Comhshaol, Pobal agus Rialtas Áitiúil
Environment, Community and Local Government

Marine Institute
Foras na Mara

IRELAND'S MARINE STRATEGY FRAMEWORK DIRECTIVE ARTICLE 19 SUMMARY REPORT INITIAL ASSESSMENT, GES AND TARGET AND INDICATORS

OCTOBER 2013

MARINE STRATEGY FRAMEWORK DIRECTIVE

INTRODUCTION TO THE INITIAL ASSESSMENT

The Marine Strategy Framework Directive (MSFD) establishes a framework within which EU Member States are required to take the necessary measures to achieve or maintain Good Environmental Status (GES) in the marine environment by 2020. The overarching aim of the Directive is to protect Europe's marine waters by applying an ecosystem-based approach to the management of human activities while enabling the sustainable use of the marine environment for present and future generations. The MSFD is applied with reference to eleven qualitative descriptors which define overarching objectives in respect of key socioeconomic or ecological aspects of the marine environment. These specifically require the consideration of the following: biodiversity, non-indigenous species, exploited fish and shellfish, food webs, human-induced eutrophication, sea-floor integrity, alteration of hydrographical conditions, contaminants in water and seafood, marine litter and introduction of energy including underwater noise.

The first step in the implementation of the MSFD in Ireland was an Initial Assessment of Ireland's marine waters and establishment of a comprehensive set of environmental targets and associated indicators for the marine waters so as to guide progress towards achieving GES. The Initial Assessment was undertaken within a defined Assessment Area, constituting 488,762 km^2 (Figure 1), over which Ireland exercises jurisdictional responsibilities. The assessment process drew on a large range of data and information sources, including national monitoring and assessment reports (published and unpublished), national survey results, and scientific literature, together with state, consultancy and academic expert knowledge. The reporting included:

- A broad description and status assessment of the predominant, natural physical and oceanographical features, together with the ecological characteristics (species and habitats) present in the Assessment Area;
- An assessment of the human-induced pressures and impacts affecting environmental status;
- An evaluation of the socio-economic significance of Ireland's marine environment.

This report constitutes a summary of the extensive Initial Assessment report to the European Commission which is available to view on the DECLG website *(1)* as well as on the EU Commission's EIONET website *(2)* . It presents an overview of the assessment and the conclusions drawn by Ireland in the formal MSFD reporting.

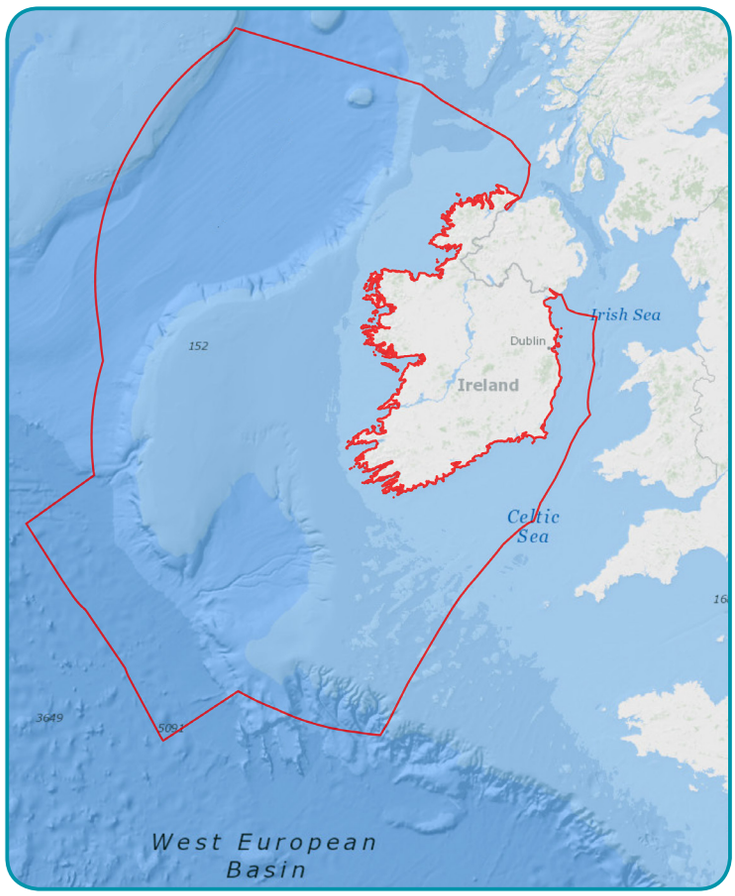


Figure 1: Ireland's MSFD Assessment Area

IRELAND'S OCEAN SETTING

The water column and seabed that surround Ireland are shaped and influenced by a huge range of natural physical processes, a consequence of our proximity to both the European continental landmass to the east and the deeper and more exposed waters of the Atlantic to the west. Ireland is at the edge of a shallow continental shelf that slopes away to form complex interconnecting sandy basins, rocky escarpments, rises and canyons, before descending to the rarely disturbed mud plains of the abyssal depths (Figure 2).

The coastal and oceanic influences are constantly colliding, forming water masses of different temperatures that are further modified by the north-eastward flow of the comparatively warm North Atlantic Current. Surface water temperatures fluctuate seasonally between averages of around 7°C after winter cooling, to 19°C following the warming influence of summer (Figure 3). In deeper water temperatures are cooler, ranging between around 6°C to 17°C along the shelf (up to 200 m depth) and in the Celtic Sea (the waters extending from

(1) *http://www.environ.ie/en/Environment/Water/WaterQuality/Marine/PublicConsultations/*
(2) *http://cdr.eionet.europa.eu/ie/eu/msfd8910/acsie/envuwsbg*

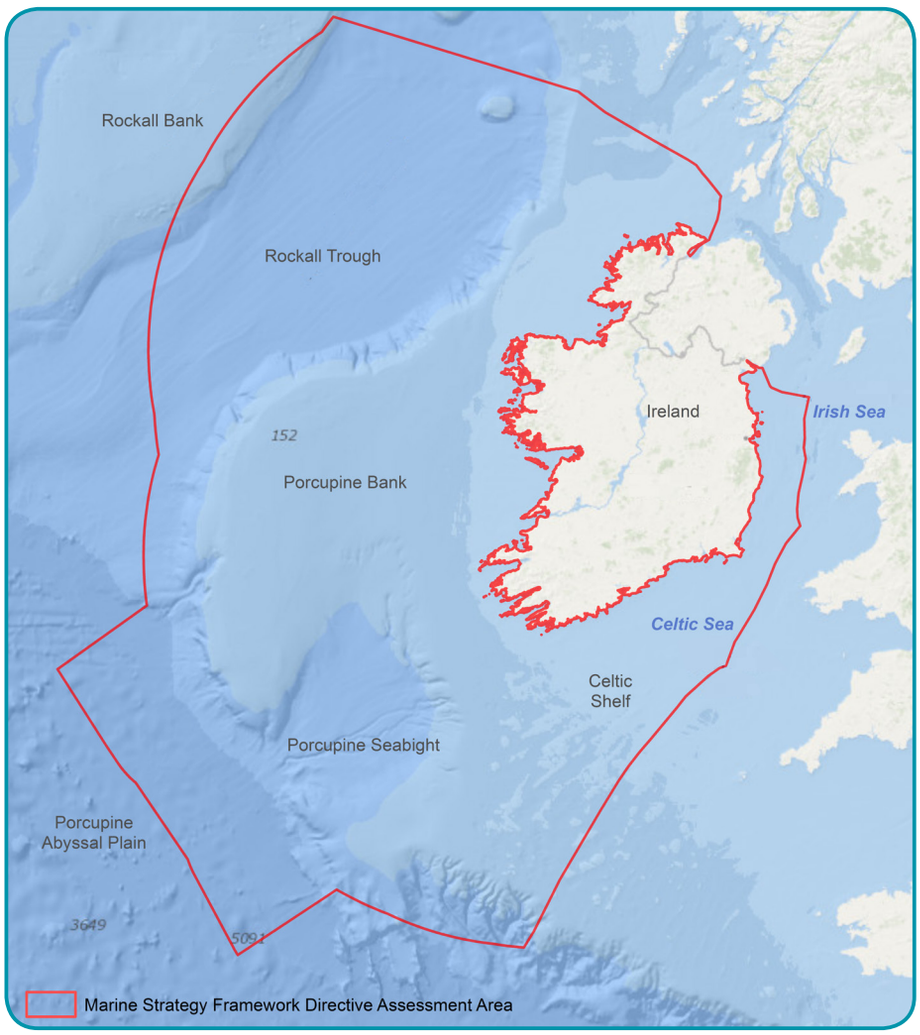


Figure 2: Ireland's seabed features

the south coast of Ireland, east toward the southwest coast of England and south toward the northwest coast of France). In the very deep waters it is colder still, ranging between around 3°C to 9°C with very little seasonal variation. At certain times of the year in the Celtic Sea and Irish Sea the temperature differences between the upper and lower water masses creates stratification, a layering effect that prevents the water masses from mixing. This effect results in a barrier to the vertical movement of nutrients and some marine organisms.

The salinity (saltiness) of the coastal waters around Ireland varies depending on the freshwater input from rivers and coastal areas, which, in turn, is dependent on the amount of rainfall. In general, salinity is reduced during winter months when rainfall is greatest. Offshore, the influence of riverine water declines sharply and there has been very little recorded fluctuation in offshore salinity over long time periods.

The movement of water masses around Ireland is complex with several ocean and inshore currents interacting to produce a broad northward water movement, flowing clockwise around the south, west and north of Ireland (Figure 4). These currents are primarily wind driven, but in spring and summer the current flow off the west coast is enhanced by temperature differences or salinity changes in surface and bottom water masses over the shallow continental shelf, causing a layering of different water densities. More widely, the North Atlantic Current, flowing across the Atlantic as an extension of the Gulf Stream, is a major influence on the movement of water masses around Ireland, splitting into two at the Rockall Bank and combining with, and enhancing, more local current flows.

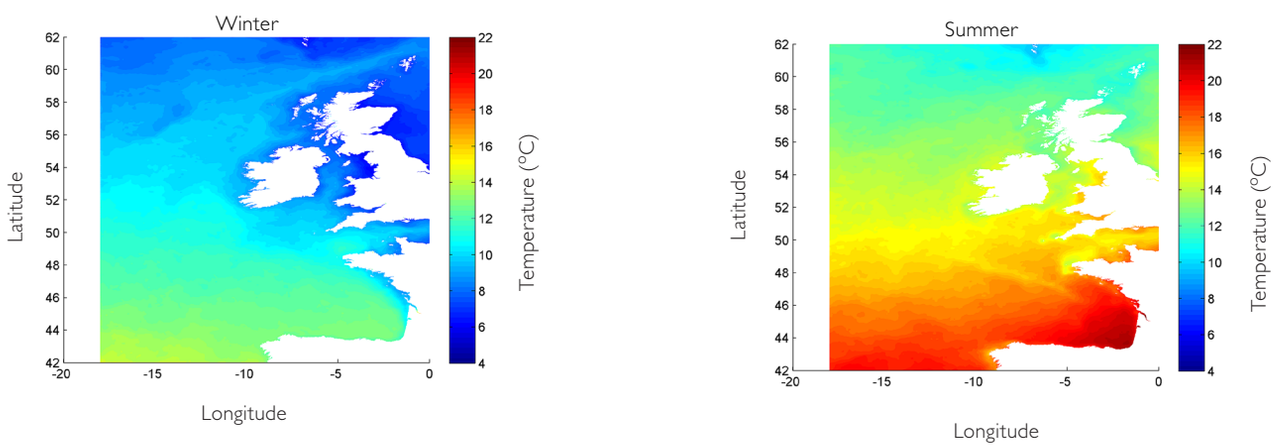


Figure 3: Winter and summer sea surface temperature

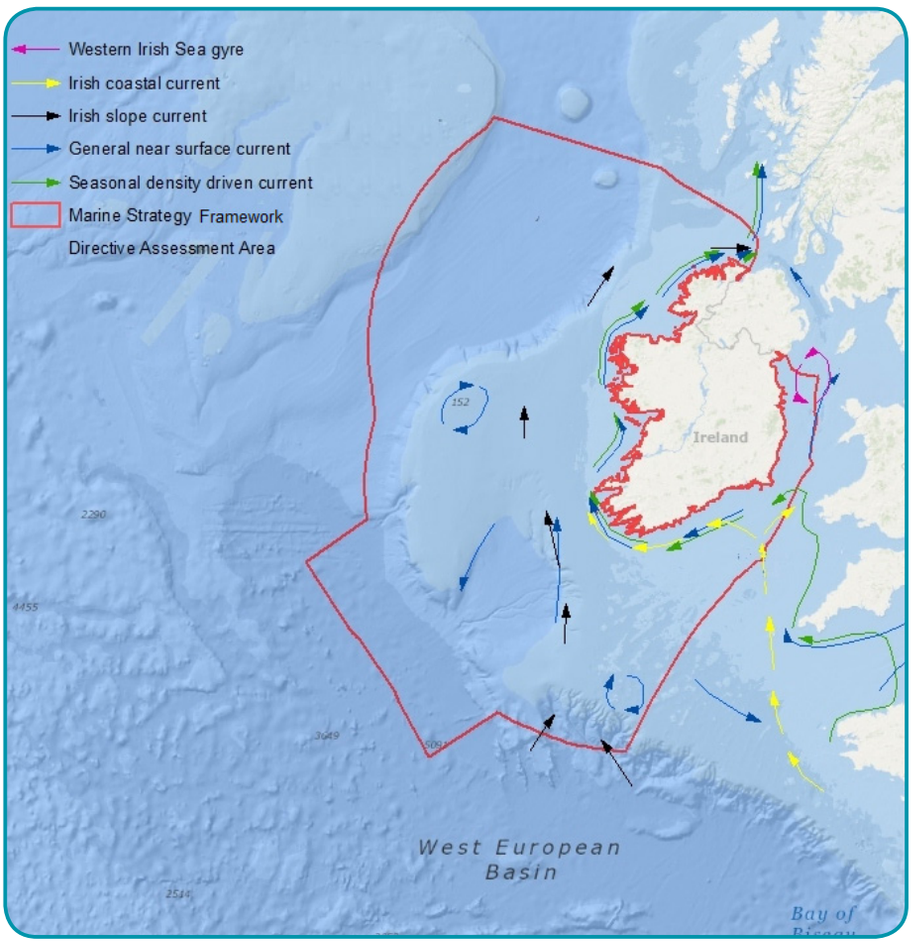


Figure 4: Coastal and offshore current flow

The divergence of ocean currents can also lead to upwelling in open water where cold, nutrient-rich waters from the ocean depths are driven up into the surface waters. In coastal waters the same event is caused by winds pushing surface water seaward forcing deeper water upward to replace it. In Irish waters both types of upwelling are known to occur but it is most commonly wind-driven, an example of which is the summer upwelling event around Fastnet Rock, off the south-west of Ireland. Upwelling events may stimulate periodic diatom blooms, the released nutrients fuelling a burst of growth.

Wind-driven wave action also plays a significant role in these ocean processes, mixing water masses and shaping the coasts and shallow sea beds. As might be expected, the larger, more violent swell and wave movement occurs along the open Atlantic and the western coasts with the more sheltered Irish Sea experiencing smaller, more localised wave disturbance. The average wave height has been increasing in recent decades, driven by the stronger and more frequent winds that are being generated by changing seasonal atmospheric pressure patterns that form over the north-eastern Atlantic.

Both wave and tidal movement contribute to the level of suspended material in the water column, lifting sediments from the sea bed and reducing the clarity of the water. Water transparency is an important factor for marine life because it governs the depth limits for the survival and growth of marine plants that depend on the sunlight that filters through the seawater. The Irish Sea is naturally high in suspended matter but there is evidence to suggest that the more frequent strong winds are reducing water clarity in shallow waters.

All of the physical features described here combine to create and support a network of inter-dependent ecosystems that gives rise to the unique biodiversity that characterises Ireland's marine waters, providing an extremely valuable economic and social resource.

SEABED HABITATS

The rich variety of Ireland's marine plants and animals and the huge range of habitats that they live in (and sometimes create themselves) are largely a result of geographical location, with Ireland lying within the influence of both cool northern waters and warmer southern current flows. This, coupled with the natural physical processes and features described above, creates the conditions to support biologically diverse communities found at all depths and encompassing all substrate types, from rock and biogenic reef to sand and soft muds (Figure 5).

Human activities affect marine habitats and species, either through the discharge and runoff of nutrients and chemicals or through direct physical contact or disturbance. The actual level of impact is, however, difficult to quantify, but the range and potential severity of human pressures acting upon seabed habitats in Irish marine waters broadly decreases with increasing water depth and distance from shore.

Fishing is, perhaps, the most widespread of the activities that have the potential to impart physical damage to seabed communities and there is concern for some areas of seabed that are experiencing particularly high levels of bottom fishing activity. Mud and sandy mud habitats, which are currently the focus of the greatest level of fishing pressure, are thought to be particularly vulnerable to physical disturbance due to the relatively low resilience of the resident organisms. In contrast, fishing on shallow and shelf sublittoral rocky reef habitats, which are also very vulnerable to physical disturbance, tends to be accidental and at a level that significant impacts are unlikely. Bottom fishing activity in areas associated with deep

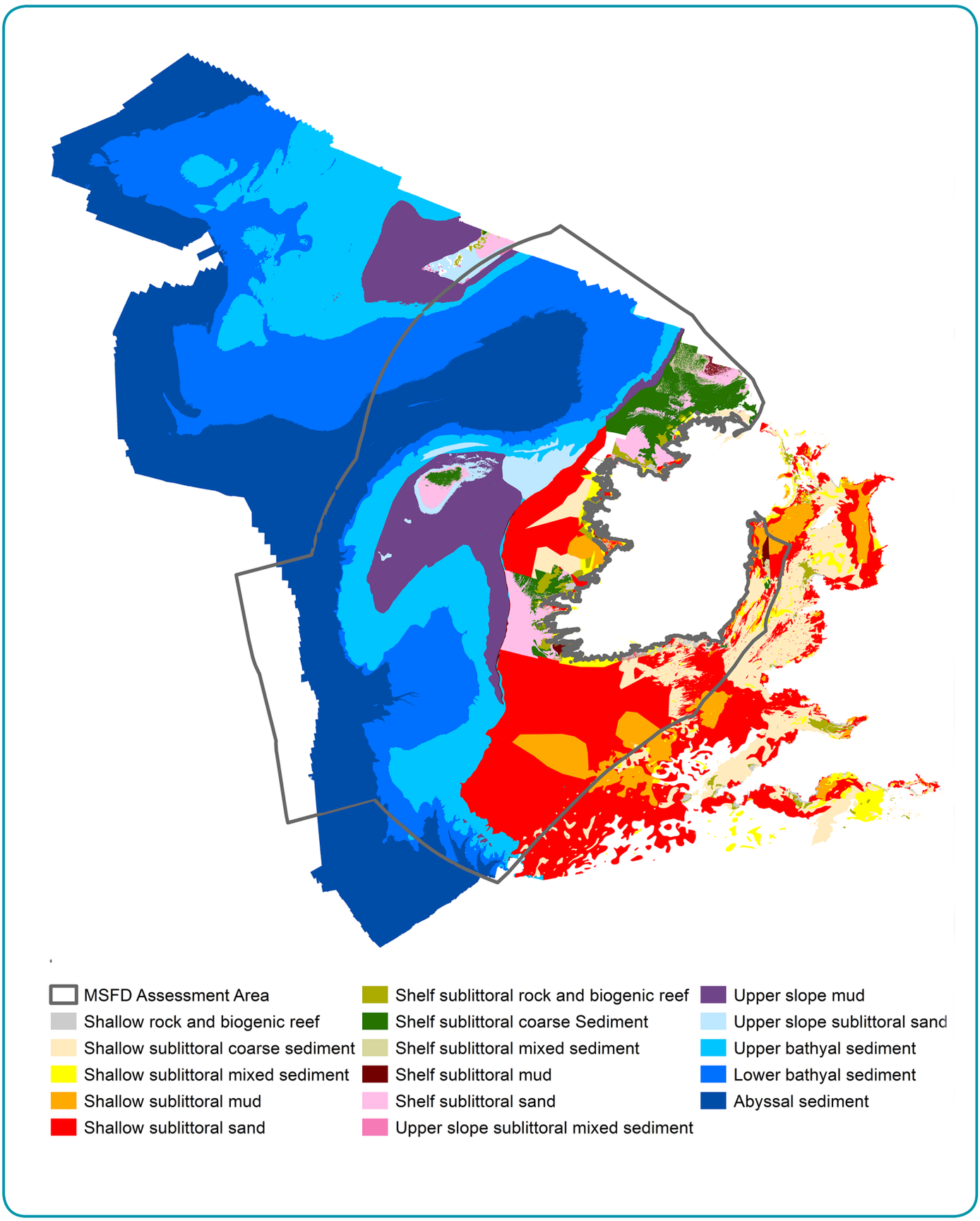


Figure 5: Distribution of seabed habitat types

water carbonate reefs - the remains of deep-water corals - is at a moderate level, but biogenic reefs (reefs formed by marine species) are not resilient to disturbance and have poor recoverability and it is thought that fishing pressure is likely to have adversely affected the condition of many reef complexes.

The Initial Assessment has concluded that seabed habitats in Ireland's Assessment Area are generally considered to be in a healthy condition.

FISH SPECIES

Ireland has a relatively large Assessment Area with an enormous variety of habitats and species present. Therefore, the ability to establish the status of the marine environment at the species level is limited, with very few studies or surveys presently providing reliable information at the spatial scale required. Due to their economic value as a major food source, fish populations have received the greatest attention with annual surveys having been undertaken for many years. Fish are an important ecological component of water column and seabed habitats and knowledge of their status provides an indication of the condition of the biological communities with which they are associated. It is important to understand, however, that our current fish surveys do not go back long enough in time to evaluate how overfishing in the past has affected the distribution, abundance and condition of commercial and non-commercial fish species. Nevertheless, data from recent surveys indicate that Ireland's marine waters continue to support a diverse fish community with around 250 species recorded.

In general, populations of shallow and shelf water bony fish are stable in terms of their numbers, distribution and size ranges (population condition). Some commercially important demersal (bottom feeding) species such as haddock, whiting and plaice, have increased their distribution, while others, such as megrim, have seen a marked improvement in the population condition. Similarly, non-commercial demersal species, including dragonet, dab and grey gurnard, have shown significant increases in population size while the condition of populations of lemon sole and dab has improved (Figure 6).

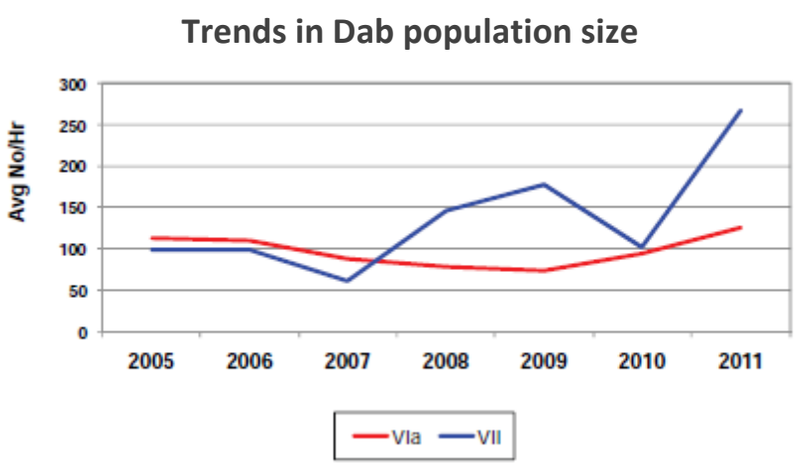


Figure 6: Dab population trends in two survey areas (VI and VII) based on catch rates (i.e. average number of individuals caught per hour fishing effort)

Cartilaginous fish (elasmobranchs), such as sharks and rays are particularly vulnerable to fishing pressures because they are slow-growing, take longer to become reproductively mature and produce fewer young. Data on four elasmobranch species were available for the current assessment. The distribution of lesser spotted dogfish is increasing and the population condition is presently stable, while both distribution and population condition for spurdog, thornback ray and cuckoo ray is currently also considered to be stable.

Overall, there is tentative evidence to suggest an improving picture for marine commercial fish species.

NON-INDIGENOUS SPECIES

The introduction of marine species not native to Irish waters, i.e. non-indigenous species (NIS), can cause problems for native marine species in a number of ways. They can out-compete native species, either for food resources or for living space; they may prey directly on native species; or they may proliferate as a harmful parasite or as an infectious disease - sometimes with a significantly greater impact on the new host, which is unlikely to have developed any form of immunity or resistance. NIS can also have substantial economic impacts, either through rapid growth of invasive species, which can foul or clog marine vessels and installations, or by infecting and reducing yields of commercially harvested species.

NIS may arrive through accidental or deliberate means. The majority of the known accidental introductions of NIS to Irish waters have occurred via shipping (commercial and recreational) or as passengers with aquaculture stock. Deliberate introductions have almost all been for marine culture proposes, such as the farming of Pacific oysters.

To date, the observed impacts of NIS on marine habitats and species have been relatively low with the exception of the introduction of the parasite Bonamia ostrea that has led to declines in yields of commercially harvested native oyster. There are also concerns for the impact of the nematode parasite Anguillicoloides crassus on declining European eel populations.

Identifying non-native species and determining the route of introduction of such species is often very difficult, because its presence is only likely to be noticed once it has become established. There is currently limited information on the presence and impacts of NIS in Irish marine waters and so an accurate assessment of the level of the pressure cannot be made at this time. Ireland is endeavouring to improve its understanding of the presence, distribution and impact of NIS in Irish marine waters.

COMMERCIAL EXPLOITATION OF FISH AND SHELLFISH

The commercial harvesting of fish and shellfish is a very important marine industry for Ireland. Because of the intensity of fishing effort and spatial area over which it occurs, it is also probably one of the most important pressures acting on Ireland's marine environment at the present time.

The accuracy of information on the spatial distribution of fishing activity varies with vessel size. Vessels above 15 m in length, generally fishing in open sea, are obliged to carry satellite tracking devices from which their location can be precisely tracked (Figure 7). Vessels below 15 m, usually operating in inshore waters, are not electronically monitored, resulting in greater uncertainty in the assessment of activities and potential impacts.

Registrations of vessels less than 12 m in length increased over a six year period (2006 - 2011) and fishing days are thought to have increased accordingly. Both vessel numbers and fishing days were relatively stable for vessels greater than 12 m targeting pelagic (near the surface or in the water column) stocks such as herring and mackerel, while vessels greater than 12 m using bottom-contacting gear decreased in number and days fished.

There has been an overall reduction in fishing pressure in the Irish Assessment Area in the last ten years with the majority of the fifty-two assessed stocks now being fished sustainably. Many of the once depleted stocks have now increased to acceptable levels (above defined biomass reference levels).

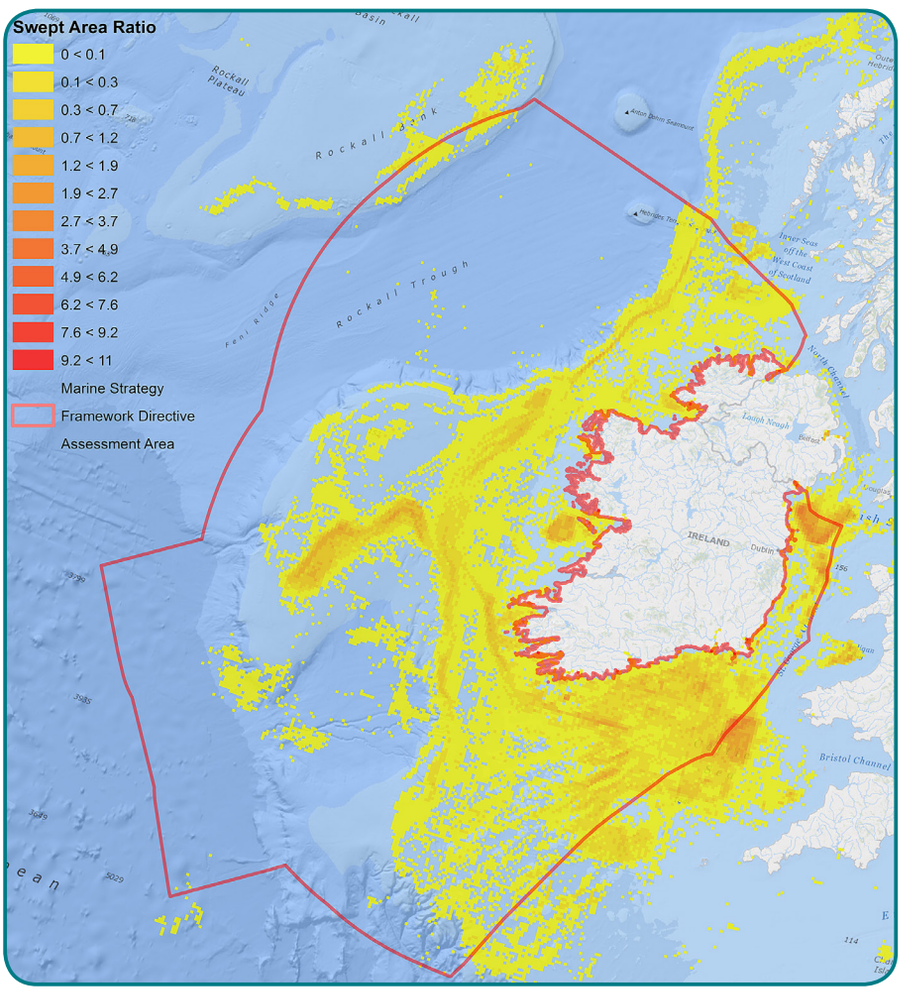


Figure 7: Seabed fishing intensity in 2011 (vessels above 15 m in length)

NUTRIENT ENRICHMENT

Nutrients, predominantly as nitrogen and phosphorus, find their way into the sea from a variety of sources, most commonly from agriculture, wastewater treatment discharges and from unsewered domestic or industrial properties. The presence of excessive or unnatural levels of nutrients (eutrophication) can cause the proliferation or accelerated growth of nuisance seaweeds or plankton blooms.

The levels of chlorophyll (a measure of phytoplankton density), opportunistic seaweeds, dissolved oxygen and organic matter in coastal waters currently meet the standards required under the Water Framework Directive.

The levels of nitrogen, phosphorus and organic matter in Ireland's coastal waters have decreased in recent years and it is unlikely that nutrient enrichment issues extend to offshore waters.

Overall, the present situation with regard to nutrient enrichment within Ireland's Assessment Area is considered to be good, with nutrient enrichment events reduced to a level that could be considered to be indicative of Good Environmental Status.

COMMERCIAL EXPLOITATION OF SEAWEED

Seaweed is harvested in Ireland as a direct food source for humans or livestock and for its extracts, which are primarily used in the food and cosmetic industries. The major seaweed resources, mostly large brown seaweeds, are concentrated along the west and southwest coasts. Approximately 40,000 tonnes of wild seaweed was harvested in 2012, the majority being intertidal species collected by hand. This level of harvesting is not thought to give rise to adverse effects on seaweed populations or the animals and other plants that depend on them for food and shelter.

In the recent past there has been some exploitation of subtidal dead maërl deposits. Maërl is calcified free-living red seaweed that can form coral-like beds in shallow waters and often has a rich associated community. It is harvested predominantly as a bulk fertiliser and soil conditioner for lime-poor soils. Approximately 16,000 tonnes of dead maërl was extracted annually from a single location off the southwest coast between 2000 and 2010. There has, however, been no commercial extraction of maërl in Irish waters since 2010. It has not been possible to assess the environmental impact of this removal, but the loss of the calcified seabed surface layer is likely to have had some localised adverse effects.

HYDROGRAPHICAL CONDITIONS

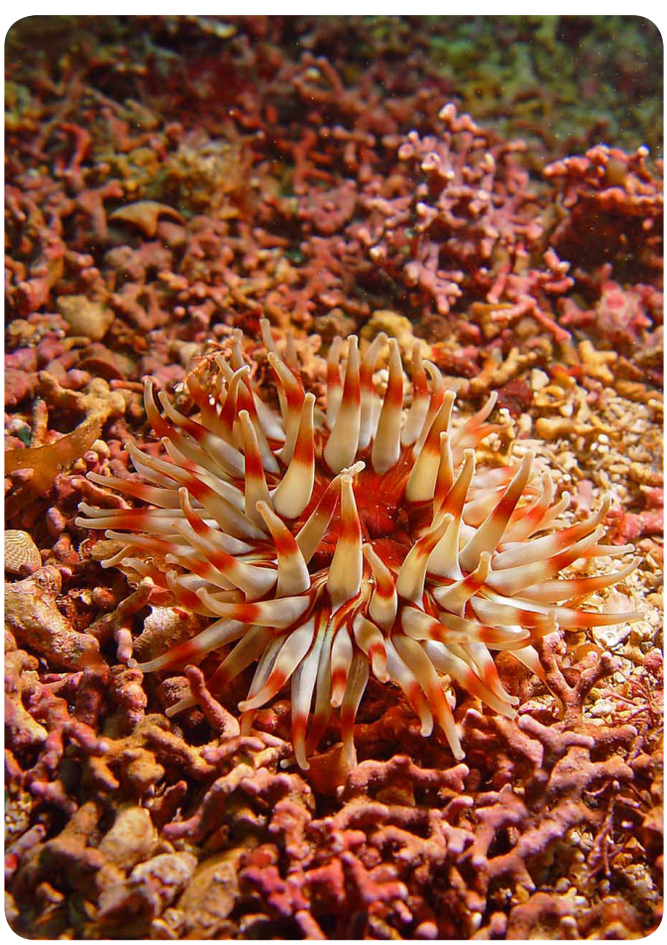
Human activities in the marine environment can sometimes change the physical and chemical properties of the sea to the detriment of marine habitats and species. These changes can include: modification of current flow, changes in natural temperatures or changes in salinity. In Ireland, activities that could result in changes in hydrographical conditions are port developments, construction of coastal infrastructure, sewage and cooling water outflows, creation of new river channels, water abstraction and the construction of offshore structures for the gas and renewable energy industries.

At present, all coastal and offshore activities with the potential to alter hydrographical conditions are of a scale that is unlikely to cause adverse effects, although some localised effects may be present. It is very difficult to establish and quantify overall hydrographical impacts across the Irish Assessment Area and our current level of knowledge has not allowed a reliable evaluation of any changes that may have occurred to date.

CHEMICAL CONTAMINANTS: NON-SYNTHETIC CONTAMINANTS

Non-synthetic contaminants are naturally-occurring chemicals that, through human activity, are introduced into the marine environment at higher-than-natural concentrations. Examples of non-synthetic contaminants include trace metals found in the earth's crust, or polyaromatic hydrocarbons (PAH) which predominantly result from the combustion of fossil fuels and organic materials. The main human sources of non-synthetic contaminants are land-based industry (including sewage discharges), urban wastewater, shipping activities and combustion processes.

A small number of non-synthetic chemicals present in marine food chains are currently monitored through water, sediment and organism sampling programmes. Results of this monitoring indicate that the concentrations of the monitored non-synthetic chemicals are within internationally acceptable ranges or standards. Concentrations in seafood from Irish waters consistently meet the standards set under European legislation, while wider environmental concentrations are unlikely to cause adverse effects on marine life. There is still, however, a high degree of uncertainty in relating the environmental concentrations of these substances to specific biological effects and so an overall evaluation of the actual impacts of these contaminants within the Irish Assessment Area cannot be made at this time.



CHEMICAL CONTAMINANTS: SYNTHETIC CONTAMINANTS

Synthetic contaminants are man-made products that, through human activity, are introduced into the marine environment. Examples of synthetic contaminants include polychlorinated biphenyls (PCBs), pesticides, brominated flame retardants, dioxins and organotins (e.g. tributyltin - TBT). The main human sources of synthetic contaminants are discharges from land-based industry (including sewage discharges) and urban emissions.

Current levels of synthetic contaminants in Irish waters are considered to be low and within the limits set under European standards or protocols, indicating that existing concentrations are unlikely to cause adverse effects on marine life. Levels of PCBs and dioxins present in seafood from Irish waters are consistently within maximum limits set under European legislation.

The ability to determine actual biological effects of elevated concentrations of synthetic contaminants is presently very limited and is currently restricted to observations of the disruptive effects of tributyltin (TBT) compounds on the sexual development (imposex) of dogwhelks (a sea snail). TBT was incorporated as the active ingredient in antifouling paints commonly applied to vessel hulls and marine structures until a global ban of its use was imposed in 2008. Despite this ban TBT concentrations remain detectable at some Irish coastal locations, mostly in the vicinity of harbours and ports. On-going monitoring indicates that marked improvements in the incidence of imposex is evident suggesting that TBT levels are continuing to decline.

CHEMICAL CONTAMINANTS: RADIONUCLIDES

Radionuclides are radioactive contaminants that are introduced to the marine environment from both natural and man-made sources. Natural inputs result from the weathering of minerals present in the earth's crust and from cosmic radiation. Man-made radionuclides are released into the marine environment from a variety of human activities, either associated directly with the nuclear industry, or as a part of the military, medical, educational and research sectors. Human activities have also led to enhanced levels of naturally occurring radionuclides, such as those discharged in wastewater from offshore oil and gas extraction activities.

Traditionally, Ireland's radionuclide monitoring programme has focused on evaluating direct human exposure to radioactive sources together with assessments of the geographic distribution of man-made radionuclides in the Irish marine environment. Currently no regulatory threshold levels have been established for what might constitute an adverse impact on marine habitats and species, so it has not been possible to undertake an assessment of the current status of

radioactive contamination from a wider marine environmental perspective. The OSPAR Commission has considered the issue and has concluded that current radioactivity dose rates across the OSPAR area are below the level at which damage to ecosystems is likely to occur.

MARINE ACIDIFICATION

The level of atmospheric CO_2 originating from human activity is increasing globally (Figure 8). When the gas dissolves in seawater it increases the acidity of the oceans. Small increases in acidity have been detected in both shallow and deep Atlantic water off the coast of Ireland in recent decades. These observations correlate well with the results of studies undertaken in other parts of the world. The main human activities contributing to increased CO_2 and other greenhouse gas emissions are fossil fuel combustion, cement production, farming and forestry (including land-use change).

Little is known about the ecological and economic impacts of marine acidification but it could hold major implications for critical components of marine ecosystems. Many species, ranging in size from microscopic plankton organisms to large seabed grazers and filter feeders, use calcium, secreted as calcium carbonate, to construct external skeletons, shells or shared reef structures. Increasing seawater acidity is thought to interfere with the secretion process and significantly impair their ability to make these structures, resulting in little or no growth and a possible eventual loss of these key ecosystem elements. Research to determine the severity of the projected impacts and implications of the current trends in ocean acidity is continuing.

ACUTE POLLUTION EVENTS

At this time there is no internationally agreed definition of what constitutes an acute pollution event. For the purposes of the present reporting Ireland has provisionally defined a significant acute pollution event as an incident in which the use of substantial Irish Coast Guard (IRCG), Local or Port Authority resources are required to react and achieve a successful outcome. Acute pollution events in Irish waters usually originate from fishing, shipping or military vessel activity. Between the period 2006 and 2011, five separate acute incidents were reported in Irish waters. These events were mostly inshore and taken together covered less than 1% of the Irish Assessment Area.

The impacts of contamination resulting from incidents or accidents in Ireland's marine waters are currently unknown but are likely to vary depending on the extent and nature of each event, the prevailing weather conditions, the location and the time of year. Reports of oiled seabirds are independently reported to the IRCG but it has been very difficult to attribute these reports to any particular reported spill incident.

MICROBIAL PATHOGENS (BATHING WATERS AND SHELLFISH WATERS)

Microbial pathogens are infectious agents that cause disease and can include bacteria, protozoans or viruses. While some microbial pathogens occur naturally in the marine environment, others are carried into the sea in sewage effluent, together with other non-pathogenic microbiological contaminants.

The main land-based sources of microbial contamination in the marine environment are from treated and untreated sewage

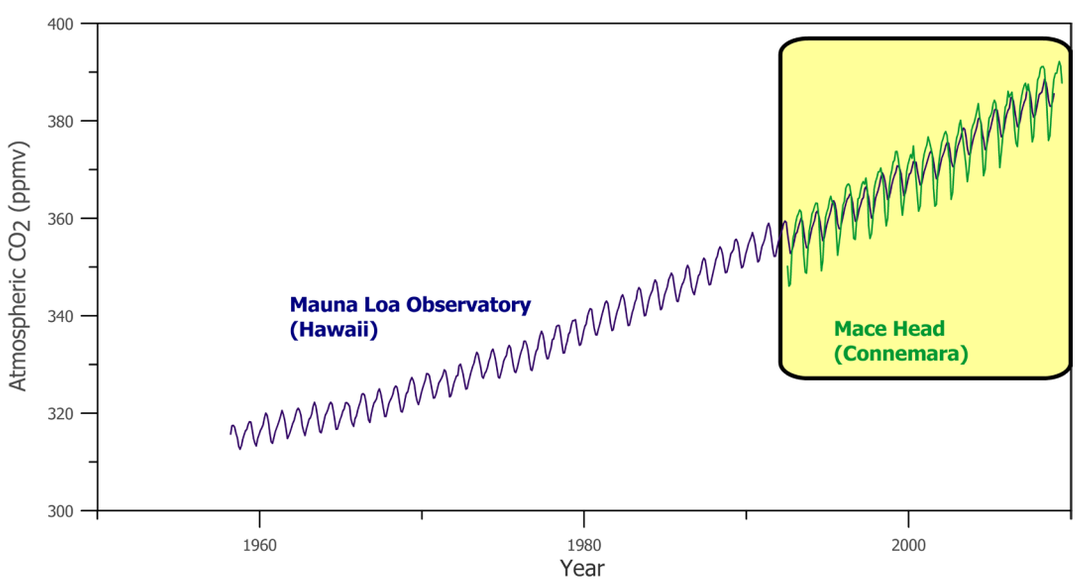


Figure 8: Concentration of atmospheric CO_2 at Hawaii and Mace Head, Galway (Reproduced from Ní Longphuirt et al. 2010)

discharges and run-off from agricultural activity. Discharges from ports, marinas and other coastal facilities may also contain significant microbial content. The main solely marine-based sources of microbial pathogens are thought to be discharges from shipping and recreational/leisure boating activities. The overall quality of Ireland's bathing waters is considered to be very high. Over the period 2001 to 2011, 93% of designated bathing waters met the minimum standards of the Bathing Water Directive (BWD), indicating a low risk to human health from microbial contamination.

Data on the water quality, including microbial pathogen content in water from which shellfish are harvested for human consumption are limited to recent years. Occasional illness outbreaks associated with eating contaminated shellfish suggests that microbial pathogens are currently an issue of concern in some areas where shellfish are commercially harvested.

MARINE LITTER

Marine litter is any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine or coastal environment. It consists mainly of very slowly degrading waste items such as plastic, metals and glass. It can have damaging ecological and economic effects on the seabed, in the water column and on the seashore.

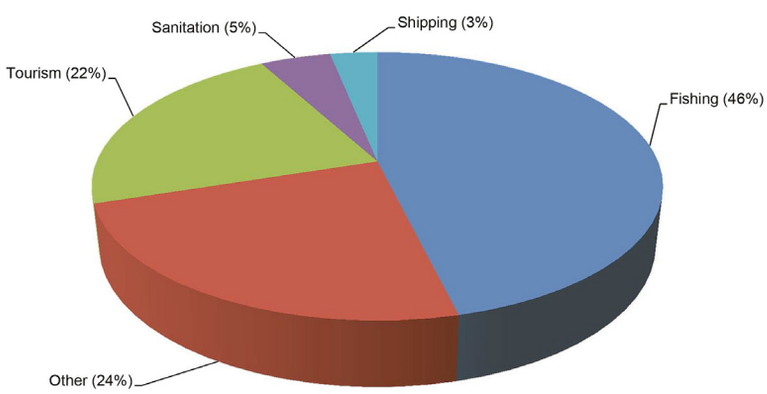


Figure 9: Proportions of beach litter collected on surveys of four beaches in 2011 and assigned to broad source categories

Marine litter enters the marine environment from multiple sources. In Ireland, beach surveys have indicated that the main land-based sources of litter are tourism and sewage. The primary sea-based sources are shipping and fishing (Figure 9). Litter is also known to be widely distributed on the seabed, although information on the amount and environmental impact is very limited. It is, however, thought that both shore and seabed litter originate from similar sources.

Marine litter can pose a risk to a wide range of marine organisms such as seabirds, marine mammals and turtles through ingestion and entanglement. The relationship between the types and amounts of marine litter in the environment and the degree of harm caused to organisms is not at present fully understood. Current evidence suggests that the impacts on cetacean and seal populations in Irish waters are minimal. Plastic items have occasionally been recovered from cetaceans and seal carcases during post-mortem examination but the direct role that these ingested items play in mammal mortality cannot usually be determined.

UNDERWATER NOISE

Underwater noise is increasing as human activities in the marine environment continue to expand. Activities such as vessel movement (e.g. shipping, fishing, and leisure crafts) (Figure 10), seismic surveys (Figure 11), drilling, use of sonar, pile-driving, underwater explosions and dredging all contribute to levels of noise in the marine environment. With many offshore activities in the oil, gas and renewable sectors expected to increase in the future, levels of underwater noise are likely to increase accordingly.

Many marine organisms, in particular marine mammals, rely on sound for navigation, communication and prey location. The introduction of additional noise from human activities holds the potential to disrupt these natural activities leading to adverse effects on individuals and populations. Information on the sources, magnitude, distribution and impacts of sound in the Irish marine environment is presently limited. Research currently being undertaken is intended to support the development of 'risk-based' noise monitoring programmes for Irish waters, incorporating the establishment of baselines and the determination of trends.

ECONOMIC AND SOCIAL ASSESSMENT

The potential socio-economic benefits of implementing the MSFD in Irish waters under three hypothetical scenarios (low, medium and high level of environmental degradation) have been assessed by examining the welfare loss incurred by society due to changes in marine environmental attributes. These attributes are biodiversity status, fisheries sustainability, pollution levels, the introduction of non-indigenous species, and physical impacts. The results of the assessment indicate that the total annual value of the welfare loss that is attributable to marine environmental change away from a "status quo" scenario range from €195 million at a low level of degradation to €521 million if human activities result in a high level of degradation. This suggests that considerable economic gains may be achieved from the full implementation of the MSFD in the Irish marine environment.

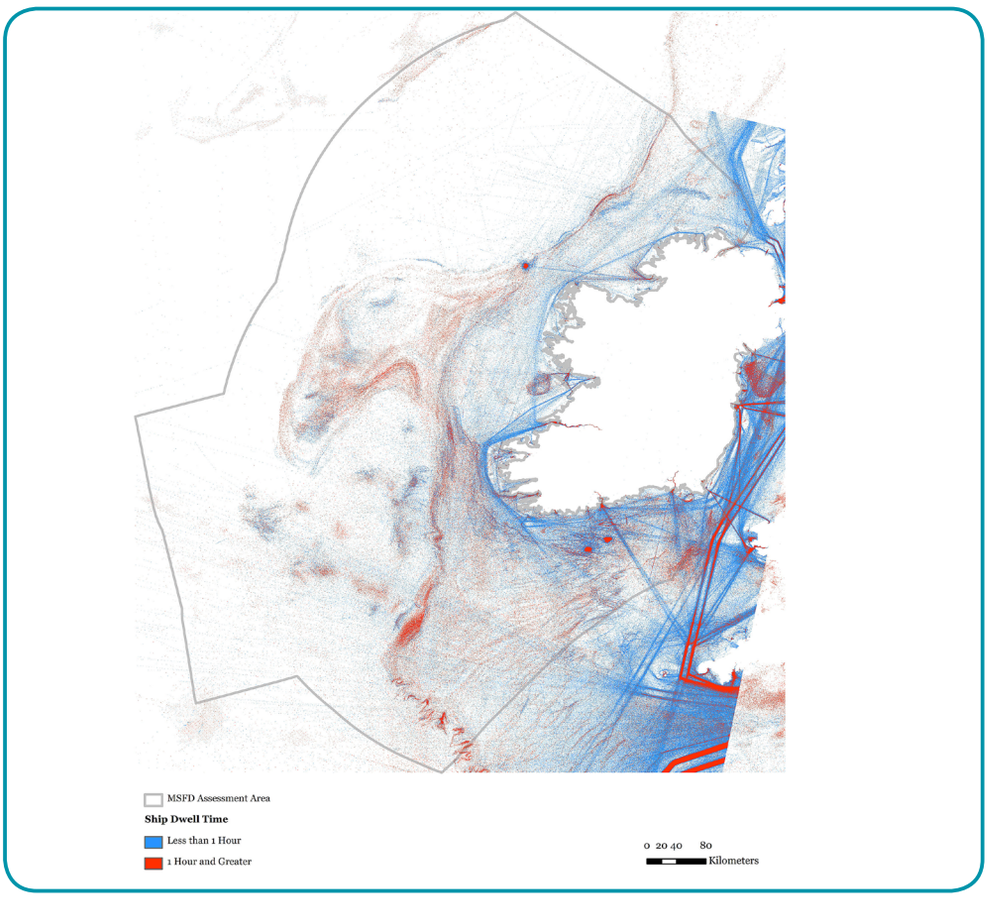


Figure 10: Shipping and fishing vessel movements in 2011

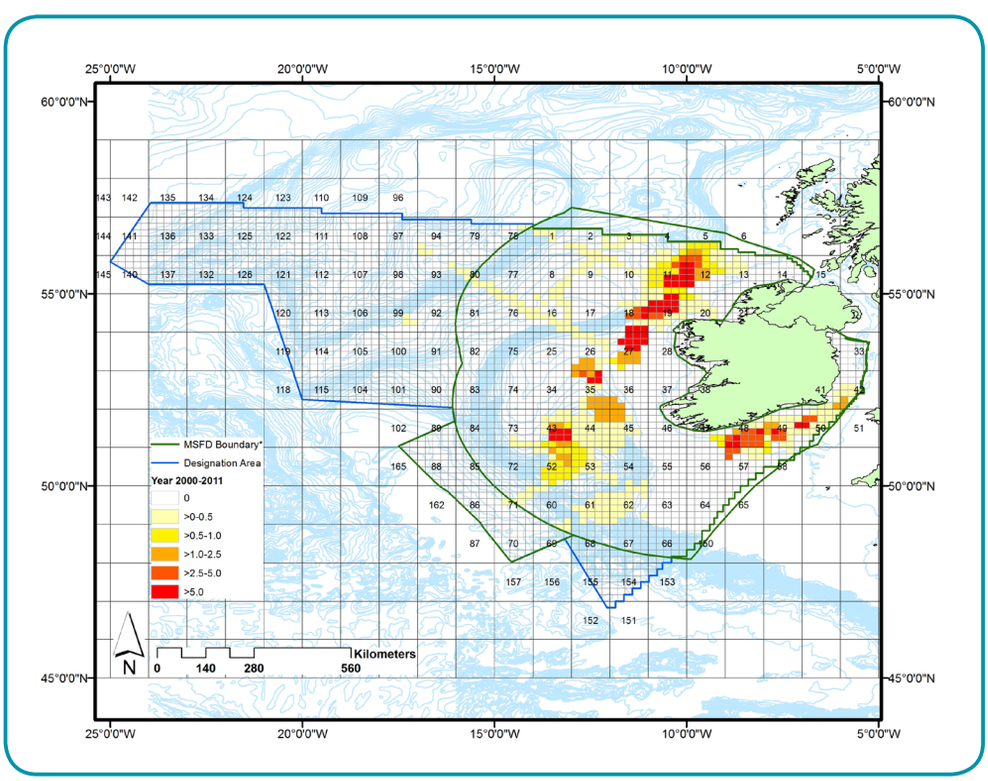


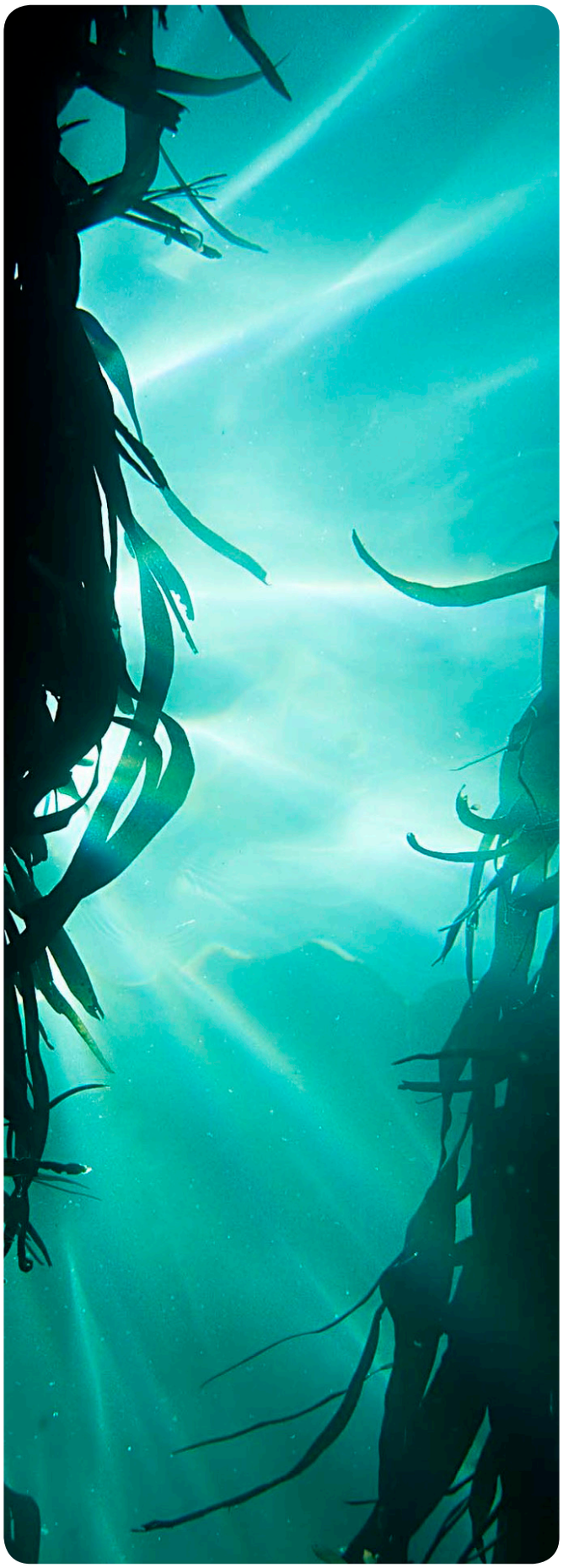
Figure 11: Seismic survey intensity (bang-days) from 2000 – 2011

CONCLUSION

The implementation of the Marine Strategy Framework Directive is an iterative process by which the environmental status of our marine waters is evaluated every six years against our vision of GES. This report, together with the reporting sheets submitted to the European Commission and the web-based atlas, fulfils Ireland's obligations under the initial phase of implementation. It comprises an Initial Assessment of our marine waters and associated economic and social uses. With reference to that assessment, a set of characteristics for GES for the eleven Descriptors of the Directive has been determined together with a set of environmental targets and indicators for seven of them. Work on targets and indicators for the four remaining Descriptors (Biodiversity, Food Webs, Sea-floor integrity and Underwater noise/energy) is on-going at both a national and international level. The cyclical nature of the MSFD implementation process provides us with the opportunity to incorporate new information as it becomes available so GES characteristics, targets and indicators may be subject to periodic review and improvement.

This report, and Ireland's Marine Atlas, is the result of a major multi-disciplinarily collaboration and represents the collective efforts of a wide range of state, consultancy and academic experts. It is essential that this level of commitment is sustained and combined with a mechanism to secure greater involvement of stakeholders in order to ensure delivery of Ireland's ongoing MSFD obligations. There are many gaps and shortcomings to be overcome but, working collaboratively with all interested parties and with both national and international organisations, the MSFD provides the mechanism to progressively fill these gaps over the next and subsequent cycles.

The monitoring and assessment of biodiversity, food webs and sea-floor integrity presents considerable technical problems and there are many questions yet to be answered - both scientific and for society generally. Commercial fish and chemical contamination (including eutrophication) are the two areas for which there is sufficient evidence available to tentatively conclude that things are generally improving. Advancements in fisheries management, waste water treatment and measures to reduce the use and discharge of both synthetic and non-synthetic contaminants are beginning to be reflected in the current environmental status. These are positive signs but more work is needed to ascertain whether current measures are sufficient to ensure progress towards GES is maintained or if more effort or alternative approaches will be required in the coming months and years.



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