

Appendix 3 – Updated Baseline Summary Report

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Glossary

Acronym	Definition
AA	Appropriate assessments
CAP	Climate Action Plan
CO ₂	Carbon dioxide
DECC	Department of the Environment, Climate and Communications
DMAPs	Designated Maritime Area Plan
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electromagnetic fields
EPA	Environmental Protection Agency
GDP	Gross Domestic Product
GES	Good environmental status
GHGs	Greenhouse gases
GSI	Geological Survey Ireland
IPCC	International Panel on Climate Change
MHWS	Mean high water spring
NM	Nautical miles
NMPF	National Marine Planning Framework
NMS	National Monuments Service
NO ₂	Nitrogen oxides
NPWS	National Parks and Wildlife Service

ORE	Offshore Renewable Energy
ORED II	Offshore Renewable Energy Development Plan II
PM _{2.5} and PM ₁₀	Particulate Matter of varying sizes, harmful to human health.
SACs	Special Areas of Conservation
SDGs	Sustainable Development Goals
SEA	Strategic Environmental Assessment
SEAI	Sustainable Energy Authority of Ireland
SO ₂	Sulphur dioxide
SPAs	Special Protected Areas
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WFD	Water framework directive
WHO	World Health Organisation

1 Introduction

This Appendix (Appendix 3) summarises available environmental baseline information which has been collated to inform the SEA for OREDP II Plan. Environmental information is structured around the SEA topic headings as identified in **Table 3-1** of this report and is supported by the environmental baseline database, also included in this **Appendix 3** and by GIS mapping.

For each topic, baseline information and data gaps have been identified. This then informed the assessment of the draft OREDP II, with clear data identifiers in the assessment workbooks linking to the baseline database.

2 Physical Environment

2.1 Metocean Conditions

Metocean conditions relating to wind, wave and climate parameters within Ireland's waters. Parameters are measured and monitored through the Irish Marine Data Buoy Observation Network (Marine Institute, 2020).

2.1.1 Ocean Surface and Sub-Surface Currents

No long-term ocean current monitoring system is currently available for Irish waters. Ocean currents are dominated by the Atlantic Meridional Overturning Circulation (AMOC) and the North Atlantic Current (Gulf Stream) (Govt of Ireland, 2020) as indicated in **Figure A3-1**.

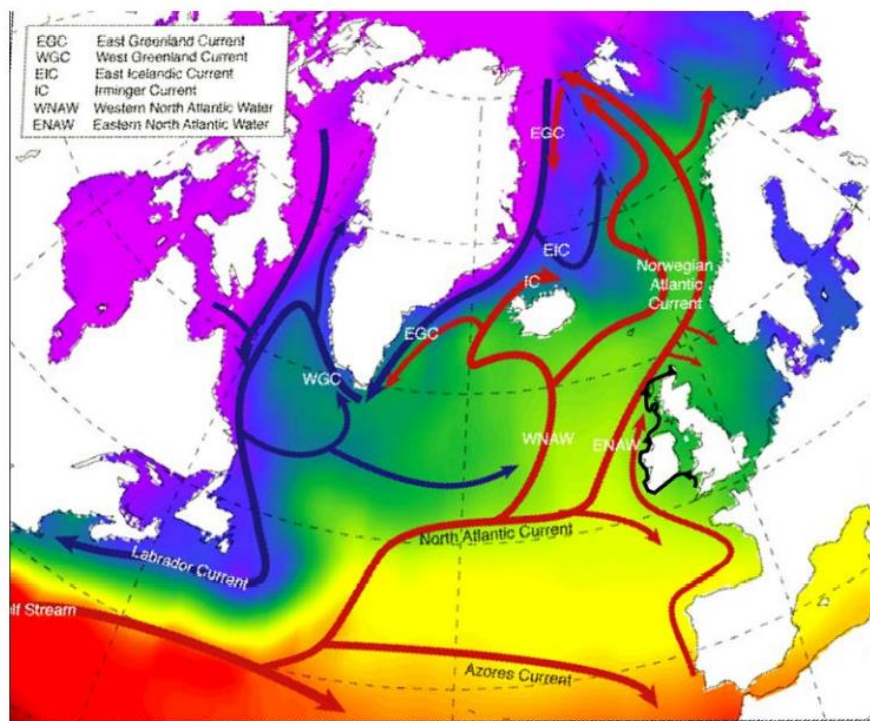


Figure A3-1: Schematic showing the general circulation of the upper ocean (0-100m) in the North Atlantic) (ICES, 2019)

2.1.2 Sea Surface and Sub-Surface Temperature (SST)

SST measurements are collected regularly from various monitoring locations both inshore and offshore within Irish waters. The longest time series data for SST is available from the Malin Head Atmospheric Research Station on the coast of Co. Donegal (**Figure A3-2**) and demonstrate a trend of progressive warming from mid 1990s onwards (Govt of Ireland, 2020).

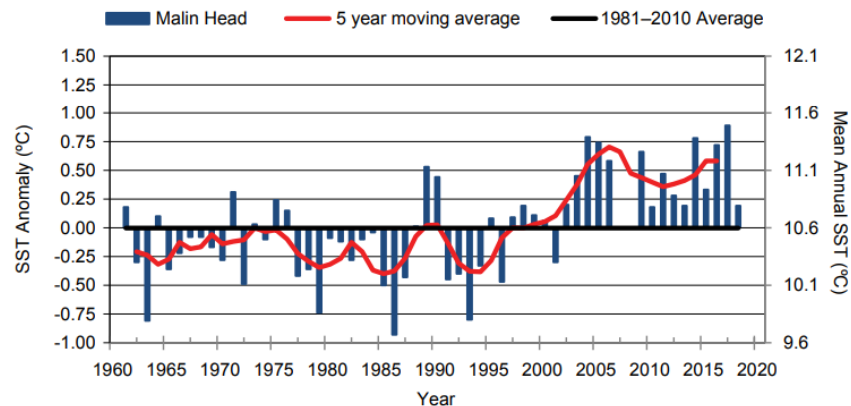


Figure A3-2: Mean Annual sea surface temperature and anomalies at Malin Head (1961 - 2018) (Govt of Ireland, 2020)

Regular oceanography surveys in the Rockall Trough have measured subsurface at between 4 and 4.6 °C consistently over the time period between 1975 and 2018 (Govt of Ireland, 2020).

2.1.3 Significant Wave Height

Wave height measurements are collected including through the Irish Marine Buoy Observation network M3 buoy off the south-west coast of Ireland and the M2 buoy in the Irish sea to the east of Dublin. **Figure A3-3** (Govt of Ireland, 2020) summarises available significant wave height data relevant to Irish waters.

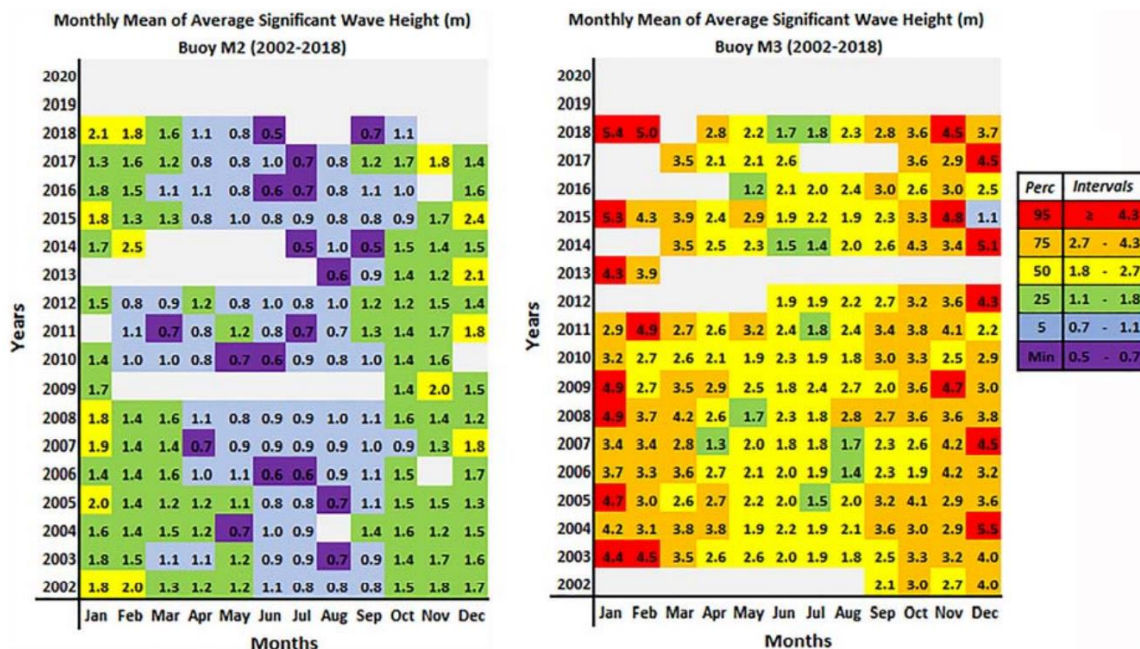


Figure A3-3: Heat map of monthly mean of average significant wave heights (m) (2002 - 2018) (Govt of Ireland, 2020)

2.2 Hydrographic Features

The majority of Ireland's territorial seas (within 12NM of the coast) lie within the 100m depth contour. Water depths within the Irish sea generally extend to approximately 150m depth, approximately -250m in a north south trending channel to the northwest of the Isle of Man (UK waters). Bathymetry contours for the waters surrounding Ireland demonstrate a gradual increase in depth, particularly on the southern coastline, where the Celtic Sea, adjacent to Cork measures -120m depth at approximately 370 km offshore. In contrast, the North Western Coastline reaches depths of -290m off the coastline of County Mayo. **Figure A3-4** shows this in more detail, with darker areas denoting steep increases in the depth of waters around the Rockall Trough and Porcupine Bank.

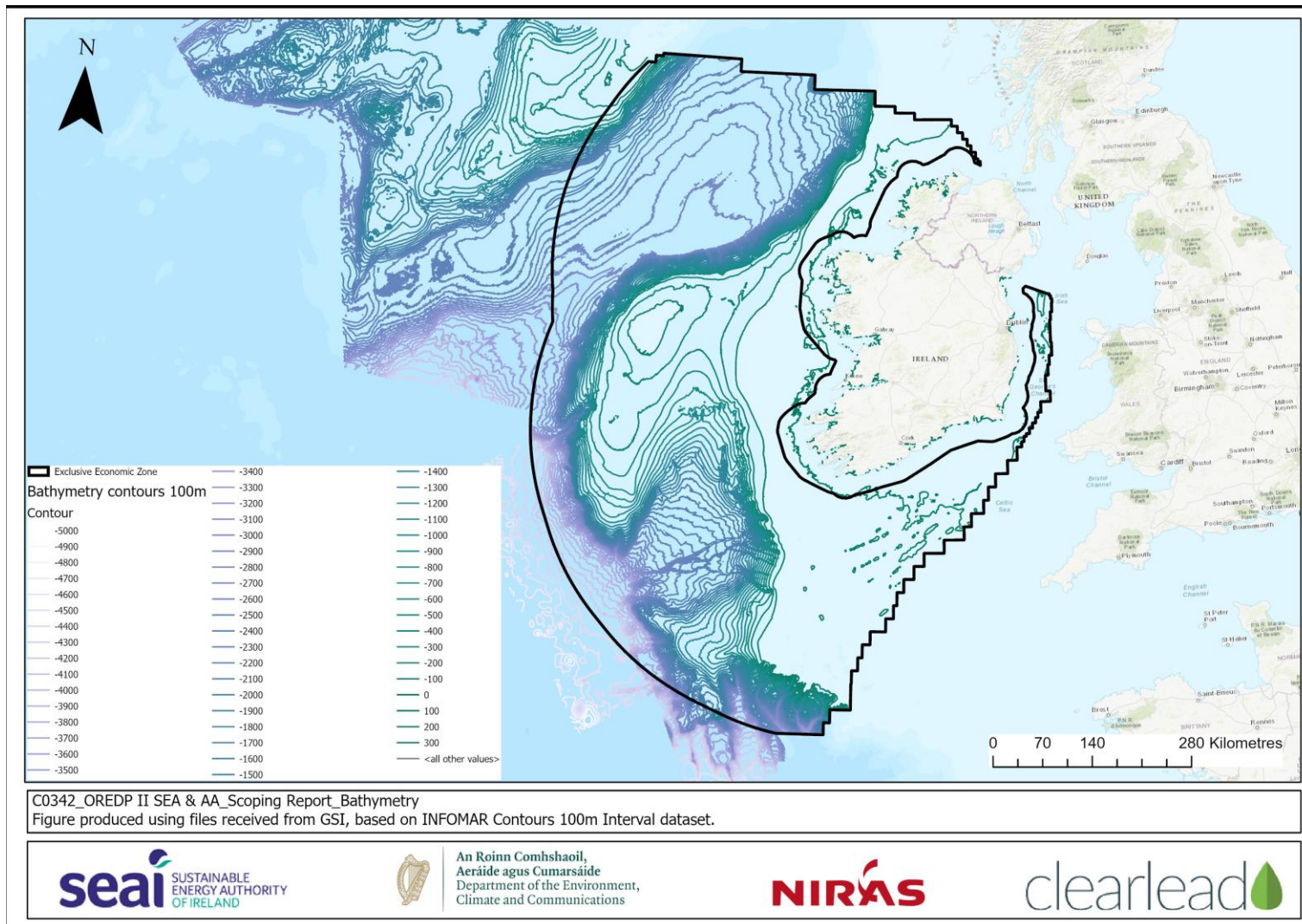


Figure A3-4: Bathymetry within Ireland's EEZ

2.3 Geology and Sediments

2.3.1 Morphology and Shallow geology

The characteristics of Ireland's underwater seabed landscape have been shaped by the underlying shallow geology and are heavily influence by past geomorphological processes particularly associated with periods of glaciation. Large volumes of material were eroded from what is now Ireland's land area and also the surrounding continental shelf, followed by extensive periods of deposition on the shelf, at the shelf edge and also over the continental slope. The morphology and distribution of superficial sediments across Ireland's EEZ developed as a result of this repeated glacial deposition/ scour processes combined with reworking and re-deposition as a result of riverine input and tidal processes (Hardisty, 1990). **Figure A3-5** shows the distribution of rock types throughout Irish waters. The Irish Sea is dominated by sandstone, mudstone and limestone, which continues into the Celtic Sea, where sedimentary material typifies deeper waters towards the southwest. The Atlantic waters within the Irish EEZ contain sedimentary material, as well as basalt, metamorphic rock and small pockets of igneous rock, sand and Granitoid in shallower waters.

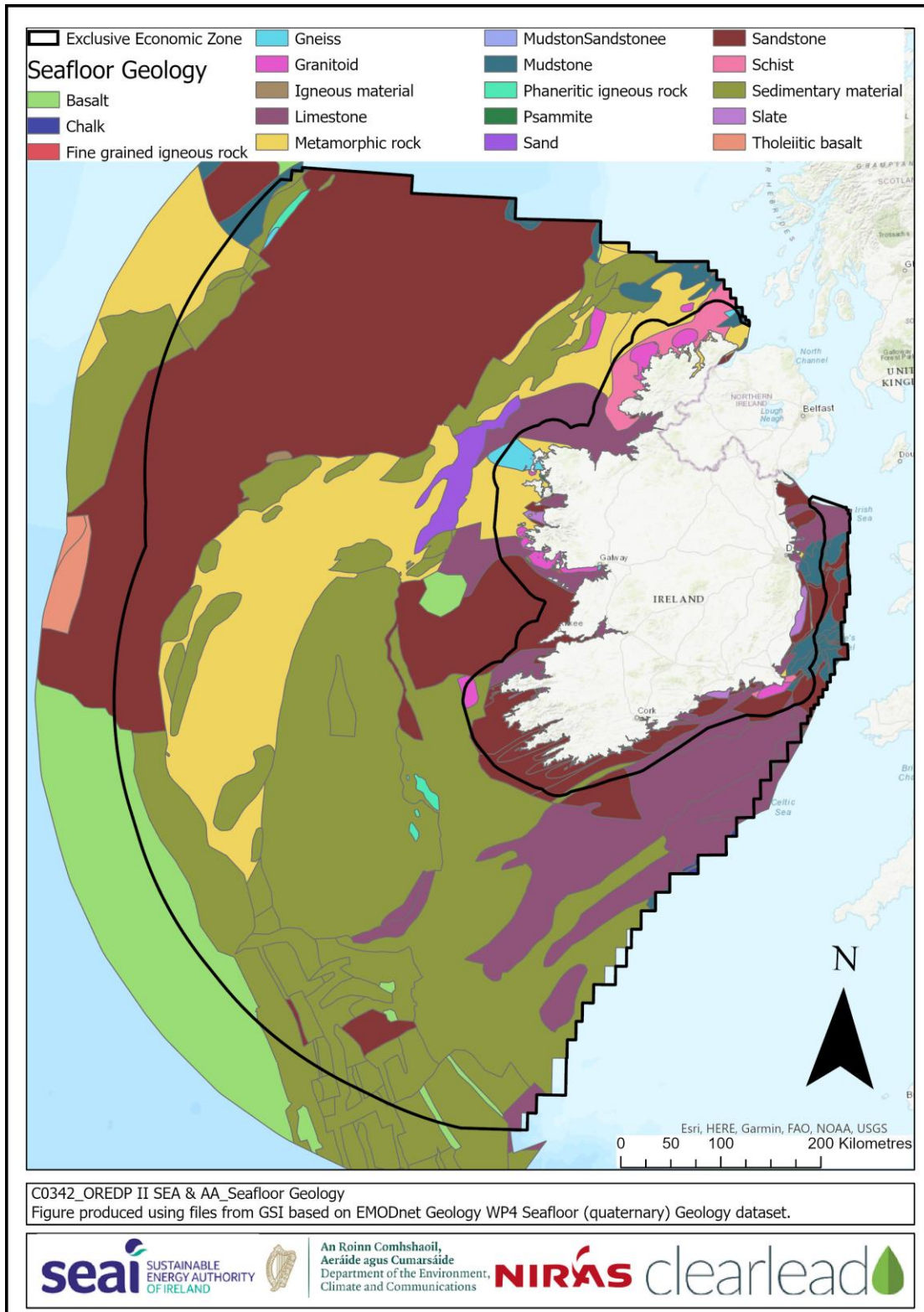


Figure A3-5: Seabed morphology and shallow geology within OREDP II strategy area

2.3.2 Sediment characteristics

Seabed substrate varies across Irish waters, with sediments in the Irish sea dominated in the north by mud to muddy sand, grading to sand and coarse substrate further south towards the Celtic Sea area. Off the southern coast of Ireland, a clear band of rock and boulders lies in the nearshore area, before grading to mud and muddy sand further offshore. Off the south-west coast seabed sediments are dominated by sand, interspersed with rock and boulders in the nearshore area. Sediments off the Atlantic west coast range between mud and muddy sand through to mixed sediment, with a defined band of rock and boulders identified in the nearshore area for example off the north coast of county Mayo (see **Figure A3-6**).

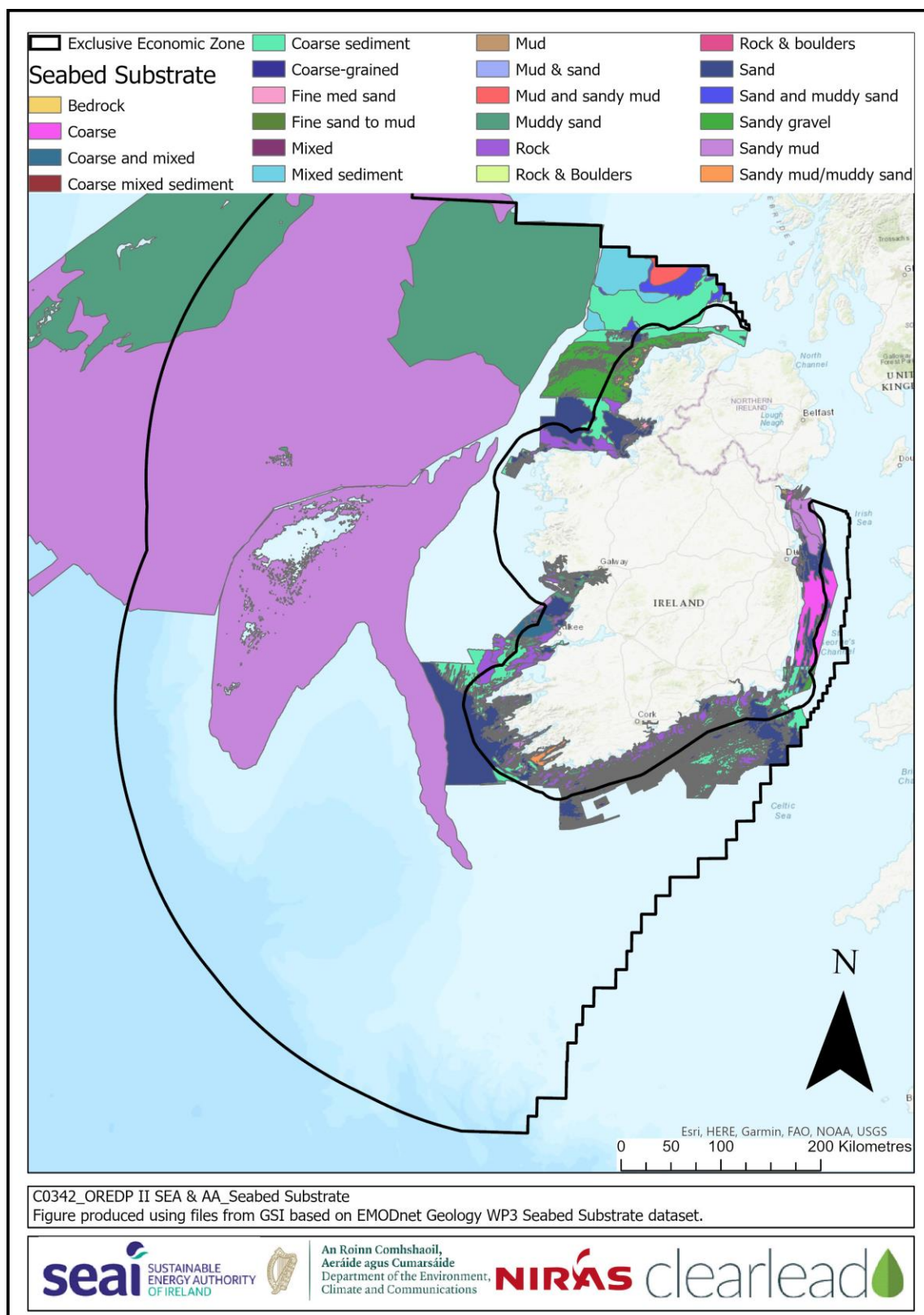


Figure A3-6: Seabed Sediments within the OREDP II strategy area

2.3.3 Sediment transport/pathways and morphology (offshore and coastal)

Generalised patterns of sediment transport/coastal movement evident from analysis of satellite data (EMODnet, 2019) indicate much of the south coast of Ireland with the Celtic Sea is reasonably stable with imperceptible change in imagery overtime. By comparison the same data set provides evidence of coastline erosion/retrogradation along much of Ireland's east coast with the Irish sea, extending transboundary along the adjacent Northern Irish coastline.

Certain specific areas primarily at the inland head of bay features, particularly along the Atlantic west coast show evidence of sediment accretion. Conversely exposed headlands particularly along the Atlantic south-west are subject to predominantly erosional forces. Sediment transport processes also closely align with coastal type, with areas where coastal migration is evidenced as stable, correlating with areas of known erosion resistant rock.

The local and regional sediment transport regime vary considerably from area to area. However, exposed parts of some coasts, and coasts that have narrows with tidal streams such as between islands, are higher energy environments. Local sediment transport regimes are highly sensitive to the effects of wave and tidal action. Some areas are vulnerable to coastal erosion where sediments are also lost from one area by erosion then deposited elsewhere.

2.4 Geological Heritage Sites

A series of sites of geological interest have been identified across Ireland through work led at county level by Geological Survey Ireland (GSI). These include an extensive range of coastal locations across the country. These are currently classified as County Geological sites (CGS) subject to review and designation as potential Geological Natural Heritage Areas (NHA) by National Parks and Wildlife Service (NPWS).

2.5 Coastal Vulnerability Index

In recognition of the fundamental interconnectivity between coastal geology and physical processes a coastal vulnerability mapping exercise is currently being undertaken by GSI to provide an initial visual representation of the areas around Ireland's coast most susceptible to effects from rising sea levels. (GSI, 2022). This is an ongoing project, with its first and only currently published output relating to the coast areas of County Dublin.

3 Water

The Marine Strategy Framework Directive (MSFD) (EC, 2008) is EU legislation aimed at improving the environmental status of the marine environment whilst maintaining sustainable development. This has been in place since 2008, with a target of all Member States reaching Good Environmental Status (GES) in the marine environment by 2020. Member States are required to report against 11 descriptors, as outlined in Annex I of the MSFD and **Table A-1** below. In Ireland, a Marine Strategy for the MSFD has been prepared to address these requirements (Govt of Ireland, 2022). The UK's Marine Strategy sets out similar commitments to achieving GES in UK waters, including adjacent to Irish waters, where transboundary effects may occur. (CEFAS, 2022) (DEFRA, 2019).

Ireland's 7th State of the Environment report (EPA, 2020) provides a recent comprehensive assessment of the state of the Irish marine environment. This is supported in nearshore coastal waters by Water Framework Directive assessment parameters for evaluating ecological health.

Table A-1: Environmental Status of Ireland's marine environment as described by the Annex I Qualitative Descriptors of Good Environmental Status (GES) (DHPLG, 2020)

	Description	Good Environmental Status (GES)
D1	Biodiversity	Some elements compatible with GES
D2	Non-indigenous species	Compatible with GES
D3	Commercial fish and shellfish	Some elements compatible with GES
D4	Food webs	Compatibility with GES not known
D5	Eutrophication	Compatible with GES
D6	Sea-floor integrity	Some elements compatible with GES
D7	Hydrographical conditions	Compatible with GES
D8	Contaminants	Compatible with GES
D9	Contaminants in seafood	Compatible with GES
D10	Marine Litter	Compatible with GES for the elements assessed
D11	Energy, including underwater noise	Compatible with GES for the elements assessed

3.1 Chemical characteristics

The evaluation of chemical status of coastal and marine waters is based on allowable concentrations of certain chemicals and substances. This aims to protect the most sensitive species from direct toxicity, including predators and humans, through secondary poisoning. A smaller group of ‘priority hazardous substances’ are identified in the Priority Substances (2013/39/EU) as uPBT (ubiquitous, persistent, bio-accumulative and toxic). Under the WFD, Irish coastal areas are considered to have acceptable levels of priority substances (DHPLG, 2020). Under the MSFD (Descriptors 8 and 9), initial assessment concentrations of contaminants in shellfish and commercial fish are generally above OSPAR background levels; however, they are not high enough to expect adverse effects (DHPLG, 2020).

64 waters have been designated as shellfish waters in Ireland (DHPLG, 2018). With a further 10 areas designated as shellfish waters in adjacent Northern Irish waters (DAERA, 2017). Between 2009 and 2015, average dissolved concentrations of metals complied with the environmental standards. However, total concentrations of chromium were elevated in four locations once during the reporting period. Namely:

- Sneem/Ardgroom
- Valentia River
- Bruckless
- Gweedore Bay.

Bathing water quality within Irish waters is the responsibility of local authorities. Generally, bathing water quality improved around the coastline between 2014 and 2020, with 96% of waters now meeting ‘sufficient’ rating or above (EEA, 2021). **Table A-2** below sets out in detail the percentage of beaches at each classification.

Table A-2: Bathing water classifications, 2021 (EEA, 2021)Error! Bookmark not defined.

Classification	Number of locations	Percentage of locations monitoring (%)
Excellent – <i>highest, cleanest class</i>	111	75
Good – <i>generally good water quality</i>	21	14.2
Sufficient – <i>water quality meets the minimum standard</i>	10	6.8
Poor – <i>water quality has not met the minimum standard</i>	4	2.7
Not Classified	2	1.4

The five beaches classified as poor were:

- Ballyloughane beach
- Portrane (the Brook) beach
- Clifden beach and lilliput
- Lough Ennell
- Merrion Strand – this is the fifth consecutive time this site has been recorded as poor, therefore this beach will no longer be classed as a bathing water area (EPA, 2019).

3.2 Biological characteristics

Eutrophication is defined within the OSPAR convention as:

“The enrichment of water by nutrients causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned, and therefore refers to the undesirable effects resulting from anthropogenic enrichment by nutrients.”

Ireland has achieved Good Environmental Status for eutrophication within its maritime area (DHPLG, 2020), for the three primary criteria assessed:

- nutrients
- chlorophyll a
- dissolved oxygen.

The main areas at risk from eutrophication are inshore estuaries, where waters are subject to more concentrated run-off from agriculture, urban and domestic wastewater discharges and urban

runoff. The total area of water classified as having eutrophication issues is 0.05% of the total maritime area and most of these areas are located on the Irish Sea and Celtic Sea coasts (DHPLG, 2020). There is no indication that coast and offshore areas are at risk of eutrophication, nor is there any indication of change in nutrient levels.

Elevated concentrations of phosphorous and nitrogen continue to be the most widespread water quality issue in Irish waters, although it is noted that they are still within GES. Between 1990 and 2013, total nitrogen levels steadily decreased. However, between 2014 and 2018, nitrogen inputs increased by around 30% (DHPLG, 2020).

Figure A3-7 shows the status of transitional and coastal waters between 2013-2018. Eutrophic waters are focused in transitional waters, around Dublin, Dundalk, Waterford, Kinsale, Clonakilty and Timoleague. Two potentially eutrophic areas of coastal water also lie on the south eastern coast, at Wexford and Wellingtonbridge (DHPLG, 2020).

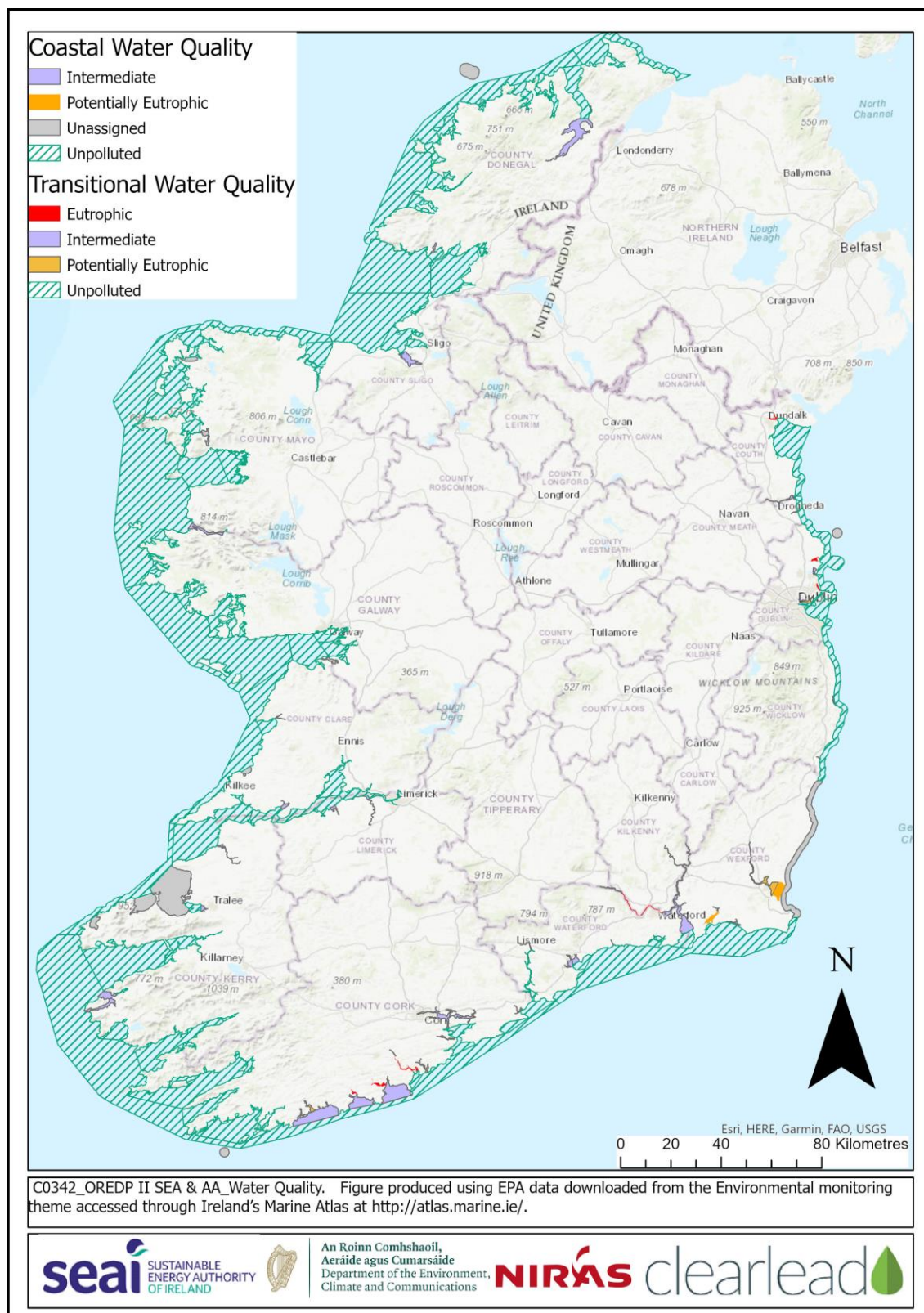


Figure A3-7: Water Quality in Transitional and Coastal waters

E.coli levels remained stable between 2009-2015, although there were some waterbodies which frequently failed to meet guidelines (DHPLG, 2018). These included:

- Adrigole Harbour
- Bannow Bay
- Bantry
- Cork North Channel
- Cromane
- Gweedore Bay
- Kinsale
- Loughros Beg
- Tralee Bay
- Wexford Harbour (inner and outer).

Investigations into the causes of these exceedances include the examination of urban wastewater discharges are ongoing but may lead to an increase in the stringency of wastewater treatment procedures.

4 Climate and Air Quality

4.1 Climate Change

Climate change is a worldwide issue, affecting people and the environment:

“Human-induced climate change, including more frequent and intense extreme events, has caused widespread adverse impacts and related losses and damages to nature and people, beyond natural climate variability”. (IPCC, 2022).

Ireland is experiencing specific climate change impacts, including but not limited to:

- Rise in annual surface air temperature by 0.8% since 1990 (EPA, 2022)
- Increased rainfall of approximately 60mm or 5% over the period 1981 – 2010 (compared to 1961 – 1990) (EPA, 2022)
- Sea level rise measured 3.6mm per year for 2005 – 2015 (EPA, 2022)
- Increased severity and frequency of extreme weather, such as Storm Ophelia in 2017 and the Beast from the East in 2018 (EPA, 2022), (Govt of Ireland, 2021).

4.2 Greenhouse Gas (GHG) emissions

Anthropogenic sources of greenhouses gases (GHGs) are implicated in amplifying the natural greenhouse effect resulting in global warming and potential climate change.

Carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and the “F-gases” (hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆)) are termed “direct” greenhouse gases as they have a direct effect on radiative forcing (RF) within the atmosphere. Atmospheric concentrations of Carbon Dioxide as the most significant contributor to climate change have increased by 40% since pre-industrial times (EPA, 2020).

Other gases including carbon monoxide (CO), volatile organic compounds (VOC), oxides of nitrogen (NO and NO₂) and sulphur dioxide (SO₂) although not significant direct greenhouse gases, are reactive and impact upon the abundance of the direct greenhouse gases through atmospheric chemistry. (IPCC, 2013).

Cumulatively, it is the concentration of such gases in the atmosphere globally, augmented by anthropogenic emissions, which is leading to global warming.

Reducing emissions of GHGs, and therefore the concentration of such gases in the atmosphere, is the principal means by which the worst effects of global temperature rises and related effects can be avoided. It is widely regarded that maintaining any rise below 2°C above pre-industrial will assist in avoiding these effects, and it is likely that if concentrations of 450ppm or lower are achieved by 2100, that warming below this can be maintained (IPCC, 2014).

Ireland's climate is changing. The scale and pace of GHG emissions reductions needs to accelerate. Over one-third of Irelands GHG profile currently originates from agriculture and a high dependency on fossil fuels. (EPA, 2020). ORE has a significant contribution to make, at the same time minimising any limitation to other important contributions through natural carbon sequestration and carbon stores. (EPA, 2020).

4.3 Carbon Sequestration

Atmospheric carbon can be stored via dissolution and chemical reaction of carbon dioxide and water forming bicarbonate, which is mainly stored in marine sediment. (Parker, et al., 2016) consequently, the potential for carbon sequestration in the marine environment is closely linked to geology, i.e. rock is surmised to have negligible sequestration potential whilst circalittoral mud thought to have the highest potential for sequestration.

Figure A3-8 below shows the potential for carbon sequestration around the seas of Ireland, as evaluated by the NPWS (Parker, et al., 2016).

The highest rates of carbon sequestration potential within the OREDP II area lie around the western coast of Ireland, with further small pockets to the north of Dublin, Rosslare Harbour and southern coastline.

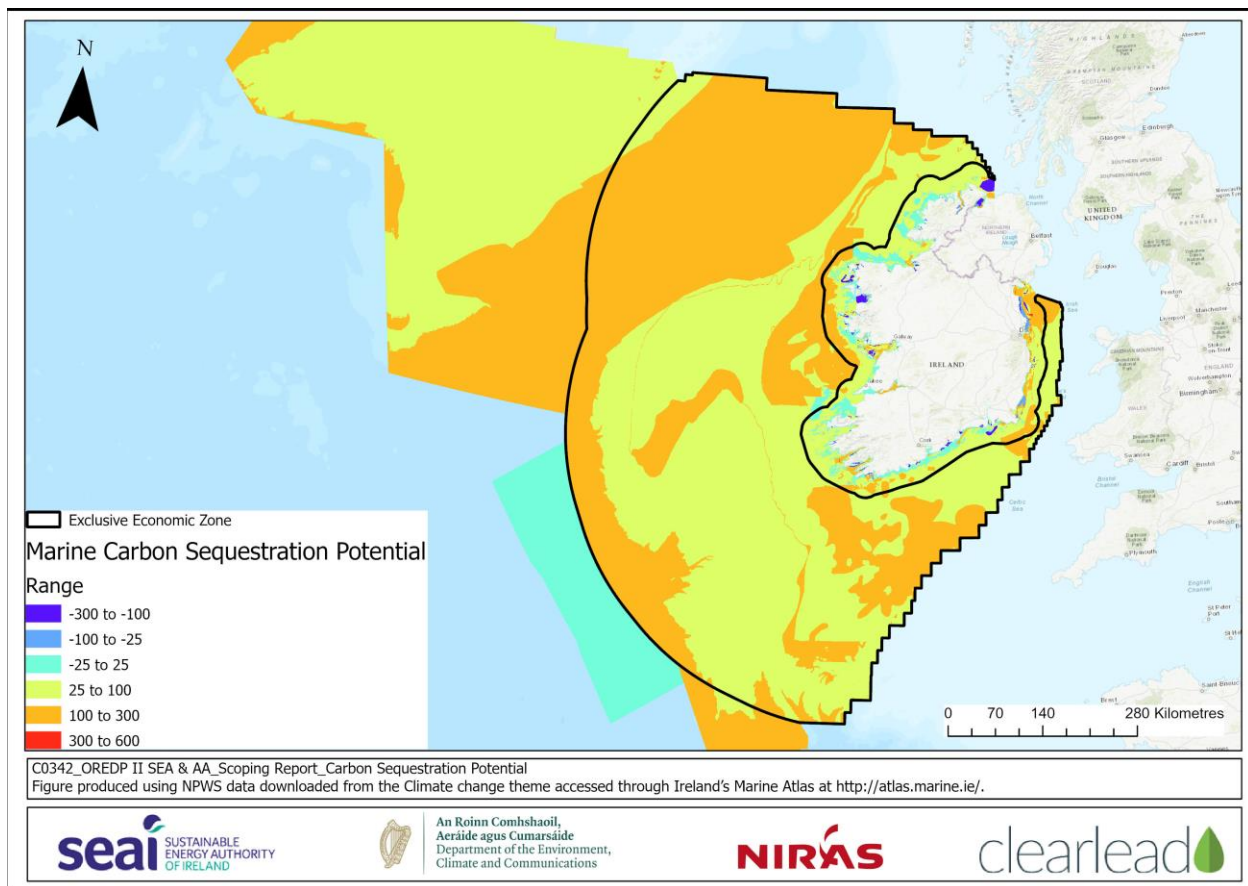


Figure A3-8: Marine sediments with potential for carbon storage (Parker, et al., 2016)

4.3.1 Blue Carbon Habitats

Additional habitats such as seagrass beds and intertidal marsh habitats hold further potential to sequester carbon at increased rates, as these habitats are thought to capture carbon up to 35 times faster than tropical rainforests (WWF, 2022). Areas of highest potential for Ireland include coastal waters to the north of Dublin and the Letterkenny Estuary.

4.4 Ocean acidification

The ocean absorbs around 30% of carbon dioxide (CO_2) released to the atmosphere as a result of human activities. As CO_2 dissolves in seawater, it forms carbonic acid, decreasing the ocean's pH resulting in ocean acidification.

The acidity of the ocean has increased by 26% since the beginning of the industrial era (UNESCO, 2022).

Ocean acidification is a global problem which requires an internationally coordinated response. Ireland is strategically positioned at the edge of the European continental shelf, adjacent to an

ocean area where some of the most important water masses driving the global ocean conveyor interact or are generated. This presents Ireland with a unique opportunity for marine research in these critically important waters.

Ocean acidification is essentially irreversible on practical human timescales. Mitigation can only be achieved through early commitment to a reduction of CO₂ emissions. Protection of the Irish marine environment, underpinned by science-based assessment, is a legal requirement under international obligations such as the OSPAR Convention and Marine Strategy Framework Directive (Dir. 2008/56/EC) (Longphuirt, et al., 2010).

4.5 Air Quality Emissions

Poor air quality may result in effects on human health, the wider environment and infrastructure. Specific measures of air quality include:

- Sulphur dioxide (SO₂) – emitted during fossil fuel combustion, sulphur dioxides can cause acid deposition which affects soils and surface waters, as well as the corrosion of buildings (EPA, 2021).
- Nitrogen oxides (NO and NO₂) – gases released during high temperature combustion. NO₂ is seen as more important for air quality, due to its increased impact on health and contributions towards acidification and eutrophication processes (EPA, 2020). Sources include diesel engines (largest source), petrol engines, industrial construction, off road machinery and electricity and heat production.
- Particulate matter (PM_{2.5} and PM₁₀) – PM is a mixture of very small solid or liquid particles suspended in air. The burning of solid fuels (e.g. coal, peat, wood), produces fine particles which, when airborne, can affect respiratory and cardiovascular health (EPA, 2020).

Large cities such as Dublin, Limerick, Cork and Galway tend to be where air quality is worst, due to the high concentrations of homes and vehicles. In Ireland, many such cities are located on the coast, adjacent to the OREDP II area. In 2019, an exceedance of NO₂ above EU Qir Quality legal limits was detected at the St John's Road West monitoring station. This was attributed to high volumes of passing traffic. In response to this, the Dublin Region Air Quality Plan 2021 was produced to improve nitrogen dioxide levels across the Dublin region (Dublin City Council, et al., 2021).

Two key issues negatively affect air quality in Ireland – emissions from the burning of solid fuel in homes and transport emissions. Whilst Ireland was compliant with EU legal limits for emissions in 2020, this was largely as a result of reduced traffic caused by the Covid-19 pandemic and associated lockdowns. Despite no exceedances of EU legal limits, it is noted that during this time, monitored levels were above WHO air quality guidelines at 52 of the 102 monitoring stations, predominately due to the burning of solid fuels for home heating.

Dublin has become the first Irish city to sign up to the WHO Breathe Life campaign, which will require meeting WHO guideline air quality values by 2030 (WHO, 2022).

Ireland's geography, on the western edge of Europe with prevailing winds from the south-west historically has meant transboundary air pollution has been minimal (EPA, 2020).

5 Marine Pollution

5.1 Underwater Sound

Introduction of energy, including underwater sound to the marine environment as a result of anthropogenic activity is identified specifically as Descriptor 11 within the EU MSFD. Man-made sounds can be both continuous and/or impulsive depending on the source, both of which can result in a broad range of potential effects in a variety of marine species, particularly Marine Mammals. The ability of marine species to hear a certain sound in the marine environment is complex and subject to many variables, including time of year or species life cycle (e.g. breeding season, nursing of young etc.).

Good Environmental Status under the MFSD is considered to be achieved when *‘Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment’* (OSPAR, 2021).

Ireland’s marine area currently achieves Good Environmental Status for anthropogenic impulsive sound with the level of impulsive underwater noise causing activities currently considered to be low overall¹) (Govt of Ireland, 2020). No threshold values are currently proposed for underwater noise.

5.2 Marine Litter

Marine litter is defined as *“any solid material which has been deliberately discarded, or unintentionally lost on beaches and on shores or at sea, including materials transported into the marine environment from land by rivers, draining or sewage systems or winds. It includes any persistent, manufactured or processed solid material.”* (OSPAR, 2022).

Plastics make up an estimated 70% of all marine litter in the oceans. (An Taisce, 2021). Most common plastic waste found around Ireland’s coastline includes: food wrap, cigarette ends, plastic bottles; and plastic bags. (Ocean Conservancy, 2020). Micro-plastics can also be released through the use of paints and anti-fouling on offshore infrastructures.

Ireland assessed the status of the marine environment against its Initial Assessment 2013 target of Good Environmental Status: Reduction in the number of visible items within specific categories/types on coastlines. This has been recorded as further improved in the latest published update (Govt of Ireland, 2020).

¹ For the assessment period 2016-2018

5.3 Electro-Magnetic Fields (EMF)

Electromagnetic Fields (EMF) existing naturally in the marine environment as a result of a range of natural functions including from the earth's magnetic field and also from different biochemical physiological and neurological functions within marine organisms.

In addition, a range of anthropogenic sources of EMF are also evidenced within the marine environment, particularly as a result of subsea electrical submission. EMF is considered to be a source of energy as covered by the MFSD Indicator GES when '*Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment*' (EC, 2008, 2017).

5.4 Chemical Pollutants

The presence of and potential release of chemical contaminants to Ireland's marine waters is considered in section 3.

6 Biodiversity

Ireland's marine waters (coastline, inshore and offshore) support a rich and diverse ecosystem supporting species and habitats including plankton, cold water corals, fish, marine birds, dolphins and whales, and a wide range of physical habitats and associated species from shallow inshore reefs and sandbanks to canyons, seamounts, troughs and coldwater coral reefs in deeper waters.

Many elements are protected under Ireland's biodiversity commitments to a range of International, European and National designations and protection commitments. In addition, the mobile nature of many of Ireland's marine species means migration and foraging ranges in many cases extend into adjacent waters, particularly in the Welsh and Northern Irish parts of UK waters.

The most recent evaluation as part of Marine Strategy Framework Directive (MSFD) compliance (EPA, 2020) identifies 80% of Ireland's coastal water bodies and 38 % of transitional water bodies having high or good ecological status. The same report records all Ireland's offshore waters as having achieved Good Environmental Status (GES) for eutrophication².

6.1 Designated sites, Qualifying Interests and species

6.1.1 Designated Sites and Quality Interests

The waters surrounding Ireland contain a network of protected marine sites, designated under a range of International, European and National legislation and commitments. (NPWS, 2022).

- Ireland is a signatory to the **Ramsar Convention** for the protection of wetlands of international importance especially as waterfowl habitat. 45 sites are designated as Ramsar wetlands around the coastline of Ireland. These are of international importance, and include wetland habitats which are representative, rare or unique in conserving biological diversity (IRWC, 2022). It is noted that most of the 45 sites within Ireland are small, and often include inland habitats. The largest marine designation stretches from Galway to Black Head lighthouse. RAMSAR Wetlands can be seen within **Figure A3-9**
- European Directive (2009/147/EC) on the Conservation of Wild Birds (**the Birds Directive**) requires that bird species listed within Annex I of the Directive along with other regularly occurring migratory species and their habitats be protected wherever they occur, including through the designation of Special Protection Areas.

Ireland has 89 Special Protection Areas (SPAs) with a marine element designated under the Birds Directive (NPWS, 2022) extending across an estimated marine area of 1,593km². A further 6 SPAs with a marine element are also designated within adjacent Northern Irish

² Based on an assessment of status applying OSPAR Comprehensive Procedure indications to evaluate the eutrophic status of marine waters.

and Welsh waters. Many of these designations encompass cliffs and islands, as well as adjacent waters that support breeding marine birds. Others comprise bays and estuaries that host important populations of wintering waterbirds. **Figure A3-9** and Error! Reference source not found. below shows the distribution of these SPA designations around the coastline.

- European Directive (92/43/EEC) on the conservation of Natural Habitats and of Wild Flora and Fauna (**The Habitats Directive**) require that habitats listed with Annex 1 of the Directive and species listed within Annex II and their habitats are maintained, or if necessary restored, to favourable conservation status, including through the designation of Special Conservation Areas (SACs). Irish waters and the Irish coastline include 10,420km² of habitat designated as SACs, all of which are required to be maintained in a favourable condition (**Figure A3-10**). SAC's are also designated in adjacent Welsh and Northern Irish waters (**Figure A3-11**). These designations seek to protect examples of following habitat types:
 - Coastal Lagoons
 - Estuaries
 - Reefs
 - Salt marshes
 - Sand dunes
 - Sandbanks
 - Sea caves
 - Shallow inlets and Bays
 - Tidal mudflats
 - Vegetated sea cliffs

Whilst not all of these habitats lie within the OREDP II area, many are adjacent to areas which could be influenced by the plan. Six Offshore SACs lie within Irish waters and all are located off the west coast in the Atlantic Ocean. Specifically, the South East Rockall Bank, NW Porcupine Bank, SW Porcupine Bank, Porcupine Bank Canyon, Hovland Mound Province and Belgica Mound Province. All are in excess of 100km from the nearest landfall.

In addition to the above referenced existing designations, an exercise is currently ongoing which is anticipated to result in the confirmation of further designation sites particularly in relation to implementing further protection for offshore reef habitats and also for marine birds, throughout the life of the OREDP II plan. Whilst these potential additional sites are not sufficiently advanced to be considered during the current preparation of the OREDP II and associated SEA, due account will be given to further progress as appropriate at plan review points, proposed throughout the life of OREDP II.

- Sites and certain species are also afforded protection under the **Wildlife Act 1976** as amended in 2000. Lough Hyne, Co. Cork is the one Marine Nature Reserve designated under the Wildlife Acts.

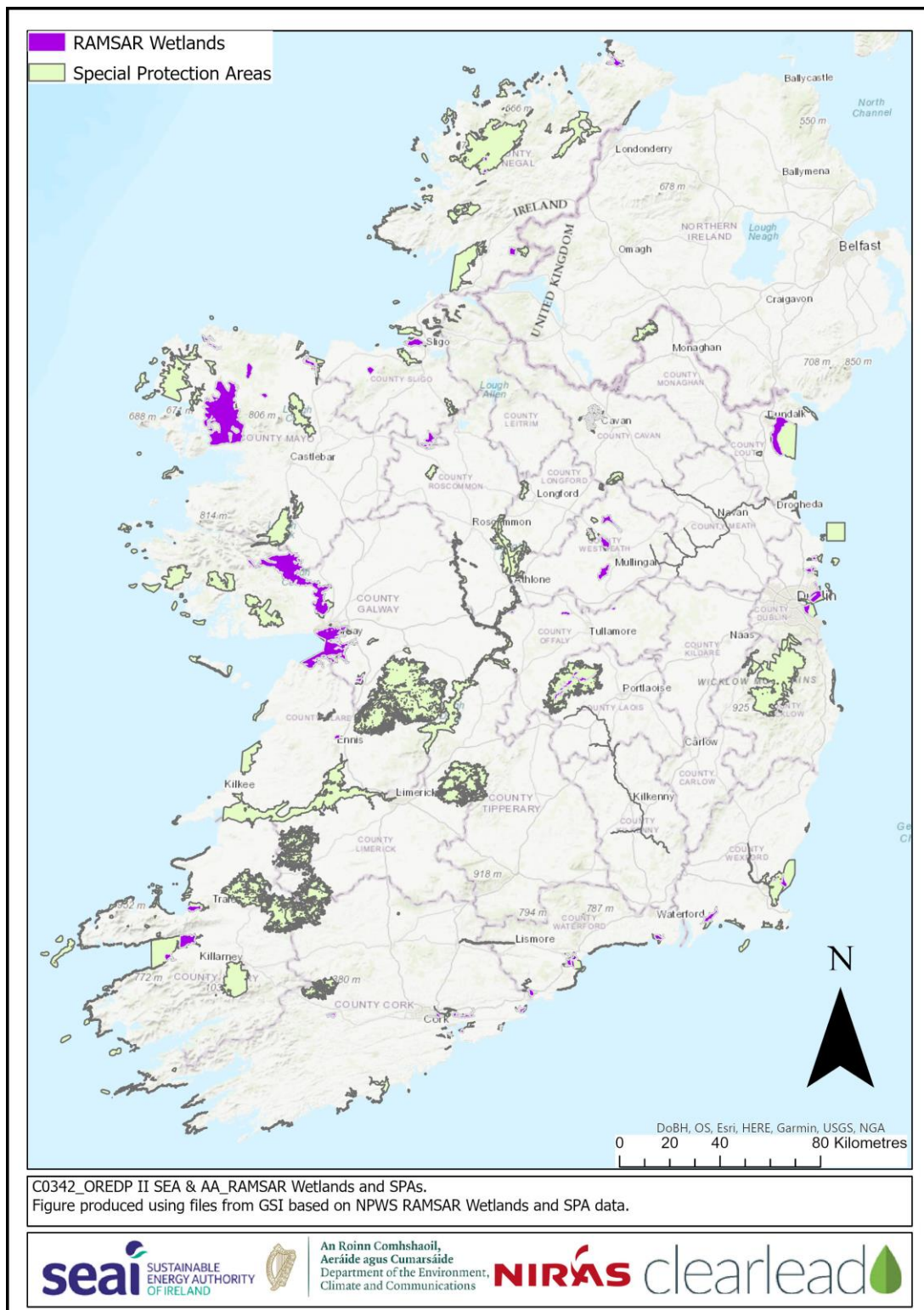


Figure A3-9: SPA and Ramsar designated sites in Irish marine waters

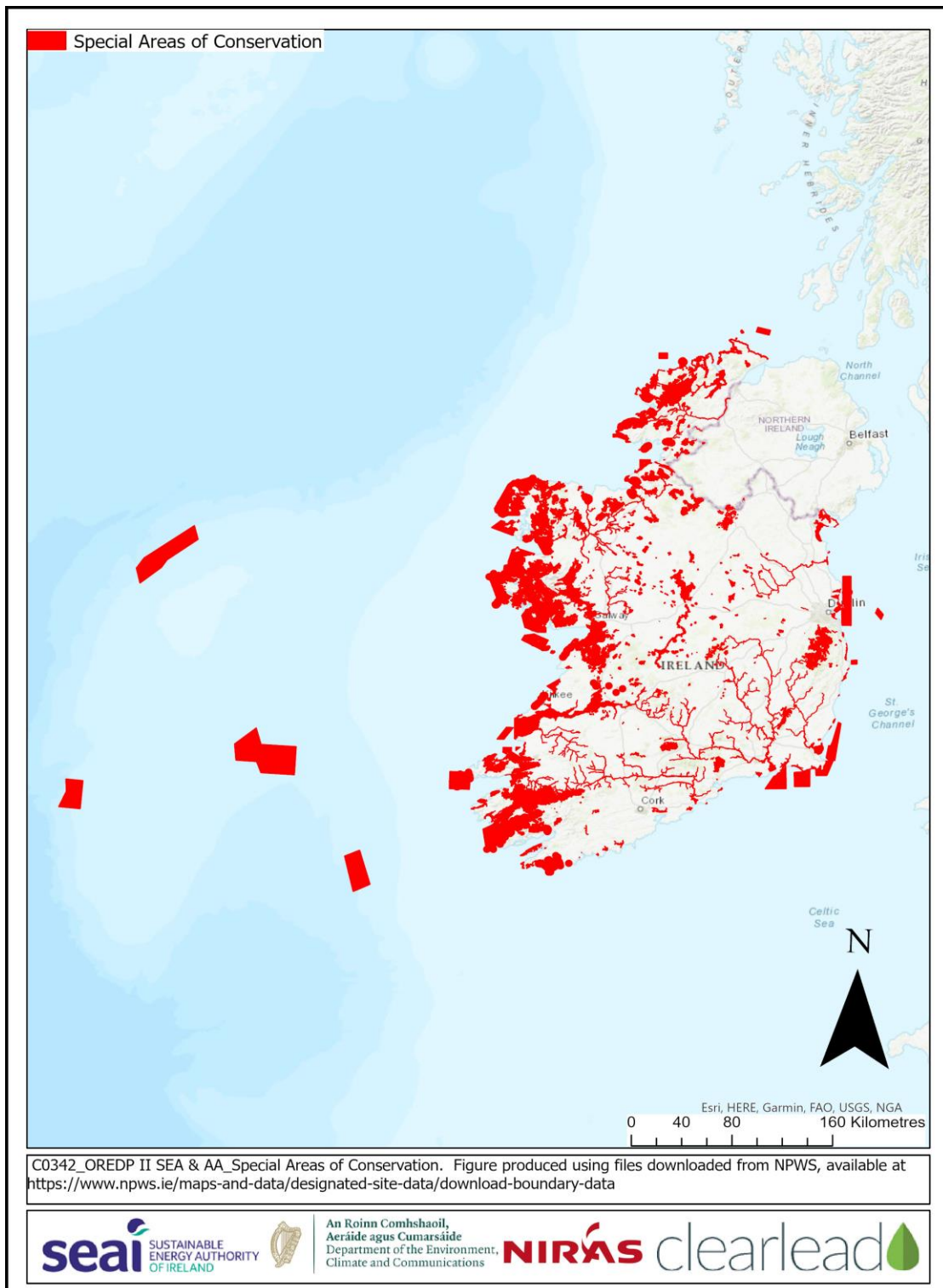


Figure A3-10: SAC designated sites in Irish marine waters

In addition to the network of sites designated under Ireland's legislative commitments, there also exists the potential for a number of designated sites outside Ireland's jurisdiction to be affected by OREDP II. Much of Irish waters lie adjacent to UK waters. Whilst the UK left the EU on 31 January 2020 the UK's European Union (Withdrawal Agreement) Act 2020 retains much of EU-derived law into UK domestic law, including protection and designations afforded to Natura 2000 sites within UK waters through the **UK's Conservation of Habitats and Species (EU Exit) Regulations 2019**, which amended the UK's 2017 Habitat Regulations. UK Marine Protected Areas (SACs, SPAs, Marine Conservation Zones (MCZ), Nature Conservation MPAs (NCMPA), with the potential for transboundary effects from OREDP II are shown in Figure A3-11.

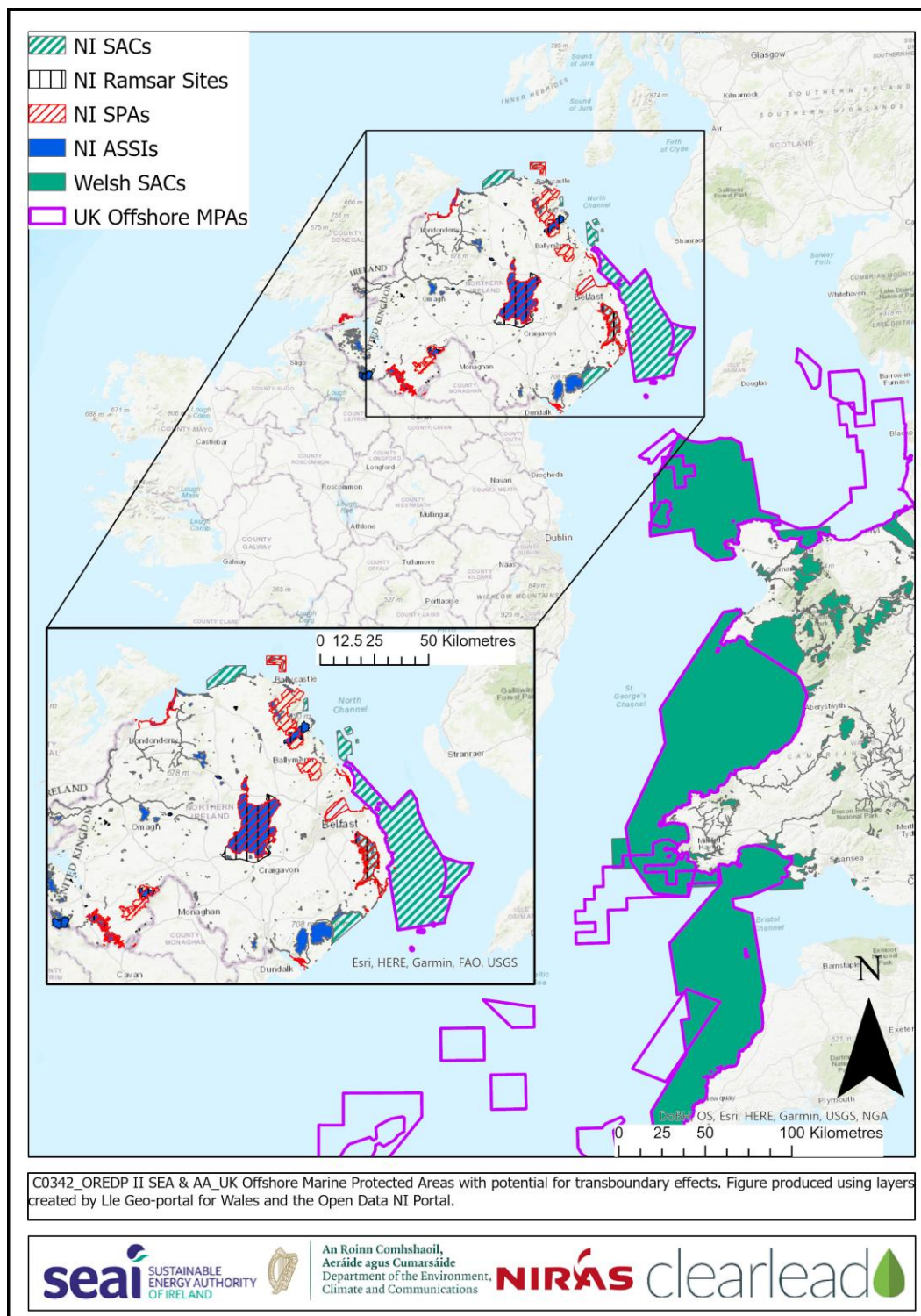


Figure A3-11: UK Offshore Marine Protected Areas with potential for transboundary effects^{3,4}

6.1.2 Designated Species

Four entirely marine species require SAC designation under **Article 4 of the Habitats Directive**: harbour porpoise, bottle-nosed dolphin, grey seal and harbour (common) seal (NPWS, 2022). Other partly marine species such as otter may also be listed for marine sites **Figure A3-10 and Figure A3-11** above shows the distribution of SACs designated for marine habitats and/or species around Ireland, Irish and adjacent (transboundary) waters.

Species listed within **Annex IV of the Habitats Directive** and their breeding sites and resting places are also designated for protection under the Habitat regulations, wherever they occur. In addition to the marine mammals listed in Annex II of the Habitats Directive, there are further 22 cetacean species and four species of turtle (kemp's ridley, loggerhead, hawksbill and leatherback turtle) are listed on Annex IV. These species require strict protection and, like species on Annex II, require monitoring.

All cetaceans and seals in Ireland's EEZ, whether resident or transitory from other jurisdictional waters, are protected under the **Wildlife Acts 1976 – 2021**.

6.2 Seabed Habitats

Ireland's marine area supports a range of seabed habitats associated with shallow inshore, continental shelf, slope and deeper water areas. Seabed habitats in the Irish sea off Ireland's east coast comprise a mosaic of circalittoral coarse sediment, sand and mud habitats with some localised areas of circalittoral rock and hard substrata. These habitats are characterised by a diverse range of polychaetes, amphipods, bivalves and echinoderms with the species mix in each habitat type influenced by the physical characteristics and particle size of the sediment present.

Off Ireland's south coast habitats within the territorial seas of the Celtic sea are dominated by a circalittoral rock and hard substrata. These are fauna dominated habitats with localised assemblages significantly influence by metocean characteristics (energy (high, medium, low), wave action, tidal stream, salinity, turbidity etc). Localised habitats in this area are likely to vary significantly. As the 12NM territorial sea limit is reached, seabed habitats begin to transition to deep circalittoral muds and coarse sediments with areas of deep circalittoral sands.

A similar mix of seabed habitat types exist within the territorial seas off Ireland's Atlantic west coast. Outside the territorial seas habitat types transition with increasing water depth to the Atlantic upper bathyal biotope in water depths between 200m and 600m, through the Atlantic

³ http://lle.gov.wales/services/wfs?version=2.0.0&request=GetFeature&typeName=inspire-nrw:NRW_SAC&outputFormat=SHAPE-ZIP

⁴ [Open Data Northern Ireland \(opendatani.gov.uk\)](https://opendatani.gov.uk/)

lower bathyal of the continental slope and into the Atlantic upper abyssal at water depths of over approximately 2000m. Off Ireland's south west coast an area of lower bathyal sediment or Lower bathyal rock and biogenic reef is defined at water depths of between approximately 1300m and 2100m extending into the outer parts of the Celtic sea.

6.3 Fish

6.3.1 Protected Fish Species

The following fish species are included in Annex II of the Habitats Directive (NPWS, 2019) and are known to be present within the OREDP II area and/or to migrate to, through or from adjacent (transboundary) waters, particularly Northern Irish and Welsh waters where corresponding protections such as listing as a UK Priority Species may also exist.

- Sea Lamprey *Petromyzon marinus*
- Twaite Shad *Alosa fallax*
- Atlantic salmon *Salmo salar*

All three of these species exhibit anadromous migration with much of their life cycle occurring within the marine environment including estuarine and nearshore habitats yet returning to freshwater environments to spawn (Davies, et al., 2020). These life cycle characteristics are reflected in the extent of SAC boundaries designated for the protection of these species.

In addition, a number of (non-cartilaginous) fish species known to be present within Irish or adjacent waters are listed as threatened or declining by OSPAR (OSPAR, 2008) **Table A-1**. (See **Table A-2** for protected cartilaginous fish).

Table A-1: Protected fish species (non-cartilaginous)

Common Name	Scientific Name	Annex II Habitats Directive	OSPAR List of Threatened/Declining species
Allis shad	<i>Alosa alosa</i>		✓
Atlantic Salmon	<i>Salmo salar</i>	✓	✓
Cod	<i>Gadus morhua</i>		✓
European Eel	<i>Anguilla Anguilla</i>	✓	
Long-snouted seahorse	<i>Hippocampus hippocampus</i>		✓
Short-snouted seahorse	<i>Hippocampus atlanticus</i>		✓
Sea lamprey	<i>Petromyzon marinus</i>	✓	✓
(NPWS, 2019) (OSPAR, 2008) (NASCO, 2019)			

6.3.2 Spawning and Nursery Grounds

Ireland's marine waters support over 400 fish and cephalopod (octopuses, squid, and cuttlefish) species and contain some very important spawning and nursery areas for commercial fish species (Marine Institute, 2022). The latter are important components of marine ecosystems in their own right as well as being a very valuable fishing resource. As a consequence, many populations, such as cod, have seen population numbers decline as a result of overfishing. Controls on fishing quotas and maintenance of good nursery grounds are some of the steps which have been taken to support the recovery of such populations (Marine Institute, 2022).

Fish species known to use Irish waters as a nursery ground include (Marine Institute, 2022) (DHPLG, 2020) (O'Sullivan, et al., 2013) (Clarke, et al., 2010):

- Atlantic cod (*Gadus morhua*)
- Blue whiting (*Micromesistius poutassou*)
- Hake (*Merluccius merluccius*)
- Herring (*Clupea harengus*)
- Horse Mackerel (*Trachurus trachurus*)
- Megrim (*Lepidorhombus whiffiagonis*)
- Black Bellied Angler Monkfish (*Lophius budegassa*).

6.3.3 Cartilaginous Fish

An estimated up to 71 species of cartilaginous fish (shark, skates or rays) are believed to be found in Irish waters (Clarke, et al., 2016) (IEG, 2022). Species range from the small and well-known dogfish *Scyliorhinus canicular* to the basking shark *Cetorhinus maximus*. Deepwater species off the continental shelf are also known to be present in Irish waters, including the birdbeaked dogfish *Deania calceus* and the leafscale gulper shark *Centrophorus squamosus*. Skates in European waters usually referring to long-nosed larger species such as the Common skate *Dipturus batis* and which are oviparous (egg laying) where as rays are often smaller species which are viviparous (giving birth to live young) such as the Thornback ray *Raja clavate* (IEG, 2022). IUCN Red List Critical Endangered, Endangered, or Vulnerable cartilaginous fish known to be present in Irish waters are summarised in **Table A-2** below. These species are mobile in nature, and in most cases not wholly contained within Irish waters and extend into adjacent (transboundary) waters, where corresponding protections such as listing as a UK Priority Species may also exist.

Table A-2: IUCN Red List Cartilaginous Fish Species known in Irish Waters

Common Name	Scientific Name	IUCN Red List Status	OSPAR List of Threatened/Declining species	(IEG, 2022)
Portuguese dogfish	<i>Centroscyrnus coelolepis</i>	CR	✓	
Common (blue) skate	<i>Dipturus batis</i>	CR	✓	
Flapper skate	<i>Dipturus intermedia</i>	CR		
Porbeagle shark	<i>Lamna nasus</i>	CR	✓	✓
White skate	<i>Rostroraja alba</i>	CR	✓	✓
Angel shark	<i>Squatina squatina</i>	CR	✓	✓
Leafscale gulper shark	<i>Centrophorus squamosus</i>	EN	✓	
Basking shark	<i>Cetorhinus maximus</i>	EN	✓	✓
Common stingray	<i>Dasyatis pastinaca</i>	EN		
Undulate skate	<i>Raja undulata</i>	EN		✓
Spurdog	<i>Squalus acanthias</i>	EN	✓	
Longnose velvet dogfish	<i>Centroselachus crepidater</i>	VU		
Kitefin shark	<i>Dalatias licha</i>	VU		
Tope	<i>Galeorhinus galeus</i>	VU		
Shagreen ray	<i>Leucoraja fullonica</i>	VU		
Longnose skate	<i>Dipturus oxyrinchus</i>	VU		✓
Cuckoo ray	<i>Leucoraja naevus</i>	VU		
Blue Shark	<i>Prionace glauca</i>	NT		✓
(Clarke, et al., 2016), (IEG, 2022) IUCN Red List Categories: CR – Critical Endangered, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern, DD – Data Deficient. A number of elasmobranch species are noted of particularly interest in Irish waters as noted above (IEG, 2022)				

6.3.4 Commercial Fish Stocks

The MSFD report provides insight into the populations of all commercially exploited fish and shellfish species, the status of 177 stocks within Ireland's marine area was assessed. Included within this was crustacean species, e.g., prawn, shrimp and edible crab. This did not include cephalopod species due to a lack of necessary biological information and data collection schemes to support these assessments are not currently in place (DHPLG, 2020).

6.4 Marine Mammals

6.4.1 Designated species

All cetaceans are protected under Annex IV of the Habitats Directive. In addition, the following pinniped species are also included in Annex IV. (NPWS, 2019):

- Grey Seal *Halichoerus grypus*
- Harbour (Common) Seal *Phoca vitulina*

Ireland's marine territory supports at least 25 species of resident or frequent/regularly-visiting whales (e.g. fin, humpback and minke whales) and dolphins (e.g. common, bottlenose, striped and white-sided), as summarised in **Table A-3** below (NPWS, 2019) (IWDG, 2022). These species are mobile in nature, and in most cases not wholly contained within Irish waters extending into and/or crossing into Irish waters from adjacent (transboundary) waters.

Table A-3: Marine Mammals in Irish and Adjacent (Transboundary) Waters

Common Name	Scientific Name	Habitat Directive Annex	IUCN Red List Status
Humpback Whale	<i>Megaptera novaeangliae</i>	IV	LC
Bottlenose Dolphin	<i>Tursiops truncatus</i>	II, IV	LC
Short-beaked common dolphin	<i>Delphinus delphis</i>	IV	LC
Harbour Porpoise	<i>Phocoena phocoena</i>	II, IV	LC
Killer whale	<i>Orcinus orca</i>	IV	DD
Long-finned pilot whale	<i>Globicephala melas</i>	IV	LC
Risso's dolphin	<i>Grampus griseus</i>	IV	LC
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>	IV	LC
White beaked dolphin	<i>Lagenorhynchus albirostris</i>	IV	LC
Striped dolphin	<i>Stenella coeruleoalba</i>	IV	LC
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	IV	DD
Sowerby's beaked whale	<i>Mesoplodon bidens</i>	IV	DD
Minke whale	<i>Balaenoptera acutorostrata</i>	IV	LC
Fin whale	<i>Balaenoptera physalus</i>	IV	NT/VU
Blue whale	<i>Balaenoptera musculus</i>	IV	EN
Sperm whale	<i>Physeter macrocephalus</i>	IV	VU
Northern bottlenose whale	<i>Hyperoodon ampullatus</i>	IV	NT
Sei whale	<i>Balaenoptera borealis</i>	IV	EN

Common Name	Scientific Name	Habitat Directive Annex	IUCN Red List Status
Northern right whale	<i>Eubalaena glacialis</i>	IV (vagrant)	CR
False killer whale	<i>Pseudorca crassidens</i>	IV (vagrant)	NT
True's beaked whale	<i>Mesoplodon mirus</i>	IV (vagrant)	LC
Pygmy sperm whale	<i>Kogia breviceps</i>	IV (vagrant)	LC
Beluga / white whale	<i>Delphinapterus leucas</i>	IV (vagrant)	LC
Gervais' beaked whale	<i>Mesoplodon europaeus</i>	IV (vagrant)	LC
IUCN Red List Categories: CR – Critical Endangered, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern, DD – Data Deficient. (NPWS, 2019) (IWDG, 2022)			

Irish waters contain a broad range of potential habitats for marine mammals, from shallow coastal areas, continental shelf, continental slope, deep ocean basins, canyons and shallow offshore banks. Data from which habitat use by these species can be inferred, relies on reports of sightings for these species within the marine environment available in a spatial format (e.g. (Rogan, et al., 2018), (Hammond, et al., 2021) and also on data collated to inform Ireland's latest Article 17 Report (NPWS, 2019c), and more recent survey data.

There are also known colonies of seal species around the coastline and their use of the coastline as habitat is widespread, as seen in **Figure A3-12** below. Specifically, grey, and common seals which can be found all around the coastline of Ireland and use coastal and offshore waters for foraging, transit and for social behaviour and territory.

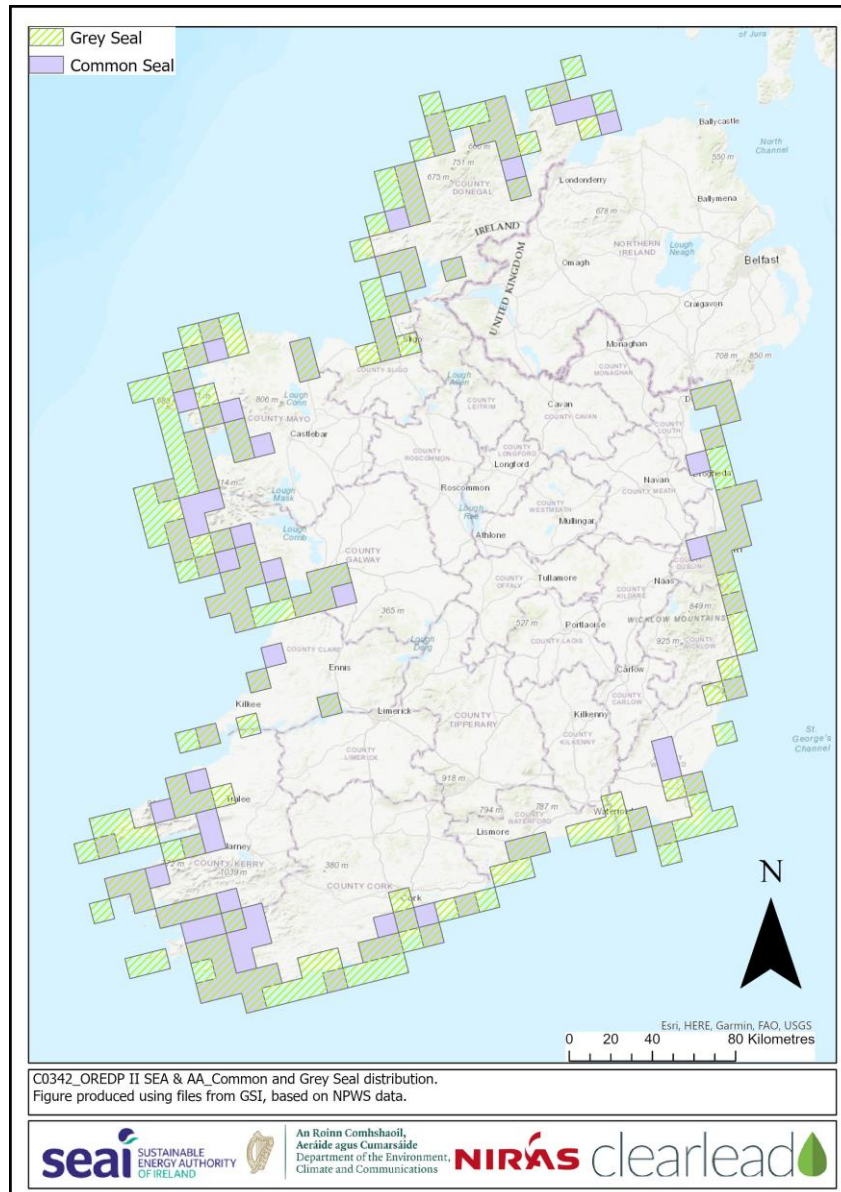


Figure A3-12 Marine Mammals Distribution around Ireland's coastline

6.5 Bats

6.5.1 Designated species

Nine species of bat are known to reside in Ireland (Bat Conservation Ireland, 2022) as listed in **Table A-4** below. All nine of these species and their roosts are protected under several laws and regulations, including the EU Habitats Directive (92/43/EEC) (Specifically, Annex IV for all species and Annex II for the lesser horseshoe bat) and by the Wildlife Act 1976 and subsequent amendments.

Table A-4: Bat Species known to be present within Ireland, which may utilise marine / coastal areas

Common Name	Scientific Name	Habitat Directive Annex	IUCN Red List Status
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	IV	LC
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	IV	LC
Nathusius' pipistrelle	<i>Pipistrellus nathusii</i>	IV	LC
Leisler's bat	<i>Nyctalus leisleri</i>	IV	LC
Brown long-eared bat	<i>Plecotus auritus</i>	IV	LC
Daubenton's bat	<i>Myotis daubentonii</i>	IV	LC
Whiskered bat	<i>Myotis mystacinus</i>	IV	Not known
Natterer's bat	<i>Myotis nattereri</i>	IV	LC
Lesser horseshoe bat	<i>Rhinolophus hipposideros.</i>	IV, II	NT
(Bat Conservation Ireland, 2022), (IUCN, 2022)			
IUCN Red List Categories: CR – Critical Endangered, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern, DD – Data Deficient.			

Relatively limited data is currently available to understand bat activity at coastal sites and/or migratory flight routes/activity over coastal waters. Some limited data from other geographies also may indicate the potential suitability for installed offshore infrastructure to provide suitable habitat/roost sites for bat (Bochamer & Beeker, 2008).

6.6 Reptiles

6.6.1 Designated species

The following marine reptile species are protected under Annex IV of the Habitats Directive

- Leatherback Turtle *Dermochelys coriacea*

A small numbers of leatherback turtles have been recorded within Irish waters. A clear trend for numbers or distribution of the species has not been found, however, it is thought that the northernmost limits follow the 15°C isotherm (DEHLG, 2007).

6.7 Birds

The seas around Ireland are used by roughly 60 species of resident and visiting birds of which 24 are considered “seabirds” (e.g. terns, puffins, guillemots, sea gulls and gannets) while the remainder include waders, sea ducks and or other birds reliant on marine waters. Over 500,000 pairs of marine birds breed annually around the island of Ireland.

Bird species listed within **Annex I of the Birds Directive** and their breeding sites and resting places should be protected, including through SPA designations under the Birds Directive (Cummins, et al., 2019). Many of the species found in Irish Waters are also listed as IUCN Red-list species (Gilbert, et al., 2021) including as shown in **Table A-5** below:

Table A-5: Protected Marine birds known in Irish Water

Common Name	Scientific Name	Birds Directive Annex 1	IUCN Red List Status
Breeding			
Black-necked grebe	<i>Podiceps nigricollis</i>		LC
Leach’s storm petrel	<i>Hydrobates leucrhous</i>	✓	NT
Kittiwake	<i>Rissa tridactyla</i>		VU
Puffin	<i>Fratercula arctica</i>		VU
Razorbill	<i>Alca torda</i>		LC
White Tailed eagle	<i>Haliaeetus Albicilla</i>	✓	LC
Passage			
Balearic shearwater	<i>Puffins mauretanicus</i>	✓	CR
Curlew sandpiper	<i>Calidris ferruginea</i>		VU
Wintering			
Bewick’s swan	<i>Cygnus columbianus bewickii</i>	✓	VU
Long-tailed duck	<i>Clangula hyemalis</i>		VU
Velvet scoter	<i>Meanitta fusca</i>		VU
Golden eye	<i>Bucephala clangula</i>		LC
Scaup	<i>Aythya marila</i>		LC
Slavonian grebe	<i>Podiceps auritus</i>	✓	VU
Breeding and Wintering			
Eider	<i>Somateria mollissima</i>		NT

Common Name	Scientific Name	Birds Directive Annex 1	IUCN Red List Status
Common Scoter	<i>Melanitta nigra</i>		LC
Pochard	<i>Aythya farina</i>		VU
Shoveler	<i>Anas clypeata</i>		LC
Oystercatcher	<i>Haematopus ostralegus</i>		NT
(Cummins, et al., 2019), (IUCN, 2022), (EU, 2022)			
IUCN Red List Categories: CR – Critical Endangered, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern, DD – Data Deficient.			

Birds are highly mobile and can travel some distance from their breeding sites to forage or migrate to and from their non-breeding areas. Foraging distances and migratory movements of bird populations vary by species, stage of life cycle (breeding, non-breeding seasons) (Woodward, et al., 2019) (BTO, 2022). (See Appropriate Assessment documentation for more detail).

6.8 Plankton

Ireland's marine strategy under the MSFD has assessed the progress towards the achievement of Good Environmental Status (GES) for elements of the marine food webs within the "Celtic Seas ecoregion". Prior to this, OSPAR Common Indicator Methodologies were followed concentrating on three trophic guilds – Phyto-plankton; zoo-plankton; and fish species (DHPLG, 2020).

6.9 Non-indigenous Species

Non-indigenous species (NIS) are those which are not native to Irish waters. NIS species can reach Irish waters either accidentally or less frequently through deliberate introduction. The most common route for accidental introduction of NIS is likely via aquaculture or the movement of shipping and equipment (e.g. jack up barges, pile driving equipment, installation and support vessels etc) into Irish waters from elsewhere, where introduction often goes initially undetected, with presence only becoming apparent as a non-indigenous species becomes established in its receiving environment.

Only limited information existing relating to the current presence and or impact of NIS in Irish marine waters. In total, 135 marine NIS have been recorded within Ireland's waters since 1811 (DHPLG, 2020). Particular examples have been recorded in the past such as the parasite *Bonamia ostreae* which has been linked to observed declines in yields of commercially harvested native oysters (DHPLG, 2019).

The number of recorded incidents of non-indigenous species in Irish waters is considered to be low, although it is noted that the target should always be zero for NIS.

Ireland's waters are currently considered to have achieved good environmental status under the MSFD GES Description 2 for Non-indigenous species (Govt of Ireland, 2022).

6.10 Marine Ecosystems

6.10.1 Marine Food Webs

All living organisms within the marine environment are interdependent through the predator-prey relationships within food chains, where a small variation in the dynamic of one species may be magnified through its linkages with other elements to ecosystem level changes. (WISE Marine, 2020).

6.10.2 Ecosystem Services

Ecosystem Services are a way of expressing, documenting and measuring the contributions that biodiversity makes to human wellbeing. Under Action 5 of the EUs Biodiversity Strategy to 2020, an exercise to map and assess the state of ecosystems and the services that they supply has been implemented within Ireland.

Prioritised ecosystem services provided by Ireland's marine environment include (Parker, et al., 2016):

- Marine Areas that Provide Food (see section 10.4 and 10.5 for further detail);
- Marine Carbon (see section 4 for further detail)
- Marine Biodiversity (see below)

Areas with biophysical properties that support marine biodiversity, based on habitats, sediments and management information have been mapped for Irish waters⁵ (Parker, et al., 2016). For example, highest ecosystem service value is currently anticipated where biogenic habitats are known to exist (e.g. corals, mussel beds etc) and/or where habitat complexity is high. Ecosystem service values are anticipated to be lower in higher energy environments where tide, current and wave action can cause crushing and damage to benthic organisms, or where human activities such as commercial fishing (depending of type of fishing gear and intensity etc) may cause damage to marine biodiversity.

Overall ecosystem service values for marine biodiversity are estimated by (Parker, et al., 2016) as generally higher to the south of Ireland in the Celtic Sea and shallow waters of the South and West coast of Ireland. Only a small extent of relatively discrete areas e.g. in Donegal Bay have

⁵ Species data has not been included in this current mapping exercise.

been mapped as areas with ecosystem disbenefit and these are recorded as being associated with known areas of dumping at sea.

7 Cultural Heritage

Marine cultural heritage in Ireland is rich and includes:

- Submerged landscapes
- Harbours
- Jetties
- Landing places
- Fish traps
- Kelp grids
- Bridge sites
- Crannogs
- Tidal mills.

The Underwater Archaeology Unit (UAU) of the National Monuments Service (NMS) works to protect and preserve such features through research to identify and quantify those present throughout Irish waters.

7.1 Protected Sites

Ireland has one marine-based UNESCO World heritage Site – Skellig Michael. This lies off the south western coast, within the Atlantic and the island forms parts of the Skellig Islands. The site was designated for its religious significance, importance for Catholics whose rights and beliefs were suppressed. Records of the site date back to 600AD and a monastery is known to have been in place on the island until the 13th century (skelligislands, 2022).

All wrecks in excess of 100 years old within Irish waters are protected under Section 3 of the National Monuments (Amendment) Act 1987. Wrecks less than 100 years old, as well as potential locations for wrecks can also be protected under this Act if considered to be significant importance. One such example was RMS Lusitania, a ship torpedoed by a German submarine in 1915 off the coast of Cork. This was granted protected under the Act in 1995, despite being under 100 years old at the time. Further information on the wrecks of Ireland is available in section 5.7.4 below (NMS, 2022).

7.2 Submerged landscapes

There are 14 known submerged sites located across Ireland, however, the majority of these sites are intertidal. Few subtidal sites are fully subtidal but it is noted that such sites are ubiquitous across Ireland (Westly & Woodman, 2020), (ECST, 2022).

7.3 Wrecks

Significant numbers of shipwrecks have been recorded from around our coast and while ongoing work by the National Monument Service has created an archive of over 18,000 wrecking events, it is estimated that the true figure could be as high as 30,000 wrecks. These losses off the Irish coast and within inland waterways represent a wide variety of vessel types. These include longboats, currachs, medieval ships of all classes, fishing and trading vessels, steamships, submarines, warships, ocean-going liners and approximately 1,800 wrecks relating to World Wars I and II (NMS, 2022). **Figure A3-13** below shows the presence of known wrecks around the coastline, which are densely clustered from the South West of Ireland to Dublin, as close to the coastline of County Cork as 800 meters. Shipwrecks are also present off the southern coast, within the Celtic Sea. Clusters are dense along the South Eastern coast up to Dublin within Irish Sea territory. There are no shipwrecks present in the North Channel. There is a dense cluster present on the Northern Irish Coastline as close to Rutland Island as 50 metres.

8 Landscape and Seascape

The seascape is an important part of Ireland's identity and culture due to its integral role in the economy and population wellbeing.

In 2020, a marine seascape character assessment was undertaken around the coastline of Ireland. 13 Regional Seascape Character Areas (RSCAs) were identified around the Irish coast which designate 'a unique geographical area of land, intertidal and marine area with a recognisable sense of place and identity' (Marine Institute, et al., 2020). **Figure A3-14** below shows the distribution of RSCAs throughout the Irish coast.

5 RSCAs were identified along Irish sea coast:

- Border-Carlingford Lough: comprising sea lough/fjord with raised hinterland.
- North-eastern Irish Sea Islands and beaches: comprising large limestone bays with low lying/undulating hinterland & coastal wetlands; and broad estuarine bays and complex low plateau and cliff coastline.
- Dublin Bay: comprising modified historic urban bay.
- Irish Sea Sandbanks & Broad Bays: comprising a large limestone bay with low lying/undulating hinterland & coastal wetlands; and broad estuarine bays and complex low plateau and cliff coastline.
- South East Irish Sea: also comprising a large limestone bay with low lying/undulating hinterland & coastal wetlands; and broad estuarine bays and complex low plateau and cliff coastline (Marine Institute, et al., 2020)

3 RSCAs were identified along Celtic Sea Coast:

- Celtic Sea Bays and Beaches: comprising mostly broad estuarine bays and complex low plateau and cliff coastline; but also an area of large estuary (Waterford) and large Islands SCT (Great and Little Saltee).
- Cork Harbour & Estuary: large estuary (Cork).
- Atlantic Celtic bays and estuaries: comprising mostly complex indented small peninsulas, low cliffs & small sandy beaches.

9 RSCAs were identified along Atlantic coast:

- Atlantic Southwest Rias, Bays and Islands: comprising sandstone peninsulas with drowned valleys (Rias); and also large islands.
- Shannon Estuary & Tralee Bay: comprising large limestone bay with low-lying/undulating hinterland & coastal wetlands; and high granite/sandstone cliffs & plateau; and large estuary (Shannon).
- Atlantic Clare Cliffs: comprising high granite/sandstone cliffs & plateau.
- Atlantic Galway Bay & Islands: comprising a large limestone bay with low-lying/undulating hinterland & coastal wetlands and large islands (Inishmore, Inishmaan and Inisheer).

- Atlantic North Mayo & Galway: comprising a large limestone bay with low-lying/undulating hinterland & coastal wetlands; complex metamorphic and igneous indented coastline, small bays and small islands; sea lough/fjord with raised hinterland (Killary) and large islands (Achill and Clare Islands).
- Atlantic Sligo Bay: comprising a large limestone bay with low-lying/undulating hinterland & coastal wetlands and high granite/sandstone cliffs & plateau.
- North Atlantic Islands, Headlands & Beaches: comprising high granite/sandstone cliffs & plateau; complex metamorphic and igneous indented coastline, small bays and small islands; and large islands (inc. Arran Island).
- North Donegal Atlantic Headlands, Bays and Beaches: comprising high granite/sandstone cliffs & plateau; complex metamorphic and igneous indented coastline, small bays and small islands; and sea loughs/fjords with raised hinterland (River Swilly).
- Border-Lough Foyle: comprising sea loughs/fjords with raised hinterland (Lough Foyle) (Marine Institute, et al., 2020).

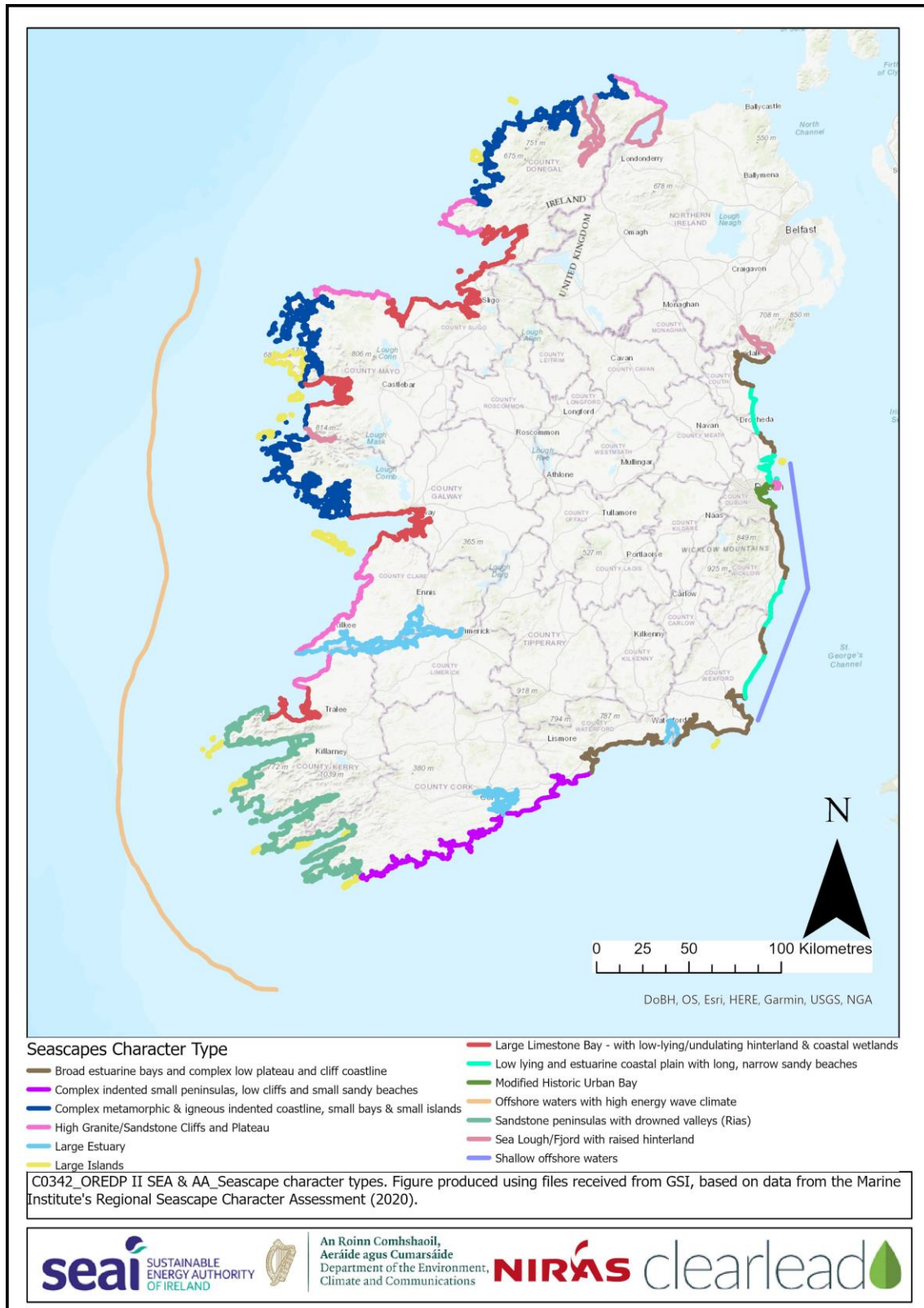


Figure A3-14: Seascape Character Areas of Ireland (Marine Institute, et al., 2020)

9 Population and Human Health

9.1 Employment

In 2019, Ireland's most active areas of employment were the agricultural sector (4.43%), industry (18.77%) and the service sector (76.8%) (Stastita, 2022). Data produced by the international Monetary Fund (IMF) in the World Economic Outlook Database demonstrates a steady rate of employment between 2012 to 2022 across all sectors. As expected, the economic impact of the coronavirus pandemic had consequences for employment capabilities in Ireland, explaining the reduction in employment in 2020 and 2021. Rates of employment have recovered to pre-pandemic level (Statista, 2021).

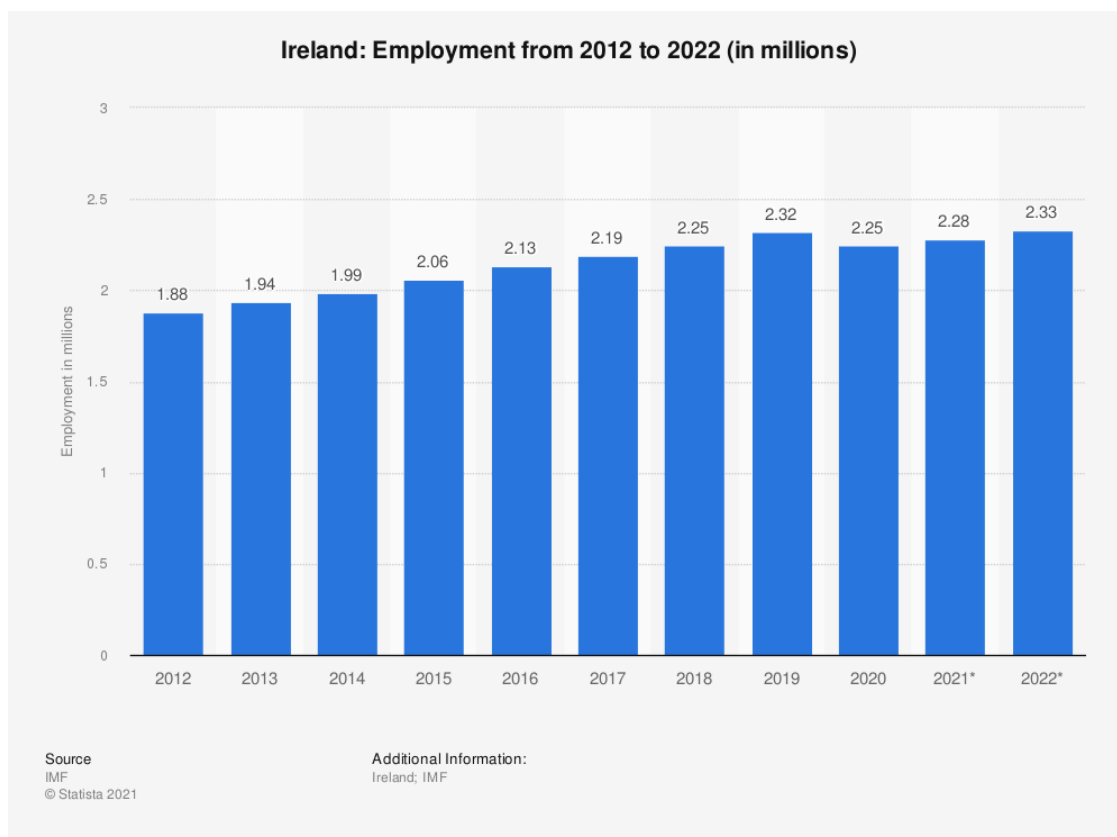


Figure A3-15: Ireland's Employment from 2012 to 2022 (in millions)

IDA Ireland (Industrial Development Agency) has reported a record high performance for Ireland FDI (Foreign Direct Investment) in a single year, for 2021, despite the challenging and volatile international economic environment. This relates specifically to those individuals employed in the multinational sector in Ireland, reaching around 275,000 - the highest FDI employment ever recorded in Ireland. As a result, 29,000 new jobs were created across all sectors in 2021. The employment opportunities recorded are not just limited to the most developed cities, over half

(53%) of the investments won went to regional locations, driving employment growth in every region of the country. Despite this, competitiveness and capacity challenges are present (IDA Ireland, 2021).

SEMRU, the Socio-economic marine research unit had targeted to double the value of Ireland's ocean wealth to 2.4% of GDP by 2030 (SEMRU, 2019). The direct impact of marine employment, reported for 2018, was 34,130 employees, at 1.16% GDP. There is a lack of data regarding the current employment statistics within the Marine Sector in Ireland.

9.2 Human Health

Life expectancy in Ireland has increased by more than six years since 2000, this is 1.5 years above the EU average. Last reported in 2019, the gap life expectancy between men and women was nearly 4 years, below the EU average of 5.5 years. In 2018, circulatory diseases and cancers accounted for more than 30% of all deaths in Ireland. Ischaemic heart disease specifically was the leading cause of death in 2018. The coronavirus pandemic accounted for 5059 deaths between 2020 and August 2021. Ireland's mortality rate in August 2021 was approximately one third lower in Ireland than the average across EU countries. Most Irish adults report being in good health, but nearly three in ten have a chronic condition.

According to estimates by the Joint Research Centre based on incidence trends from previous years, 27,000 new cancers were expected in 2020, the age standardised instance rate for cancer was expected to be the highest in the EU for men and women due to an increasingly aging population and wider behavioural factors. The main risk factors are in relation to alcohol and tobacco misuse and lifestyle factors, including lack of physical exercise and diet (OECD, 2021).

In Ireland, 1.9 million people live within 5km of the coast (Marine Institute, 2020). Over the last decade, changing environmental parameters because of climate change, has led to an increase in extreme weather and coastal hazards. The ongoing research project titled 'Sea's Ocean's and Public Health in Europe' (SOPHIE) proves the intrinsic link between ocean health and human health, and overall wellbeing. In the research conducted so far, risks of ocean pollution and marine biodiversity are the largest threats to marine health, as voted by respondents (SOPHIE Consortium, 2020). Although there is a gap in the data in relation to coastal communities and health in Ireland as a whole, the threat of pollution is evident on Dublin's coast. Research from University College Dublin suggests that disease-causing bacteria or viruses or protozoa may be present in the sea, sources ranging from sewage or agricultural waste, or animal waste which is deposited on the beach. This may result in human illness when people swim in the water or consume foods such as shellfish, which have been grown in aquaculture (One Health UCD, 2021).

9.3 Leisure

Ireland's waters host a huge range of marine sport, leisure and adventure activities including sailing; canoeing; dinghy sailing; jet skiing; paddle-surfing / Standup Paddleboarding (SUP'ing); kite surfing; powerboating; sea kayaking, surfing, snorkelling, diving, wakeboarding, water skiing, windsurfing, rowing; coasteering and sea swimming. Sailing is the most popular with over 19,000 club members in 60 clubs and Ireland is a world class sailing destination.

Ireland is also a world leading destination for other marine activities such as surfing, particularly along the west coast at locations such as Lahinch, Strandhill, and Mullaghmore where big wave surfers from around the globe gather to take on the famous "prowlers" wave. Ireland's position on the continental shelf offers significant opportunity for scuba diving and snorkelling all year around with over 80 clubs nationally.

As referenced previously within the section on human health, the EU funded project, SOPHIE provides evidence to support the positive impact of ocean on human wellbeing, as a highly valuable resource for human leisure activities. Spending time at the beach offers an increase in exposure to Vitamin D, boosting quality of sleep and reducing symptoms of anxiety and depression. Sea swimming has multiple health benefits, releasing endorphins and the salt water can sooth some skin conditions, as it is naturally rich in magnesium (SOPHIE Consortium, 2020).

Particularly during the pandemic, where daily routines have been impacted by restrictions and infection, adolescents reporting elevated symptoms of depression increased from 39% to 46%. For those previously active, there was an increase in physical activity, for those previously inactive, rates of poor mental health increased. Accessibility and availability of healthy coastlines for the population of Ireland is therefore essential for those using this as a means of both leisure, and routine physical activity to regulate both physical and mental health (Murphy, et al., 2021).

10 Material Assets

10.1 Tourism

Tourism is a crucial source of income for the Irish Economy. Fáilte Ireland (the National Tourism Development Authority) figures for 2017 evidence this (Failte Ireland, 2022).

- 9 million overseas tourists came to Ireland, representing a growth of 3.2%;
- Overseas tourism expenditure grew by an estimated 4.2% to €5.3bn;
- Volume of holiday trips taken by domestic residents was estimated at 4.9 million;
- Spending by Irish people on holiday trips in Ireland amounted to €1.1bn;
- Almost 150,000 people were employed in the accommodation and food service sectors alone.

Ireland's coastal areas, marine resources and activities are significant components in the overall tourism offering. The qualities that make a region attractive as a place to visit also enhance its attractiveness as a place to live, work and invest in. For example, 'The Wild Atlantic Way' tourism experience brand is designed to highlight and leverage Ireland's unique geographical positioning along the Atlantic Ocean.

Out of a total of 4.9 million domestic holiday trips in 2017, about 1 in 5 (21%) domestic holidaymakers engaged in water sports (excluding swimming), and 3% engaged in angling. By allowing tourists to engage with and feel the benefits of coastal activities during their holiday coastal communities in Ireland hope to entice more visitors, encouraging them to increase duration and as a result, spending.

Fáilte Ireland own research on Irish tourism businesses and tourist travel patterns within Ireland shows that 70% of visitors are concentrated in areas representing 30% of the country and most of these areas are along the coastline.

The Irish Tourism Confederation (ITIC) has previously revealed that the tourism and travel sector of the country lost about €400 million in December 2021, it is estimated that about €17 million are being lost per day in the country due to the ongoing pandemic and the restrictions in travel that come with this (schengenvisa.info, 2022). Fáilte Ireland reports that Ireland's tourism sector may not make a full recovery until 2026.

10.2 Mineral Exploration and Mining

The activity of marine exploration and mining can involve extraction of sedimentary sand or gravel materials located on the seabed this may involve dredging of the deposit to remove it from the seabed. According to the National Marine Planning Framework, for commercial purposes extraction up to 2018 was from terrestrial sources (Gov't of Ireland, 2019).

Mineral exploration and mining have been permitted only for beneficial purposes such as beach nourishment, coastal protection, reclamation and backfill. However, anticipated growth in construction activity and associated demand may lead to a greater level of marine exploration and mining, leading to further extraction in the future. There is a gap in data regarding updated statistics on Mineral Exploration and Mining, the figures used reflect the landscape in 2018.

10.3 Defence

The Naval Service is Ireland's primary maritime defence agency and comprises eight ships, primarily deployed in fisheries protection tasks, from Haulbowline Naval base in Cork. Investment in a new ships programme since 2010 runs to over €250 million which has delivered four new Naval Service vessels (Irish Defence Force, 2020).

- LÉ Samuel Beckett was commissioned in May 2014,
- LÉ James Joyce was commissioned in September 2015,
- LÉ William Butler Yeats was commissioned into service in October 2016.
- LÉ George Bernard Shaw was accepted into state service in October 2018.

The Irish Government has most recently purchased two new navy patrol vessels, to replace two existing ships, LÉ Orla, and LÉ Ciara for a combined cost of €26m (£21.8m) as part of the continued regeneration of the Irish Navy forces (BBC News, 2022).

The Air Corp operate Maritime Patrol Aircraft from Casement Aerodrome Baldonnel County Dublin. Together, the Naval service and the Air Corp have responsibility for patrolling the Irish EEZ, particularly to protect Ireland's fisheries and to ensure compliance with national and EU fisheries legislation. General surveillance, security, pollution monitoring and marine search and rescue services are also provided.

10.4 Aquaculture

In 2021, Ireland produced 42,000 tonnes of fish through aquaculture production (including molluscs and crustaceans), with a value of approximately €175 million. (BIM, 2021) (OECD, 2021).

Aquaculture is an integral part of Ireland's coastal economy, this is divided primarily between finfish, shellfish and seaweed species, and an aquaculture licence is required for this activity. Some aquaculture takes place on land, but most of the aquaculture activity takes place in the marine environment on the foreshore, with the main activity concentrated on the south, west and northwest coast (Government of Ireland, 2018).

The Bord Iascaigh Mhara (BIM) Aquaculture Surveys (BIM, 2021) (BIM, 2018) indicate that Salmon was the most significant species for the aquaculture industry, with a value of €109 million

in 2021, with Irish Rock Oysters, Seabed and Rope cultured mussels, dominating the remaining production. (BIM, 2021). In 2017, the industry employed 1,913 people directly on 280 primary production units in 2017. More recent figures show that Ireland is a net exporter of fish and fish products, between 2008 and 2018 exports increased by a total of 38% and a further 10% to 2021, while imports increased by 38% to 2018, but fell back by 16% to 2021. Global share of aquaculture volume was recorded by the OECD as 0.447% in 2018.

Predicted to grow over the next 5 years is seaweed harvesting in Ireland. Some 25,000 - 40,000 tonnes of wild seaweed are harvested and sold every year at present. Estimates vary of the number of harvesters who are engaged in seaweed harvesting and it is estimated to be somewhere in the region of 150 – 300. The value of aquaculture across Ireland is illustrated in **Figure A3-16** (2018 reflection).

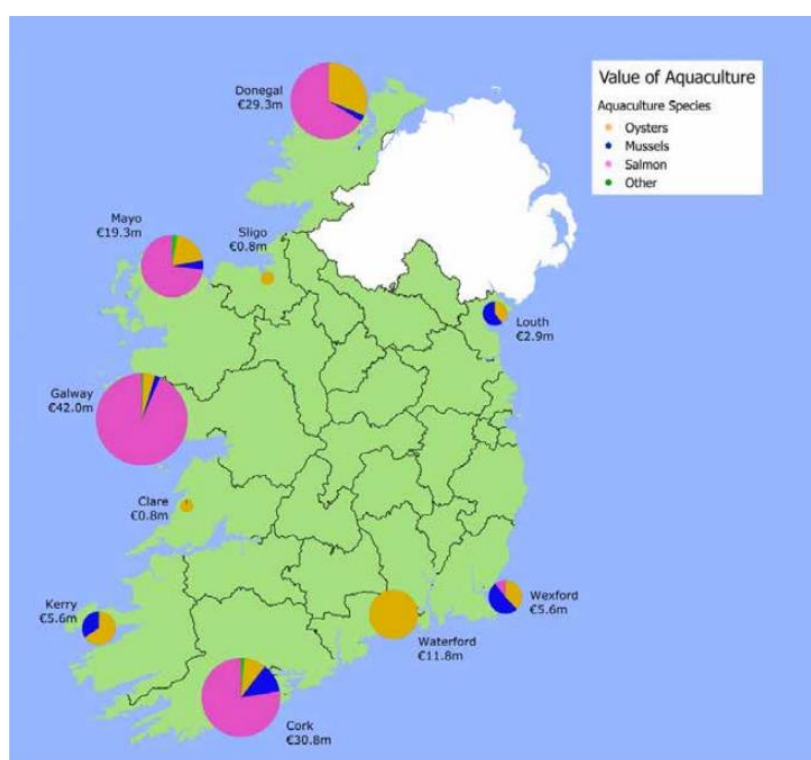


Figure A3-16: Value of Aquaculture across Ireland (Government of Ireland, 2018)

10.5 Commercial Fishing

Ireland's coastline, inshore and offshore waters contain some of the largest and most valuable sea fisheries resources in Europe. In 2021, the Irish Seafood Economy was worth €1.26 billion. Employment in the seafood sector, including processing, accounted for 16,647 jobs made up of 8,705 employed directly in fishing, aquaculture and processing, with the remainder employed in downstream ancillary and support sectors. This represented a 1% increase in employment since

last reported (2018) (BIM, 2021). Over the same period, the average value of production per employee increased by 18% in marine fisheries and increased by 55% in aquaculture (OECD, 2021). A particularly significant increase in the seafood-tech sector was noted recorded a 71% increase in employment in since 2015 (741 jobs).

Among the most important species for Irish fishing vessels are mackerel and Dublin Bay prawns. An observed reduction in the volume and value of landings of certain fish species, particularly mackerel in 2021 may be at least partially attributable to changes in the quotas for individual fish species following the Brexit EU/UK Trade and Cooperation Agreement (TCA) quota transfers between the EU and UK (BIM, 2021). The same report however noted an increase in volume and landings of Dublin Bay prawns over the same period, and also similar patterns for white fish species (e.g. haddock, hake whiting and megrim) with the increasing recovery of the EU food service sector, following the COVID 19 pandemic closures potentially providing a counter-balance to changes in TAC quotas (BIM, 2021).

Ireland's waters are currently considered to have achieved partial good environmental status under the MSFD GES Description 3 for Commercial Fish and Shellfish with 18% of fish stocks (24 species) achieving GES. 22% of fish stocks (44 species) are not currently recorded at GES, with the remainder unknown (Govt of Ireland, 2022).

While there is no consistent international definition of 'inshore fisheries' or 'small scale coastal fisheries' the EU rule-of-thumb applies to as vessels less than 12m in length using non-towed gear. In an Irish context, this measure excludes small trawlers and shellfish dredgers which are an important component of the inshore fleet. Inshore boats primarily operate within 6 nautical miles of the coast. In Ireland, protection enforcement of commercial sea-fishing legislation comes under the remit of the Sea-Fisheries Protection Authority.

10.6 Marine Infrastructure / Exploration

Ireland's Government has set with ambitious targets for 70% of electricity to be generated from renewable sources by 2030 and for 5GW of offshore wind by 2030. Subsequently, policy for commercial ports to develop infrastructure to support offshore renewable energy has been developed. The Climate Action Plan published on 4th November 2021 (CAP 21) has since increased the target to up to 80% renewable electricity by 2030 (Gov't of Ireland, 2021).

At present, a broad range of possible offshore renewable opportunities around Ireland are under consideration (42 current or potential offshore renewables projects are identified by industry tracker 4Coffshore (4Coffshore, 2022)). Of these, two sites are currently operational in their defined capacities.

- Arklow Bank Wind Farm Phase 1 was constructed in 2003/04 consisting of seven wind turbines with a capacity of 25.2 MW. Phase 1 is owned and operated by GE Energy under

a sublease to the foreshore lease and remains the first and only operational offshore wind farm in Ireland (SSE Renewables, 2022).

- Galway Bay Marine and Renewable Energy test site has also been operational as a test site since 2006.

Other potential projects are in early stages, or expected to come forward for consent application and/or public consultation in the future (4Coffshore, 2022). With proposed investment from SSE renewables of between €1 billion and €2 billion, phase 2 of Arklow Park will have a capacity of 520MW, and will be located off the coast of Arklow, Co. Wicklow.

The degree to which a country is dependent on imports for energy can be measured to understand levels of energy security, with indigenous energy sources generally considered more secure than imported energy. Movements over the last decade in Ireland have seen a reduction in reliance on imported energy, at 67% in 2018 down from an average of 89% between 2001 and 2015 (SEAI, 2020). Ireland is considered to be one of the most import dependent countries in the EU, despite efforts to transition to indigenous sources (SEAI, 2020).

Data shows oil accounted for 49% of Ireland's primary energy requirement in 2018; to meet the demands of the transport sector (71%), but also including for home heating and in the industrial sector (SEAI, 2020). With the exception of a small amount of indigenous biofuel production, Ireland imports all its oil, and likelihood of a new indigenous supply of crude oil is low given small levels of recent offshore drilling activity. Ireland's current policy indicates that licences for the exploration of oil and gas are no longer being issued, effective from September 2019 (DECC, 2019). Ireland has one oil refinery located at Whitegate, Co. Cork. This processes crude oil from diverse sources and meets the demand of approximately 30-40% of Ireland's demand, the remainder of demand is met by refined products, 64% of which came from the UK in 2018 (SEAI, 2020).

Natural (fossil) gas accounted for 31% of Ireland's primary energy requirement in 2018. 61% came from indigenous production (mostly from the Corrib Field). The remaining requirement was imported via an interconnector system with the UK, which itself imports almost half of its gas from EU neighbours. While gas is anticipated to continue to be a requirement in Ireland's electricity and heat sectors up to 2030, plans beyond 2030 are less certain – there may be enduring roles for fossil gas with carbon capture, and for green gases the need to emerge is evident in the context of a net zero 2050 ambition (SEAI, 2020).

10.7 Ports, Shipping and Navigation

The Coronavirus pandemic has had a significant impact on Ports and Shipping in Ireland, in terms of both volume and configuration of Roll/on – Roll/off (RoRo) traffic, route choice and shipping mode (IMDO, 2021). Figures from Q3 2021 demonstrate a bounce-back in volume through ports in the Republic of Ireland (ROI) reflecting those in Q3 2019. Between July and September 2021,

297,920 RoRo units were handled at Dublin, Cork, and Rosslare Europort, just 0.02% more than the same period in 2019 (IMDO, 2021). However, new trends have emerged because of trading and customs arrangements that came into force on January 1st, 2021, after Great Britain's withdrawal from the European Union. The most major impact is a decline in use of the UK Landbridge, a route to market which connects Irish importers and exporters to international markets via the UK road and ports network. As demand to use the Landbridge has significantly decreased, this has resulted in a reduction in ROI- GB traffic and increase in direct ROI-EU traffic.

Other significant trends that have emerged in the RoRo freight market include:

- 71% of all RoRo traffic is now unaccompanied compared to 64% in Q3 2019.
- One third of all RoRo traffic in ROI now operates on direct routes to ports in the European Union, up from a 16% share held throughout 2019. In the first nine months of 2021, ROI-EU traffic is already above 52% annual total for 2019.
- Irish importers are benefitting from the demand for direct EU routes and services. In 2021, there were 13 different direct EU RoRo services available to Irish businesses, compared to 6 in 2019.

Volumes of Lift/on – Lift/off (LoLo) on direct EU routes reached unprecedented levels in 2021, with traffic through ROI ports reaching record-breaking levels in Q2 2021 surpassing 300,000 Twenty-Foot Equivalent units or 20-foot containers (TEUs) - for the first time. LoLo volumes have benefitted from the demand from Irish importers and exports to access EU markets directly.

In terms of passenger numbers, no Irish maritime segment has been more dramatically disrupted because of the pandemic and restrictions on travel impacted passenger numbers. However, following the introduction of the EU Digital Covid certificate in July 2021, the volume of passengers on maritime services in the ROI rose, with passenger numbers in the ROI increasing by 86% in Q3 2021.

It is noted that the Policy Statement on the facilitation of Offshore Renewable Energy by Commercial Ports in Ireland identified a requirement for a minimum of two facilities to support deployment activities, with multiple smaller ports required to support Operational and Maintenance requirements. This therefore has potential to alter the future ports baseline.

10.8 Other marine industry

International submarine fibre optic telecommunication cables land in Irish coastal counties including Mayo, Cork, Wexford, and Dublin. These connect Ireland to the United States of America and Canada, as well as other European countries such as the United Kingdom and France, as seen in **Figure A3-17** below.

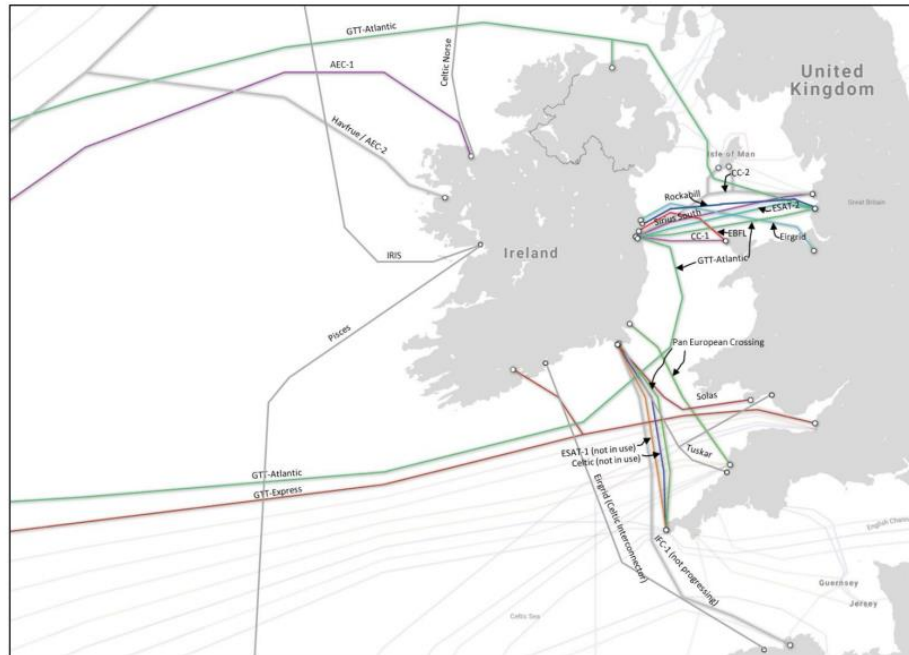


Figure A3-17: Map of Existing and planned subsea cables connecting to Ireland (planned cables in Grey)
(DECC, 2021)

11 Data Gaps

Data collation and evaluation is an ongoing process throughout the SEA. The list set out below summarise currently identified areas where additional data to support the SEA process would be beneficial. In many cases, studies are either underway or are planned, outside of OREDP II and SEA development process, to provide further information and whilst not available at this development and SEA stage, some of these studies could support subsequent review and monitoring activities.

Table A-1: Currently identified data gaps

SEA Topic	Data Gap	Notes
Physical Environment	None so far identified	None so far identified
Water	None so far identified	None so far identified
Climate Change and Air Quality	National Inventory and Distribution Mapping of Storage Capacity of Blue Carbon Habitats	Studies are currently ongoing (out with the scope of the SEA) to further develop a national inventory of the storage capacity of blue carbon habitats around Ireland. This study is funded by the Marine Institute and will improve the detail available for inclusion in National inventory or Greenhouse Gases reporting to the UN Framework Convention on Climate Change. It is not anticipated that this study will report within the timeframe of the OREDP II SEA Process.
	Distribution of Seagrass beds within Irish Waters	Data is not currently available to inform an understanding of the current extent and/or distribution of seagrass within Ireland's waters.

SEA Topic	Data Gap	Notes
Marine Pollution	Continuous Underwater sound profile for Ireland's marine area	No characterisation of continuous underwater sound profile in Ireland's marine area has yet been carried out, as methodologies for evaluation of this element of the MSFD Descriptor 11 are still under development.
Biodiversity	Habitat use data for Marine Mammals and Reptiles across Irish Waters	Specific habitat use data for marine mammals and reptiles is required. This was noted as a data gap within the MSFD Marine Strategy Report, 2020 (DHPLG, 2020).
	Population and distribution data for non-commercial fish species	It is noted that there is a great disparity in the information available for those fish species which are and are not commercially fished (DHPLG, 2020).
	Population and distribution data for basking shark	Population estimates particularly for basking sharks are currently not available due to a lack of measurable data sets over a prolonged time. There is also a lack of data on the distribution of the species within Irish waters, although high numbers have been recorded anecdotally. Current work by the Irish Basking Shark Group (IBSG) may help to reveal detailed movements, but it is thought that agglomerations for this species occur around Malin Head (IBSG, 2022).
	Population and distribution data for marine invertebrates, including shellfish species	Marine mammal survey work at the moment does not gather robust data on cetacean movements through the development sites during periods of adverse weather conditions or during hours of darkness. This is a significant data gap. Such data gaps could be closed by way of targeted surveys, monitoring and research, by way of the deployment of remote sensing technologies such as passive acoustic monitoring

SEA Topic	Data Gap	Notes
	Combined/Strategic level data collection of bird passage movements during migration, during inclement weather, and during hours of darkness	The use of remote sensing technologies in future targeted surveys, monitoring or research could address some of these data gaps.
	Data relating to migratory flight routes for bats	Paucity of information relating to migratory flight routes for bats is acknowledged.
	Characterisation of Ireland's marine ecosystem and foodwebs, and understanding of development pressures	Environmental status of marine food webs in Ireland's maritime area is currently poorly understood. MSFD GES indicators have been designed to provide some data which can be interpreted at national level. In addition some studies at more regional level are currently ongoing e.g. https://www.galwaydaily.com/news/science/irish-sea-food-web-mapping/ . Ireland's marine strategy under the MSFD has assessed the progress towards the achievement of Good Environmental Status (GES) for elements of the marine food webs within the "Celtic Seas ecoregion". Prior to this, OSPAR Common Indicator Methodologies were followed concentrating on three trophic guilds – Phyto-plankton; zoo-plankton; and fish species (DHPLG, 2020). There is a data gap around higher trophic guilds, such as marine birds, mammals due to limited data and integration models.
Cultural Heritage	None so far identified	Whilst no specific data gaps have been identified, it is noted that the vast nature of Irish waters make it challenging to find and identify marine heritage assets. Most assets known are located within coastal waters and whilst this could be due to prevalence of wrecks, harbours and other anthropogenic remains, this is also where search effort is easiest.

SEA Topic	Data Gap	Notes
Landscape / Seascape	Visability Sensitivity to different types of ORE technology.	Whilst some work has been completed, looking at the visual impacts of turbines the parameters assessed (turbine height, dimensions etc) are not necessarily representative of technology developments considered within OREDP III. Likewise, sensitivity analysis for other technology types to be covered by the strategic document is not readily available. It is anticipated that wave and tidal effects would be more localised to deployment locations due to a lower external profile, however further information is required.
Population and human health	Employment data for ORE sector.	Figures relating to employment offer an overview of the current economic and employment situation in Ireland. The related information for the marine sector in Ireland was reported and published in 2018, these levels represent pre-pandemic data. More recently published data is required to offer an accurate picture of the current situation. There is a gap in measurable data regarding the correlation between the health of the population living in Ireland, and the impact of living in Coastal Communities.
Material Assets	None so far identified	None so far identified

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