

Using Industry Data for UK Marine Assessment and Reporting

(Scoping Report)

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Discover Data and Evidence Projects

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Author: Harriet Baldwin
Contact email: mde@thecrownstate.co.uk
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Executive Summary

Nations worldwide are facing twin crises of both climate change and biodiversity loss. In response to the intensifying global climate crisis, the British government has arrived at its "Net Zero Strategy: Build Back Greener", which sets out strategic goals of decarbonising all sectors of the UK economy to achieve net zero carbon emissions by 2050. As part of these goals, the UK government has set a target of achieving 50GW of offshore wind by 2030.

The UK's 25 Year Environment Plan (2018) outlines a natural capital approach to the protection and management of the marine environment that centres on comprehensive and reliable data. In addition, the United Nations Convention on Biological Diversity (CBD) calls on governments worldwide to conserve and protect biodiversity, and outlines commitments such as identifying important components of biological diversity and the importance of high level biodiversity reporting and assessment.

It is critical that offshore development decisions are based on sound science in order to maximise growth in secure, affordable green energy, whilst also protecting and restoring the UK's precious marine ecosystems. As marine sectors expand so too does the spatial footprint of monitoring and survey data collected by offshore industries.

Industry data can therefore help to inform monitoring programmes put in place as part of the UK Marine Strategy (2012), which aims to achieve Good Environmental Status (GES) in British Seas.

The Marine Data Exchange (MDE) is the world's largest database of offshore industry survey data, research and evidence, and includes over 2,600 survey campaigns collated from feasibility through to decommissioning studies.

Survey data includes information collected from the offshore wind and renewables industries, in addition to marine aggregates and dredging. The data collected as part of these surveys could be re-used to help inform GES reporting, providing an improved evidence base for decision making and regional assessment, and could play a critical role in helping the UK in achieving more comprehensive marine reporting.

This study outlines potential uses of marine industry data for marine assessment and reporting. Existing studies that explore the use of industry data were examined, including projects such as OneBenthic, the Joint Cetacean Data Programme and the Office for National Statistics Marine Natural Capital Accounts. The existing studies were reviewed to explore whether UK Marine Strategy descriptors were included and whether industry data had been utilised.

There were notable gaps in the number of studies which had explored industry data containing information regarding UK Marine Strategy Descriptors, such as "commercial fish", "contaminants", "hydrography" and "non-indigenous species".

An initial search of the industry data that is made available through the MDE produced a large range of surveys that contained key words relevant to important UK marine assessments (such as GES reporting), highlighting potentially useful data for inclusion.

To explore how data collected by offshore industries can support data aggregation for marine monitoring and assessment, this study recommends five future pilot study themes, including searching industry data held on the MDE for:

- Commercial and non-commercial fish species
- UK Marine Strategy (GES) and 25 Year Environment Plan indicators
- Water quality surveys and habitat mapping data to inform natural capital accounting
- Trends in data collected from offshore wind post-construction monitoring surveys
- And to explore how discoverable and accessible information is within surveys and reports

The study concludes that there are several opportunities where inclusion of industry data in marine assessments and reporting could contribute to the development of natural capital and ecosystem service approaches, helping the UK in progressing towards its aim of ecologically diverse and productive seas.

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1. Introduction

The UK seabed resources are some of the richest in the world, underpinning the UK’s position as a global leader in offshore wind and supporting vital national industries and infrastructure. As demand for the seabed continues, it is critical that development decisions are based on sound science in order to maximise growth in secure, affordable green energy, whilst also protecting and restoring the UK’s precious marine ecosystems.

As managers of the seabed around England, Wales and Northern Ireland, The Crown Estate have been proactively investing in world-leading marine data and evidence for over 20 years. Our unique role on the seabed is underpinned by a carefully curated data holding, research that strengthens the UK evidence base and award-winning digital tools to generate insight and promote data sharing. As trusted experts able to take a long-term view across many sectors, interests and industries, we know that data and evidence will play a critical role in addressing the climate and biodiversity crises. We need to be smarter about how we collect and use data and we need to do this in collaboration with others to drive positive change and to promote innovative solutions and approaches.

As offshore industries expand so does the spatial footprint of the survey data collected as part of routine licensing conditions in place to ensure the sustainable development of the seabed.

The survey data collected as part of licensing requirements contains valuable biological

and physical data, which can help to provide further baseline information regarding the UK’s marine environment. Many industries, such as the offshore wind industry, are making this survey data freely available through platforms such as the Marine Data Exchange; enabling access to trusted data that is critical for developing a holistic evidence base to support the sustainable development of the seabed, and the protection and enhancement of marine habitats.

The data provided within these surveys provides an invaluable opportunity to develop an evidence base that not only informs a greater understanding of the impacts of marine activities but can also be utilised in wider UK environmental reporting requirements, such as Good Environmental Status (GES) and natural capital assessments.

The UK Marine Monitoring and Assessment Strategy (UKMMAS) aims to provide coordinated and integrated marine monitoring programmes that support periodic assessments of the state of the UK marine environment.

The strategy plans to deliver vital data and information necessary to help assess progress towards achieving the UK’s vision of clean, healthy, safe, productive and biologically diverse seas. There are four evidence groups responsible for implementing the programmes; Clean and Safe Seas Evidence Group (CSSEG); Productive Seas Evidence Group (PSEG); Healthy and Biologically Diverse Seas Evidence Group (HBDSEG) and Ocean Processes Evidence Group (OPEG).

The Crown Estate has partnered with PSEG to deliver projects that will aid the UK in achieving its environmental objectives and progress towards natural capital approaches to marine assessment and reporting.

Therefore, the aim of this study is to identify opportunities for industry data to be used for future monitoring programmes and assessments.

1.1. Policy Context

1.1.1. Climate Crisis

Green energy growth continues to accelerate, as the UK responds to the intensifying global climate crisis. The British government has arrived at its “Net Zero Strategy: Build Back Greener”, which sets out strategic goals of decarbonising all sectors of the UK economy to achieve net zero carbon emissions by 2050, including a rapid increase in the development of offshore renewables.

Under the current UK Energy Security Strategy (2022), the UK government has set a target of achieving 50GW of offshore wind by 2030 and 5GW from floating offshore wind in deeper seas. The Crown Estate Offshore Wind Leasing Round 4 has created the opportunity for at least 7 GW of new offshore wind projects in UK waters by the end of the decade - enough to power more than 6 million homes, and ambitious plans for floating offshore wind in the Celtic Sea hope to unlock up to 4GW of new clean energy capacity in England and Wales by 2035.

1.1.2. Biodiversity Crisis

In addition to the climate crisis, countries worldwide are facing a biodiversity crisis. “Nature is declining globally at rates unprecedented in human history... we are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide” (IPBES, 2022).

The UK’s 25 Year Environment Plan (2018) outlines a natural capital approach to the protection and management of the marine environment and centres on comprehensive and

reliable data. In addition, the United Nations Convention on Biological Diversity (CBD) calls on governments worldwide to conserve and protect biodiversity, and outlines commitments such as identifying important components of biological diversity and the importance of high-level biodiversity reporting and assessment.

Natural capital may be defined as “the sources of the services that nature provides” (Conservation International, 2021) and includes “certain stocks of the elements of nature that have value to society, such as fisheries, rivers, biodiversity, land and minerals. Natural capital includes both the living and non-living aspects of ecosystems.” (HM Treasury, 2018).

Natural capital, such as marine habitats and the functionally diverse organisms that inhabit them, provide critical ecosystem services such as carbon sequestration and food production, and can also support climate change adaptation and mitigation by providing services such as storm defences (Gattuso *et al.*, 2018). Protecting the health of these systems also ensures we protect environments that help to support both our mental and physical wellbeing (Swedish Environmental Protection Agency, 2009).

The UK Marine Strategy is a policy framework that aims to protect and enhance the marine environment, and consists of 3 stages for achieving Good Environmental Status (GES) in our seas, which can be defined as:

“The environmental status of marine waters where they constitute ecologically diverse and dynamic ocean and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations” (Defra, 2021).

Part One of the UK Marine Strategy provides an updated assessment of the health of British seas and sets out objectives and indicators for reaching GES over a 6 year period. **Part Two** sets out a strategy for monitoring programmes that will be put in place to make sure that these objectives are met, and **Part Three** outlines the measures that contribute to the achievement and maintenance of GES in UK seas by 2020.

Monitoring programmes, as part of the UK Marine Strategy Part Two, aim to gather evidence on the status of different elements of the UK marine environment.

Monitoring programmes across the UK are developed with government departments and devolved administrations, and with scientists in the UK Marine Monitoring and Assessment Strategy (UKMMAS) evidence groups.

The inclusion of offshore marine industry data within these monitoring programmes can help to support the UK in achieving international ambitions, such as targets set-out in the United Nations Convention on Biological Diversity (2019), and to support the UK in reaching national goals such as those set-out in the UK Marine Strategy Part Two (HM Government, 2014). Strategic use of industry data may also help to achieve environmental targets set out in the 25 Year Environment Plan (HM Government, 2018) by providing a greater evidence base for decision-making, and therefore could support the UK achieving a natural capital approach to development (Office for National Statistics, 2015) whilst also achieving its Net Zero targets.

The present study outlines the potential use of industry data and presents future industry data pilot studies. A review of existing industry data studies can be found in [Appendix I](#).

2. Marine Industry Data

2.1. Industry Data Collection

Consenting and monitoring conditions for offshore development often require surveys and studies to be taken within the marine environment to ensure that the impacts of offshore development are properly understood and well-documented. The relevant regulatory and licensing authorities determine applications for offshore development under the Marine and Coastal Access Act 2009 (MCAA), and have the authority to grant or refuse applications for offshore development. All relevant legislation must be considered during the consent process. Key legalisation and regulatory drivers include (MMO, 2014):

- Habitats and Birds Directives (which can lead to the requirement for a Habitats Regulations Assessment)
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Convention)
- Marine Conservation Zones under the Marine and Coastal Access Act 2009
- Marine Policy Statement
- Relevant National Policy Statement(s)
- OSPAR Convention
- Planning Act 2008
- Ramsar Convention
- Water Framework Directive
- Waste Framework Directive
- Wildlife and Countryside Act 1981

Conditions such as pre-construction, construction and post-construction monitoring may be attached to a marine license if there is any concern over the impact of the project on the environment and/or the livelihoods and health of coastal communities within impact range of the development.

Therefore, the UK marine industry has collected and curated a wealth of data and evidence as part of pre-consenting surveys, environmental impact assessments (EIAs), ground investigations and post-consent monitoring studies carried out during the lifespan of an offshore development.

For example, during an EIA for an offshore wind farm, a baseline environmental survey is conducted, to predict the potential environmental impacts (beneficial or adverse) of the proposed development. Throughout the construction phase, environmental surveys are also conducted to ensure that sensitive marine life are not disturbed or harmed by construction activities. During the operation of a wind farm, several post-construction monitoring studies are also undertaken to ensure that the levels of impact predicted in the EIA are accurate. If levels of impact are higher than predicted, further mitigation measures may be put into place to prevent deterioration of the marine environment.

2.2. Industry Data Example: Gunfleet Sands

Surveys conducted as a result of monitoring requirements contain valuable data that could be used for a variety of marine assessments and reporting.

For example, the license for Gunfleet Sands offshore wind farm stipulated that post-construction benthic monitoring surveys must be conducted in order to investigate possible changes to the marine benthic communities within the area. Therefore, benthic grab samples were taken in 2010 to investigate any changes, one year after the completed construction of the wind farm.

Raw biological data and sediment data were collected as part of this survey and are hosted on the Marine Data Exchange (MDE), alongside a full report of the investigations. This information could be used for UK marine assessment and reporting. For example, benthic species and abundance data are biodiversity descriptors listed as part of the UK Marine Strategy (Table 1) and could be used into inform monitoring programmes.

Example Data: [2010, Centre for Marine and Coastal Studies Ltd., Gunfleet Sands Offshore Wind Farm, Year 1 Post-construction Benthic Monitoring](#)

2.3. The Marine Data Exchange

The **Marine Data Exchange** (MDE) is the world's largest database of offshore renewables survey data, research and evidence.

Since the development of the first operational offshore wind farms in the UK just over 20 years ago, The Crown Estate's offshore wind customers have agreed to share data collected throughout the lifecycle of their projects, in a bid to support the future sustainable growth of the offshore renewables industry. This led to the creation of the MDE in 2013, which has since grown to over 200 terabytes of survey data from offshore projects across England, Wales and Northern Ireland.

The MDE now includes over 2,663 series (a group of datasets and reports collected in relation to a survey or data collection campaign, linked by a common research question) collated from feasibility through to decommissioning studies across the offshore wind, marine aggregates and wave and tidal sectors. It also hosts outputs from the Offshore Wind Evidence and Change programme, evidence projects commissioned by The Crown Estate, and outputs from The Crown Estate's spatial analysis and plan-level Habitats Regulations Assessments.

Physical, biological and human datasets, including geotechnical, metocean, sedimentology, geophysical, meteorological, benthic, marine mammal, bird, fish and marine archaeology data, are all collected as part of licensing conditions to inform operational management and to support project design (**Figure 1**).

The type of data collected for these assessments often aligns with ecological indicators and descriptors outlined in the UK Marine Strategy Part Three (2021), as described in **Appendix 1**.

Therefore, the data collected as part of these surveys could be re-used to help inform GES assessments and could play a critical role in helping the UK in achieving its marine policy targets.

Introduction	Marine Industry Data	Future Pilot Studies	Summary	References	Appendices
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Industry Data Collection	Parameter													
	Physical							Biological				Human		
	Bathymetry	Sidescan	Seismic/CHRP (sub-bottom)	Water levels	Flows	Waves	Sediment	Water/Sediment quality	Weather	Benthic	Birds	Fish	Mammals	Maritime Archaeology
Regional														
To support project design- Round 3 Zones	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Project														
To support project design	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Inform operational management	**	**					**		**					
License condition	**	**					**			*	*	*	*	
Other statutory requirement														
Other														
*, ** or *** relates to the scale of data collected with *** denoting a large geographical coverage of data														
Data Availability														
Data is generally made available														
Data is generally not collected														

Figure 1: Summary of data collected by the offshore wind industry detailing its scale and the availability (adapted from ABPmer, 2015).

2.4. The Benefits of Using Industry Data

The wealth of high-quality, freely available data on the MDE provides a valuable opportunity to improve our understanding of the environmental status of marine ecosystems. The use of existing data allows for both industry and government to approach environmental challenges with a natural capital lens and enables the protection of critical ecosystem services. Some of the main benefits of utilising marine industry data include:

- An improved data coverage for GES indicators and consequently improved assessment of marine ecosystem health
- An improved evidence base for decision making and regional assessment, allowing for improved measurement of progress/regression against key targets.
- Promotion of data standardisation to support more efficient use of expensive resources, avoiding unnecessary repeat survey activity.
- Efficiency gains in data sourcing for marine assessment and consequently data analysis.

To achieve and maintain GES in UK Seas, the Marine Strategy Part Three has outlined 11 critical marine ecosystem elements (key descriptors), including: biodiversity; non-indigenous species; commercial fish; food webs; eutrophication; sea-floor integrity; hydrographical conditions; contaminants; contaminants in seafood; marine litter and underwater noise (Defra, 2015). The strategy also outlines

indicators that will help to inform the UK government as to the quality and health of these 11 core marine descriptors. Descriptors of GES and their indicators are outlined in **Appendix 1**, and relevant marine industry datasets available on the MDE have been assigned to indicate future areas of investigation. These indicators also largely overlap with those identified within the 25 Year Environment Plan.

2.5. Industry data challenges and barriers

Previous studies undertaken by ABPmer (2015), the Natural Capital Coalition (2019) and ORJIP (2020) have highlighted challenges in using and sharing industry data, such as risks to developers and stakeholders caused by commercial confidentiality issues and the potential misuse/ incorrect re-use of data. Data standardisation, format and quality issues were also considered, such as developers using different data standards to the Marine Environmental Data and Information Network (MEDIN) and Data Archive Centres (DACs). Some developers may also lack the motivation to share their survey data due to resource issues and time constraints.

The next section explores a number of future data pilots that may help to overcome some of these challenges and improve data sharing and data accessibility through platforms such as the MDE.

3. Future Industry Data Pilot Studies

A number of existing studies that explore the use of industry data in UK marine assessment and reporting have been summarised in **Appendix 2**. These studies have been reviewed in order to recommend areas of future investigation in the use of marine industry data, such as the data stored on the MDE. These studies include:

- OneBenthic
- JNCC: The Joint Cetacean Data Programme (JCDP)
- JNCC: Marine Natural Capital Group Projects:
- ONS/JNCC/Defra: Marine Natural Capital Accounts
- Plymouth University: Offshore Wind Natural Capital Assessment
- Plymouth Marine Laboratory: Application of the natural capital approach to the marine environment to aid decision-making
- Marine Aggregate's Regional Seabed Monitoring Plan
- Scottish Marine Energy Research (ScotMER) Programme
- Oil and Gas UKBenthos Database
- System of Industry Metocean Data for the Offshore and Research Communities (SIMORC)
- UK Marine Noise Register (MNR)
- BGS Geotechnical Standardisation Project

This review has also taken into consideration the priority evidence gaps identified by the Offshore Wind Environmental Evidence Register (OWEER); a publicly available database developed by JNCC in collaboration with Defra, and funded by The Crown Estate's Offshore Wind Evidence and Change Programme. The OWEER collates and prioritises specific evidence gaps in relation to the impact of offshore wind on key receptor groups (i.e., birds, marine mammals, fish and benthic habitats). The proposed pilot studies are designed to take a higher-level approach, providing an overview of industry data and exploring how industry data as a whole can inform UK marine policy and assessment. It is recommended that within any given pilot study consideration is given to the OWEER, and opportunities to explore specific evidence gaps using industry data are identified in later phases of the study.

Within the industry data projects explored, there is a tendency to place emphasis on GES descriptors such as biodiversity, sea-floor integrity and food-webs. However, there is an evidence gap in projects exploring descriptors such as commercial fish, non-indigenous species, contaminants and marine litter.

Descriptor 7 "Hydrographical Conditions" within the UK Marine Strategy Part 3 (2015) outlines indicators such as salinity, temperature, pH and hydrodynamics. There is an abundance of data on the MDE which describes the hydrodynamic conditions of a site - these datasets fall under the category of "metocean". Whilst there are fewer surveys which cover indicators such as salinity etc., there are surveys on the MDE which investigate water quality. However, these surveys may have already been aggregated within

the SIMORC project or ScotMER programme. Furthermore, due to the nature of licensing conditions for offshore developments, it is unlikely that information on marine litter will be readily found within the data. However, commercial fish, non-indigenous species and contaminants could be a future area of study.

In an initial search of MDE industry data (June, 2022), 11 series appeared to contain the search term "contaminant", 170 contained the term "fish" and 0 series contained the terms "non-indigenous". Overall, 419 series appeared under the theme "Birds", 184 under "Marine Mammals", 314 under "Benthic", 345 under "Fish" and 682 series appeared under the theme "geophysical", providing a wide range of data for investigation.

This search was conducted only using words found in MDE series titles and themes; therefore, a number of datasets beyond the initial search may also contain useful information. The proposed pilot studies are intended to investigate surveys hosted on the MDE in further depth for relevant information.

To further investigate the potential use of industry data to strengthen the evidence base for UK marine assessments and reporting, the following areas of study are recommended.

3.1. Commercial & Non-commercial Fish Pilot Study

Much like the OneBenthic platform (see **Appendix I**), industry data on the abundance and distribution of commercial and non-commercial fish could

be presented in a GIS/map-based platform, allowing for a better understanding of the distribution of fish stocks and to allow for better habitat characterisation. Information provided in fish survey data, such as EIAs, post-construction commercial fish surveys and finfish distribution surveys could be included. MDE survey data could also be checked for presence/absence of fish species within the datasets, to provide better insight into the distribution of species, especially for data limited stocks.

Information found within these searches could be integrated as a new "fish" layer in OneBenthic and/or could be integrated into Cefas's Fisheries Data Archive Centre (FishDAC) or Cefas Data Portal. This information, alongside existing fisheries data, could help to increase our understanding of the distribution of commercial fish stocks, allowing for better spatial prioritisation of offshore renewables.

Analysing pre-construction and post-construction monitoring surveys may also help to indicate whether certain species are more vulnerable to displacement. However, all results identified from the proposed study will likely only show indicative trends, due to the mobile nature of fish species and potentially low resolution/varying methodology of industry data surveys (MMO, 2014).

Collaboration with Cefas is highly recommended if this project is to be taken forward. It is also recommended that any involvement in fish monitoring and reporting is undertaken with caution, and that thorough and early stakeholder engagement is undertaken with those within the fishing industry, due to the sensitive nature of the relationship between the offshore renewables sector and fishing industry.

3.2. MDE Good Environmental Status (GES)/ 25 Year Environment Plan Indicator Pilot Study

Of the industry data projects reviewed, few evaluated whether GES indicators (or 25 Year Environment Plan indicators) are present within the datasets. To maximise the value of the data available on the MDE, datasets could be assessed for whether they include GES descriptors and indicators (i.e., contaminants or non-indigenous species) and could be tagged with information to make it clear to users what information is available within the datasets. These datasets could then be pooled into various different studies, such as the studies reviewed in **Appendix I**, to increase the evidence pool for marine environmental monitoring.

For example, baseline studies, EIAs, post-construction monitoring surveys and habitat mapping surveys containing benthic, marine mammal, fish and bird data could be flagged if they contain information regarding indicators such as the abundance and distribution of species, providing evidence to support the UK Marine Strategy descriptor 1: "Biodiversity". These tags could then be integrated into the MDE portal so that users may search for specific descriptors and integrate the data into existing monitoring programmes. The same may also be done for 25 Year Environment Plan Indicators.

If this pilot study is to be progressed, a smaller feasibility

study investigating one or two indicators could be used to test the value of this approach and whether the tagged industry data can be used to inform policy. Updates and reviews to environmental indicators must be taken into consideration to ensure that the pilot study remains valid and the tags used are not outdated.

3.3. Industry Data Natural Capital Assessment

Assigning a value to the benefits provided by marine ecosystems can help to ensure that the economic and societal benefits are more widely recognised and are considered in decision making.

To support the assessment of marine natural capital, TCE could collaborate with the Office for National Statistics (ONS) to support marine natural capital accounting projects. The ONS have based marine natural accounts upon initial studies conducted by the JNCC and Cefas. Within the "Initial Natural Capital Accounts" final report, JNCC and Cefas call for improved habitat mapping and better coordination and collaboration between agencies in data collection.

The report also outlines future recommendations for more frequent monitoring and analysis, and better data to describe the water quality of marine waters. Natural capital indicators and corresponding data sources are also outlined in the study, in addition to logic chains for several key ecosystem services (**Figure 2**; Thornton *et al.*, 2019).

To support natural capital assessments, TCE could search MDE data for indicators and key descriptors, as identified by JNCC, such as: water quality survey data and habitat mapping data. TCE could then work towards standardising the datasets, as per JNCC requirements, to integrate the data into the ecosystem service modelling.

Similarly for Defra's Marine Natural Capital Accounts project, TCE could help to provide insights into the financial value of offshore wind to help calculate the resource rent of ecosystem services provided by marine and coastal environments; resource rent being "the annual return stemming directly from the natural capital asset itself" (ONS, 2021). The Initial Natural Capital Accounts for the UK Marine and Coastal Environment report states that JNCC and Cefas can either use financial data from individual wind farm companies or aggregate data from the Systems of National Accounts (SNA) (Defra, 2019), with the more detailed data providing a more precise estimate of resource rent.

TCE could help JNCC and Cefas access the most detailed data available, working in collaboration with other stakeholders and developers.

Furthermore, information regarding the spatial extents of offshore windfarms and corresponding cables could be used to inform natural capital accounting, as the information collected as part of EIAs provides a more informed picture of the environmental status of marine habitats, which is then included as part of the logic chain used to value the ecosystem services provided.

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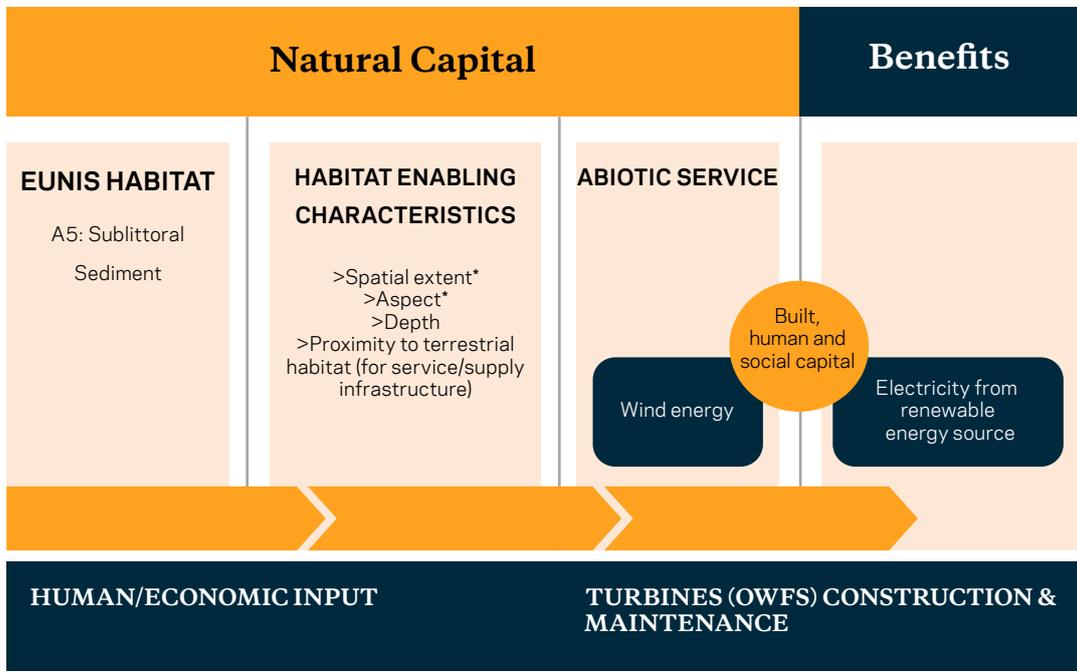


Figure 2: Logic chain applied to the abiotic service of renewable energy from off-shore wind farms (OWFs) providing the benefit of wind-generated electrical energy (adapted from Thornton *et al.*, 2019)

3.4. Post-Construction Monitoring Pilot

Although the MDE contains an abundance of post-construction survey data (668 surveys, June 2022), most surveys do not provide a summary of trends observed across the post-construction monitoring period.

To inform our understanding of the environmental impacts of offshore wind farms on the marine environment, temporal analysis of post-construction monitoring surveys could be conducted and findings could be collated in a clear, standardised and structured format so that different developments may be compared.

An overall view of the impact of offshore wind development could then be presented in data tables, graphs and spatially via distribution maps, categorised by the environmental status of the marine environments associated with each site. Where applicable, post-construction monitoring surveys could also be compared to baseline conditions and third-party data. For example, if a site is observed to experience decreasing biodiversity, these trends could be compared with those at a similar, undeveloped site. This would help separate the impact of offshore wind development from other factors such as climate change and other environmental pressures.

The proposed pilot study could be split into two parts: 1) a feasibility study standardising data from more recent post-construction monitoring surveys (2012 onwards) and an exploration of general data trends and 2) a study to explore whether the standardised MDE survey data can be compared to third-

party data, to identify whether trends can be linked to offshore development.

Analysis of these trends would help to inform whether the construction of an offshore wind farm has had an overall negative or positive effect on the marine environment and could also be used to understand the rate of recovery of ecosystems. However, there are limitations to the quality of outputs as a result of the proposed study, as the temporal resolution and methodology behind the data collection may cause challenges in comparisons between different sites/ third party data, and therefore the outputs of the study may only help to inform on general trends, rather than on the overall cumulative impact of offshore development (as described in the MMO "Review of Environmental Data Associated with Post-consent Monitoring of Licence Conditions of Offshore Wind Farms" (2014)).

Despite these challenges, the proposed study would provide greater insight into the impacts of offshore wind development and would allow for greater data accessibility through the collation of data currently locked up within reports on the MDE. This will contribute towards a better understanding of the impact of offshore construction and the rate of recovery of marine ecosystems.

3.5. Industry Data Accessibility and Discoverability Pilot

There are thousands of surveys available on the MDE containing valuable information regarding biological and physical data. However, it is unclear how

discoverable and accessible the data is, as often information is buried within the series, packages and reports and is not listed within the summary information of the series, as the desired data may not be the main focus of the study and therefore is not listed or searchable on the series landing page.

Therefore, this study recommends a feasibility study to explore how data discoverability and accessibility may be improved, to increase the use of industry data in UK marine assessment and reporting and to maximise the value and efficiency of industry survey work. For example, the MDE could be improved through adding different search criteria options, such as whether the series contains raw or unprocessed data (i.e. raw infauna data, raw species abundance data, etc.).

The structure of MDE packages may also be explored to understand whether the current system could become more accessible. Different search studies could also be conducted to explore whether MDE users can find data and how discoverable this information is.

The study outputs would include recommendations such as improvements to the MDE and changes to the data delivery process, such as MDE package restructure and data tagging etc.

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4. Summary

The findings of this study showcase a wide range of opportunities to use industry data in marine assessments and reporting.

Future industry data pilot studies can help to facilitate natural capital approaches and make strides towards understanding the environmental status of the UK's marine environment.

Future studies may also help to address challenges and barriers to using industry data, such as improving data standardisation and accessibility, and can be used as a learning exercise to understand how industry data might be better collected and collated in the future to ensure the data contributes to the sustainable development of marine industries.

The wide range of physical and biological data available on the MDE may help to facilitate a better understanding of the relationships between biotic and abiotic factors and ecological processes, helping to incorporate a natural capital approach into decision-making and marine spatial design.

Ultimately, progress in the inclusion of industry data in marine assessments and reporting will also help the UK in achieving its goal of ecologically diverse, healthy, clean and productive oceans.



Photo credit: Tony Reed. "A pleasant day", Underwater Photographer of the Year, 2022, British Waters Living Together category.

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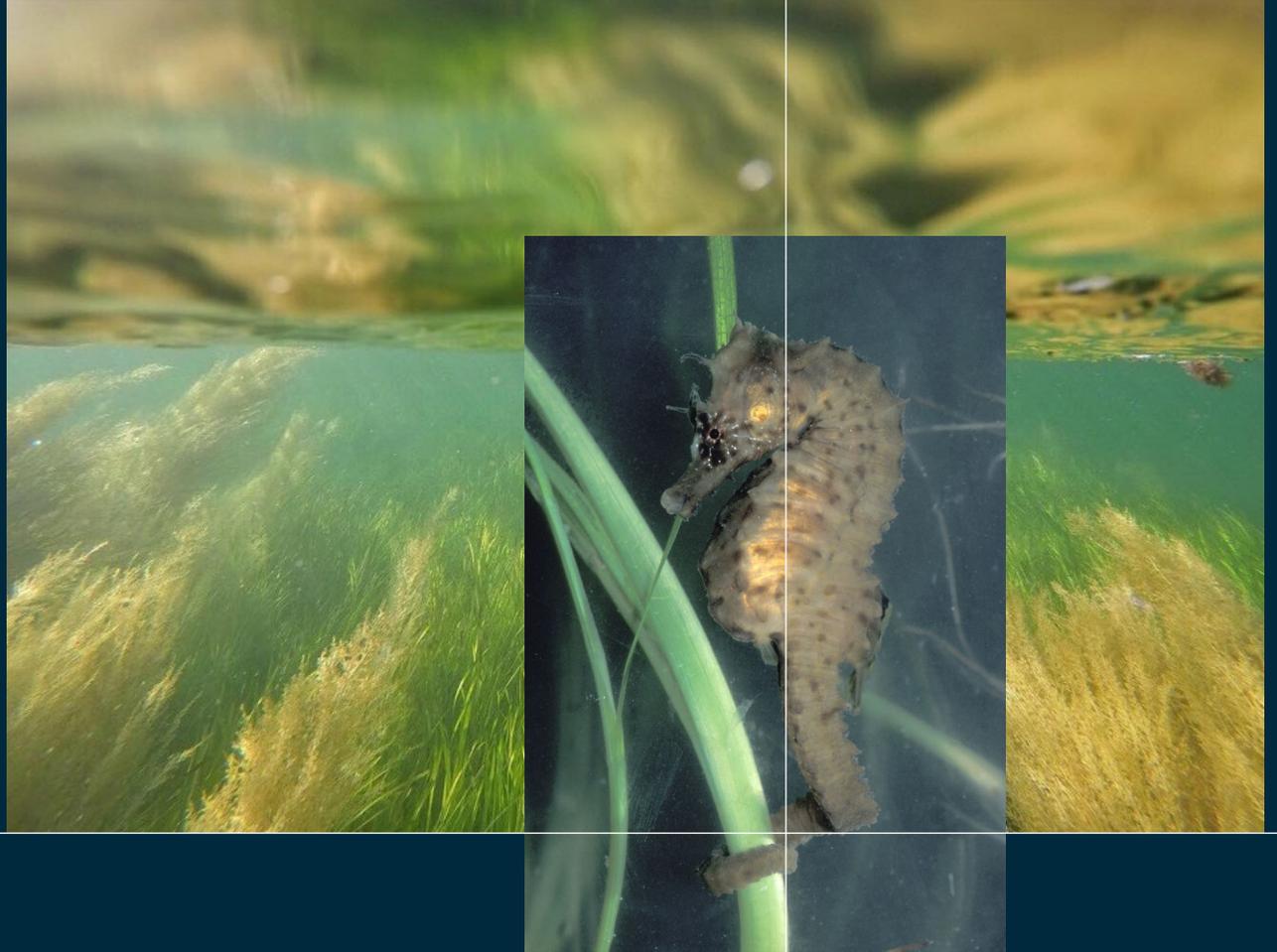


Photo credits: John Mitchell "*Seagrass meadows of the Solent*"
& Keith Hiscock "*Hippocampus guttulatus*"

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Appendix I: UK Marine Strategy descriptors and their indicators

*(note not all indicators are listed. Descriptors and indicators have been taken from the UK Marine Strategy Part Three: UK programme of measures, 2015) in addition to linked Outcome Indicators listed within the 25 Year Environment Plan)

UK Marine Strategy Descriptors (Defra, 2015)	UK Marine Strategy Indicators (not all indicators have been listed - see Marine Strategy Part Three: UK programme measures for all indicators)	25 Year Environment Plan: Outcome Indicators (Defra, 2018)	Examples of Available Marine Industry Data : (Sourced from the MDE, 2022)
1. Biodiversity: Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions ('Descriptor 1' or 'D1').	Indicators for fish, marine mammals, birds and benthic species include indicators such as: <ul style="list-style-type: none"> ▪ Distributional range (continental shelf seas and shelf-edge seas) ▪ Distributional pattern within range (continental shelf seas and shelf-edge seas) ▪ Population abundance ▪ Population biomass ▪ Population demographic characteristics ▪ Abundance trends of functionally important selected groups/species ▪ Composition and relative proportions of ecosystem components ▪ Performance of key predator species using their production per unit biomass (productivity) 	C3: Diverse seas: status of marine mammals and marine birds C4: Diverse seas: condition of seafloor habitats C6: Diverse seas: status of threatened and declining features C7: Healthy seas: fish and shellfish populations C8: Healthy seas: marine food webs functioning C9: Healthy seas: seafloor habitats functioning C11: Productive seas: status of sensitive fish and shellfish stocks	Benthic, marine mammal, fish and bird survey data, including: <ul style="list-style-type: none"> ▪ Environmental Impact Assessments ▪ Marine Wildlife Surveys, such as benthic grabs, trawls and aerial surveys. ▪ Acoustic monitoring of the spatial occurrence of cetaceans ▪ Post-Construction Commercial Fish Surveys ▪ Aerial seal monitoring surveys
2. Non-indigenous species: Non-indigenous species (NIS) introduced by human activities are at levels that do not adversely alter the ecosystems ('Descriptor 2' or 'D2').	<ul style="list-style-type: none"> ▪ Trends in abundance, temporal occurrence and spatial distribution in the wild of nonindigenous species, particularly invasive non-indigenous species, notably in risk areas, in relation to the main vectors and pathways of spreading of such species ▪ Impacts of non-indigenous invasive species at the level of species, habitats and ecosystem, where feasible 	C3: Diverse seas: status of marine mammals and marine birds C4: Diverse seas: condition of seafloor habitats C6: Diverse seas: status of threatened and declining features C7: Healthy seas: fish and shellfish populations C8: Healthy seas: marine food webs functioning C9: Healthy seas: seafloor habitats functioning C11: Productive seas: status of sensitive fish and shellfish stocks	Benthic, marine mammal, fish and bird survey data, including: <ul style="list-style-type: none"> ▪ Environmental Impact Assessments ▪ Marine Wildlife Surveys

UK Marine Strategy Descriptors (Defra, 2015)	UK Marine Strategy Indicators (not all indicators have been listed - see Marine Strategy Part Three: UK programme measures for all indicators)	25 Year Environment Plan: Outcome Indicators (Defra, 2018)	Examples of Available Marine Industry Data : (Sourced from the MDE, 2022)
<p>3. Commercial fish: Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock ('Descriptor 3' or 'D3').</p>	<ul style="list-style-type: none"> ▪ Fishing mortality ▪ Ratio between catch and biomass index ▪ Spawning stock biomass ▪ Biomass indices 	<p>C7: Healthy seas: fish and shellfish populations</p> <p>C11: Productive seas: status of sensitive fish and shellfish stocks</p>	<p>Fish survey data, including:</p> <ul style="list-style-type: none"> ▪ Environmental Impact Assessments ▪ Post-Construction Commercial Fish Surveys (4m Beam Trawl) ▪ Finfish distribution studies ▪ Adult and Juvenile Fish and Epibenthic pre-construction surveys ▪ Potting surveys
<p>4. Food webs: All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity ('Descriptor 4' or 'D4').</p>	<ul style="list-style-type: none"> ▪ Composition and relative proportions of ecosystem components 	<p>C8: Healthy seas: marine food webs functioning</p>	<p>Fish survey data, including:</p> <ul style="list-style-type: none"> ▪ Environmental Impact Assessments ▪ Post-Construction Commercial Fish Surveys (4m Beam Trawl) ▪ Finfish distribution studies ▪ Adult and Juvenile Fish and Epibenthic pre-construction surveys ▪ Potting surveys
<p>5. Eutrophication: Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters ('Descriptor 5' or 'D5').</p>	<ul style="list-style-type: none"> ▪ Nutrients in the water column ▪ Chlorophyll concentration in the water column ▪ Water transparency related to increase in suspended algae, where relevant ▪ Abundance of opportunistic macroalgae ▪ Abundance of perennial seaweeds and seagrasses (eg fucooids, eelgrass and Neptune grass) adversely impacted by a decrease in water transparency ▪ Dissolved oxygen, ie changes due to increased organic matter decomposition and size of the area concerned 	<p>C4: Diverse seas: condition of seafloor habitats</p>	<p>Although the data available on the MDE is not specific to eutrophication, the following datasets listed below may provide valuable information (Metocean, sedimentology, and onshore themed datasets) including:</p> <ul style="list-style-type: none"> ▪ Environmental impact Assessments ▪ Water quality surveys ▪ Metocean and marine mammal monitoring surveys ▪ Contaminated sediments surveys

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UK Marine Strategy Descriptors (Defra, 2015)	UK Marine Strategy Indicators (not all indicators have been listed - see Marine Strategy Part Three: UK programme measures for all indicators)	25 Year Environment Plan: Outcome Indicators (Defra, 2018)	Examples of Available Marine Industry Data : (Sourced from the MDE, 2022)
6. Sea-floor integrity: Seafloor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected ('Descriptor 6' or 'D6').	<ul style="list-style-type: none"> ▪ Distributional range of benthic habitats ▪ Distributional pattern of benthic habitats ▪ Condition of the typical species and communities ▪ Physical, hydrological and chemical conditions 	C4: Diverse seas: condition of seafloor habitats	Benthic, metocean, and meteorological datasets, including: <ul style="list-style-type: none"> ▪ Benthic Monitoring Programmes ▪ Habitat map surveys ▪ Benthic Video Surveys ▪ Hydrological and geotechnical surveys ▪ Sediment monitoring surveys
7. Hydrographical Conditions: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems ('Descriptor 7' or 'D7')	<ul style="list-style-type: none"> ▪ Extent of area affected by permanent alterations ▪ Spatial extent of habitat affected by the permanent alteration 	C2: Seabed subject to high pressure from human activity	Sedimentology, geophysical, metocean and benthic datasets, including: <ul style="list-style-type: none"> ▪ Hydrographical monitoring surveys ▪ Environmental Impact Assessments ▪ Post-construction geophysical surveys ▪ Scour/cable burial surveys ▪ Water quality surveys
8. Contaminants: Concentrations of contaminants are at levels not giving rise to pollution effects ('Descriptor 8' or 'D8').	<ul style="list-style-type: none"> ▪ Concentrations of the contaminants mentioned in the COM DECISION, measured in the relevant matrix (such as biota, sediment and water) in a way that ensures comparability with the assessments under Directive 2000/60/EC ▪ Levels of pollution effects on the ecosystem components concerned, having regard to the selected biological processes and taxonomic groups where a cause/effect relationship has been established and needs to be monitored ▪ Occurrence, origin (where possible), extent of significant acute pollution events (e.g. slicks from oil and oil products) and their impact on biota physically affected by this pollution 	C4: Diverse seas: condition of seafloor habitats	Sedimentology, geophysical, hydrographical, fish, marine mammals, bird and benthic datasets, including: <ul style="list-style-type: none"> ▪ Environmental impact assessments ▪ Benthic grab sampling surveys ▪ Pre-construction contaminants investigation surveys ▪ Contaminated sediments surveys ▪ Benthic ecology characterisation survey ▪ Water Quality Surveys

UK Marine Strategy Descriptors (Defra, 2015)	UK Marine Strategy Indicators (not all indicators have been listed - see Marine Strategy Part Three: UK programme measures for all indicators)	25 Year Environment Plan: Outcome Indicators (Defra, 2018)	Examples of Available Marine Industry Data : (Sourced from the MDE, 2022)
<p>9. Contaminants in sea-food: Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards ('Descriptor 9' or 'D9').</p>	<ul style="list-style-type: none"> ▪ Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels ▪ Frequency of regulatory levels being exceeded 	<p>Na</p>	<p>Although surveys are unlikely specifically designed to capture contaminants in seafood, fish datasets may include details of stomach content and benthic and water quality surveys may elude to contaminants within the ecosystem/food web, including:</p> <ul style="list-style-type: none"> ▪ Pre-consent fish and fisheries reports ▪ Fish and shellfish resource assessments ▪ FEPA monitoring Fish Surveys ▪ Contaminants in marine sediments survey ▪ Characterisation of Subtidal Benthic Ecology and Fish Communities
<p>10. Marine Litter: Properties and quantities of marine litter do not cause harm to the coastal and marine environment ('Descriptor 10' or 'D10').</p>	<ul style="list-style-type: none"> ▪ Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source ▪ Trends in the amount of litter in the water column (including floating at surface) and deposited on the seafloor, including analysis of its composition, spatial distribution and, where possible, source 	<p>C1: Clean seas: marine litter</p>	<p>Because monitoring for marine litter is not a requirement of most offshore renewable licensing and reporting, it is unlikely that there will be suitable datasets on the MDE. However, some reports might document marine litter in benthic and water quality surveys.</p>

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UK Marine Strategy Descriptors (Defra, 2015)	UK Marine Strategy Indicators (not all indicators have been listed - see Marine Strategy Part Three: UK programme measures for all indicators)	25 Year Environment Plan: Outcome Indicators (Defra, 2018)	Examples of Available Marine Industry Data : (Sourced from the MDE, 2022)
11. Underwater noise: Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment ('Descriptor 11' or 'D11').	<ul style="list-style-type: none"> ▪ Proportion of days and their distribution within a calendar year over areas of a determined surface, as well as their spatial distribution, in which anthropogenic sound sources exceed levels that are likely to entail significant impact on marine animals measured as Sound Exposure Level (in dB re 1µPa².s) or as peak sound pressure level (in dB re 1µPa peak) at one metre, measured over the frequency band 10 Hz to 10 kHz ▪ Trends in the ambient noise level within the 1/3 octave bands 63 and 125 Hz (centre frequency) (re 1µPa RMS; average noise level in these octave bands over a year) measured by observation stations and/or with the use of models if appropriate 	Na	Noise datasets available on the MDE include: <ul style="list-style-type: none"> ▪ Modelling of Underwater Noise ▪ Noise Impact Assessments ▪ Noise Coastal and Offshore Assessments ▪ Effects of offshore windfarm marine mammals and fish ▪ Effects of pile-driving noise on the behaviour of marine fish ▪ Assessment of existing background noise levels

Appendix 2: Using Industry Data for Marine Monitoring and Assessment

To ensure that any future use of industry data does not duplicate efforts already underway, a review of existing industry projects has been undertaken. However, this list is not an exhaustive list of industry data projects in the UK.

A. Plymouth University: Offshore Wind Natural Capital Assessment

In 2020, Plymouth University proposed a pilot study using industry data collected by Offshore Wind Farm (OWF) developers. The aim of the study is to explore the use of natural capital and net gain approaches in the offshore wind licensing and consents process, the effects on decision-making, and consequently the implications to marine policy.

The main objectives of the study are:

- To use a natural capital framework to reappraise the data from one completed

Environmental Impact Assessment (EIA) in order to determine whether this approach can provide additional insights compared to standard methods;

- To explore further this EIA data and monitoring methods to provide a preliminary assessment of possibilities for a net gain metric, particularly in terms of how this might apply to environmental (as opposed to biodiversity) net gain;
- To examine the social and economic information contained within additional EIAs to determine the extent to which this is standardised and to identify gaps with respect to the implications of OWFs across ecosystem services, benefits and values;
- To develop recommendations on the strengths and weaknesses of using natural capital and net gain approaches and hence their relevance for decision making in marine licencing;
- To support understanding of how the environmental impacts of floating OWFs may differ from those with fixed foundations.

The suggested case study location is the Southern North Sea. Examination of this site would include the assessment of a Special Area of Conservation and its Harbour Porpoise population. Greater Gabbard (including the Galloper extension) is the proposed site. Whilst post-consent monitoring data is available, the site is limited by its relatively small size. Plymouth University has already identified the Marine Data Exchange as a primary source of survey data, and Defra and the MMO have been identified as potential supports, as the process of searching through the data is likely to be a timely process.

B. Plymouth Marine Laboratory: Application of the natural capital approach to the marine environment to aid decision-making

The Marine Conservation Research Group at the Plymouth Marine Laboratory, funded by Defra, have been working together on a project which aims to improve the understanding of how the natural capital approach can be applied to the marine environment and how this links to UK policy, particularly in terms of assessing trade-offs and value for money in monitoring, protection and rebuilding of marine assets (Marine Conservation Research Group, 2022).

One of the key questions being asked is whether existing data and frameworks are fit for purpose and if not, what is required to improve these data frameworks? The project duration was scheduled to last two years (2018-2020). The team at the Plymouth Marine Laboratory aim to develop natural capital tools to support decision making, and aim to pioneer innovative approaches that promote 'net gain' for biodiversity and society (Rees, 2020). It is expected that GES indicators will likely be examined in existing datasets, if existing data frameworks are being interrogated for use in natural capital assessments.

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C. Marine Aggregate’s Regional Seabed Monitoring Plan

In Dr Keith Cooper and Dr Jon Barry’s “A big data approach to macrofaunal baseline assessment, monitoring and sustainable exploitation of the seabed” (2017), industry and government data sources were used to develop a new approach to monitoring the offshore marine sectors impact on seabed sediments. The approach now forms the basis of the Regional Seabed Monitoring Programme (RSMP) and has allowed for a more sustainable dredging movement in the UK. Cooper and Barry *et al.* (2019) also used the previously mentioned dataset derived from industry and government sources to create a new method of habitat classification, which differs from the commonly used European Nature Information System (EUNIS). Creating a more biologically based habitat mapping system using existing industry data allows for a more cost effective approach to ecological monitoring and also improves the ability to detect change.

D. OneBenthic

The OneBenthic data platform (Or Marine Aggregates Application (MAAP), developed by Dr. Keith Cooper from the Centre for Environment, Fisheries and Aquaculture (Cefas), is an excellent example of how industry data can be used to enhance our understanding of the marine environment. Benthic data from the MDE were made available to members of Cefas, via Azure, for potential inclusion in the cloud-based platform. The platform pools

data provided from both industry and government organisations, such as Natural England, JNCC, and Marine Scotland etc. (Figure 3). Previously disparate benthic datasets have now been collated as a result of these efforts, bringing together seabed, macrofauna and sediment particle size data, in a standardised format, so that they can be used to inform marine license application and compliance monitoring, such as the marine aggregate Regional Seabed Monitoring Programme. Over 35,000 samples from 780 surveys have been included, benefiting data providers in industry and government.

Tools present on the platform include the following (amongst others):

- The OneBenthic Baseline Tool: Which visualises the faunal cluster identity of ‘baseline’ sampling stations (Cooper and Barry, 2017).

- The OneBenthic M-Test Tool: which is used to identify ecologically significant changes in sediment composition in support of the delivery of licence compliance requirements.
- The OneBenthic Non-Native Species Tool: which provides distribution records for benthic non-native species and species distribution range.

These datasets align with the UK Marine Strategy biodiversity, non-indigenous species and sea-floor integrity descriptors and their indicators, such as: identifying the distributional range of benthic habitats and trends in the abundance and distribution of key benthic species.

Cefas have made recommendations to improve the transfer of data between the MDE and OneBenthic by asking developers to make their data available in a standard, machine readable format, such as Darwin Core.

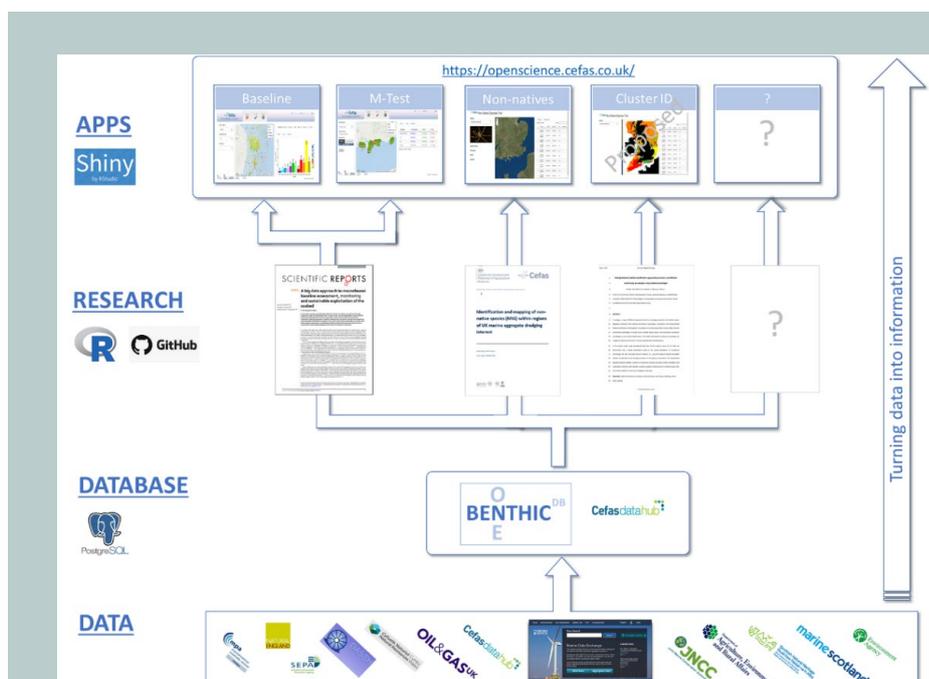


Figure 3: The OneBenthic Platform: diagram displaying the online repositories where data can be freely obtained and the process of turning the data into valuable information (Cefas, 2022).

E. Joint Nature Conservation Committee (JNCC): Joint Cetacean Data Programme (JC DP):

The Joint Nature Conservation Committee (JNCC) is currently developing an international platform to host cetacean survey datasets from the northeast Atlantic, as part of its Joint Cetacean Data Programme (JNCC, 2022). During Phase One of the project, which started in 2019, cetacean data was collected from a variety of different data providers and a draft Data Standard was developed, to ensure data quality was appropriate for integration into the platform. Offshore marine industry consultancies and developers, such as Royal Haskoning DHV, APEM, Scottish Power, NIRAS and more, have agreed to provide data to the platform.

The project also includes data provided by academic and technical parties (Bangor University, Sea Mammal Research Unit, University of Plymouth etc.), in addition to government and statutory agencies (Defra, Natural England, The Crown Estate etc.). The programme then continued to investigate Data Policies, and how data is submitted, stored and accessed. In Phase Two of the project, plans to develop the platform with the International Council for the Exploration of the Sea (ICES) begun, with JNCC and ICES working with key stakeholders to build and populate the platform with cetacean data. The platform is now live, and currently in its first

phase of development. To improve data standardisation, the JC DP has also developed a universal data standard – in consultation with MEDIN, which data providers can then use to ensure data compliancy with the platform.

F. Scottish Marine Energy Research (ScotMER) Programme:

The Scottish Marine Energy Research Programme (ScotMER) was developed by Marine Scotland to improve the understanding of the environmental and socio-economic implications of offshore renewable developments. The programme is a collaboration between industry, Statutory Nature Conservation Bodies and NGOs, and aims to address evidence gaps through the creation of evidence maps, and research programmes. Seven specialist groups are in place, including ornithology, marine mammals, fish and fisheries, diadromous fish, benthic, physical processes and socio-economic groups. The evidence maps outline gaps in existing data, and the following research frameworks aim to address these gaps. Ongoing initiatives under the ScotMER programme include (but are not limited to):

- Production of a Cumulative Effects Framework for key ecological receptors
- Collection of Seabird Flight Height Data at an Operational Windfarm using Aircraft Mounted Lidar
- Bird Sensitivity Mapping tool – further development and extension to UK waters

The evidence maps are useful in

identifying GES indicator data gaps. However, it is unclear whether the evidence gaps apply to industry data alone, or apply to all data pooled for investigation, including government and NGO research data.

G. JNCC's Marine Natural Capital Group Project's:

Within the [Marine Ecosystems Team](#) at JNCC, the Marine Natural Capital Group is working towards a natural capital approach to the protection of marine ecosystems.

As part of their project work, the JNCC aims to create a marine asset services register that will assess and quantify the natural capital and value of ecosystem services provided by marine habitats. The objective of this work stream is to identify habitats in need of greater protection.

JNCC has also written a paper which explores the [marine ecosystem components and processes that influence potential ecosystem service delivery](#) (JNCC, 2016). Within this report, literature and data were reviewed and data were mined to produce ecosystem services maps.

Spatial data acquired from various data portals, including European-funded data networks, governmental bodies and academic sites were included in the investigation (JNCC, 2016). Potential ecosystem service delivery maps were then created by combining spatial data in ArcGIS. The paper is an excellent demonstration of how using existing data resources can provide valuable insight into marine natural capital. However,

it is unclear what proportion of industry data has been used, and whether the data mined was taken predominantly from research based environmental monitoring.

JNCC is also collaborating with Defra on a pilot study, which explores the economic value of Blue Carbon.

H. ONS/JNCC/Defra: Marine Natural Capital Accounts:

The Office for National Statistics (ONS) marine natural capital accounts are produced in partnership with Defra, and the defining framework used to produce the accounts was developed and produced by the JNCC, Cefas and Defra as part of the [Marine Natural Capital Accounts \(ME5116\)](#).

Within Defra, there is also the marine [Natural Capital and Ecosystem Assessment](#) (mNCEA) programme, which aims to transform evidence provision and decision-making to support natural capital assessment.

Between 2018 and 2019 Defra collaborated with the JNCC and Cefas on a Marine Natural Capital accounts science and research project, which explored initial marine natural capital accounts for British marine and coastal ecosystems.

The programme was designed to align with the ambitions of the 25 Year Environment Plan and to explore the contribution of marine environmental services to ecological systems in the UK (Defra, 2019).

One of the primary project objectives was to clarify the conceptual framework for marine

and coastal accounts (JNCC lead); including defining distinct elements of the area accounts, highlighting and appraising conceptual issues, identifying and defining key ecosystem services; and establishing relevant indicators of habitat condition.

The project used existing datasets to estimate the value of ecosystem services and to generate an evidence map, identifying data gaps. Financial offshore wind farm data was specifically used to value the ecosystem services provided by marine and coastal environments for offshore wind energy, enabling precise estimates of marine resource rent.

The project successfully demonstrates the kind of industry data which would be valuable to marine natural capital assessments and also details indicators of marine habitat health which are relevant to ecosystem services'. The project makes recommendations regarding methodological issues, data overlaps and suggests the integration of findings within marine policy and conservation.

I. UKBenthos Database (5.17) & the North Sea & Oil and Gas Interactive Map

The UKbenthos Database 5.17' - Offshore Energies UK (OEUK) is a product of academic and industry projects, originally created by Heriot Watt University and UKOOA (now OEUK) to collate

offshore benthic environmental surveys, so that the information can be used by operators, contractors, government agencies, NGOs and research institutions.

The North Sea Interactive was a project led by Heriot Watt University 2014 (Gormley *et. al* 2014), to digitise the UKBenthos Database into GIS format (along with other oceanographic and seabed data from NOC and BGS), and the Oil and Gas Environment Interactive (led by Aberdeen University (Gormley, 2021)) was implemented to create a GIS data portal for data access (of the North Sea Interactive data, plus other data).

The information displayed on the Oil and Gas Environment Interactive map includes the North Sea Benthos database, the Natural Environmental Research Council's (NERCs) regional North Sea marine sediment data and layers of modelled hydrodynamics.

Datasets include the UKBenthos data (1975 to 2019) and other marine industry surveys such as Oil and Gas UK Wide Area Surveys, Strategic Environmental Assessment surveys and the Atlantic Frontier Environmental Network surveys.

The UKBenthos database was created over 17 years ago and provides an excellent case study for how industry data, such as routine benthic surveys, can be used by a wide range of stakeholders.

The interactive mapping tool is a good example of how the data can be displayed and interacted with, to make it more accessible to users and therefore more successful in meeting evidence demands (**Figure 4**).

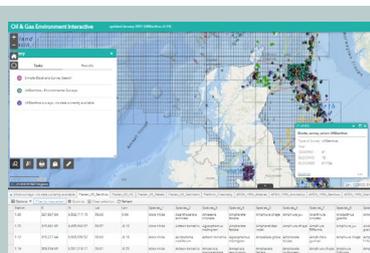


Figure 4: Oil and Gas Environment Interactive. A data and mapping tool using marine industry benthic survey data (Roberts and Gormley, 2014).

J. System of Industry Metocean Data for the Offshore and Research Communities (SIMORC)

The National Oceanography Centre in collaboration with the oil and gas industry presents 7700 data sets from Shell, Total and BP, including wind, wave, current and sea level data, on the System of Industry Metocean Data for Offshore and Research Communities platform (SIMORC) (SIMORC, 2022).

Making these datasets accessible creates an opportunity for a variety of stakeholders to make use of expensive metocean surveys, and provides an opportunity for analysis of data by the scientific community.

The main objectives of the programme were to create a central index and database of metocean datasets, facilitate standardisation of data, create searchable studies, define and establish database operation and to promote industry data for use by both industry and academia.

Using the SIMORC service users may search for benthic data across the world. Datasets are displayed by their variables, platform type, instrument and water depth, and can be placed in a basket for download (Figure 5).

The platform demonstrates the potential use of MDE metocean data and presents a good example of industry data standardisation.

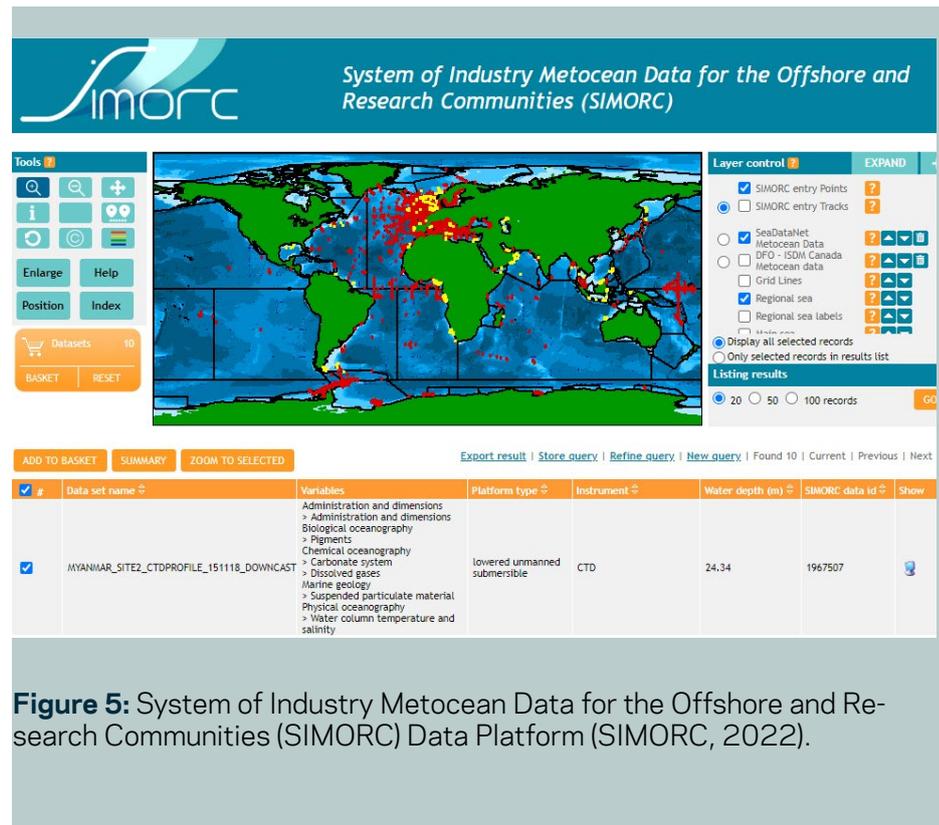


Figure 5: System of Industry Metocean Data for the Offshore and Research Communities (SIMORC) Data Platform (SIMORC, 2022).

K. UK Marine Noise Register (MNR)

Listed as one of the UK Marine Strategy GES descriptors, understanding the impacts of increased underwater noise (descriptor 11), caused by offshore activity, such as offshore wind farm construction, is critical to understanding marine ecosystem health.

Underwater noise modelling and impact assessments are conducted as part of EIAs for offshore developments, and are therefore stored on the MDE.

The JNCC holds the Marine Noise Registry (MNR) for the UK, which holds records of human activities in UK seas that produce loud, low to medium frequency (10 Hz – 10kHz) impulsive noise. The MNR collates industry and regulator noise data, including location and

time referenced data points. The platform also pulls information from current licensing portals, and could even be pulling information from the MDE. A valuable exercise would be to collate the noise data available on the MDE and compare it with the data available on the JNCC Marine Noise Registry, to assess whether there are any data gaps present.

L. BGS Geotechnical Standardisation Project

The Crown Estate in collaboration with the British Geological Survey (BGS) aims to work on a Geotechnical Standardisation Project using industry data, commencing June 2022. The MDE currently holds over 100 geotechnical surveys from more than 30 offshore wind projects. Whilst the geotechnical data

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is currently held in disparate datasets, this partnership approach will develop a method for bringing the historic datasets together into one standardised dataset where possible, and will also work with industry to develop a consistent and standardised approach for the future delivery of geotechnical data. The project will aim to review geotechnical data held on the MDE to understand standardisation potential and will define detailed methodology for standardising historical geotechnical data held on the MDE, including recommendations for how automation and/or MDE development could facilitate this.

Relevant case study area/s will be identified to trial the methodology for standardising historical geotechnical data, and a standardised dataset for the case study area, document process and update the overall standardisation methodology to reflect any changes to the process will be produced. In the second stage of the project, the outputs from phase one will be used to demonstrate the value of standardised projects, and further case studies will be identified.

London
The Crown Estate
1 St James's Market
London
SW1Y 4AH
T 020 7851 5000

Windsor
The Crown Estate
The Great Park
Windsor
SL4 2HT
T 01753 860 222

thecrownestate.co.uk
[@TheCrownEstate](https://www.instagram.com/TheCrownEstate)

 marinedataexchange.co.uk

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