

Carlingford Lough MPAs

Management Plan

January 2023



Document Version Control

Version	Issue Date	Modifier	Note	Issued To	Date
1.0	19/01/2023	BWI_ROS AFBI_DS	Completed Version	MarPAMM Stakeholders	19/01/2023
2.0	28/07/2023	AFBI_VLP	Revised Version	Matt Service, Naomi Wilson, Alex Callaway	28/07/2023

Document Title: Carlingford Lough MPAs Management Plan.

Status: Version 2.0

Date: 28/07/2023

Completed by: R. O'Sullivan, D. Stevenson.

Signature/date: 19/01/2023

Approved by:Matthew Service.....

Initials/date MS 4-08-23

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Project Start date: 31st January 2018

Project duration: 60 months

Document title: Carlingford Lough MPAs Management Plan

Date: 26/07/23

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Glossary of Terms.

AFBI Agri-Food and Biosciences Institute

AONB Area of Outstanding Natural Beauty

ASSI Area of Special Scientific Interest

AtoN Aids to Navigation

BSAC British Sub Aqua Club

BIM Bord Iasc Mhara

BWI Birdwatch Ireland

CEDar Centre for Environmental Data and Recording

DAERA Department of Agriculture, Environment and Rural Affairs

DAFM Department of Agriculture, Food and the Marine

DHLGH Department of Housing, Local Government and Heritage

DFI Department for Infrastructure

DAPs Drainage Area Plans

EC European Commission

EU European Union

EWL Extreme water levels

FCL Fish culture licence

Ha Hectares

ICES International Council for the Exploration of the Seas

INNS Invasive non-native species

INCDB Irish National Biodiversity Data Centre (INBDC)

IPCC Intergovernmental panel on climate change

JNCC Joint Nature Conservation Committee

LA Local Authority

LLA Local Lighthouse Authority

MarPAMM Marine Protected Area Management and Monitoring

MCA Marine and Coastguard Agency

MCZ Marine Conservation Zone

MLS Minimum landing size

MPA Marine Protected Area

NGO Non-governmental organisation

NHA Natural Heritage Area

NPWS National Parks and Wildlife Service

PADI Professional Association of Diving Instructors

PAM Passive Acoustic Monitoring

PWC Personal watercraft

OSPAR Oslo and Paris Conventions

SAC Special Area of Conservation

SLR Sea-level rise

SPA Special Protection Areas

SWOT Strengths, Weaknesses, Opportunities and Threats

TTS Temporary Threshold Shift

UNESCO The United Nations Educational, Scientific and Cultural Organisation

Executive Summary.

The Marine Protected Area Management and Monitoring (MarPAMM) project developed tools for the efficient management of Marine Protected Areas (MPAs) within , Northern Ireland, the Republic of Ireland and Western Scotland. The MarPAMM project aimed to increase capacity in and collaboration betweenNorthern Ireland, Ireland and Scotland for MPA management planning, linking this planning to 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
- Produce four regional MPA management plans, and two site specific MPA management plans covering waters around the border counties of Republic of Ireland, Northern Ireland, the west coast of Scotland and the Outer Hebrides. MarPAMM Management Plans within the island of Ireland aim to:
 - Deliver feature conservation condition benefits.
 - Deliver benefits from management guidance for marine activity users from co-management and scientific outputs for 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 INTERREG VA Objective 2.2, through the production of a site-specific MPA management document for the Carlingford Lough Special Protected Area (SPA) area. This plan will deliver site-based conservation guidance, building upon existing best practice approaches to MPA management (e.g., risk-based, adaptive management) and recommend innovative approaches to aid restorative and adaptive management practices. If implemented correctly, this will effectively create resilience and adaptability to protect, maintain and enhance Carlingford Lough MPAs, the surrounding environment and adjoining marine areas.

Areas important for management consideration were highlighted, such as commercial fishing, aquaculture, port and harbour development, climate change, recreation, and tourism practices. Key recommendations for current and future management of designated features and adjacent areas within the Carlingford Lough MPAs Management Plan were identified from the work package, scientific outputs ad stakeholder engagement. These key recommendations include:

1. The application of pot tagging systems to enable quantification of effort for monitoring between commercial and recreational pots.
 - a. The application of a colour coded system will enable observers to effectively identify and locate commercial and recreational pots and assist with identification of pot ownership.

2. With the growth of recreation and tourism, post COVID, a key recommendation is that activity users need guidelines to help support environmentally friendly interactions in coastal and marine transition areas.
 - a. Areas of concern have been identified from the impacts of human interactions with seabirds and marine mammals from the shoreline and sea surface.
 - b. A key indicator is the need for education and knowledge dissemination from local clubs or commercial recreation groups through webpages, social media, verbally or organisational posters.
 - c. The plan recommends users follow codes of conducts such as the WiSe Scheme, Leave No Trace and Share the Shore.
3. Anthropogenic climate change is leading to increasing vulnerability and risk (i.e., flooding and erosion) which will have significant effects on shorelines.
 - a. A key recommendation to increase carbon sequestration reduce carbon emissions across the island of Ireland, is that competent authorities should conserve, restore, and create new areas of Blue Carbon habitats.
 - b. This should involve examination and mapping of existing Blue Carbon habitats within Carlingford Lough and implementation of enhanced protection measures in newly identified areas.

Implementation of the Carlingford Lough MPAs management plan is expected to produce outputs which are hierarchical in their nature. This means enabling issues to be addressed at the appropriate level, from strategic regional issues, to those best dealt with at a local scale. Outputs will be delivered through working closely with stakeholders, work package partners and sister projects, such as SeaMonitor to build upon evidence bases and support robust management approaches.

1 Regional setting: location, boundary, and context.

1.1 Overview and context of Carlingford Lough MPA Management Plan.

Carlingford Lough is a narrow sea inlet approx. 15 km long, located at the estuary of the Newry River and extends to Ballagin in the south and Cranfield in the north (Crowe, 2005). Carlingford Lough is a transboundary sea lough located in County Down on the border of Northern Ireland (herein referred to as NI) and County Louth in the Republic of Ireland (herein referred to as RoI). It is surrounded by multiple geological features such as glacial moraines and mountains: the Mourne Mountains in the north and the Carlingford Mountain to the south-west (NPWS, 2013a). Carlingford Lough supports a variety of biologically important features from aquatic



Figure 1: Sea pen (*Virgularia mirabilis*) habitat in Carlingford Lough (DAERA, 2016).

estuarine fauna to larger marine wildlife species, some of which can only be found in this location (Poppleton *et al.*, 2021). Sea pen (*Virgularia mirabilis*) beds in fine mud, as displayed in Figure 1 are extensively located towards the inner part of the lough, north of the navigation



Figure 2: Harbour seal (*Phoca vitulina*) (© O'Sullivan R, 2022).

channel and there are also areas of sand and rock in the central section of the lough. The lough is home to internationally important populations of light-bellied Brent geese (*Branta bernicla hrota*) and nationally important populations of eight species of wintering waterfowl. Parts of the lower regions of the lough near Green Island also host important breeding populations of terns (Poppleton *et al.*, 2021). In addition to this, Carlingford Lough contains some of the highest counts of harbour seals (*Phoca vitulina*), in NI as well as forming an important haul-out site for the grey seal (*Halichoerus grypus*) (Morris and Duck, 2018). Additionally, cetaceans including harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*), are often sighted within the lough, including a resident solitary male bottlenose dolphin.

Due to its cross-boundary location, several conservation areas have been designated within both the RoI and NI jurisdictions. Under RoI jurisdiction, areas of Carlingford Lough have been designated as a Special Protection Area (SPA), a Special Area of Conservation (SAC), and a Natural Heritage Area (NHA). Within the NI jurisdiction, areas of Carlingford Lough have been designated as a Marine Conservation Zone (MCZ), Special Protection Areas (SPAs), an Area of Special Scientific Interest (ASSI), an Area of Outstanding Beauty (AONB) and a Ramsar Site under the Ramsar Convention (Poppleton *et al.*, 2021). A map showing the locations of designated sites within Carlingford Lough is shown in Figure 4.



Figure 3: Grey seal (*Halichoerus grypus*) (© Kennedy F, 2020).

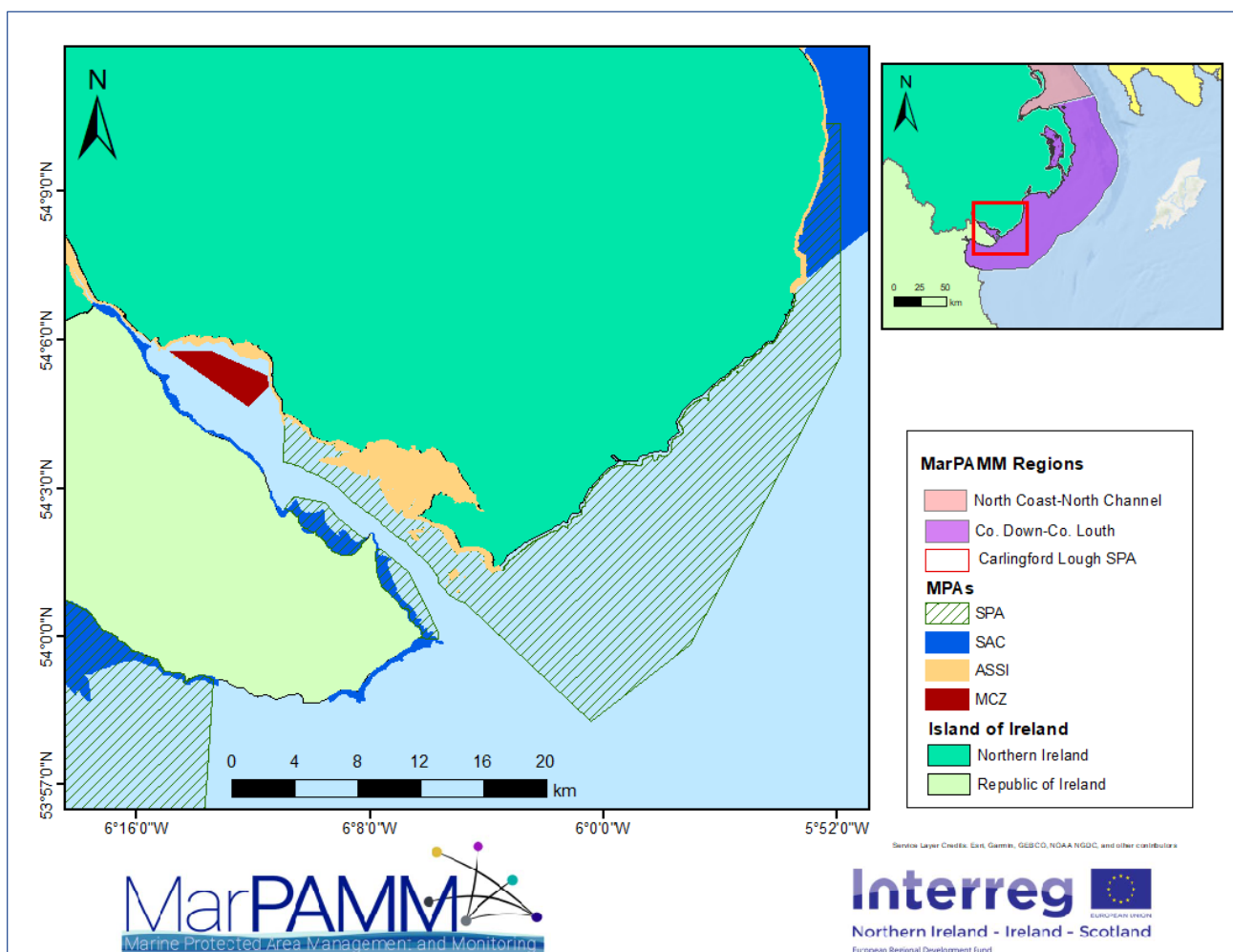


Figure 4: Carlingford Lough MPA Region MPA overview.

1.2 Overview of what this plan seeks to achieve.

The objective of the MarPAMM Carlingford MPAs management plan is to provide all necessary support for the efficient delivery of conservation benefits from MPAs within the site, whilst including all valuable input from local communities and stakeholders. Consultations were held from a designated steering group, comprising representatives of stakeholders from sectors such as government, non-governmental organisations, industry, and the local community to develop an effective guidance plan for the management of the Carlingford Lough MPAs.

The information presented in this management plan has been prepared on a co-management basis, together with local stakeholders. The management plan is a combination of aspirational targets framed within references to existing legislation which are presented as guidance for all interested parties. Whilst this guidance is not wholly statutory and as such cannot be fully enforced as a management plan; for ease of reference and discussion it is referred to herein as the 'Carlingford Lough MPAs management plan' or 'management plan'.

The management plan will support sustainable and efficient use of the marine environment/ecosystem services in Carlingford Lough both within MPAs and across undesignated areas. This will be achieved through the objectives below:

- Support delivery site conservation benefits and identify the aspirations of activity users/local communities for site specific guidance. This guidance may fall outside of legislation, particularly in relation to how it may benefit MPAs.
- Planning at a scale which anticipates both site-specific and strategic actions (i.e., climate change adaptation) to be applied to promote integration within wider marine management.
- Continue to highlight the importance of understanding that these protected areas (and their stakeholders) are part of an interconnected network and that actions outside of MPAs can still influence the features within them.

Successful and effective management will incorporate all best available evidence, will be supported widely by stakeholder involvement and community engagement, and include regular review and updates following monitoring and evaluation of new data and information. The Carlingford Lough MPAs management plan was created to increase awareness of the importance of conserving the Carlingford Lough MPAs, with a strong focus on the actions required to achieve favourable conservation benefits, which in turn will enhance general improvements within the management plan area. This should prompt the delivery of a sustainably managed marine and coastal environment and stand as an aid for decision-makers in creating, communicating, and maintaining a consistent approach in the establishment of MPA management in conjunction with the relevant authorities. In line with this, the management plan will be used as a management tool in determining the development of marine based activities. Guidance information used to influence this management plan has been adapted from existing best practices throughout the European Union (EU), The United Kingdom (UK) and the RoI. Further influences included previously used approaches from various other MarPAMM project outputs from four science focused work packages.

Key deliveries from this management plan will assist decision making for marine managers working within the Carlingford Lough MPAs, by supporting the wider marine management practise associated with marine spatial planning through the Marine Act (2013), marine licensing through Marine and Coastal Act (2009) and Draft Maritime Marine Planning Bill (2021). Although the Carlingford Lough MPAs management plan is a non-statutory document, it is being produced in collaboration with the Carlingford Lough MPAs Steering group (Appendix 3) and the statutory authorities, the Department of Agriculture, Environmental and Rural Affairs (NI) and the Department of Housing, Local Government and Heritage (RoI). The guidance provided in the Carlingford Lough MPAs management plan should remain in effect where necessary, until information is either updated, revised, or replaced by new Departmental guidance or statutory policies.

OSPAR and Next Steps.

The Convention for the Protection of the Marine Environment of the North-East Atlantic (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, encompassing a wide array of marine issues from work on pollution and dumping at sea to the conservation of marine biodiversity (OSPAR, 2006).

As part of the OSPAR convention, the RoI has committed to establishing a series of official MPAs to protect local marine biodiversity. These are specific areas where it is mandatory to cultivate and sustain a “favourable conservation status” where there is the presence of registered species of “qualifying interest” and are considered 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 Ireland's Economic Exclusion Zone (EEZ) (Classen, 2020). In December 2022, the General Scheme of the Marine Protected Areas Bill was approved by the RoI Government. The draft legislation works in conjunction with the Maritime Area Planning Act (2021) and pre-existing biodiversity protection measures, including the Wildlife Acts, the Marine Strategy Framework Directive, The EU Birds and Habitats Directives and the EU Common Fisheries Policy (DAFM, 2022). This approach aims to effectively balance the conservation requirements and the long-term sustainable use of the RoI's important and diverse marine environment.

In parallel, NI's commitment to the objectives of the OSPAR commission is through marine conservation work undertaken by DAERA within SACs, SPAs and Marine Conservation Zones (MCZs) (DAERA, 2021). 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 Carlingford Lough 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 and objective.

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 user’s social, economic and cultural conditions*” (Berkes, 2009). More and more, co-management is implemented into governance regimes as a direct result of failures from historical approaches. This provides a system for collaboration with fisheries and other important stakeholders in governance planning (Wilson *et al.*, 2003; Kooiman *et al.*, 2005). Co-management refers to the shared authority between local communities and stakeholders, non-governmental organisations (NGOs) and the Government (Berkes, 2010). This governance approach will facilitate the distribution of power and responsibility for local resource users, maintenance and sustainability between Government Departments and local stakeholders instead of a regionalised government approach.

As part of the work with MarPAMM, the project will deliver site specific approaches from a strategic perspective for MPA management planning, focusing on the ecological and cross-boundary significance of the area situated on the border of NI and the RoI. This management plan was developed between the RoI and NI in a mirrored cross-border approach with the focus on MPA species and habitats selection. Collaboration with key marine stakeholders and project partners in each jurisdiction developed a guide that presents a range of identified issues considered important in the context of the Carlingford Lough MPAs Management Area, including activities and issues influencing the various biological, environmental, economic, social and ecosystem services. A co-management governance approach was taken as it enables the sharing of authority and decision making 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) was used as a tool for any aspects that have the potential to affect the management of sustainable resource and to assist risk assessments of human-environment interactions (Nagendra and Ostrom, 2014). MPAs are considered as complex social-ecological systems, where the natural environment and anthropogenic activities are consistently interacting, therefore the implementation of conservation must be simultaneously examined with social influences. The overall spatial dynamics of MPAs requires the need for an efficient governance framework that emphasises the importance of co-operational and collaborative work ethics, while combining the traditional modelling outputs to create participatory and inclusive, productive outputs. Current evidence shows that economic, social and organisation factors all determine the overall success of an MPA (Bennett *et al.*, 2020; Chaigneau and Brown, 2016).

To identify the complexities associated with the dynamic social - ecologic systems operating within MPAs, stakeholder engagement strategies were developed by MarPAMM MPA project officers for the Carlingford Lough MPAs. This strategy pulled together a stakeholder group that was comprised of individuals currently in positions that are directly associated with these environments and assisted in developing policy guidance that agrees on potential benefits with all planning partners, emphasises project goals and identifies any potential gaps within data collections. The steering group reviewed all previous guidance approaches developed from previous MarPAMM work packages and provided critical comments on plan drafts. Advice was given on the spatial use of area by sectors, illustrated observed interactions and provided detail on any informal/formal existing management practices implemented by the sector.

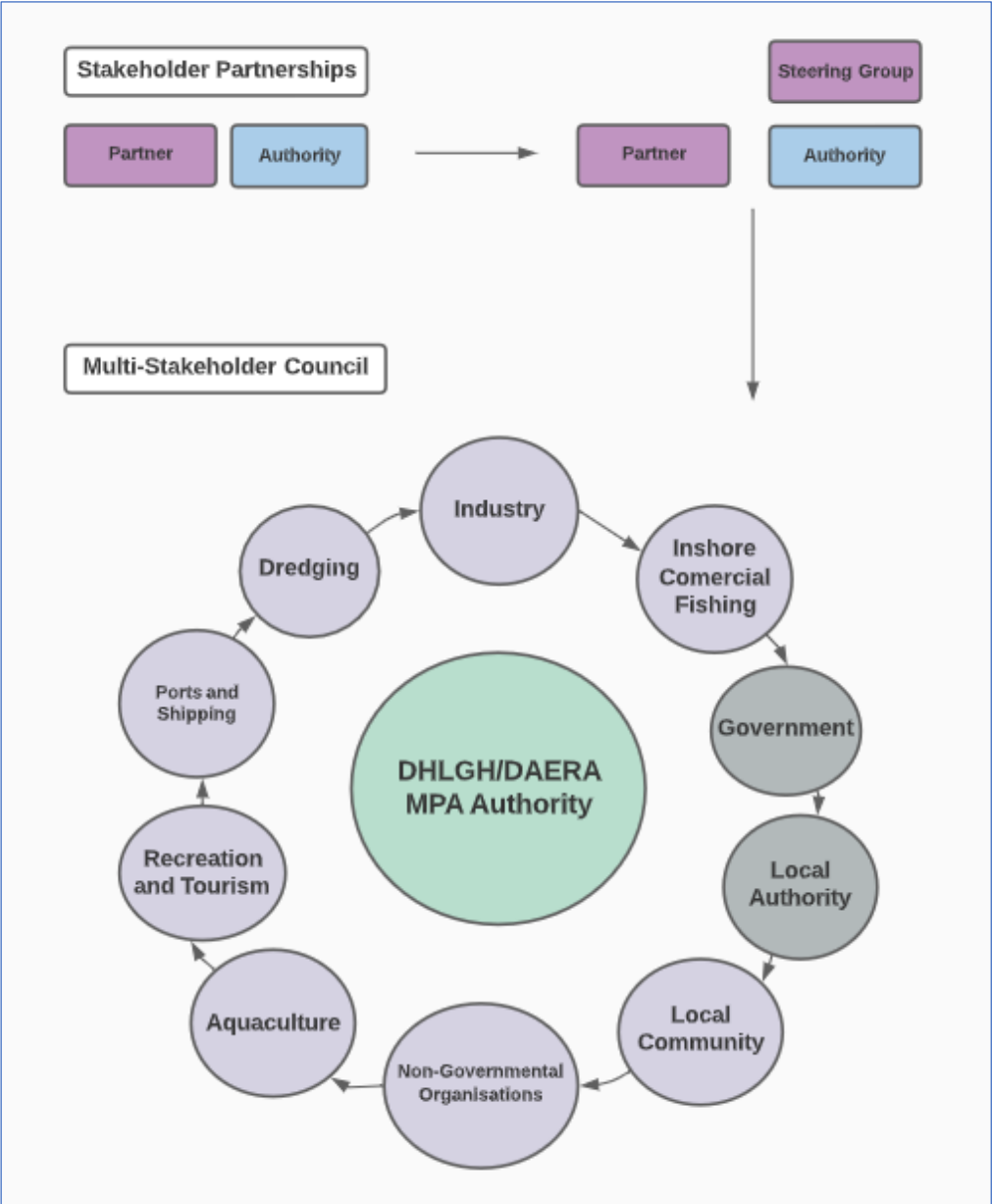


Figure 5: Evolution of the Carlingford Lough MPAs management plan Steering Group.

From September 2020, the Carlingford Lough MPAs Steering group worked closely with MPA management policy officers to access all critical issues and anthropogenic pressures needed

to support an efficient management plan of the area. From these stakeholder engagements, five key stakeholder objectives were identified to support the effective guidance approaches for the Carlingford Lough MPAs management plan:

1. To enhance the overall sustainability of the MPAs through the application of a proactive ecosystems approach.
2. To create an MPA management plan that is evidenced on robust species data, that creates a dynamic tool to aid biodiversity restoration.
3. To explore sustainability as a key mechanism in achieving wider benefits through the ecosystems approach and improving Net Gains.
4. To develop a greater platform for Carlingford Lough habitat education and feature awareness among stakeholders.
5. To foster a management plan which empowers stakeholders at the the core of the process whilst bestowing local ownership.

These objectives were developed further into a stakeholder benefits mapping exercise which was analysed through a Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis and modelled into a Benefits Realised Infographic, which can be seen in greater detail in Appendix 1. These were reviewed and refined by stakeholders. The weaknesses and threats analysed from the SWOT Analysis were further modelled as key management criteria for marine management, this identified 6 areas, including:

1. Climate Change and Blue Carbon,
2. Inshore commercial fishing,
3. Aquaculture,
4. Recreation and Tourism,
5. Marine Infrastructure, Ports and Shipping
6. Dredging.

These 6 criteria comprise the policy areas that will provide additional support and assist marine managers within NI and the RoI by supporting statutory marine management through the Marine Act (Northern Ireland) 2013 and the Maritime Planning Act (2021). Ultimately, the intention of the Carlingford Lough MPAs Management Plan is to provide the key management guidance that is applicable to the designated features within MPAs. The guidance also applies to adjacent areas outside of MPAs to help maintain the conservation status of designated features.

2. Description of the Site and its features.

2.1 Conservation value of site.

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

MPA 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, 2020). 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). On the island of Ireland there are several different MPA systems in place for the protection of important local and cross boarder species, under both RoI and NI jurisdictions; Special Areas of Conservation (SACs), Special Protected Areas (SPAs), and in NI Areas of Special Scientific Interest (ASSIs), Marine Conservation Zones (MCZs).

Republic of Ireland Special Protection Area.

The Carlingford Lough SPA in the RoI is made up of parts of the south side of the lough in Co Louth, between Carlingford Harbour and Ballagan Point. Habitats of interest include intertidal sand and mud flats but has been predominantly assigned due to the presence of internationally important light bellied brent geese (*B. hrota*) as shown in Figure 6, during the winter months. Their preferred habitat is along the salt marshes due to the presence of intertidal eelgrass (*Zostera noltei*) (Owen and Black, 1990; Hassall and Lane, 2005; Inger *et al.*, 2006). The distribution of intertidal eelgrass within Carlingford Lough (as provided by DAERA) is shown in Figure 8, where it is evident that it is confined to a small portion of the Mill Bay area and located on the northern and southern shores of Carlingford Lough. The presence of oyster trestles throughout various intertidal locations throughout the lough (such as Ballagan and Greenore) also provide excellent foraging areas for these Light Bellied Brent Geese (*B. hrota*). The high population numbers recorded at these sites indicate that they can easily support the large numbers of foraging brent geese in parallel with the current levels of aquaculture activities taking place (DAFM, 2022).



Figure 6: Light Bellied Brent Goose (*B. hrota*) (Bird Watch Ireland 2022).



Figure 7: Sandwich Tern (*Thalasseus sandvicensis*) (BWI, 2022).

The Lough's intertidal flats provide rich feeding areas for a variety of other internationally important populations of wintering waterfowl species including Wigeon (*Mareca penelope*), Oystercatcher (*Haematopus ostralegus*), Dunlin (*Calidris alpina*), Bar-tailed Godwit (*Limosa lapponica*), Redshank (*Tringa totanus*) and Turnstone (*Arenaria interpres*) (NPWS, 2011) and in the lower parts of the lough there are important breeding populations of terns (*Sternidae*s) (Poppleton *et. al* 2021). The E.U. Birds Directive pays particular attention to wetlands, and as these form part

of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds (NPWS, 2013a).

Northern Ireland Special Protection Area

The Carlingford Lough SPA in NI is situated between Killowen Point and Soldiers Point on the north shore of the lough and both its marine and terrestrial boundaries coincide with the boundaries of both the Carlingford Lough Area of Special Interest (ASSI) and the Carlingford Lough Ramsar Site. The site supports internationally important populations of Sandwich Tern (*Thalasseus sandvicensis*) and Common Tern (*Sterna hirundo*), as well as light bellied brent geese (*B hrota*) (DAERA, 2014).

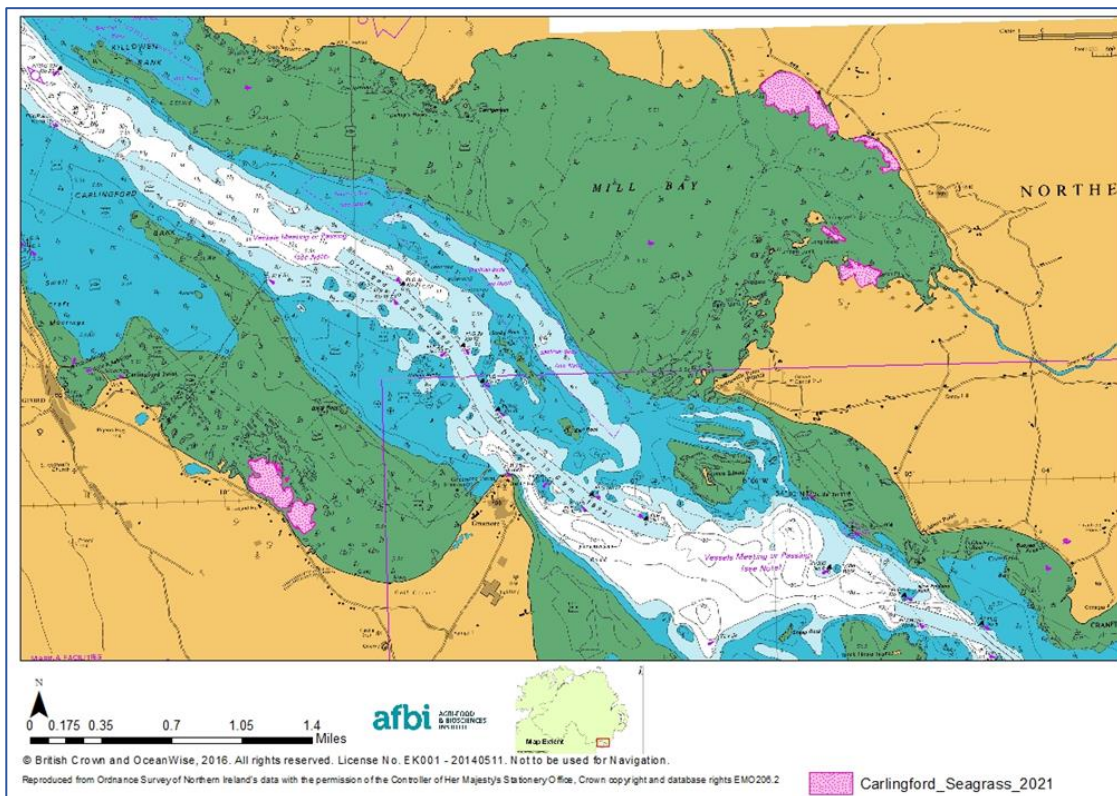


Figure 8: Distribution of intertidal eelgrass within Carlingford Lough as provided by DAERA.

Republic of Ireland Special Area of Conservation.

The Carlingford Lough SAC site comprises the entire southern shoreline of Carlingford Lough and continues round the tip of the Cooley Peninsula to just west of Cooley Point. While the principal conservation interests lie in the perennial vegetation of shingle banks and the annual vegetation of drift lines, the site also has intertidal sand and mudflats, patches of saltmarsh, some areas of dry grassland, and an area of mixed deciduous woodland. The site is flanked by Carlingford Mountain to the south-west. The underlying rock within the SAC is mainly carboniferous limestone. This outcrops in places in the form of bedrock shore or reefs. Granite boulders are occasionally found. Intertidal mudflats and sand/gravel banks also occur.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive:

- Annual Vegetation of Drift Lines
- Perennial Vegetation of Stony Banks

Northern Ireland Marine Conservation Zone and Area of Special Scientific Interest.

Carlingford Lough MCZ is located off the northern shore in the inner part of the lough, north of the navigation channel and contains shallow subtidal areas of fine mud encompassing approx. 3.23km². The presence of soft infralittoral mud supports various species including the white lobe shell (*Philine quadripartita*) and sea pen (*V. mirabilis*). Habitats created by sea pens provide oxygen, food, and shelter to a large number of smaller benthic infauna organisms like sea cucumbers (*Ocnus planci*) (DAERA, 2017a). DAERA have highlighted management measures in relation to marine and coastal activities within the lough. These measures are recommended to remove or avoid pressures associated with shipping and general at-sea anchoring and mooring, where they are likely to impact the MCZ features (DAERA, 2017a). For more detail on the marine conservation zone please see Carlingford Lough MCZ.

Carlingford Lough ASSI is located within Carlingford Lough and covers an area of 1105 hectares (Ha) It extends from Cranfield Point to the main intertidal mudflats upstream towards Newry, including Narrow Water which marks the transition from marine to terrestrial territory. Limestone sediment deposited during the Carboniferous period, approx. 339 million years ago, contain numbers of fossils of brachiopods and solitary corals (DAERA, 2015). The site also supports a diverse range of rich littoral communities such as boulder shores, muddy sand, intertidal seagrass beds and salt marshes. These salt marshes feature important drainage systems in the forms of creeks, pools/salt pans, and hummocks, Mill Bay contains the largest intact block of saltmarsh within NI (DAERA, 2017a). The ASSI contains intertidal mudflats and sandflat habitats that help to support nationally important wintering waterfowl species.

2.2 Features of the Special Protected Areas, Special Area of Conservation, Marine Conservation Zone and Area of Scientific Interest.

For the purpose of this management plan, we consider the SPA, SAC, MCZ and ASSI designations within the marine area, below the spring mean high tide mark, and with fully marine features to be considered as MPAs. The conservation objectives for the marine features within designations in both RoI and NI in Carlingford Lough are:

- **Republic of Ireland**

SPA:

1. "To maintain the favourable conservation condition of the waterbird Special Conservation Interest species listed for Carlingford Lough SPA" (NPWS, 2013a)
2. "To maintain the favourable conservation condition of the wetland habitat at Carlingford Lough SPA as a resource for the regularly-occurring migratory waterbirds that utilise it." (NPWS, 2013a)

SAC:

1. "To maintain the favourable conservation condition of Annual vegetation of drift lines in Carlingford Shore SAC, which is defined by the following list of attributes and targets" (NPWS, 2013b)
2. "To maintain the favourable conservation condition of Perennial vegetation of stony banks in Carlingford Shore SAC, which is defined by the following list of attributes and targets" (NPWS, 2013b)

- **Northern Ireland**

SPA:

1. To continue to enhance the current population of qualifying species.
2. Fledgling success to enhance/maintain current populations.
3. To ensure conditions of all surrounding habitats used by the qualifying species are properly maintained
4. To safeguard the integrity of the site
5. To prevent significant disturbances of the species and
6. To provide long term protection for:
 - Species populations within the site
 - Species distribution within the site
 - Species habitat distribution
 - All other supporting processes of habitats positively supporting the species (DAERA, 2017a)

- **MCZ:**

Protected features:

1. If in favourable condition, remain so (DAERA, 2017a)
2. If in unfavourable condition, are brought to a favourable condition and remain so (DAERA, 2017a).

Republic of Ireland Feature Status.

Table 1: Republic of Ireland List of SPA selection Features (NPWS, 2013a).

Feature Type	Feature	Last Status Update
Species	Light-bellied Brent Goose (<i>B. hrota</i>)	Intermediate - Unfavourable 2013

Table 2: Republic of Ireland SAC Selection Features (NPWS, 2013b).

Feature Type	Feature
Habitat	Annual Vegetation of Drift lines
Habitat	Perennial vegetation of stony banks

Northern Ireland Feature Status.

Table 3: Northern Ireland List of SPA selection features (DAERA, pers. comms).

Feature Type	Feature	Population (5 year mean 1995-2000) except where stated	Last Status Update
Species	Sandwich Tern (<i>S. Sandvicensis</i>)	575 pairs 5-year mean (2010–2014)	Favourable
Species	Common Tern (<i>S. hirundo</i>)	339 pairs 5-year mean (2010–2014)	Unfavourable
Species	Light-bellied Brent Goose (<i>B. hrota</i>)	435 5yr peak mean 2007/08 – 2011/12	Favourable

Table 4: Northern Ireland Feature List of Marine Conservation Zone (DAERA, pers. Comms).

Feature Type	Feature	Latest Status Update
Habitat	<i>P. quadripartita</i> and <i>V. mirabilis</i> in soft stable infralittoral mud	Favourable

Table 5: List of Carlingford Lough ASSI selection features.

Feature Type	Feature	Latest Status Update
Great Crested Grebe	Coastal Saltmarsh	Unfavourable

Habitat	Intertidal Mudflats and Sandflats	Favourable
Species	Great Crested Grebe (<i>Podiceps cristatus</i>)	Favourable
Species	Arctic Tern (<i>Sterna paradisaea</i>) Breeding	Favourable
Species	Common Tern (<i>S. hirundo</i>) Breeding	Unfavourable
Species	Light-bellied Brent Goose (<i>B. hrota</i>) Wintering	Favourable
Species	Oystercatcher (<i>H. Ostralegus</i>) Wintering	Favourable
Species	Red-breasted Merganser (<i>Mergus serrator</i>) Wintering	Favourable
Species	Redshank (<i>T. tetanus</i>) Wintering	Unfavourable
Species	Sandwich Tern (<i>S. Sandvicensis</i>) Breeding	Favourable
Species	Scaup (<i>Aythya marila</i>) Wintering	Unfavourable
Species	Shelduck (<i>Tadorna</i> sp.) Wintering	Unfavourable

For each of the SPA features, the responsible authority for SPA management in both jurisdictions have identified component objectives as shown in Table 5, 6 and 7. These objectives include a series of attributes, measures and targets which are assessed to determine the future status of whether a feature is in a favourable or unfavourable condition. The main component objectives for the Carlingford Lough SPA are specified for the sandwich tern (*S. sandvicensis*), common tern (*S. hirunda*) and Light - bellied brent goose (*B. hrota*).

Table 6: Republic of Ireland SPA Component Objectives (NPWS, 2013a).

Feature	Component Objective
Light-bellied Brent Goose (<i>B. hrota</i>) - wintering population	To ensure the increase in long term population trend

Table 7: Republic of Ireland SAC Component Objectives (NPWS, 2013b).

Feature	Component Objective
Annual Vegetation of Drift lines	Maintain the favourable conservation condition
Perennial vegetation of stony banks	Maintain the favourable conservation condition

Table 8: Northern Ireland SPA Component objective (DAERA, 2020).

Feature	Component Objective
Sandwich Tern (<i>S. sandvicensis</i>)	Fledging success sufficient to maintain or enhance population
Common Tern (<i>S. hirundo</i>)	Fledging success sufficient to maintain or enhance population
Light-bellied Brent Goose (<i>B. hrota</i>) - wintering population	<p>To ensure the long-term maintenance of:</p> <ul style="list-style-type: none"> Population of the species as a viable component of the site <ul style="list-style-type: none"> Distribution of the species within site Distribution and extent of habitats supporting the species Structure, function and supporting processes of habitats supporting the species

Table 9: Northern Ireland Marine Conservation Zone Management Options.

Features	Potential management options for the MCZ
White Lobe shell (<i>P. quadripartita</i>) & Sea pen (<i>V. mirabilis</i>) communities in soft stable infralittoral mud	<ul style="list-style-type: none"> Application for coastal infrastructure and dredging works are subject to marine licence which considers the impacts of the MCZ features; and Management measures are recommended to remove or avoid pressures associated with shipping – general at sea (anchoring and mooring) where they are likely to impact the MCZ feature.

3. Legislative Framework.

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, collectively referred to as Natura 2000 sites; Europe's largest network of

sites designated to protect endangered terrestrial/marine species (Classen, 2020). The first Irish Marine Spatial Plan, the National Marine Planning Framework (NMPF), was published and formally launched on the 1st of July 2021. The framework aims to cover a maritime area of approx. 495,000km² and sets out goals of protecting marine features up to the year 2040 (Marine Institute, 2022). Full policy details for the RoI have been attached in Appendix 2.

Table 10: Carlingford Lough MPA ROI Policy Summary.

	Policy	Summary
International	OSPAR Convention 1992	Aims to develop an ecologically coherent network of well-managed MPA 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 flood risk from floods of all flood types (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 Habitat's 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 Frame Works 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 Acts 1976 to 2022	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.

Legislation in NI.

The NI 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, with full policy details attached in Appendix 2.

Table 11: Northern Ireland MPA Policy Summary.

	Policy	Summary
International	<u>OSPAR Convention 1992</u>	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.
	UK Marine Strategy 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 flood risk from floods of all flood types (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. Also allows for the conservation of nationally important marine features and the designation of MCZs.
	Marine and Coastal Access Act 2009	In Northern Ireland 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.
	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 Northern Ireland through ASSIs.

	Nature Conservation and Amenity Lands Order (Northern Ireland) 1985	Provides the legislation to designate Areas of Outstanding Natural Beauty (AONB)
	The Wildlife (Northern Ireland) Order 1985 (the Order) and amendment The Wildlife (Amendment) (Northern Ireland) Order 1995	<p>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.</p> <p>It is an offence to release into the wild non-native invasive species as listed in Schedule 9 Part II of the Order.</p>

4. Management Tactics.

4.1 Management Goals and Objectives.

The Carlingford Lough MPAs management plan has been designed to 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 development decisions. This will provide a reference to those wishing to use or develop within Carlingford Lough, whilst respecting the multiple social and economic dependencies of the area.

MarPAMM MPAs Management Plans are non-statutory, they work in line with existing statutory and non-statutory marine and coastal management governance, i.e., Draft Marine Plan 2013, and National Marine Planning Framework 2021. This will help to establish management guidance for the Carlingford Lough MPAs Management Plan, as well as integrating wider marine management through marine spatial planning and coastal zone management. The management plan appraises each activity that could have a potential impact on the conservation interests of an area. This will identify current legislative policy relating to the regulation of each activity, and provides future management suggestions, based on existing legal framework within the site.

The plan has an integrated view 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 supported the work packages outputs from MarPAMM on seabirds, marine mammals, and coastal processes. The process by which it has been derived has built partnerships and opened lines of communication between those who have a direct interest in the site. The Carlingford Lough 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.

This management plan uses an approach based on an ecosystem management system by Sardá *et al.*, (2017) defined “*As the conservation of the species, habitat or ecosystem structure and functioning to maintain long-term and resilient ecosystem services.*” This will ensure the long-term sustainability 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 Carlingford Lough MPAs Management plan which can be found in Appendix 1.

Management - Strategic Guidance.

Strategic Guidance 1: Climate Change, Coastal Processes and Shoreline Change Impacts of Storm Events, sea-level rise and shoreline change.

The impacts from increasing intensity of storm events, sea level rise and increased erosion incidents present current and future challenges for the Carlingford Lough MPAs and adjacent areas, their species, and habitats. Findings from the MarPAMM coastal process work package highlighted the potential impacts from extreme weather events, further rises in sea levels and increased erosion incidents (Grottoli *et al.*, 2022). Although, this research was directed within the Murlough SAC, the findings have important considerations that are applicable within the Carlingford Lough MPAs Management Plan. 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. For example, in areas of sand dunes, impacts from these extreme events could create an inhospitable environment for the sensitive indigenous species and cause an increase 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 the RoI and NI. In NI, the risk of damages to coastal locations as a direct result of climate change was examined in September 2016 by an 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 are exposed to several sources of flooding and the number of assets exposed to these risks are likely to double within the next 60 years in line with projected changes in the UK climate (NMDDC, 2017). Findings from this report have outlined that shipping ports are at risk from rising sea levels and considerable increases in onshore wave height and storm surges. 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 (NMDDC, 2017). Although coastal erosion is a natural process, anthropogenic activities such as dredging, coastal engineering, land reclaim, gas mining and water extraction may contribute to the erosion process. These activities can also interfere with flood defences, increasing the risk of coastal flooding and consequential damage to infrastructure and private property as a result. In NI, recent events of tidal surges have caused approx. £1.4million in damages to roads due to heavy flooding, with approx. £382,000 required to fix the sea wall at Rostrevor Road, near Warrenpoint (NMDDC, 2017). Further impacts of coastal erosion can be seen in various locations along the NI coast, particularly at Windmill Road in Cranfield where planning requests for the development of a 127m sea wall to prevent further erosion was rejected on the bases of its adjacent location to two designated protected sites: Carlingford Lough SPA, Murlough SAC and Carlingford Lough ASSI (NMDDC, 2017).

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. This was based on the geographic extent of the flood plain and their proximity to local communities (RPS, 2010). The coastal location from Carlingford to Greenore was identified as a primary area at risk of potential coastal erosion in respect of both the 0.1% AEP and 0.5% AEP events. These

erosion maps have been produced as a tool to assist in identifying features that could be subject to coastal erosion in these locations over the next 50 years.

To mitigate the increasing effects of climate change on the coastal environments, the Carlingford Lough MPAs must take a proactive approach in addressing negative 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 through 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 apply. In these cases, applying both an engineering and nature-based response could be a successful management solution. To aid adaption and mitigation against climate change, coastal landowners and statutory regulators are encouraged to follow the actions outlined in 4.2. The Co Down-Co Louth Region 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 and allowing the expansion of non-indigenous warm water species.

The Northern Ireland Climate Change Act (2022) sets out NI’s response to the risks and opportunities identified in the Climate Change Risk Assessment for Northern Ireland (January 2012) as part of the overall UK Climate Change Risk Assessment. The Adaptation Programme provides the strategic objectives in relation to adaptation to climate change, the proposals and policies by which each department will meet these objectives and the timescales associated with the proposals and policies identified.

Blue Carbon Habitats.

Marine carbon storage habitats or “Blue Carbon” are habitats mainly composed of salt tolerant vegetation that can store large quantities of carbon within the soils and the sediments in which they grow, sequestering carbon through natural processes. These Blue Carbon habitats are very efficient “carbon sinks” and able to store significantly more carbon than terrestrial equivalent habitats of similar size’s (forests, heathlands, grasslands etc), making them a significant asset for the mitigation of climate change.

Within Carlingford Lough, the most prevalent Blue Carbon habitats are those of eelgrass beds (*Z. noltei*) which are mainly distributed along the northern shores of the lough and within the Mill Bay area, which can be seen in Figure 8. Blue Carbon habitats provide a significant natural resource in combating the effects of climate change, as well as provisioning wider biodiversity and protection against coastal erosion and flooding, binding of sediments and bioremediation. These areas provide nursery grounds for commercially important fish

species, foraging and breeding grounds for wintering birds and have societal wellbeing benefits.

The EU Habitats Directive (RoI), UK Habitats Regulations, Marine Act (Northern Ireland) 2013 and Environmental Orders (NI) provide 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 Co. Down – Co. Louth region. This will ensure that these habitats will be conserved, restored if declining and established in new areas deemed appropriate within the Carlingford Lough and adjacent areas, using the Strategic Guidance actions below.

Strategic Guidance 2: Commercial Fishing.

Within Carlingford Lough the extraction of living marine sources through commercial fishing is conducted through demersal and static gear for European Lobsters (*Homarus gammarus*) and edible crabs (*Cancer pagurus*). There is a small wild fishery for blue mussel (*Mytilus edulis*) and flat fish. This fishery operates on the northern shore within the Narrow Water area, north of Warrenpoint. Commercial fishing generally occurs in the inner part of the lough and as part of the ICES rectangle 37E3, with generally operating vessels under 10m. Additionally, static fishing occurs through potting for green crab (*Carcinus maenas*) and European lobsters (*H. gammarus*) within the main body of the lough along with small-scale intertidal collections of winkles, mussels, and wild cockles (Poppleton *et. al* 2021).

Within the “wild fishery” commercial targeting occurs using several gear types (including demersal trawling and dredging), which could have the potential to damage features adjacent to the MCZ. Further challenge could occur through fishing intensification with physical damages, de-oxygenation, habitat structure changes, siltation rate changes, abrasion, and unintentional removal of non-targeted species along with targeted (DAERA, 2016).

Presently, there is some evidence from side scan sonar and observer reports of boats on operation or turning gear within the MCZ (DAERA pers. comms). The presence of pot landings at locations in Warrenpoint and Greencastle suggest that fishing practices are occurring in the inner part of the Lough (DAERA, 2016).

Overall, DAERA considers fishing traps (pots/creels) to be a moderate risk to achieving the initial conservation objectives for the MCZ. Fishing traps should be removed, avoided or limited from any location where they are likely to negatively impact features protected within the MCZ (DAERA, 2022).

Strategic Guidance 3: Aquaculture.

Aquaculture activities within Carlingford Lough occurs on licenced sites on both the intertidal and subtidal terrains (Boyd, 2015). The subtidal aquaculture involves the bottom culture of blue mussel (*M. edulius*) and the intertidal aquaculture involves the trestle culture of Pacific Oyster (*Magallana gigas* formally known as *Crassostrea gigas*) (Poppleton *et al.*, 2021). Site licences for the bottom cover of shellfish cover 23pprox.. 943 Ha of the subtidal area of Carlingford Lough and 23pprox.. 218 Ha is licenced for off bottom culture of oysters (Poppleton *et al.*, 2021). In total 23.7% of the total area of Carlingford Lough is licenced for Aquaculture (although it is important to note that not all licences are currently active).

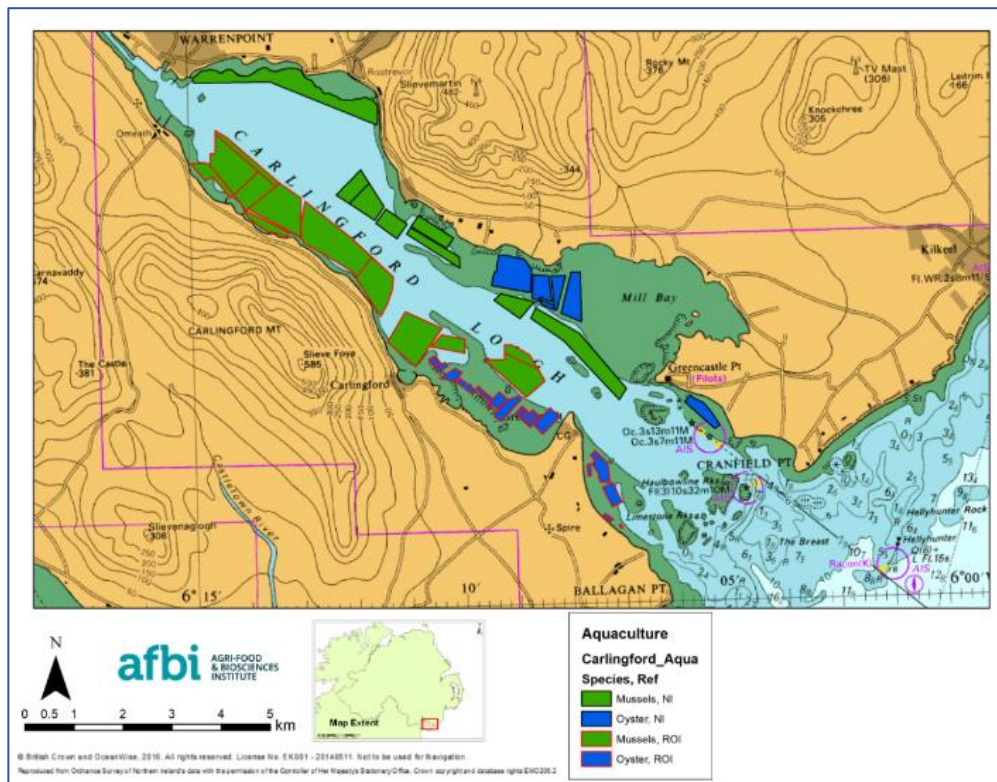


Figure 9: Map of all current licenced aquaculture sites within Carlingford Lough (Poppleton *et al.*, 2021).

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) for the Carlingford Lough Area. In the case of aquaculture developments being proposed in areas within or adjacent to protected MPAs, these generally will require an Appropriate Assessment to examine any potential impacts on designated features. The Marine institute provides scientific advice on Marine and Aquaculture environment issues, carrying out relative scientific reports. In cases where an Appropriate Assessment indicates negative issues, these reports can help to create mitigation measures for Carlingford Lough.

In NI, the Marine and Fisheries Division of DAERA, is responsible for the approving of fish culture licences, shellfish fishery licences and marine fish fishery licences under the Fisheries Act (Northern Ireland) 1966 (Poppleton *et al.*, 2021). In coastal areas, aquaculture operations existed prior to this legislation, therefore Ireland 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 (Marine Institute, 2019 & Poppleton *et al.*, 2021). Due to the designated features within MPAs on Carlingford Lough, only applications for aquaculture sites within NI are subject to Habitats Regulations Assessment under the Conservation (Natural Habitats etc.) Regulations (Northern Ireland) 1995. This HRA process is designed to show if new proposals for aquaculture will have an impact on designated MPAs.

Aquaculture operators 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.

Strategic Guidance 4: Recreational and Tourism

Shoreline based recreation.

Within the Carlingford Lough Region, there is a wide range of shoreline based recreational activities from angling, abseiling, kite buggies, dog-walking, bird watching, camping, and hiking within areas close to MPAs. Shoreline based recreational activities within the Carlingford Lough Region should be conducted with an awareness to implications of anthropogenic interactions with MPAs, adjacent areas and features. The focus is to inform recreational users of the risk activities can pose to MPAs and the impacts associated with unmanaged or uninformed use and/or overuse (increased pressure). This is achieved by providing education to recreational users as to how they can minimise their level of impact, MarPAMM have 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 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.

Surface based recreation.

The South East Canoe Trail stretches 90 kilometres along the southeast coast of Northern Ireland and into Co. Louth in the Republic of Ireland. Much of this trail traverses through Carlingford Lough, up to Narrow Water castle and on to Newry Canal. The scenery makes the lough a popular spot with local canoe clubs and activity centres, with the lough providing regular access and egress points at Omeath Road jetty, Narrow Water, Greer's Quay, Carlingford Harbour, Ballylagan Point, Albert Basin Quay and Rostrevor. Many of these access points also offer parking and picnic benches.

Various water-sports and adventure centres exist on the shores of the lough, namely Carlingford Adventure Centre; Rostrevor Swimming and Boating Club; East Coast Adventure Centre operates a Watersports Centre from Warrenpoint Baths through a lease from Newry, Mourne and Down District Council (Poppleton *et al.*, 2021).

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 (Oakley *et al.*, 2017). DAERA assessments carried out through the Jet-ski public consultation for introducing regulations (2020) have indicated that there are no disturbances to designated features within the Lough on the NI shores. Disturbance is the result of direct or indirect interaction with people that causes a change in behaviour of an animal or changes the 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, increased vulnerability of an individual or population to predators, damage to habitat and chronic stress, which can impact on an animal's health (e.g. immune, digestive and reproductive functions). The main pressure associated with pleasure boating and cruising is physical abrasion associated with anchoring/mooring, which can result in degradation of designated benthic features.

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 or mooring activity associated with pleasure boating and cruising within the SACs within/adjacent MPAs within the Carlingford Lough region should be avoided (unless specified by statutory policy) to aid in the continued achievement of the conservation objectives. Anchoring in emergencies will not be restricted.

Sub-aqua recreation.

Sub-Aqua is a broad term encompassing recreational underwater activities including snorkelling, freediving, and SCUBA diving. In the RoI, the DHLGH are the responsible authority for sub aqua archaeological sites. In NI, DAERA are 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.

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 to recreational divers and snorkellers through awareness and education recording marine species and habitats within the Carlingford local environment. The information collected can be uploaded to the Irish National Biodiversity Data Centre (INBDC) and the NBN (Northern Ireland). This data collected by citizen science can be a useful observational

tool for understanding the condition of MPAs and wider ecological trends within Carlingford Lough.

In general, fishing activities (i.e., spearfishing) that occur within sub-aqua conditions are regulated using the same by-laws as outlined in the shoreline-based fishing activities strategic guidance, which has been expanded in the guidance actions below. It must 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 conscious manner that causes no intentional damage to MPA designated features. Recreational divers intending to dive within the Carlingford Lough MPAs management plan area should follow the actions outlined in 4.2 before participating in sub-aqua activities.

Strategic Guidance 5: Marine Infrastructure, Ports and Harbours.

Marine Infrastructure encompasses a wide array of development, which include 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 the 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 Carlingford lough there are two important port assets with Warrenpoint and Greenore. These ports tend to manage their activities in such a way that they contribute positively to the environment status of marine areas. This requirement was derived from the Marine Strategy Framework's Directive and is currently applicable to the RoI to 1 nautical mile for water quality but also includes issues such as litter and noise. Through the UK's withdrawal from the EU, this is covered in NI through the UK Marine Strategy. The purpose of this approach is to achieve "Good Ecological Status". This legislation provides the basis for development, managing waste and water pollution.

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 and typically, with Haulbowline lighthouse located just off the coast, to the entrance of Carlingford Lough. Collectively these are known as the Harbour Authorities or County Councils. 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 and 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. AtoN include

lighthouses, radio aids, buoys, beacons, poles, signs, and any other aid intended to assist safe navigation.

Although there is a section on climate change, the following information is more applicable to this section of the management plan. Within Carlingford Lough Remedial coastal protection for existing infrastructure, support (i.e., ports and railways) along the shoreline should follow an approach, which avoids detrimental protected feature degradation and can demonstrate significant resilience. This approach should focus on Nature Based Solutions (NBS) or soft engineering methods with the aim of achieving sustainable long-term coastal resilience. For all new and proposed marine/coastal developments, the strategy should move towards co-management-based realignment, existing coastal infrastructure should work towards this realignment with the next ten years. In cases where hard engineering is required, departmental policy should be followed. In the undeveloped coast, co-management-based realignment should be the sole focus.

Infrastructure, ports, and harbour developments 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.

Strategic Guidance 6: Dredging.

Ports, harbours, and shipping lanes within Carlingford Lough require routine maintenance dredging of sediment to ensure navigational channels and berths can remain operational for safe vessel navigation. Dredging within Carlingford Lough occurs in the central channel of the lough to the Narrow Water inlet, with Warrenpoint and Greenore ports, engaging in various forms of navigational dredging such as plough dredging and maintenance dredging. In most cases removal of materials from the seabed and deposition of materials into the sea requires a marine licence. There are a few exempt activities that do not require a licence:

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

From an NI perspective, some attributes of these exemptions have been highlighted by the competent authority to having potential negative impacts on areas in and adjacent to MPAs, although it is important to note that exempted activities are not more likely to cause negative impacts than non-exempted activities. Although navigational dredging occurs, there is no overlap between the channel dredging and the MCZ. However, the proximity of Warrenpoint harbour may pose a risk if dredging activity occurs within or adjacent to the MCZ boundary (AFBI, 2017). This risk has the potential to impact the northwest area of the MCZ through “*re-suspension and smothering*”, caused by direct habitat/species destruction through habitat

removal or by the disposal of dredged materials (smothering/siltation) onto vulnerable habitat features/species (DAERA, 2016). If levels of activity were to increase a buffer would be added to proposed dredge sites to enable activity while avoiding damage to designated features.

4.2 Specific Goals and detailed actions to deliver Strategic Guidance.

Strategic Guidance 1: Climate Change Actions, Coastal Processes and Shoreline Change.

Management measures which cover shoreline management within the Carlingford Lough MPAs are outlined below and in guidance.

1. To increase the resilience of Carlingford Loughs coastal habitats, restoration of features of interest should be encouraged by local landowners, local authorities, and competent regional authorities to help reduce the impacts of increased storm, flooding, and erosion events.
 - a. 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 wave energy.
 - i. Using green and blue infrastructure (i.e., marshes to increase resilience to sea level rise will create living shorelines that can help to stabilise and protect against higher water levels).
 - ii. In extreme cases where the competent authority deems it appropriate, a hard engineering response will be accepted as a last resort.
 - iii. Managed realignment should be encouraged and promoted by competent authorities.
 - b. 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.
 - c. In areas of identified coastal risk areas, grey infrastructure such as sea walls, rock armour and gabions, should be discouraged with greater focus on green infrastructure.

- d. Existing storm defence infrastructure from either governmental, private or a local authority's perspective should consider introducing Nature Based Solutions or soft engineering.
 - e. Coastal infrastructure operators should work with competent authorities to achieve an aligned management approach.
- 2. 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 regard for areas of highly sensitive sand dunes because of coastal erosion through awareness of local existing signage and areas off limits.
- 3. Marine users should report sightings or occurrences of non-indigenous species to the competent authorities.
 - a. 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.
 - i. In NI the Centre for Environmental Data and Recording (CEDaR) records all data reported for both native and non-native species
 - ii. 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. The competent authorities must identify low-lying coastal areas 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 to be developed in conjunction with both regional and local authorities.
- b. Saltmarsh habitats have the effect of by 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 measure to reduce declines, examples include the installation of artificial floating islands.

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, restore and create new areas of Blue Carbon habitats within the Co Down-Co Louth Region, as supported by The Green Growth Strategy for Northern Ireland 2022 and the EU Adaptation Strategy 2021 for the RoI.
 - a. Competent authorities should map existing Blue Carbon habitats and enhance protection to help achieve net gains of Blue Carbon habitats.
 - 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.
 - 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 or eel grass (*Z. noltei*) beds intentionally or through negligence, under the EU Habitats Directive (RoI), UK Habitats Regulations, Marine Act (Northern Ireland) 2013 and Environmental Orders (NI).
 - 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 eelgrass (*Z. noltei*) 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 eelgrass (*Z. noltei*) 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 Blue Carbon habitats (and potential Blue Carbon) due to climate change and human activities.
5. Further research and monitoring of coastal areas in Carlingford Lough should be undertaken to identify un-designated 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.
6. 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 2: Commercial Fisheries.

The DAERA (2020) consultation on the development of fisheries management measures for MPAs has identified that the level of static gear fishing activity taking place in Murlough SAC area is considered as low. As the designated sandbank features are moderately sensitive to static gear fishing pressures, the risk of damage is moderate. To mitigate this risk the Department are recommending the introduction of a managed static gear fishery throughout the MCZ. The Department expect limited loss of fishing opportunity from the introduction of the additional management measures on the pot fishery. The level of static gear fishing activity taking place in the Carlingford Lough MPAs management area is considered as low and has been highlighted by the inshore fisheries management consultation (DAERA, 2021) as having a moderate impact to designated features within the area.

The Marine Protected Areas (Prohibited Methods of Fishing) Regulations (Northern Ireland) 2022 will prohibit demersal mobile gear throughout the entire MCZ. The Inshore Fishing

(Prohibition of Fishing and Fishing Methods) Regulations (Northern Ireland) 1993 prohibit the use of any trawl net or any seine net, for the capture of sea fish, within Northern Ireland inshore waters, within Carlingford Lough.

Management measures which cover commercial fishery actions within the Carlingford Lough MPAs are outlined below and include both statutory measures and in guidance.

1. Landing sizes for lobsters (*H. gammarus*), brown crabs (*C. pagarus*), velvet crabs (*Necora puber*) and whelks (*Buccinum undatum*) 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. Historically these were introduced at an EC level through Council Regulations (EC) 850/98. This been amended into UK Policy though the Fisheries Act (2020). The current Minimum Landing Size (MLS) are 150mm for brown crab, 87mm for lobster, velvet crab 65mm and 45mm for whelk. Whilst the MLS for velvet crab, lobster and whelk follow those set out in the EU regulations, DAERA have increased the MLS brown crab from the EU MLS of 130mm to 150mm 25 (January 2022) following consultations with the fishing industry on ways of sustaining the stock. Unless a species is subject to the landing obligation (discard ban) you must return all catches below the MLS to the sea immediately.
 - a. The Edible Crabs (Conservation) (Amendment) Regulations (Northern Ireland) 2021 (S.R. 2021 No. 336) prohibit 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 licence.
 - a. Under the regulations it prevents anyone without a licence from:
 - i. Landing more than five crab 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) and prawns (*Nephrops norvegicus* and *Palaemon serratus*) in Northern Ireland.
3. Using V- notching as a means to increase the total number of reproductive female crustaceans within a population, increasing 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 the high-water content, but which will also greatly reduce their survival rate if landed.

- a. The DAERA (2022) consultation on proposals to prohibit the fishing for and selling of soft-shelled edible crab could create new legislation.
5. Vessels under 12 metres should be encouraged to use I-VMS for while operating within the pot fishery area. Data derived from I-VMS will provide a more complete picture of all fishing in our seas.
 - a. I-VMS provides latitude and longitude, course, speed and date and time of each positional report and reports data via mobile phone signal (GPRS) which is a cheaper alternative.
 - b. This issue has been explored by DAERA (2022), through a consultation on I-VMS for fishing vessels under 12 metres as an enhanced data collection and monitoring tool.
7. 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 Habitats Directive 92/43/EEC article 16, 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 showed that, when used, less bait is needed.
7. Static fishers should be aware of all MPAs, the MPA network and the connectivity between MPAs when carrying out commercialised fishing practices and where practicable, fishers should ensure the impact to designated features is limited.
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 fisher 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 fishermen's pots are moved by weather events.
 - a. Marking of static pots can help to distinguish the difference between a commercial fisher or a hobby fisher. This developed further into a departmental scheme for tagging to examine tagging differences between commercial and hobby.
10. There is some dredging for "free" mussel in Carlingford Lough, i.e: mussel not located on licenced growing areas. Annual landings of up to 55 tonnes have been recorded.

- a. Dredge fishing within the lough is considered small but operators should be aware that operation adjacent or close to the MCZ in NI and the SAC in the RoI has the potential to damage designated features.
 - b. Information on the intensity of this activity is limited and demonstrates a need for enhanced data collection through electronic or observer small vessel monitoring.
11. Smaller shipping vessels undertaking demersal fishing activities for flatfish should limit the impact from demersal gear in areas adjacent to MPAs, which 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.

Strategic Guidance 3: Aquaculture.

Management measures, which cover aquaculture management within the Carlingford Lough MPAs, are outlined below and include both statutory measures (numbers) and guidance (numbers).

1. All aquaculture operators within MPAs follow statutory guidelines and will require appropriate licencing relative to each jurisdiction:
 - i. In NI, licencing is required under section 11 of the Fisheries Act (Northern Ireland) 1966.
 - ii. In RoI, the Aquaculture and Foreshore Management Division of DAFM is responsible for aquaculture licencing under the Fisheries (Amendment) Act, 1997 (Poppleton *et al.*, 2021).
2. All aquaculture operators continually monitor the health of cultivated species to minimise the risk of transmissible diseases and parasites to naturally occurring species within MPAs, as well as reducing the risk of transmissible pathogens to humans.
 - i. Aquaculture operators are aware of relevant 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 eelgrass species).

4. The accumulation of faeces and pseudo faeces beneath intertidal oyster trestles has the potential to impact benthic community structures.

- i. These impacts are small scale and localised.

5. The Molluscan Shellfish (Control of Deposit) Order (Northern Ireland) 1972 prohibits the introduction into Northern Ireland waters of molluscan shellfish taken from outside Northern Ireland 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 (*M. gigas*), which is a non-native species, is regulated under the Alien and Locally Absent Species in Aquaculture Regulations (Northern Ireland) 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 (Northern Ireland) 2012, in accordance with competent authority.

- 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 NPWS in the Republic of Ireland and Northern Ireland Environmental Agency 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. It is an offence for an operator to introduce an alien species or 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 (Northern Ireland) 2012. Licenced aquaculture operators of such species are required by the terms of their Fish Culture Licence to ensure effective measures are taken to prevent the spread of these species outside of the aquaculture site.

7. In the RoI, plans have begun working towards coordinating on the International River Basins Districts Management Plan (IRBDs) and 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). More information on the Water Framework Directive Co-ordination Group can be found: <https://circabc.europa.eu/ui/group/1c566741-ee2f-41e7-a9157bd88bae7c03/library/c0e2818a-febe-4af9-a75b-c00bd649f2ac>.

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

Strategic Guidance 4: Recreation and Tourism.

Shoreline recreation.

Management measures which cover recreational activities and shoreline management within the Carlingford Lough MPAs are outlined below and include both statutory measures and guidance.

1. Recreational users within MPAs where activities including angling, sea bathing, bird watching, walking/hiking, geo-tourism, exercising, and beach going should adhere to local authorities, DAERA and DHLGLH codes of conduct for the shoreline of Carlingford Lough.

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

- a. 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 &c.) Regulations (Northern Ireland) 1995 (as amended) gives power to the competent authority to reduce the level of disturbance to habitats and wildlife within 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, and killing and in some cases possession or sale of the species.

- a. For marine mammals all users should keep your distance 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. 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. 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. 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.

- 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 and or 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.

- c. Recreational dog walking:

- I. Dogs can often cause alarm to both sea birds and seals, if you do 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 communication and planning for management of licenced operators, through the development of information and training needs of recreational service operators to enhance visitor experiences.

5. Support and promote the implementation of volunteer codes of conduct for activities within MPA sites:

- 1. Leave no trace campaign for the Island of Ireland.
- 2. The Wise Scheme- Minimising Disturbance for Marine Wildlife.
- 3. Newry Mourne and Down District Council's Guidance on Share the Shore; and
- 4. Nature Scotland's A Guide to Best Practice for Watching Marine Wildlife.

6. Commercial recreation providers and local activity clubs should work with customers and/or members to disseminate codes of conduct and measures verbally, through social media and websites.

7. Shoreline angling are 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).

8. Recreational activity users and operators should have good practice methods in creating an environment that does not cause any negative impact on the marine environment within the MPA network.

9. 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 further 15% reach inland shores (OSPAR, 2022).

10. In Carlingford Lough, volunteer clean ups have removed hundreds of bags of rubbish with a specific note to the high volume of plastic and fishing related marine litter (Wall, 2017). This coincides with the increase in documented cases of seals becoming entangled by irresponsibly discarded fishing gear and ingesting plastic materials (Desclos *et al.*, 2022).

- I. The Co-Ordinated Local Aquaculture Management Systems (C.L.A.M.S) group collaborates with the local community Tidy Towns clean up initiatives during the months of May and September. C.L.A.M.S also do a prewinter shore clean up each October.

- II. An Bord Iascaigh Mhara (BIM) also assist with funding of beach clean initiatives and the recycling of aquaculture equipment e.g., metal trestles from oyster cultivation and plastic barrels.

11. Education of the significant impacts of marine litter on local marine species is crucial to the successful conservation of Carlingford Lough's marine mammal species.

Surface based recreation.

Management measures which cover shoreline management within the Carlingford Lough MPAs are outlined below and include both statutory measures and guidance.

1. Users within MPAs undertaking activities including, boating, jet-skiing, wildlife watching and recreational offshore fishing should follow Departmental (DAERA Marine and Fisheries Division and DHLGH) and local authority policy, by-laws and guidance to reduce negative adverse effects on designated features.

- a. In some activities of surface based recreations, the Departments in NI and the RoI will require a Habitats Regulation Assessment to be conducted or/and a marine license obtained for operations in appropriate circumstances.

2. 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.

3. Surface based recreational participants should ensure that they are following best practice guidelines regarding the approach outlined in the JNCC code of conduct.

4. Surface based recreational users should comply with appropriate regulations around wildlife disturbance.

- a) 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 (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended) gives power to the competent authority to reduce the level of disturbance to habitats and wildlife with protected features.
- c) In the RoI, the Natural Heritage Act and the Wildlife Act 1976 ensures the protection and conservation of all wild flora and fauna with the intention of continually preserving important ecosystems.

5. 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.

6. 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).

7. Pleasure boating and cruising operators should aim to achieve best practice as outlined within Moorage and Anchorages strategic guidance, to reduce the risk of degradation to designated benthic features within or adjacent to MPAs and protected wrecks.

8. Surface based recreational users from pleasure crafts should take caution when anchoring and mooring within MPAs and adjacent areas to mitigate as little damage to the seabed and the designated features within the area (i.e. seagrass (*Zostera spp.*) and maerl (*Phymatolithon calcareum*)). 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 Royal Yachting Association (RYA).

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 you approaching could be more serious as you could disrupt this important behaviour. If they are with young, this may affect their willingness to engage. Knowing what their original behaviour is can help you determine if you cause a disturbance, i.e. if the behaviour significantly changes.

- i. Do not approach animals closer than 100m. Remain at least 200m away if another boat is present and 300m away if a mother and calf are present.
- ii. Spend no longer than 15 minutes near the animals.
- iii. Do not drive head on, in-between on attempt to encircle the animals.
- iv. Maintain a slow 'no wake' speed and steady course.
- v. If animals approach your craft, turn the engine to neutral.
- vi. Never swim with animals in the water.
- vii. 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 be witnessed in 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. We recommend a minimum approach distance of around 50 metres, 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 recreation.

Management measures which cover shoreline management within the Carlingford Lough MPAs are outlined below and include both statutory measures and guidance.

1. Recreational divers must acquire all adequate diving qualifications issued by an accredited diving organisation in order to dive eg: PADI.

2. Recreational divers must adhere to safe and responsible diving practises as outlined.

3. Divers and snorkellers are encouraged to follow UNESCO's Code of Ethics for Diving on Underwater Cultural Heritage Sites and the BSAC, PADI and SSA's Respect Our Wrecks Code of Practice.

1. Respect our wrecks policy

- a) Respect war graves. Many wrecks are also war graves. Treat them with the respect you would give a churchyard.
- b) Respect the wreck environment. Many wrecks make great habitats for marine life. Treat them with the care you would give to coral reefs.
- c) 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.
- d) 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.
- e) Respect yourself. Make sure that you are appropriately trained for safe wreck diving.
- f) Respect your family and friends. Some wrecks contain dangerous cargoes or live munitions. Don't disturb them or bring them ashore.
- g) Respect the law. Know and respect maritime laws - and avoid a criminal record.

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 could help experts to identify trends and changes in the MPA network.

5. Divers can actively help to protect the marine environment by reporting marine wildlife sightings to CEDar online recording facility or by using iRecord smartphone app and watching out for marine wildlife disturbance.

6. Divers should be encouraged to have adequate diving qualifications, issued by an accredited diving organisation, in order to dive.

a. Divers should have experience/training in cold or temperate waters prior to exploring any of the Northern Ireland sites.

b. In order to minimise the risk of harm to yourself or your diving buddy, please remember to practice the principles of safe and responsible diving which apply before, during and after your dive or snorkel.

7. Recreational divers participating within sub aqua activities should aim to achieve best practice when diving in areas containing marine mammals, sea birds and basking sharks.

8. 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 Sub aqua activities.

9. 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.

10. Divers and snorkellers should follow the principles of 'Leave No Trace' while on land before or after their dive/snorkel.

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

12. 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).

13. Divers and snorkellers 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-sea and shoreline, as this approach is applicable for coastal areas outside of the Causeway Coast.

Strategic Guidance 5: Marine Infrastructure, Ports and Harbours Actions.

Management measures which cover marine infrastructure, ports, and harbours management within the Carlingford Lough MPAs are outlined below and include both statutory measures and guidance.

1. Any development within ports and harbours within the Carlingford Lough MPAs management plan area should be done so under appropriate legislative guidelines, with preapproved planning permission and an obtained marine construction licence from the competent authorities (DAERA, 2017b).

- I. DAERA are the marine licensing authority in Northern Ireland and in the RoI, DAFM is responsible for marine infrastructure licencing.

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.

- i. Ports and harbours are obliged to ensure the provision of 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, 2017b).
- ii. This plan should incorporate all processes required by the relevant legislations, with focused intentions to mitigate damages to environmental habitats/features (DAERA 2017b). 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.

- iii. All permissions for shipping operations must be obtained from the designated port/harbour 24 hours prior to operations commencement.
- iv. All ship-generated waste produced must be delivered to a designated waste reception facility and pay a mandatory charge for the service (DAERA, 2017b).
- v. All persons operating within harbours/ports/waste management facilities should be up to date with Marine Guidance Notices (MGNs), Merchant Shipping Notices and Marine Information Notices published by the Maritime and Coastguard Agency (DAERA, 2017b).
- vi. The harbour authorities within the Carlingford Lough MPAs management plan area should carry out daily patrols to retrieve any floating waste/debris/marine litter generated from land and marine based activities or storms
- vii. 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.
- viii. Shipping vessels contain many unsafe materials which can pose a threat to both human safety and the environment. Any “End-of-life” shipping vessels must be responsively dismantled/recycled to prevent contaminated material escaping and potentially harming marine and human life. The competent authorities should continually review current energy and waste related infrastructure within the Carlingford Lough MPAs management plan area and the environmental profile of port users (DAERA, 2017b).

3. Shipping operations, shipping traffic, recreational water sports other terrestrial and marine activities that take place in Carlingford Lough have the potential to cause water pollution.

- i. Harbours and ports within the Carlingford Lough MPAs management plan are obliged to have specific contingency arrangements for any water pollution events that may occur within the lough. 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 [here](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/614442/Contingency_planning_marine_pollution_preparedness_and_response.pdf); Contingency planning: marine pollution preparedness and response - GOV.UK (www.gov.uk)
- ii. In the RoI, protection for Carlingford Lough 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, 2019).

4. All fast-moving vessel operators within the Carlingford Lough MPAs management plan area must adhere to the designated speed limit within the lough as it mitigates the risk

of reckless disturbances, injury, or mortality of marine wildlife, in particular, to larger marine mammals such as grey seals and the resident bottlenose dolphin, Finn.

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

7. Acoustic monitoring should be conducted within the shipping lane of Carlingford Lough to aid and enhance marine management, in terms of monitoring the acoustic presence of a target species, and indirectly by monitoring the acoustic environment individuals are exposed to.

- a. 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 6: Dredging Actions.

Management measures which cover dredging within the Carlingford Lough MPAs are outlined below and include both statutory measures and guidance.

1. It is suggested that dredging sites within the Carlingford Lough MPAs management plan area be identified through regular bathymetric monitoring and appropriate assessment of potential sediment deposit rates (DAERA, 2017b).

2. Marine licences for dredging (where necessary) within the Carlingford Lough MPAs management plan must be obtained from the relative authorities:

- i. In NI the Marine and Fisheries Division of DAERA are responsible for licensing and monitoring dredging activities
- ii. In the RoI, consent must be granted by the Department of Housing, Local Government and Heritage (DHLGH) under the Foreshores Act.
- iii. It is important to note that marine licences are not always required, however research and preparation should be conducted/confirmed prior to commencement of any operations.

3. All dredging operations within the Carlingford Lough MPAs 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.

- i. To mitigate risk of pollution, all potential polluted contaminants from extracted materials must be identified prior to licence application under the OSPAR

Guidelines for the Management of Dredged Materials, which can be found here; [OSPAR-dmguidelines.PDF \(dredging.org\)](https://www.dredging.org/OSPAR-dmguidelines.PDF)

- ii. If high levels of pollutants are detected within 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, 2017b).

4. Dredging operators should be aware of all MPAs, the MPA network, protected species and the connectivity between MPAs when carrying out dredging activities and where practicable should limit the impact to designated features.

- i. All dredging operations should be up to date and familiar with the Marine Wildlife Licencing Guide which can be found: <https://www.daera-ni.gov.uk/publications/marine-wildlife-licensing-guidance-applicants>
- ii. Dredging operators should be aware of the potential risk that noise pollution from operations may have on marine mammals within Carlingford Lough 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 lough's ecosystem. A Marine Mammal Observer (MMO) should be present to monitor the surrounding area for cetaceans or seals whilst dredging activities are under operation. A site-specific Marine Mammal Risk Assessment (MMRA) should also be undertaken in advance of the engagement of the MMO to ensure the risk and requirements are assessed. This will considerably reduce the risk of injury/disturbance to the larger marine mammals within the lough.

5. Monitoring of Plan Effectiveness.

Monitoring, evaluation, and research are fundamental to the success of MPA Management plans. The strategic guidance plan needs to demonstrate to regulatory authorities, marine activity users and local communities that the strategic guidance and actions are making a difference to the integrity of the conservation objectives and achieving the aim of the plan. This process needs to be iterative with continual learning from management experience to help keep improving the overall integrity of the management plan through adaptive management.

The management plan policies have monitoring to help evaluate the effectiveness of management approaches. Initially the monitoring should focus on outputs that can be measured, using the modelling and data outputs from the MarPAMM project, as well as key species and habitats within MPAs. This approach to monitoring effectiveness is essential to distinguish the success in delivering the aims, objectives, and outcomes of the management plan. 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 5 years to provide a detailed update and review of the strategic guidance.

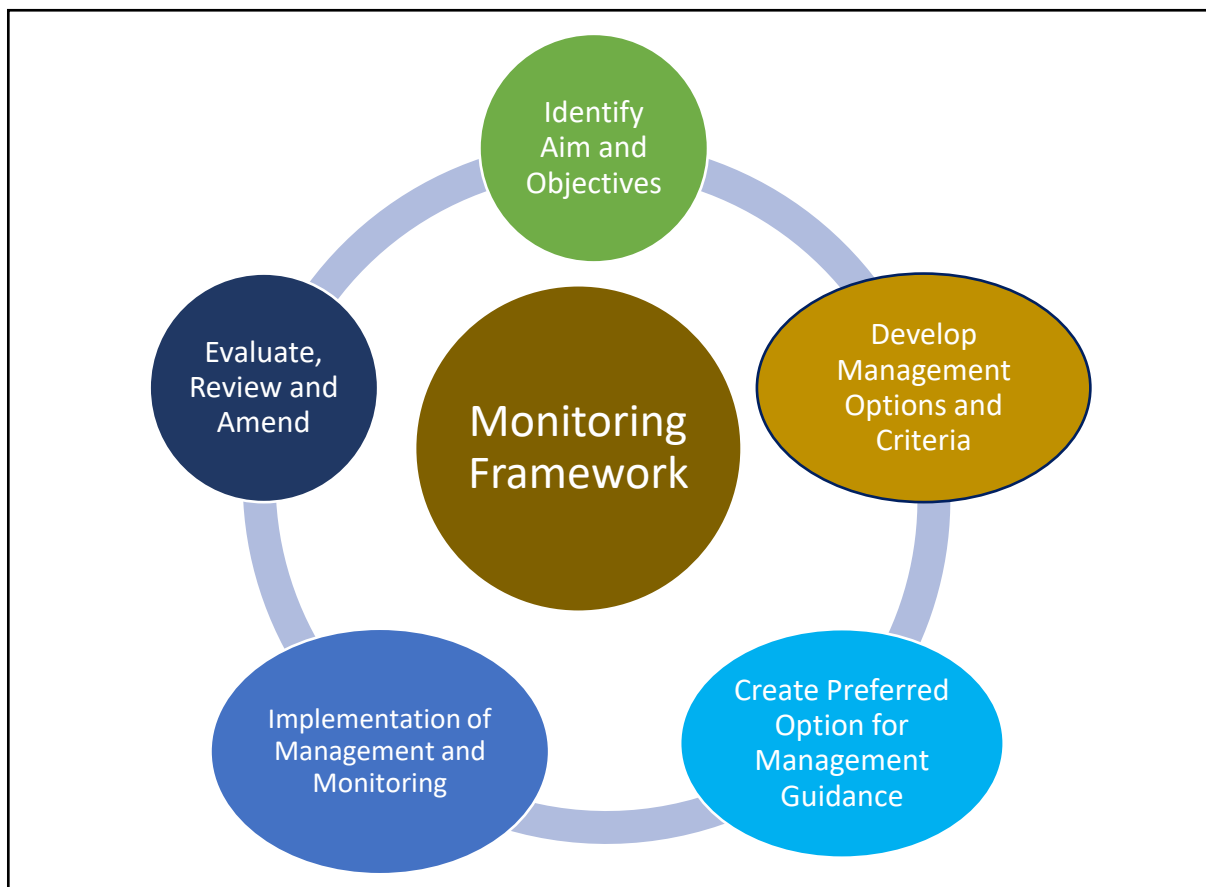


Figure 10: Management Monitoring Framework (AFBI, 2022).

Strategic Guidance 1: Climate Change, Coastal Processes and Shoreline Monitoring.

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 LAs) should monitor the condition of future shoreline within the dynamics of change and the impacts of features.
3. DAERA Marine and Fisheries and NPWS 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 a five-year plan review.

Due to the impact that climate change will have on the marine environment, and the natural processes which take place within, there is no designated feature, MPA or adjoining area within the Co Down-Co Louth Region that will not be affected by climate change. This extends to all MarPAMM Regions around the Ireland of Island, 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 Monitoring.

1. The competent authority will monitor the scale of biosecurity measures and the extent of disease, non-native spread, and native species absence within designated Blue Carbon Habitats.
2. DAERA Marine and Fisheries and NPWS will construct an assessment document to review and examine the impact of actions associated with this guidance.
3. All aspects of this guidance will be re-examined as part of a five-year plan review.

Strategic Guidance 2: Commercial Fisheries.

1. DAERA Marine Fisheries and DAFM will examine the impacts of activities that affect benthic environments and develop records of present condition and subsequent variation of condition in the feature(s) of interest.

2. DAERA Marine Fisheries and DAFM will monitor the impact and application for mitigation of bycatch, such as modifying fishing gear to reduce the accidental catching of non-target species.

- h) This should include extensive monitoring of current impacts and recordings of bycatch on stocks, seabirds, and marine mammals within the Carlingford Lough MPAs management plan area.

- i) 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. This is island of Ireland wide and not just within the Carlingford Lough MPAs management plan area.
- j) The AFBI and Marine Institute observer programme will also alert if non-native species appear in catches.

3. 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 crab and lobster samples to be sent to Queens University for study. This will help to establish how larvae retention is working within Carlingford Lough MPAs management plan area.

4. DAERA Marine and Fisheries and DAFM will monitor the scale of biosecurity measures within MPAs.

5. DAERA Marine Fisheries and DAFM will construct an assessment document to review and examine the impact of actions associated with this guidance.

6. All aspects of this guidance will be re-examined as part of a five-year plan review.

Strategic Guidance 3: Aquaculture Monitoring.

1. DAERA Marine and Fisheries and the Aquaculture and Foreshores Management Division of DAFM will continue to monitor the condition of designated features and seabed to assess the impact of aquaculture processes.

2. DAERA Marine and Fisheries and the Aquaculture and Foreshores Management Division of DAFM will monitor the scale of biosecurity measures concerning the extent of disease, non-native species establishments and native species absence within MPAs that contain aquaculture licences.

3. DAERA Marine Fisheries and DAFM will construct an assessment document to review and examine the impact of the actions associated with this guidance. All aspects of this guidance will be re-examined as part of a five-year plan review.

Strategic Guidance 4: Recreation and Tourism Monitoring.

Shoreline based recreation monitoring.

1. Analysis on the level of recreational activity in MPAs to establish a limited amount of tolerance that can both sustain MPA longevity and integrity while maintaining recreational activity.
2. A competent authority will monitor recreational shipping vessel's adherence to assigned speed limit of the lough.
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.
4. The component authorities should monitor the impact of recreational interactions with the conservation objectives of protected features.
5. The competent authorities will construct an assessment document to review and examine the impact of actions associated with this guidance.
6. All aspects of this guidance will be re-examined as part of a five-year plan review.

Surface based recreation monitoring.

1. The competent authority will monitor the condition of features and seabed to assess the impact of surface based activities and their impact on processes.
2. The competent authority will monitor the scale of biosecurity measures and the extent of disease, non-native spread and native species absence within MPAs.
3. The competent authority will construct an assessment document to review and examine the impact of the actions associated with this guidance.
4. All aspects of this guidance will be re-examined as part of a five-year plan review.

Sub-Aqua recreation monitoring.

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

Strategic Guidance 5: Marine Infrastructure, Ports and Harbours Monitoring.

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 will construct an assessment document to review and examine the impact of actions associated with this guidance.
7. All aspects of this guidance will be re-examined as part of a five-year plan review.

Strategic Guidance 6: Dredging Monitoring.

1. The competent authorities will monitor the acquisition of permit requirements for all shipping vessels conducting dredging activities within the Carlingford Lough MPAs management plan area.
2. The competent authorities will monitor the condition of habitats near and adjacent to dredging sites during and after dredging operations.
3. The competent 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 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 a five-year plan review

The policies outlined in this management plan have monitoring measures associated with them to determine the level of achievement made against the named objectives of this management guidance plan. To balance the need for evaluation and efficacy of the management plan, the regulatory authority will look annually at key performance and undertake a detailed plan review every 5 years to provide a detailed update and assessment of the strategic guidance.

6. Future work and management considerations.

The Carlingford Lough MPAs management plan is an assurance to provide enhancement and further protection for marine and coastal biodiversity for MPAs within the Carlingford Lough area. This section looks at future considerations for marine management that may arise or are important for consideration as part of the marine management. By creating management guidance for the Carlingford MPAs, future uncertainty can be mitigated/adapted by applying the plan's generated principles.

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

In March 2022, BWI commissioned HiDef Aerial Surveying Limited to obtain high resolution digital aerial surveys of the Dundalk Bay and Carlingford Lough areas for marine megafauna, ornithological and human activities around the survey area. Key observations from these surveys were:

- Common scoter (*Melanitta nigra*) were the most abundant species with highest densities in Dundalk Bay and the nearby coast.
- Herring gulls (*Larus argentatus*) were observed in relatively high numbers during the survey and were mainly recorded in inshore areas.
- Red-throated divers (*Gavia stellata*) were the most abundant species recorded during the survey, with highest densities recorded in Dundalk Bay and inshore at Carlingford Lough.
- Distribution maps for bird species showed a higher diversity in Carlingford Lough with some species showing higher population densities, such as Brent goose (*B. hrota*).
- The distribution of non-avian animals was spread throughout the survey area, with the majority of detections occurring on the south-eastern perimeter.

Key recommendations for future actions are to maintain the work carried out as part of MarPAMM to build datasets for an understudied area. 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.

MarPAMM Grey seal Passive Acoustic Monitoring.

Carlingford Lough is home to multiple grey seal (*H. grypus*) haul out sites due to the abundance of food sources and hidden bays. Unfortunately, human disturbance is a key threat that grey seals face within this region. Disturbance may scare the mother away, subsequently increasing the likelihood of pups becoming abandoned (Cronin *et al.*, 2007). Breeding and pupping seasons are sensitive times for seals, especially seal pups as they are highly vulnerable at this stage in their life (Russell *et al.*, 2019). During this time seals spend

most of their time onshore (Russell *et al.*, 2019). During a grey seals first 6 weeks, pups are discouraged from swimming as they have not gained suitable amount of blubber (Yochem *et al.*, 2009). However, pups are most vulnerable 3-4 weeks after birth when they have weaned and begin to moult their lanugo coat (DAERA, 2022). Within this period, it is crucial that there are protected sites for pups to rest and develop. Any disturbance during this vulnerable time may force pups into the water which may result in the pup's developing hypothermia or drowning (DAERA, 2022). It must be noted that often disturbance is accidental and reported abandoned seal pups in many cases are rescued and treated in rehabilitation centres across the UK and Ireland (Wilson *et al.*, 2021). In addition, as benthic feeders' seals are exposed to noise pollution. Noise pollution causes harm, masking their vocalisations in which they use to communicate and may cause temporary deafness, reducing the hearing threshold (Trigg *et al.*, 2018) which usually ranges from 50 Hz-80 kHz (National Marine Fisheries Service, 2018). Noise pollution at this level often occurs within busy shipping channels (Chen *et al.*, 2017). Marine litter is another pollutant of ever-growing concern for coastal species. Documented cases of larger marine mammals such as dolphin's and seals ingesting plastics (Desclos *et al.*, 2022) and becoming entangled (Luck *et al.*, 2022) has greatly increased, these cases are often linked with peak tourism seasons. Awareness of these situations are crucial to the successful conservation of grey seals and cetaceans.

Carlingford Lough is a known haul out site for grey seals and is likely an ideal location to acoustically monitor underwater grey seals during the breeding and pupping season. Shipping noise has been documented as having a negative effect on seals; altering behavioural state, social interactions and foraging (Southall *et al.*, 2017). Physiological effects have also been reported with Temporary Threshold Shift (TTS) i.e., temporary deafness (Trigg *et al.*, 2018) in areas with high noise levels such as within busy shipping channels (Chen *et al.*, 2017)

The ability of PAM to provide year-round high resolution temporal data on grey seal presence could be a valuable complement to existing monitoring efforts. Traditionally grey 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 grey 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 such as Carlingford Lough.

Finn the Dolphin.

Finn is a solitary male bottlenose dolphin (*T. truncatus*) that has been in residency in Carlingford Lough since 2020. Bottlenose dolphins are generally found in larger family groups due to their social nature; it is unknown as to why he remains alone at the lough. Because Finn is currently in Irish waters, he is officially protected under the Wildlife Act 1976 and several international directives from both the RoI and NI perspectives (Discover Carlingford 2020). Finn's presence will naturally attract more attention from tourists and other marine crafts within the areas, therefore Marine Connection has advised all fast watercraft users

(boats, jet skis etc) and recreational sub aqua users in Carlingford Lough to be cautious and respectful if they encounter Finn, particularly when it comes to speed. Marine Connection also encourages all or any encounters with Finn to be reported to info@marineconnection.org in order for the data to be included in the Marine Connection solitary cetacean's database.

Water Quality.

The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017 have taken a universal approach to the management of water quality and require the protection and improvement of all aspects of the water environment including rivers, lakes, estuaries, coastal waters and groundwater. This is achieved through the production of River Basin Management Plans (RBMP), which exist for both jurisdictions in NI and the RoI (Poppleton *et al.*, 2021). A significant factor influencing water quality within the lough is Dissolved Inorganic Nitrogen (DIN) of which numerous studies have revealed agricultural runoff to be the main source (Poppleton *et al.*, 2021). In the RoI, the National Marine Monitoring programme is regulated by the Environmental Protection Agency (EPA) and an equivalent programme in the north is carried out for by DAERA Marine and Fisheries Division, where sites are monitored for chemical parameters within both jurisdictions (Poppleton *et al.*, 2021).

The Shared Waters Enhancement and Loughs Agency (SWELL) project is a cross-border collaboration comprising NI Water, Irish Water, Agri-Food & Biosciences Institute (AFBI), Loughs Agency and East Border Region, working to enhance water quality within the shared waters of Carlingford Lough and Lough Foyle (Poppleton *et al.*, 2021). This €35m EU-funded project is due for completion in 2023 and will deliver sustainable upgrades to wastewater management on both sides of the border. This includes improving the current management of raw effluent run-off that flows from both sides of the lough produced by terrestrial and agricultural activities and will be a positive contribution towards 'Good Ecological Status' under the EU Water Framework Directive (SWELL, 2020). Cross border species and environmental pressures do not adhere to international restrictions and boundaries, therefore each lough has been considered as an individual ecosystem with impacting pollutants on both sides of the border (Poppleton *et al.*, 2021). As part of this project, important activities including ecosystem modelling, catchment studies and construction packages to improve wastewater assets in the RoI and NI are being carried out. This will lead to the development of a unique ecosystem model and will enhance support for further improvements within shared waters (Swell Project, 2020). This work expands on previous modelling systems constructed through the SMILE and EASE (Enhanced Application of the SMILE Ecosystem model to Lough Foyle) projects (Poppleton *et al.*, 2021) The SWELL project will work Drainage Area Plans (DAPs), created by water utilities from both sides of the border and at all essential key points (the catchment, lough areas and adjacent marine systems) (Poppleton *et al.*, 2021). More information on the SWELL project can be found at the project's website: <https://swellproject.com>.

Shoreline Vulnerability.

Accurate baseline data for coastal change in Northern Ireland and Carlingford Lough is important for vulnerability assessment monitoring. The work for baseline data is underway through the 3-D LiDAR work package undertaken and analysed by DAERA Marine and Fisheries Division. The data and shoreline modelling will be important for future shoreline management to help map areas of vulnerability for erosion and land instability. The data collected through DAERA, AFBI and the National Trust should be deposited in a coastal repository within the Ulster University (Discussed through National Trust “Shifting Shores” and DAERA - DFI Coastal Erosion Working Group). This data will inform future iterations of the climate change management guidance within this management plan.

Steering Group Future.

The Carlingford Lough MPAs 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 access MarPAMM scientific outputs to help develop recommendations on management strategies and guidance.

The department (DAERA) should look at mechanisms to sustain the Steering Group 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 Carlingford Lough MPAs management plan area.

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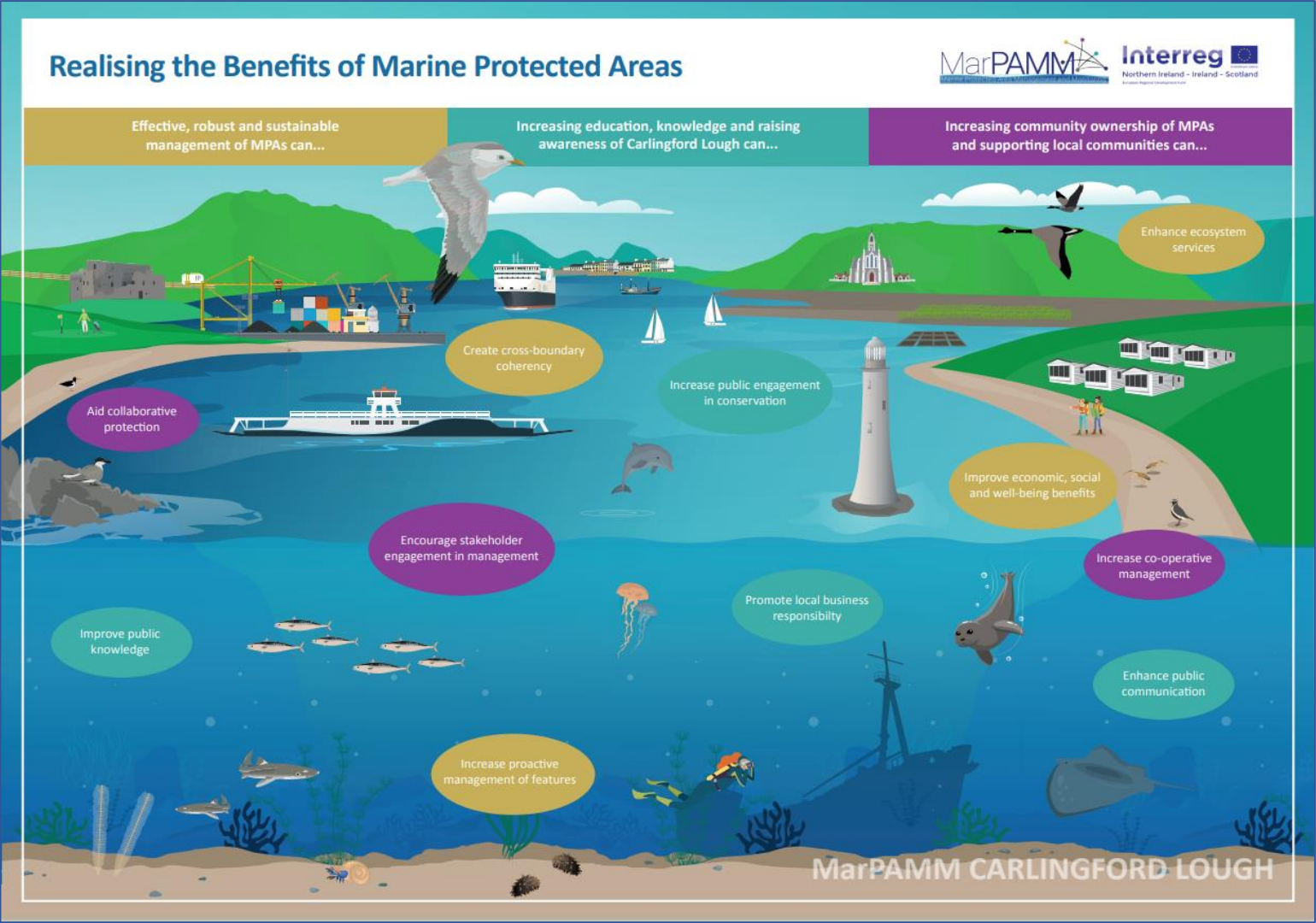
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Appendix 1: Regional Benefits Realised Infographic of Marine Protected Areas for Carlingford Lough.



Appendix 2: Detailed Policy Review.

Northern Ireland.

1. International Designations.

International designations that are applicable to the MarPAMM Carlingford Lough MPAs management plan area 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; and
- Transposed Bird and Habitats Directive 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, 2006).

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 UK Marine Strategy 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 "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 "Good 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).

2. National designations.

National designations that are applicable to the MarPAMM Carlingford Lough MPAs area 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; and
 - The Wildlife (Northern Ireland) Order 1985 (the Order) and amendment The Wildlife (Amendment) (Northern Ireland) Order 1995.
- Conservation (Natural Habitats, etc.) (Amendment) (Northern Ireland) (EU Exit) Regulations (2019)

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.

International designations that are applicable to the MarPAMM Carlingford Lough MPAs plan area include:

- OSPAR Convention 1992
- Convention on Wetlands of international importance/Ramsar Convention
- Marine Strategy framework directive 2008/56/EC
- Marine Strategy Regulations 2010
- 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)

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 Convention on Wetlands of Importance/Ramsar Convention is an intergovernmental treaty 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 Ha (NPWS; More information on the Convention on Wetlands of Importance/Ramsar Convention can be found here: <https://www.ramsar.org/> (NPWS, 2022a).

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 "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 “Good Ecological Status” in identified water bodies by 2015. This includes transitional (estuarine) and coastal waters out to one nautical mile.

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National Legislation.

Wildlife Act 1976 (Revised)

The Wildlife Act 1976 (Revised) 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”

Foreshore Act 1933

The 1933 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 as administered by the Foreshore Section of the DHLGH. Foreshore Activities relating to sea fisheries and aquaculture are administered by DAFM. Dredging is regulated by Environmental Protection Agency, with the Department of Communications, Climate Action and the Environment regulating 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, 2022b).

Appendix 3: 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).

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, 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.

TCle 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 TCle contract, which was extended to January 2022).

The video conferencing and meeting platform Zoom, curated and provided by TCle, allowed for stakeholder meetings to be conducted online, in accordance with public health advice. Features such as breakout rooms, online polling (via Slido) and screen-sharing allowed 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 TCle 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.

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.