ are currently in favourable condition. The Department recommends that the conservation objectives are set to maintain this feature in its favourable condition.

3. Legislative framework.

Legislation in NI.

The Northern Ireland Executive, through DAERA, is committed to the continued development and enhancement of a well-managed and ecologically coherent network of MPAs from a devolved perspective and through the UK's contribution to the OSPAR network. In NI, multiple MPAs have been designated under both international and national legislation and are maintained to satisfy these obligations. These have been summarised in the table below (Table 10), with full policy details attached in Appendix 4.

Table 10: NI Policy Summary.

	Policy	Summary
International	**OSPAR Convention 1992**	Aims to develop an ecologically coherent network of well-managed MPAs and provides a mechanism to protect the marine environment of the North-East Atlantic.
	Marine Strategy Regulations 2010	Sets out a comprehensive framework for assessing, monitoring and enforcement across the UK's seas to achieve the shared vision for 'clean, healthy, safe, productive, and biologically diverse ocean and seas'.
	The Water Environment (Floods Directive) Regulations (Northern Ireland) 2009	Manages risk from all types of floods (fluvial, pluvial, sea water, groundwater, artificial water bearing infrastructure.
	The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017	Sets out the management of the 'water environment' including rivers, lakes, transitional waters, groundwater and coastal waters out to 1 nautical mile (12 nautical miles for chemical status, i.e., for territorial waters).

	The Conservation (Natural Habitats, etc.) (Amendment) (Northern Ireland) (EU Exit) Regulations 2019	Habitats Directive requires Member States to take measures that contribute to the conservation of biodiversity by maintaining or restoring certain habitats and species at a favourable conservation status. SACs are designated for habitats and species listed under Annex I and II.
National	**The Marine Act (Northern Ireland) 2013**	The Marine Act (Northern Ireland) 2013 establishes a strategic system of marine planning within the inshore region (out to 12 nautical miles) and helps to streamline the process of marine licensing.
	Marine and Coastal Access Act 2009	In NI DAERA's Marine and Fisheries Division are responsible for licensing of activities related to construction, deposition or removal of any substance or object as the marine planning process.
	Marine Policy Statement 2011	The framework for preparing Marine Plans and taking decisions affecting the marine environment.
	The Environment (Northern Ireland) Order 2002	Provides protection of nationally important flora and fauna within NI through ASSIs.
	Nature Conservation and Amenity Lands Order (Northern Ireland) 1985	Provides the legislation to designate AONB.
	The Wildlife (Northern Ireland) Order 1985 (the Order) and amendment The Wildlife (Amendment) (Northern	Prohibits the intentionally killing, taking, or injuring of certain species of wild birds and animals or the intentional destruction, uproot or picking of certain wild plants. It is an offence to release into the wild non-native invasive species as listed in Schedule 9 Part II of the Order.

	Ireland) Order 1995	

Legislation in RoI.

Currently in the RoI MPAs only exist in the form of SPAs and SACs, under the EU's Habitats and Birds Directive (Table 11), collectively referred to as Natura 2000 sites (Europe's largest network of sites designated to protect endangered terrestrial/marine species; Classen, 2020). There are ongoing discussions and work by the RoI governmental departments around MPAs with the recognised need that legislation to create domestic MPAs will help to enhance RoI commitments to maritime designated features protection. This work began with the publication of the first Irish Marine Spatial Plan, the National Marine Planning Framework (NMPF), which was formally launched on the 1st of July 2021. The NMPF aims to cover a maritime area of approximately 495,000km² and sets out goals of protecting marine features up to the year 2040 (Marine Institute, 2022a). Full policy details for the RoI have been attached in Appendix 4.

Table 11: RoI Policy Summary.

	Policy	Summary
International	**OSPAR Convention 1992**	Aims to develop an ecologically coherent network of well-managed MPAs and provides a mechanism to protect the marine environment of the North-East Atlantic.
	Convention on Wetlands of International Importance; Ramsar Convention 1971	Focuses on the sustainable use of wetlands to ensure their effective management.
	Marine Strategy Framework Directive 2008/56/EC	Aims to protect the marine environment more effectively across Europe.

	Marine Strategy Regulations 2010	Aims to achieve clean, healthy, safe, productive and biologically diverse oceans and seas.
	The Floods Directive 2007/60/EC	Manages risk from all types of floods (fluvial, pluvial, sea water, groundwater, artificial water bearing infrastructure.
	The EU Birds Directive 2009/147/EC	Aims to protect listed rare/vulnerable species, regularly occurring migratory birds and wetlands, especially of international importance. Marine Species listed under Annex I of the Directive.
	The Habitats Directive (92/43/EEC)	Aims to conserve biodiversity by maintaining or restoring certain habitats and species at a favourable conservation status. SACs are designated for habitats and species listed under Annex I and II.
	Water Framework Directive 2000/60/EC	Member States must aim to achieve good chemical and ecological status in identified water bodies. This includes transitional (estuarine) and coastal waters out to one nautical mile.
National	**Wildlife Act 1976 to 2022 (Revised)**	Natural Heritage Areas (NHAs) may be established to protect habitats or species.
	Foreshore Act 1933	A foreshore licence is required by any person proposing to place any material or to place or erect any articles, things, structures, or works in or on foreshore or to get and take any minerals in foreshore or to use or occupy foreshore for any purpose unless exempt under other legislation or due to existing rights.

4. Management Tactics.

4.1. Management goals and objectives.

This management plan can be used as a tool that both statutory and local authorities can use to ensure requirements established through the UK Marine Strategy, Marine Strategy Frameworks Directive and OSPAR agreements are fulfilled in future management decisions. It is also a reference for those wishing to develop or use the area to determine if their proposed activities are compatible whilst considering the multiple social and economic dependencies of the plan area.

MarPAMM MPA Management Plans are non-statutory recommendations that work in line with existing statutory and non-statutory marine and coastal management governance, i.e., Draft Marine Plan (NI) 2013, and NMPF (RoI) 2021. The governance in both regions help in establishing management guidance for the Co. Down – Co. Louth MPAs management plan as well as integrating wider marine management through marine spatial planning and coastal zone management.

The Co. Down – Co. Louth MPAs management plan appraised activities that could have a potential impact on the conservation interests within the Co. Down – Co. Louth MPAs area. Work on the plan included identifying current legislative policy relating to the regulation of each activity and providing future management suggestions based on existing legal framework within the region.

The Co. Down – Co. Louth MPAs management plan takes an integrated perspective on resilience and sustainable development, considering the needs of all marine users to aid more enlightened management approaches. Cross–disciplinary management policy was developed through stakeholder engagement and outputs from the MarPAMM work packages on seabirds, benthic species and habitats, marine mammals, and coastal processes. This process has built partnerships and opened lines of communication between those who have a direct interest in the area. The Co. Down – Co. Louth MPAs management plan is to be considered a 'living document' and can be adapted to reflect the continually changing needs of the MPAs and surrounding areas.

The Co. Down – Co. Louth MPAs management plan uses an approach based on an ecosystem management system defined by Sardá *et al*., (2017) as work on "*the conservation of the species, habitat or ecosystem structure and functioning to maintain long-term and resilient ecosystem services."* This aims to provide long-term sustainability that is required to continue providing essential ecosystem services to the

environment and society during periods of unexpected risk or change. This interdisciplinary approach recognises the integration of governance principles, human influences, and ecological requirements within complex social-ecological systems. This approach has been emphasised by the benefits mapping infographic for the Regional Steering Group for this management plan (Appendix 1).

Strategic Guidance 1: Commercial fishing.

Within the Co. Down – Co. Louth region, commercial fishing is undertaken through potting for *Nephrops* (prawns), brown crab and lobster, dredging for scallops and limited whitefish landing through by-catch.

Commercial fishing plays an important role within the economies of NI and RoI, with fish processing in NI accounting for an estimated turnover of £90 million (DAERA, 2020). Over the past 10 years there has been a 39% increase in fish processing through micro-enterprises (Seafish, 2019). There is significant cross-border trade within the seafood industry on the island of Ireland, with £26 million of seafood exports going from NI to the RoI (DAERA, 2021b). With regards to imports, £31 million of seafood imports into NI come from the RoI (DAERA, 2021b).

Across the RoI, the Irish commercial fishing industry is worth about €1.22 billion annually, with the industry employing around 16,000 people in fishing, processing, sales, and marketing (Fishing Daily, 2019). Landings to Irish ports have been valued at €275 million in 2019, an increase of 15% on the previous years (Fishing Daily, 2019).

Overall, the fishing fleet in NI is aging in comparison with other fleets in the UK, consisting of about140 vessels of >10 m in length vessels, around 200 vessels of smaller scale and three large pelagic vessels >50 m in length (DAERA, 2021b). Most of the fishing vessels within the Irish Sea are inshore potting (low impact) and scallop dredging vessels from both Ireland and neighbouring regions (i.e., Scotland). Within NI, the targeting of whitefish is generally undertaken by 3 vessels. These are based on the eastern coast outside of the Co. Down – Co. Louth management plan, often operating off the western coast of the RoI and western Scotland.

The Norway lobster (*Nephrops norvegicus*, also known as the prawn, Dublin Bay prawn, langoustine, scampi or Nephrops) is a pale orange crustacean than can grow

up to 25 cm in length (9-10 inches) but is often smaller (AFBI, 2016b). The greatest concentration of current effort (i.e., number of days spent fishing at sea) is in the International Council for the Exploration of the Sea (ICES) Sub-area VII fishing areas, covering the Irish Sea (AFBI, 2016b). The commercial fishing fleet that targets Nephrops generally operate in the Irish Sea and West coast of Scotland, with vessels based in Portavogie, Kilkeel and Ardglass (Allen, 2013).

Within the Co. Down – Co. Louth MPAs region, ports and harbours that support commercial fishing are generally large (i.e., Ardglass, Belfast, Kilkeel and Portavogie), with reported average landings value in NI of >£1,000,000 (Seafish, 2021). These ports and harbours represent the majority of the NI fishing fleet through landing and production facilities. There are smaller harbours around the coast with smaller operations and limited facilities, i.e., Carnlough <£200,000, Newcastle <£200,000 and Warrenpoint <£200,000 (Seafish, 2021). A smaller port/harbour is defined as a landing site that supports commercial fishing vessels and has a reported average landings value of <£1,000,000 (Seafish, 2021). In the RoI, Greenore (Co Louth) is the largest and busiest commercial fishing ports on the east coast outside of Howth (Co. Dublin), with smaller harbours at Carlingford and Dundalk used for commercial fishing vessels.

The Co. Down – Co. Louth MPAs management plan is mainly relevant to the inshore fleet targeting shellfish, with extremely limited relevance to the whitefish industry (only a few hundred tonnes of most whitefish species were landed in 2019 across NI; DAERA, 2021b). Fishing for shellfish is generally undertaken by the inshore fleet using relatively small vessels and low seabed impact static gear. With inshore static potting usually conducted by vessels of 10 m in length or under, DAERA is considering the introduction of mandatory vessel mandatory system (iVMS).

Commercial fishing methods should aim to mitigate and adapt to responsible fishing and landing practises which put the integrity of MPAs and designated features at the forefront of best practice. Reducing impact on MPA features will have ecosystem benefits, including recovery, restoration, and the preservation of commercial fish stocks, meeting the requirements of the Fisheries (Northern Ireland) Act 1966 and Fisheries (Consolidation) Act 1959 (RoI). Competent authorities including DAERA, Department of Agriculture Food and Marine (DAFM), Agri-Food and Biosciences Institute (AFBI) and the Marine Institute (MI) should work with the commercial fishing industry to introduce mitigation measures to help reduce adverse impacts on MPAs within the Co. Down – Co. Louth area. Commercial fishing operations should adhere to the recommendations and guidance laid out within section 4.2.

Strategic Guidance 2: Aquaculture.

Aquaculture within the Co. Down – Co. Louth MPAs region are mainly shellfish focussed. Aquaculture practises are actively operating within areas of Killough Bay, Inner Dundrum Bay, Strangford Lough, Carlingford Lough, and Dundalk Bay. Activities at these sites are generally for the cultivation of intertidal shellfish, such as Pacific oysters (*Magallana gigas*), Blue mussels *(Mytilus edulis)* and native oysters *(Ostrea edulis*). Table 12 and 13 provide details on production and value of aquaculture on these species in NI.

Table 12. Figures from 2019 on the value of shellfish production in Northern Ireland.

SPECIES	TONNAGE PRODUCED (Metric Tonnes)	VALUE (£)
Blue Mussels (market)	695	£1,390,000.00
Pacific oysters (market)	561	£1,647,999.00
Pacific oysters (on-growing)	541	£1,454,648.00
TOTAL SHELLFISH	**1,797.00**	**£4,492,647.00**

Table 13: Figures from 2020 on the value of shellfish production in Northern Ireland.

SPECIES	TONNAGE PRODUCED (Metric Tonnes)	VALUE (£)
Blue Mussels (market)	674	£ 882,000.00
Pacific oysters (market)	494.95	£ 1,619,114.40
Pacific oysters (on-growing)	377.49	£ 1,141,950.00
TOTAL SHELLFISH	**1,546.44**	**£ 3,643,064.40**

Killough Harbour.

Killough Harbour is an important marine location within the Co. Down – Co. Louth MPAs management plan area. It is protected under criterion 6 of the Ramsar Convention due to the large returning populations of Light Bellied Brent Geese *(B. b. hrota;* JNCC, 2003). Aquaculture activities within the bay are licensed for 0.48 km^2 of the harbour for the cultivation of intertidal benthic species including Pacific oysters (*M. gigas*) and native oysters *(O. edulis)* (Ulster Wildlife, 2019). Pacific oysters (*M. gigas*) are cultivated using the bag and trestle method that involves placing harvested Pacific oysters (*M. gigas*) in mesh bags and placing them onto metal framed trestle structures within the intertidal zones (Fox, 2019).

Dundrum Bay and Murlough SAC.

Within the Dundrum Bay, aquaculture activities are licenced under the Fish Culture Licence (FCL) with operators licenced for cultivating various shellfish species, although Pacific Oysters *(M. gigas*) and mussels (*M. edulis)* are the main species of interest. There are two licenced areas within the Murlough SAC. The total area of these sites is approximately 63.64 hectares. The total designated area of the Murlough SAC is 11,902.03 hectares. Aquaculture practises therefore occupy 0.53% of the total designated area. Under the conditions of the current FCL only 20% of the designated area may be utilised for trestle culture.

Strangford Lough.

Strangford Lough is located on the east coast of NI and is nestled between the east coast and the Ards Peninsula. Aquaculture activities take place on a total of 22 licenced sites within the lough in an area over 3.9 km^2 (only 12 of these sites are currently producing; AFBI, 2015a). These activities provide an array of high quality shellfish species, such as Blue mussels (*M. edulis*), Scallops *(P. maximus)* and Pacific oysters (*M. gigas*).

To enhance the overall management of aquaculture fisheries within Strangford Lough and to help mitigate against all possible damages to features in MPAs, the outputs of the Sustainable Mariculture in Northern Irish Sea Loughs Ecosystems (SMILE) models were applied. A full evaluation for the carrying capacities for aquaculture operations within the Lough environs was assessed. This assessment examined all interactions between cultivated species for normal and alternative cultivation practices, in conjunction with the examinations of the effects of overexploitation on key ecological variables. Further a bay-scale analysis of environmental effects of different culture strategies was conducted (AFBI, 2021).

Carlingford Lough.

Carlingford Lough is a prominent sea lough, with area of 51 km^2 for aquaculture activities within the Co. Down - Co. Louth MPAs region (Figure 10). There are approximately 8 licensed sites (NI) covering an area of 26.4 km^2 (AFBI, 2015b). These operations are carried out on both subtidal and intertidal terrains, where subtidal aquaculture involves the bottom culture of blue mussel (*M. edulis*) and the intertidal aquaculture involves the trestle culture of Pacific Oyster (*M. gigas*) (Poppleton *et al.,*

2021). The required site licences for the bottom cover of shellfish cover approximately 943 hectares of the subtidal area of Carlingford Lough and approximately 218 hectares is licenced for off bottom culture of oysters (Poppleton *et al.,* 2021). In total 23.7% of the total area of Carlingford Lough is licensed for aquaculture. It is important to note that not all licences are currently active.

To enhance the overall management of aquaculture fisheries within Carlingford Lough and to help mitigate against all possible damages to features in MPAs, the outputs of the Sustainable Mariculture in Northern Irish Sea Loughs Ecosystems (SMILE) models were applied. A full evaluation for the carrying capacities for aquaculture operations within the Lough environs was assessed. This assessment examined all interactions between cultivated species for normal and alternative cultivation practices, in conjunction with the examinations of the effects of overexploitation on key ecological variables. Further, a bay scale analysis of environmental effects of different culture strategies was conducted (AFBI, 2021).

Due to the cross-border location of Carlingford Lough, both jurisdictions within NI and the RoI have their own designated authority responsible for the oversight of aquaculture licence enforcement. Both jurisdictions are currently assessing across the island of Ireland existing and proposed aquaculture activities within coastal MPA designated sites (such as Carlingford Lough, Murlough/Dundrum Bay and Killough) (Marine Institute, 2019 & Poppleton *et al.,* 2021).

Strangford Lough and Carlingford Lough are designated as Shellfish Water Protected Areas for the protection of shellfish growth and production (DAERA, 2017d). These areas are managed by River Basin Management Plans through the application of Water Framework Directive Protected Areas for the protection of economically significant aquatic species. The protected areas are regulated by The Water

Environment (Water Framework Directive) Regulations (Northern Ireland) 2017, post UK withdrawal from the EU.

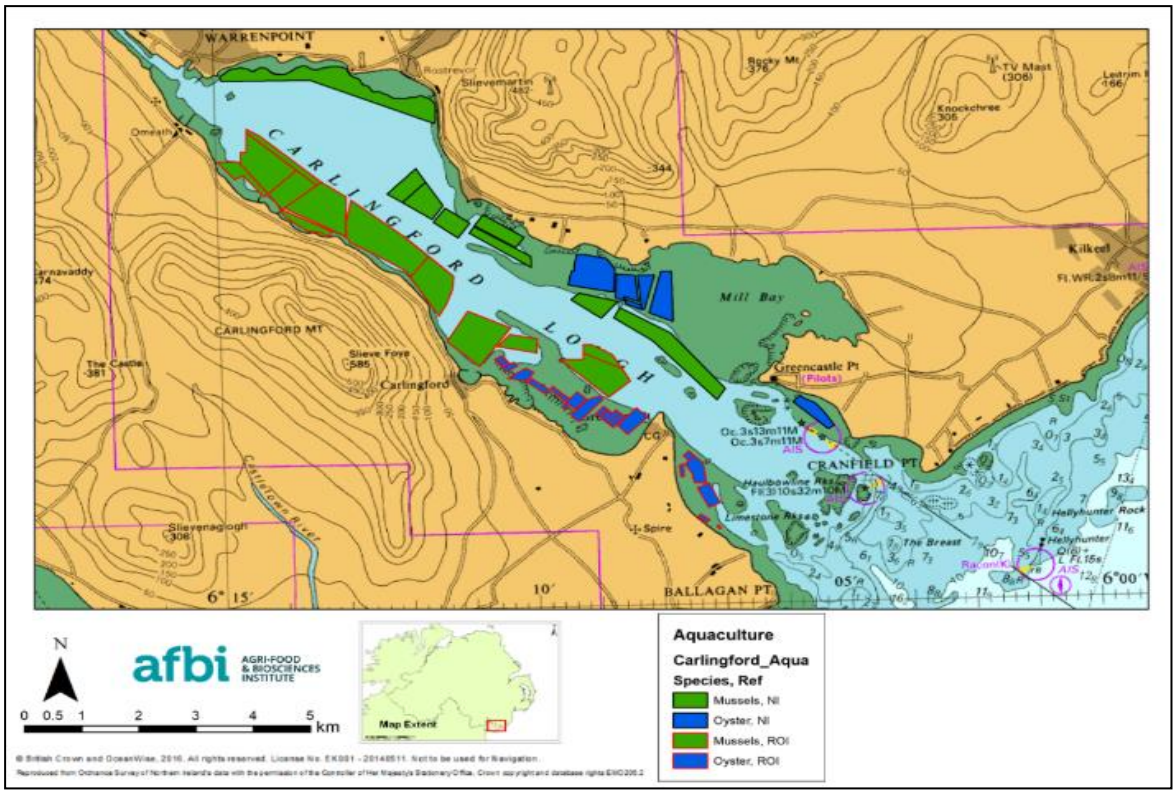

Figure 10: Current licensed aquaculture sites within Carlingford Lough (Poppleton et al., 2021).

Dundalk Bay.

Dundalk Bay is a large open shallow sea bay located in Co. Louth. The site features include important intertidal sand/mudflats and saltmarshes that extends approx. 16 km from Castletown River on the Cooley Peninsula in the north to Annagassan/ Salterstown in the south (NPWS, 2014a). Aquaculture activities are licenced within Dundalk Bay for the cultivation of cockles (*Cerastoderma edule)* and Pacific oysters *(M. gigas)* and there are designated shellfish waters also located within the bay in line with the EU Shellfish Directive (Figure 11; RPS, 2014).

It is essential that prior to any aquaculture related activities that the correct licencing is obtained and pre-application survey work completed with mitigation plans to limit negative impacts on the marine environment. This process will ensure that aquaculture is managed in an appropriate way to avoid damage to designated features and adjacent areas. This will help to limit negative environmental impacts, such as the

removal of important prey sources for nesting waterbirds or damage to intertidal habitats with oyster trestles (NPWS, 2012).

In NI, the Marine and Fisheries Division of DAERA is responsible for the approval of FCLs, shellfish fishery licences and marine fish fishery licences under the Fisheries Act (NI) 1966 (Poppleton *et al.,* 2021). In the RoI, the Department Agriculture, Food and the Marine is responsible for aquaculture licensing under the Fisheries (Amendment) Act, 1997 and Foreshores Act (1933 - 2011). In the case of aquaculture developments being proposed in areas within or adjacent to protected MPAs, these will usually require an Appropriate Assessment to examine any potential impacts on designated features. The MI and AFBI provide scientific advice on both marine and aquaculture environment issues, carrying out relevant scientific reports. In cases where an Environmental Impact Assessment (NI) or Appropriate Assessments indicates negative issues, these reports can help to create mitigation measures for the management plan area.

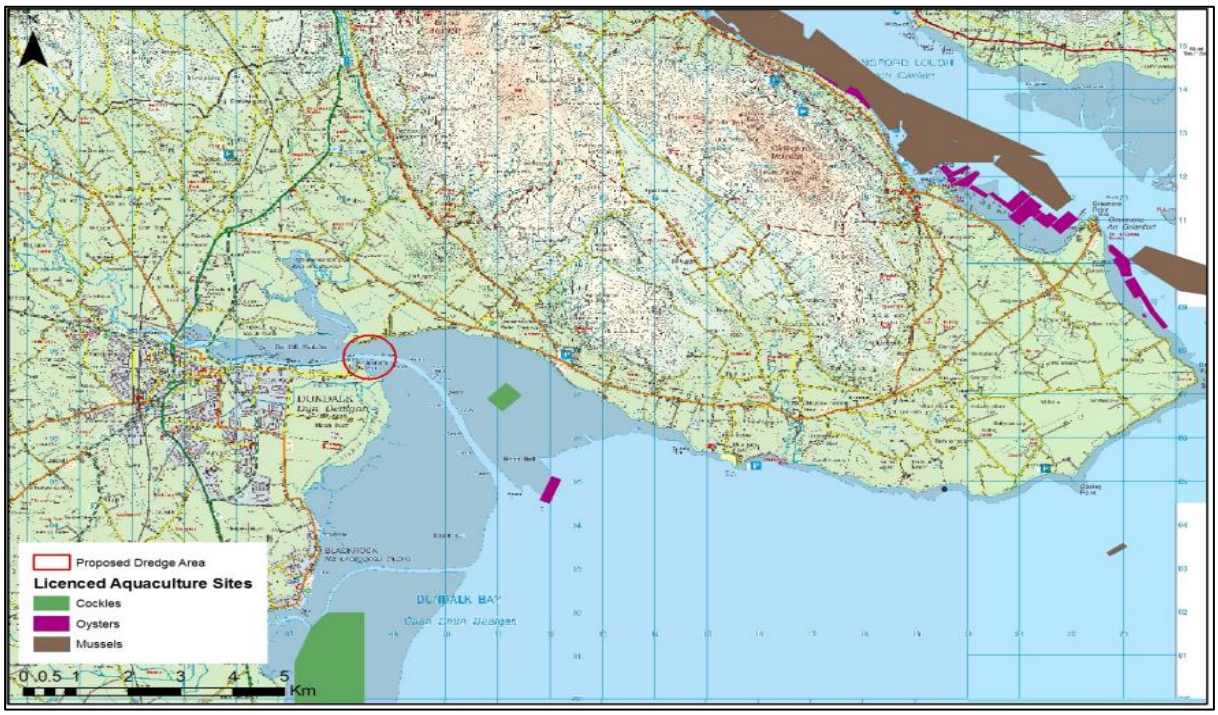

Figure 11: Licenced Aquaculture sites in Dundalk Bay (RPS, 2014).

Along coastal areas aquaculture operations existed prior to this legislation. RoI is assessing both existing and proposed aquaculture and fishing activities in all designated sites. This is a cumulative process, as agreed with the European Commission in 2009, and will eventually include all fishing and aquaculture activities in all Natura 2000 sites (Poppleton *et al.,* 2021).

Intertidal hand gathering of shellfish refers to the collection of wild shellfish from the shore without the aid of mechanised equipment. In NI this is predominantly for periwinkles but also includes cockles, native oysters and Blue mussels (DAERA, 2022). The activity is common and is undertaken for both personal consumption and as a commercial activity. Intertidal hand gathering of shellfish is currently unregulated by DAERA and as a result, the Department holds limited information on the commercial scale of this fishery (DAERA, 2022).

Aquaculture operators with NI and RoI undertaking shellfish farming in either new or existing developments must follow the conditions and mitigations set out within the required licence. Aquaculture developments should operate within appropriate departmental guidance which states that no significant adverse effects directly, indirectly, or cumulatively on the seabed, designated features, species, wider biodiversity interests or environmental carrying capacity must occur. Aquaculture operators or activity users should adhere to the considerations set out in actions in 4.2.

Strategic Guidance 3: Benthic dredging and disposals.

Benthic dredging and the subsequent disposal of dredged material for farming and port maintenance purposes occurs in various ports/harbours within the Co. Down – Co. Louth MPAs management plan region. Methods and gear used by operational vessels when conducting these dredging activities have the potential to cause significant damage to important habitats and communities on the seabed.

Dredging operations with regards to the maintenance of ports, harbours, and shipping lanes (such as seen within Carlingford Lough) and adjacent to the Co. Down – Co. Louth MPAs management plan area are required to ensure existing navigational channels/berths are maintained on a regular basis and remain operational for safe vessel navigation (DAERA, 2017e).

Dredging operations occur in two stages:

1. the removal of benthic material from the seabed, and
2. the redepositing of dredged material in another predetermined location.

In most cases these dredging operations will require a marine licence. There are a few exempt activities that do not require a licence:

- Dredging and/or disposal that is authorised by and carried out under Harbour Order.
- Marine Licencing Authority is satisfied that the dredged material is not hazardous.
- Materials deposited for land reclamation, flood risk prevention, and managing waterways or sediments are relocated inside surface waters (plough dredging).

Dredged material must be tested for contaminated sediments prior to obtaining any operating licences or before the redistribution of freshly dredged materials. All contaminants must be identified through appropriate testing of sediment samples along with an assessment against safety limitations for specific chemicals (DAERA, 2017e). The OSPAR Guidelines for the Management of Dredged Material advise that all sampling of dredged materials should be carried out every 3 years in any area where dredging is a regular occurrence and where polluted sediment has been discovered (DAERA, 2017e). Dredge operators should adhere to the considerations set out in actions in 4.2.

Strategic Guidance 4: Recreation and tourism.

Shoreline based recreation.

Within the Co. Down – Co. Louth MPAs management plan area there is a wide range of recreational activities including angling, abseiling, kite buggies, dog-walking, bird watching, coasteering, camping, and hiking that take place within the shoreline interface, often within the MPAs. Shoreline based recreational activities within the management plan area should be conducted with an awareness to implications of anthropogenic interactions with MPAs and adjacent areas. The focus of this guidance is to highlight the potential risks that recreational activities have on MPAs, and the impacts associated with local communities and visitors, by providing education to recreational users as to how they can minimise their level of impact. MarPAMM has created a story map to raise awareness of MPAs and provide this education. This story map can be accessed at https://storymaps.arcgis.com/stories/e32db16f15504e1db04c68443e418df1.

In MPAs with sensitive features, recreational users should adhere to DAERA and DHLGH policy along with appropriate codes of conduct. Recreational users should adhere to the recommended considerations in this management plan, which will lead to the enhanced integrity of the MPAs and surrounding habitats while aiding in the

conservation of MPAs and their networks. In addition, shoreline based recreational activity users should adhere to the considerations set out in actions in 4.2.

Surfaced based recreation.

Within the Co. Down – Co. Louth MPAs management plan area there is a wide range of activities, which represent a significant amount of tourism assets. Surface based activities include paddle sports (kayaking, stand up paddle boarding and rowing), sailing, wind and kite surfing, surfing, recreational fishing and jet-skiing, pleasure boating/cruising.

Surface based recreational activities represent a significant asset for social-economic benefits; however, there are negative associations with certain activities concerning wildlife disturbances and degradation of designated features. Over the past couple of years stakeholders have expressed concern with the increasing interactions of jet-skis in marine areas. Jet- skis launch from beach locations, are notorious for operating at speed within shallow areas, and are associated with disturbances of protected features and species (such as marine mammals; Oakley *et al.,* 2017). Disturbance is the result of direct or indirect interaction of a species or habitat with people that causes a change in the behaviour of an animal or environment, which in turn affects the well-being or survival of an animal in the short, medium, or long term. This might include direct injury (e.g., collisions, propeller damage), changes in distribution, disruption of natural behaviours (communication, migration, breathing, breeding, nursing, feeding, or resting), excessive use of energy and eventual loss of condition caused by continual or repeated avoidance of an area or activity. Increased vulnerability of an individual or population to predators, damage to habitat and chronic stress can impact on an animal's health (e.g., immune, digestive, and reproductive functions). The main pressures associated with pleasure boating and cruising are physical abrasion associated with anchoring/mooring, which can result in degradation of designated benthic features and inappropriate interactions with marine mammals.

Surface based recreational activities within MPAs, areas adjacent and areas containing features of archaeological or historic interest should be undertaken in a sustainable approach that causes no intentional damage to designated features or disturbances to wildlife. Anchoring in emergencies will not be restricted. As well surface based recreational activity users should adhere to the considerations set out in actions in 4.2.

Sub Aqua based recreation.

Sub-Aqua is a broad term encompassing recreational underwater activities including snorkelling, freediving, and SCUBA diving. In NI, DAERA is the responsible authority for the management and protection of wrecks and the MCA is responsible for collating reported information and salvaged materials from wreck dives. In the RoI, the DHLGH are the responsible authority for sub aqua archaeological sites.

Recreational diving can be an important tool to aid and enhance marine biodiversity recording through citizen science. Groups like Seasearch (https://www.seasearch.org.uk/) provide training for recreational divers and snorkellers through awareness and education, recording marine species and habitats within the local environment. The information collected can be uploaded to the Irish National Biodiversity Data Centre (INBDC) and the National Biodiversity Network (NI). Data collected by Citizen Science can be a useful observational tool for understanding the condition of MPAs and the wider ecological trends within the management plan region.

In general, fishing activities (i.e., spear fishing) that occur within sub-aqua conditions are regulated using the same by-laws as outlined in the strategic guidance for shoreline based fishing activities, which has been expanded in the guidance actions below. It should be noted that NPWS representatives have highlighted that spear fishing is illegal in the RoI. Sub-aqua activities within MPAs and adjacent areas should be conducted in a considerate manner that causes no intentional damage to MPA designated features. Recreational divers intending to dive within the management plan area should follow the actions outlined in 4.2 before participating in sub-aqua activate.

Strategic Guidance 5: Renewable energy.

In recent years concerns over energy supply security, combined with the increase in the damaging effects of climate change, has increased awareness in the importance of having sustainable solutions for energy security across the island of Ireland. To help achieve this energy security, the maritime renewables energy sector is experiencing growth. The transitioning of the energy sector from traditional hydrocarbons to renewable energy resources will significantly aid the delivery the 2050 targets for Net Zero Emissions and low carbon economies.

From the NI perspective, the release of the 2022 Energy Strategy has set out key targets for the evolution of the energy sector:

1. To meet 70% of electricity consumption from a mix of renewable resources by 2030.
2. 40% of energy generation through renewable resources (mostly terrestrial) was met by the deadline of 2020. And
3. To double low carbon and renewable energy economies to a turnover of more than £2 billion by 2030 (Woodward, 2022).

It is anticipated that Northern Irish departments will encourage growth in offshore renewables to help achieve 2050 carbon reduction targets.

The RoI, in line with EU energy efficiency targets, has agreed in reducing energy usage to meet the EU wide reduction targets of 40% by 2030 and reduce overall greenhouse gas emissions by 95% (in comparison with 1990 levels) (SEAI, 2017). It is currently exploring the potential of offshore renewable wind generation within the Irish Sea, including areas east of Co. Louth.

Offshore wind developments combined with wave and tidal energy are favoured technologies that have significant potential to meet these renewable energy targets, especially when the stronger wind speeds experienced offshore within the management plan area provide stronger electricity production (NMD, 2017).

Non statutory guidance for offshore renewable energy production in NI has been provided in 'The Regional Locational Guidance (RLG) for Offshore Renewable Energy Developments in NI Waters 2011' (NMD, 2017). Eight zones of potential interest for development of the three main renewable technologies were identified based on the potential available natural resources and the technical parameters of the technologies i.e., wind speed, tidal velocity, and max water depth.

A proposed development for offshore wind generation within the Co. Down – Co. Louth MPAs region is the Olympic Offshore Wind project. This is the second offshore wind project by the Simply Blue Group wind development company and is located off the coast of Co. Down. The project aims to provide 1.3 GW through the construction of floating offshore wind turbines (Figure 12). This type of project could demonstrate the commercial ability for offshore energy generation within Co. Down and improve the knowledge and awareness of this type of blue economy (Memija, 2022).

Figure 12: Representative example of a of floating offshore wind turbines (Henderson, 2021).

A further example of marine renewable energy development is the proposed Oriel Offshore Windfarm. This project will result in the development of a floating wind farm, with construction due in 2024. The location of the development is approximately 22 km off the coast of Dundalk in Co. Louth in a collaborative project among Oriel Wind Farm Limited, Parkwind NV and ESB International. This maritime wind farm is expected to produce approximately 1,500 GWh of energy per year, while offsetting 600,000 tonnes of carbon emissions annually (NS Energy, 2022).

In the Narrows of Portaferry, the first maritime renewable tidal energy project saw the successful installation of the Seagen Turbine. Constructed within Strangford Lough, it is one of the UK's first successful energy structures developed for the purpose of harnessing tidal power. It has the capability to produce electricity for over 1500 homes (Ulster Wildlife, 2022). This project demonstrated the ability for renewable energy generation within the island of Ireland.

Developments associated with offshore renewables can be of increasing concern due to the infrastructure (construction, operation, or end of life phases) impacts on local biodiversity and marine habitats (SEER, 2022). Foundations, anchors, and cables

associated with the development of offshore wind farms have the potential to negatively alter benthic environments both during and after operations. High levels of noise from construction work have the potential to displace many aquatic species. Invertebrates can be displaced by monopole structures (Wilhelmsson & Malm, 2008), seabirds, marine mammals and fish species can have collisions with infrastructure or machinery and/or can become displaced by interference from construction, operational, and end of life stages of hardware (SEER, 2022).

If managed appropriately, new habitats may be created during construction that could increase invertebrate abundance and generate positive impacts on the surrounding biodiversity (SEER, 2022). The foundations of structures, anchors and exposed cables can alter biodiversity and abundance of benthic organisms. However, they can also become new substrate types on the sea floor and within the water column, leading to the development of new benthic habitats (SEER, 2022). An infographic about newly formed benthic habitats on the foundations of wind turbine can be viewed in Appendix 5. The construction, operation, and maintenance of submarine cables can cause harmful damage to benthic habitats close to designated features. Operators must follow the developmental guidelines. Operators should employ biodiversity friendly strategies that mitigate the risk of detrimental impacts on benthic features, based on the ecosystems approach. Renewable energy developers and operators should adhere to the considerations set out in actions in 4.2.

Strategic Guidance 6: Marine infrastructure, ports, and harbours.

Marine infrastructure encompasses a variety of development which includes ports, harbours, piers, marinas, lighthouses, and navigational aids. In NI, the Department for Infrastructure (DFI) is the competent authority responsible for marine infrastructure through the European Programmes and Gateways Unit (EPG). Responsibility for shipping services, navigation and marine safety matters remain reserved functions for the Department for Transport (London) and the Maritime and Coastguard Agency. In the RoI, DAFM is the competent authority responsible for marine infrastructure through the Irish Maritime Administration (IMA), which integrates the planning and delivery of all maritime services. The IMA is responsible for developing the maritime transport sector, facilitating the achievement of international safety levels, and enhancing infrastructure needed to secure employment in the shipping, fishing, and leisure sectors.

Within the Co. Down – Co. Louth MPAs management plan region there are several important ports and harbours used for commercial industry and trade. The largest ports in NI for freight and economic generation are located at the Port of Belfast and

Warrenpoint Harbour. Within the RoI, the most significant port for industry and trade activities is located within Greenore Harbour. Further important harbours include Kilkeel Harbour, Portavogie Harbour and Strangford Harbour (NI) and Carlingford, and Dundalk Harbour (RoI).

The increase in shipping vessels utilising these ports and harbours will naturally lead to necessary port and shipping channel expansion developments such as channel deepening and berths accessibility expansion works. These operations, along with the increase in frequent fast-moving vessels will naturally increase the risk of marine related incidents. However, some ports within the management plan area have demonstrated positive practices of port maintenance and management (Greenore and Warrenpoint), by using methods that contribute positively to the environmental status of its surrounding marine environment. These positive and proactive maintenance procedures are a requirement derived from the Marine Strategy Framework Directive and are currently applicable in the RoI to 1 nautical mile for water quality but also include issues such as litter and noise. Through the UK's withdrawal from the EU, this is covered in NI through the UK Marine Strategy 2010, which provides the legislation for development, managing waste and water pollution within ports and harbours.

Across the island of Ireland, the Commissioners Irish Lights, working through the Local Lighthouse Authorities (LLA) are the responsible authority for the management of Local Aids to Navigation (AtoN) in their area. AtoN include lighthouses, radio aids, buoys, beacons, poles, signs, and any other aid intended to assist safe navigation. Collectively, these are known as the Harbour Authorities or County Councils. AtoN include lighthouses, radio aids, buoys, beacons, poles, signs, and any other aid intended to assist safe navigation. The responsibility of Irish Lights to provide AtoN does not extend to individual approaches to ports or harbours. The quality of service to all operators should be the same. Merchant Shipping and Ports legislation regulate the provision of AtoN. The duties of LLA in NI are set out in detail in the Port Marine Safety Code.

Marine infrastructure initiatives for various conservation projects will be important for targeting specific species. For example, within the port of Belfast, the British Trust for Ornithology (BTO), in collaboration with 'Action for Biodiversity' on an EU Interreg funded project has worked to construct 40 new nesting boxes for Black Guillemot (*C. grylle*) populations who have been nesting within the North Pier of the marina from 1911, originally constructing nests within decaying wood and concrete along the harbour (BTO, 2021).

Infrastructure, ports, and harbour developments along the management plan region should operate within appropriate departmental guidance which states that no significant adverse effects, directly or cumulatively on the seabed, designated features, species, wider biodiversity interests or environmental carrying capacity must occur. Port and Harbour operators, as well as marine infrastructure developers should adhere to the considerations set out in actions in 4.2.

Strategic Guidance 7: Climate change, coastal processes, and shoreline change.

The Coastal Processes work package of the MarPAMM project explored 'Coastal geomorphology and sediment dynamics' for Dundrum Bay in Northern Ireland. Dundrum Bay exhibits a succession of sandbars separated by channels. Located within the intertidal beach profile are what are known as 'multiple intertidal bars' (MITB) features. The work carried out in the work package examined the positional changes of the coast over a 187-year period. Data was extracted from multiple datasets - historical maps, aerial photos, orthophotos and Differential Global Navigation Satellite System (DGNSS) surveys. The shoreline variations were compared with coeval physical forces (hindcast storms and recorded extreme water levels), present details of sediment erosion or accretion at various sections of the coastline to show long-term trends in shoreline behaviour for the site.

Despite the general trend in shoreline retreat which is affecting Murlough, especially in the last 100 years (since 1920), the strongest and episodic phases of coastal retreat occurred between 1920 and 1951 and from 2012 to 2014. The period from 2012 to 2014 however were not the most energetic periods in terms of storm energy but a prolonged and consecutive Extreme Water Levels (EWLs) combined with cluster of storms during this period appeared to be the main driver of those episodic coastal retreat phases. The Royal County Down golf course was the area least affected by shoreline changes, mainly due to the difference in the topography between the golf course foredune and the adjacent beach. In fact, the rock armouring built decades ago to protect the seaward most part of the golf course has also prevented any natural sediment exchange between the dune and the adjoining beach.

At a large scale, the sediment (i.e., sand) is moving from Newcastle/Murlough to Ballykinler. This trend has been evident for an extended time, evidenced by both the overall shoreline displacement and by the shoreline analyses for each single period. There is interest in the finding that the foredune in Ballykinler has gained twice the volume that was lost from the Murlough foredune between 1963 – 2014. This suggests that the sediment filling Ballykinler is not just coming from the Murlough

foredune but is also provided by more complex local sediment dynamics made by sub-cells of sediment transport that are feeding the inlet area from both sides (Biausque *et al*., 2022). For more details, please examine 'Report on coastal geomorphology and sediment dynamics' by Grottoli *et al*. (2022).

The impacts from increasing intensity of storm events, sea level rise and increased erosion incidents present current and future challenges within the Co. Down – Co. Louth MPAs management plan and adjacent areas, their species, and habitats. An increase in the frequency of severe weather events such as storms, flooding, erosion, and sea level rises will jeopardise the overall sustainability of all species, habitats, ecosystems services, housing, business, infrastructure, and industries. In areas with sand dunes, impacts from these extreme events could create an inhospitable environment for the sensitive indigenous species and cause an increase in the presence of invasive/non-indigenous species. One of the main impacts of concern for future climatic change is the replacement of cold-water species with warm water species, with the rate of change subject to specific climate change scenarios and regional sensitivities (CCRA3, 2022).

The expected increase in severe weather events and storms is a major concern for vulnerable coastal locations both in NI and the RoI. In NI, the risk of damages to coastal locations as a direct result of climate change was examined in September 2016 by the NI Assembly, where the increase in frequency and severity of coastal flooding represented the main climate change associated risk to infrastructure (NMDDC, 2017). Currently, multiple assets in all infrastructure sectors (i.e., road infrastructure on the east coast). are exposed to several sources of flooding, erosion, and impacts from storm events. The anticipated impacts from coastal risk are likely to double within the next 60 years in line with projected changes in the UK climate (NMDDC, 2017). This expected increase in onshore wave height will also hasten rates of coastal erosion, increasing the risk to the UK rail network and coastal sea walls.

In the RoI, findings from work packages 2, 3 and 4a from the Irish Coastal Protection Strategy (ICPSS) for the northeast coast of Ireland produced a series of floodplain and flood depth maps outlining several primary areas that are at risk of coastal flood hazards.

The general patterns of climate change and the correlating impacts on marine species, especially to internationally important sea bird populations, is a significant trend of concern. Studies conducted by EU Interreg funded projects investigated the direct and indirect variables of climate related processes affecting seabirds through analysing

prey abundance, weather events that alter prey behaviour, quality and quantity of prey, prey accessibility and sea bird foraging efficiency (Johnston *et al.,* 2021). During these studies, it was revealed that across most species, prey abundance had a significant influence on sea bird demographics (Johnston *et al.,* 2021), particularly in areas where there was a reduction in prey species due to the adverse effects of extreme weather events, impacting seabird species such as kittiwakes (Johnston *et al.,* 2021). These studies have emphasised the impacts that current climatic changes are having on important sea bird populations and a focus may need to shift to the conservation of fish stock management and the protection of bird colonies from intense weather/storm events (Johnston *et al.,* 2021).

To mitigate the increasing effects of climate change on the coastal ecosystems located within the management plan region, a proactive approach must be taken in addressing all vulnerabilities associated with extreme weather events that will change over time. Incorporating nature-based solutions into strategic management plans will help to reduce risks associated with climate change, such as the creation of new intertidal habitats (e.g., saltmarshes) which act as a natural barrier during high-risk periods. By using these natural based approaches for shoreline protection, it mitigates risk of damage to coastal and shoreline areas while increasing habitat restorations and value. Green and blue mechanisms for coastal protection management are being recognised as a coastal management "*panacea*" for coastal change; however, in some exceptional scenarios, grey infrastructure may be more applicable. In these cases, applying both an engineering and nature-based response could be a successful management solution. The management plan and overall inshore marine areas across the island of Ireland present a series of difficult and complex threats for the long-term resilience and sustainability for protected marine features. The threats expected to have impacts in these areas will include increased rates of erosion, especially in areas of sand dunes, creating non-compatible conditions for sensitive indigenous species reliant on sand dune presence and allowing the expansion of non-indigenous warm water species. To aid adaption and mitigation against climate change, coastal landowners and statutory regulators are encouraged to follow the actions outlined in 4.2.

Blue Carbon habitats.

Marine carbon storage habitats or 'Blue Carbon' are habitats mainly composed of salt tolerant vegetation or shellfish beds that can store large quantities of carbon within the soils and the sediments in which they grow, sequestering carbon. These Blue Carbon habitats are very efficient 'carbon sinks' and able to store significantly more carbon than terrestrial equivalent habitats of similar size (forests and heathlands etc), making them a significant asset for the mitigation of climate change. Blue Carbon habitats within the management plan area include areas of seagrass meadows, kelp forests,

saltmarsh and shellfish beds and are important in sequestering high levels of carbon emissions.

Native oysters (*O. edulis*), if left undisturbed from commercial fishing and aquaculture activities, will form an extensive biogenic habitat (reef) on the seabed. These oyster reefs create three-dimensional habitats that support higher biodiversity and biomass of species which could help increase fish production through protective nurseries and increasing food availability in the form of improved prey presence (Ulster Wildlife, 2022). Overspill of larvae from nurseries may help seed and support sustainable fisheries (Ulster Wildlife, 2022). A major ecosystem benefit from enhancing native oyster reefs is their ability to protect considerable stores of carbon from releasing into the atmosphere.

Ulster Wildlife established a natural recovery programme for native oyster in Belfast Lough through the installation of 24 oyster nurseries in Bangor Marina (Ulster Wildlife, 2022). This nursey is a micro-habitat of 27 mature oysters (hung in cages in the water underneath the marina pontoons) that will reproduce and release larvae to settle on the seabed (Ulster Wildlife, 2022). This is the first project of its kind in Northern Ireland.

The EU Habitats Directive also provides protection to important salt tolerant plant species that in turn support other rare species of plants and animals within the area. It is therefore essential that there is sufficient protection for these habitats to enable renewed growth within the management plan area. This will ensure that these habitats will be conserved, restored if declining and established in new areas deemed appropriate within the management plan and adjacent areas, using the Strategic Guidance actions in section 4.2.

Strategic Guidance 8: Research and education.

Marine research has been carried out throughout the Co. Down – Co. Louth MPAs management plan area within the MarPAMM project. Past research has been conducted by the competent authorities, marine NGOs, and academic partners (i.e., AFBI, Bird Watch Ireland, Marine Institute, and universities). Within the management plan area, continued and future marine research will be encouraged as an output to further enhance awareness and knowledge sharing of connectivity between MPAs and adjacent areas.

All marine research within the management plan area should adhere to governmental guidelines, practices and advice through guidance and actions outlined in 4.2. These

actions focus on the mitigation of any negative impacts or alterations to protected features within MPAs, designated habitats and species. Operators and members of the public (conducting citizen science) should adhere to the guidance set out in actions in 4.2.

Strategic Guidance 9: Ballast water and accidental offshore discharges.

The use of ballast water is essential for the safe and efficient operation of vessels by ensuring their stability whilst operating. Although ballast is important it can also be traced as a spreader for marine non-indigenous species, examples of which include brown algae, some species of barnacles, and sea squirts. To regulate the discharge of ballast water and control the spread of invasive species the International Maritime Organisation (IMO) through its Marine Environment Protection Committee (MEPC) developed the International Convention for the Control and Management of Ships' Ballast Water and Sediments, which was adopted at a Diplomatic Conference during 2004. The Convention applies to all vessels that operate in the waters of the Co. Down – Co. Louth region. It applies to all vessels, regardless of size and tonnage that are entitled to fly the Flag of a Party to the Convention.

Within the UK, new legislation through The Merchant Shipping (Control and Management of Ships' Ballast Water and Sediments) Regulations 2022 places controls on the discharge of ships' ballast into UK waters. The approach is based on the International Ballast Water Convention. The legislation aims to protect the UK coastline by stopping international shipping or UK ships returning from international locations emptying unmanaged ballast. This will help to prevent the spread of non-indigenous species and limit the impact of the spread of already present non-indigenous species within the marine environment.

In the RoI, the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) has been ratified with regulations coming into force in 2023. This will help control the spread of non-indigenous species and pathogens. Vessel operators and owners should coordinate and integrate water/waste and fuel management in a manner that seeks to prevent pollution and accidental discharge and act to promote sustainable and effective on-board storage. Within estuaries and near-shore areas there should be awareness for enhancing and improving water quality by preventing accidental pollutant discharge and eutrophication. Vessel operators should adhere to the considerations set out in actions in 4.2.

Strategic Guidance 10: Land-use sediment run-off.

Land-based activities in shoreline areas adjacent to the coast within the Co. Down – Co. Louth MPAs region can greatly impact the rate of sediment runoff into the marine environment. Land based activities such as agriculture, drainage and development in coastal areas should be conducted in such a manner where the sediment run-off has minimal impact.

The most significant pressures on water quality are from the release of phosphorus and nitrogen from agricultural sources (DAERA, 2019b). Agriculture activity can also give rise to sediment entering waters due to damage caused to riverbanks and lake shores by livestock trampling (poaching) and from other types of land disturbance. Other pressures from agriculture include the contamination of waters from hazardous chemicals, such as pesticides and sheep dip (DAERA, 2019b). If a land-based activity has the potential of increasing the rate of sediment run-off into the region, the guidance in 4.2 should be considered.

Strategic Guidance 11: Wild seaweed foraging and cultivation (farming).

Wild harvesting.

Foraging and the cultivation of seaweed including kelp is a growing sector within the coastline within the Co. Down – Co. Louth MPAs region. Wild seaweed harvesting provides opportunities as a unique food source within the hospitality industry and could be viewed as a natural economic resource to the tourism and recreation industry (i.e., seaweed baths). Wild seaweed can be used as food product, cosmetics, ingredients in animal feed and a source of material for biofuels. Wild seaweed and kelp foraging from a personal/recreational perspective should adhere to practices compliant with the amended Wildlife Order 1985 (NI) and the Wildlife Act 1976 (Revised) (RoI). This should encourage minimal and sustainable foraging in areas within MPAs to help encourage MPA integrity by leaving sufficient (1/3) of the algal resource/plant for regeneration. Wild seaweed foragers cultivation should consider the impact that they are having within the marine/coastal environment and mitigate negative environmental impacts. Foragers should ensure only indigenous species are cultivated. Strategic Guidance actions in 4.2 should be considered when harvesting or foraging for wild seaweed.

Cultivation/faming.

In the UK, wild seaweeds, including kelp, have traditionally been used for centuries for food, feed and land fertilizers. Demand has so far been met by the harvesting of wild resources. However, the increase in demand for seaweed biomass is likely only going to be met by seaweed farming rather than natural harvest (Capuzzo and McKie, 2016). Aquaculture production of seaweed farming industry in the UK is still limited, although there are research farms associated with Queens University and a commercial farm on Rathlin Island (Islander Kelp). The most farmed species within the UK are *Saccharina latissima, Laminaria digitata, Alaria esculenta*, and *Palmaria palmata* (Wilding *et al.,* 2021). Seaweed farming/cultivation could become a growth area within coastal areas within the Co. Down – Co. Louth region.

Seaweed is farmed either on suspended ropes or on textiles in the water column, although the structure and shape of the farm can be variable. The most common method in Europe for growing out cultivated seaweed plants is twinning seeding, where the seeded twine is unwound from a spool to helically wrap around a larger longline rope (Wilding *et al.,* 2021). For commercial scale operations, cultivation lines heavy with seaweed can be lifted out the water workboats with winches before cutting seaweed (harvesting) from the lines.

Following deployment, cultivated seaweed lines should be monitored and maintained to prevent damage to infrastructure or loss of biomass due to line entanglement (Wilding *et al.,* 2021). Environmental conditions and growth rates should be monitored with regular (monthly, more frequently approaching harvest) biomass estimates recommended (Wilding *et al.,* 2021). Strategic Guidance actions in 4.2 should be considered for the cultivation/farming of seaweed.

Strategic Guidance 12: Military and defence.

Within the Co. Down – Co. Louth MPAs region there are a diverse range of military activities from the Irish Defence Forces in the RoI and the Ministry of Defence in NI.

The UK Ministry of Defence (MoD) have an established presence within the Ballykinler area both historically and through the retention of the training area within the former Ballykinler Training Centre. Generally, the activities undertaken are not made public, and the MoD use their own environmental assessment of military activities - military activity is not widely covered by JNCC conservation advice. The MoD have

incorporated all designated MPAs into their Environmental Protection Guidelines (Maritime) and wider Marine Environmental and Sustainability Assessment Tool. These guidelines are used to manage MoD activity to minimise the associated risks to the environment within the management plan. However, there is minor indication that military activities are having any negative impact on the marine environment.

In the RoI, Department of Defence has created a strategic guidance which under the White Paper on Defence provides strategic comprehensive defence up to the period 2025. This highlights the range of activities undertaken by all military operators and along with appropriate practices to sustain, maintain and enhance the marine environment in which they take place.

4.2. Specific Goals and detailed actions to deliver Strategic Guidance.

Strategic Guidance 1: Commercial fisheries.

The DAERA (2020) consultation on the development of fisheries management measures for MPAs has identified areas of concern in relation to commercial fishing activities across multiple MPAs (including Murlough SAC and Strangford Lough SAC). These concerns include the impacts from demersal, dredge and static gear within the different MPAs and across the designated features (i.e., sand banks, reefs, and seagrass etc.). Recommendations included putting restrictions on certain fishing activities within or over features in the MPAs. Subsequently The Marine Protected Areas (Prohibited Methods of Fishing) Regulations (Northern Ireland) 2022 and The Scallop Enhancement Sites (Prohibited Methods of Fishing) Regulations (Northern Ireland) 2022 were issued.

Management measures which cover commercial fisheries in the Co. Down – Co. Louth MPAs management plan area, including those working within or adjacent to MPAs, are outlined below and include both statutory measures and guidance.

1. Landing sizes for lobsters, brown crabs, velvet crabs and whelks are governed through Regulation (EU) 2019/1241 of the European Parliament and of the Council on the conservation of fishery resources and the protection of marine ecosystems through technical measures. This Regulation has been retained in UK Law following its exit from the EU. In Northern Ireland, the current Minimum Landing Sizes (MLS) are 150 mm for brown crab, 87 mm for lobster, 65 mm for velvet crab and 45mm for whelk. Whilst the MLS for velvet crab, lobster and whelk follow those set out in the retained regulations, DAERA have increased the MLS for brown crab from 130mm to 150mm (25th January 2022) following consultations with the fishing industry on ways of sustaining the stock.

a. Unless a species is subject to the landing obligation (discard ban) you must return all catches below the MLS to the sea immediately.
b. The Edible Crabs (Conservation) (Amendment) Regulations (Northern Ireland) 2021 (S.R. 2021 No. 336) prohibits the retention on board, the bringing to land and the landing from a sea -fishing boat, the detached claws of an edible crab.

2. The Unlicensed Fishing for Crabs and Lobster Regulations (Northern Ireland) 2008 was introduced to improve the management and conservation of crab and lobster and to prevent the increase in fishing by hobby fishermen who did not hold a license.

a. Under the regulations it prevents anyone without a license from:
    i. Landing more than 5 crabs and one lobster per day,
    ii. using more than 5 pots; and
    iii. using a stock cage.
b. Currently, there are no restrictions placed on pot fishing for whelks (other than the EU MLS), *Nephrops* and *Palaemon* in Northern Ireland.

3. Use V- notching to increase the total number of reproductive female crustaceans within a population, raising total egg production of the population. Any female which has been v-notched should not be landed. This reduces harvest rates on reproductive females and as the v-notch can last for several moults, females can remain protected for several years.

4. Ban the landing of soft-shelled crab/lobster. Once moulted, brown crab and lobster have a soft shell which not only is representative of poor meat quality due to high-water content but will also greatly reduce survival rate if landed.

a. The Edible Crabs (Conservation) (Amendment) Regulations (Northern Ireland) 2023 (S.R. 2023 No. 5) prohibits the retention on board a sea-fishing boat, the bringing to land, the landing, having in possession, selling, exposing for sale, buying for sale, or consigning to any person for the purpose of sale, a soft-shelled edible crab.
b. Where a soft-shelled edible crab is brought on board a sea-fishing boat, it must be immediately returned to the sea as near as possible to the place from which it was taken.

a. 5. Vessels under 12 metres should be encouraged to use iVMS while operating within the pot fishery area. Data derived from iVMS will provide a more complete picture of all fishing in our seas.
    a. iVMS provides latitude, longitude, course, speed, date, and time of each positional report of the vessel. Data is reported via mobile phone signal (GPRS).
        i. The use of existing technology to provide iVMS through the mobile phone network will be more cost effective than upgrading and/or buying new technology. The system uses cutting edge antenna

technology and will generally give good coverage within inshore areas.

b. The issue has been considered by DAERA (2022) through a consultation on iVMS for fishing vessels under 12 metres as an enhanced data collection and monitoring tool.

6. Demersal and static fisheries should take efforts to limit bycatch of non-target species.

a. Vessel operators are required to report all incidents of accidental injury/mortality of any marine mammals due to bycatch to the Marine Management Organisation within 48 hours of end of trip.
b. In compliance with The Conservation (Natural *Habitats*, etc.) (Amendment) (*Northern Ireland*) (EU Exit) Regulations 2019, vessels must also report any incidents of lost gear to the relevant authorities if the gear cannot be reclaimed by the vessel. Failing to report or correctly mark lost gear is an offence and may result in prosecution.
c. Static fishing pots should have an escape panel for reduction in by-catch and the easy release of under-size stock. Escape panels have also shown that when used, less bait is needed.

7. All commercial fishers should actively examine the locations of MPAs before commencing trawl activity to ensure their awareness of all MPAs and designated features within the operating areas. This information can be found on the departmental marine map viewers and associated departmental maps (i.e., DAERA Marine Map Viewer). Using the MarPAMM story maps, Seafish Kingfisher MPA fisheries map (which includes management measures for specific MPAs) and marine map viewers (NI/RoI), awareness can be raised within the fishing community on the connectivity between MPAs in relation to impacts.

8. Introduction of pot tagging systems to enable quantification of effort, with different colours for commercial and recreational pots. The number of tags issued to each recreational fisherman would reflect the current 5 pot limit, as described in Regulation 4 of The Unlicensed Fishing for Crabs and Lobster Regulations (Northern Ireland) 2008.

9. Marking of Pots for static fishing: Currently there is no definitive way to mark pots to distinguish what fisherperson a pot belongs to. By ensuring that all pots are labelled in a consistent manner it ensures that they are easily identifiable. This can be used in terms of enforcement, gear conflict, or if a fisherperson's pots are moved by weather events.

a. Marking of static pots can help to distinguish the difference between a commercial fisher or a recreational fisher. This could be further developed into a departmental scheme for tagging to examine tagging differences between commercial and recreational fishers.

10. Information on intensity of dredge/demersal fishing within the inshore regions using smaller vessels is limited and demonstrates a need for enhanced data collection through electronic or observer monitoring of small vessel.

11. Smaller shipping vessels undertaking demersal fishing activities for flatfish should limit the impact from demersal gear in areas adjacent to MPAs as this could create negative impacts to designated features within the management plan area.

12. Commercial fishing should follow best practice on biosecurity to prevent the spread of disease and non-indigenous species.

13. Old fishing gear should be discarded responsibly to reduce the risk of entanglement to larger marine species. Entanglement incidents are to be officially reported in local reporting schemes from environmental bodies.

14. There is an opportunity for the competent authorities to explore with the commercial fishing industry the use of remote electronic monitoring (REM) in relation to enhancing bycatch mitigation for marine mammals e.g., bottlenose dolphins (*Truncatus tursiops).* This focus is not on introduction of REM but exploring better mitigation strategies for bycatch and entanglements.

Strategic Guidance 2: Aquaculture.

Management measures which cover aquaculture management within the Co. Down – Co. Louth MPAs management plan area, including that within the MPA or adjacent, are outlined below and include both statutory measures and guidance.

1. All aquaculture operators within the management plan area should follow statutory guidelines and will require appropriate licencing:
    i. Licencing is required under section 11 of the Fisheries Act (NI) 1966.
    ii. Most aquaculture is an exempted activity for EIAs under Marine Licensing rules. The one exception is the need for an EIA for marine finfish.
    iii. In RoI, the Aquaculture and Foreshore Management Division of DAFM is responsible for aquaculture licencing under the Fisheries (Amendment) Act, 1997 (Poppleton *et al., 2*021).

2. All aquaculture operators should continually monitor the health of cultivated species within the management plan area to minimise the risk of transmissible diseases and parasites to naturally occurring species within MPAs. This should also apply to reduce the risk of transmissible pathogens to humans and all aquaculture operators should be aware of appropriate disease notification, reporting, surveillance, and eradication programmes under the Animal Health Law (Regulation (EU) 2016/429 section 3).

3. Aquaculture activities have the potential to damage intertidal mudflats and sandflats through trampling (resulting from anthropogenic vehicular presence when accessing intertidal sites) and smothering (caused by aquaculture structures being placed over areas colonised by *Zostera* eelgrass species). This usually a consideration of the marine licence and/or appropriate assessment process.
   a. Normally construction or deposits below the mean high water spring tide mark require a Marine Licence from DAERA under The Marine and Coastal Access Act 2009. However, elements of shellfish propagation and cultivation are exempt from this requirement under Article 13 of The Marine Licensing (Exempted Activities) Order (Northern Ireland).
   b. The exemption to a. does not apply to any such deposit made for the purpose of disposal,
   c. To any such deposit made for the purpose of creating, altering, or maintaining an artificial reef; or
   d. To any such deposit that causes or is likely to cause obstruction or danger to navigation.
   e. The licence holder shall ensure that the placement or removal of any structure outside the licensed area holds all other necessary permissions.
   f. To protect the intertidal area, operators can make an application for a Marine Licence for the use of any temporary ground cover/protection to be placed for a limited period during harvesting/ stocking operations in future. The temporary ground cover must be removed after each operation.

4. Accumulation of pseudo faeces beneath intertidal oyster trestles has the potential to impact benthic community structures.
   a. These impacts are small scale and localised.

5. The Molluscan Shellfish (Control of Deposit) Order (NI) 1972 prohibits the introduction into NI waters of molluscan shellfish taken from outside NI waters except under the authority of a permit granted by DAERA Marine and Fisheries.

   a. All spat and juveniles must be sourced from areas free from known invasive non-native species.
   b. The movement of Pacific oysters (*Magallana gigas*), a non-native species in Ireland, is regulated under the Alien and Locally Absent Species in Aquaculture Regulations (NI) 2012, which implement Council Regulation (EC) No 708/2007 on the use of alien and locally absent species in aquaculture.
   c. All aquaculture operators must comply with The Alien and Locally Absent Species in Aquaculture Regulations (NI) 2012.
   d. Attention should be paid to any invasive species initiatives to become familiar with the procedures to mitigate the risk of species

establishments. The Invasive Species Ireland project is a collaboration between the NI Environmental Agency and the NPWS in the RoI and began in May 2006. It aims to reduce the impact and threats from invasive species on the island of Ireland and more information about the initiative can be found here: https://invasivespeciesireland.com/wp-content/uploads/2010/07/Aquaculture_CoP.pdf.

6. Intertidal shellfish gathering undertaken as a commercial activity and sold into the food chain must comply with retained EU Regulation 853/2004 which lays down specific hygiene rules for premises that handle or process fishery products.

7. The DAERA intertidal shellfish gathering consultation 2022 recommends:
    a. A closed season for winkle gathering from January to April to be the most effective time to protect future stock.
    b. A minimum landing size should be set at 16 mm to allow all specimens a minimum of one winter spawning.
    c. A bag limit of 4 kg/ 2 litres in one tide for personal consumption.
    d. Registration of commercial gatherers with the Department, with activity logs detailing weight and location of harvesting; and
    e. A night-time curfew on gathering which can have benefits for shellfish stock as well as protection of sensitive habitats and species.

8. A voluntary code of practice which aid sustainability of intertidal shellfish include:
    a. Harvesters need to be aware of MPA related regulations and environmental legislation for feature protection.
    b. Sorting and returning small shellfish to the shore.
    c. Replacing rocks or clumps of seaweed that have been moved while shellfish gathering to their original location.

9. It is an offence for an operator to introduce an alien species or to undertake in the translocation of a locally absent species except under and in accordance with, the conditions of a permit where this is issued under the Alien and Locally Absent Species in Aquaculture Regulations (NI) 2012. Licensed aquaculture operators of such species are required by the terms of their FCL to ensure effective measures are taken to prevent the spread of these species outside of the aquaculture site.

10. In the RoI, plans have begun working towards coordinating on the International River Basins Districts Management Plan (IRBDs). A North/South Water Framework Directive Co-Ordination Group was created to address the issue of cross-border invasive alien species establishments (Poppleton *et al.,* 2021).

11. When establishing new aquaculture sites or altering the operations of existing sites within MPAs, feedback from regional stakeholders and local communities should be sought and considered before progressing.

Strategic Guidance 3: Benthic Dredging and Disposal.

Management measures which cover dredging management within the Co. Down – Co. Louth MPAs management plan area including within or adjacent to MPAs, are outlined below and include both statutory measures and guidance.

1. It is suggested that all dredging locations within the management plan area be identified through regular bathymetric monitoring and appropriate assessment of potential sediment deposit rates (DAERA, 2017d).
2. Marine licenses for dredging within the management plan area must be obtained from the relative authorities:
    a. In NI the Marine and Fisheries Division of DAERA are responsible for licensing and monitoring dredging activities.
    b. In the RoI, consent must be granted by the Department of Housing, Local Government and Heritage (DHLGH) under the Foreshores Act.
3. All dredging operations within the management plan area will require two licences: one for removal of sediments and one for the deposit of extracted materials at a designated disposal site.
    a. To mitigate risk of pollution, all potential polluted contaminants from extracted materials must be identified prior to license application under the OSPAR Guidelines for the Management of Dredged Materials.
    b. Sediment analysis is required to determine the levels of pollutants within material to be dredged. A chemical analysis must be conducted by a recognised laboratory to assess the risk of environmental impact. If levels of pollutants/contaminants are detected within the material to be dredged, a chemical analysis must be conducted to assess the risk of environmental impact. If the level of contamination is considered too toxic for the marine environment, the materials cannot be disposed of into the sea and further investigations should be carried out to identify the source of contamination and further specialist dredging and disposal techniques carried out (DAERA, 2017d).
4. Dredging operators should be aware of all MPA locations, the MPA network, protected species, and the connectivity between MPAs when carrying out dredging activities and where practicable should avoid any impact to designated features.
    a. All dredging operations should be up to date and familiar with the Marine Wildlife Licencing Guide which can be found here:

https://www.daera-ni.gov.uk/publications/marine-wildlife-licensing-guidance-applicants.

b. Dredging operations produce 'low frequency omnidirectional sound' and some coastal dredging operations can be heard from approx. 10 km offshore (NPWS, 2014b). Dredging operators should be aware of the potential risk this noise pollution may have on marine mammals within the management plan area that are sensitive to loud underwater sounds such as cetaceans and grey seals. These animals rely on acoustics as a form of navigation/communication and disturbances caused by damaging noise levels can cause confusion and behavioural changes. As important marine predators, this could have a ripple effect throughout the entire coastal and offshore ecosystem. A Marine Mammal Observer (MMO) should be present to monitor the surrounding area for cetaceans or seals whilst dredging activities are under operation. This will considerably reduce the risk of injury/disturbance to the larger marine mammals.

Strategic Guidance 4: Recreation and tourism.

Shoreline based recreation.

Management measures which cover recreational activities and shore-based management within the management plan area are outlined below and include both statutory measures and guidance.

1. Recreational users within MPAs participating in activities including angling, sea bathing, bird watching, walking/hiking, geo-tourism, exercising, and beach going should ensure that interactions with designated species or habitats do not create or cause negative adverse effects.

2. Recreational users should comply with appropriate regulations around wildlife disturbance.

   a. The Wildlife (NI) Order 1985 and Section 23 (7)(c) of the Wildlife Act 1976 (RoI) states that it is an offence to wilfully interfere with or destroy a breeding or resting place for wildlife.
   b. The Conservation (Habitats etc.) Regulations (NI) 1995 (as amended) gives power to the competent authority to reduce the level of disturbance to habitats and wildlife with protected features.

3**.** Certain species are protected by international, European, and national legislation throughout the UK and Ireland. Offences can include intentional or reckless disturbance, taking, harming, killing, and in some cases possession or sale of the species.

a. For marine mammals all users should keep their distance 100 m from the animal(s) and refrain from touching or interacting with live or dead animals.
    I. Never separate seal pups from mothers. Leave lone pups alone, the mother may only be foraging for food.
    II. If there are several people on foot, keep to one side of the animals and leave them an escape route to the sea. Remain as quiet as possible, especially if you are in a group, and avoid sudden movements.
    III. Never camp near a haul-out site or at a breeding site.
    IV. If you come across an abandoned seal pup which is obviously injured, sick or distressed, contact Exploris on 07701 372 623 (NI). Do not pick the seal up or chase it back into the sea. Instead, observe from a safe distance until the rescue team arrives.
    V. In NI, if you come across a dead seal, contact the DAERA Marine and Fisheries Division Marine Conservation and Reporting Team (MCRT) on Marine.Wildlife@daera-ni.gov.uk or 028 905 69421. Exploris do not have any involvement with dead seals.
    VI. If you find a whale, dolphin or porpoise stranded (live or dead) on the beach contact the DAERA Marine and Fisheries Division Marine Conservation and Reporting Team (MCRT) on Marine.Wildlife@daera-ni.gov.uk or 028 905 69421.
    VII. In the RoI all sick or injured seals sightings can be reported to Seal Rescue Ireland on 087 195 5393 or your local National Parks and Wildlife Service.
    VIII. Report the stranding to the Irish Whale and Dolphin Group via the app (IWDG Reporting App), email strandings@iwdg.ie or phone 0892790295 or your local National Parks and Wildlife Service station.
b. For seabirds: Where possible use binoculars or a telescope, understand the birds' situation and behaviour and recognise signs of stress.
    I. If you are disrupting their behaviour in any way, back off carefully.
    II. Use bird hides or observe from a vehicle or boat at a distance.
    III. Approach birds slowly and quietly and, if on foot, adopt a prone position whilst observing.
    IV. Be careful that the size of your group does not in itself disturb the birds, particularly if they are not used to people watching them.
    V. Always keep noise and sudden movements to a minimum.

VI. Be very careful not to leave any litter, and do not leave food ‘for the birds’. It is likely to attract predatory gulls and do more harm than good.

VII. Avoid flash photography, especially at close range. Flash is rarely needed but is a default setting on many cameras. Check your settings before your trip.

VIII. Drones should never be flown directly at or through nesting, foraging or rafting birds. Care should be taken not to disturb birds by flying too close to them. For more information see DAERA leaflet on drone usage: https://www.wildlifecrimeni.org/_files/ugd/259455_db4ed41291ce447bb7781013ab3d16aa.pdf.

c. Recreational dog walking:

I. Dogs can often cause alarm to both sea birds and seals. If you take your dog with you, keep it on a lead and under close control.

II. To avoid disturbance of seabirds and marine mammals such as seals, walk your dog towards the back of the shore and try to avoid seal haul - outs and/or the feeding birds along the tide line, or at times around high tide.

III. Keep away from known bird roosts and take note of any signs requesting your co-operation in these areas.

IV. Do not allow your dog to chase birds on the beach as this stops them from feeding and roosting.

V. Keep your dog on a lead when near feeding or roosting birds and in areas used by other recreational activities as boisterous dogs can scare both birds and people.

VI. Please clean up after your dog to keep the beach safe and clean for other users.

4. Support management of licensed operators through the development of information and training needs for recreational service operators to enhance visitor experiences.

5. Support and promote the implementation of volunteer codes of conduct for activities within MPA sites:
   a. Leave No Trace Campaign for the island of Ireland.
   b. The WiSe Scheme - Minimising Disturbance for Marine Wildlife:
      i. Contains guidance for observing cetaceans, seals, basking sharks and seabirds within their Boat course and new Adventure courses.
   c. Newry, Mourne and Down District Council’s Guidance on Share the Shore shoreline information panels; and

d. Nature Scotland's A Guide to Best Practice for Watching Marine Wildlife.

6. Shoreline anglers are required to follow UK and EU fishing byelaws regarding any take size and/or quantity limits and prohibited species (salmon, sea trout and sea bass during spawning).

7. Recreational activity should adhere to best practice so that they do not contribute to environmental damage or disturbance.

8. The increase in marine litter is a growing concern for all coastal species including marine mammals. It is estimated that 70% of all marine litter has reached the seabed, while 15% can be found floating on the ocean's surface and a further 15% reaching inland shores (OSPAR, 2022).
    a. Raising awareness of the significant impacts of marine litter on local marine species is crucial to the successful conservation of marine species located in the management plan area.
    b. Local communities and coastal users should be encouraged to engage with the Clean Coasts programme who support thousands of volunteers in the removal of marine litter from the Irish coastline and provide guidance on responsible behaviour along the coast through their 'Enjoy and Protect' code of conduct document.

Surface based recreation.

Management measures which cover recreational surface-based activities within the management plan area are outlined below and include both statutory measures and guidance.

1. Surface based recreational users should comply with appropriate regulations around wildlife disturbance.
    a. The Conservation (Habitats &c.) Regulations (NI) 1995 (as amended) gives power to the competent authority to reduce the level of disturbance to protected habitats and species.

    b. Section 23 (7)(c) of the Wildlife Act 1976 (Revised) (RoI) states that it is an offence to wilfully interfere with or destroy a breeding or resting place for wildlife.
    c. In the RoI, the Natural Heritage Act and the Wildlife Act 1976 (Revised (RoI) ensures the protection and conservation of all wild flora and fauna with the intention of continually preserving important ecosystems.

2. Certain species are protected by international, European, and national legislation throughout the UK and Ireland. Offences can include intentional or

reckless disturbance, taking, harming, and killing and in some cases possession or sale of the species.

3. Boat angling is required to follow UK and EU fishing byelaws regarding taking size and quantity limits and prohibited species (salmon, sea trout and sea bass during spawning).

4. Surface based recreational users within MPAs were activities including boating, jet skiing, bird and marine mammal watching, pleasure cruisers and recreational offshore fishing should demonstrate that there will be no significant adverse effects, directly, indirectly, or cumulatively on designated feature areas.

5. The DAERA consultation in 2022 on management measures for use of fast and personal watercraft In MPAs has recommended management measures for the management of fast watercraft:

    a. For commercial tour operators', access will be permitted to MPAs on the condition the vessel's skipper has hained certification in the WiSe Scheme,
    b. For recreational users', issue Advisory Notices detailing best practice on the use of PWCs in MPAs where vulnerable marine species are a designated feature.
    c. Permit PWC users' access to MPAs conditional on the user's agreement to abide by a code of practice for the operation of PWC in specifics MPAs.
    d. Speed restricted zones within specific areas of MPAs.
    e. Prohibition zones within an SPA where there is the risk of disturbance to loafing / nesting birds.
    f. Prohibition zones within an MPA where the use of PWCs are excluded in the vicinity of marine species sensitive to disturbance of entry to specific zones.
        i. The boundaries of any prohibition zone will be set considering the guidance set out in the WiSe Scheme (DAERA, 2022b).

6. All operators of leisure boats and cruises are advised to ensure effective measures are taken to prevent the spread of non-indigenous species within the MPA network.

7. Certain species are protected by international, European, and national legislation throughout the UK and Ireland. Offences can include intentional or reckless disturbance, taking, harming, killing, and in some cases possession or sale of the species.

8. Surface based recreational users from PWCs should take caution when anchoring and mooring within MPAs and adjacent areas to ensure as little damage to the seabed and the designated features within the area (i.e.,

seagrass and maerl). Operators should follow the appropriate code of conduct as set out in the 'Green Guide to Anchoring and Moorings' developed by the Green Blue Organisation and RYA.

   a. An opportunity should be explored between competent authorities and recreational boating groups for the development of a coastal atlas which can aid tracking of crafts. This has been conducted by the Royal Yacht Association in England using Automatic Identification System (AIS) which can support pressure management.

9. In the case of interactions with marine mammals and Basking Sharks, surface based recreational users should first slow down and take time to assess what the animal(s) are doing and, if possible, what the group composition is. If they are feeding, the impacts of approaching could be more serious as it could cause disruption to this important behaviour. If they are with young, this may affect their willingness to engage. Knowing what their original behaviour is can help determine if a disturbance will be caused, i.e., if the behaviour significantly changes.
   a. Do not approach animals closer than 100 m. Remain at least 200 m away if another boat is present and 300 m away if a mother and calf are present.
   b. Spend no longer than 15 minutes near the animals.
   c. Do not drive head on, in-between or attempt to encircle the animals.
   d. Maintain a slow 'no wake' speed and steady course.
   e. If animals approach the craft, turn the engine to neutral.
   f. Never swim with animals in the water.
   g. All recreational boat users should adhere to the correct guidelines through the Sharks Trust, Basking sharks code of conduct which applies to both UK and EU waters.

10. Seabird interactions from surface based recreational users can occur among large groups, or rafts, on the sea both in summer and in winter. If you see a raft of birds ahead, reduce speed to less than 6 knots as you approach. A minimum approach distance of 50 m is recommended, although this may be varied according to species and circumstance. Avoid driving your boat through rafts of birds and navigate around them where practicable and safe to do so. Breaking up rafts can make them more vulnerable to predators and uses up precious energy.

Sub Aqua based recreation.

Management measures which cover sub-sea recreational activities within the Management Plan area are outlined below and include both statutory measures and guidance.

1. Recreational divers must hold all appropriate diving qualifications issued by accredited diving organisations to dive e.g.: Professional Association of Diving Instructors (PADI).

2. Recreational divers must adhere to safe and responsible diving practices as outlined by the British Sub Aqua Club (BSAC) and BSAC Safe Diving Guide.

4. Recreational divers can aid marine biodiversity conservation efforts. Information recorded by divers and other recreational users can provide assessment data for on-going condition of our marine ecosystems which could help experts to identify trends and changes in the MPA network.
    a. Divers can actively help to protect the marine environment by reporting marine life sightings to CEDaR online recording facility or by using iRecord or iNaturalist smartphone app and watching out for marine wildlife disturbance**.**
5. Recreational divers participating in sub aqua activities should aim to achieve best practice when diving in areas containing marine mammals, sea birds and basking sharks.

    a. Recreational divers are encouraged to follow the guidance laid out within the British Sub-Aqua Club's Divers Code of Conduct (Annex VIII) when participating in aub aqua activities.
    b. Divers and snorkellers must follow The Access to the Countryside (Northern Ireland) Order 1983 and seek permission from the landowners prior to entering private land.
    c. Divers and snorkellers should follow the principles of 'Leave No Trace' while on land before or after their dive/snorkel.

3. Divers and snorkellers are encouraged to follow UNESCO's Code of Ethics for Diving on Underwater Cultural Heritage Sites and the Sub-Aqua Association's (SSA) Respect Our Wrecks Code of Practice.

    a. Respect our wrecks policy:

        I. Respect war graves. Many wrecks are also war graves. Treat them with the respect you would give a churchyard.
        II. Respect the wreck environment. Many wrecks make great habitats for marine life. Treat them with the care you would give to coral reefs.
        III. Respect the future. Explore wrecks, where allowed, but don't damage or disturb them. Take photos rather than souvenirs, so that our wrecks remain for future divers to see.
        IV. Respect our history. Many wrecks have an important history and hold clues to our maritime past. If you find anything, report it to the Receiver of Wreck, who will pass on such information to archaeological experts.
        V. Respect yourself. Make sure that you are appropriately trained for safe wreck diving.

VI. Respect your family and friends. Some wrecks contain dangerous cargoes or live munitions. Don't disturb them or bring them ashore.
VII. Respect the law. Know and respect maritime laws - and avoid a criminal record.
VIII. Divers diving in and around areas that have been classified as military sites, especially aircraft remains, should be aware of Protection of Military Remains Act 1986 (NI), which provides protection from interference as it could be a war grave.
IX. Divers diving in and around areas that have been classified as military sites, especially aircraft remains, should be aware of Protection of Military Remains Act 1986 (NI), which provides protection from interference as it could be a war grave.
X. Under the Protection Wrecks Act (1973), it is illegal to dive the site of the La Girona without a license from the Department for Culture, Media, and Sport (London).
XI. HMS Drake, SS Loughgarry, and Devereux are scheduled monuments under the historic monuments and archaeological objects NI Order 1995. Divers removing objects from, or otherwise damaging these wrecks may be prosecuted.

6. Recreational divers intending to dive protected shipwreck sites are required to obtain the relevant licences from the competent authority.

7. Recreational divers engaging in sub aqua fishing activities are required to follow UK and EU fishing byelaws regarding take size, catch quantity, and prohibited species (salmon, sea trout and sea bass during spawning seasons).

8. Divers and snorkellers operating within the area should follow the Codes of Conduct set out within the Causeway Coast and Glens Heritage Trust and Ulster Wildlife's Rock pool, Snorkel and Shore Diving Guide- For sub aqua and shoreline. This approach is applicable for coastal areas outside of the Causeway Coast.

Strategic Guidance 5: Renewable energy.

Management measures which cover offshore renewable energy within Co. Down – Co. Louth MPAs management plan area, including within and adjacent to MPAs, are outlined below and include both statutory measures and guidance.

1. Renewable energy developments must adhere to the maritime spatial plan and should follow the conditions of the Habitats Regulations Assessments, Appropriate Assessments and Environmental Impact Assessments. These are statutory departmental requirements that must be taken into consideration when developing renewable energy projects within the Co. Down – Co. Louth MPAs management plan area.

a. Developers need to incorporate the mitigation hierarchy as part of the HRA, EIA and Appropriate Assessment, with the requirement for developments to attempt to first avoid, then mitigate, then compensate adverse effects to MPAs and designated species in adjacent areas.
b. DAERA Marine and Fisheries Division carries out licensing functions in NI territorial waters under the Marine and Coastal Access Act 2009. Proposals related to renewable energy developments may require a marine licence and developers are advised to engage with the Department at an early stage to determine what authorisations may be required.
c. Crown Estate in NI will be included within the assessments and consultation process and will provide application outputs and considerations relating to activity on the seabed and subsurface owner and leasing authority.
d. Developers must undertake all offshore renewable activities in line with the marine licence under the Foreshore Act 1933 (RoI).

2. Prior to windfarm construction, monitoring campaigns/surveys for biological baseline data must be conducted with continued monitoring of the area during and after operational activities. The duration of preconstruction surveys will depend on the natural variability of the benthic community and findings from mobile species surveys (e.g., seabirds aerial survey) (SEER, 2022).
    a. Developers are required to provide all planned mitigations measures that have been designed based on collected data to eliminate harmful impacts to benthic resources (SEER, 2022).
    b. Seabed disturbances should be monitored using high resolution acoustic surveys (multibeam/side scan sonar) to identify minor changes in depth and surface characteristics on the sea floor during operational activities (SEER, 2022).
    c. Water quality must be continually monitored during construction by use of operational sensors (SEER, 2022).
    d. For soft substrates, samples can be obtained from bottom grab samples/cores to assess benthic fauna structure (SEER, 2022).
    e. Use of video and photographic surveys to characterize the habitat and identify all organisms present. Spatial image surveys should be used to monitor changes of a larger scale, providing a holistic view of the study area (SEER, 2022).

3. Renewable energy developments should have adaptive management built into construction, operational and end-of-life stages of projects to ensure marine environmental safeguards and mitigation measures can be applied to any identified negative degradation identified through monitoring.

4. Protected features present within the management plan area should be recognised by developers, to reduce the risk of degrading or disturbances by the establishment or operation of offshore renewables.
    a. Operators should be aware of all MPAs, the MPA network and the connectivity between MPAs when carrying out benthic dredging and where practicable should limit the impact to designated features.

5. All major planning and scoping exercises for offshore renewable development projects within the management plan area should include an engagement process from MarPAMM regional stakeholders and local communities before further progression.

6. Offshore renewable energy developments should be aware of existing activities and not obstruct their future capabilities.

7. MPAs and areas adjacent to protected features should include buffer zones to offshore renewable developments to protect and enhance ecologically sensitive areas.

8. Operators laying submarine cables within MPAs during renewable energy developments should avoid laying cables in areas containing designated benthic features.

9. Operators carrying out repairs and maintenance of submarine cables should carry out operations in a manner that results in minimal disturbance to benthic species e.g., horse mussel (*M. modiolus).*

10. Development of offshore renewables and the laying of submarine cables should be avoided in areas which hold significant cultural, historic, or archaeological importance.

11. It is recommended that projects should follow the guidelines laid out within the JNAPC Code of Practice for Seabed Development when developing fixed renewable installations and when laying submarine cables.

12. In the RoI, renewable energy developments that require the laying of submarine cables should have the relevant Dumping at Sea Permits (DHLGH).

Strategic Guidance 6: Marine infrastructure, ports, and harbours.

Management measures which cover marine infrastructure, ports, and harbours management within the Co. Down – Co. Louth MPAs management plan area, including that within or adjacent to MPAs are outlined below and include both statutory measures and guidance.

1. Developments within ports and harbours in the management plan area should be done under appropriate legislative guidelines, with preapproved planning permission and an obtained marine construction licence from the competent authorities (DEARA, 2017e).

    a. DAERA are the marine licensing authority in NI. DAFM is responsible for marine infrastructure licencing in RoI.

2. A Port Waste Management Plan (PWMP) should be in place to ensure all waste generated by shipping vessels and other cargo operations is responsibly managed and disposed of.

    a. Ports and harbours are obliged to provide waste reception facilities and to ensure a preapproved waste management plan is in place for any shipping operations taking place within the port/harbour (DAERA, 2017e).
    b. This plan should incorporate all processes required by the relevant legislations, with focused intentions to mitigate damages to environmental habitats/features (DAERA 2017e). This plan should include details of:
        1. Waste type
        2. Quantities
        3. Storage facilities
        4. Waste treatments required (if any)
        5. Charging systems
        6. Waste disposal details.
    c. All shipping operations must obtain approval from the designated port/harbour 24 hours prior to operations commencement.
    d. All ship-generated waste must be delivered to a pre-designated waste reception facility and pay a mandatory charge for the service (DAERA, 2017e).
    e. All persons operating within harbours/ports/waste management facilities should be familiar with the Marine Guidance Notices (MGNs), Merchant Shipping Notices and Marine Information Notices published by the Maritime and Coastguard Agency (DAERA, 2017e).
    f. Harbour authorities along the management plan area should conduct daily patrols to retrieve floating waste/debris/marine litter generated from land and marine based activities or storms.
    g. Spreading awareness through citizen science gatherings, school talks and education will encourage the public to change their behaviour with regards to the disposal of personal litter when in a marine environment.
    h. Any ‘End-of-life’ shipping vessels must be responsively dismantled/recycled to prevent any potential contaminated material escaping and potentially harming marine and human life. The

competent authorities should continually review current energy and waste related infrastructure along the management plan area and the environmental profile of all port users (DAERA, 2017e).

3. Shipping operations, shipping traffic, recreational water sports other terrestrial and marine activities that take place along the management plan region have the potential to cause water pollution.
    a. Harbours and ports within the Co. Down – Co. Louth MPAs management plan region are obliged to have specific pre-planned contingency arrangements for potential water pollution events that may occur in the region. The MCA has published a Contingency Planning for Marine Pollution Preparedness and Response Guidelines for local ports and harbours to refer to and can be found https://www.gov.uk/government/publications/contingency-planning-for-marine-pollution-preparedness-and-response-guidelines-for-ports.
    b. In the RoI, protection against dredging activities will fall under several international policies including the Sea Pollution (Amendment) Act, 1999, Dumping at Sea Act, 1996, and the Sea Pollution Act, 2006 (Gov.ie, 2019).

4. All fast-moving vessel operators within the management plan area must adhere to any designated speed limits within shipping lanes to mitigate the risk of reckless disturbances, injury, or mortality of marine wildlife, particularly larger marine mammals such as grey seals and cetaceans.

5. A wildlife licence must be obtained from the relevant authorities intending to partake in marine activities that are prohibited under conservation legislations with the management plan area.

6. Acoustic monitoring should be conducted within the Co. Down – Co. Louth MPAs management plan area to enhance marine management by monitoring directly the acoustic presence of a target species, and indirectly the acoustic environment individuals are exposed to.
    i. This should be undertaken through Passive Acoustic Monitoring (PAM), which can collect information on the wider soundscape, including noise emitting anthropogenic activities. As benthic feeders, seals are repeatedly exposed to underwater noise pollution.

Strategic Guidance 7: Climate change, coastal processes, and shoreline change.

Management measures which cover climatic, and shoreline change within the Co. Down – Co. Louth management plan area, including that within the MPA or adjacent, are outlined below and include both statutory measures and guidance.

To increase resilience along the management plan area's coastal habitats restoration of features should be encouraged by local landowners, local authorities, and competent regional authorities to help reduce the impacts of increased storm, flooding, and erosion events.

1. The above approach should focus on the use of green infrastructure over grey infrastructure which can help to dissipate the direct energy and impacts associated with storms, flooding, and waves.
    a. Using green and blue infrastructure (i.e., saltmarshes to increase resilience to sea level rise will create living shorelines that can help to stabilise and protect against higher water levels).
    b. In extreme cases where the competent authority deems it appropriate, hard engineering response will be accepted as a last resort.
    c. Managed realignment should be encouraged and promoted by competent authorities.
2. Coastal landowners and responsible authorities should apply nature-based solutions as a provision for greater mechanisms to aid adaptation and mitigation.
        i. Nature based solutions provide beneficial infrastructure options as they often have a smaller carbon footprint than grey infrastructure and often sequester carbon.
        ii. Nature based solutions can be cost effective in comparison to grey infrastructure and can provide more societal and economic benefits.
    b. In areas of identified coastal risk, grey infrastructure such as sea walls, rock armour, and gabions should be discouraged with a greater focus on green infrastructure.
    c. Existing storm defence infrastructure from either governmental, private or a local authority's perspective should consider introducing nature-based solutions or soft engineering.
    d. Coastal infrastructure operators should work with competent authorities to achieve an aligned management approach.

3. All relevant coastal landowners should encourage the rehabilitation of sand dunes to restore their natural processes through grass planting, fencing and controlled grazing within the dune systems, which can help create a buffer and sustain or establish new habitats. This should help to offset coastal squeeze (loss of natural habitats or deterioration of their quality).
    a. All shoreline users should keep to designated paths provided and avoid walking directly on sand dunes as this can result in trampling of dune habitats and damages to the stability of dune systems.

b. All shoreline users, particularly those with regular access to the designated features, should take extra care in areas highly sensitive to coastal erosion such as sand dunes through awareness of local existing signage and areas off limits.

4. All maritime users should report any/all sightings and occurrences of non-indigenous species to the competent authorities.

5. Marine users can learn about non-indigenous species and the reporting procedures with the relevant departments using the island of Ireland Interactive Story Map and Citizen Science.
    a. In NI the Centre for Environmental Data and Recording (CEDaR) records all data reported for both native and non-native species.
    b. In the RoI, the National Biodiversity Register (NBR) records all data reported for both native and non-native species and can be found at https://biodiversityireland.ie/.

4. Competent authorities must identify low-lying coastal areas along the management plan area that are particularly vulnerable to coastal flooding due to rising sea levels and establish mitigation measures to reduce the risks of flooding. In NI, this is the responsibility of the Department for Infrastructure (DFI) and in the RoI this is the responsibility of the Office of Public Works (OPW).

   a**.** The competent authorities should promote the restoration and establishment of coastal saltmarshes in areas identified as being vulnerable to rising sea levels.
    i. This should involve engagements with local landowners and communities to raise awareness through identification procedures and be developed in conjunction with both regional and local authorities.

   b**.** Saltmarsh habitats have the effect of binding and raising sediments, reducing the risk of coastal flooding due to rising sea levels.

   c**.** Competent authorities should identify areas at risk for breeding or overwintering birds within and adjacent to MPAs and install mitigation measures to reduce declines: examples include the installation of artificial floating islands.

5. Conservation methods of seabirds should be adapted to focus on the current climate related threats that seabird colonies within the management plan area face (Johnston *et al.,* 2021).

6. The competent authorities should review current conservation methods and adjust to tackle the climate related influences on particular prey species that are most susceptible to extreme weather events and other climate change related impacts (Johnston *et al.,* 2021).

7. Suggest that conservation management switch focus to the conservation of prey fish stocks of and the protection of internationally important seabird colonies from storm events (Johnston *et al.,* 2021).

8. Future proofing of all marine craft should look towards a reduction of diesel, petrol and LPG operations and transition to low carbon emission technologies to achieve net zero carbon target for 2050.

Blue Carbon habitats.

1. The competent authorities should conserve and establish new areas of Blue Carbon habitats within the management plan area, as supported by The Green Growth Strategy for NI 2022 and the EU Adaptation Strategy 2021 for the RoI.
    a. Competent authorities should ensure that there is no net loss of existing Blue Carbon habitats and ensure where possible a net gain of Blue Carbon habitats is achieved.
    b. Enhancing Blue Carbon habitats can be promoted through partnership and effective co-ordination across governmental departments with inter-departmental arrangements set out to help develop and maintain Green Growth strategies as appropriate.
        i. Blue Carbon enhancement should take reference of the blue Carbon Action Plan and MPA Strategy review work that is currently being undertaken by DAERA and key stakeholders. This is following a co-design process with focus group workshops planned and a consultation due in 2023.
    c. The competent authorities should ensure that stakeholder engagement is sought out and maintained throughout the process of maintaining, restoring, and establishing Blue Carbon habitats.
    d. To support further development and implementation of adaption strategies and plans at all levels of governance, the competent authorities should promote local ownership and the use of nature-based solutions.

2. It is an offence to damage, remove or destroy areas of Atlantic saltmarsh meadows, Maërl, or eel grass (*Zostera marina*) beds intentionally or through negligence under the EU Habitats Directive.
    a. The use of off-road vehicles, agricultural equipment, quadbikes, or other powered vehicles should be prohibited in areas in which Atlantic saltmarsh meadows and eel grass (*Z. marina)* beds are growing.
    b. Marine users participating in recreational activities such as dog walking, bird watching, trekking, or engagement in citizen science should avoid trampling areas of Atlantic saltmarsh meadows and eel grass (*Z. marina*) beds, keeping to existing footpaths where they are present.

3. The competent authorities should devise and deploy an effective means of removing invasive cord grass (*Spartina anglica)* from areas of Blue Carbon habitats, whilst conserving areas of native habitats.
    a. The use of herbicide spraying methods to remove invasive cord grass (*S. anglica)* should be carefully considered due to the potential adverse impacts on indigenous plant species, as well as the potential impacts on water and sediment stability.

4. The competent authorities should examine and characterise current and future threats to existing and potential Blue Carbon habitat areas due to climate change and human activities.

5. Competent authorities should examine partnerships with academic institutes and eNGOs to identify areas suitable for Blue Carbon habitat restoration across the Co. Down – Co. Louth MPAs management plan region.
    a. A current example of this type of partnership is through the Ulster Wildlife, the National Oceanography Centre, and the University of Hull to identify areas suitable for blue carbon habitat restoration using predictive habitat modelling methodologies.

6. Further research and monitoring of coastal areas along the northern coast of Ireland should be undertaken regularly to identify undesignated potential Blue Carbon habitats, with the aim of proposing new Blue Carbon habitats and ecosystems so that they may receive the appropriate level of protection.

7. The competent authorities should provide recommendations on and how Blue Carbon may be included in NI's and Ireland's national response to climate change and the associated climate, nature, biodiversity, and spatial planning policy frameworks.

Strategic Guidance 8: Research and education.

Management measures which cover research and education management within the Co. Down – Co. Louth MPAs management plan area are outlined below and include both statutory measures and guidance.

1. Strict guidelines and practices developed by the Joint Nature Conservation Committee (JNCC) UK for survey work seek to ensure that any impact on features is minimised to the lowest possible levels and that the conservation objectives can be achieved.

2. Marine research activities surveys are generally performed by trained, qualified staff using non-invasive techniques (where possible) such as acoustic and video methodologies.

3. In NI, DAERA and the Crown Estate must be notified before any activities within MPAs take place and will require the provision of detailed methodologies for all Marine research to assess if any impacts to the SPAs, SACs and MCZs features are likely to occur.
    a. The Marine Licensing (Exempted Activities) (Amendment) Order (Northern Ireland) 2022 Article 17 Scientific instruments etc.

4. In the RoI conducting marine scientific research within SPAs and SACs is subject to permit from the National Parks and Wildlife Service (NPWS).

5. In the RoI, researchers conducting surveys on vessels should follow the code of practice for undertaking marine scientific research by the Marine Institute within MPAs.
    a. For research in SACs researchers must apply for consent to the DHLGH NPWS through the Conduct Marine Scientific Research at Irish Coral Reef Special Conservation Areas.

6. The Marine Monitoring Handbook addresses the principles behind, and the procedures for, monitoring the habitats and species within marine SACs in UK waters to assess their condition.
    a. Researchers should use the Handbook as a toolkit to assist those with responsibility for monitoring to select and use appropriate methods.

7. Within the UK and Ireland, a series of Recommended Operating Guidelines were produced by the MESH and MESH Atlantic projects to standardise the use of survey equipment (including the use and ground-truthing of acoustic techniques and remote sensing imagery) for users to obtain the best quality data for habitat mapping. Researchers should use these guidelines. For mapping intertidal, shallow subtidal and deep subtidal habitats by remote and on-site surveys.

Strategic Guidance 9: Ballast water and accidental offshore discharges.

Management measures which cover ballast water and accidental discharges within the management plan, are outlined below and include both statutory measures and guidance.

1. All vessels must comply with the Ballast Water Management convention by the IMO:
    a. All vessels to exchange ballast water at sea away from coastal areas; and
    b. All vessels should specify the maximum amount of viable organisms allowed to be discharged, including identified specified indicator microbes harmful to human health.

c. Vessel operators should be aware of certain circumstances where this convention does not apply:
    i. If a vessel is on a voyage between specified locations,
    ii. If all ballast operations are being conducted within the same location,
    iii. If the vessel remains in the same jurisdiction and is not a new vessel or unfit for retrofitting, and
    iv. If a vessel is operating within a defined area.
    v. For more information please visit: https://www.gov.uk/guidance/control-and-management-of-ballast-water#:~:text=Exemptions%20to%20the,Guidelines%20(Guideline%20G7).

2. Before being put to sea all new vessels must demonstrate compliance of a Water Management Plan and associated systems.
3. All vessels new and existing should follow the statutory requirements within the international Ballast Water Management certificate, for survey and outputs of the water management system.
4. Vessel operators should endeavour to develop strategies that demonstrate incident preparedness for accidental collisions with other vessels, submerged rocks, wrecks, accidental beaching or stranding that may result in the accidental discharges of pollutants.
5. Vessel operators should be aware of all MPAs, the MPA network and the connectivity between MPAs when carrying out benthic dredging and where practicable should limit the impact to designated features.

Strategic Guidance 10: Land-Use sediment run-off.

Management measures which cover land-use sediment runoff within the Co. Down – Co. Louth MPAs management plan area are outlined below and include both statutory measures and guidance.

1. In NI, operators should adhere to the Water (Northern Ireland) Order 1999 which provides the basis for the disposal of wastewater, effluent or industrial discharges.

2. In the RoI, operators should use the National Wastewater Sludge Management Plan (NWSMP) which sets out how waste is managed in a sustainable way.

3. Operators should be conscious of the production and disposal of waste during their activities, particularly with respect to wastewater which can contain suspended sediments.
    a. Directly dumping wastewater into the Co. Down – Co. Louth region or adjoining bodies of water should be avoided, even if consent has been given to do so.

4. Coastal developments involving construction operations should take measures to reduce excess runoff of sediments into marine areas by designating areas for temporary surface water drainage measures such as settlement ponds.
    a. Silty wastewater should be treated before being discharged to remove the majority of suspended solids within the wastewater.
    b. It is advised that site operators follow the guidelines laid out within the UK's Control of Water Pollution from Construction Sites - Guidance for consultants and contractors C532.
5. Participants of agricultural practices near coastal areas should be aware of the potential risk of agricultural run-off to marine areas and seek advice to achieve Good Farming Practice regarding the environment from the relevant department in NI and RoI.
    a. Agricultural practitioners are required to receive consent from DAERA through the Groundwater Regulations (Northern Ireland) 1998 before disposal of any effluent produced from agricultural operations.
    b. Agricultural practitioners in the RoI should follow the official outputs of the River Basin Management Plans as laid out by the Water Frameworks Directive.
6. Any accidental discharge from operations that have the potential to increase the rate of sediment flow into the marine environment or adjoining waterways should be reported to DAERA and DAFM and/or NI Water and Irish Water.
    a. Causing an incident of accidental discharge or failing to report such an incident may result in a criminal prosecution.
    b. New applications for sewage or dredge disposal will be subject to the marine licensing and Water Order discharge consent processes.
    c. Any changes to the current discharge sites will be managed by Northern Ireland Water (NIW) in consultation with the statutory department.

Strategic Guidance 11: Wild seaweed foraging and cultivation (farming).

Wild harvesting.

As an extension of the public right to fish in and gather items from the sea, members of the public can take fresh seaweed which is floating in the sea. Floating seaweed on the foreshore (occurring either as fresh vegetation or drift) can be harvested as part of this public right when the tide is in. However, seaweed remaining as fresh vegetation or drift when the tide is out cannot be taken, unless some other legal basis for taking seaweed is permitted.

Seaweed harvesting is not currently regulated through a specific licensing or permit system. However, it is controlled by the following legislation in terms of its impact on nature:

a. The Environment (NI) Order 2002,
b. The Conservation (Natural Habitats etc) Regulations (NI) 1995 (commonly referred to as the Habitats Regulations); and
c. The Wildlife (NI) Order 1985.

Seaweed harvesting guidance was created by the Environmental Heritage Service in 2007 (Now DAERA Marine and Fisheries Division). The management measures are currently undergoing a review and are to be published in March 2023.

Management measures which cover seaweed foraging and cultivation within the Co. Down – Co. Louth MPAs management plan area are outlined below and include both statutory measures and guidance.

1. In NI, DAERA Marine and Fisheries Division and local council must be consulted before harvesting seaweed and landowner permission must be sought.

2. Harvest seaweed only by hand, mechanical methods should not be used.

3. Do not use vehicles on the foreshore.

4. Avoid disturbing wildlife such as seabirds and seals by keeping an appropriate distance away.

5. Avoid or minimise trampling on non-target organisms and avoid taking ‘bycatch’ such as stalked jellyfish and brittle stars.

6. Collect less than one third of an individual plant to allow for regrowth.

7. Cut fronds (leaves) well above the point of growth (e.g., the meristem for kelps) and always leave the holdfast attached.

8. Harvest sparsely, taking only a small percentage of standing stock.

9. Rotate harvesting areas to allow ample time for recovery. Harvested areas should be left for up to several years, depending on the species, before harvesting again.

10. Harvest seaweeds during the active growth season to allow for quicker recovery.

11. Harvest seaweeds after reproduction has occurred if possible and ensure a substantial proportion of mature plants remain.

12. Take extra care when harvesting invasive non-native seaweeds (INNS) to ensure that seaweeds or spores are not transferred to other areas.

Cultivation/Farming.

Any deposits or construction to facilitate seaweed cultivation is authorised through the marine licensing process by DAERA under the Marine and Coastal Access Act 2009. Extensive commercial harvesting of seaweed would require permission from the relevant departments in both NI and RoI to ensure a full assessment of impacts can be undertaken.

The information presented on seaweed cultivation/farming has been created using best practice guide from Natural England (Wilding *et al*., 2021).Best practice recommendation for kelps is to collect fertile material from only a restricted number of wild plants (i.e., 10 - 30 individuals), which can be bio-banked and used to initiate gametophyte cultures.

   a. Collections should be carried out in accordance with the Crown Estate harvesting licence and operational marine licence.
   b. Environmental Impact Assessments are required in most nascent industries to minimise ecological damage and ensure long-term sustainability and a Habitat Regulations Assessment will be required where seaweed farms are sited near MPAs.
   c. Reproductive material should be sought from sites relatively near to the aquaculture site.

2. Following best practice guidelines for hatchery processes, which include use of sterile air and seawater, UV filtration systems, and germanium dioxide to remove diatom contamination can minimise the change of spread through seedling production.
   a. Recommendations for best practice are difficult to develop as there is limited knowledge about seaweed diseases in the UK (Campbell *et al*., 2019).
3. Biosecurity planning (and cleaning processes) need to be put in place to prevent movement on non-native species.

4. Seaweed cultivation should be sited away from sources of pollution, including areas of wastewater outflow.

5. Management to limit the INNS should consider biosecurity measures that reduce the movement of fouled objects, including services vessels.

a. Following recommendations to ‘check, clean and dry’ surfaces would also be beneficial to growers where these reduce colonisation and associated losses of seaweed biomass and reduce operational costs resulting from biofouling.
b. Siting and management may reduce impacts from INNS by considering levels of exposure and water movement, water temperature, cultivation period, timing of harvest, and through the choice of infrastructure materials, which all influence biofouling rates.
c. Where species tolerances allow, farming at more exposed locations may limit biofouling.

6. Regular maintenance of all cultivation infrastructure is advised to prevent losses into the marine environment, with mandatory reporting of material losses.

7. Applications for new seaweed farms should incorporate risk planning to examine the possible impacts from catastrophic loss of infrastructure due to storm events, impacts on hydrodynamics, and the carrying capacity of the site in terms of cultivation density.

8. Developers should seek engagement with the local community where the activity is taking place (social license).

Strategic Guidance 12: Military and defence.

Management measures which cover military and defence within the Co. Down – Co. Louth MPAs management plan area are outlined below.

1. The UK MoD Sustainable Development and Environmental Manual (JSP 418) set out their commitments to avoiding environmental damage.

2. The MoD will operate in MPAs following the requirements of the Environmental Protection Guidelines (Maritime) Version 2.1. which outline the details of activities which are prohibited in MPAs and certain designated features (i.e., sandbanks under 20 m), as well as outlining accepted activities and control measures to mitigate degradation of designated features.

3. The Ballykinler Ranges Co. Down NI 1940 (to be reviewed) sets out a military exclusion zone within the marine areas of Dundrum Bay during live firing activities. The exclusion zone is active when displays of signals are hoisted on the perimeter of the ranges. All intrusion on the land, foreshore or sea during this period is prohibited.
    a. The presence of **Red flags and/or Red lights** within the Ballykinler firing range prohibits access to the danger area. The authorities can expect that you will not linger in the area, and they operate on the ‘Clear Range’ principle.

b. At times when the red lights are on and red flags are raised, there is live firing across this area with the risk of serious injury or death.

4. Under the EU's Maritime Strategy, the RoI as a member state provides protection from exploitation of the maritime resource including the destruction of marine habitats through the DoD.

5. In the RoI the Naval Service provides a unique sea-going capability for National maritime defence, and the Air Corps provides an effective maritime surveillance capacity.

6. The White Paper on Defence (2000) recognises that Naval Service vessels carry with them unique characteristics as an expression of state sovereignty and political will at sea and in furthering policy objectives in the maritime domain.

7. The Naval Service and the Air Corps provide a range of services to assist the Scottish Fisheries Protection Agency in securing an efficient and effective enforcement of fisheries protection legislation and these services are covered under an SLA. Naval Service and Air Corps personnel are empowered by statute as Sea Fishery Protection Officers to carry out inspections at sea and to enforce fisheries legislation and regulation.

5. Monitoring of plan effectiveness.

Monitoring, evaluation, and research are fundamental to the success of MPA Management plans. The Co. Down – Co. Louth MPAs management plan needs to demonstrate to regulatory authorities, marine activity users, and local communities that management policies are making a difference to the integrity of the conservation objectives.

Continual learning from management experience will help to improve the overall integrity of the management plan. Adaptive management and regular monitoring of the plan can contribute to evaluating how effective the management approaches have been. This monitoring should focus on outputs that can be measured, using the modelling and data outputs from the MarPAMM project alongside assessing the status and condition of key species and habitats in the MPAs within the Co. Down – Co. Lough region. To balance the need for management plan evaluation and management stability, the regulatory authority should also look annually at key performances of the plan and undertake a detailed plan review every 6 years to provide a detailed update and any amendments to the strategic guidance given in the plan.

The 6 year plan review aligns with the reporting obligations attached within the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 in NI and Article 12 and 17 reporting obligations within the Birds Directive and Habitats Directive for RoI. The monitoring approach and the five-year plan review will also align with the Common Standards Monitoring approach of feature condition assessment within protected areas (Figure 13). This will help with biodiversity indicators, international obligations and assessing progress on feature sustainability from local to international scales.

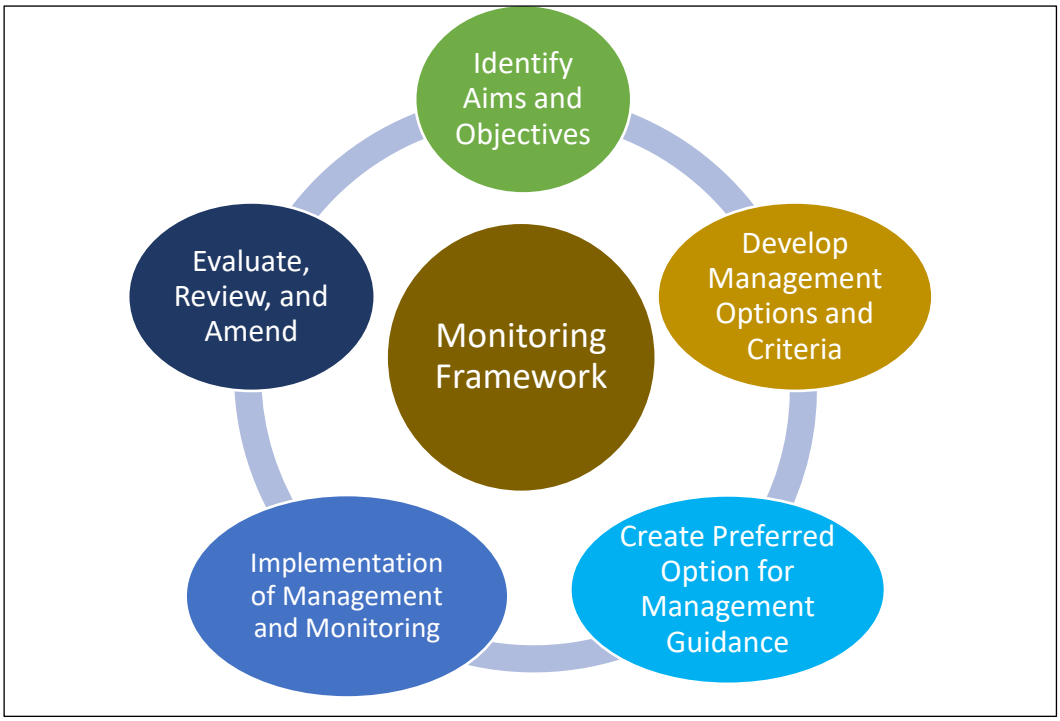

Figure 13. Management monitoring framework (AFBI, 2022).

Strategic Guidance 1: Commercial fisheries.

1. DAERA Marine and Fisheries Division (NI) and DAFM (RoI) will monitor the impact and application for mitigation of bycatch, such as modifying fishing gear to reduce the accidental catching of non-target species.
    a. This should include extensive monitoring of current impacts and recordings of bycatch on stocks, seabirds, and marine mammals within the management plan area.
    b. AFBI and the Marine Institute will undertake observer trips throughout the year on commercial fishery vessels, which encompasses MPAs to examine target species and by-catch implications. These trips would cover the island of Ireland and not just within the management plan area.
    c. The AFBI and Marine Institute observer programme will also alert if non-native species appear in catches.
2. Genetic v-notch monitoring should be undertaken every 2 years to monitor the healthy status of crustacean stocks.
    a) This should include a process to authorise/reject lobster samples sent to Queens University for study. This will help to establish how larvae retention is working within the management plan area.
3. DAERA Marine and Fisheries Division (NI) and DAFM (RoI) will monitor the scale of biosecurity measures within MPAs.

4. DAERA Marine and Fisheries Division and DAFM will examine the impacts of activities that affect benthic environments and develop records of present condition and subsequent variation in the condition of the feature(s) of interest.
5. DAERA Marine and Fisheries Division and DAFM will review and examine the impact of actions associated with this guidance. This should align with climate sectoral plans for commercial fishing and fisheries management plans.

Strategic Guidance 2: Aquaculture.

1. AFBI and the Marine Institute will continue existing monitoring and evaluation procedures examining potential impacts from aquaculture activities within the management plan area.
2. DAERA Marine and Fisheries Division in NI and the Aquaculture and Foreshores Management Division of DAFM in the RoI will continue to monitor the condition of designated features and seabed to assess the impact of aquaculture processes.
3. DAERA Marine and Fisheries Division in NI and the Aquaculture and Foreshores Management Division of DAFM in the RoI will monitor the scale of biosecurity measures concerning the extent of disease, non-native species establishments, and native species absence within MPAs that have active aquaculture licences.
4. DAERA Marine and Fisheries Division in NI and the Aquaculture and Foreshores Management Division of DAFM in the RoI will establish monitoring for unlicensed aquaculture activities. Both authorities should examine governance /jurisdictional ambiguity and responsibilities for enforcement.
5. DAERA Marine and Fisheries Division and DAFM will construct an assessment document to review and examine the impact of measures associated with this guidance.
6. All aspects of this guidance will be re-examined as part of the 6 year plan review.

Strategic Guidance 3: Benthic Dredging and Disposal.

1. The competent authorities (DAERA, DFI (NI), DAFM, DHLGH (RoI)) will monitor the acquisition of permit requirements for all shipping vessels conducting dredging activities in benthic and coastal areas of the management plan area.

2. The competent authorities (DAERA (NI), DECC and DHLGH (RoI)) will monitor the condition of habitats near and adjacent to dredging sites during and after dredging operations.
3. The competent authorities (DAERA (NI), DHLGH and Local authorities) will ensure there is an appropriate waste management plan in place to facilitate the safe and responsible removal of potentially contaminated materials.
4. The competent authorities (DAERA (NI), DECC and DHLGH (RoI)) will monitor and assess the impact of redeposited dredged sediment deposits and test for any chemical pollutants within the material to mitigate risks of contamination to the surrounding environment.
5. All aspects of this guidance will be re-examined as part of the five-year plan review.

Strategic Guidance 4: Recreation and Tourism.

Shoreline based recreation monitoring.

1. MPA Managers will monitor and assess the levels of recreational activities taking place within the Co. Down – Co. Louth MPAs management plan area to enable the evaluation of user interaction impacts on features.
2. Competent authorities will monitor recreational shipping vessel's adherence to assigned speed limit.
3. Local Authorities and/or NGOs with remits for shoreline/beach/pathways should monitor the impacts from visitors in terms of disturbance, litter, camping and anti-social behaviour.
    a. Monitoring should assess the impacts from applications of codes of conduct including 'Enjoy and Protect' and 'Leave No Trace'.
4. The component authorities should monitor the impact of recreational interactions with the conservation objectives of protected features.
5. The competent authorities should develop an assessment document to examine the impact of actions associated with this guidance.
6. All aspects of this guidance will be re-examined as part of the 6 year plan review.

Surface based recreation monitoring.

1. The competent authority will monitor the condition of designated features and benthic seabed to assess the impact of surface based recreational activities and their impact on processes.
2. The competent authority will monitor biosecurity measures and the extent of disease, non-native species spread, and native species absence within MPAs.

3. Local authorities with DAERA or DHLGH will monitor the impact of recreational commercial watercraft sight sighting tours and self-owned recreational jet-skis and fast watercraft.
    a. Monitoring should assess the impacts from applications of codes of conduct including 'The Wise Scheme'.
4. The competent authority will construct an assessment document to review and examine the impact of actions associated with this guidance.
5. All aspects of this guidance will be re-examined as part of the 6 year plan review.

Sub-Aqua recreation monitoring.

1. DAERA Marine and Fisheries Division and AFBI (NI), DAFM and Marine Institute (RoI) will monitor the condition of wrecks, features and seabed to assess the impact of sub-aqua activities and their impact on processes.
2. DAERA Marine and Fisheries Division and DHLGH will construct an assessment document to review and examine the impact of measures associated with this guidance.
3. All aspects of this guidance will be re-examined as part of the 6 year plan review.

Strategic Guidance 5: Renewable energy.

1. Any renewable energy production activity within and adjacent to MPAs needs to be monitored by the competent authorities to assess the impact of activities on designated features from both the perspective of a short and long-term time period. Currently most renewable energy projects offshore are not old enough to be considered for long-term monitoring.
2. DAERA and AFBI (NI), and DHLGH and the Marine Institute (RoI), will monitor all renewable energy development operations and ensure the pre-examinations of local biodiversity for baseline data are carried out prior to the commencement of construction.
3. DAERA and DAFM will ensure minimal impact to marine and benthic species during the laying of submarine cables within the management plan area and throughout operations. They will examine any potential impacts these activities have on benthic environments and marine mammal species.
4. All competent authorities will ensure that procedures and protocols set out within the JNAPC Code of Practice for Seabed Development are followed by developers during the construction of any necessary renewable energy production structures i.e., offshore wind turbine foundations.
5. DAERA and DHLGH will ensure the necessary licences are acquired by developers for waste disposal including Dumping at Sea Permits (DHLGH).

6. DAERA and DHLGH will construct an assessment document to review and examine the impact of the guidance action set out in this guidance document.
7. All aspects of this guidance will be re-examined as part of the 6 year plan review.

Strategic Guidance 6: Offshore oil and natural gas exploration.

1. The competent authorities will monitor the impact of offshore oil and gas developments within MPAs.
    a. In NI, the Department of Energy and Climate change in London (DECCL) are the responsible authority and in the RoI, the Department of the Environment, Climate and Communications (DECC) is the responsible authority for monitoring natural gas exploration.
2. The competent authorities will monitor how offshore oil and gas developments affect designated species behaviours and distributions within MPAs.
3. The competent authorities will construct an assessment document to review and examine the impact of actions associated with this guidance.
4. All aspects of this guidance will be re-examined as part of the five-year plan review.

Strategic Guidance 7: Marine infrastructure, ports and harbours.

1. The competent authorities will monitor the condition of features to assess the impact of marine infrastructure developments within MPAs.
2. The competent authorities will monitor how marine infrastructure operations effect designated species behaviours and distributions within MPAs.
3. The competent authorities will monitor the impact of shoreline and beach profile changes as well as erosion rates.
4. The competent authorities for flood prevention measures will monitor the impact of this approach from the perspective of pluvial, fluvial, and coastal flooding.
5. The competent authority will monitor shipping and cargo vessel's adherence to assigned speed limit of the lough.
6. The competent authorities should monitor larger commercial vessels for adherence to speed limits set within inland loughs, estuaries and MPAs.
7. The competent authorities will construct an assessment document to review and examine the impact of actions associated with this guidance.
8. All aspects of this guidance will be re-examined as part of the 6 year plan review.

Strategic Guidance 8: Climate change, coastal processes, and shoreline change.

1. The competent authorities will monitor the condition of designated features to assess the impact of climate change and their impact on processes.
2. The competent authority (DAERA, DFI, DHLGH, and local authorities) should monitor the condition of future shorelines within the dynamics of change and the impacts on features.
3. DAERA Marine and Fisheries Division and the National Parks and Wildlife Service will monitor the scale of biosecurity measures and the extent of disease, non-native spread, and native species absence within MPAs.
4. The competent authority will construct an assessment document to review and examine the impact of actions associated with this guidance.
5. All aspects of this guidance will be re-examined as part of the 6 year plan review.

Due to the impact of climate change on the marine environment and the natural processes that occur within the marine environment, there is no designated feature, MPA or adjoining area within the management plan area that will not be affected by climate change. This extends to all MarPAMM regions around the island of Ireland, Argyll, and Outer Hebrides. As such, the actions and measures listed in this strategic guidance can be applied and amended to suit all MarPAMM Regions.

Blue Carbon habitats.

1. Competent authorities will monitor the scale of biosecurity measures and the extent of disease, non-native species spread, and native species absence within designated Blue Carbon Habitats.
2. DAERA should work with eNGOs including Ulster Wildlife Trust in monitoring Blue Carbon initiatives with relation to managing successful interventions.
3. DAERA Marine and Fisheries in NI and the National Parks and Wildlife Service in the RoI will construct an assessment document to review and examine the impact of actions associated with this guidance.
    1. Reporting on Blue Carbon habitats should align with reporting within the Blue Carbon Action Plan for NI.
4. All aspects of this guidance will be re-examined as part of the 6 year plan review.

Strategic Guidance 9: Research and education.

1. Competent authorities will monitor the scale of biosecurity measures within MPAs.
2. Competent authorities will examine the impact and recordings of bycatch on stocks, seabirds, and marine mammals.
3. Competent authorities will examine the impacts of activities that affect benthic environments and develop records of present condition and subsequent variation of condition in the feature of interest.
4. Competent authorities should develop an assessment document to review the impact of actions associated with this guidance.
5. All aspects of this guidance will be re-examined as part of the 6 year plan review.

Strategic Guidance 10: Ballast water and accidental offshore discharges.

1. DAERA Marine and Fisheries Division and DECC Environmental Protection Unit competent authorities will continue to monitor ballast water discharges.
2. The competent authorities will monitor incidents of permitted and accidental discharges into or adjacent to MPAs and assess the impact of designated features.
3. The competent authorities will construct an assessment document to review and examine the impact of actions associated with this guidance.
4. All aspects of this guidance will be re-examined as part of the 6 year plan review.

Strategic Guidance 11: Land-use sediment run-off.

1. The competent authorities will continue monitor discharges of effluent.
2. The competent authorities will monitor incidents of permitted and accidental discharges into or adjacent to MPAs and assess the impact of designated features.
3. The competent authorities will construct an assessment document to review and examine the impact of actions associated with this guidance.
4. All aspects of this guidance will be re-examined as part of the 6 year plan review.

Strategic Guidance 12: Wild seaweed foraging and cultivation (farming).

1. The competent authorities will monitor the condition and interactions to assess the impact of how seaweed cultivation/farming interact with the surrounding environment.

   a. It is necessary to fill the knowledge gaps which currently impede development and licensing consent.

2. The competent authorities need to consider how to monitor the cumulative effects of multiple farms within a set location, as one small farm is unlikely to result in nutrient depletion but several neighbouring farms in a defined area may have a detectable local impact.
3. The competent authorities will monitor the scale of biosecurity measures and the extent of disease, non-native species spread, and native species absence within MPAs that are within aquaculture licences.
4. The competent authorities will construct an assessment document to review and examine the impact of management associated with this guidance.
5. All aspects of this guidance will be re-examined as part of the 6 year plan review.

The non-statutory policies within this Management Plan will need to be assessed for management effectiveness through a formal engagement process in the future that can examine policy outcomes and help stakeholders understand the rationale of management approaches applied. The monitoring policies created for each of the thirteen Strategic Guidance areas need to feed into wider regional monitoring for the marine environment in NI and RoI. This will provide a way to show accountability for this Management Plan. The monitoring reviews could aid the completion of OSPAR Score Cards for as a straight-forward self-assessment tool used by MPA managers to monitor management effectiveness (OSPAR, 2007).

An OSPAR Score Card could act as a tool to enable rapid assessment of MPAs across the inshore region of NI and the MarPAMM areas of Co. Donegal and Co. Louth in the RoI. This self-assessment review could use the monitoring outputs of the Co. Down – Co. Louth management plan policies to aid those in departmental MPAs teams to assess and report on biological and environmental information on the status of species and habitats within MPAs (OSPAR, 2007).

The policies outlined in this management plan have monitoring measures associated with each of them by which progress towards achieving the objectives of this management guidance plan can be assessed. Initially the monitoring should focus on outputs that can be measured with reliance on key species and habitats within MPAs. This approach to monitoring is essential to distinguish the success in delivering the management actions and delivery of the plans aims and objectives. To balance the need for plan evaluation and management stability the regulatory authority will look

annually at key performance and undertake a detailed plan review every 6 years to provide a detailed update and review of the strategic guidance.

6. MarPAMM management considerations and Future work.

This management plan sets out non-statutory guidance and reaffirms existing statutory policy to help enhance and further protection for marine and coastal biodiversity for MPAs within the Co. Down – Co. Louth region. This section looks at future considerations for marine management that may arise or are important for consideration as part of the marine management strategy. By creating this management plan, future uncertainty can be mitigated/adapted by applying the plan's generated principles.

The outputs of the MarPAMM work packages from seabirds and marine mammals provide new data and evidence that can be used outside of this plan to improve and enhance integrated and universal marine management. Work carried out under MarPAMM could also identify potential knowledge gaps that could lead to new research areas or considerations that may become important for any future improvements.

Seabird Modelling work package outputs.

The seabirds work package included collection of new data on seabird abundance and distribution/movement (via at sea surveys and tracking studies), collation of existing data and knowledge, and new analysis and models. Listed below are the core components highlighting key findings and relevance to management.

The key findings from this work are:

- Better understanding of storm petrel colony sizes in NI, including the discovery of new breeding sites. As well as providing this information to inform Seabirds Count (2015-22), these counts provided updated data on sites that have not been surveyed for many years and may help provide baseline data should more regular counts be carried out in future years.
- Baseline data for kittiwake productivity including the creation of standardised plots that can be used at key sites for the species going forward to provide ongoing data on Kittiwake breeding outcomes. Given the recent declines in Kittiwakes, the fact that they have moved from Amber to Red on the Birds of Conservation Concern in Ireland 2020-26 and that Kittiwakes appear to be one of the species most susceptible to the current strain of bird flu, having a baseline for productivity as well as the ability to monitor productivity going forward is vital.
- Satellite tracking has shown important foraging areas as well as migration routes for a range of species. This work was carried out by Bird Watch Ireland

and AFBI in the MarPAMM project and included tracking work (GPS – foraging, short term and migration) on Lesser and Herring Gulls (GPS/GSM), Kittiwake (GLS & GPS), Fulmar (GLS & GPS), Manx Shearwater (GLS & GPS). This is important work in both an international and Irish context as much of the technology is relatively novel with recent developments improving longevity of tracking devices and potential to cover longer distances.

- Aerial surveys in Donegal Bay, Carlingford Lough and Belfast Lough have shown key sites for wintering bird species but also showed a worrying lack of some species. For example, despite being a qualifying species for the Donegal SPA, there was no Common Scoters (*Melanitta nigra*), detected during the 2020 winter aerial survey of the site.
- ESAS survey in Donegal Bay showed importance of the site for priority species currently in unfavourable condition which do not breed in significant numbers in the immediate area. These include the species Puffin and Manx Shearwater.
- It would be beneficial in future to build on the datasets produced by MarPAMM, SeaMonitor, and COMPASS, for example by combining oceanographic models with seabird distribution information.

Recommendations for future management.

Future surveys of sites covered during MarPAMM surveys should be conducted or regular monitoring (numbers and productivity) of key sites should be established. This is particularly relevant with the recent Avian Influenza outbreak at important seabird sites which may have large-scale impacts on populations and would allow us to understand any potential impacts. Further productivity monitoring of the Kittiwake sites should be undertaken to monitor future changes.

Further tracking of seabirds is required in this sea area; in the short-term the priorities should include recovery of

1. Already deployed tracking devices (such as GLS on Fulmar and Manx Shearwater); and
2. Deployment of remaining devices for the purpose they were intended (on the understanding that the devices/data belongs to the MarPAMM project; Covid-19 and Highly Pathogenic Avian Influenza (HPAI) have had significant impacts in all years except 2019).
3. In the longer-term, tracking should increase the range of species where possible and concentrate on those key sites where experience has been gained.

Population Viability Analysis Findings.

This report aimed to investigate population-level impacts of changes in breeding success and adult survival of seabirds. The report found that species which lay more than one egg benefited more from increases in breeding success, while species that only laid a single egg tended to benefit more from increases in adult survival. From these results the report identified potential management interventions to protect seabirds, focusing on increasing either adult survival or breeding success, depending on the life history traits of the target species. Increasing prey availability could benefit all species of seabirds, while managing invasive predators will more greatly benefit burrow nesting species.

Black Guillemot foraging ecology and diving behaviour (in relation to areas with strong tidal currents) report, NI.

The construction of tidal stream turbines may alter habitat used by inshore foraging seabirds. One such species is the benthic diving Black Guillemot (*C. grylle*), which associates with areas of strong tidal currents for foraging. Black Guillemots dive to the depths at which turbine blades operate and are therefore at potential risk of collision. The extent to which turbines will impact Black Guillemots is currently limited by gaps in our knowledge of the species' diving behaviour exhibited at foraging locations. To address these gaps, tracking of breeding adult Black Guillemots using GPS/Temperature Depth Recorder (TDR) tags was conducted to examine habitat use and dive depths around the Copeland Islands in Northern Ireland, an area associated with strong tidal currents, during the 2021 breeding season.

Birds were found to remain close inshore (<5 km) in relation to the breeding colony and used distinct and individualistic foraging areas. Through the novel combination of GPS and TDR records, maximum dive depths were observed to correspond with seafloor depth profiles, indicating benthic foraging behaviour. Birds were found to exhibit both benthic and mid-water dives in areas of high oceanic kinetic energy. Bathymetries, benthic substrate, and kinetic energy associated with foraging were often found to be individual-specific. Greatest variation in habitat selected between individuals was seen in relation to kinetic energy and substrate. Overall, birds often used areas of fast flowing currents, remaining within the shallow circalittoral (10 to 30 m) bathymetry zones, despite greater depths being available (Johnston *et al*., 2022).

Marine Mammals Modelling work package outputs.

The Co. Down – Co. Louth MPAs region is home to diverse variety of marine mammal species, from cetaceans to pinnipeds. The grey seal (*Halichoerus grypus*) is the UK and Irelands most abundant seal species. There are approximately 8000 - 10,000 grey

seals on the island of Ireland, protected under the Irish Wildlife Act 1976 (Seal Rescue Ireland, 2022), the Wildlife (Northern Ireland) Order 1985 (Wildlife Trust, 2022) and under Annex II of the EU Habitats Directive (92/43/EEC) (McLeod *et al*., 2005).

Within the management plan area there are several identified, important common seal *(P. vitulina)* haul-out sites (i.e., Strangford Lough and Dundrum Bay) due to the abundance of food sources and hidden bays along the coastal region. Unfortunately, human disturbance is a serious threat that seals face within this region. Disturbances to pupping locations may disturb mothers, leading to the potential increase in abandoned pups (Cronin *et al.,* 2014). Breeding and pupping seasons are sensitive times for seals, especially seal pups as they are highly vulnerable at this stage in their life and during this time will spend most of their time onshore (Russell *et al*., 2019).

Disturbance of common seal (*P. vitulina)* is often accidental and reported abandoned seal pups in many cases can be rescued, treated in rehabilitation centres, and released across the UK and Ireland (Wilson *et al.,* 2021). In addition, as benthic feeders, seals are increasingly exposed to noise pollution. Other anthropogenic interference from construction or marine developments can lead to noise pollution which causes harm to seals by masking their underwater vocalisations used in colony communication and may cause temporary deafness, reducing the hearing threshold (Trigg *et al.,* 2018) which usually ranges from 3 - 16 kHz (Tougaard *et al.*, 2022). Noise pollution at this level often occurs within busy shipping channels (Chen *et al.,* 2017).

Shipping traffic within the management plan area can also be a cause of harm to many marine mammals including Harbour porpoise (*P. phocoena*). In a study reviewing the interactions and impacts between *P. phocoena* and shipping vessels within Swansea Bay and the south Gower coast in Southwest Wales by Oakley *et al.* (2017), a significant correlation was observed between the number of vessels present and the number of harbour porpoise sightings (Oakley *et al.,* 2017). Vessels ranged from large cargo ships to recreational vessels such as jet skis and stand-up paddleboards, with the most common being recreational shipping vessels. No positive reactions to vessels from *P. phocoena* was observed, with steady speed vessels accounting for 70% of all negative interactions with *P. phocoena*. 69% of behavioural reactions occurred when vessels were located approx. 200m from individuals (Oakley *et al.*, 2017). Further investigation into these reactions revealed significant reduction in foraging and feeding behaviour depending on vessel type and travelling speed. This suggests that shipping traffic does have a negative influence on the ecological behavioural patterns of *P. phocoena* (depending on the location and number of individuals within the area; Oakley et al., 2017).

Marine litter is another pollutant of ever-growing concern for marine mammal species. Incidents of larger marine mammals such as dolphins, whales, and seals ingesting plastics (Desclos *et al.,* 2022) and/or becoming entangled in negligently discarded fishing gear (Luck *et al.,* 2022) has greatly increased and is often linked to peak tourism seasons. Awareness of these situations are crucial to the successful conservation of grey seals and cetaceans.

The ability of Passive Acoustic Monitoring (PAM) to provide year-round high resolution temporal data on seal presence could be a valuable complement to existing monitoring efforts. Traditionally seal population studies have involved visual counts at haul-out sites and the use of satellite telemetry. Both techniques provide a wealth of information on species abundance, population health and spatial distribution. The addition of non-invasive PAM to seal monitoring schemes, however, may provide the opportunity for interrogation of temporal dynamics in species presence. PAM has the potential to play a future role in monitoring seal populations in important coastal waters within the Co. Down – Co. Louth MPAs management plan area.

Benthic Habitat and Species Modelling work package outputs.

Fan mussel habitat suitability model.

The fan mussel *(Atrina fragilis)* has been listed as a priority marine feature for MPA designation in Scotland and Northern Ireland. Due to their rarity a model has been developed and used to predict the distribution of fan mussel habitat within the project area (Langton, 2022c).

The modelled output (Figure 14) is a map of predicted density of fan mussel records. Areas predicted to have an intensity of records greater than a set threshold value represented suitable habitats. The threshold was chosen to result in a sensitivity of 0.9 in the species records (Langton *et al*., 2022c). The suitable areas were assessed against the MarPAMM MPA management regions and MPAs within the regions to analyse replication and representation in the project area. As fan mussels are a benthic species, only MPAs that include at least one benthic species as a protected feature were included. The model predicts that approximately 48.56% of the total area of benthic MPAs included in the modelled area are suitable habitat for fan mussel (Langton, 2022c).

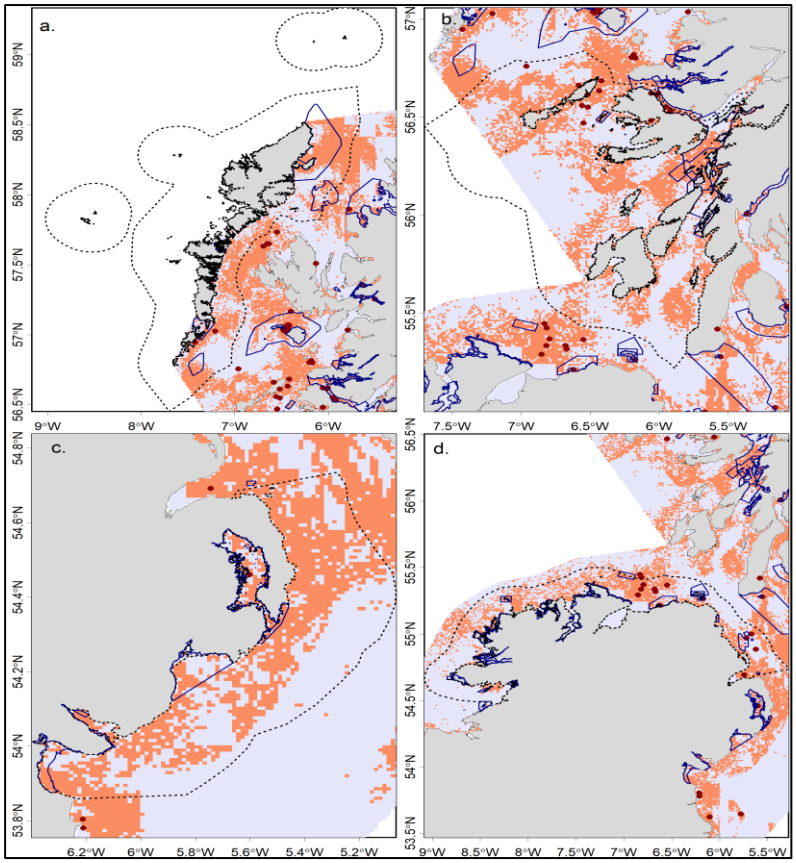

Figure 14. The MPAs containing predicted habitat suitable for fan mussel (*Atrina fragilis*) and confirmed records for each MarPAMM MPA management region; a) Outer Hebrides, b) Argyll, c) County Down - County Louth and d) North Coast to North Channel (Ireland). Pale blue area is the extent of the modelled domain (Langton *et al*., 2022c).

Sea pen habitat distribution model.

Sea pen habitats have been listed as a "*threatened and declining habitat*" under the 1992 Oslo Paris (OSPAR) Convention (Langton *et al*., 2022b). The MarPAMM region overlaps with region III Celtic Seas where this habitat is in notable decline. Sea pens are considered important indicator species with regards to negligent fishing activities within soft sediment areas and communities characterised by Sea pens are protected by MPAs in Scotland and Northern Ireland (Langton *et al.*, 2022b).

The MarPAMM Benthic habitat and species modelling work package developed a model (Figure 15) to predict the distribution of habitats of three Sea pen species within the project area. *Funiculina quadrangularis* (Western Scotland), *Pennatula phosphorea* (Western Scotland) and *Virgularia mirabilis*. The areas of suitable habitat were intersected with the MarPAMM MPA management regions and MPAs to assess replication and representation in the project area (Langton *et al.,* 2022b). As Sea pens

are benthic species, only MPAs that include at least one benthic species as a protected feature were included.

Model extent within the area was restricted by the available environmental data and therefore did not cover the full extent of the management regions. The model predicts that all 3 MarPAMM regions contain habitat that is suitable for each of the three Sea pen species (Langton *et al.*, 2022b).

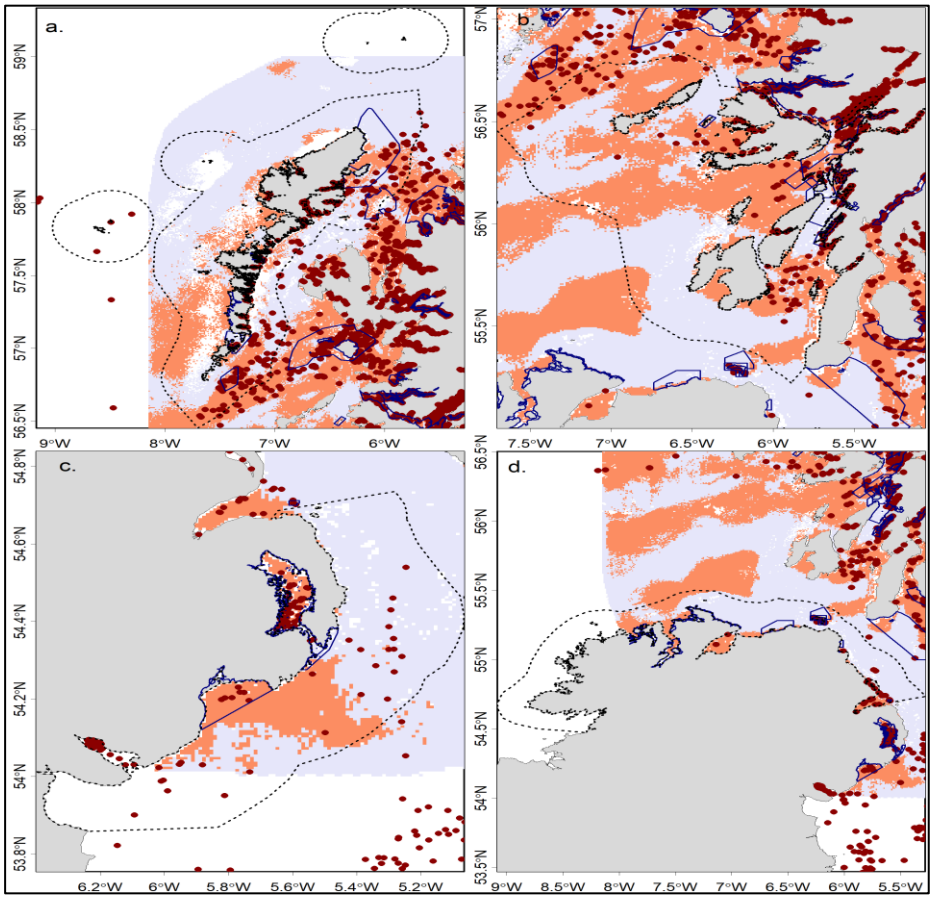

Figure 15. The MPAs containing a mean (N=1000) species richness of at least one Sea pen and confirmed records of Sea pen for each MarPAMM MPA management region; a) Outer Hebrides, b) Argyll, c) County Down - County Louth and d) North Coast to North Channel (Ireland). Pale blue area is the extent of the modelled domain (Langton *et al*., 2022b).

Sand eel habitat suitability model.

Sand eels are an important prey species for seabirds and marine mammals and are considered a key component of the marine food web. A model was developed under the MarPAMM project to predict the distribution of lesser sand eel habitat within the project area (Langton *et al*., 2021).

Data for lesser sand eel (*Ammodytes spp.*) populations were collated from bottom trawl surveys using Grande Overture Verticale (GOV) trawls, downloaded from the DATRAS database and included data spanning from 1985 to 2018 (ICES, 2020).

The modelled output (Figure 16) shows a map of predicted probability of lesser sand eel presence and density where sand eels have been recorded as present. Areas that were predicted to have a 10% probability of sand eel presence were in the top 5 percentile of densities and considered to represent suitable habitat (Langton *et al*., 2021). Suitable sand eel areas intersected with the MarPAMM MPA management regions and MPAs within to assess replication and representation in the project area (Langton, 2021).

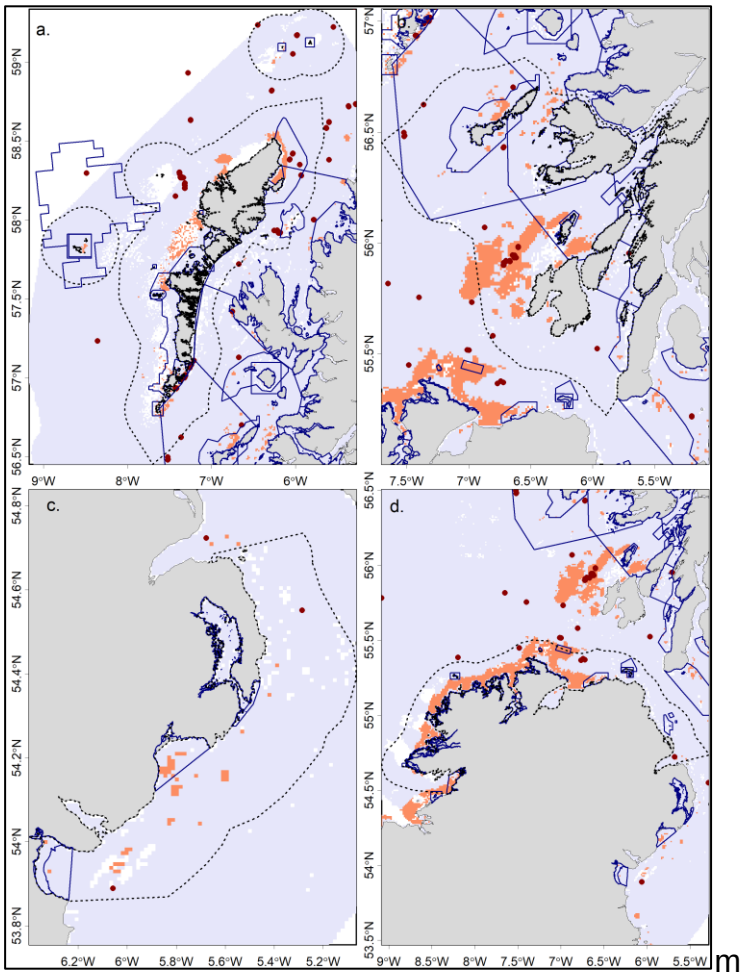

Figure 16. The MPAs containing predicted habitat suitable for lesser sand eel (*Ammodytes spp.*) and confirmed records for each MarPAMM MPA management region; a) Outer Hebrides, b) Argyll, c) County Down - County Louth and d) North Coast to North Channel (Ireland). Pale blue area is the extent of the modelled domain (Langton *et al.*, 2021).

Sea fan species complex habitat suitability model.

The sea fan complex comprises of two species of coral: the Northern Sea fan and the Pink Sea fan. Both are species protected under National and European legislation and are designated features of MPAs across the management plan area (Langton *et al.*, 2022a). A model was developed in the MarPAMM project to predict the distribution of sea fan complex habitat within the project area (Langton *et al.*, 2022a).

The modelled output (Figure 17) is a map depicting locations of sea fan complex density (Langton *et al.*, 2022a). The areas that had the highest 5% of predicted intensity were considered suitable habitat. The model predicts that approx. 12.08% of the total area of benthic MPAs included in the modelled area is suitable habitat for sea fan complex (Langton *et al.*, 2022a).

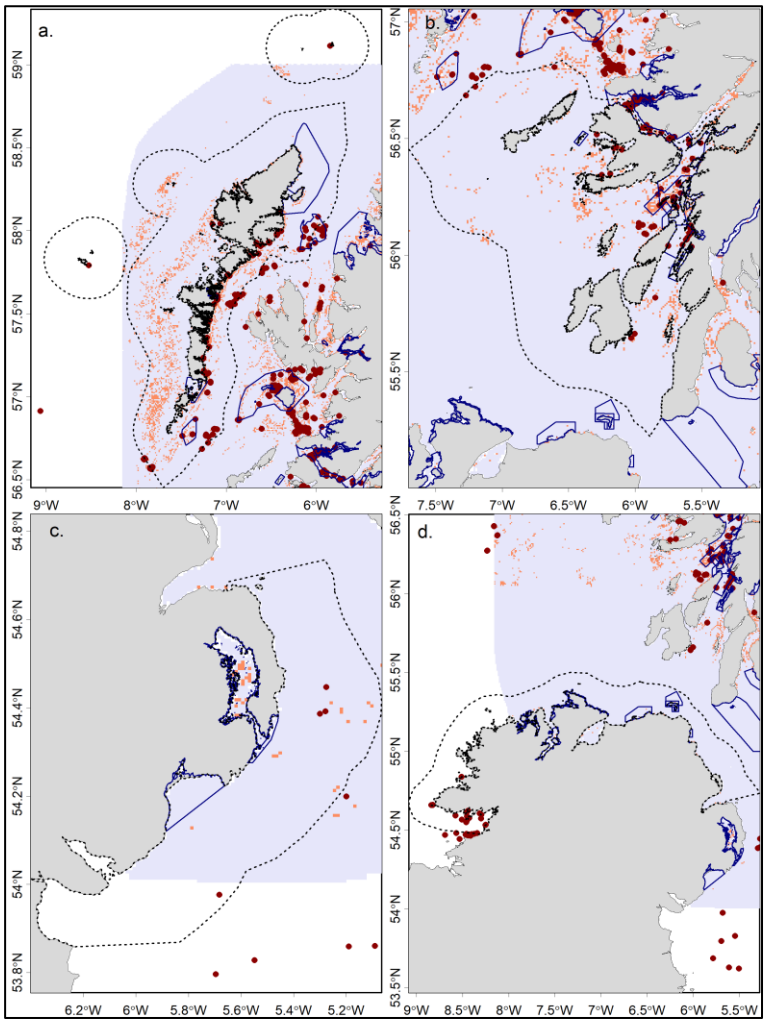

Figure 17. The MPAs containing predicted habitat suitable for sea fan complex and confirmed records for each MarPAMM MPA Management region; a) Outer Hebrides, b) Argyll, c) County Down - County Louth and d) North Coast to North Channel (Ireland). Pale blue area is the extent of the modelled domain (Langton *et al.*, 2022a).

Horse Mussel (M. modiolus) habitat suitability modelling output.

Within the MarPAMM region, 0.11% of the modelled area (Figure 18) is predicted to have the most suitable habitat for the formation of Horse mussel *(M. modiolus)* beds, 9.41% is predicted to be less suitable habitat and 90% is predicted to be unsuitable habitat (Brown, 2022). Within the Co. Down – Co. Louth region, 1.03% is predicted to be the most suitable habitat for *M. modiolus* beds, 8.97% is predicted to be less suitable habitat and 90.01% is predicted to be unsuitable habitat (Brown, 2022). There are 7 designated MPAs in the Co. Down – Co. Louth MPAs management plan region. 97.62% of the management plan area is predicted to be most suitable. However, 59.17% of the designated MPA area within the management plan region is predicted as being less than suitable habitat for the formation of *M. modiolus* beds (Brown, 2022).

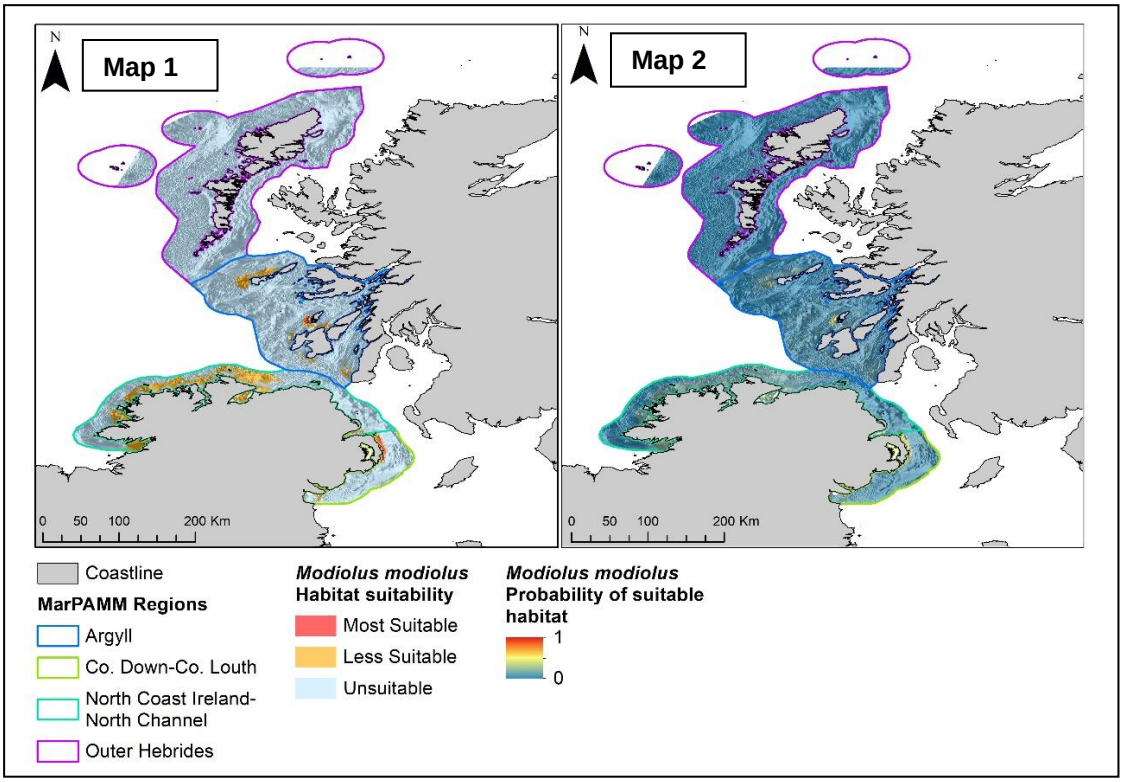

Figure 18. Habitat suitability maps for horse mussel (*Modiolus modiolus)* beds. Map 1 represents the suitability in categories whereas Map 2 represents the probability of there being suitable habitat on a continuous scale, where 0 represents no probability and 1 represents a high probability of suitability (Brown, 2022).

Ocean Quahog (A. islandica) habitat suitability modelling output.

Within the MarPAMM region, 37.48% of the area is predicted to be most suitable habitats for *A. islandica* (Figure 19), 29.29% predicted to be less suitable, and 33.22% is predicted to be unsuitable habitat (Brown & Callaway, 2022). Within the Co. Down – Co. Louth MarPAMM region, 21.33% is predicted to be the most suitable habitat for *A. islandica*, 30.94% is predicted to be less suitable and 47.73% is predicted to be unsuitable habitat (Brown & Callaway, 2022). Within the Co. Down – Co. Louth region there are seven MPAs, 26.10% of this designated area is predicted to be most suitable and 37.05% of the area predicted as being less suitable habitat falls within an existing MPA within the Co. Down – Co. Louth region (Brown & Callaway, 2022).

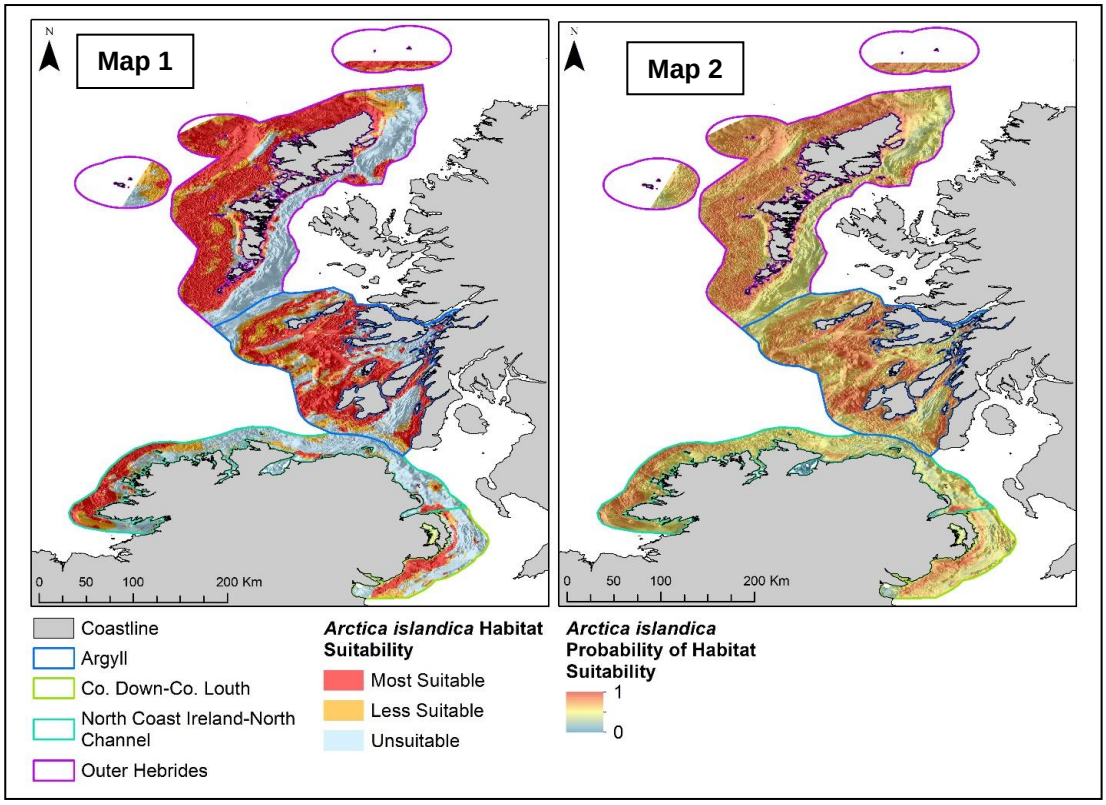

Figure 19. Habitat suitability maps for ocean quahog (*Arctica islandica*). Map 1 represents the suitability in categories whereas Map 2 represents the probability of there being suitable habitat on a continuous scale, where 0 represents no probability and 1 represents a high probability of suitability (Brown & Callaway, 2022).

Maërl (*Lithothamnion* spp.*) habitat suitability modelling output.*

5.60% of the MarPAMM region is predicted to be most suitable habitat for maërl (Figure 20), 6.01% is predicted to be less suitable habitat and 88.38% predicted to be unsuitable (Brown & Callaway, 2022). Within the Co. Down - Co. Louth MPAs management plan region, 9.45% is predicted to be the most suitable habitat for maërl, 12.12% predicted to be less suitable habitat and 78.44% predicted to be unsuitable habitat (Brown & Callaway, 2022). Within the seven MPAs found in the Co. Down –

Co. Louth region (Table 2) 60.10% of the current designated MPA area is predicted to be most suitable and 33.50% of the area predicted as being less suitable habitat for maërl (Brown & Callaway, 2022).

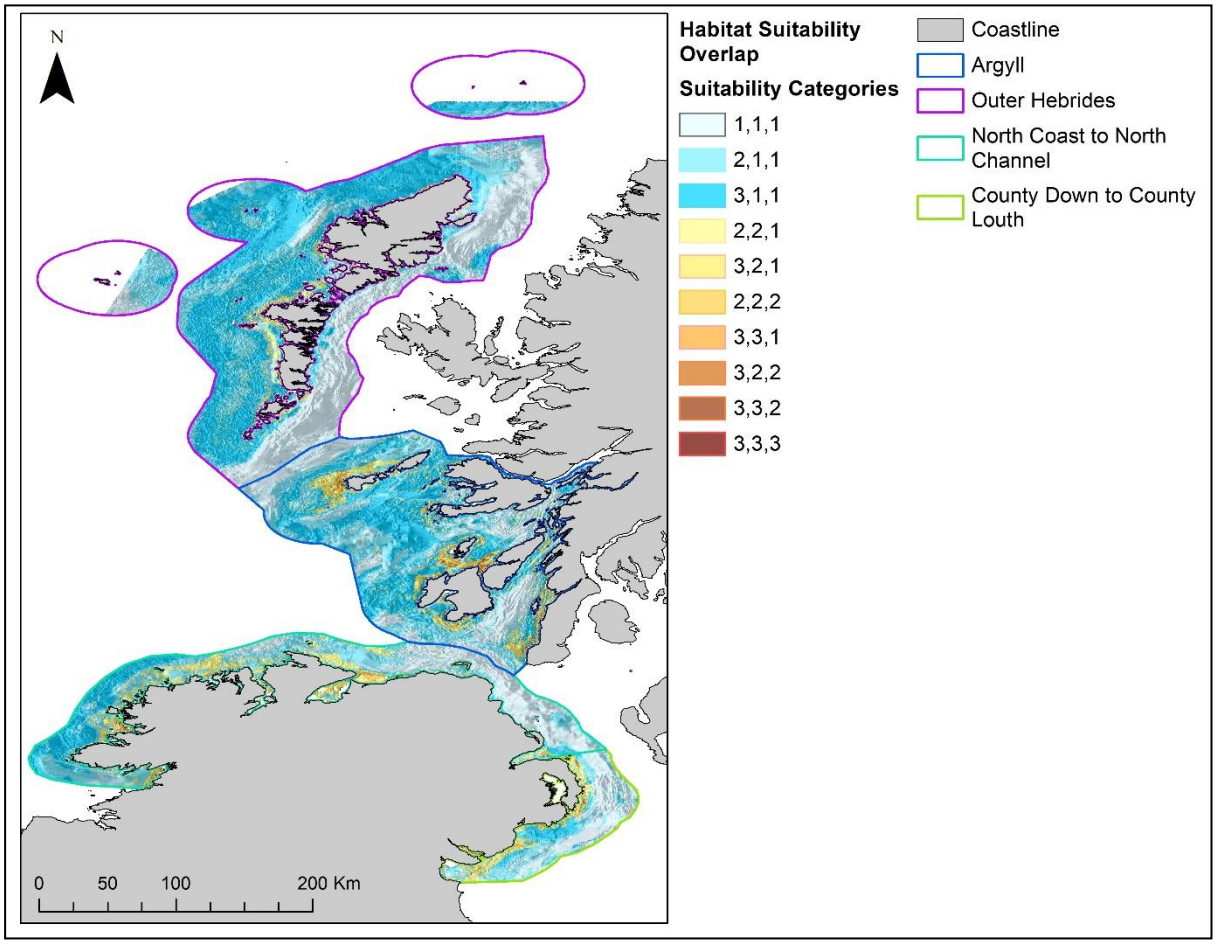

Figure 20. A map representing locations where suitable habitat between *M. modiolus* beds, *A. islandica* and maërl sp. overlaps. Habitat suitability in this map has been coded, where 3 = "Most suitable", 2 = "Less Suitable" and 1 = "Unsuitable". Each category is assigned three habitat suitability numbers. Locations which have been assigned the code 3,3,3 = locations which are likely to be "Most suitable" habitat for all three of the modelled species, 2,2,2 = Locations which are likely to be "Less suitable" habitat for all three species and 1,1,1 = Locations which are likely to be "Unsuitable" habitat for all three species (Brown & Callaway, 2022).

All marine and coastal developments should be aware of these benthic mapping distributions within proposals to make sure that areas aren't compromised for future growth or continued enhancement of sustainability for these features. With regards to habitat and feature restoration, within the primary stage organisations involved in restoration or identification of areas for new habitats should use the modelling outputs from the Benthic species and habitats works package to aid site selection suitability.

Steering Group Future.

The Regional MPA Management Steering Group was created to create a platform for stakeholders to engage and assist on the development of management policy, as well as detailed revisions of the policy iterations. The process enabled stakeholders to work with MarPAMM scientific outputs to help develop management plans which would promote sustainable use of de. As the project draws to a close in 2022, consideration should be given on continuing the Steering Group over a long-term period post MarPAMM.

The relevant NI and RoI departments (DAERA & DHLGH) should look at mechanisms to sustain the Steering Group post project with the intention of developing it into a Marine Advisory Group. The future of this group should be evolved for the purpose of evaluation and review to help the monitoring of plan guidance effectiveness from industry and activity users. New funding avenues should be considered to help support the development of a Marine Advisory Group through the next round of European funding (post Brexit) through the Peace Plus programme. This will help to evolve and grow the skills of Steering Group members for the benefit of future decision making within the plan area.

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Appendix 1: Stakeholder engagement report.

TCI Engagement - Final Report to AFBI, re MarPAMM project January 2022.

1. Background.

TCI Engagement (TCIe) was commissioned by AFBI in autumn 2019, after competitive tender, to assist with Stakeholder Management activities during the MarPAMM project, then scheduled until autumn 2021 (subsequently extended by mutual agreement, by reason of the Covid pandemic, until January 2022). 2

TCIe specialises in stakeholder management and managing public consultation, through advice and guidance, training, and other relevant support. An agreed work plan, which was updated and refined during the course of the project and guided TCIe and MarPAMM officers, ensuring efficient project management.

Significant components of the work plan covered:

- Stakeholder identification, profiling and mapping
- Risk Assessment and mitigation
- Stakeholder communication and engagement
- Database management and monitoring
- Responses to stakeholder enquiries
- Production of online content (social media, web etc)
- Servicing meetings through alerts, agendas, minutes etc

The engagement plan has been delivered to deadline, and to budget.

2. How were stakeholders recruited into the MarPAMM project?

After wide promotion, a well-attended in-person seminar in December 2019 engaged participants in a detailed discussion on Stakeholder Mapping and Consultation/Engagement Risk Management.

Stakeholders were identified as those who will be affected and impacted by the decisions recommended through this policy drafting process. This includes stakeholders who live, work, use or have an interest in the areas and the topics. Activists, officials, farmers, fishers, campaigners, lobbyists, academics, trade associations, other public bodies, environmental and conservation groups all fall under the umbrella term of stakeholders.

Once stakeholders were identified and profiled (who are they, whom do they represent?), the process of stakeholder mapping was undertaken: this is an iterative, matrix-based process, drawing on and contributing to corporate memory; it allows for amendments to stakeholder involvement to be made as the project evolves; it also aids resource allocation, targeting and eliminates wasteful activities.

The process of stakeholder management also involves the categorisation of key stakeholders into key areas, policy objectives and geographical locations (e.g., Murlough SAC group, Carlingford SAC group and Regional SAC group; these three geographies were selected to maximise efficiencies and reflect each locality's needs).

3. How did this convert into Steering Groups and what did the Steering Groups achieve?

Stakeholder mapping led to the formation of three Steering Groups made up of representative stakeholders (Murlough, Carlingford, Regional), as described above. These Steering Groups were designed to facilitate engagement with stakeholders to benefit from site-specific knowledge and expertise on the coastal areas included in the MarPAMM project.

Steering Groups provided a platform for stakeholders to raise concerns about the pressures and unanticipated issues they felt were facing coastal areas, whether that be in their line of work, their property, communities, or as recreational visitors.

They also facilitated information-sharing, issue debates and sharing of ideas, updating on the project and its direction, as well as engaging special interest/single issue groups.

Overall, Steering Groups provided the opportunity for stakeholders to be directly involved in the drafting process which will inform policy implementation in their areas.

TCIe facilitated online protocols and a Code of Conduct that guided participants in best practice, ensuring strong impacts.

At all times GDPR and data security protocols were noted and fully observed.

Covid19: Rethinking stakeholder engagement and initial approaches made to transfer MarPAMM engagement online.

In light of Covid19 from March 2020, compliance required that adjustments be made to the management of stakeholder engagement, to facilitate online communication in place of in-person face-to-face activity, to ensure the safety of all participants. Reduced activity during lockdowns also meant that some activities were suspended, or rescheduled (including by agreement, the TCIe contract, which was extended to January 2022.

The video conferencing and meeting platform Zoom, curated and provided by TCIe, allowed for stakeholder meetings to be conducted online, in accordance with public health advice. Features such as breakout rooms, online polling (via Sli.do) and screen-sharing allowing for personable experiences for stakeholders. Chairs reported improved delegate contributions, more manageable discourse and less time-wasting; sessions began and ended on time; the Chairs were respected and advice from support staff followed.

The platform established by TCIe with a dedicated MarPAMM email address and central hub, for information and data sharing, worked well, with all correspondence tracked and archived when appropriate; meeting alerts, calendar invites, agendas, Friday / Tuesday reminders and follow-ups were all undertaken efficiently.

In addition, to ensure inclusivity for all stakeholders, detailed minutes were circulated after each meeting, with supporting papers, to keep those unable to attend up-to-date on project direction and stakeholder interaction with project officers.

Online written materials such as website updates and newsletters were circulated, with the purpose of keeping stakeholders informed about project activities across the three Irish region Steering Groups and MarPAMM partners from across the project.

While issues surrounding internet connectivity (broadband width) and ICT resource and hardware constraints occasionally arose for some stakeholders through this process, the email system requires less technical resource, and Zoom allowed for stakeholders to participate in meetings in a time-efficient and convenient manner from a PC, tablet or mobile device.

Social media platforms (Twitter and Facebook) provide convenient tools for stakeholder engagement. Small bite-sized pieces of information, with relevant graphics, photographs and video content was available to a wide audience, increasing the reach of, interest in, and impact of the project.

Please see selected graphs below showing engagement with MarPAMM social media outlets.

4. Benefits of the MarPAMM project - policy guidance and drafting.

The core objectives of the MarPAMM project were to deliver four novel models designed to support the conservation of habitats and species that underpin Marine Protected Area (MPA) designations within the eligible region.

MarPAMM is an environment project to develop tools for monitoring and managing a number of protected coastal marine environments in Ireland, Northern Ireland and Western Scotland. It will be completed by 31 March 2022.
It is a cross-border project because many marine species and habitats do not abide by administrative borders. To manage mobile species and border areas requires cooperation.
MarPAMM partners will collect data on the abundance, distribution and movement of marine protected species and habitats. These data will help us produce new habitat maps and develop models for a range of species, including connectivity assessment for species with mobile life stages.
We will produce a regional sea bird model, a regional model of protected seabed-dwelling species and habitats, a seal foraging and underwater noise model and a coastal processes model.

Stakeholder engagement is important as it helps to address gaps within current marine conservation policy by identifying the up-to-date issues and pressures that face these areas, from experts active in the areas.

As marine species and habitats do not abide by administrative borders the cross-border element of the MarPAMM project was vital, building and cementing relationships and networks of future value. MarPAMM believes that MPAs work better when they arise from a point of connectivity between the geographies and the personnel servicing those areas. Therefore, objectives included deployment of a

collaborative cross-border approach involving rich and extensive, meaningful stakeholder engagement; this worked productively.

Another benefit of the MarPAMM project was the importance placed upon connectivity between species and habitats. MarPAMM has potentially created sustainable networks, which provide an interdisciplinary approach (quantitative science packages and qualitative stakeholder engagement) to MPA research, leading to more concerted, coherent and impactful actions.

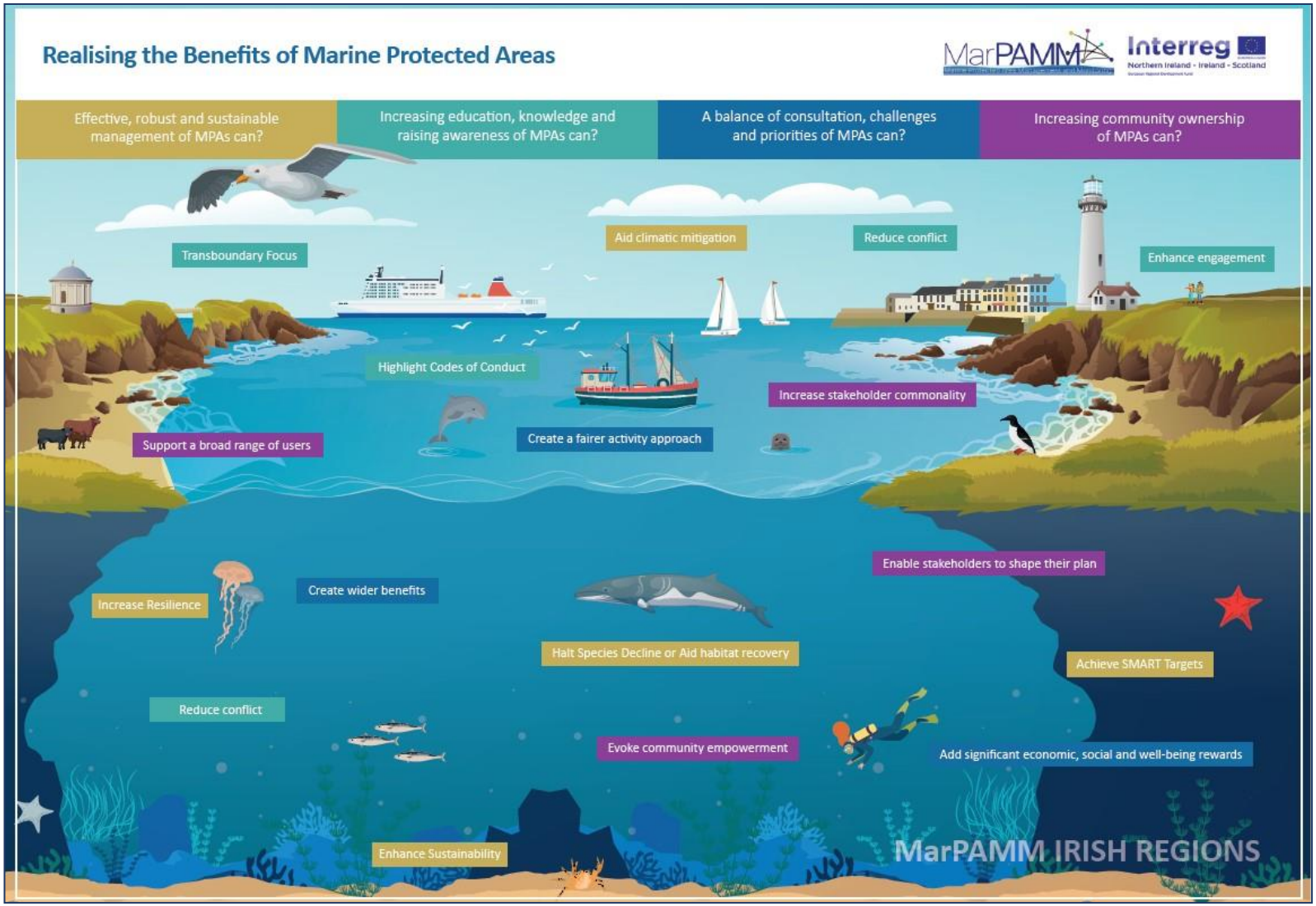
5. **Result: Finished policy guidance draft brought back to stakeholders.**

The result of the MarPAMM project is a policy guidance document, which will provide coastal users / environmental organisations / stakeholders / local government / other non-departmental public bodies (NDPBs) / other departments and DAERA itself with information about MPA areas, and best practice that meets conservation objectives.

This policy guidance document along with the accompanying social media / online engagement will improve the reach and visibility of marine work of this sort being conducted by MarPAMM; the model can also ensure embedding of the proceeds of the connectivity described above between geographies, disciplines, and marine mammal – and many other – species.

Effective stakeholder engagement in turn strengthens relationships, causing deeper involvement, interactions and possible co-management of future programmes.

Appendix 2: Regional Steering Group infographic.



Appendix 3: Full outline of designated features within Co. Down - Co. Louth Region.

List of all SPAs, SACs, MCZs and ASSIs within the Co. Down – Co. Louth Region. These include all species and habitats from the designated sites from Belfast Lough in Co Antrim to Dunay in Co Louth.

Seabirds:

Area	Feature
East Coast* (*covers larne lough SPA, Belfast lough SPA, Outer Ards SPA, Copeland Island SPA, Strangford Lough SPA, and Belfast Lough Open Water SPA)	Great Crested Grebe (*Podiceps cristatus*) - wintering population
	Red-throated Divers (*Gavia stellata)*
	Sandwich Tern (*Sterna sandvicensis*)
	Common Tern (*Sterna hirundo*)
	Arctic Tern (*Sterna paradisaea*)
	Manx shearwater (*Puffinus puffinus*), breeding
	Eider duck (*Somateria mollissima*)
	Roosting/loafing sites
Killough Bay SPA	[Canada/Ireland] - Light-bellied brent goose (*Branta bernicla hrota*)
Carlingford Lough SPA	[Canada/Ireland] Light-bellied brent goose (*Branta bernicla hrota*)
	Sandwich tern (*Sterna sandvicensis*)
	Common tern (*Sterna hirundo*)
Copeland Islands ASSI	Common Gull (*Larus canus*)
Outer Ards ASSI	Great Cormorant (*Phalacrocorax carbo*)
	Purple Sandpiper (*Calidris maritima*)
	Ringed Plover (*Charadrius hiaticula*)
	Turnstone (*Arenaria*)
Ballyquintin Point ASSI	Breeding bird assemblage
Strangford Lough Parts 1, 2 & 3 ASSI	Great Cormorant (*Phalacrocorax carbo*)
	Greylag Goose (*Anser answer*)
Murlough ASSI	Common Scoter (*Melanitta nigra*)

	Great Crested Grebe (*Podiceps cristatus*)
	Red-breasted Merganser (*Mergus serrator*)
Killough Bay and Strand Lough ASSI	Breeding bird assemblage
Mourne Coast ASSI	Kittiwake (*Rissa tridactyla*) breeding population
Carlingford Lough ASSI	Great Crested Grebe (*Podiceps cristatus*)
	Red-breasted Merganser (*Mergus serrator*)
Carlingford Lough SPA (RoI)	Red-throated Diver (*Gavia stellata*)
	Great Crested Grebe (*Podiceps cristatus*)
	Cormorant (*Phalacrocorax carbo*), breeding
	Light-bellied Brent Goose (*Branta bernicla hrota*)
Dundalk Bay SPA	Great Crested Grebe (*Podiceps cristatus*)
	Red-breasted Merganser (*Mergus serrator*)
	Black-headed Gull (Chroicocephalus ridibundus), wintering
	Common Gull (*Larus canus*), wintering
	Herring Gull (*Larus argentatus*), wintering
	Red-throated Diver (*Gavia stellata),* wintering
	Common Scoter (*Melanitta nigra*), wintering
Boyne Estuary SPA	Little Tern (*Sterna albifrons*)
	Black-headed Gull (*Chroicocephalus ridibundus*), wintering
	Common Gull (*Larus canus*), wintering
	Herring Gull (*Larus argentatus*), wintering
	Great Black-backed Gull (*Larus marinus*), wintering

Marine Mammals:

Feature	Area
Strangford Lough SAC	Common seal (*Phoca vitulina*)
North Channel SAC	Harbour porpoise (*Phoca phocoena*)
Murlough SAC	Common seal (*Phoca vitulina*)

Benthic Species:

Area	Feature
Outer Ards Proposed MCZ	Biogenic reef – Horse Mussels (*Modiolus modiolus*)

Intertidal:

Area	Feature
Strangford Lough SAC	Mudflats and sandflats not covered by seawater at low tide
	Coastal lagoons
	Large shallow inlets and bays
	Salicornia and other annuals colonising mud and sand
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
Strangford Lough MCZ	Intertidal biogenic reef
Murlough SAC	Mudflats and sandflats not covered by seawater at low tide
	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
Ballymacormick Point ASSI	Mudflats
Outer Ards ASSI	Coastal Saltmarsh
	Intertidal rock
	Mudflats
Strangford Lough Parts 1, 2 & 3	Coastal saltmarsh
	Mudflats
	Intertidal rock
Murlough ASSI	Coastal Saltmarsh
Killough Bay and Strand Lough ASSI	Saline lagoons
	Mudflats
	Intertidal rock
	Coastal Saltmarsh

St Johns Point ASSI	Intertidal Rock
Tyrella and Minerstown ASSI	Intertidal rock
	Intertidal mudflats and sandflats
Mournes Coast ASSI	Intertidal Rock
Carlingford Lough ASSI	Coastal saltmarsh
	Mudflats
Carlingford Lough SAC (RoI)	Annual vegetation of drift lines
Dundalk Bay SAC	Estuaries
	Mudflats and sandflats
Clogher Head SAC	Vegetated sea cliffs of the Atlantic and Baltic coasts
Boyne Coast and Estuary SAC	Estuaries
	Mudflats and sandflats

Subtidal:

Area	Feature
Strangford Lough SAC	Reefs
Murlough SAC	Sandbanks which are slightly covered by sea water all the time
Murlough ASSI	Subtidal, Mudflats
Mourne Coast ASSI	Reef
Carlingford Lough MCZ (NI)	Philine aperta and Virgularia mirabilis in soft stable infralittoral mud

Appendix 4: Detailed policy review.

Northern Ireland

International legislation.

International legislation that are applicable to the management plan include:

- OSPAR Convention 1992
- UK Marine Strategy 2010
- Water Environment (Floods Directive) Regulations (Northern Ireland) 2009;
- Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017
- Transposed Bird and Habitats Directives 2000.

Under the OSPAR Convention to Protect the Marine Environment of the Northeast Atlantic, Ireland and the UK are committed to establishing marine protected areas to protect biodiversity (i.e., OSPAR MPAs). The OSPAR Convention aims develop an ecologically coherent network of well-managed MPAs. OSPAR provides a mechanism through collaborative governance with EU and non-EU members to protect the marine environment of the North-East Atlantic. OSPAR includes a wide array of marine issues from work on pollution and dumping at sea to the conservation of marine biodiversity (OSPAR, 2016).

The aim of the EU's Marine Strategy Framework Directive (2008/56/EC) is to protect the marine environment more effectively across Europe. The MSFD was adopted in June 2008. The Commission also produced a set of criteria and methodological standards to help Member States implement the Directive. These were revised in 2017 leading to the new Commission Decision on Good Environmental Status (GES).

The Marine Strategy Regulations 2010 replaces MSFD post-Brexit and provides the framework for delivering marine policy at the UK level. The UK Marine Strategy Regulations 2010 require the UK to take the necessary measures to achieve or maintain Good Environmental Status through the development of a UK Marine Strategy. The UK Marine Strategy sets out a comprehensive framework for assessing, monitoring and taking action across the UK's seas to achieve the shared vision for 'clean, healthy, safe, productive and biologically diverse ocean and seas. There are strong links between the UK Marine Strategy and River Basin Management Plans (RBMPs). The RBMPs address the improvement and protection of the chemical and ecological status of surface waters over the whole river basin ranging from rivers, lakes, and ground waters through to estuaries and coastal waters out to one nautical mile at sea and overlap with the UK Marine Strategy in coastal waters. The Department

for Environment, Food and Rural Affairs (DEFRA) are responsible implementation of the Regulations within the UK, with devolved responsibility for NI delegated to DAERA.

The Floods Directive (FD) 2007/60/EC is the European legislation for managing flood risk from floods of all flood types (fluvial, pluvial, sea water, groundwater, artificial water bearing infrastructure. It has a particular focus on riverine and coastal floods. Coastal waters are assigned to these river basin districts as well as are groundwater bodies.

The Water Framework Directive 2000/60/EC of the European Parliament established a framework for the Community action in the field of water policy. The sets out the management of the 'water environment' including rivers, lakes, transitional waters, groundwater, and coastal waters out to 1 nautical mile (12 nautical miles for chemical status, i.e., for territorial waters). Member States must aim to achieve good chemical and ecological status in identified water bodies by 2015. This includes transitional (estuarine) and coastal waters out to one nautical mile.

Special Areas of Conservation (SAC) are sites designated under the Habitats Directive for habitats of European Importance. SACs are designated for habitats and species listed under Annex I and II of the EC Habitats Directive, such as reefs and sandbanks. The Habitats Directive requires Member States to take measures that contribute to the conservation of biodiversity by maintaining or restoring certain habitats and species at a favourable conservation status. The Habitats Directive was transposed by The Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 and is required to identify and protect a series of Special Areas of Conservation (SACs).

National legislation.

National designations that are applicable to the management plan include:

- Marine and Coastal Access Act 2009
- Marine Policy Statement 2011
- The Marine Act (Northern Ireland) 2013
- The Environment (Northern Ireland) Order 2002
- Nature Conservation and Amenity Lands Order (Northern Ireland) 1985
- The Wildlife (Northern Ireland) Order 1985 (as amendment)

Across the UK, each devolved administration has the power to create Marine Protected Areas to conserve nationally important wildlife and habitats. These national sites have different names in the devolved nations of the UK. The Marine and Coastal Accesses Act 2009, in Northern Ireland gives DAERA's Marine and Fisheries Division

the responsibility for licensing of activities related to construction, deposition or removal of any substance or object as the marine planning process. The Marine Policy Statement 2011 provided the platform for the development for a Northern Ireland Marine Plan ensure the sustainable use of marine resources and strategic management of marine activities from renewable energy to nature conservation, fishing, recreation, and tourism.

The Marine Act (Northern Ireland) 2013, establishes a strategic system of marine planning within the inshore region (out to 12 nautical miles) and helps to streamline the process of marine licensing. As part of this act is the creation of draft of our The Marine Plan for Northern Ireland 2013, which informs and guides the regulation, management, use and protection of our marine area, one for the inshore region and one for the offshore region (as a material consideration due to draft). This plan covers the inshore region from the Mean High Water Spring Tide mark out to, at most, 12 nautical miles and the small offshore region. The Marine Plan will be used for making decisions on activities in the marine environment. The Act enables the delivery of an ecologically coherent network of Marine Protected Areas, through giving DAERA the power, with the agreement of the Secretary of State, to designate MPAs, called Marine Conservation Zones (MCZ).

Marine Conservation Zones (MCZs) are designated protect a range of nationally important habitats and species such as cold-water coral reefs which thrive in the UK's deeper waters, sedimentary seabed habitats vital for a range of marine processes. MCZs fulfil the obligations of The Marine Act (Northern Ireland) 2013 to contribute to an ecologically coherent UK network of MPAs as well as wider biodiversity commitments at North-East Atlantic and global level while fully taking into account any economic, cultural or social consequences of doing so.

Areas of Special Scientific Interest (ASSIs) are designated under The Environment (Northern Ireland) Order 2002 and contains powers for the protection of nationally important flora and fauna within Northern Ireland. Schedules of listed nationally important habitats and species include reference to coastal and marine features, including mudflats and common seals.

An Area of Outstanding Natural Beauty is designated under the Nature Conservation and Amenity Lands Order (Northern Ireland) 1985.

The Wildlife (Northern Ireland) Order 1985 (the Order) and amendment The Wildlife (Amendment) (Northern Ireland) Order 1995, prohibits the intentionally killing, taking

or injuring of certain species of wild birds and animals or the intentional destruction, uproot or picking of certain wild plants. Under the Wildlife (Northern Ireland) Order it is an offence to release into the wild non-native invasive species as listed in Schedule 9 Part II of the Order.

Republic of Ireland

International legislation.

International designations that are applicable to the management plan area include:

- OSPAR Convention 1992
- Convention on Wetlands of international importance/Ramsar Convention
- Marine Strategy framework directive 2008/56/EC
- The Floods Directive 2007/60/EC
- Water Frame Works Directive 2000/60/EC
- The EU Birds Directive 2009/147/EC
- The habitats Directive (92/43/EEC)

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The Convention on Wetlands of Importance/Ramsar Convention is an intergovernmental treat that provides the framework for national and international action for the conservation and appropriate use of wetlands for resources. Currently there are 147 contracting parties to the convention covering 1,524 wetland sites, a total of 129.2 million hectares (NPWS. More information on the Convention on Wetlands of Importance/Ramsar Convention can be found here: https://www.ramsar.org/ (NPWS, 2022).

The Marine Strategy Frameworks Directive 2008 was introduced on the 17th of June 2008 by the European Union in an active attempt to effectively protect the vast marine environment across Europe. A set of detailed criteria was commissioned to assist member states in implementing the Marine Strategy Framework Directive. The directive has encouraged a better understanding of current pressures and the impact of anthropogenic activities on the sea, their implications to marine biodiversity,

habitats, and surrounding ecosystems. Knowledge from this initiative was one of the main drivers in developing the 'Single Use Plastics Directive' as well as increased levels of cooperation from member states within the four European sea regions (EC, 2021).

The Floods Directive (FD) 2007/60/EC is the European legislation for managing flood risk from floods of all flood types (fluvial, pluvial, sea water, groundwater, artificial water bearing infrastructure. It has a particular focus on riverine and coastal floods. Coastal waters are assigned to these river basin districts as well as are groundwater bodies.

The Water Framework Directive 2000/60/EC of the European Parliament established a framework for the Community action in the field of water policy. The sets out the management of the 'water environment' including rivers, lakes, transitional waters, groundwater, and coastal waters out to 1 nautical mile (12 nautical miles for chemical status, i.e., for territorial waters). Member States must aim to achieve good chemical and ecological status in identified water bodies by 2015. This includes transitional (estuarine) and coastal waters out to one nautical mile.

Special Areas of Conservation (SAC) are sites designated under the Habitats Directive for habitats of European Importance. SACs are designated for habitats and species listed under Annex I and II of the EC Habitats Directive, such as reefs and sandbanks. The Habitats Directive requires Member States to take measures that contribute to the conservation of biodiversity by maintaining or restoring certain habitats and species at a favourable conservation status. The Habitats Directive was transposed by The Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 and is required to identify and protect a series of Special Areas of Conservation (SACs).

National legislation.

National designations that are applicable to the management plan include:

- Wildlife Act 1976
- Foreshore Act 1933 - 2011

The Wildlife Act 1976 is the main piece of national legislation in the Republic of Ireland for providing protection to wildlife and control to some activities that may adversely affect wildlife and biodiversity. The act aims 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 Foreshore Act identifies the RoI foreshore as the seabed below the high-water mark of medium tides, extending out to 12 nautical miles. The Foreshore Act requires that before the commencement of any works or activity (including the erection of any structures) on State-owned foreshore a licence or lease must be obtained. Marine and coastal developments in this area generally require consent an administered by the Foreshore Section of the DHLGH. Foreshore Activities relating to sea fisheries and aquaculture are administrated by DAFM. Dredging is regulated by Environmental Protection Agency, with the Department of Communications, Climate Action and the Environment regulates oil and gas related developments. Local authorities regulate planning functions immediately above the identified shoreline. All regulatory authorities have a legal obligation to ensure activities or operations that are likely to have a significant effect on the protected habitats and/or species in a Special Area of Conservation are subject to an Appropriate Assessment (NPWS, 2022).

Appendix 5: Infographic of new benthic habitats on windfarm foundations (SEER, 2022).