

# Data Prioritisation and Collection for Spatial Representation – Summary Report

May 2020

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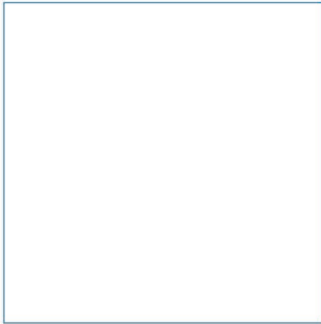
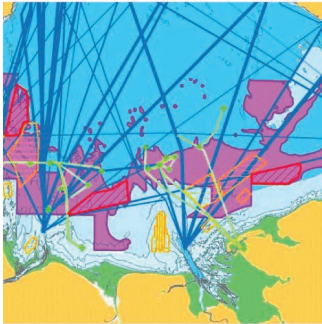
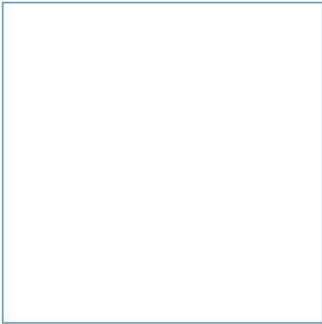
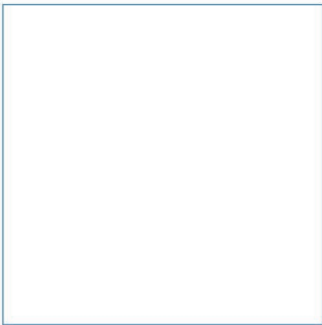
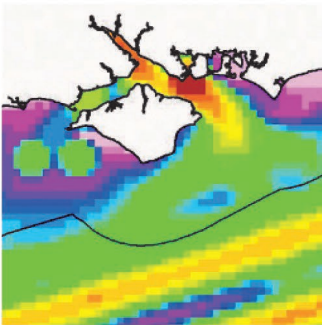
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**Marine Institute**

# **Spatial Data and Evidence Projects**

Project 2 – Data Prioritisation and Collection for Spatial Representation – Summary Report

May 2020



Innovative Thinking - Sustainable Solutions



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# Spatial Data and Evidence Projects

## Project 2 – Data Prioritisation and Collection for Spatial Representation – Summary Report



*Marine Institute*  
*Foras na Mara*



European Union  
European Maritime and Fisheries Fund

May 2020





**MERC Consultants**  
environmental and conservation services



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# Executive Summary

ABPmer and its project partners were appointed by the Marine Institute to deliver Spatial Data and Evidence Projects to support the development of Ireland's first marine spatial plan. The projects were funded through the European Maritime and Fisheries Fund (EMFF). This report relates to Project 2 Data Prioritisation and Collection for Spatial Representation, which follows on from Project 1 Data Discovery, Collation and Gap Analysis for Spatial Representation. The specific objectives for the project comprised:

- Prioritising data needs (data gaps identified in Project 1).
- Developing recommendations on how the data gaps could be filled, including recommendations in relation to practicalities and costs.
- Carrying out data collection and data processing to produce spatial data layers to fill the agreed priority data gaps (including mapping activities, species, ecosystems and resources).

This report summarises the data products developed under this project, and also highlights where data products have been initiated but have not been able to be completed due to missing data or lack of licensing agreements for publication of the data obtained. These issues can be followed up in due course by the Marine Institute.

A total of 840 data gaps for marine spatial planning data needs were identified (606 for which no information was available, and 234 for which only partial information was available), based on the data available on the Marine Institute's Marine Atlas as of September 2018. Of these, 175 were considered to be high or medium priority, and Roadmaps to fill these gaps were developed. A further prioritisation of these was carried out, and under Project 2, 115 data products were prioritised to be taken forward. Of these, 98 plus 2 additional ones, were completed, and 17 were not completed (mostly due to data not being available). Of those that were completed, 26 still have licence issues outstanding which will need to be resolved before the data layers can be made publicly available.

A number of additional maps and data products were developed to support the production of the Draft National Marine Plan Framework.

In addition, a large number of 'Roadmaps' were developed, which detail the steps needed to create data products to fill data gaps identified in project 1. Not all of these were able to be progressed within this project, due to budget and time constraints. Together, they provide a package of information that will assist the Marine Institute in identifying future projects and developing further data products to support the marine spatial planning process.

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# 1 Introduction

## 1.1 Background

ABPmer and its project partners were appointed by the Marine Institute to deliver Spatial Data and Evidence Projects to support the development of Ireland's first marine spatial plan. The projects were funded through the European Maritime and Fisheries Fund (EMFF).

Marine Spatial Planning (MSP) has been identified as an important process for supporting the sustainable development of Ireland's seas. The development of an overarching national marine spatial plan is identified as a Government policy objective in Ireland's Integrated Marine Plan as set out in Harnessing Our Ocean Wealth (HOOW) (Inter-Departmental Marine Coordination Group, 2012). The Maritime Spatial Planning Directive (2014/89/EU) also requires Member States to develop and implement marine spatial plans covering marine water under their jurisdiction by 2021. Ireland has transposed the Directive through Part 5 of the Planning and Development (Amendment) Act 2018.

Under the Act, The Department of Housing, Planning and Local Government (DHPLG) is the competent authority responsible for preparing Ireland's first marine spatial plan. In December 2017, the Department published a roadmap for the development of the Plan (DHPLG, 2017). Four broad stages for the development of the plan were envisaged:

- Stage 1 – Activation Stage: establishing the MSP function within DHPLG and initial engagement with stakeholders (to end of 2017);
- Stage 2 – Development Stage: development of evidence base, publication of evidence and issues report for public consultation, development and testing of plan options and publication of a draft Plan (to end of September 2019);
- Stage 3 – Finalisation Stage: consideration, approval and publication of Plan (to end September 2020); and
- Stage 4 – Plan Implementation Stage: implementation, review and iterative development of the Plan (end of 2020 onwards).

DHPLG published the National Marine Planning Framework Baseline Report on 18 September 2018 (DHPLG, 2018), setting out the policy, legislative and regulatory context, the existing sectoral development situation, potential high level objectives, and consultation questions for consideration.

The Draft National Marine Planning Framework was published on 12 November 2019 for consultation (DHPLG, 2019). The framework sets out planning objectives and policies relating to sixteen different sectors/activities including: offshore renewable energy (and other energy sectors); fisheries; ports, harbours and shipping; safety at sea; sport and recreation; tourism; and telecommunications. The plan enhances national climate action through support for offshore renewable energy and provides greater protection of marine resources amidst increasing environmental pressure on Ireland's maritime area.

A high-level Inter-Departmental Group (IDG) was established to lead and oversee the development of the Plan. An Advisory Group was also established to ensure participation of relevant non-governmental organisations, professional bodies and technical experts in the process. The Marine Institute has a key support role in relation to technical and scientific input into the development of the Plan, supporting the proposed organisational structures and supporting the process of preparing the Plan.

This report is prepared under one of a number of Spatial Data and Evidence Projects supporting the development of the Plan:

1. Data Discovery, Collation and Gap Analysis for Spatial Representation;
2. Data Prioritisation and Collection for Spatial Representation;
3. Assess and Map Marine Ecosystems Services;
4. Mapping the Potential Impacts of Climate Change; and
5. Best Practice on Modelling and Support Tools for Integrating Marine Spatial Data for Scientific and Technical Advisory Services.

This report relates to Project 2, Data Prioritisation and Collection for Spatial Representation, which follows on from Project 1 — Data Discovery, Collation and Gap Analysis for Spatial Representation.

## 1.2 Project 2 objectives

Project 2 has prioritised the data gaps that were identified in Project 1 and collected data and compiled maps for use in support of MSP for priority topics.

Existing spatial, environmental, socio-economic data, from Ireland's Marine Atlas, the Digital Ocean, national agencies, ISDE, European databases, ICES, OSPAR data sources and national data sets from other countries were identified, collated and assessed under Project 1. A comprehensive data gap analysis was then undertaken, based on international best practice in MSP. This is set out in Figure 1.

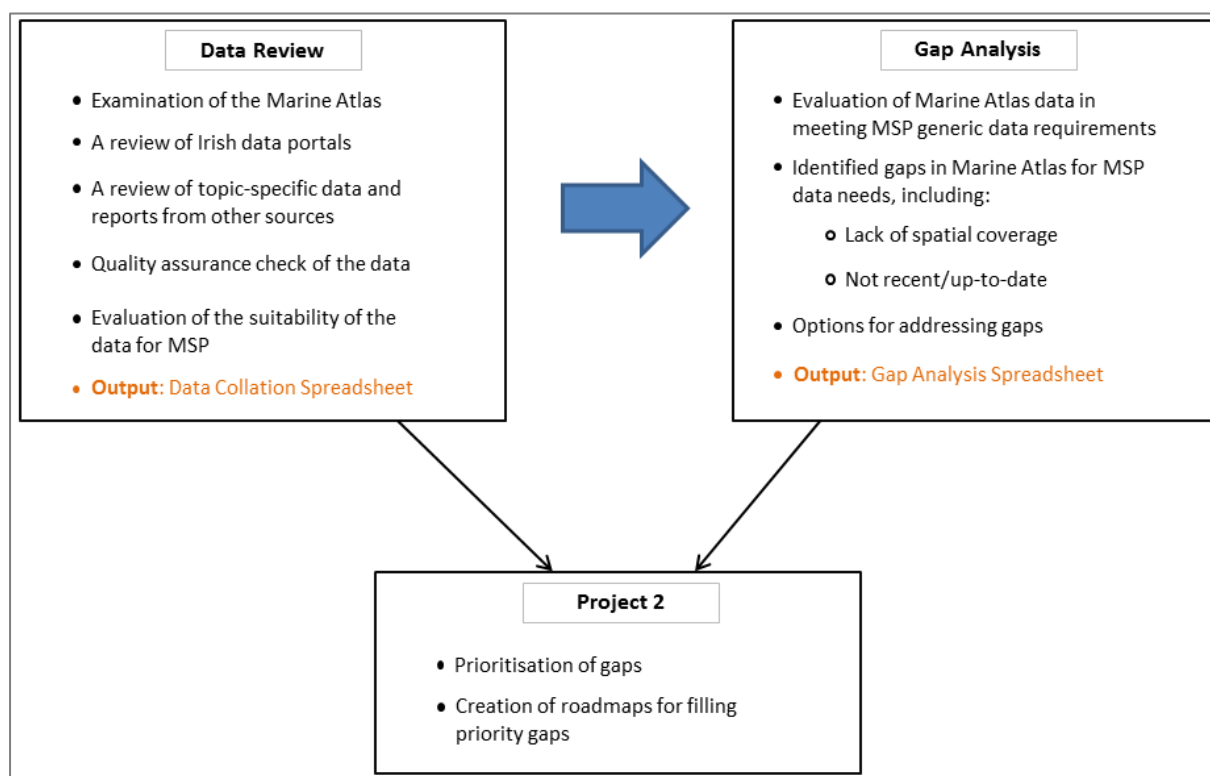


Figure 1. Overview of Methodology for the Data Review and Gap Analysis

The specific objectives for Project 2 were to:

- Prioritise data needs (data gaps identified in Project 1).
- Develop recommendations on how the data gaps could be filled including recommendations on practicalities and costs.
- Carry out data collection and data processing to produce spatial data layers to fill the agreed priority data gaps (which may include mapping activities, species, ecosystems and resources).

This report summarises:

- the prioritised data needs for MSP, based on the outcomes of the gap analysis;
- the 'Roadmaps' developed, which set out the steps for addressing the prioritised data needs;
- the prioritised Roadmaps which were taken forward under the project, to collate and process data to develop new data products; and
- the status of those data products and any further follow-up required to finalise outstanding data products beyond the lifetime of the project.

## 2 Prioritised Data Needs for MSP

### 2.1 Introduction

There is no absolute list of information requirements for MSP but different national MSP processes generally use similar types of information (European Commission, 2016). Information requirements will also be dictated by the level of detail that MSP is seeking to achieve. For example, plans that are seeking to promote more prescriptive spatial policies are likely to require greater levels of evidence to underpin such policies and achieve stakeholder support (MSPP Consortium, 2006).

In the absence of an absolute list of data requirements, the project team has taken forward the task drawing on its experience of spatial data and evidence processes for other marine plans and the generic checklist provided in European Commission (2016). MSP is explicitly spatial and temporal process and therefore needs to be supported by data that is both spatial and temporal.

This study has focused on gaps in relation to broad generic data product/data layer requirements (Table 1) to support MSP, recognising that additional evidence can be collected through the course of the MSP process where this is necessary to address specific future requirements. The relevant data requirements vary by the topic type (e.g. whether relating to biological or environmental aspects, or human activities), and are modified according to the specifics of each topic.

**Table 1. Generic MSP Data Requirements**

Data Category	Generic Data Requirement
Administrative and Physical Boundaries	<ul style="list-style-type: none"> <li>Spatial representation of relevant boundary/unit (e.g. maritime limits, Local Authority boundaries, MSP assessment area)</li> </ul>
Physical environment	<ul style="list-style-type: none"> <li>Current spatial distribution and characteristics of physical feature (e.g. wave height, contaminant concentration etc)</li> <li>Potential future spatial distribution and characteristics of physical features (where relevant) <sup>1</sup></li> </ul>
Biological Environment	<ul style="list-style-type: none"> <li>Historic spatial distribution of feature</li> <li>Current spatial distribution and/or abundance/intensity of feature</li> <li>Spatial information on current ecological function (e.g. foraging, nursery, breeding, migration route etc) – relevant to mobile features (fish, birds, mammals, reptiles)</li> <li>Potential future spatial distribution of feature</li> <li>Administrative boundary for biological feature</li> </ul>
Environmental Quality (e.g. assessments of the state of the environment, human pressures)	<ul style="list-style-type: none"> <li>Administrative or management boundary (e.g. assessment areas)</li> <li>Historic quality status</li> <li>Current quality status</li> <li>Potential future quality status</li> </ul>

<sup>1</sup> Physical features are unlikely to change significantly over the time period of a marine plan. The value of seeking to create data products/data layers for future time periods is considered to be limited and thus likely to score low in any prioritisation process. However, this element has been included in the gap analysis for the majority of physical environment features for completeness.

Data Category	Generic Data Requirement
Human Environment	<ul style="list-style-type: none"> <li>▪ Historic spatial distribution/location and/or intensity of activity (last 10 years)</li> <li>▪ Current spatial distribution of resource</li> <li>▪ Current spatial distribution/location and intensity of activity</li> <li>▪ Potential future spatial distribution of resource (next 20 years)</li> <li>▪ Potential future spatial distribution/location and intensity of activity (next 20 years)</li> <li>▪ Activity specific administrative boundary (e.g. fishing closed areas)</li> <li>▪ Data/spatial data on historic value of activity (last 10 years)</li> <li>▪ Data/spatial data on current value of activity</li> <li>▪ Data/spatial data on potential future value of activity (next 20 years)</li> </ul>

The gap analysis, undertaken in September 2018, assessed whether information was **currently available on the Marine Atlas** and suitable for use in its current form. 'Partial' was used to describe situations where data were available on the Marine Atlas but were spatially incomplete or out-of-date and required updating. A summary of the gap analysis by topic is provided in Table 2. For full details see the Project 1 report. Options for addressing gaps and 'partial' gaps were developed, together with an estimate of the cost of obtaining data and producing suitable data products.

**Table 2. Summary of gap analysis findings by topic**

MSP Topic	Number of MSP requirements for which layers exist on the Marine Atlas			Comment
	Yes	Partial	No	
<b>Administrative Boundaries</b>				
Administrative and physical boundaries	59		2	Data on Atlas almost complete. Gaps can be readily filled.
<b>Physical Environment</b>				
Geology		13		Incomplete coverage of Irish waters. Filling gaps entails significant costs.
Seabed sediments		2		Only partial coverage and coarse resolution. Can be improved with processing of existing data.
Ocean process features	8	20		Atlas has some data on spatial distribution of some features, but other features require significant investment to fill gaps.
<b>Biological Environment</b>				
Benthic habitats and species	5	36	19	Some data on Atlas but gaps entail significant costs to fill through field-based surveys and processing of existing data.
Fish and shellfish	5	46	30	Existing data on administrative boundaries. Atlas data are incomplete for most species. Most can be updated from existing sources.
Marine mammals	1	44	53	Existing Atlas data is incomplete, should be updated with existing data from other sources/surveys.
Birds	1	1	21	Significant gaps exist, but much relevant data is held by other agencies.
Reptiles			16	No data on the Atlas, layers can be created from NPWS data at relatively low cost.
Terrestrial habitats	1	8		Data exist on land cover classification; gaps can be addressed at relatively low cost.
Natural capital and ecosystem services	9	16	24	Some data exist on distribution of habitats, energy resources and some infrastructure. Significant gaps exist, can be addressed through project 3.

MSP Topic	Number of MSP requirements for which layers exist on the Marine Atlas			Comment
	Yes	Partial	No	
<b>Environmental Quality</b>				
Water quality	7		17	Data exist on boundaries and WFD quality status. Additional data could be sourced from other agencies
Marine litter			6	Data can be sourced from Coastwatch or MI/OSPAR, but further investment in surveys to fill gaps is needed.
Other human pressures			31	No data on Atlas on pressures, but many could be sourced from existing data with some processing required.
<b>Human Environment</b>				
Aquaculture	4		21	Atlas contains information on boundaries and current spatial distribution. Gaps on resource, historic and future distribution and value.
Aviation			4	Information can be sourced from IAA.
Coast and flood defences			6	No data on Atlas, some can be sourced from OPW. Information on coastal defence assets would need significant effort.
Cultural heritage and assets		1	21	Data on Atlas relate to wrecks. Additional data can be sourced, new data on palaeolandscapes needed. Other aspects better addressed through tourism/recreation.
Defence and national security			5	No data on the Atlas, spatial data can be filled from other sources, information on value would require more processing.
Energy (Petroleum, renewables, transmission systems)	9	20	36	Some layers exist, most gaps can be filled from data from other sources at relatively low cost.
Energy – Carbon capture and storage			3	Spatial information can be sourced from SEIA (2008). Value would require assumptions.
Fisheries and shellfisheries	9	4	38	Existing layers relate to admin boundaries. Layers on activity need updating; some gaps can be filled from processing existing data, others would require new data collection.
Infrastructure – Land-side (Roads, rail, urban development, utilities)		2	28	Significant data gaps but most can be filled from existing sources, albeit with some processing required.
Infrastructure – Other marine	4			Layers available for current distribution.
Marine aggregates		2	4	Filling the data gap on distribution of marine aggregate resource is likely to entail significant effort.
Ports, harbours and shipping	2	8	15	Need for updating and improving some existing layers, additional layers needed on various topics by processing existing sources.
Seascape			2	No layers on Atlas but seascape/landscape character assessments available from county councils. National assessment needed.
Seaweed harvesting			8	Some gaps can be readily filled from existing data, information on current distribution of resource, and future activity would cost more.
Social and economic factors			6	No layers currently on Atlas but could be created from existing sources. Future layers would require assumptions.
Telecommunications		3	3	Need to refine existing layers, could create layers on value (replacement cost).
Tourism, sport and recreation		2	178	Some gaps can be filled from existing sources, but significant primary data collection required for others.
Wastewater treatment and disposal	3	6	9	Layers exist on current distribution of facilities, and could be created for historic, future and value.
<b>Key</b>				
	Data on the Marine Atlas are broadly complete and sufficient			
	Marine Atlas has some information, but further improvements and additions are desirable			
	Data substantially lacking from the Marine Atlas			

## 2.2 Prioritisation of data gaps

The gaps identified under Project 1 were prioritised as high, medium or low, according to the following broad criteria:

- High:
  - current and potential future distribution/intensity of principal human activities;
  - important spatial boundary or management area.
- Medium:
  - current distribution/intensity of more minor human activities;
  - less important spatial boundary or management area;
  - current distribution of fish, birds, marine mammals;
  - important physical or social features.
- Low:
  - future distribution/intensity of more minor human activities;
  - historic distribution of infrastructure, rights/leases, activities;
  - current distribution of reptiles and terrestrial habitats;
  - future distribution of fish, birds, marine mammals, reptiles and terrestrial habitats;
  - less important physical or social features.

The assigned priorities were then reviewed at workshops with MI. Priority data products/data layers to be taken forward for development were agreed with MI taking account of other existing/ planned data projects. For example, a seascape data product was not progressed in this study because another project was planned to take this forward.

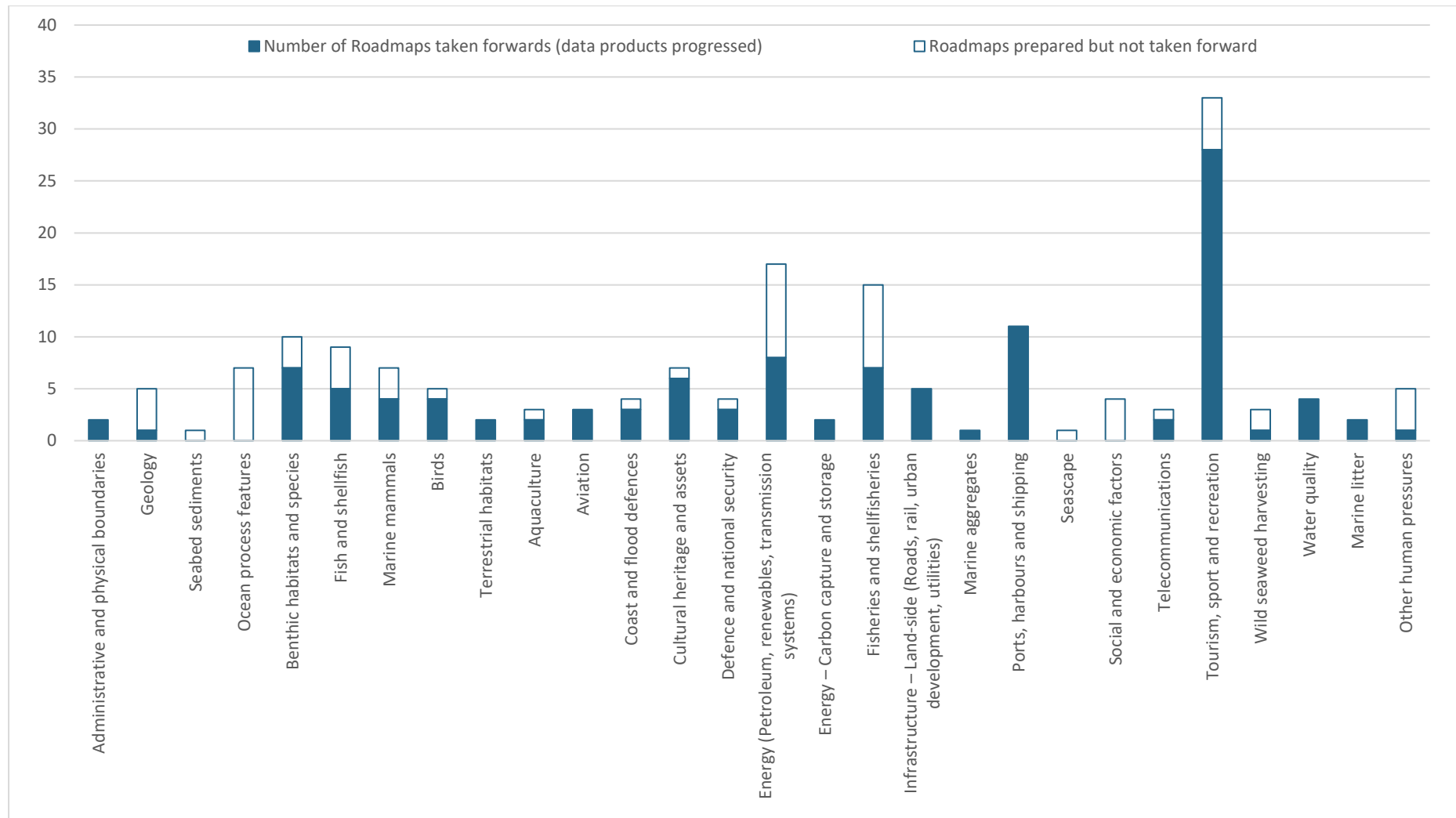
## 2.3 Development of roadmaps

Detailed 'Roadmaps' were developed for the high and medium priority data gaps, which set out the steps of the work and costs to develop suitable data products. A total of 174 Roadmaps were prepared, of which 114 were identified to be taken forward under Project 2. The distribution of Roadmaps prepared and taken forward, by topic, is shown in Figure 2.

A full list of the Roadmaps developed, by topic and priority, and the reasons for taking forward each one – or not – is provided in Appendix A.

The full Roadmaps are provided in Appendix B.

When Data Products were developed from the Roadmaps, in some cases the data available, and/or steps undertaken in data processing differed from those set out in the original Roadmaps. The datasets used in the development of the Data Products, and the data processing steps undertaken, are recorded in the Data Processing Logs and Data Provenance Sheets that accompany each Data Product.



**Figure 2. Number of Roadmaps prepared, and number taken forward under Project 2**

Note: Not all roadmaps taken forward resulted in completed data products, due to lack of data or licences – see Section 3 and Table 3.

## 3 Development of Data Products

### 3.1 Process for data product development

Roadmaps developed to guide the creation of data products were used to identify the source data and methods for each data product. Data requests were made to data owners for access to the source datasets, along with requests for permission for use, licensing (where applicable), and information to support the completion of the data product metadata (provenance sheet).

Entries were recorded in a data registry on receipt of datasets from providers. The name, date of receipt, and data provider details were recorded along with a unique identifier (ID) that was assigned to each data source. The ID was appended to the filename of the source data to provide a clear reference to track the use of source data during the creation of the data products.

The source datasets were stored in a project data repository containing a folder for each data provider. This folder also held any correspondence with the data provider and a copy of any licence agreements. Unique identifiers were also generated for the data products to assist in the data management tasks. Individual folders were created as a workspace for each data product. The folder names were tagged with the relevant data product ID. The folder contained the data product roadmap, source datasets, map document, geodatabase, processing log, licences, and provenance, and final data product shapefiles.

The provenance sheet provides a record of the metadata for each data product. This includes details of the data provider, purpose and abstract statements, licensing information and associated permissions for viewing and download, and other details such as file format and spatial reference system. A statement details any lineage from the data provider and any subsequent processes conducted during the creation of the data product. The provenance sheet also captures update frequency and the date last accessed. The British Oceanographic Data Centre (BODC) parameter usage vocabulary is also recorded at the P01 level where available. A description of parameters is included where BODC vocabulary is lacking.

Details of the Provenance Sheet are provided in Appendix C.

Data products, including the provenance sheets and data processing logs, were uploaded to Github for review by the MI Data Team. At the end of the project, not all data products had been reviewed by MI; this is recorded in Table 3.

The finalised data product shapefiles were stored within each data product workspace before being packaged for delivery.

### 3.2 Status of data products

In total, 115 data products were taken forward under the project. These required data to be sourced, and licence permissions to be obtained. Additional data products for the current location of licensed aquaculture sites, and technical resource areas for wind energy were also created, taking the total to 117. Of these, 100 data products were prepared. Lack of data availability meant that the remaining 17 could not be prepared.

In total, 74 data products were developed and completed. 26 data products were prepared, but require some further follow-up to confirm licensing permissions. 17 data products were not progressed due to a lack of data available, or lack of permission to use/publish the data.

In some cases, despite numerous attempts, it was not possible to source the data to create products. Where the data exist, these should be followed up after the project.

A summary of the status of the Data Products is provided in Table 3. This also highlights any outstanding issues for individual data products.

## 4 Knowledge Transfer

Knowledge transfer is an important part of the project and there have been regular meetings and updates between the GIS team from ABPmer and the Data Management Team at the Marine Institute. These have served to coordinate and agree details of the Provenance Sheet (Appendix C), coordinate upload of data products to the GitHub repository, and address comments. In addition, there have been visits by project team members to work at MI to follow up data contacts and obtain data, and to coordinate data processing and metadata aspects.

A final knowledge transfer event has been planned to provide a training session on relevant aspects of Project 1 (Data collation, review and gap analysis) and Project 2 (this project), including:

- Definition of types of data needed for MSP purposes;
- Assessment of suitability of data for MSP purposes;
- Details on data sources and processing of specific data products; and
- State-of-play of the data products and outstanding issues to follow up (recorded in this report and an accompanying spreadsheet).

This was originally planned as an in-person meeting in MI, but due to COVID-19 travel restrictions, this was changed to video conferencing.

Table 3. Summary of data product status and outstanding issues to follow up

MSP Topic	Data Product / Roadmap Name	Data Product ID	Data Product Complete?	Licence in Place?	Comments (i.e. follow up licence permissions, chase additional data sources)
Administrative and Physical Boundaries	Ramsar Site Boundaries	DPT001	✓	✓	
Geology	Geological sites	DPT003	✓	✓	
Benthic habitats and species	Broad-scale habitat	DPT016	✓	✓	
	Reefs	DPT017	✓		Share data product with NPWS and confirm licence information
	Distribution of mudflats and sandflats	DPT018	✓		Share data product with NPWS and confirm licence information
	Distribution of sea cave habitats	DPT019	✓		Share data product with NPWS and confirm licence information
	Coral gardens, <i>Lophelia pertusa</i> Reefs and Carbonate mounds	DPT020	✓	(✓)	Need licence for MI-provided data on <i>Lophelia pertusa</i> and Carbonate mounds. Potential to follow up additional coral gardens data (NUIG).
	<i>Sabellaria spinulosa</i> reefs	DPT021	✓		Share data product with NPWS and confirm licence information
	Distribution of <i>Zostera</i> , Maerl and Sea-Pen & Burrowing Megafauna Communities	DPT022	✓		Share data product with NPWS and confirm licence information
Fish & Shellfish	Map of SACs for which designation includes fish features	DPT025	✓	✓	Requires MI review*. Licence not required
	Current distribution of migratory fish	DPT028	✓	✓	Requires MI review
	Current distribution and abundance of basking shark	DPT030	✓	✓	
	Location of key shellfish beds	DPT032	✓	✓	Requires MI review. Partial figure created with available data. Follow up additional data from shellfish surveys
	Location of scallop habitat	DPT033	✓	✓	Note, data only available for areas that were surveyed

MSP Topic	Data Product / Roadmap Name	Data Product ID	Data Product Complete?	Licence in Place?	Comments (i.e. follow up licence permissions, chase additional data sources)
Marine mammals	Current distribution and abundance of key cetacean species	DPT034	✓	✓	Requires MI review
	Current distribution and abundance of seals	DPT036	✓	✓	Requires MI review
	Management units for cetaceans	DPT039	✓	✓	Requires MI review
	Management units for seals	DPT040	No		No management units for seals in Ireland have been agreed
Birds	National inventory of breeding seabird sites	DPT041	✓	✓	Requires MI review
	Seabird colony foraging areas	DPT042	✓	✓	Requires MI review
	Tern foraging areas	DPT043	✓	✓	Requires MI review
	Winter and summer seabird distributions in Irish waters	DPT044	✓	✓	Requires MI review
Terrestrial habitats	Sand dune	DPT046	✓	✓	
	Vegetated sea cliff	DPT047	✓	✓	
Aquaculture	Current distribution of aquaculture sites	DPT175	✓	(✓)	Provenance indicates no licence required but this needs checking
	Potential future spatial distribution/location and intensity of aquaculture activity	DPT050	No		Not permitted to show licence application areas due to commercial sensitivity
Aviation	Airport control areas	DPT051	✓		Follow up licence with IAA
	Airport control zones	DPT052	✓		Follow up licence with IAA
	Helicopter main routes	DPT053	No		No data available
Carbon Capture & Storage (CCS)	Current spatial distribution of CCS resource	DPT054	✓	✓	Check PAD licence details
	Potential future distribution/location and intensity of CCS activity	DPT055	✓	✓	Check PAD licence details
Coastal & Flood Defences	Current coastal flood risk	DPT056	✓		Awaiting licence agreement from OPW
	Future coastal flood risk	DPT057	✓		Awaiting licence agreement from OPW
	Coastal erosion	DPT058	✓		Awaiting licence agreement from OPW

MSP Topic	Data Product / Roadmap Name	Data Product ID	Data Product Complete?	Licence in Place?	Comments (i.e. follow up licence permissions, chase additional data sources)
Cultural Heritage	World Heritage Sites	DPT060	✓	(✓)	Provenance indicates no licence needed
	Wreck extents	DPT061	✓	✓	
	Value of World Heritage Sites	DPT062	✓	(✓)	Provenance indicates no licence needed for one of the two layers
	Value of Wrecks	DPT063	✓	✓	
	Terrestrial heritage extents	DPT064	✓	✓	Provenance indicates licence either CC or 'n/a' depending on layer.
	Value of terrestrial heritage assets	DPT065	✓	✓	
Defence	Location of danger areas	DPT067	✓		Follow up licence with IAA
	Intensity of danger areas	DPT068	No		No data available on intensity
	Location of naval bases	DPT069	✓	✓	
Energy	Power interconnectors	DPT071	✓		MI to follow up KIS-ORCA licence
	Gas interconnectors	DPT072	✓	✓	Display resolution restriction
	Offshore windfarms	DPT073	✓	✓	Could be updated with polygon of fully commissioned windfarms from DPT079
	Coastal power stations	DPT074	✓	✓	
	Future Power Interconnectors	DPT075	✓	✓	
	Future offshore wind development	DPT079	✓	✓	
	Future tidal stream energy development	DPT084	✓	✓	
	Future wave energy development	DPT086	✓	✓	
	Future wind energy development	DPT176	✓	✓	Additional product, not in original list
Fisheries & Shellfisheries	Close areas/fisheries management areas	DPT088	✓	✓	No licence required. Add a disclaimer to the provenance that 'Data are for guidance purposes only and are not to be used for legal/enforcement purposes. Refer to the relevant national legislation and EU Regulations for full details.'
	Fishing rights in 6-12 NM zone	DPT091	✓	✓	No licence required. Add a disclaimer to the provenance that 'Data are for guidance purposes only and are not to be used for legal/enforcement purposes.'

MSP Topic	Data Product / Roadmap Name	Data Product ID	Data Product Complete?	Licence in Place?	Comments (i.e. follow up licence permissions, chase additional data sources)
					Refer to the relevant national legislation and EU Regulations for full details.'
	Fish and shellfish landings by port (tonnes)	DPT092	✓	✓	Data layers showing previous years' data could be developed but is lower priority than current/maintaining updated in the future
	Fish and shellfish landings by port (Euros)	DPT093	✓	✓	Data layers showing previous years' data could be developed but is lower priority than current/maintaining updated in the future
	Fishing vessels by port	DPT094	✓	✓	Data layers showing previous years' data could be developed but is lower priority than current/maintaining updated in the future
	Salmon fisheries – distribution	DPT099	✓	✓	
	Salmon fisheries – value	DPT100	✓	✓	
Landside Infrastructure	Electricity transmission network	DPT103	No		Data not obtained. MI sent data agreement to ESB on 09.09.19. Still awaiting DVD data issue from ESB.
	Gas distribution network	DPT104	No		Awaiting data release from GNI for land-side network. Follow up Kinsale and Corrib pipelines data.
	North South interconnector	DPT105	No		Unable to obtain shapefile. Follow up with ESB through data agreement and data release
	Rail network	DPT106	✓	✓	
	Road network	DPT107	✓	✓	
Marine Aggregates	Marine aggregate resources	DPT108	No		MI progressing
Ports & Shipping	Commercial shipping and recreational boating activity	DPT109	✓	✓	
	Location and intensity of port activity	DPT110	✓	✓	
	Navigation dredging	DPT111	No		No data available – MI pursue with UKHO
	Dredge disposal sites	DPT112	✓	✓	
	IMO Routeing Measures	DPT113	No		Follow up data/licence with UKHO
	Commercial anchorages	DPT114	No		Follow up data/licence with UKHO

MSP Topic	Data Product / Roadmap Name	Data Product ID	Data Product Complete?	Licence in Place?	Comments (i.e. follow up licence permissions, chase additional data sources)
	Navigation buoys	DPT115	No		Follow up data with CIL or UKHO
	Particularly Sensitive Sea Areas	DPT116	✓		Check original licence information from old MI Atlas
	Statutory Harbour Areas	DPT117	No		Follow up data/licence with UKHO, or licence information from Dept of Transport
	Maintained Navigation Channels	DPT118	No		Data not available on dredging areas. Follow up data/licence with UKHO
Telecommunications	Telecom Cables	DPT125	✓		Follow up MI KIS-ORCA licence to display data
	Future Telecom Cables	DPT126	✓		
Tourism & Recreation	Location and intensity of recreational angling	DPT128	✓	✓	<p>Note, available data only show location, not intensity. Some layers have licence or don't require licence. Where 'Licence Agreement' field has been created in the provenance sheet, this information should be moved to the 'Licence' field.</p> <p>Data products that use Wild Atlantic Way data need MI licence follow-up (cycling routes, general coastal tourism)</p> <p>Explore data from Failte Ireland for additional club/operator locations.</p> <p>Angling – explore data from Fisheries Ireland and Angling Council of Ireland.</p> <p>Kitesurfing – explore data from Maps.ie.</p> <p>Surfing – explore data from Maps.ie, Magic Seaweed, Failte Ireland.</p> <p>Climbing etc – explore data from Maps.ie and UK Climbing.</p> <p>General tourism – explore data from Failte Ireland on scenic driving routes.</p>
	Location and intensity of kite surfing	DPT129	✓	✓	
	Location and intensity of windsurfing	DPT130	✓	✓	
	Location and intensity of surfing	DPT131	✓	✓	
	Location and intensity of climbing/coasteering/bouldering	DPT132	✓	✓	
	Location and intensity of diving/snorkelling	DPT133	✓	✓	
	Location and intensity of recreational drone use	DPT134	✓	✓	
	Location and intensity of general beach leisure	DPT135	✓	✓	
	Location and intensity of general tourism	DPT136	✓	(✓)	
	Location and intensity of hovercrafting	DPT137	No data available		
	Location and intensity of coastal cycling	DPT138	✓	(✓)	
Location and intensity of coastal quad biking/scrambling	DPT139	✓	✓		

MSP Topic	Data Product / Roadmap Name	Data Product ID	Data Product Complete?	Licence in Place?	Comments (i.e. follow up licence permissions, chase additional data sources)
	Location and intensity of sand-yachting/land sailing/land-yachting	DPT140	✓	✓	
	Location and intensity of kite bugging	DPT141	✓	✓	
	Location and intensity of kite landboarding	DPT142	No data available		
	Location and intensity of coastal recreational light aircraft	DPT143	✓	✓	
	Location and intensity of motor/power boating	DPT144	✓	✓	
	Location and intensity of motorised sailing	DPT145	✓	✓	
	Location and intensity of wakeboarding/waterskiing	DPT146	✓	✓	
	Location and intensity of parascending	DPT147	✓	✓	
	Location and intensity of unmotorised sailing	DPT148	✓	✓	
	Location and intensity of kayaking	DPT149	✓	✓	
	Location and intensity of Canadian canoeing	DPT150	✓	✓	
	Location and intensity of stand-up paddleboarding	DPT151	✓	✓	
	Location and intensity of rowing/sculling	DPT152	✓	✓	
	Location and intensity of dinghy/dayboat/small keelboat sailing	DPT153	✓	✓	
Location and intensity of personal watercraft use	DPT154	✓	✓		

MSP Topic	Data Product / Roadmap Name	Data Product ID	Data Product Complete?	Licence in Place?	Comments (i.e. follow up licence permissions, chase additional data sources)
	Location and intensity of visitor attractions	DPT155	✓	✓	
	Location and intensity of coastal walking	DPT156	✓	(✓)	
	Location and intensity of wildlife/bird watching/wildfowling	DPT157	✓	✓	
	Location of marine recreational infrastructure	DPT158	✓	✓	
	Location of coastal tourism infrastructure	DPT159	✓	✓	
Wild seaweed harvesting	Location and intensity of wild seaweed harvesting	DPT161	✓	✓	Only includes commercial harvesting locations. Follow up private foreshore rights with PRA when available.
Water Quality	Bathing Water Quality	DPT164	✓	✓	
	Bivalve Mollusc Production Area Quality	DPT165	✓	✓	
	Shellfish Water Quality	DPT166	No		Not progressed – shellfish waters legislation subsumed within WFD
	Nutrient Sensitive Areas	DPT167	✓	(✓)	
Marine Litter	Coastal litter	DPT168	✓	✓	
	Seabed litter	DPT169	✓	✓	
Human Pressures	Seabed penetration and abrasion	DPT171	✓	✓	

'Data product completed' implies that the data have been obtained, processed and uploaded to Github, a processing log and provenance sheet have been completed. It may still require further follow up on licence permissions, and there may be additional data that could be obtained to further develop and improve the data product at a later date. These issues are captured in the 'Comments' column, with further details provided in a separate spreadsheet.

In the 'Licence in place?' column, '✓' means that the licence information is in place, or no licence is required; '(✓)' means that a licence is in place for some layers/data sources in the data products, but some layers/data sources still require licence information to be finalised.

\*'Requires MI review' means that the data product and provenance sheet uploaded to Github was pending review by MI Data Team at the end of the project.

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## 6 Abbreviations and Acronyms

ACI	Angling Council of Ireland
AI	Artificial Intelligence
AIS	Automatic Identification System
AMETS	Atlantic Marine Energy Test Site
API	Application Programming Interface
BGS	British Geological Survey
BIM	Bord Iascaigh Mhara
BODC	British Oceanographic Data Centre
BRITICE	British-Irish Ice Sheet - Glacial Mapping Project
BSA	Biologically Sensitive Area
BTS	Beam Trawl Surveys
CABI	Centre of Agriculture and Biosciences International
CAD	Computer Aided Design
CC	Creative Commons
CCS	Carbon Capture and Storage
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CFP	Common Fisheries Policy
CFR	Community Fleet Register
CIL	Commissioners Of Irish Lights
CODA	Cetacean Offshore Distribution & Abundance in the European Atlantic
CORINE	Coordination of Information on the Environment
COVID-19	Corona Virus Disease 2019
CSO	Central Statistics Office
CTD	Conductivity, Temperature and Density
DAFM	Department of Agriculture, Food and the Marine
DCCAE	Department of Communications, Climate Action & Environment
DCENR	Department of Communications, Energy & Natural Resources
DCHG	Department of Culture, Heritage and the Gaeltacht
Defra	Department for Environment, Food and Rural Affairs
DG	Directorate General
DHI	Danish Hydration Institute
DHPLG	Department of Housing, Planning and Local Government
DMSP	Defence Meteorological Satellite Program
DOI	Digital Object Identifier
DTM	Digital Terrain Model
DVD	Digital Video Disc
EC	European Commission
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EMFF	European Maritime and Fisheries Fund
EMODnet	European Marine Observation and Data Network
EPA	Environmental Protection Agency
EPSC	European Petroleum Survey Group
ERSEM	European Regional Seas Ecosystem Model
ESAS	European Seabirds At Sea
ESB	Electricity Supply Board
EU	European Union
GDPR	General Data Protection Regulation

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GEBCO	General Bathymetric Chart of the Oceans
GFS	Ground Fish Surveys
GIS	Geographic Information System
GLM	Generalized Linear Model
GMIT	Galway-Mayo Institute of Technology
GNI	Gas Networks Ireland
GPS	Global Positioning System
GSI	Geological Survey of Ireland
GSM	Global System for Mobile Communications
GT	Gross Tonnage
GVA	Gross Value Added
HD	High Definition
HOOW	Harnessing our Ocean Wealth
IA	Intermediate Assessment
IAA	Irish Aviation Authority
IAMMWG	Inter-Agency Marine Mammal Working Group
IAS	Invasive Alien Species
ICC	Irish Cruising Club
ICES	International Council for the Exploration of the Sea
ICPSS	Irish Coastal Protection Strategy Study
ID	Identifier
IDG	Inter-Departmental Group
IFC	Ireland-France Subsea Cable
IFI	Inland Fisheries Ireland
IGFS	Irish Groundfish Surveys
IHLS	International Herring Larval Survey
IMAGIN	Irish Sea Marine Aggregates Initiative
IMDO	Irish Maritime Development Office
IMO	International Maritime Organization
Infomar	Integrated Mapping For the Sustainable Development of Ireland's Marine Resource
INNS	Invasive Non-Native Species
INSPIRE	Infrastructure for Spatial Information in Europe
ISCOPE	Irish Scheme for Cetacean Observation and Public Education
ISDE	Irish Spatial Data Exchange
ISKA	Irish Sea Kayaking Association
IWDG	Irish Whale and Dolphin Group
JNCC	Joint Nature Conservation Committee
KIS-ORCA	The Kingfisher Information Service - Offshore Renewable Cable Awareness
LiDAR	Light Detection and Ranging
LPG	Liquefied Petroleum Gas
MaREI	Marine and Renewable Energy, Environmental Research Institute
MCA	Marine character areas
MCZ	Marine Conservation Zone
MHWS	Mean High Water Springs
MI	Marine Institute
MIDA	Marine Irish Digital Atlas
MMO	Marine Management Organisation
MMSI	Maritime Mobile Service Identity
MODIS	Moderate Resolution Imaging Spectroradiometer
MS	Magic Seaweed
MSFD	Marine Strategy Framework Directive
MSP	Marine Spatial Planning

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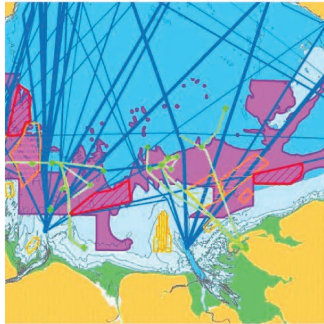
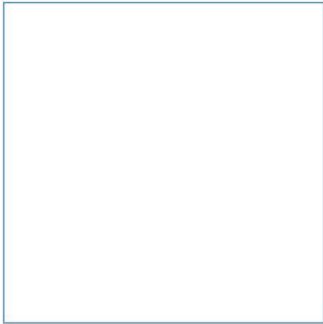
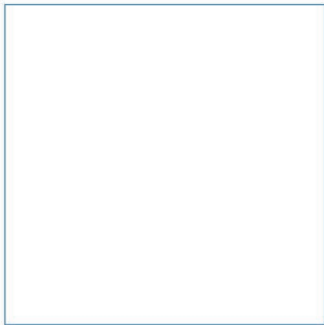
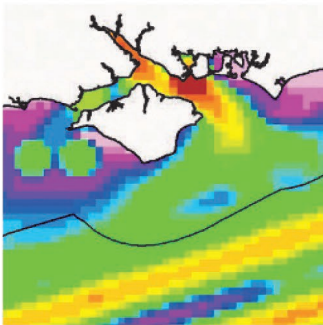
MSPP	Marine Spatial Planning Pilot
NACE	Statistical classification of economic activities in the European Community
NASA	National Aeronautics and Space Administration
NBDC	National Biodiversity Data Centre
NEMO	Nucleus for European Modelling of the Ocean
NEODAAS	NERC Earth Observation Data Acquisition and Analysis Service
NERC	Natural Environment Research Council
NEWS	Non-Estuarine Coastal Waterbird Survey
NIAH	National Inventory of Architectural Heritage
NM	Nautical Miles
NPWS	National Parks and Wildlife Service
NUI	National University of Ireland
NUIG	National University of Ireland Galway
ONS	Office for National Statistics
OPW	Office of Public Works
OREDP	Offshore Renewable Energy Development Plan
OSI	Ordnance Survey Ireland
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PAD	Petroleum Affairs Division
PRA	Property Registration Authority
preflab	Preferred Label
PSSA	Particularly Sensitive Sea Area
QUB	Queen's University Belfast
Ramsar	Wetlands of international importance, designated under The Convention on Wetlands (Ramsar, Iran, 1971)
RI	Rowing Ireland
RIB	Rigid Inflatable Boat
ROMS	Regional Ocean Modelling System
RP	Return Periods
RV	Research Vessel
SAC	Special Area of Conservation
SAM	Static Acoustic Monitoring
SCANS	Small Cetaceans in European Atlantic and North Sea
SCOS	Special Committee on Seals
SEA	Strategic Environmental Assessment
SEAI	Sustainable Energy Authority Ireland
SEIA	Social and Economic Impact Assessment
SEMURU	Socio-economic Marine Research Unit
SFPA	Sea-Fisheries Protection Authority
SIAR	Strategic Impact Assessment Report
SLR	Sea Level Rise
SMR	Sites and Monuments Record
SMRU	Sea Mammal Research Unit
SOG	Speed Over the Ground
SPA	Special Protection Area
SST	Sea Surface Temperature
SUP	Stand Up Paddleboarding
UCC	University College Cork
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UKTAG	UK Technical Advisory Group
UNESCO	United Nations Educational, Scientific and Cultural Organization

URL	Uniform Resource Locator
VIIRS	Visible Infrared Imaging Radiometer Suite
VMS	Vessel Monitoring System
WFD	Water Framework Directive
WFS	Web Feature Service
WHS	World Heritage Sites
WMS	Web Mapping Service

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

# Appendices



Innovative Thinking - Sustainable Solutions

# A Summary of Roadmaps and Data Products Progressed

A summary of all Roadmaps developed, by topic and priority, is provided in Table A1. This table also lists the data product identification number (e.g. DPT001), which was used to identify and track data products as they were developed.

An indication of which Roadmaps/data products were progressed within the project is also shown, with reasons why they were or were not progressed.

**Table A1. Roadmaps developed, by topic and priority, and data products progressed (those shaded in grey were not taken forward under the project)**

MSP Topic	Priority	Data Product / Roadmap Name	Data Product ID	Progressed?	Reasons
Administrative and Physical Boundaries	High	Ramsar Site Boundaries	DPT001	Yes	Quick win. In addition, 12 NM boundary, MSP assessment area and designated sites' boundaries were also verified
Geology	High	Bathymetry	DPT002	No	Infomar have data, MI consider potential to take forward
		Geological sites	DPT003	Yes	Quick win, data available
	Medium	Morphological features	DPT004	No	MI/Infomar consider potential to take forward
		Glacial process features	DPT005	No	
		Palaeo-landscapes	DPT006	No	
Ocean Features	High	Mean Annual Wave Height distribution	DPT007	No	MI Oceanographic services better placed to take forward – to be discussed
		Mean Annual Wave Period distribution	DPT008	No	
	Medium	Mean Tidal Amplitude distribution	DPT009	No	
		Ocean Fronts	DPT010	No	
		Sea temperature	DPT011	No	
		Sea salinity	DPT012	No	
		Suspended Particulate Matter	DPT013	No	
Seabed Sediments	High	Seabed sediment	DPT014	No	MI/Infomar consider potential to take forward
Benthic Habitats & Species	High	Subtidal sandbank	DPT015	No	MI/Infomar consider potential to take forward
		Broad-scale habitat	DPT016	Yes	Important
		Reefs	DPT017	Yes	Expected to be quick from Infomar data plus NPWS or ICES
		Distribution of mudflats and sandflats	DPT018	Yes	Improve available data
		Distribution of sea cave habitats	DPT019	Yes	
		Coral gardens, <i>Lophelia pertusa</i> Reefs and Carbonate mounds	DPT020	Yes	Possibility to use EMODnet data
		<i>Sabellaria spinulosa</i> reefs	DPT021	Yes	Base on existing data
		Distribution of <i>Zostera</i> , Maerl and Sea-Pen & Burrowing Megafauna Communities	DPT022	Yes	Bring together data sources

MSP Topic	Priority	Data Product / Roadmap Name	Data Product ID	Progressed?	Reasons
		Invasive alien species	DPT023	No	MI undertaking separate project on invasive species
	Medium	Distribution of key seaweed species	DPT024	No	MI undertaking separate project on key seaweed species
Fish & Shellfish	High	Map of SACs for which designation includes fish features	DPT025	Yes	
	Medium	Distribution and abundance of key commercial fish species	DPT026	No	Requires longer-term project and additional research, potential for MI fisheries to take forward
		Location of spawning and nursery areas for key commercial fish species	DPT027	No	Requires longer-term project and additional research, potential for MI fisheries to take forward
		Current distribution of migratory fish	DPT028	Yes	Should be possible if data available
		Current distribution and abundance of key elasmobranch species	DPT029	No	Requires longer-term project and additional research, potential for MI fisheries to take forward
		Current distribution and abundance of basking shark	DPT030	Yes	Should be possible if data available from IWDG
		Location of spawning and nursery areas for key elasmobranch species	DPT031	No	Requires longer-term project and additional research, potential for MI fisheries to take forward
		Location of key shellfish beds	DPT032	Yes	Should be possible if data available from BIM
		Location of scallop habitat	DPT033	Yes	
Marine mammals	Medium	Current distribution and abundance of key cetacean species	DPT034	Yes	Additional data available that should be incorporated
		Functional use of areas by key cetacean species	DPT035	No	Out-of-scope
		Current distribution and abundance of seals	DPT036	Yes	Additional data available that should be incorporated
		Functional use of areas by seals	DPT037	No	Potential for MI to take forward internally
		Current distribution and abundance of otter	DPT038	No	Lower priority

MSP Topic	Priority	Data Product / Roadmap Name	Data Product ID	Progressed?	Reasons
		Management Units for cetaceans	DPT039	Yes	
		Management units for seals	DPT040	Yes	
Birds	Medium	National inventory of breeding seabird sites	DPT041	Yes	Important – need to improve available data
		Seabird colony foraging areas	DPT042	Yes	Important – need to improve available data
		Tern foraging areas	DPT043	Yes	Important – need to improve available data
		Winter and summer seabird distributions in Irish waters	DPT044	Yes	Important – need to improve available data
		Key areas for seabirds in the Irish Sea	DPT045	No	Longer-term, lower priority than other bird layers
Terrestrial habitats	Medium	Sand dune	DPT046	Yes	Identify best data source – several available
		Vegetated sea cliff	DPT047	Yes	Identify best data source – several available
Aquaculture	Medium	Current spatial distribution of aquaculture resources	DPT048	No	MI have been doing some work on potential areas for aquaculture
	n/a	Current distribution of aquaculture sites	DPT175	Yes	Update existing Atlas layer
	Medium	Current value of aquaculture	DPT049	No	SEMRU/MI Socio-economics potential to take forward separately
		Potential future spatial distribution/location and intensity of aquaculture activity	DPT050	Yes	Important for planning
Aviation	High	Airport control areas	DPT051	Yes	
		Airport control zones	DPT052	Yes	
		Helicopter main routes	DPT053	Yes	
Carbon Capture & Storage	High	Current spatial distribution of CCS resource	DPT054	Yes	
	Medium	Potential future distribution/location and intensity of CCS activity	DPT055	Yes	
Coastal & Flood Defences	High	Current coastal flood risk	DPT056	Yes	
		Future coastal flood risk	DPT057	Yes	
	Medium	Coastal erosion	DPT058	Yes	
		Coastal and flood defences	DPT059	No	Longer-term, consider separately
Cultural Heritage	High	World Heritage Sites	DPT060	Yes	Potential quick win
		Wreck extents	DPT061	Yes	Identify best data source – several available
	Medium	Value of World Heritage Sites	DPT062	Yes	

MSP Topic	Priority	Data Product / Roadmap Name	Data Product ID	Progressed?	Reasons
		Value of Wrecks	DPT063	Yes	
		Terrestrial heritage extents	DPT064	Yes	Potential quick win
		Value of terrestrial heritage assets	DPT065	Yes	
		Paleo-landscapes	DPT066	No	See Geology
Defence	High	Location of danger areas	DPT067	Yes	Important aspect for planning
		Intensity of danger areas	DPT068	Yes	
		Location of naval bases	DPT069	Yes	Important aspect for planning
	Medium	Value of naval bases	DPT070	No	Value is bigger topic than current project can undertake – SEMRU/MI Socio-economics to consider separately
Energy	High	Power interconnectors	DPT071	Yes	Important infrastructure, DHPLG priority issue
		Gas interconnectors	DPT072	Yes	Important infrastructure, DHPLG priority issue
		Offshore windfarms	DPT073	Yes	Important infrastructure, DHPLG priority issue
	Medium	Coastal power stations	DPT074	Yes	Important infrastructure, DHPLG priority issue
		Future Power Interconnectors	DPT075	Yes	Important for planning
		Value of power interconnectors	DPT076	No	Value is bigger topic than current project can undertake – SEMRU/MI Socio-economics to consider separately
		Future gas interconnectors	DPT077	No	None planned
		Value of gas interconnectors	DPT078	No	Value is bigger topic than current project can undertake – SEMRU/MI Socio-economics to consider separately
		Future offshore wind development	DPT079	Yes	Important for planning, DHPLG priority issue
		Value of offshore windfarms	DPT080	No	Value is bigger topic than current project can undertake – SEMRU/MI Socio-economics to consider separately
		Future oil and gas development	DPT081	No	No new production facilities planned
		Value of oil and gas	DPT082	No	Value is bigger topic than current project can undertake – SEMRU/MI Socio-economics to consider separately
		Tidal range energy resources	DPT083	No	Would need to be created from MI model,

MSP Topic	Priority	Data Product / Roadmap Name	Data Product ID	Progressed?	Reasons
					Oceanographic services to consider separately
		Future tidal stream energy development	DPT084	Yes	Important for planning, DHPLG priority issue
		Value of tidal stream energy	DPT085	No	Value is bigger topic than current project can undertake – SEMRU/MI Socio-economics to consider separately
		Future wave energy development	DPT086	Yes	Important for planning, DHPLG priority issue
		Value of wave energy	DPT087	No	Value is bigger topic than current project can undertake – SEMRU/MI Socio-economics to consider separately
		Future wind energy development	DPT176		Not in original prioritisation but data were available and this was added to show areas where wind conditions are favourable for development
Fisheries & Shellfisheries	High	Close areas/fisheries management areas	DPT088	Yes	Quick win if can obtain data from BIM
		Inshore fisheries < 12 m vessels	DPT089	No	Out-of-scope of project to update – requires significant research, MI Fisheries to consider separately
		VMS fishing intensity > 12 m vessels	DPT090	No	MI Fisheries best placed to update existing layers
	Medium	Fishing rights in 6-12 NM zone	DPT091	Yes	Quick win if can obtain data from BIM
		Fish and shellfish landings by port (tonnes)	DPT092	Yes	Data should be available
		Fish and shellfish landings by port (Euros)	DPT093	Yes	Data should be available
		Fishing vessels by port	DPT094	Yes	Data should be available
		Fishing vessel steaming routes to fishing grounds	DPT095	No	Can be done in line with VMS data processing (MI Fisheries)
		Fishing grounds – shellfish beds	DPT096	No	
		Fishing grounds – other species	DPT097	No	
		Inshore (< 12 m) fishing – value	DPT098	No	See above
		Salmon fisheries – distribution	DPT099	Yes	Data should be available from IFI
		Salmon fisheries – value	DPT100	Yes	Data should be available from IFI
Offshore (> 12 m) fishing (Irish vessels) –	DPT101	No	MI Fisheries best placed to update existing		

MSP Topic	Priority	Data Product / Roadmap Name	Data Product ID	Progressed?	Reasons
		value			layers
		Offshore (> 12 m) fishing (non-Irish vessels) – fishing intensity	DPT102	No	
Landside Infrastructure	Medium	Electricity transmission network	DPT103	Yes	
		Gas distribution network	DPT104	Yes	
		North South interconnector	DPT105	Yes	
		Rail network	DPT106	Yes	Needed for Project 4 (implications of sea level rise on coastal infrastructure)
		Road network	DPT107	Yes	Needed for Project 4 (implications of sea level rise on coastal infrastructure)
Marine Aggregates	High	Marine aggregate resources	DPT108	Yes	Potential to use EMODnet geology layer
Ports & Shipping	High	Commercial shipping and recreational boating activity	DPT109	Yes	Ports & shipping is priority issue
		Location and intensity of port activity	DPT110	Yes	Ports & shipping is priority issue, data available
		Navigation dredging	DPT111	Yes	Ports & shipping is priority issue
		Dredge disposal sites	DPT112	Yes	Ports & shipping is priority issue
		IMO Routeing Measures	DPT113	Yes	Ports & shipping is priority issue
		Commercial anchorages	DPT114	Yes	Ports & shipping is priority issue
	Medium	Navigation buoys	DPT115	Yes	Ports & shipping is priority issue
		Potentially Sensitive Sea Areas	DPT116	Yes	Ports & shipping is priority issue
		Statutory Harbour Areas	DPT117	Yes	Ports & shipping is priority issue
		Maintained Navigation Channels	DPT118	Yes	Ports & shipping is priority issue
		Location of slipways	DPT119	No	Progress under recreation topic (DPT158)
Seascape	High	Seascapes	DPT120	No	Large topic, priority issue in consultation, DHPLG to take forward separately
Social & Economic Factors	High	Deprivation Index	DPT121	No	SEMRO carrying out research and mapping
		Population Distribution	DPT122	No	
		Unemployment	DPT123	No	
	Medium	Employment by Sector	DPT124	No	SEMRO best placed to lead
Telecommunications	High	Telecom Cables	DPT125	Yes	

MSP Topic	Priority	Data Product / Roadmap Name	Data Product ID	Progressed?	Reasons
ns	Medium	Future Telecom Cables	DPT126	Yes	
		Value of Telecom Cables	DPT127	No	Value is bigger topic than current project can undertake – SEMRU/MI Socio-economics to consider separately
Tourism & Recreation	Medium	Location and intensity of recreational angling	DPT128	Yes	Important topic that needs some information on for MSP
		Location and intensity of kite surfing	DPT129	Yes	
		Location and intensity of windsurfing	DPT130	Yes	
		Location and intensity of surfing	DPT131	Yes	
		Location and intensity of climbing/coasteering/bouldering	DPT132	Yes	
		Location and intensity of diving/snorkelling	DPT133	Yes	
		Location and intensity of recreational drone use	DPT134	Yes	
		Location and intensity of general beach leisure	DPT135	Yes	
		Location and intensity of general tourism	DPT136	Yes	
		Location and intensity of hovercrafting	DPT137	Yes	
		Location and intensity of coastal cycling	DPT138	Yes	
		Location and intensity of coastal quad biking/scrambling	DPT139	Yes	
		Location and intensity of sand-yachting/land sailing/land-yachting	DPT140	Yes	
		Location and intensity of kite buggying	DPT141	Yes	
		Location and intensity of kite landboarding	DPT142	Yes	
		Location and intensity of coastal recreational light aircraft	DPT143	Yes	
Location and intensity of motor/power boating	DPT144	Yes			
Location and intensity of motorised sailing	DPT145	Yes			
Location and intensity of	DPT146	Yes			

MSP Topic	Priority	Data Product / Roadmap Name	Data Product ID	Progressed?	Reasons
		wakeboarding/waterskiing			
		Location and intensity of parascending	DPT147	Yes	
		Location and intensity of unmotorised sailing	DPT148	Yes	
		Location and intensity of kayaking	DPT149	Yes	
		Location and intensity of Canadian canoeing	DPT150	Yes	
		Location and intensity of stand-up paddleboarding	DPT151	Yes	
		Location and intensity of rowing/sculling	DPT152	Yes	
		Location and intensity of dinghy/dayboat/small keelboat sailing	DPT153	Yes	
		Location and intensity of personal watercraft use	DPT154	Yes	
		Location and intensity of visitor attractions	DPT155	Yes	
		Location and intensity of coastal walking	DPT156	Yes	
		Location and intensity of wildlife/bird watching/wildfowling	DPT157	Yes	
		Location of marine recreational infrastructure	DPT158	Yes	
		Location of coastal tourism infrastructure	DPT159	Yes	
		Value of tourism & recreation activity	DPT160	No	
Wild seaweed harvesting	High	Location and intensity of wild seaweed harvesting	DPT161	Yes	Important activity in Ireland
	Medium	Location of commercial seaweed resources	DPT162	No	New project on seaweed being undertaken separately
		Value of wild seaweed harvesting	DPT163	No	Value is bigger topic than current project can undertake – SEMRU/MI Socio-economics to consider separately

MSP Topic	Priority	Data Product / Roadmap Name	Data Product ID	Progressed?	Reasons
Water Quality	High	Bathing Water Quality	DPT164	Yes	
		Bivalve Mollusc Production Area Quality	DPT165	Yes	
		Shellfish Water Quality	DPT166	Yes	
	Medium	Nutrient Sensitive Areas	DPT167	Yes	
Marine Litter	Medium	Coastal litter	DPT168	Yes	
		Seabed litter	DPT169	Yes	
Human Pressures	Medium	Land claim	DPT170	No	Lower priority, explore other ways to take forward
		Seabed penetration and abrasion	DPT171	Yes	Quick win, data from ICES
		Marine litter	DPT172	No	See Marine Litter topic
		Continuous Anthropogenic Underwater Noise	DPT173	No	Longer-term issue requires further research
		Invasive Alien Species	DPT174	No	See Benthic habitats topic

## B Roadmaps

The roadmaps that follow were created in 2018 to scope the development of a range of priority '1' and '2' data products (see Project 1 report). They have not been subsequently modified. Not all were taken forward as a further prioritisation process had to take place to select those that were highest priority for the project to take forward.

For those that were taken forward, the Processing Log that accompanies the data product should be referred to for the actual data sources used and data processing that took place. Sometimes the data sources identified in the Roadmaps were not available, or alternative better data sources became available during the process of developing the data products. Therefore, the Roadmaps do not necessarily reflect the final data products, and the data processing logs should be referred to for details of the data products created.

The Roadmaps for data products that were not taken forward provide a useful resource for further developing the evidence base for marine spatial planning.

## B.1 Administrative boundaries

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Administrative Boundaries topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- Ramsar Site boundaries

Important gaps (priority 2) have also been identified for the following data products:

- None

<b>MSP Topic: Administrative Boundaries</b>	
<b>Ramsar Sites</b>	
<b>Priority Rating: 1</b>	
Data Product Description	Map showing boundaries of Ramsar Sites in Ireland
Relevant existing Atlas data layers	Ramsar Wetlands UK
Proposed names for new Atlas data layers	Ramsar Wetlands Ireland
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ Free download available from <a href="https://rsis.ramsar.org/">https://rsis.ramsar.org/</a> . May also be available via MIDA</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Download shapefiles from Ramsar website</li> <li>○ Create shapefile for Ramsar Wetlands Ireland.</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual check)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 day

## B.2 Geology

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the geology topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

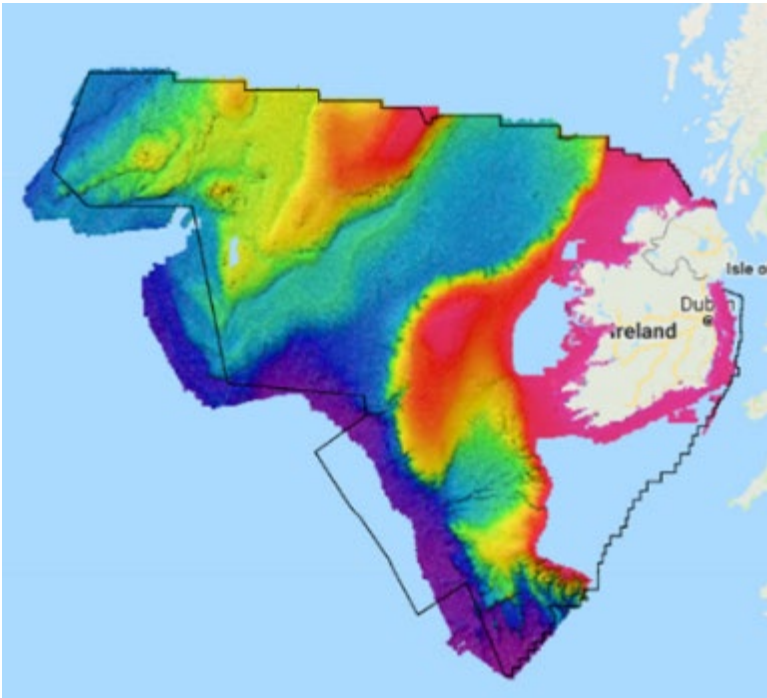
The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gaps have been identified:

- Current bathymetry
- Location of geological sites

Important gaps (priority 2) have also been identified for the following data products:

- Location of morphological features
- Location of glacial process features
- Location of paleo-landscapes

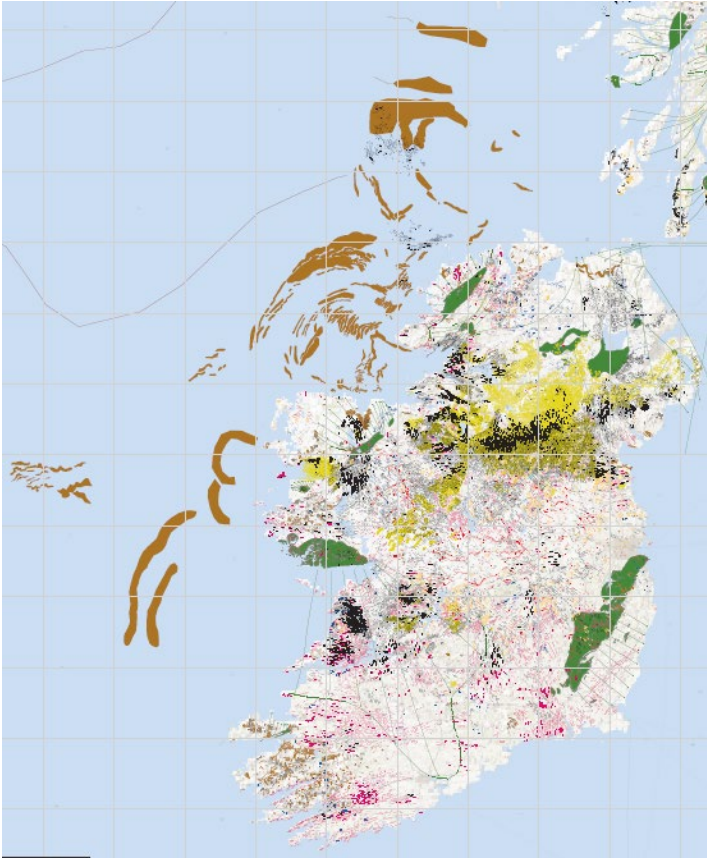
<b>MSP Topic: Geology</b>	
<b>Bathymetry</b>	<b>Priority Rating: 1</b>
Data Product Description	This data product will provide a data layer of the seabed bathymetry
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Bathymetry
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ INFOMAR (<a href="https://jetstream.gsi.ie/iwdds/map.jsp">https://jetstream.gsi.ie/iwdds/map.jsp</a>)</li> </ul> </li> </ul>  <ul style="list-style-type: none"> <li>○ Example extent of INFOMAR bathymetry data.</li> <li>○ EMODnet (<a href="http://www.emodnet-bathymetry.eu/metadata-and-data">http://www.emodnet-bathymetry.eu/metadata-and-data</a>)</li> <li>○ GEBCO <a href="https://www.gebco.net/">https://www.gebco.net/</a></li> </ul> <ul style="list-style-type: none"> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be downloaded and viewed using standard GIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Download from INFOMAR WMS service</li> <li>○ Download data from the EMODnet bathymetry portal, WMS or WFS services and/or from GEBCO</li> <li>○ Create composite bathymetry using relevant data sources. Due to the data resolution and survey accuracy, the INFOMAR bathymetry would form the main source, while the EMODnet/GEBCO bathymetry would be supplementary and fill any gaps in the INFOMAR bathymetry. In summary this process will involve: <ul style="list-style-type: none"> <li>▪ Digitising polygons over the area where there are gaps in the INFOMAR bathymetry data</li> <li>▪ Use the gap polygons to extract the area of interest from the EMODnet/GEBCO bathymetry and</li> <li>▪ Merge the two bathymetric layers giving priority to the INFOMAR bathymetry</li> </ul> </li> </ul> </li> </ul>	

	<ul style="list-style-type: none"> <li>○ Create data processing log outlining the steps completed in extracting the required areas of bathymetry from the supplementary EMODnet/GEBCO bathymetry and merging it with the INFOMAR bathymetry</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Establish update frequency (10 years)</li> </ul>
Estimated staff effort/cost	Estimated 2-3 days of staff effort at approximately €1500 to collate available data from INFOMAR, EMODnet and create a composite bathymetry.
Required skills	GIS Analyst
Estimated time scales	1 week

<b>MSP Topic: Geology</b>	
<b>Geological sites</b>	<b>Priority Rating: 1</b>
Data Product Description	This data product will provide a data layer identifying geological sites of national importance
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Geological sites
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ The GSI Geological Heritage data repository (<a href="https://www.gsi.ie/en-ie/data-and-maps/Pages/Geoheritage.aspx">https://www.gsi.ie/en-ie/data-and-maps/Pages/Geoheritage.aspx</a>) Available under Creative Commons licence</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be downloaded and viewed using standard GIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Download from GSI Geological Heritage data repository.</li> <li>○ Create data layer</li> <li>○ Create data processing log that sets out the steps taken to create the data layer</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Establish update frequency (annual check for update)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 day GIS analyst) cost approx. €500
Required skills	GIS Analyst
Estimated time scales	1 day

<b>MSP Topic: Geology</b>	
<b>Marine process features - Morphology and morphological features</b>	
	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a data layer of the locations and extents of morphology and morphological features
Relevant existing Atlas data layers	Sandbanks, Coastal Lagoon, Tidal Mudflats Sandflats
Proposed names for new Atlas data layers	Marine process features
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• The marine process features to identify include: <ul style="list-style-type: none"> <li>○ Tidal banks</li> <li>○ Transverse bedform features (e.g. sand or gravel waves)</li> <li>○ Longitudinal bedform features (e.g. sand ribbon, gravel furrow)</li> <li>○ Bedform field (e.g. sand or gravel patches)</li> <li>○ Erosional scour features</li> <li>○ Ebb tidal deltas</li> </ul> </li> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Option 1: Digitising geological paper charts from the GSI and BGS. BGS geology chart examples include Bloody Foreland, Marlin 55 N - 08 W, Dublin, Anglesey 53 N - 06 W, Waterford, Cardigan Bay 52 N - 06 W, Nymph Bank 51 N - 08 W, Cork, Labadie Bank, Great Sole Bank, Cockburn Bank 49 N - 10 W</li> <li>○ Option 2: Interpretation of and digitising features from the INFOMAR bathymetry</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Both options 1 and 2 can be carried out using standard GIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Option 1: <ul style="list-style-type: none"> <li>▪ Relevant charts would need to be scanned and geo-rectified</li> <li>▪ Features will then need to be digitised from the geo-rectified charts. Information on the type of the morphology feature should be recorded associated with each digitised feature. The required features are as listed above and are identified as such within the geological paper charts</li> <li>▪ Create data layer</li> <li>▪ Create metadata record consistent with ISDE requirements</li> <li>▪ Create data processing log</li> <li>▪ Establish update frequency (10 years)</li> </ul> </li> <li>○ Option 2: <ul style="list-style-type: none"> <li>▪ Review of bathymetry data to identify and digitise morphological features represented on the bathymetric imagery.</li> <li>▪ The required features are as listed above; however, it would need an experienced geologist to identify the range of features on bathymetric imagery.</li> <li>▪ This would need to be carried out at an appropriate resolution where the morphological features can be identified.</li> <li>▪ Create data layer</li> <li>▪ Create metadata record consistent with ISDE requirements</li> <li>▪ Create data processing log that sets out the steps taken to create the data layer</li> </ul> </li> </ul> </li> </ul>	

<ul style="list-style-type: none"> <li>▪ Establish update frequency (10 years)</li> </ul>	
Estimated staff effort/cost	<p>Option 1: To digitise the paper chart would take an estimated 1-2 days of staff effort per chart, resulting in about 20 days at approximately €10,000 (based on 2 days GIS Analyst at €1,000). The cost of acquiring the charts would be around €15 each.</p> <p>Option 2: Depending on the resolution and bathymetry extent, and the experience of the analyst in identifying the features, the estimation could take in excess of 20 days. Ideally a geologist would undertake the task of identifying the feature represented in the bathymetry. Estimate €20,000</p>
Required skills	GIS analyst. Option 2 would also require additional input from a geologist.
Estimated time scales	Option 1 – 2 months; Option 2 – 4 months

MSP Topic: Geology	
Quaternary geology - Glacial process features	Priority Rating: 2
Data Product Description	This data product will provide a data layer of the locations and extents of glacial process features
Relevant existing Atlas data layers	None available
Proposed names for new Atlas data layers	Glacial process features
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data:                             <ul style="list-style-type: none"> <li>○ Information collated as part of the BRITICE Glacial Mapping Project (<a href="https://www.sheffield.ac.uk/geography/staff/clark_chris/britice_v2/index">https://www.sheffield.ac.uk/geography/staff/clark_chris/britice_v2/index</a>), available from Sheffield University. Data is available as vector data from the above website. Where there is missing information, it can be digitised from geological paper charts from the GSI and BGS. BGS geology chart examples include Bloody Foreland, Marlin 55 N - 08 W, Dublin, Anglesey 53 N - 06 W, Waterford, Cardigan Bay 52 N - 06 W, Nympe Bank 51 N - 08 W, Cork, Labadie Bank, Great Sole Bank, Cockburn Bank 49 N - 10 W. The features to digitise would include:                                     <ul style="list-style-type: none"> <li>▪ Erosional glacial features</li> <li>▪ Depositional glacial features</li> <li>▪ Erosional fluvio-glacial features</li> <li>▪ Depositional fluvio-glacial features</li> <li>▪ Periglacial features</li> </ul> </li> <li>○ An example of the output from the BRITICE Glacial Mapping Project are illustrated in the figure below</li> </ul> </li> </ul>	
	

- Required data processing tools
  - Data products can be created using standard GIS software
- Outline tasks for creating data product
  - The vector data from The BRITICE Glacial Mapping Project is already available digitally.
    - Create data layer
    - Create metadata record consistent with ISDE requirements
    - Create data processing log
    - Establish update frequency (10 years)
  - In the instance that information is required from the geological paper charts to fill any gaps, the following would apply:
    - Relevant charts would need to be scanned and geo-rectified
    - Features will then need to be digitised from the geo-rectified charts based on the list outlined above. Information on the type of feature should be recorded associated with each digitised feature, which is already identified on the geological charts.
    - Create data layer
    - Create metadata record consistent with ISDE requirements
    - Create data processing log that sets out the steps taken to create the data layer
    - Establish update frequency (10 years)

Estimated staff effort/cost	2 days staff effort to use the BRITICE vector data at approximately €1,000. To digitise geological paper chart would require an estimated 1-2 days staff effort per chart. The cost of acquiring the charts would be around €15 each.
Required skills	GIS analyst
Estimated time scales	up to 3 weeks

<b>MSP Topic: Geology</b>	
<b>Palaeo-landscapes</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a data layer identifying the current spatial distribution/location and extent of known palaeo landscapes / areas of high archaeological potential in the marine environment.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Palaeo-landscapes
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Interpreted maps from "The palaeo-geography of Northwest Europe during the last 20,000 years" from Brooks <i>et al.</i>, 2011. Journal of Maps, 2011, pp 73-587.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard GIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ The data is already available as digital charts and the extents of the palaeo-landscapes have been categorised. This version was published in 2011. Updated information on palaeo-landscapes is due to be released in 2019 by Jeremy Ely (University of Sheffield).</li> <li>○ Create data layer</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log that sets out the steps taken to create the data layer</li> </ul> </li> </ul>	
Estimated staff effort/cost	To digitise the maps would take an estimated 2 days of staff effort at approximately €1,000.
Required skills	GIS Analyst
Estimated time scales	1 week

## B.3 Ocean process features

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the ocean features topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

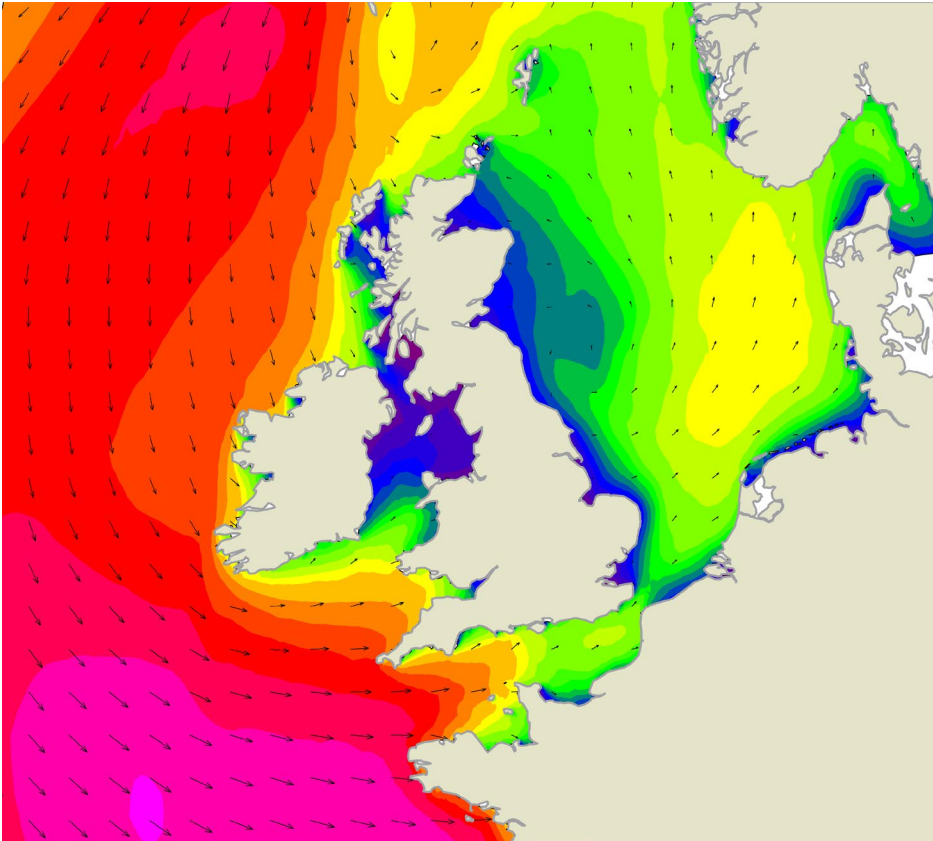
The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap have been identified:

- Mean annual distribution of wave height and period

Important gaps (priority 2) have also been identified for the following data products:

- Distribution of mean tidal amplitude
- Ocean fronts
- Sea temperature
- Sea salinity
- Suspended particulate matter

MSP Topic: Ocean Features	
Mean Annual Distribution of Wave Height	Priority Rating: 1
Data Product Description	This data product will provide a data layer illustrating the spatial distribution of the mean annual wave height across Irish waters; it would be associated to similar data layer for the mean annual wave period.
Relevant existing Atlas data layers	Wave Buoy; Weather Buoy Wave; UK Met Office Buoy (Wave), [all of which are real time point based data]. Mean Annual Distribution of Wave Height (m)
Proposed names for new Atlas data layers	Mean Annual Wave Height distribution map
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data:                             <ul style="list-style-type: none"> <li>○ Option 1: The wave energy resource theme, Annual average wave potential value sub-theme and Mean Annual Distribution of Wave Height (m) layer provides this information, although the reference date is not clear.</li> <li>○ Option 2: More recent hindcast representation of the mean annual wave height is available from the Seastates wind-wave hindcast model, which is available to purchase and provides coverage over the Irish continental shelf. An example of the data coverage is illustrated below.</li> </ul> </li> </ul> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> <li>○ Option 3: To develop a model grid from which to model the spatially varying wave properties would require:                             <ul style="list-style-type: none"> <li>▪ Wave observation data at point based locations (to use for data calibration and validation)</li> <li>▪ Model grid</li> </ul> </li> </ul>	

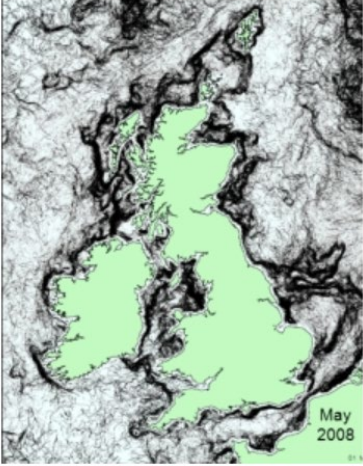
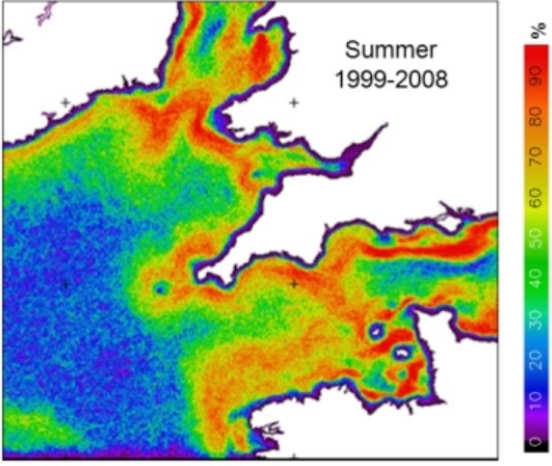
<ul style="list-style-type: none"> <li>• Required data processing tools                             <ul style="list-style-type: none"> <li>○ Option 1: Outputs from the annual average wave potential value under the wave energy resource theme, no further processing required.</li> <li>○ Option 2: For outputs from the Seastates wind-wave hindcast data, the information can be mapped using standard GIS software.</li> <li>○ Option 3: To develop the model grid and data would require spectral wave modelling software, for example DHI Mike21 spectral wave model.</li> </ul> </li> <li>• Outline tasks for creating data product                             <ul style="list-style-type: none"> <li>○ Option 1: The data and layer already exists on the Atlas, therefore the information needs to be cross-referenced.</li> <li>○ Option 2: Using the Seastates wind-wave hindcast data a gridded surface can be produced based on the position and attribute information (i.e. X, Y and mean wave height) in standard GIS software.</li> <li>○ Option 3: Tasks involved in generating a wave model include:                                     <ul style="list-style-type: none"> <li>▪ Create a model grid over a domain wider than the area of interest, so this would include the Atlantic Ocean in order to capture the swell and fetch.</li> <li>▪ Over the model domain Input a wind field, bathymetry, seabed roughness.</li> <li>▪ Use the time series of wave buoy observation for calibration.</li> <li>▪ Run the spectral wave modelling (note this would involve a lot of computation power and would be dependent on the resolution).</li> <li>▪ Use the time series of wave buoy observation for validation.</li> <li>▪ Re-run the spectral wave model as necessary.</li> </ul> </li> </ul> </li> <li>• For chosen option:                             <ul style="list-style-type: none"> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log that sets out the steps taken to create the data layer</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Option 1: 1-2 days staff effort (GIS Analyst) at approximately €1,000 Option 2: To purchase the Seastates wind-wave hindcast data for the Irish continental shelf at a specified spatial resolution would cost approximately €2,000, plus 1-2 days GIS analyst at approximately €1,000 Option 3: To undertake the spectral wave modelling would be between €60,000 and €100,000
Required skills	Option 1: GIS Analyst Option 2: GIS Analyst to create a gridded surface of the Seastates wind-wave hindcast data for the Irish continental shelf. Option 3: Spectral wave numerical modelling.
Estimated time scales	Option 1: 1 week Option 2: 1 week. Option 3: The modelling exercise would be dependent the resolution used, the computing power, but would be on the order of several months.

<b>MSP Topic: Ocean Features</b>	
<b>Mean Annual Distribution of Wave Period</b>	<b>Priority Rating: 1</b>
Data Product Description	This data product will provide a data layer illustrating the spatial distribution of the mean annual wave period across Irish waters; it would be associated to similar data layer for the mean annual wave height.
Relevant existing Atlas data layers	Wave Buoy; Weather Buoy Wave; UK Met Office Buoy (Wave), [all of which are real time point based data]. Mean Annual Distribution of Wave Period (Sec)
Proposed names for new Atlas data layers	Mean Annual Wave Period distribution map
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Option 1: The wave energy resource theme, Annual average wave potential value sub-theme and Mean Annual Distribution of Wave Period (Sec) layer provides this information, although the reference date is not clear.</li> <li>○ Option 2: More recent hindcast representation of the mean annual wave period is available from the Seastates wind-wave hindcast model, which is available to purchase and provides coverage over the Irish continental shelf.</li> <li>○ Option 3: To develop a model grid from which to model the spatially varying wave properties would require: <ul style="list-style-type: none"> <li>▪ Wave observation data at point based locations (to use for data calibration and validation)</li> <li>▪ Model grid</li> </ul> </li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Option 1: Outputs from the annual average wave potential value under the wave energy resource theme, no further processing required.</li> <li>○ Option 2: For outputs from the Seastates wind-wave hindcast data, the information can be mapped using standard GIS software.</li> <li>○ Option 3: To develop the model grid and data would require spectral wave modelling software, for example DHI Mike21 spectral wave model.</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Option 1: The data and layer already exists on the Atlas, therefore the information needs to be cross-referenced.</li> <li>○ Option 2: Using the Seastates wind-wave hindcast data a gridded surface can be produced based on the position and attribute information (I.e. X, Y and mean wave period) in standard GIS software.</li> <li>○ Option 3: Tasks involved in generating a wave model include: <ul style="list-style-type: none"> <li>▪ Create a model grid over a domain wider than the area of interest, so this would include the Atlantic Ocean in order to capture the swell and fetch.</li> <li>▪ Over the model domain Input a wind field, bathymetry, seabed roughness.</li> <li>▪ Use the time series of wave buoy observation for calibration.</li> <li>▪ Run the spectral wave modelling (note this would involve a lot of computation power and would be dependent on the resolution).</li> <li>▪ Use the time series of wave buoy observation for validation.</li> <li>▪ Re-run the spectral wave model as necessary.</li> </ul> </li> </ul> </li> </ul>	

	<ul style="list-style-type: none"> <li>• For chosen option:             <ul style="list-style-type: none"> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log that sets out the steps taken to create the data layer</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>
Estimated staff effort/cost	<p>Option 1: 1-2 days staff effort (GIS Analyst) at approximately €1,000</p> <p>Option 2: To purchase the Seastates wind-wave hindcast data for the Irish continental shelf at a specified spatial resolution would cost approximately €2,000, plus 2 days GIS Analyst €1,000.</p> <p>Option 3: To undertake the spectral wave modelling would be between €60,000 and €100,000</p>
Required skills	<p>Option 1: GIS Analyst</p> <p>Option 2: GIS Analyst to create a gridded surface of the Seastates wind-wave hindcast data for the Irish continental shelf.</p> <p>Option 3: Spectral wave numerical modelling.</p>
Estimated time scales	<p>Option 1: 1 week</p> <p>Option 2: 1 week</p> <p>Option 3: The modelling exercise would be dependent the resolution used, the computing power, but would be on the order of several months.</p>

<b>MSP Topic: Ocean Features</b>	
<b>Mean Tidal Amplitude</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a data layer illustrating the spatial distribution of the mean tidal amplitude across Irish waters.
Relevant existing Atlas data layers	Irish Tide Gauge Network; Sea Level Rise (metre); Mean Tidal Amplitude
Proposed names for new Atlas data layers	Mean Tidal Amplitude distribution map
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Option 1: A series of the ROMS hydrodynamic model (Regional Ocean Modelling System) sea surface height forecasts.</li> <li>○ Option 2: The Seastates tide-surge hindcast data is available to purchase, with coverage over the Irish continental shelf.</li> <li>○ Option 3: To develop a model grid from which to model the spatially varying mean tidal amplitude: <ul style="list-style-type: none"> <li>▪ Tide observations data at point based locations (to use for data calibration and validation)</li> <li>▪ Model grid</li> </ul> </li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Option 1: The ROMS hydrodynamic model used for generating forecasts can be edited and used to generate enough hindcast information to calculate the mean annual levels.</li> <li>○ Option 2: For outputs from the Seastates tide-surge hindcast data, the information can be mapped using standard GIS software.</li> <li>○ Option 3: To develop the model grid and data would require tidal modelling software, for example DHI Mike21 HD.</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Option 1: The ROMS hydrodynamic model is edited to generate a series of hindcast predictions, which are in turn used to calculate the required average. The exact process steps will vary depending on the properties of the ROMS hydrodynamic model.</li> <li>○ Option 2: Using the Seastates tide-surge hindcast data a gridded surface can be produced based on the position and attribute information (i.e. X, Y and mean wave height) in standard GIS software.</li> <li>○ Option 3: Tasks involved in generating a tide model include: <ul style="list-style-type: none"> <li>▪ Create a model grid over a domain wider than the area of interest, so this would include the Atlantic Ocean in order to capture the swell and fetch.</li> <li>▪ Obtain tidal constituents and across the model domain.</li> <li>▪ Use the time series of tide observations for calibration.</li> <li>▪ Run the tidal modelling (note this would involve a lot of computation power and would be dependent on the resolution).</li> <li>▪ Use the time series of tide observation for validation.</li> <li>▪ Re-run the tide model as necessary.</li> </ul> </li> </ul> </li> <li>• For chosen option: <ul style="list-style-type: none"> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log that sets out the steps taken to create the data layer</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	

Estimated staff effort/cost	<p>Option 1: Presently unknown as the effort and costs to complete this would be dependent on the data available within the Marine Institute and the properties of the ROMS hydrodynamic model. Likely to be similar cost to Option 2</p> <p>Option 2: To purchase the Seastates tide-surge hindcast data for the Irish continental shelf at a specified spatial resolution would cost approximately €2,000, plus 2 days GIS Analyst €1,000.</p> <p>Option 3: To undertake the spectral wave modelling would be between €60,000 and €100,000</p>
Required skills	<p>Option 1: Numerical modelling.</p> <p>Option 2: GIS Analyst.</p> <p>Option 3: Numerical modelling.</p>
Estimated time scales	<p>Option 1: Presently unknown.</p> <p>Option 2: 1 week</p> <p>Option 3: The modelling exercise would be dependent the resolution used, the computing power, but would be on the order of several months.</p>

MSP Topic: Ocean Features	
Ocean Fronts	Priority Rating: 2
Data Product Description	This data product will provide a data layer illustrating the approximate locations and extents of ocean fronts within Irish waters.
Relevant existing Atlas data layers	Ocean Fronts
Proposed names for new Atlas data layers	Ocean Fronts
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• It is not presently clear if the current ocean fronts data available on the Marine Atlas fully represents all the fronts within Irish waters. On the assumption that there are more ocean fronts than currently represented, the following methodologies apply.</li> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Option 1: Map outputs from the NERC Earth Observation Data</li> <li>○ Acquisition and Analysis Service (NEODAAS) Oceanic fronts and marine megafauna study (<a href="https://www.neodaas.ac.uk/supportedscience/fronts_megafauna.php">https://www.neodaas.ac.uk/supportedscience/fronts_megafauna.php</a>). Available from Dr Peter Miller <a href="http://rsg.pml.ac.uk/people/profile_miller.php">http://rsg.pml.ac.uk/people/profile_miller.php</a>.</li> </ul> </li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <ul style="list-style-type: none"> <li>○ Option 2: This is based on the approach used in Belkin and Cornillon (2007) for the identification of thermal fronts in oceans. Sea surface temperature satellite data over the area of interest for a number of years. Belkin and Cornillon (2007) used approximately 11-years of data.</li> </ul> <ul style="list-style-type: none"> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Option 1: Data products can be created using standard GIS software</li> <li>○ Option 2: The Cayula–Cornillon front detection algorithm as applied by Belkin and Cornillon (2007).</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Option 1: <ul style="list-style-type: none"> <li>▪ Relevant maps would need to be scanned and geo-rectified</li> <li>▪ The represented fronts will then need to be digitised from the geo-rectified maps and any associated information recorded.</li> </ul> </li> <li>○ Option 2: <ul style="list-style-type: none"> <li>▪ Extensive data collation;</li> <li>▪ Processing the remote sensing data for use;</li> <li>▪ Further tasks or processed involved in generating this product is unknown and most likely would need specialist knowledge to achieve.</li> </ul> </li> </ul> </li> </ul>	

<ul style="list-style-type: none"> <li>• For chosen option:             <ul style="list-style-type: none"> <li>○ Create data layer</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log that sets out the steps taken to create the data layer</li> </ul> </li> </ul> <p>Establish update frequency (10 years)</p>	
Estimated staff effort/cost	<p>Option 1: To digitise the maps would take an estimated 2 days of staff effort at approximately €800.</p> <p>Option 2: Likely to require a significant staff effort at an approximate cost of over €10,000.</p>
Required skills	<p>Option 1: GIS Analyst</p> <p>Option 2: Remote sensing data specialist.</p>
Estimated time scales	<p>Option 1: 1 week</p> <p>Option 2: Of the order of weeks</p>

<b>MSP Topic: Ocean Features</b>	
<b>Sea temperature</b>	
<b>Priority Rating: 2</b>	
Data Product Description	This data product will provide information on the summer (August) and Winter (February) spatial distribution of sea temperature
Relevant existing Atlas data layers	Wave Buoy Sea Temperature; Marine Institute CTD; Tide Gauge; Weather Buoy; Celtic Explorer Underway; Celtic Voyager Underway; Celtic Voyager Windmill; Lough Beltra Windmill; Tide Gauge; TidbiT Sea Temperature Probe Network; CIL Buoy; UK Met Office Buoy
Proposed names for new Atlas data layers	Winter sea temperature distribution Summer sea temperature distribution
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• All the available data are at point based locations and there is the potential to have information about sea surface temperature to be represented spatially and particular months to be used as an indication of the seasonal differences. It is on this basis that the following methodology is outlined.</li> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Option 1: A series of the ROMS hydrodynamic model (Regional Ocean Modelling System) sea surface temperature forecasts for the selected winter (February) and summer (August) months.</li> <li>○ Option 2: All the available Marine Institute data on sea surface temperature.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Option 1: The ROMS model to generate a hindcast dataset of the temperature in the selected winter and summer months</li> <li>○ Option 2: The data products can be created using standard GIS software.</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Option 1: <ul style="list-style-type: none"> <li>▪ Modify the existing ROMS model to enable hindcast predictions</li> <li>▪ Run model for the required months and periods</li> <li>▪ Collate and average model run results to determine the average for the selected winter and summer months</li> </ul> </li> <li>○ Option 2: <ul style="list-style-type: none"> <li>▪ Collate all the available data</li> <li>▪ Aggregate the information by the selected winter and summer months</li> <li>▪ Identify any outliers in the seasonal data and confirming if they are representative of real or erroneous data</li> <li>▪ Undertake density surface analyses based on the range of data of corrected data for each season to create a density surface representative of the SST. The most appropriate resolution for the resulting data will be dependent on the spatial distribution of the data points/records.</li> </ul> </li> </ul> </li> <li>• For chosen option: <ul style="list-style-type: none"> <li>○ Create data layer</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log that sets out the steps taken to create the data layer</li> <li>○ Establish update frequency (Annually)</li> </ul> </li> </ul>	

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Estimated staff effort/cost	Option 1: Dependent on the properties of the existing model, input parameters and computational power. Likely to be similar cost to Option 2. Option 2: Estimated 1-2 days staff effort for each month, equates to about 4 days for the winter and summer months, at approximately €2,000 (based on 2 days GIS Analyst at €1,000)
Required skills	Option 1: Numerical modelling Option 2: GIS analyst
Estimated time scales	Option 1: Presently unknown Option 2: 2.5 weeks

<b>MSP Topic: Ocean Features</b>	
<b>Sea salinity</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide information on the seasonal (winter and summer only) spatial distribution of sea salinity
Relevant existing Atlas data layers	Marine Institute CTD, Celtic Voyager Windmill, Celtic Voyager Underway, Celtic Explorer Underway, Lough Beltra Windmill, Salinity August 2017 Contours, Salinity September 2017, Salinity May 2017, Salinity July 2017, Salinity January 2018 Contours, Salinity September 2017 Contours, Salinity February 2018, Salinity April 2017 Contours, Salinity June 2017, Salinity March 2017 Contours, Salinity June 2017 Contours, Salinity December 2017, Salinity October 2017 Contours, Salinity March 2017, Salinity January 2018, Salinity May 2017 Contours, Salinity October 2017, Salinity November 2017 Contours, Salinity July 2017 Contours, Salinity April 2017, Salinity August 2017, Salinity December 2017 Contours, Salinity February 2018 Contours, Salinity November 2017
Proposed names for new Atlas data layers	Winter sea salinity distribution Summer sea salinity distribution
<b>Outline methodology</b> <ul style="list-style-type: none"> <li>• The information is mainly presented at monthly time scales as spatially varying density maps. There is a benefit to represent the same information as an indication of the seasonal differences. On this basis, the months of February and August are used to represent the variation between the winter and summer months respectively.</li> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ All the available Marine Institute data on sea salinity, including point data and spatially varying density maps.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ The data products can be created using standard GIS software.</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Collate all the available data</li> <li>○ Aggregate the information relating to all observations in the selected and winter (February) and summer (August) months</li> <li>○ Identify any outliers in the seasonal data and confirming if they are representative of real or erroneous data</li> <li>○ Undertake density surface analyses based on the range of data of corrected data for t representative month to create a density surface representative of the SST. The most appropriate resolution for the resulting data will be dependent on the spatial distribution of the data points/records.</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log that sets out the steps taken to create the data layer</li> <li>○ Establish update frequency (Annually)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1-2 days staff effort per season month, equates to about 4 days for the winter and summer months , at approximately €2,000 (based on 2 days GIS Analyst at €1,000)
Required skills	GIS analyst
Estimated time scales	1weeks

<b>MSP Topic: Ocean Features</b>	
<b>Suspended particulate matter</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide information on the monthly spatial distribution and concentration of suspended particulate matter
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Seasonal suspended particulate matter distribution map
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Cefas Suspended Sediment Climatologies around the UK study produced as representative monthly and seasonal suspended particulate matter (SPM) charts.</li> <li>○ Study report at <a href="https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584621/CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf">https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584621/CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data available digitally as gridded data from Cefas and can be viewed using standard GIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Import into GIS software</li> <li>○ Create data layer(s)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing that sets out the steps taken to create the data layer</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 day GIS analyst) cost approx. €1,000
Required skills	GIS Analyst
Estimated time scales	1 week

## B.4 Seabed sediments

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the seabed sediments topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap have been identified:

- Seabed sediment

<b>MSP Topic: Seabed sediments</b>	
<b>Seabed sediment</b>	<b>Priority Rating: 1</b>
Data Product Description	This data product will provide a data layer that sets out
Relevant existing Atlas data layers	INFOMAR Seabed Substrate; EMODnet Seabed Substrate; Sediment Samples; Sea bed area
Proposed names for new Atlas data layers	Seabed sediment
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ GSI and INFOMAR seabed classification available from the GSI (<a href="https://www.gsi.ie/en-ie/data-and-maps/Pages/Marine.aspx#Habitats">https://www.gsi.ie/en-ie/data-and-maps/Pages/Marine.aspx#Habitats</a>)</li> <li>○ Seabed sediment paper charts from the GSI and BGS</li> <li>○ BGS surficial sediment chart examples include Bloody Foreland, Marlin 55 N - 08 W, Dublin, Anglesey 53 N - 06 W, Waterford, Cardigan Bay 52 N - 06 W, Nymph Bank 51 N - 08 W, Cork, Labadie Bank, Great Sole Bank, Cockburn Bank 49 N - 10 W</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard GIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ The INFOMAR and EMODnet seabed substrate maps provide an extensive coverage there are however a few gaps that can be filled in from digitising data surficial sediment charts and is the basis for this entry</li> <li>○ Digitising the GSI and BGS surficial sediment charts to fill in existing gaps in the available seabed substrate layers, resulting in a composite map: <ul style="list-style-type: none"> <li>▪ Relevant charts would need to be scanned and geo-rectified</li> <li>▪ Features will then need to be digitised from the geo-rectified charts.</li> <li>▪ Information is only really needed where there are presently data gaps, so the following tasks are likely to apply: <ul style="list-style-type: none"> <li>• Digitise polygons over the area where there are gaps in the seabed substrate data</li> <li>• Use the gap polygons to identify the area of interest in the geo-rectified seabed sediment charts</li> <li>• Digitise the extents and record the sediment type from the information represented on the charts for each digitised feature</li> <li>• Merge chart digitised information with the existing seabed substrate data to create a composite seabed sediment layer</li> </ul> </li> <li>▪ Create a metadata record consistent with ISDE requirements</li> <li>▪ Create data processing log that sets out the steps taken to create the data layer</li> </ul> </li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	INFOMAR and EMODnet seabed substrate data already available on Atlas. To digitise paper charts where there are gaps in the INFOMAR and EMODnet seabed substrate data would take an estimated 1-2 days of staff effort per chart, resulting in about 20 days at approximately €10,000. The exact cost would be dependent on the extent of the data gaps. The same charts would be applicable to the marine process features under the geological theme, so the necessary charts will only need to be purchased once

Required skills	GIS analyst
Estimated time scales	1-3 weeks

## B.5 Benthic habitats and species

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the benthic habitats and species topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gaps have been identified:

- Subtidal sandbanks
- Seabed substrate
- Reefs
- Tidal mudflats and sandflats
- Sea caves
- OSPAR habitats
  - Coral gardens
  - *Lophelia pertusa* reefs
  - Carbonate mounds
  - *Sabellaria spinulosa* reefs
  - *Zostera*
  - Maerl
  - Sea-Pen & Burrowing Megafauna Communities
- Invasive Alien Species

Important gaps (priority 2) have also been identified for the following data products:

- Distribution of key seaweed species

MSP Topic: Benthic habitats and species	
Subtidal sandbanks	Priority Rating: 1
Data Product Description	This data product will provide a data layer identifying the location and general characteristics of subtidal sandbanks outside of the Natura 2000 network
Relevant existing Atlas data layers	Sandbanks
Proposed names for new Atlas data layers	Distribution of subtidal sandbanks
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permission to use data: <ul style="list-style-type: none"> <li>○ INFOMAR Sediment samples <a href="https://jetstream.gsi.ie/iwdds/map.jsp">https://jetstream.gsi.ie/iwdds/map.jsp</a> and survey data <a href="https://www.infomar.ie/">https://www.infomar.ie/</a></li> <li>○ UK hydrographic Survey. <a href="http://www.ukho.gov.uk">http://www.ukho.gov.uk</a></li> <li>○ Irish Sea Marine Aggregate Resource Area <a href="http://oar.marine.ie/bitstream/10793/277/1/No%2036%20marine%20Environment%20and%20Health%20Series.pdf">http://oar.marine.ie/bitstream/10793/277/1/No%2036%20marine%20Environment%20and%20Health%20Series.pdf</a></li> <li>○ NPWS – Article 17 report ‘in preparation’ - discuss availability of data with NPWS</li> <li>○ Additional data is likely to be available from the commissioners of Irish lights <a href="http://www.irishlights.ie">www.irishlights.ie</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Conduct a desk survey to identify the location of submerged sandbanks inside and outside of the Natura 2000 network to include information from the Infomar survey, admiralty charts and other relevant sources (e.g. seismic survey data published on behalf of windfarm applications and Environmental Impact Statements) <ul style="list-style-type: none"> <li>○ Create shapefile of potential submerged sandbank habitats.</li> </ul> </li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log <ul style="list-style-type: none"> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 15 days effort (Researcher: 10 days, GIS analyst: 5 days) cost approx. €6,000
Required skills	Ecologist, GIS analyst
Estimated time scales	2 months

<b>MSP Topic: Benthic habitats and species</b>	
<b>Broadscale habitat map</b>	<b>Priority Rating: 1</b>
Data Product Description	This data product will update the existing broadscale habitat data layer
Relevant existing Atlas data layers	MSFD Predominant Habitat Type
Proposed names for new Atlas data layers	Broadscale habitat
<p>The EMODnet habitat map provides full coverage of Irish waters at the level of broad-scale habitat. There may be some refinements that can be made to this map by incorporating more recent INFOMAR data. This would need to be ascertained through discussion with INFOMAR.</p> <p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permission to use data: <ul style="list-style-type: none"> <li>○ INFOMAR seabed substrate data: <a href="https://data.gov.ie/dataset/infomar-seabed-substrate">https://data.gov.ie/dataset/infomar-seabed-substrate</a></li> <li>○ EMODnet habitat map <a href="https://www.emodnet-seabedhabitats.eu/access-data/download-data/">https://www.emodnet-seabedhabitats.eu/access-data/download-data/</a> Free to download under open access licence</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Review data from the source identified above.</li> <li>○ Update existing shapefile</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 4 days effort cost approx. €2,000
Required skills	GIS analyst
Estimated time scales	1 month

MSP Topic: Benthic habitats and species	
Reefs	Priority Rating: 1
Data Product Description	This data product will update the existing Reefs data layer and provide additional information on offshore geogenic reef and intertidal biogenic reef within and outside of the Natura network.
Relevant existing Atlas data layers	Reefs
Proposed names for new Atlas data layers	Distribution of geogenic and biogenic Reefs
<b>Outline methodology</b> <ul style="list-style-type: none"> <li>• Data sources and permission to use data:           <ul style="list-style-type: none"> <li>○ NPWS 2018 EU Article 17 reporting for marine habitats Annex I habitats</li> <li>○ SeaRover Survey data to be available through INFOMAR</li> </ul> </li> <li>• Required data processing tools           <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers           <ul style="list-style-type: none"> <li>○ Option 1</li> <li>○ Use data from recent <i>SeaRover</i> survey to collate spatial data for offshore geogenic reef habitats.</li> <li>○ Conduct a desktop survey to identify potential areas of biogenic (<i>Mytilus edulis</i> reef) outside of Natura 2000 sites.</li> <li>○ Option 2</li> <li>○ As per Option 1 but also conduct field surveys of the areas identified as potential biogenic reef.</li> <li>○ Create a single shapefile of all new and existing biogenic and geogenic reef data</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	<b>Option 1:</b> Estimated 20 days effort (Researcher: 15 days, GIS analyst: 5 days) cost approx. €10,000 <b>Option 2:</b> Estimated 32 days effort (Researcher: 25 days, GIS analyst: 7 days) cost approx. €22,000
Required skills	Junior ecologist, GIS analyst
Estimated time scales	<b>Option 1:</b> 3 months. <b>Option 2:</b> 6 months

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<b>MSP Topic: Benthic habitats and species</b>	
<b>Mudflats and sandflats</b>	<b>Priority Rating: 1</b>
Data Product Description	This data product will provide a data layer identifying the location and general characteristics of intertidal mudflats and sandflats outside of the Natura 2000 network
Relevant existing Atlas data layers	Tidal Mudflats Sandflats
Proposed names for new Atlas data layers	Distribution of mudflats and sandflats
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permission to use data: <ul style="list-style-type: none"> <li>○ NPWS range and distribution maps for the distribution of intertidal mudflats and sandflats not covered by seawater at low tide (In preparation)</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ An existing layer is available through NPWS prepared during the creation of distribution maps for this habitat under EU Habitats Directive requirements. This layer includes data outside of the Natura 2000 network.</li> <li>○ Update and refine the existing distribution map by reference to current ortho imagery.</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log <ul style="list-style-type: none"> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 3 day effort (GIS analyst: 1 days) cost approx. €1,500
Required skills	GIS analyst
Estimated time scales	1 months

MSP Topic: Benthic habitats and species	
Sea caves	Priority Rating: 1
Data Product Description	This data product will update the existing Sea caves spatial data layer
Relevant existing Atlas data layers	Protected site/Conservation objectives/Habitat
Proposed names for new Atlas data layers	Distribution of sea cave habitats
<p><b>Outline methodology</b></p> <p>There is a paucity of publicly available collated records on sea caves in Irish waters. While some information is available through NPWS Article 17 reporting the data is extremely limited. Sea caves remain one of the most challenging habitats to survey. It is likely that a very large number of sea caves around the Irish coast are completely submerged and unknown. Without considerable exploration it is unlikely that the full extent of the national resource will ever be known. Continued surveys of this habitat are conducted by NPWS. However, the existing spatial distribution layer is considered to have significant inaccuracies. This has resulted from the difficulties in distinguishing Sea caves from adjacent reef habitat based on the use of ortho-imagery and oblique aerial imagery.</p> <ul style="list-style-type: none"> <li>• Data sources and permission to use data: <ul style="list-style-type: none"> <li>○ NPWS range and distribution maps for the distribution of submerged or partially submerged sea caves in Ireland (In preparation)</li> <li>○ OPW oblique coastal mapping. <a href="http://www.coastalhelicopterview.ie">http://www.coastalhelicopterview.ie</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Option 1 <ul style="list-style-type: none"> <li>○ Conduct a desktop review of the current distribution of sea caves to create a more accurate map</li> <li>○ Update and refine the existing distribution map</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (Unlikely to require updating)</li> </ul> </li> <li>○ Option 2 <ul style="list-style-type: none"> <li>○ As per option 1 but also conduct field surveys to ground truth the distribution of partially submerged sea caves to address inaccuracies resulting from desk surveys.</li> <li>○ Update the base map with the data from ground truthing</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (Unlikely to require updating)</li> </ul> </li> </ul> </li> </ul>	
Estimated staff effort/cost	<p><b>Option 1:</b> Estimated 15 days effort (1 x Researcher 10 days, 1 X GIS analyst 5 days) €8,000</p> <p><b>Option 2:</b> 2 x Field survey team (Ground truthing), (1 x Researcher 10 days, 1 X GIS analyst 10 days)) cost approx. €58,000</p>
Required skills	Marine ecologists, GIS analyst
Estimated time scales	12 months

<b>MSP Topic: Benthic habitats and species</b>	
<b>Coral gardens, <i>Lophelia pertusa</i> Reefs and Carbonate mounds</b>	
<b>Priority Rating: 1</b>	
Data Product Description	This data product will provide data layers identifying the location and general characteristics of Coral gardens, <i>Lophelia pertusa</i> Reefs and Carbonate mounds
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Distribution of Coral gardens Distribution of <i>Lophelia pertusa</i> Reefs Distribution of Carbonate mounds
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permission to use data: <ul style="list-style-type: none"> <li>○ Irish Cold-Water Coral Metadata Report (Deegan, 2004) <a href="https://www.npws.ie/sites/default/files/general/irish-coral-metadata-report.pdf">https://www.npws.ie/sites/default/files/general/irish-coral-metadata-report.pdf</a></li> <li>○ EMODNET OSPAR Habitat map <a href="https://www.emodnet-seabedhabitats.eu/access-data/download-data">https://www.emodnet-seabedhabitats.eu/access-data/download-data</a></li> <li>○ Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Review current OSPAR layer to identify gaps in spatial coverage of Coral gardens, <i>Lophelia pertusa</i> Reefs and Carbonate mounds</li> <li>○ Conduct a literature survey to identify additional records for Coral gardens, <i>Lophelia pertusa</i> reefs and Carbonate mounds with the aim of updating the base layer <ul style="list-style-type: none"> <li>○ Create a shapefile that includes these areas and lists the characterising species and physical/geological features associated with these areas.</li> </ul> </li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log <ul style="list-style-type: none"> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 25 days effort (Researcher: 20 days, GIS analyst: 5 days) cost approx. €10,000
Required skills	Junior ecologist, GIS analyst
Estimated time scales	2 months

<b>MSP Topic: Benthic habitats and species</b>	
<b>Sabellaria spinulosa reefs</b>	<b>Priority Rating: 1</b>
Data Product Description	This data product will provide a data layer identifying the location and general characteristics of inshore <i>Sabellaria spinulosa</i> reefs
Relevant existing Atlas data layers	OSPAR monitoring and protected sites
Proposed names for new Atlas data layers	Distribution of <i>Sabellaria spinulosa</i> reefs.
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>○ Data sources and permissions to use data <ul style="list-style-type: none"> <li>○ Review current OSPAR layer to identify gaps in spatial coverage of <i>Sabellaria spinulosa</i> reefs.</li> <li>○ NPWS 2018 EU Article 17 reporting for marine habitats Annex I habitats</li> </ul> </li> <li>● Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> <li>● Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Collate existing spatial data on the distribution of <i>Sabellaria spinulosa</i> in Ireland</li> <li>○ Create a shapefile that includes these areas and lists the characterising species and physical/geological features associated with these areas.</li> <li>○ Conduct a desk based study to identify intertidal areas with the potential to host this species.</li> <li>○ Conducted targeted field surveys of areas where intertidal <i>Sabellaria spinulosa</i> Reefs have been identified as having the potential to occur and use this information to address gaps in current mapping.</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log <ul style="list-style-type: none"> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> </li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 30 days effort (Researcher: 25 days, GIS analyst: 5 days) cost approx. €15,000
Required skills	Junior ecologist, GIS analyst
Estimated time scales	2 months

MSP Topic: Benthic habitats and species	
Distribution of <i>Zostera</i> , maerl and Sea-Pen & Burrowing Megafauna Communities	Priority Rating: 1
Data Product Description	This data product will update the existing layer for the distribution of <i>Zostera</i> , maerl and Sea-Pen & Burrowing Megafauna Communities within the Natura 2000 network and also create a data layer identifying the distribution and general characteristics of <i>Zostera</i> , maerl and Sea-Pen & Burrowing Megafauna Communities outside of the Natura 2000 network
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Distribution of <i>Zostera</i> , Distribution of maerl and Distribution of Sea-Pen & Burrowing Megafauna Communities
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>○ Data sources and permissions to use data <ul style="list-style-type: none"> <li>○ NPWS records for Maerl outside of the Natura 2000 network.</li> <li>○ NPWS 2018 EU Article 17 reporting for marine habitats Annex I habitats</li> </ul> </li> <li>● Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> <li>● Outline tasks for creating data product</li> <li>○ Option 1 <ul style="list-style-type: none"> <li>○ Update existing layer (Protected sites/Conservation objectives/Habitats) to include recently collated Article 17 monitoring data on the distribution of these species and their associated habitats from Special Areas of Conservation.</li> <li>○ Collate existing spatial data on the distribution of <i>Zostera</i>, maerl and Sea-Pen &amp; Burrowing Megafauna Communities in Ireland outside of the Natura 2000 network.</li> <li>○ Create a shapefile that includes these areas and lists the characterising species and physical/geological features associated with these areas.</li> </ul> </li> <li>○ Option 2 <ul style="list-style-type: none"> <li>○ Conduct a desk surveys to Identify areas outside of the Natura 2000 network with the potential to host <i>Zostera</i>, maerl and Sea-Pen &amp; Burrowing Megafauna Communities.</li> </ul> </li> <li>○ Conducted targeted field surveys of the identified inshore areas, outside of the Natura 2000 network, where these species and their associated habitat have the potential to occur.</li> <li>○ Create data layers for each species for distribution (presence/absence and relative abundance).</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> <li>○</li> </ul> </li> </ul>	
Estimated staff effort/cost	<p><b>Option 1:</b> Estimated 4 days effort (Ecologist 3 days GIS analyst 1 day). cost approx. €2,000</p> <p><b>Option 2:</b> Estimated 30 days field survey effort (Survey team consisting of three marine ecologists, vessel support and equipment). GIS analyst: 20 days. Cost approx. €90,000</p>

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Required skills	Experienced Marine survey ecologists, Dropdown video operator and analyst, Dive support, GIS analyst
Estimated time scales	Option 1 – 1 month Option 2 – 6 months

MSP Topic: Benthic habitats and species	
Location of Invasive Alien Species	Priority Rating: 1
Data Product Description	This data product will provide a data layer showing the spatial distribution of key Invasive Alien species
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Distribution X for key IAS
<p><b>Outline methodology</b></p> <p>There is a paucity of publicly available collated records on IAS in Irish waters. The NBDC database contains limited records for only 4 species of marine IAS <a href="https://maps.biodiversityireland.ie/Map">https://maps.biodiversityireland.ie/Map</a>. Some additional records are available from CABI <a href="https://www.cabi.org/isc">https://www.cabi.org/isc</a>. There is an existing MI project to collate information on marine IAS. It will not be cost effective to replicate this effort within the Spatial Data and Evidence Project. Outputs from the MI marine IAS project should be used to create data layers for marine planning once available (probably 2020).</p>	
Estimated staff effort/cost	Being taken forward under separate MI marine IAS project
Required skills	N/A
Estimated time scales	2020

MSP Topic: Benthic habitats and species	
Seaweed	Priority Rating: 2
Data Product Description	This data product will provide point data layers indicating the recorded distribution of key seaweed species around the Irish coast including <i>Ascophyllum nodosum</i> , <i>Laminaria hyperborea</i> , <i>Laminaria digitata</i> , <i>Saccharina latissima</i> , <i>Palmaria palmata</i> , <i>Chondrus crispus</i> , <i>Mastocarpus stellatus</i> , <i>Gracilaria gracilis</i> , <i>Porphyra umbilicalis</i> , <i>Fucus vesiculosus</i> , <i>Fucus spiralis</i> , <i>Ulva</i> spp.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Distribution of X
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permission to use data: <ul style="list-style-type: none"> <li>○ National biodiversity data centre: <a href="https://maps.biodiversityireland.ie/Species">https://maps.biodiversityireland.ie/Species</a></li> <li>○ Environmental protection agency: <a href="http://erc.epa.ie/safer/index.jsp">http://erc.epa.ie/safer/index.jsp</a></li> <li>○ National Parks and Wildlife Service. Data available on request</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Collate all existing publicly available data on the distribution of the following key species of Seaweed in Ireland. The records contained in the spatial data sources detailed above have already been verified for taxonomic and location accuracy.</li> <li>○ Key species: <p style="margin-left: 20px;"><i>Ascophyllum nodosum</i>  <i>Laminaria hyperborea</i>  <i>Laminaria digitata</i>  <i>Saccharina latissima</i>  <i>Palmaria palmata</i>  <i>Chondrus crispus</i>  <i>Mastocarpus stellatus</i>  <i>Gracilaria gracilis</i>  <i>Porphyra umbilicalis</i>  <i>Fucus vesiculosus</i>  <i>Fucus spiralis</i>  <i>Ulva</i> spp.</p> </li> <li>○ Create a single shapefile of all available records.</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (Unlikely to require updating)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 10 days effort (Ecologist 8 days GIS analyst 2 days) cost approx. €5,000
Required skills	GIS analyst
Estimated time scales	2 months

## B.6 Fish and shellfish

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Fish and Shellfish topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

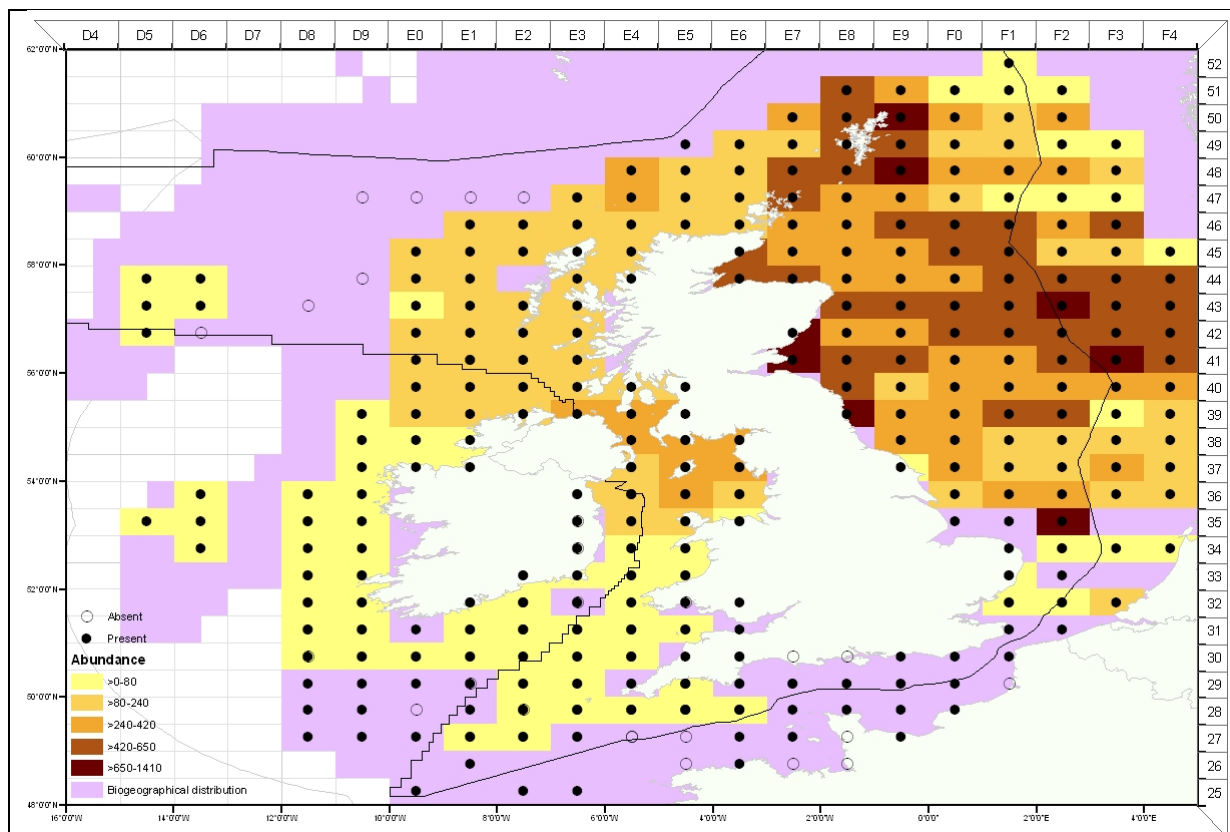
- Map of SACs for which designation includes fish features (including migratory fish)

Important gaps (priority 2) have also been identified for the following data products:

- Current distribution and abundance of key commercial fish species (Atlantic Cod; Blue Whiting; Haddock; Hake, Herring; Horse Mackerel; Mackerel; Megrim; Monkfish; Whiting) - potentially could include additional species
- Location of spawning and nursery areas for key commercial fish species (Atlantic Cod; Blue Whiting; Haddock; Hake, Herring; Horse Mackerel; Mackerel; Megrim; Monkfish; Whiting) - potentially could include additional species
- Current distribution of migratory fish (Atlantic salmon; Brook lamprey, river lamprey; sea lamprey; Twaite shad)
- Current distribution and abundance of key elasmobranch species (potentially to include Portuguese Dogfish ; Gulper Shark; Leafscale Gulper Shark; Spurdog; Angel Shark; Shortfin Mako; Porbeagle Shark; Tope Shark; Blue Shark; Common Skate Complex; Sandy Ray; Thornback Ray; Spotted Ray; Undulate Ray; White Skate)
- Current distribution and abundance of basking shark
- Location of spawning and nursery areas for key elasmobranch species (potentially to include Portuguese Dogfish; Gulper Shark; Leafscale Gulper Shark; Spurdog; Angel Shark; Basking Shark; Shortfin Mako; Porbeagle Shark; Tope Shark; Blue Shark; Common Skate Complex; Sandy Ray; Thornback Ray; Spotted Ray; Undulate Ray; White Skate)
- Location of key shellfish beds (cockle, native oyster, razor clam, scallop)
- Location of scallop habitat

<b>MSP Topic: Fish and Shellfish</b>	
<b>Location of SACs with designated fish features</b>	<b>Priority Rating: 1</b>
Data Product Description	This data product will provide a data layer identifying SACs that include marine or migratory fish features
Relevant existing Atlas data layers	Special Areas of Conservation
Proposed names for new Atlas data layers	Special Areas of Conservation with marine or migratory fish features
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Special Areas of Conservation (shapefiles already on Marine Atlas)</li> <li>○ Information on SAC features – available from <a href="https://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives">https://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Identify SACs that supported designated marine or migratory fish species (based on citation descriptions)</li> <li>○ Create new shapefile that includes these sites and identifies the fish features associated with each site.</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual check)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 3 days staff effort (1 day Env Scientist; 2 days GIS analyst) cost approx. €1,200
Required skills	Env scientist; GIS analyst
Estimated time scales	1 week

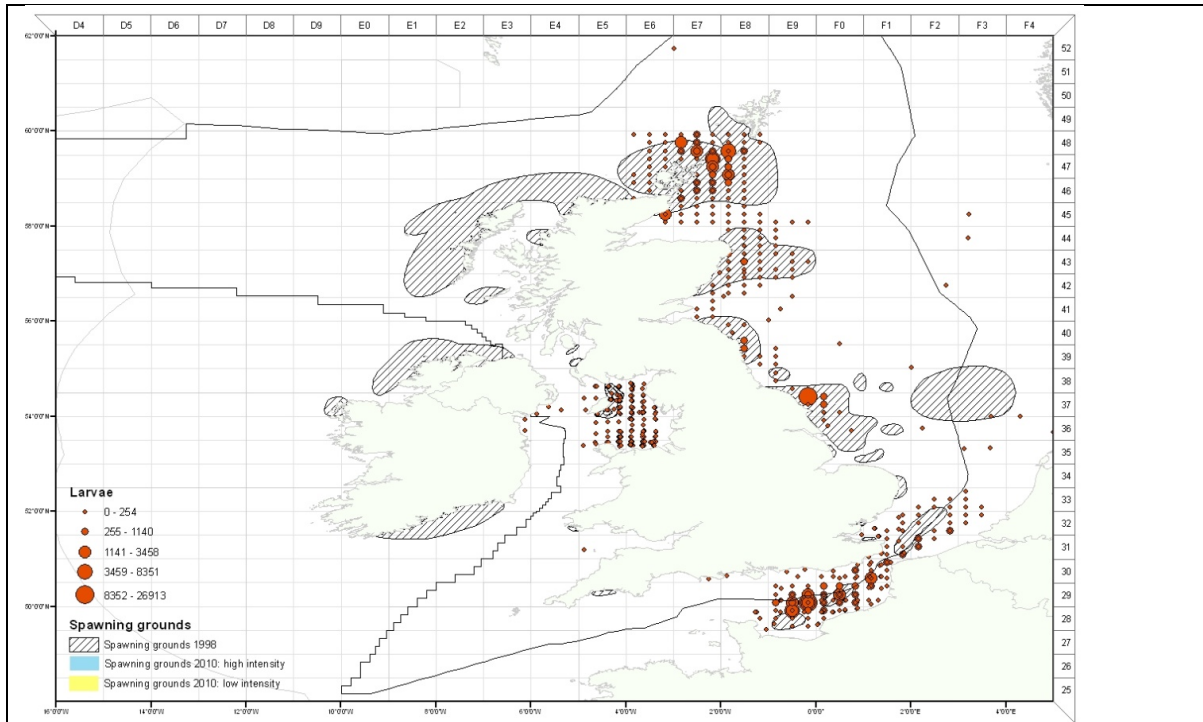
MSP Topic: Fish and Shellfish	
Current distribution and abundance of key commercial fish species	Priority Rating: 2
Data Product Description	This data product will provide information on the current spatial distribution and relative abundance of key commercial fish species in Irish waters: Atlantic Cod; Blue whiting; Haddock; Hake, Herring; Horse Mackerel; Mackerel; Megrim; Monkfish; Whiting – could potentially include additional species if data robust
Relevant existing Atlas data layers	Search for X; Range for X; Observations X
Proposed names for new Atlas data layers	Distribution of X; Relative Abundance of X
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Irish Groundfish Survey data (last 10 years) – collected by MI</li> <li>○ Other Groundfish surveys (to provide greater coverage of Irish waters) e.g. English Celtic and Irish Sea GFS; English Near West Coast BTS – collected by UK fisheries institutes</li> <li>○ Data can be accessed via ICES <a href="http://ices.dk/marine-data/data-portals/Pages/DATRAS.aspx">http://ices.dk/marine-data/data-portals/Pages/DATRAS.aspx</a> (trawl surveys) and <a href="http://ices.dk/marine-data/data-portals/Pages/acoustic.aspx">http://ices.dk/marine-data/data-portals/Pages/acoustic.aspx</a> (pelagic surveys) available as open source data</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Follow methodology in Ellis <i>et al</i> (2010) Accessing and developing the required biophysical datasets and data layers for Marine Protected Areas network planning and wider marine spatial planning purposes Report No 15: Task 2B Distribution of highly mobile species</li> <li>○ Create data layers for each species for distribution (presence/absence and relative abundance as (i) XXX_quarter_rectangle_layer.shp; (ii) XXX_half_rectangle_layer.shp; and (iii) XXX_rectangle_layer.shp. Where high resolution data are available, the layers should be produced at the resolution of quarter rectangle – see cod example below</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	



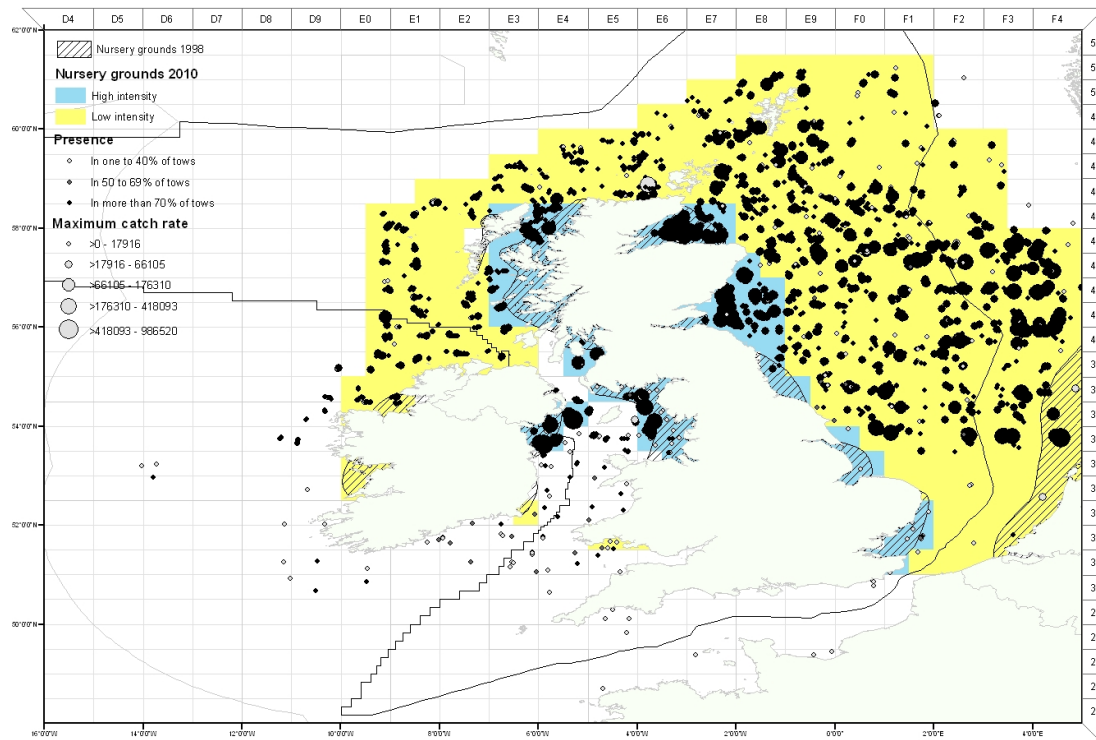
**Example data layers for cod indicating the overall biogeographical range; presence/absence in otter trawl and beam trawl surveys; and relative abundance in otter trawl surveys.**

Estimated staff effort/cost	Estimated 25 days staff effort (20 days GIS analyst; 5 days fisheries scientist) cost approx. €10,000
Required skills	GIS analyst; fisheries scientist with knowledge of fisheries surveys data
Estimated time scales	8 weeks

<b>MSP Topic: Fish and Shellfish</b>	
<b>Spawning and nursery areas of key commercial fish species</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide information on current spatial distribution of spawning and nursery areas of key commercial fish species in Irish waters: Atlantic Cod; Blue whiting; Haddock; Hake, Herring; Horse Mackerel; Mackerel; Megrim; Monkfish; Whiting – potentially could include additional species if data robust
Relevant existing Atlas data layers	X Spawning Ground; X Nursery Ground
Proposed names for new Atlas data layers	X Spawning Ground Intensity; X Spawning Ground Larval Density X Nursery Ground Intensity; X Nursery Ground Presence; X Nursery Ground Maximum Catch Rate
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Irish Groundfish Survey data (juvenile fish) – collected by MI</li> <li>○ Other Groundfish surveys (to provide greater coverage of Irish waters) e.g. English Celtic and Irish Sea GFS; English Near West Coast BTS – collected by UK fisheries institutes</li> <li>○ International Herring Larval Survey (IHLS)</li> <li>○ Triennial mackerel egg survey</li> <li>○ Irish Sea plankton surveys</li> <li>○ Eastern Irish Sea plaice surveys</li> <li>○ Data can be accessed via ICES <a href="http://ices.dk/marine-data/data-portals/Pages/DATRAS.aspx">http://ices.dk/marine-data/data-portals/Pages/DATRAS.aspx</a> (trawl surveys) and <a href="http://ices.dk/marine-data/data-portals/Pages/acoustic.aspx">http://ices.dk/marine-data/data-portals/Pages/acoustic.aspx</a> (pelagic surveys) - available as open source data</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Follow methodology in Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. 2012. Spawning and nursery grounds of selected fish species in UK waters. Sci. Ser. Tech. Rep., Cefas Lowestoft, 147: 56 pp.</li> <li>○ Create data layers for spawning and nursery areas for each species</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	



Example data layers for herring spawning areas.

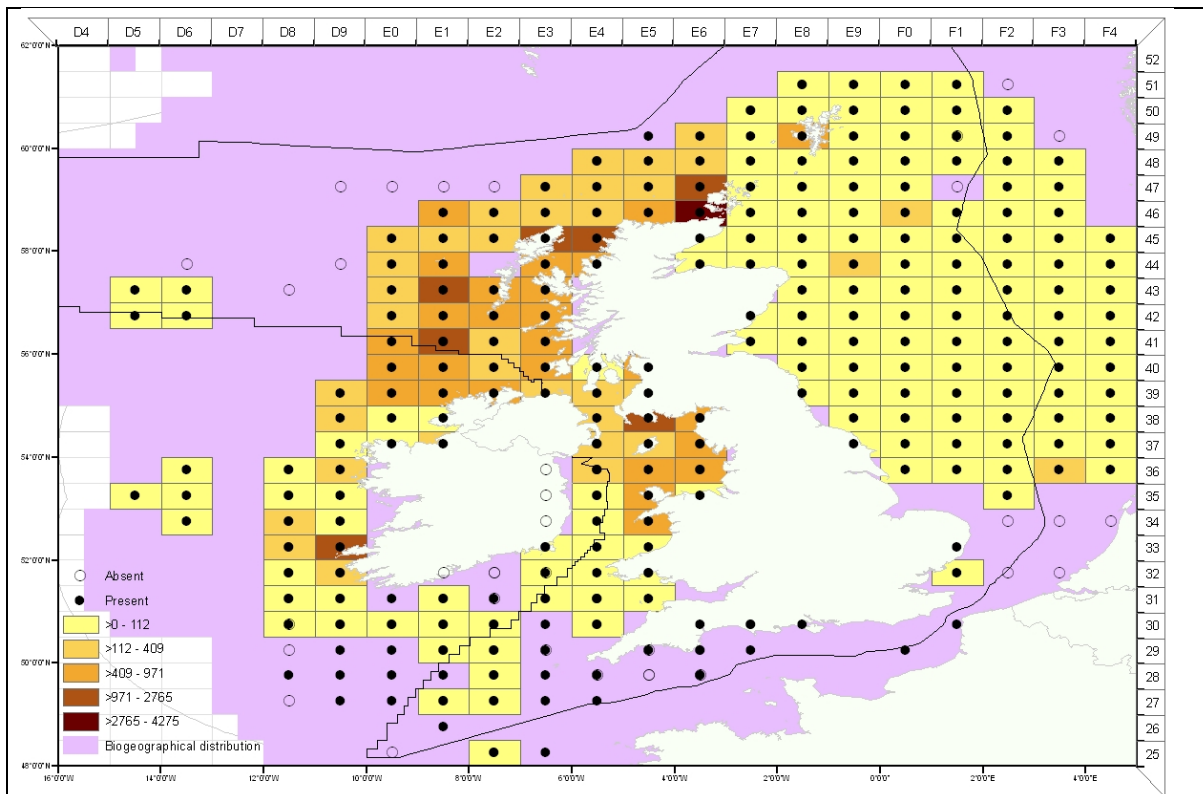


Example data layers for herring nursery areas.

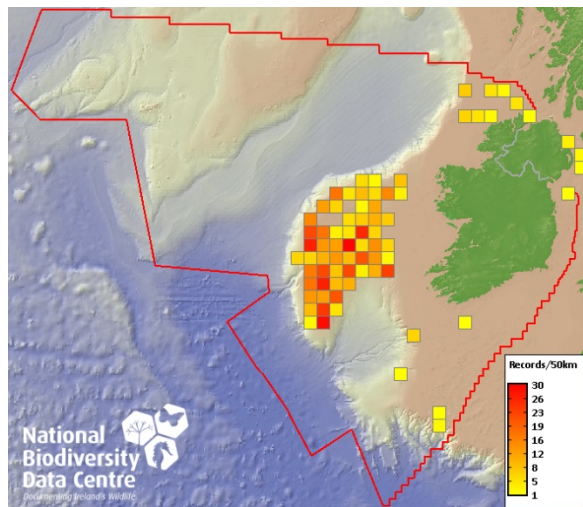
Estimated staff effort/cost	Estimated 25 days staff effort (20 days GIS analyst; 5 days fisheries scientist) cost approx. €10,000
Required skills	GIS analyst; fisheries scientist with knowledge of fisheries surveys data
Estimated time scales	8 weeks

<b>MSP Topic: Fish and Shellfish</b>	
<b>Current distribution of migratory fish</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide information on the current spatial distribution and relative abundance of key migratory fish species in Irish waters: (Atlantic salmon; Brook lamprey, river lamprey; sea lamprey; Twaite shad)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Distribution of X; Relative Abundance of X
<b>Outline methodology</b> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Use IFI maps once available (referenced on NPWS website)</li> </ul> </li> </ul> <a href="https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17/species/fish">https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17/species/fish</a> <ul style="list-style-type: none"> <li>○ Establish update frequency (10 years)</li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €1,000
Required skills	GIS analyst;
Estimated time scales	1 week

MSP Topic: Fish and Shellfish	
Current distribution and abundance of key elasmobranch species	Priority Rating: 2
Data Product Description	This data product will provide information on the current spatial distribution and relative abundance of key elasmobranch species in Irish waters: (potentially to include Portuguese Dogfish ; Gulper Shark; Leafscale Gulper Shark; Spurdog; Angel Shark; Basking Shark; Shortfin Mako; Porbeagle Shark; Tope Shark; Blue Shark; Common Skate Complex; Sandy Ray; Thornback Ray; Spotted Ray; Undulate Ray; White Skate)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Distribution of X; Relative Abundance of X
<p><b>Outline methodology</b></p> <p>Option 1 (preferred)</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Irish Groundfish Survey data (last 10 years) – collected by MI</li> <li>○ Other Groundfish surveys (to provide greater coverage of Irish waters) e.g. English Celtic and Irish Sea GFS; English Near West Coast BTS – collected by UK fisheries institutes</li> <li>○ Data can be accessed via ICES <a href="http://ices.dk/marine-data/data-portals/Pages/DATRAS.aspx">http://ices.dk/marine-data/data-portals/Pages/DATRAS.aspx</a> (trawl surveys) and <a href="http://ices.dk/marine-data/data-portals/Pages/acoustic.aspx">http://ices.dk/marine-data/data-portals/Pages/acoustic.aspx</a> (pelagic surveys) - available as open source data</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Follow methodology in Ellis et al (2010) Accessing and developing the required biophysical datasets and data layers for Marine Protected Areas network planning and wider marine spatial planning purposes Report No 15: Task 2B Distribution of highly mobile species</li> <li>○ Create data layers for each species for distribution (presence/absence and relative abundance as (i) XXX_quarter_rectangle_layer.shp; (ii) XXX_half_rectangle_layer.shp; and (iii) XXX_rectangle_layer.shp. Where high resolution data are available, the layers should be produced at the resolution of quarter rectangle – see cod example below</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p>Alternative option (option 2) would be to use existing data from Chondrichthyans of Ireland e.g. <a href="https://maps.biodiversityireland.ie/Dataset/259">https://maps.biodiversityireland.ie/Dataset/259</a> available under CC licence but these maps are considered to be unrepresentative and this approach is not recommended.</p>	



Example data layers for spurdog



**Black-mouth dogfish**

Estimated staff effort/cost	Option 1 - Ellis et al method: Estimated 25 days staff effort (20 days GIS analyst; 5 days fisheries scientist) cost approx. €10,000 Option 2 - NBDC data records – limited data quality (incomplete records/coverage) Estimated 5 days staff effort (5 days GIS analyst) cost approx. €2,000
Required skills	GIS analyst; fisheries scientist with knowledge of fisheries surveys data
Estimated time scales	Ellis et al: 8 weeks Basking shark – 2 weeks NBDC method – 2 weeks

<b>MSP Topic: Fish and Shellfish</b>	
<b>Current distribution and abundance of key elasmobranch species</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide information on the current spatial distribution and relative abundance of basking shark Irish waters
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Distribution of X; Relative Abundance of X
<b>Outline methodology</b> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ IWDG basking shark database (available from IWDG)</li> <li>○ ARGOS tracking data - QUB</li> <li>○ Basking Shark Ireland <a href="mailto:info@baskingshark.ie">info@baskingshark.ie</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Create point density layers based on IWDG database</li> <li>○ Consider incorporation of float tracking data from other sources</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 5 days staff effort (4 days GIS analyst; 1 day IWDG) cost approx. €2,000
Required skills	GIS analyst
Estimated time scales	2 weeks

<b>MSP Topic: Fish and Shellfish</b>	
<b>Spawning and nursery grounds for key elasmobranch species</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide information on the location of spawning and nursery grounds for key elasmobranch species in Irish waters: (potentially to include Portuguese Dogfish ; Gulper Shark; Leafscale Gulper Shark; Spurdog; Angel Shark; Basking Shark; Shortfin Mako; Porbeagle Shark; Tope Shark; Blue Shark; Common Skate Complex; Sandy Ray; Thornback Ray; Spotted Ray; Undulate Ray; White Skate)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	
<b>Outline methodology</b> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Irish Groundfish Survey data (juvenile fish) – collected by MI</li> <li>○ Other Groundfish surveys (to provide greater coverage of Irish waters) e.g. English Celtic and Irish Sea GFS; English Near West Coast BTS – collected by UK fisheries institutes</li> <li>○ International Herring Larval Survey (IHLS)</li> <li>○ Triennial mackerel egg survey</li> <li>○ Irish Sea plankton surveys</li> <li>○ Eastern Irish Sea plaice surveys</li> <li>○ Data can be accessed via ICES <a href="http://ices.dk/marine-data/data-portals/Pages/DATRAS.aspx">http://ices.dk/marine-data/data-portals/Pages/DATRAS.aspx</a> (trawl surveys) and <a href="http://ices.dk/marine-data/data-portals/Pages/acoustic.aspx">http://ices.dk/marine-data/data-portals/Pages/acoustic.aspx</a> (pelagic surveys) - available as open source data</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Follow methodology in Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. 2012. Spawning and nursery grounds of selected fish species in UK waters. Sci. Ser. Tech. Rep., Cefas Lowestoft, 147: 56 pp.</li> <li>○ Create data layers for spawning and nursery areas for each species as far as practicable</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Ellis et al method: Estimated 25 days staff effort (20 days GIS analyst; 5 days fisheries scientist) cost approx. €10,000
Required skills	GIS analyst; fisheries scientist with knowledge of fisheries surveys data
Estimated time scales	8 weeks

<b>MSP Topic: Fish and Shellfish</b>	
<b>Key shellfish beds</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide information on the location of key shellfish beds and shellfish density in Irish waters (cockle, oyster, razor clam, scallop)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Location and density of key [shellfish] beds
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data:               <ul style="list-style-type: none"> <li>○ Shellfish Stocks and Fisheries Review 2016-2017: an assessment of selected stocks</li> <li>○ Shellfish Stocks and fisheries Review 2015</li> <li>○ Shellfish Stocks and Fisheries Review 2010 and shapefile:</li> <li>○ <a href="https://data.gov.ie/dataset/9289714e-97cc-46d1-a20a-73b06f8e50bd/resource/38c9c904-7e5c-4e29-9389-7af7e264a3cf">https://data.gov.ie/dataset/9289714e-97cc-46d1-a20a-73b06f8e50bd/resource/38c9c904-7e5c-4e29-9389-7af7e264a3cf</a></li> <li>○ Data required from BIM (available under CC licence)</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Obtain data layers from BIM</li> <li>○ Create national location/density maps for each species based on last 5/10 years' data</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 5 days staff effort (4 days GIS analyst; 1 day fisheries scientist) cost approx. €2,500
Required skills	GIS analyst; fisheries scientist with knowledge of shellfisheries surveys data
Estimated time scales	2 weeks

<b>MSP Topic: Fish and Shellfish</b>	
<b>Scallop Habitat</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide information on the location of Scallop habitat in Irish waters
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Scallop habitat
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ <a href="http://www.isde.ie/#/9b42028b-4b4f-44c0-bcbd-2e588e124ca1">http://www.isde.ie/#/9b42028b-4b4f-44c0-bcbd-2e588e124ca1</a></li> <li>○ MI report prepared for BIM 2010</li> <li>○ Data required from BIM or MI (available under CC licence)</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Obtain data layers from MI/BIM</li> <li>○ Layers may require editing</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €1,000
Required skills	GIS analyst; fisheries scientist with knowledge of data
Estimated time scales	1 week

## B.7 Marine mammals

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Marine Mammals topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet Prioritisation-Master\_compiled – 2018-12-03.

Key priorities (priority 1) for which data gap has been identified:

- None

Important gaps (priority 2) have been identified for the following data products:

- Current distribution and abundance of key cetacean species (Atlantic White-sided Dolphin, Beaked Whale, Blue Whale, Bottlenose Dolphin, Common Dolphin, Cuvier's beaked whale, Fin Whale, Harbour Porpoise, Humpback Whale, Killer Whale, Long finned pilot whale, Minke Whale, Northern bottlenose whale, Risso's Dolphin, Sowerby's beaked whale, Sperm Whale, Striped Dolphin, White-beaked Dolphin)
- Functional use of areas by key cetacean species (Atlantic White-sided Dolphin, Beaked Whale, Blue Whale, Bottlenose Dolphin, Common Dolphin, Cuvier's beaked whale, Fin Whale, Harbour Porpoise, Humpback Whale, Killer Whale, Long finned pilot whale, Minke Whale, Northern bottlenose whale, Risso's Dolphin, Sowerby's beaked whale, Sperm Whale, Striped Dolphin, White-beaked Dolphin)
- Current distribution and abundance of seals (Grey seal; Harbour seal)
- Functional use of areas by seals (Grey seal; Harbour seal)
- Current distribution and abundance of otter
- Management Units for cetaceans (Common Dolphin, Harbour Porpoise, Risso's Dolphin, Atlantic White-sided Dolphin, Bottlenose Dolphin, Minke Whale, White-beaked Dolphin)
- Management units for seals (Grey seal; Harbour seal)
  -

MSP Topic: Marine mammals	
Current spatial distribution and/or abundance/intensity of cetaceans	Priority Rating: 2
Data Product Description	This data product will provide information on the current spatial distribution and relative abundance of key cetaceans (Atlantic White-sided Dolphin, Beaked Whale, Blue Whale, Bottlenose Dolphin, Common Dolphin, Cuvier's beaked whale, Fin Whale, Harbour Porpoise, Humpback Whale, Killer Whale, Long Finned Pilot Whale, Minke Whale, Northern Bottlenose Whale, Risso's Dolphin, Sowerby's Beaked Whale, Sperm Whale, Striped Dolphin, White-beaked Dolphin)
Relevant existing Atlas data layers	Search for X, Observations of X, Abundance of X
Proposed names for new Atlas data layers	Distribution of X, Relative Abundance of X
<p><b>Outline methodology</b></p> <p>A recent study (Kavanagh et al., 2018) combined a wide range of datasets including SCANS, CODA, SIAR, PReCAST, ESAS, and ISCOPE and ship-based surveys from SCANS II all carried out between 1979-2016. These combined datasets provide good coverage but a lot of the data are historic. This would however make a good starting point to add on more recent datasets.</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data – <ul style="list-style-type: none"> <li>○ Irish Whale and Dolphin Group (2012-2017)</li> <li>○ SMRU (SCANS III) Contact: St Andrews University</li> <li>○ NPWS and MI fisheries surveys. Contact: Dept of Culture, Heritage and the Gaeltacht and/or MI</li> <li>○ DCCAE - ObSERVE programme.</li> <li>○ Access MMO reports from seismic surveys Petroleum Affairs Division and other MMO reports from NPWS (<a href="mailto:offshore@chg.gov.ie">offshore@chg.gov.ie</a>). Some already accessed and mapped by Kavanagh et al. (2018) during KOSMOS project.</li> <li>○ Large whale sightings from Baines et al. (2017)</li> <li>○ Other ad hoc records may also be used to supplement 'Search for' and 'Observations' layers</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ 'Distribution of' layers will comprise two elements – areas that have been subject to survey effort ('Search for' data) and areas where the presence of the cetacean species has been recorded ('Observations of' X. The 'Search for' map is to be created on 0.5 x 0.5 degree grid based on Kavanagh et al. (2017) using effort data from above surveys (last 10 years). Where other ad hoc surveys record presence of a particular species in a block cell not subject to effort in the other main surveys, this should be added to the 'Search for' map. The 'Observations of' maps to be created on 0.5 x 0.5 degree grid based on Kavanagh et al. (2017) using observations data from above surveys (last 10 years). Where other ad hoc surveys record presence of a particular species in a block cell not subject to effort in the other main surveys, this should be added to the 'Observations of' map. Where search effort has occurred in a grid cell but the presence of the cetacean species hasn't been recorded, this will be denoted by an</li> </ul> </li> </ul>	

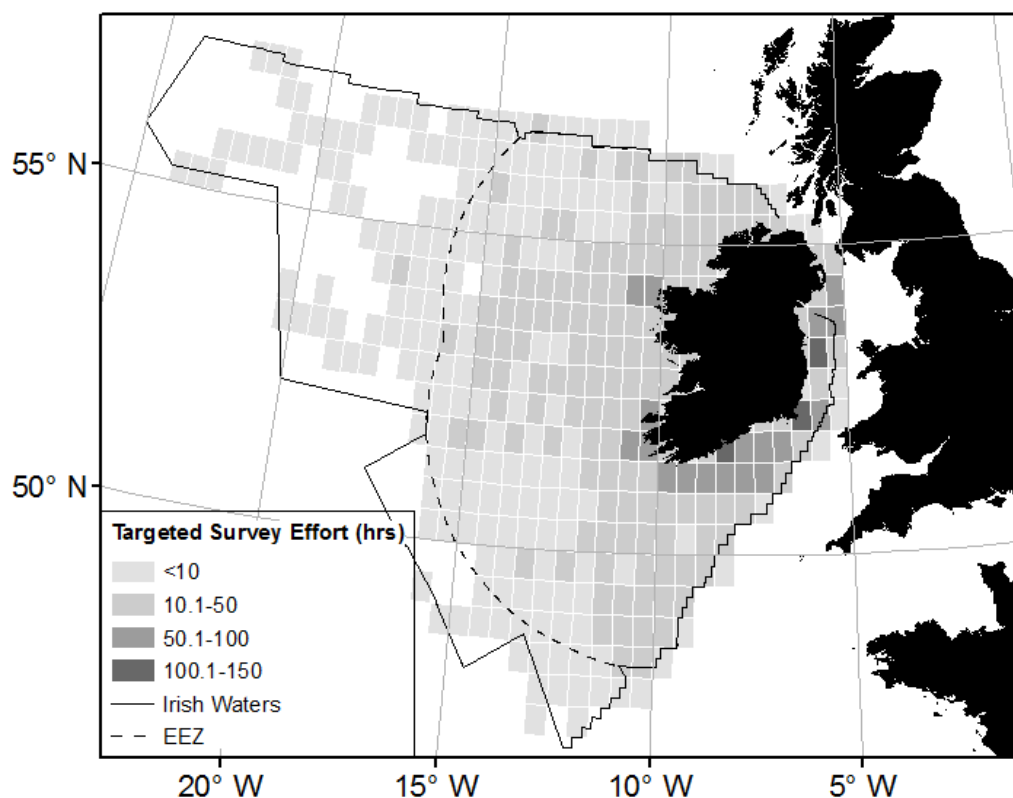
open circle. Where the presence of a cetacean species has been recorded, this will be denoted by a solid circle. The combined layers will form the 'Distribution of' layers.

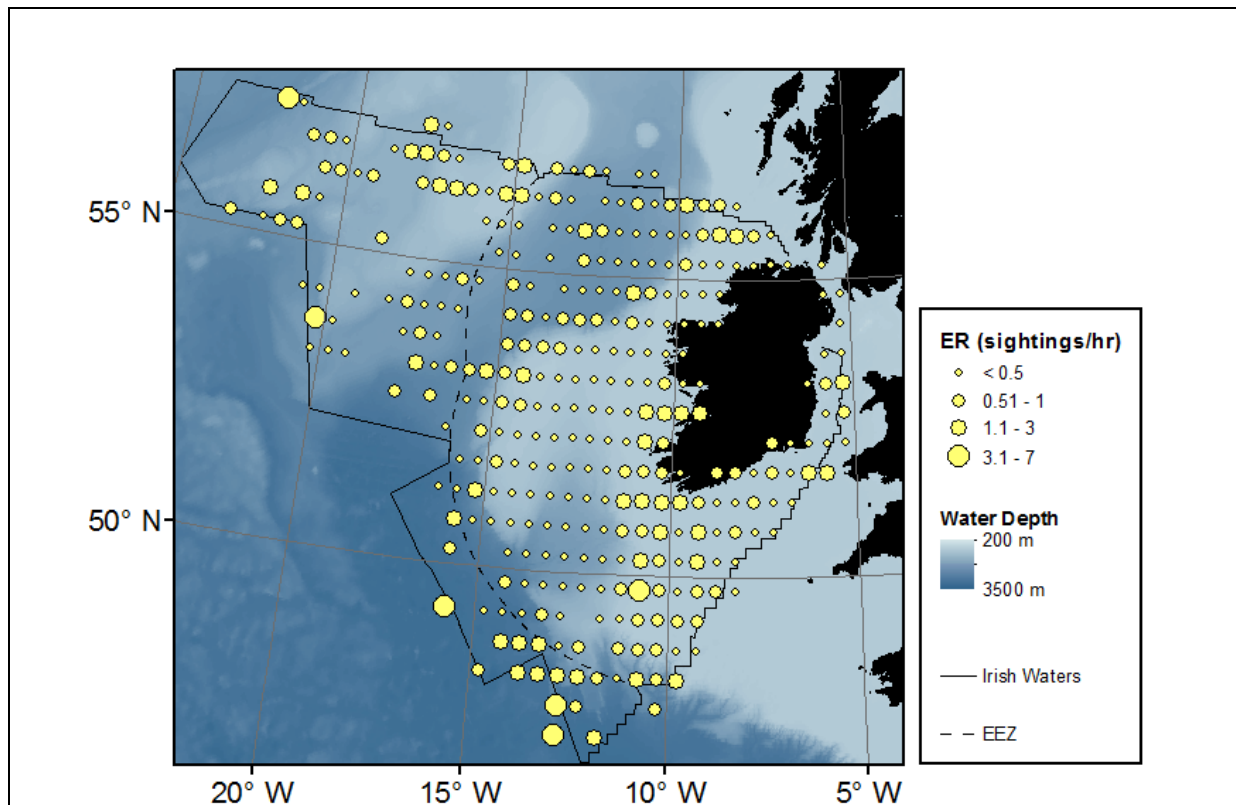
- Abundance layer to be created as abundance per standard unit effort, based on boat/shore surveys for which effort data is available
- Separate layer for aerial visual surveys data and for passive acoustic data recommended
- Create metadata record consistent with ISDE requirements
- Create data processing log
- Establish update frequency (10 years)

## References

Baines M., Reichelt M, Griffin D. (2017) An autumn aggregation of fin (*Balaenoptera physalus*) and blue whales (*B. musculus*) in the Porcupine Seabight, southwest of Ireland, Deep-Sea Research Part II <http://dx.doi.org/10.1016/j.dsr2.2017.03.007>

Kavanagh, A.S., Hunt, W., Richardson, N., Jessopp, M (2018) Cetaceans in Irish offshore waters: Final Report of the SFI-KOSMOS Project 2015-2017. MaREI Centre for Marine and Renewable Energy, Environmental Research Institute, University College Cork





Survey effort and Encounter rates (ER - cetacean sightings per hour of survey effort) in Beaufort sea state  $\leq 4$  (all years and seasons combined) for targeted surveys in Irish waters from Kavanagh et al. (2018)

Estimated staff effort/cost	Estimated 35 days staff effort (20 days GIS analyst; 15 marine mammal biologist) cost approx. €14,000
Required skills	GIS analyst; marine mammal biologist with knowledge of marine mammal surveys data
Estimated time scales	8 weeks

MSP Topic: Marine mammals	
Spatial information on current ecological function of cetaceans	Priority Rating: 2
Data Product Description	This data product will provide information on the current spatial information on current ecological function of key cetaceans (Atlantic White-sided Dolphin, Beaked Whale, Blue Whale, Bottlenose Dolphin, Common Dolphin, Cuvier's beaked whale, Fin Whale, Harbour Porpoise, Humpback Whale, Killer Whale, Long finned pilot whale, Minke Whale, Northern bottlenose whale, Risso's Dolphin, Sowerby's beaked whale, Sperm Whale, Striped Dolphin, White-beaked Dolphin)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Functional Use X
<p><b>Outline methodology</b></p> <p>Ecological function is considered to refer to breeding and feeding areas and migration routes and other areas or times of year that are essential for proper ecological functioning. These data layers will enhance information on distribution and abundance of key cetacean species by identifying key functional use of areas where this is understood. Most of the relevant data are contained within the same datasets (i.e. sightings of calves, feeding aggregations)</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data – <ul style="list-style-type: none"> <li>○ Irish Whale and Dolphin Group (2012-2017)</li> <li>○ SMRU (SCANS III) Contact: St Andrews University</li> <li>○ NPWS and MI fisheries surveys.</li> <li>○ DCCAE - ObSERVE programme.</li> <li>○ Access MMO reports from seismic surveys Petroleum Affairs Division and other MMO reports from NPWS (<a href="mailto:offshore@chg.gov.ie">offshore@chg.gov.ie</a>). Some already accessed and mapped by Kavanagh et al. (2018) during KOSMOS project.</li> <li>○ Large whale sightings from Baines et al. (2017)</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Using 'Distribution of' layers created in previous road map, annotate grid cells where species is present to identify whether the cell is primarily used for feeding, breeding, calving, nursery or migration, to the extent to which this is known</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p>References</p> <p>Baines M., Reichelt M, Griffin D. (2017) An autumn aggregation of fin (<i>Balaenoptera physalus</i>) and blue whales (<i>B. musculus</i>) in the Porcupine Seabight, southwest of Ireland, Deep-Sea Research Part II <a href="http://dx.doi.org/10.1016/j.dsr2.2017.03.007">http://dx.doi.org/10.1016/j.dsr2.2017.03.007</a></p> <p>Ellis et al (2010)</p>	

Kavanagh, A.S., Hunt, W., Richardson, N., Jessopp, M (2018) Cetaceans in Irish offshore waters: Final Report of the SFI-KOSMOS Project 2015-2017. MaREI Centre for Marine and Renewable Energy, Environmental Research Institute, University College Cork	
Estimated staff effort/cost	Estimated 15 days staff effort (5 days GIS analyst; 10 marine mammal biologist) cost approx. €6,000. Assuming data is already made ready through previous work packages
Required skills	GIS analyst; marine mammal biologist with knowledge of marine mammal survey data
Estimated time scales	4 weeks

**MSP Topic: Marine mammals**

**Current spatial distribution and/or abundance/intensity of feature** Priority Rating: 2

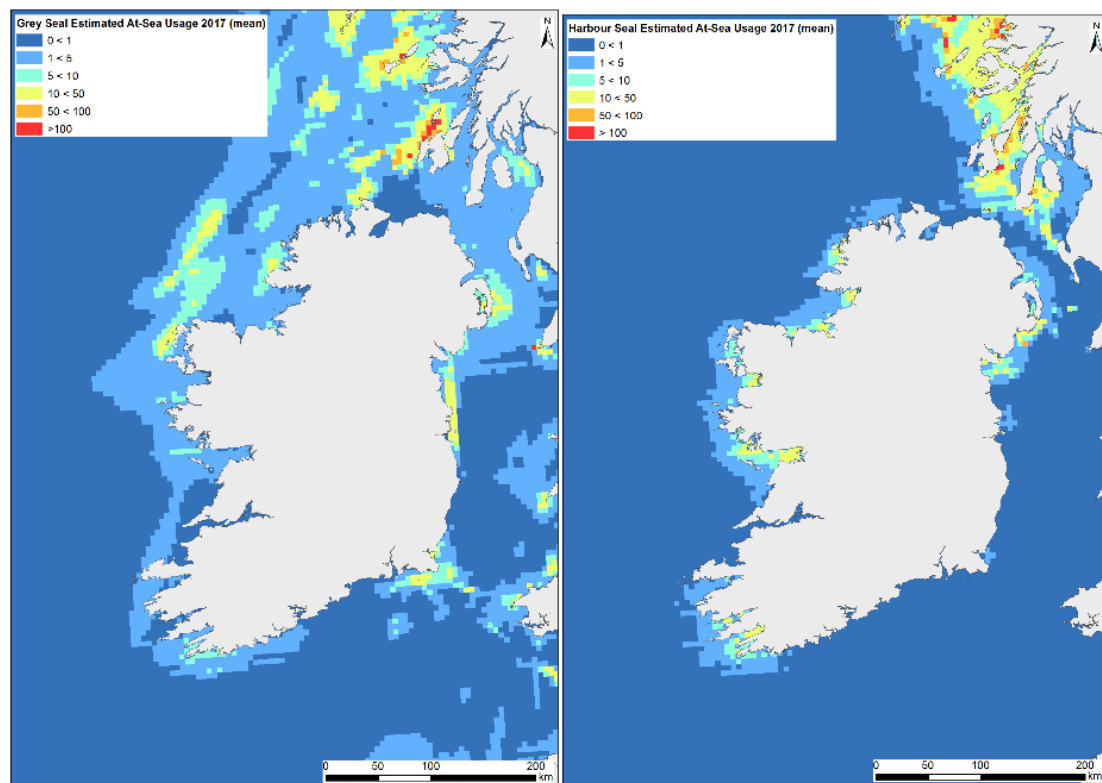
Data Product Description	This data product will provide information on the current spatial distribution and relative abundance of seal species
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Relevant existing Atlas data layers	None
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Proposed names for new Atlas data layers	Grey Seal distribution Harbour Seal distribution
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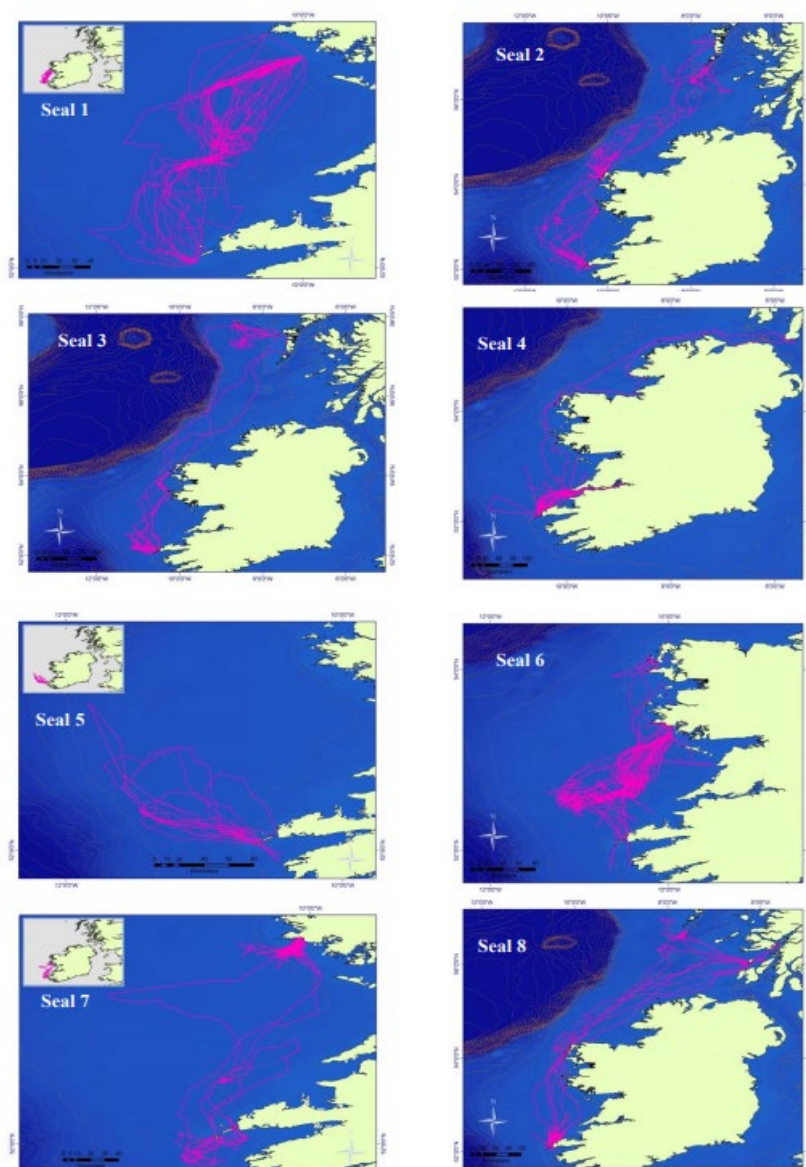
**Outline methodology**

The most recent survey data for harbour or common seals is from 2011. Grey seal data extends to 2012 (O’Cadhla et al. 2013) but there are no more recent data available on pupping sites. Telemetry data for grey seals is available up to 2009 from one site in west Kerry (Cronin et al 2011) and for harbour seals in the Kenmare River (Cronin et al. 2007). NPWS have new data that are not yet available. Little data for observations at sea, only limited telemetry data. Most data from haul out sites including pupping and moulting sites. SMRU and Marine Scotland have published 5 km grid distribution maps (below) <https://data.marine.gov.scot/dataset/estimated-sea-distribution-grey-and-harbour-seals-updated-maps-2017> This data is freely downloadable.



- Data sources and permissions to use the data –
  - SMRU and Marine Scotland have published 5 km grid distribution maps (below) <https://data.marine.gov.scot/dataset/estimated-sea-distribution-grey-and-harbour-seals-updated-maps-2017>
  - Additional data could be available from:
    - NPWS
    - UCC

- Required data processing tools
  - Data products can be created using standard ArcGIS software
- Outline tasks for creating data product
  - Option 1 – download SMRU and Marine Scotland data layers
    - Create metadata record consistent with ISDE requirements
    - Create data processing log
    - Establish update frequency (depends on SMRU/Marine Scotland update frequency)
  - Option 2 - develop more detailed maps based on all available data
    - 'Search for' layers to be created on 0.5 x 0.5 degree grid using telemetry data collected at sea from NPWS, UCC and more recent surveys (last 10 years). Where other ad hoc surveys record presence of a particular species in a block cell not subject to effort in the other main surveys, this should be added to the 'Search for' layer.
    - 'Observations of' layers to be created on 0.5 x 0.5 degree grid based on using observations data from above and recent surveys (last 10 years). Where other ad hoc surveys record presence of a particular species in a block cell not subject to effort in the other main surveys, this should be added to the 'Observations of' layer
    - Abundance layer to be created as count data
    - Create metadata record consistent with ISDE requirements
    - Create data processing log
    - Establish update frequency (10 years)



Example of maps of telemetry data from GSM/GPS tags on eight seals from Great Blasket Island Co. Kerry February 2009. From Cronin et al. (2011). Presence could be mapped on small spatial scale.

#### References

Cronin, M.A., Zuur, A., McConnell, B. & Rogan, E. (2007). Is it the moon? Factors influencing the haul-out behaviour of harbour seals in southwest Ireland. *Journal of Animal Behaviour*

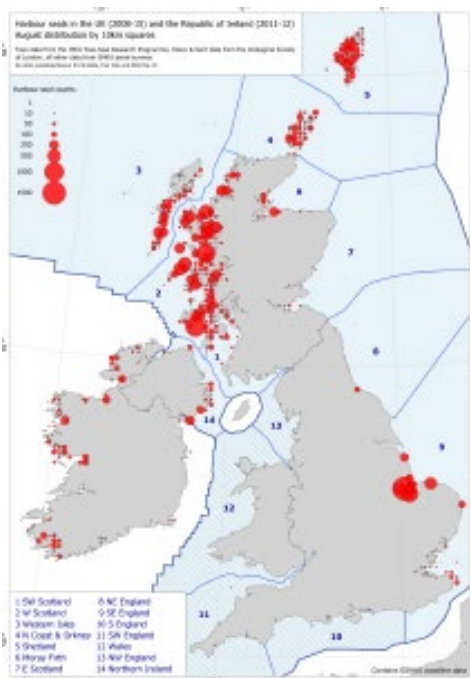
Cronin, M. A. Jessopp, M. J. and Del Villar, D. (2011) Tracking grey seals on Ireland's continental shelf Report to National Parks & Wildlife Service, Department of Arts, Heritage and Gaeltacht. November 2011

Ó Cadhla, O., Keena, T., Strong, D., Duck, C. and Hiby, L. (2013) Monitoring of the breeding population of grey seals in Ireland, 2009 - 2012. *Irish Wildlife Manuals*, No. 74. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland

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Estimated staff effort/cost	Option 1 – estimated 1 day staff effort (1 day GIS analyst) cost approx. €400 Option 2 - estimated 10 days staff effort (5 days GIS analyst; 5 marine mammal biologist) cost approx. €4,000
Required skills	GIS analyst; marine mammal biologist with knowledge of marine mammal surveys data
Estimated time scales	4 weeks

MSP Topic: Marine mammals	
Spatial information on current ecological function of seals	Priority Rating: 2
Data Product Description	This data product will provide information on the current spatial information on current ecological function of seals (Grey seal; Harbour seal)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Functional Use X
<p><b>Outline methodology</b></p> <p>Ecological function is considered to refer to breeding, moulting, haul out and feeding areas or times of year that are essential for proper ecological functioning. These data layers will enhance information on distribution and abundance of seals by identifying key functional use of areas where this is understood. Telemetry data for grey seals is available up to 2009 from one site in west Kerry (Cronin et al 2011) and for harbour seals from Kenmare River (2007). Also satellite data from Strangford Lough for harbour seals as part of the SEAGEN project but availability of data unknown.</p> <p>Standing Committee on Seals, 2016. Scientific Advice on Matters Related to the Management of Seal Populations: 2016. <a href="http://www.smru.st-andrews.ac.uk/files/2017/04/SCOS-2016.pdf">http://www.smru.st-andrews.ac.uk/files/2017/04/SCOS-2016.pdf</a> includes map of harbour seal colonies in Ireland (see image below)</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Need discussion with NPWS on data sources/availability e.g. <a href="https://www.npws.ie/sites/default/files/publications/pdf/OCadhla_et_al_2005_Grey_Seal_Population_Survey.pdf">https://www.npws.ie/sites/default/files/publications/pdf/OCadhla_et_al_2005_Grey_Seal_Population_Survey.pdf</a>; <a href="https://www.npws.ie/sites/default/files/files/Grey%20Seal_Generalised%20range%20map.pdf">https://www.npws.ie/sites/default/files/files/Grey%20Seal_Generalised%20range%20map.pdf</a></li> <li>○ <a href="https://www.npws.ie/sites/default/files/publications/pdf/Harbour%20seal%202012_2%20Duck_Morris.pdf">https://www.npws.ie/sites/default/files/publications/pdf/Harbour%20seal%202012_2%20Duck_Morris.pdf</a></li> <li>○ <a href="https://www.npws.ie/sites/default/files/publications/pdf/Harbour%20seal%202012_1%20Duck_Morris.pdf">https://www.npws.ie/sites/default/files/publications/pdf/Harbour%20seal%202012_1%20Duck_Morris.pdf</a></li> <li>○ Standing Committee on Seals, 2016. Scientific Advice on Matters Related to the Management of Seal Populations: 2016. <a href="http://www.smru.st-andrews.ac.uk/files/2017/04/SCOS-2016.pdf">http://www.smru.st-andrews.ac.uk/files/2017/04/SCOS-2016.pdf</a> – may be possible to access data on harbour sea haul out sites through SCOS/SMRU</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Option 1 – seek to access SCOS/SMRU data layers for harbour seal; check if similar available for Grey Seal. <ul style="list-style-type: none"> <li>▪ Create metadata record consistent with ISDE requirements</li> <li>▪ Create data processing log</li> <li>▪ Establish update frequency (depends on SCOS/SMRU update frequency)</li> </ul> </li> <li>○ Option 2 - using 'Observations for' layers created in previous road map, annotate grid cells where species is present to identify whether the cell is primarily used for feeding, breeding or migration, to the extent to which this is known <ul style="list-style-type: none"> <li>▪ Create metadata record consistent with ISDE requirements</li> <li>▪ Create data processing log</li> <li>▪ Establish update frequency (10 years)</li> </ul> </li> </ul> </li> </ul>	



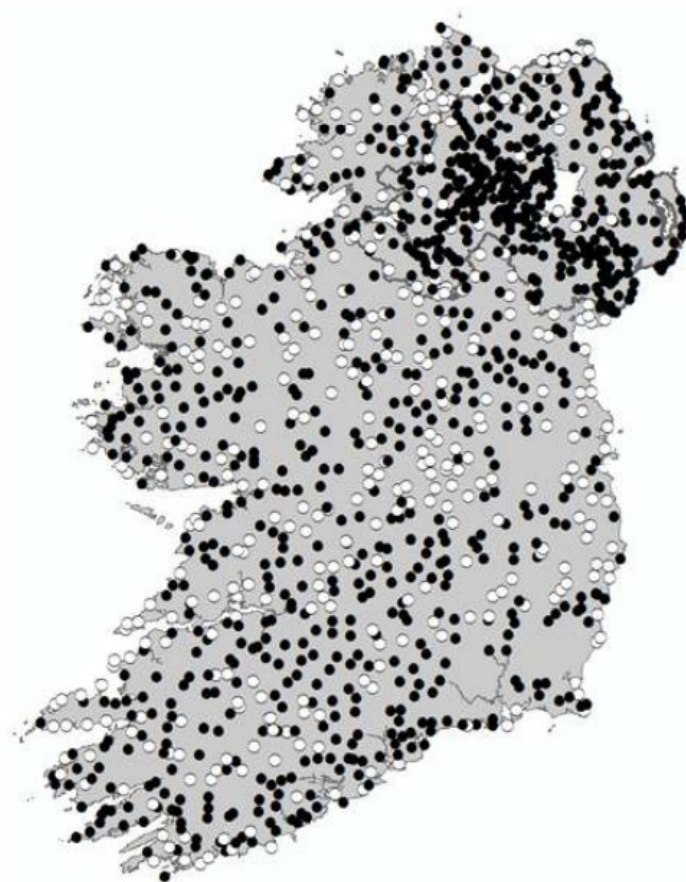
References

Cronin, M.A., Zuur, A., McConnell, B. & Rogan, E. (2007). Is it the moon? Factors influencing the haul-out behaviour of harbour seals in southwest Ireland. *Journal of Animal Behaviour*

Cronin, M. A. Jessopp, M. J. & Del Villar, D. (2011) Tracking grey seals on Irelands' continental shelf Report to National Parks & Wildlife Service, Department of Arts, Heritage and Gaeltacht. November 2011.

Estimated staff effort/cost	Option 1 – estimated 1 day staff effort (3 days GIS analyst) cost approx. €1200 Option 2 - estimated 10 days staff effort (5 days GIS analyst; 5 marine mammal biologist) cost approx. €4,000
Required skills	GIS analyst; marine mammal biologist with knowledge of marine mammal survey data
Estimated time scales	4 weeks

<b>MSP Topic: Marine mammals</b>	
<b>Current spatial distribution and/or abundance/intensity of otter</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide information on the current spatial distribution and relative abundance of otter
Relevant existing Atlas data layers	Otter Commuting, Otter Habitats
Proposed names for new Atlas data layers	Distribution of Otter
<p><b>Outline methodology</b></p> <p>The most recent survey data for otter in Ireland is from 2011/12 (Reid et al. 2013). There are no more recent national surveys though sub-sites might be surveyed by the NPWS. Data from 2010-2015 available from Lysaght and Marnell (2016).</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ NPWS</li> <li>○ National Biodiversity Data Centre Mammal Atlas (2016)</li> <li>○ Atlas layers 'Otter Commuting' and 'Otter Habitats' are spatially resolved but patchy coverage – need to clarify with NPWS that these maps are based on Reid et al 2013 (which should have comprehensive coverage)</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ 'Search for' layers to be created on occupied grid cells based on Reid et al. (2013). High resolution mapping possible (e.g. 2 km grid) if sample site data available.</li> <li>○ 'Observations of' layers to be created on 2 km grid based on Reid et al. (2013) using observations data from above surveys (last 10 years). Where other ad hoc surveys record presence of a particular species in a block cell not subject to effort in the other main surveys, this should be added to the 'Observations of' layer</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	



Example map: Otter survey sites in the Republic of Ireland (during 2010/11) augmented by those surveyed Northern Ireland in 2010 showing otter occurrence as closed circles and absence of tracks or signs as open circles. From Reid et al. (2013).

References

Lysaght, L. and Marnell, F. (eds.) (2016) *Atlas of Mammals in Ireland 2010-2015*. National Biodiversity Data Centre, Waterford.

Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. & Montgomery, W.I. (2013) National Otter Survey of Ireland 2010/12. Irish Wildlife Manuals No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. • Required data processing tools

Estimated staff effort/cost	Estimated 5 days staff effort (3 days GIS analyst; 2 biologist) cost approx. €2,000
Required skills	GIS analyst; mammal biologist with knowledge of otter survey data
Estimated time scales	1 week

<b>MSP Topic: Marine mammals</b>	
<b>Management Units for Cetaceans</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide information on the management units for cetaceans (Common Dolphin, Harbour Porpoise, Risso's Dolphin, Atlantic White-sided Dolphin, Bottlenose Dolphin, Minke Whale, White-beaked Dolphin)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Management Unit for X
<p><b>Outline methodology</b></p> <p>Administrative boundary refers to management units based on stock structure, movements and ecology. Tentative management units have been developed for a number of species and maps are available from JNCC.</p> <ul style="list-style-type: none"> <li>• Data Sources <ul style="list-style-type: none"> <li>○ IAMMWG. 2015. Management Units for cetaceans in UK waters (January 2015). JNCC. Report No. 547, JNCC Peterborough</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire management unit shapefiles from JNCC</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (IAMMWG report indicates that the MUs will be reviewed in 2019 and at 5 year intervals)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst;
Estimated time scales	1 week

<b>MSP Topic: Marine mammals</b>	
<b>Management Units for Seals</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide information on the management units for seals (Grey seal, Harbour seal)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Management Unit for X
<p><b>Outline methodology</b></p> <p>Administrative boundary refers to management units based on stock structure, movements and ecology. There is currently no subdivision of Ireland's waters for management of either Grey or Harbour seal. Data on foraging range from haul out sites especially for harbour seals may provide useful guidance on MU. Studies on genetic variability in harbour seals in Ireland ongoing (GMIT) and may provide data on discreteness between sampling areas.</p> <ul style="list-style-type: none"> <li>• Data Sources <ul style="list-style-type: none"> <li>○ Standing Committee on Seals, 2016. Scientific Advice on Matters Related to the Management of Seal Populations: 2016. <a href="http://www.smru.st-andrews.ac.uk/files/2017/04/SCOS-2016.pdf">http://www.smru.st-andrews.ac.uk/files/2017/04/SCOS-2016.pdf</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire management unit shapefiles once developed</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (5 years?)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

## B.8 Birds

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Bird topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-05*.

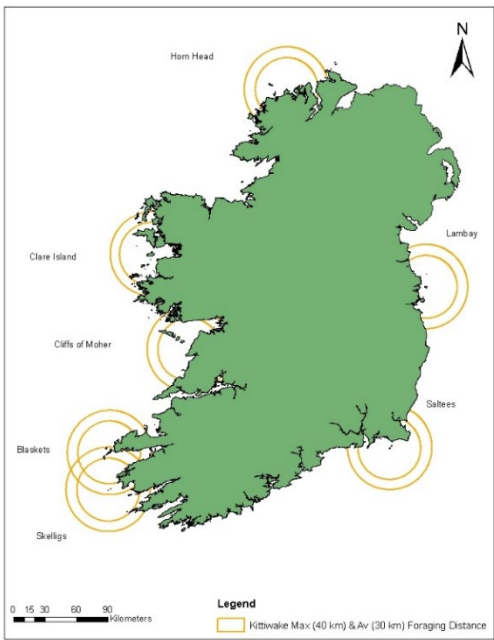
Key priorities (priority 1) for which data gap has been identified:

- None

Important gaps (priority 2) have also been identified for the following data products:

- Location of seabird colonies.
- Foraging areas around coastal (cliff and island colonies) breeding seabirds
- Foraging areas around tern colonies
- Winter and summer seabird distributions.
- Winter and summer seabird distributions in western Irish Sea.

<b>MSP Topic: Birds</b>	
<b>Location of seabird colonies</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers based on the NPWS Seabird Census.
Relevant existing Atlas data layers	New layer
Proposed names for new Atlas data layers	National inventory of breeding seabird sites
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Liaise with Birds Unit at NPWS (and other data owners/suppliers) and negotiate access to the 2015-18 national seabird census</li> </ul> </li> <li>• Required data processing <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> <li>○ Outline tasks for creating data product</li> <li>○ GIS analyst/Ornithologist to prepare summary data sets and maps</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days GIS analyst €1000 plus 3 days ornithologist €900
Required skills	GIS analyst & ornithologist
Estimated time scales	1 week

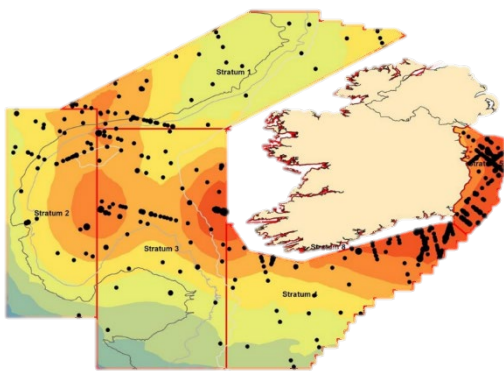
MSP Topic: Birds	
Foraging areas for cliff/island seabird colony features	Priority Rating: 2
Data Product Description	This data product will provide a data layer identifying foraging areas for 34 SPAs comprising cliff-nesting seabirds and cormorants, shags and gulls nesting on islands
Relevant existing Atlas data layers	Special Protection Areas for breeding seabirds
Proposed names for new Atlas data layers	Seabird colony foraging areas
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permission to use data:                             <ul style="list-style-type: none"> <li>○ To date about there has been about 90% coverage and it expected that this will be accessible by early 2019</li> </ul> </li> <li>• Required data processing tools                             <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers                             <ul style="list-style-type: none"> <li>○ Select relevant SPAs with breeding seabird interests (from NPWS Bird Seabird Census)</li> <li>○ Review methods for describing foraging areas, particularly the BirdLife International Toolkit on foraging ranges and related recent publications</li> <li>○ Identify key species by site (SPA), exclude pelagic species (with much greater foraging ranges e.g. Fulmar)</li> <li>○ Create new shapefile that includes these sites with foraging range radii for suite of species present</li> <li>○ Devise a weighting system based on the abundance of the species at each site</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <div style="display: flex; align-items: flex-start; margin-top: 20px;"> <div style="flex: 1;">  </div> <div style="flex: 1; padding-left: 20px;"> <p>Example of Kittiwake foraging ranges (mean and maximum) around sample of 7 SPAs</p> </div> </div>	
Estimated staff effort/cost	Estimated 12 days staff effort (12 days ornithologist and 3 days GIS analyst) cost approx. €3,400
Required skills	Ornithologist & GIS analyst
Estimated time scales	3 weeks

MSP Topic: Birds	
Tern Foraging Areas	Priority Rating: 2
Data Product Description	This data product will create maps of foraging ranges for Little, Sandwich, Roseate, Common and Arctic Terns associated with key breeding colonies
Relevant existing Atlas data layers	New layer
Proposed names for new Atlas data layers	X tern foraging areas
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Location of tern colonies – liaise with Birds Unit at NPWS (and other data owners/suppliers) and negotiate access to the 2015-18 national seabird census</li> <li>○ Required data processing tools</li> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Option 1 – modelling of potential foraging areas based on review of published foraging ranges for individual species and directly recorded ranges for Roseate Terns based on recent (summer) work by EU LIFE Project at Rockabill</li> <li>○ Datasets to utilise include Thaxter et al. 2012 Biol Conserv 156: 53-61; Parsons <i>et al.</i> (2015); Perrow et al. 2015 Biol Conserv 191: 729–738; Perrow et al 2017 British Birds 110: 257– 277.</li> <li>○ Option 2 – field survey (summer) of actual foraging ranges using visual boat tracking (from RIBs) for other 4 species: Little Tern at Kilcoole (Wicklow), Sandwich and Arctic at Lady’s Island (Wexford) and Common at Rockabill (Dublin)</li> <li>○ Follow methodology of Perrow et al 2011 J. Field Ornithology 82: 68–79.</li> <li>○ Option 3 – hybrid of modelling and available field observations e.g. based on JNCC GLM work <a href="http://jncc.defra.gov.uk/pdf/SAS_Identification_of_important_marine_areas_for_larger_terns.pdf">http://jncc.defra.gov.uk/pdf/SAS_Identification_of_important_marine_areas_for_larger_terns.pdf</a></li> </ul> </li> </ul>	
Estimated staff effort/cost	Option 1: 2 weeks ornithologist €3000 Option 2: 1 month fieldwork, team with RIB €30,000; 1 month analysis €10,000 Option 3: 1 month ornithologist €6,000
Required skills	Option 1: ornithologist with some GIS skills Option 2: contract expertise at ECON-Ecology.com Option 3: ornithologist and spatial statistician
Estimated time scales	Option 1: complete in 1 month Option 2: with pre-planning, 6 months overall from first contact with ECON Option 3: complete in 2 months

MSP Topic: Birds	
Winter and summer seabird distributions in Irish waters	Priority Rating: 2
Data Product Description	Identifying winter and summer seabird distributions in Irish waters (species/species groups to be determined)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Winter distribution X Summer distribution X
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Assume ObSERVE bird data will be released in next 12 months. Before then liaise with UCC team and see what they intend publishing in the academic literature and work closely to identify new conservation-related outputs.</li> <li>○ This speculative data product and networking with UCC researchers in early 2019 will indicate whether it is a productive avenue.</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers</li> </ul> <p><u>Option 1</u></p> <ul style="list-style-type: none"> <li>○ UCC team may have this topic in their sights and if so they could be contracted to supply a data layer to the MSP-Marine Institute</li> <li>○ Set out different options if they exist, or if it is not clear whether the required data will be able to be obtained</li> <li>○ Some original research will need to be undertaken to assess the threshold densities for key seabirds based on their biogeographic population size.</li> </ul> <p><u>Option 2</u></p> <p>Aerial surveys of birds were mapped in the outer parts of the Irish EEZ by the ObSERVE programme. These surveys typically commenced outside offshore islands so that counts were not interrupted by passage over land. However, this gap comprises the main shallow water used by wintering seaduck (scoters, eiders, long-tailed duck) and divers (particularly Great Northern Diver). In summer this area will likely support a large part of the foraging range for breeding species including Kittiwakes, Common Guillemots, Razorbills and Puffins which mostly range up to 40 km from their colony. The target area comprises Stratums 6, 7 &amp; 8 in the ObSERVE Report (2018) predicted density distribution maps (see map below).</p> <p>Outline methodology (Phase1)</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: Required data processing tools: <ul style="list-style-type: none"> <li>○ European Seabirds at Sea database for recent (post-2000) seabird data; extract and map. Open access database.</li> <li>○ Consult the GMIT PhD student working on seabird distributions during Celtic Explorer fisheries surveys (perhaps the holder of the most relevant data).</li> <li>○ NPWS have commissioned some inshore work in Mayo (divers and scoters in Broadhaven &amp; Blacksod Bays); request this.</li> <li>○ AMETS data from SEAI</li> </ul> </li> </ul>	

- Required data processing tools: Outline tasks for creating data layers
  - Data products can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Available data will be mapped
  - This will potentially reveal large holes as aerial surveys have not been previously undertaken and very few relevant ship surveys are expected except off Mayo.
  - Progress to a **Phase 2**

Phase 2 is to commission an appropriate survey by aerial videography or observer-based (quicker, expensive, produces direct density estimates) or ship-based (slower but relatively cheap)



Map above illustrates the gap (white area) between coastline and ObSERVE stratum 1,2,3, & 4 and illustrates how modelled distributions are truncated by lack of 'inshore/coastal' data.

<p>Estimated staff effort/cost</p>	<p>Option 1 - Scoping work as a phase 1 will require 2-3 days networking over the course of a month; €1000. This will help to define level of effort required to develop maps for MSP.                      Option 2 – scoping (phase 1): 5 days staff in consultation and 5 days data collation and mapping, approx. €3,000; Detailed bird surveys would entail a budget range of €500,000-1M</p>
<p>Required skills</p>	<p>Ornithologist; GIS analyst</p>
<p>Estimated time scales</p>	<p>Option 1 - Complete by end February 2019                      Option 2: Phase 1 could be completed in a 3-months; phase 2 would require 1 year of planning-lead in 2 years data collection and 1 year for analysis/write up</p>

<b>MSP Topic: Birds</b>	
<b>Winter and summer seabird distributions in the Irish Sea and Offshore Renewable Energy target areas</b>	<b>Priority Rating: 2</b>
Data Product Description	Merge ObSERVE seabird dataset with seabird monitoring data from offshore windfarm EIAs
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Key areas for seabirds in the Irish Sea
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Assume ObSERVE bird data will be released in next 12 months. Before then liaise with UCC team and see what they intend publishing in the academic literature and work closely to identify new conservation-related outputs.</li> <li>○ This speculative data product may be developed following networking with UCC researchers and offshore renewable energy companies in early 2019. It will effectively contribute to a strategic environmental assessment of the scale of potential overlap between key seabird and waterbird concentrations, foraging areas for breeding seabirds and likely windfarm developments over the next few years.</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>▪ Approach wind energy companies with or seeking leases in Irish Sea (Oriel/Dundalk, Kish Bank, Codling Bank, Arklow Bank) for copies of their seabird monitoring data (post-year 2000) for the same summer, autumn, winter months used by ObSERVE team</li> <li>▪ Approach Marine Institute for 2014 and 2015 scoter (seaduck) survey data</li> <li>▪ Extract two sets of bird density data and scale to that used in ObSERVE (4x4 km grid cells)</li> <li>▪ Explore spatial overlap between the three datasets and the projected seabird foraging areas around SPA colonies, summer only (see previous data layer 'SPA seabird foraging area extensions')</li> <li>○ Scoping work as a Phase 1 will require 5 days networking over the course of a month and data extraction</li> <li>○ Phase 2 spatial analysis, 2 weeks</li> </ul> </li> </ul>	
Estimated staff effort/cost	Phase 1 ornithologist (3 days) €1250 Phase 2 GIS analyst(10 days) €3000
Required skills	Ornithologist, statistician with spatial analysis experience
Estimated time scales	Can be completed in 4 months once data is made available

## B.9 Terrestrial habitats

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Terrestrial Habitats topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

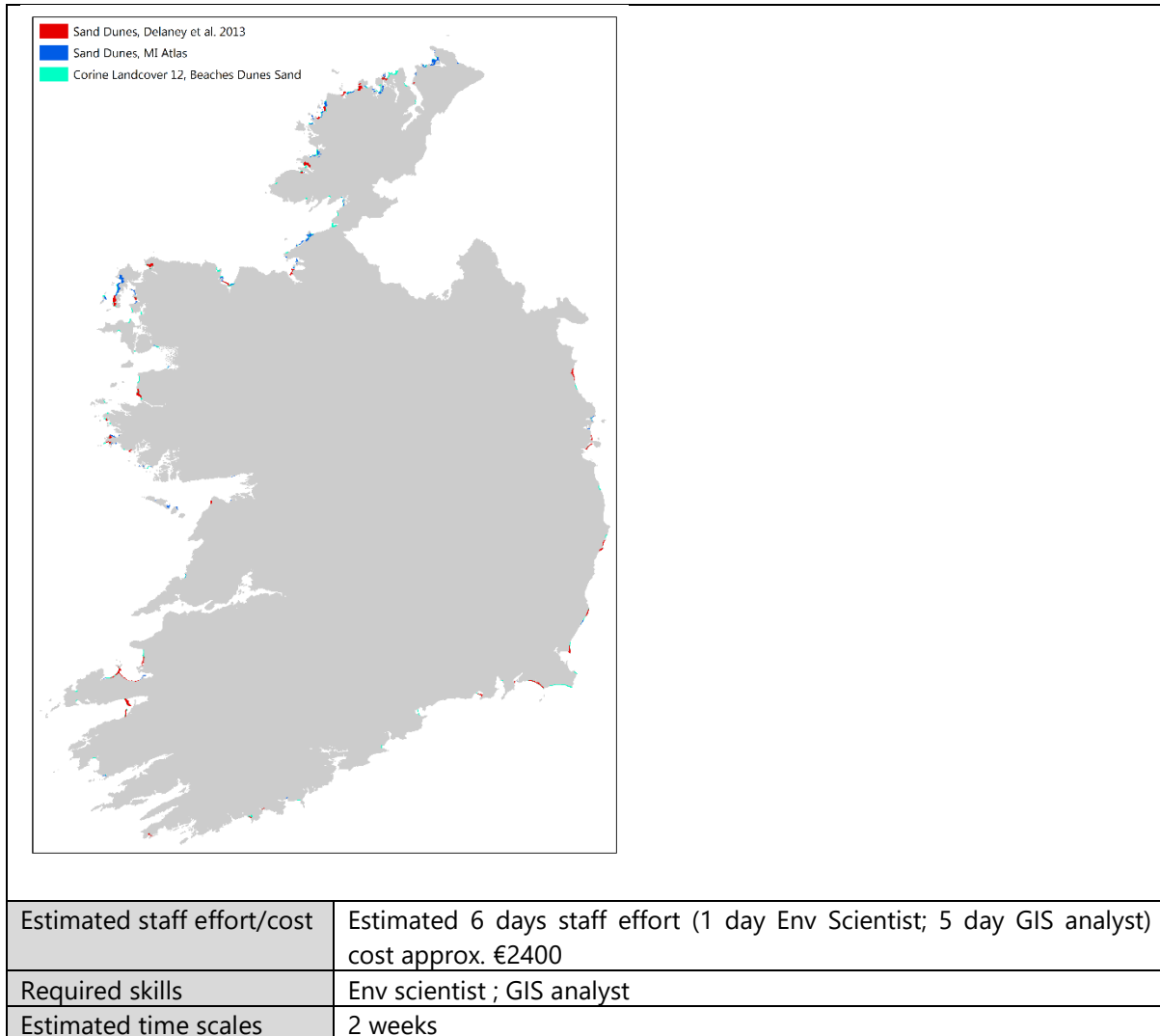
Key priorities (priority 1) for which data gap has been identified:

- None

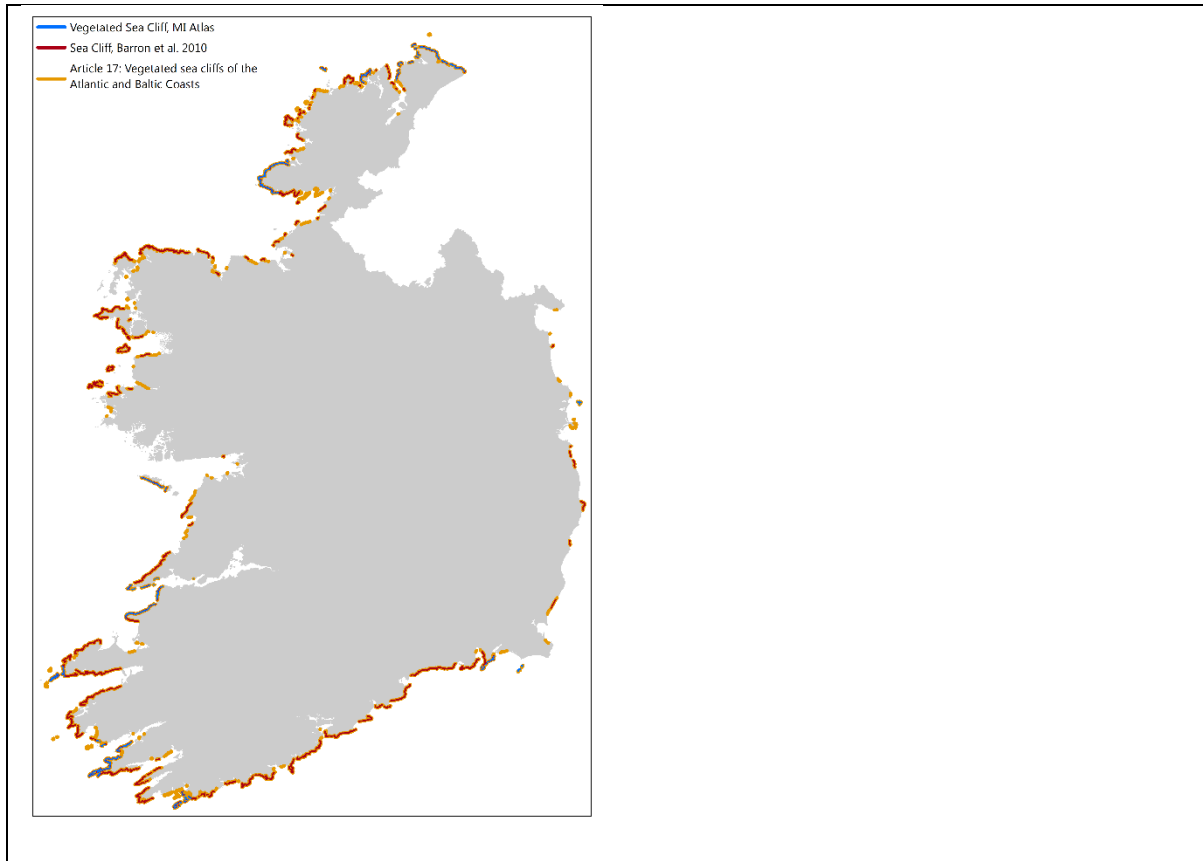
Important gaps (priority 2) have also been identified for the following data products:

- Sand dune
- Vegetated sea cliffs

MSP Topic: Terrestrial Habitats		
Sand Dunes		Priority Rating: 2
Data Product Description	Map showing distribution of sand dune habitat in Ireland	
Relevant existing Atlas data layers	Sand Dune	
Proposed names for new Atlas data layers	Sand Dune	
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ NPWS data layers freely available under CC licence from <a href="http://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives">http://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives</a></li> <li>○ CORINE Landcover map data (2012) freely available from EPA <a href="http://gis.epa.ie/GetData/Download">http://gis.epa.ie/GetData/Download</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Download shapefiles from NPWS and EPA</li> <li>○ Need to clarify with NPWS and EPA differences between data sets including: <ul style="list-style-type: none"> <li>▪ There are differences in the 2 NPWS data sets (one which is currently on the MI Atlas and the other created by Delaney et al <a href="https://www.npws.ie/sites/default/files/publications/pdf/IWM75.pdf">https://www.npws.ie/sites/default/files/publications/pdf/IWM75.pdf</a> )</li> <li>▪ The CORINE Landcover map includes a layer for Beaches, Dunes, Sand which appears to include additional areas of dune compared to NPWS layers</li> </ul> </li> <li>○ Create single map of sand dune features (broken down by category as far as possible): <ul style="list-style-type: none"> <li>▪ 1210 Annual vegetation of drift lines</li> <li>▪ 1220 Perennial vegetation of stony banks</li> <li>▪ 2110 Embryonic shifting dunes</li> <li>▪ 2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)</li> <li>▪ 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)</li> <li>▪ 2140 Decalcified fixed dunes with <i>Empetrum nigrum</i></li> <li>▪ 2150 Atlantic decalcified fixed dunes (Calluno-Ulicetea)</li> <li>▪ 2170 Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>)</li> <li>▪ 2190 Humid dune slacks</li> <li>▪ 21A0 Machairs</li> </ul> </li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>		



<b>MSP Topic: Terrestrial Habitats</b>	
<b>Vegetated Sea Cliffs</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing distribution of vegetated sea cliffs habitat in Ireland
Relevant existing Atlas data layers	Vegetated Sea Cliffs
Proposed names for new Atlas data layers	Vegetated Sea Cliffs
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ NPWS data freely available under CC licence from <a href="http://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives">http://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives</a> (on MI Atlas) and <a href="https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17">https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17</a></li> <li>○ Barron et al data also available as NPWS published shapefiles <a href="http://www.botanicalevironmental.com/projects/habitat-studies/national-baseline-surveys/national-survey-and-assessment-of-the-conservation-status-of-irish-sea-cliffs/">http://www.botanicalevironmental.com/projects/habitat-studies/national-baseline-surveys/national-survey-and-assessment-of-the-conservation-status-of-irish-sea-cliffs/</a></li> <li>○ There are differences between each of these data sources which need to be reconciled. In theory Article 17 data should be most comprehensive data set but the other two data sources include additional locations</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Download shapefiles from NPWS</li> <li>○ Agree with NPWS best means of creating composite layer</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	



Estimated staff effort/cost	Estimated 6 days staff effort (1 day Env Scientist; 5 days GIS analyst) cost approx. €2400
Required skills	Env Scientist; GIS analyst
Estimated time scales	○ 2 weeks

## B.10 Aquaculture

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Aquaculture topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2019-12-03*.

Key priorities (priority 1) for which data gaps have been identified:

- None

Important gaps (priority 2) have also been identified for the following data products:

- Current spatial distribution of resource
  - Finfish
  - Shellfish
  - Seaweed
- Data/spatial data on current value of activity
  - Finfish
  - Shellfish
  - Seaweed
- Potential future spatial distribution/location and intensity of activity (next 20 years)
  - Finfish
  - Shellfish
  - Seaweed

MSP Topic: Aquaculture	
Current spatial distribution of aquaculture resource	Priority Rating: 2
Data Product Description	This data product will provide layers identifying areas that are suitable for aquaculture (separate layers for finfish, shellfish, seaweed)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Aquaculture current resource areas – Finfish Aquaculture current resource areas – Shellfish Aquaculture current resource areas – Seaweed
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Bathymetry – see Geology</li> <li>○ Seabed habitat (sediment type) – see Benthic Habitats and Species</li> <li>○ Photic zone - Ocean colour (chlorophyll-a) - MODIS Aqua Satellite L3m analysis product - NASA Giovanni data portal <a href="https://giovanni.gsfc.nasa.gov/giovanni/">https://giovanni.gsfc.nasa.gov/giovanni/</a></li> <li>○ Sea surface temperature – see Ocean Features</li> <li>○ Salinity – see Ocean Features</li> <li>○ Wave exposure (energy) – see Ocean Features</li> <li>○ Tide exposure (energy) – see Ocean Features</li> <li>○ Water quality – location of controlled discharges, combined storm overflows, water quality classifications (in bivalve production areas under food hygiene regulations), shellfish water protected areas – see Water Quality</li> <li>○ Disease – confirmed designation for disease e.g. <i>Bonamia ostrea</i> – information available from MI – contact to be confirmed</li> <li>○ Marine Planning data: <ul style="list-style-type: none"> <li>▪ Aggregate resource areas – see Marine Aggregates</li> <li>▪ Subsea cables – see Energy and Telecoms</li> <li>▪ Wave energy lease areas – see Energy</li> <li>▪ Tide energy lease areas – see Energy</li> <li>▪ Oil and gas platforms and pipelines – see Energy</li> <li>▪ Inshore fishing grounds – see Fisheries &amp; Shellfisheries</li> <li>▪ Military defence areas – see Defence</li> <li>▪ Nature conservation designated areas – see Administrative Boundaries</li> <li>▪ Ports and harbours – anchorage areas, maintenance dredge areas, dredge disposal sites – see Ports &amp; Shipping</li> <li>▪ Shipping – IMO traffic separation schemes – see Ports &amp; Shipping</li> <li>▪ Marine and coastal recreation – areas used for sailing and racing, angling, board sports – see Tourism &amp; Recreation</li> </ul> </li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Identify finfish, shellfish and seaweed species of current and future interest to the aquaculture industry, methods of cultivation, physical requirements of cultivation method (e.g. hard substrate, specific water depth requirements) and range of environmental tolerances for each species likely to be farmed</li> <li>○ Identify and collate required data sets relating to physical, environmental and marine spatial planning constraints (relating to other sector activity) in Irish waters</li> <li>○ Determine and assign the type and level of constraint associated with each marine</li> </ul> </li> </ul>	

<p>spatial planning constraint e.g. whether an activity completely excludes aquaculture sector activity (and hence requires an 'exclusion zone') or a partial constraint (relating to the degree to which the sectors may co-exist). Assign appropriate weighting to the data layers within the model.</p> <ul style="list-style-type: none"> <li>○ Model rules can be based on e.g. ABPmer (2015)  <a href="https://gov.wales/topics/environmentcountryside/marineandfisheries/SeaFisheries/aquaculture/spatial-assessment-of-the-potential-for-aquaculture-in-welsh-waters/?lang=en">https://gov.wales/topics/environmentcountryside/marineandfisheries/SeaFisheries/aquaculture/spatial-assessment-of-the-potential-for-aquaculture-in-welsh-waters/?lang=en</a></li> <li>○ Create shapefiles that show areas of least constraint (greatest potential) for aquaculture for each species/cultivation method</li> <li>○ Create metadata and data processing/model creation log consistent with ISDE requirements</li> </ul>	
Estimated staff effort/cost	Estimated 30 days Env Scientist and 25 GIS days, cost approx. €25,000 (for model combining physical, environmental and marine planning parameters)
Required skills	Env scientist; GIS analyst
Estimated time scales	3 months + (depending on complexity of model required)

<b>MSP Topic: Aquaculture</b>	
<b>Current value of aquaculture</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide layers identifying the relative value of different regions for aquaculture (separate layers for finfish, shellfish, seaweed)
Relevant existing Atlas data layers	Seaweed by species type Seaweed by culture type Finfish by species type Finfish by culture type Shellfish by species type Shellfish by culture type
Proposed names for new Atlas data layers	Aquaculture value – Finfish Aquaculture value – Shellfish Aquaculture value – Seaweed
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Seaweed by species type</li> <li>○ Seaweed by culture type</li> <li>○ Finfish by species type</li> <li>○ Finfish by culture type</li> <li>○ Shellfish by species type</li> <li>○ Shellfish by culture type</li> <li>○ BIM Annual Aquaculture Survey Report - BIM</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Finfish: Create layer of total annual value of finfish production by county based on historic BIM annual aquaculture survey data. Option to assign production value of each finfish species produced per county or layer showing average value of finfish (or species) per production unit within each county from data</li> <li>○ Shellfish: Create layer of total annual value of shellfish production by county based on BIM annual aquaculture survey data. Option to assign production value of each shellfish species produced per county or layer showing average value of shellfish (or species) per production unit within each county from data</li> <li>○ Seaweed: Production volume and value data by region may be available from BIM annual aquaculture surveys (where seaweed currently included in 'other sectors'). If so, a layer of annual value by county and/or species could be created</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (GIS analyst) per 'type' of aquaculture (i.e. finfish, shellfish and seaweed), €2,400
Required skills	GIS analyst
Estimated time scales	2 weeks

<b>MSP Topic: Aquaculture</b>	
<b>Potential future spatial distribution/location and intensity of activity</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide layers identifying the areas subject to licence applications for future aquaculture production (separate layers for finfish, shellfish, seaweed)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Aquaculture licence applications – finfish Aquaculture licence applications – shellfish Aquaculture licence applications – seaweed
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ DAFM/DHPLG Aquaculture/foreshore licence applications</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ The short-term future location of aquaculture developments will be represented in current applications for aquaculture/foreshore licences. Applications received are published on the DAFM website: <a href="https://www.agriculture.gov.ie/seafood/aquacultureforeshoremanagement/aquaculturelicensing/aquacultureforeshorelicenceapplications/">https://www.agriculture.gov.ie/seafood/aquacultureforeshoremanagement/aquaculturelicensing/aquacultureforeshorelicenceapplications/</a></li> <li>○ The data are also available via the DHPLG Foreshore Licensing Database</li> <li>○ Extract spatial location data for sites from application (digitisation or co-ordinates)</li> </ul> </li> </ul>	
Estimated staff effort/cost	5 days GIS analyst, €2000
Required skills	GIS analyst
Estimated time scales	2 weeks

## B.11 Aviation

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the aviation topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- Airport control areas – activity specific administrative boundary
- Airport control zones – activity specific administrative boundary
- Helicopter main route – current spatial distribution and intensity of activity

<b>MSP Topic: Aviation</b>	
<b>Airport control areas</b>	<b>Priority Rating: 1</b>
Data Product Description	Map of airport control areas
Relevant existing Atlas data layers	No layer to date.
Proposed names for new Atlas data layers	Airport control areas
<b>Outline methodology</b> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Request data as represented on aeronautical charts as shown on OSI website as seen here: <a href="https://www.osi.ie/products/professional-mapping/aeronautical-charts/">https://www.osi.ie/products/professional-mapping/aeronautical-charts/</a></li> <li>○ Possible contacts: <a href="mailto:planning@iaa.ie">planning@iaa.ie</a>.</li> <li>○ Licence agreement: Licence unlikely to be creative commons as map at restricted resolution on sale (in paper format).</li> <li>○ Likely restrictions on scale of resolution for online display and download as part of Marine Atlas.</li> <li>○ Update: Data updated every 8 years, last update dated 2017 (2008-2016 data)</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Acquire layer of airport control areas from the Irish Aviation Authority</li> <li>○ Create data layer identifying airport control areas</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Confirm update frequency with the Irish Aviation Authority</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 day

<b>MSP Topic: Aviation</b>	
<b>Airport control zones</b>	<b>Priority Rating: 1</b>
Data Product Description	Map of airport control zones
Relevant existing Atlas data layers	No layer to date
Proposed names for new Atlas data layers	Airport control zones
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Request data as represented on aeronautical charts as shown on OSI website as seen here: <a href="https://www.osi.ie/products/professional-mapping/aeronautical-charts/">https://www.osi.ie/products/professional-mapping/aeronautical-charts/</a></li> <li>○ Possible contacts: <a href="mailto:planning@iaa.ie">planning@iaa.ie</a> (generic email).</li> <li>○ Licence agreement: Licence unlikely to be creative commons as map at restricted resolution on sale (in paper format).</li> <li>○ Likely restrictions on scale of resolution for online display and download as part of Marine Atlas.</li> <li>○ Update: Data updated every 8 years, last update dated 2017 (2008-2016 data)</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Acquire layer of airport control areas from the Irish Aviation Authority</li> <li>○ Create data layer identifying airport control areas</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Confirm update frequency with the Irish Aviation Authority</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 3 days effort (3 days GIS analyst) cost approx. €1200
Required skills	GIS analyst
Estimated time scales	1 week

<b>Aviation</b>	
<b>Helicopter main routes</b>	
<b>Priority Rating: 1</b>	
Data Product Description	Map of helicopter main routes
Relevant existing Atlas data layers	No layer to date
Proposed names for new Atlas data layers	Helicopter main routes
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data:               <ul style="list-style-type: none"> <li>○ Request data from the Irish Aviation Authority : <a href="mailto:planning@iaa.ie">planning@iaa.ie</a> (generic email).or/and</li> <li>○ Request data from Department of Transport (Interdepartmental Group on MSP rep)</li> <li>○ Licence agreement: Unclear</li> <li>○ Update: To be clarified with data owner.</li> </ul> </li>   <li>• Required data processing tools:               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li>   <li>• Outline tasks for creating data product:               <ul style="list-style-type: none"> <li>○ Acquire layer of airport control areas from the Irish Aviation Authority</li> <li>○ Create data layer identifying heliport main routes</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Confirm update frequency with the Irish Aviation Authority</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 day

## B.12 Coast and flood defence

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for “Flood risk and Coastal Erosion” topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (**priority 1**) for which data gap has been identified:

- Coastal flood risk from ICPSS for the current epoch (10, 100, 200 RP events) provided in ArcGIS file formats; and
- Coastal flood risk from ICPSS for the potential future epoch (end of the century) (10, 100, 200 RP events) provided in ArcGIS file formats.

Important gaps (**priority 2**) have also been identified for the following data products:

- Coastal Erosion distribution/location (in ArcGIS file formats); and
- Current spatial distribution/location of flood and coastal defence structures (in ArcGIS file formats).

**MSP Topic: Coastal Flood Risk and Coastal Defence**

**Current spatial distribution/location of flood risk extents** Priority Rating: 1

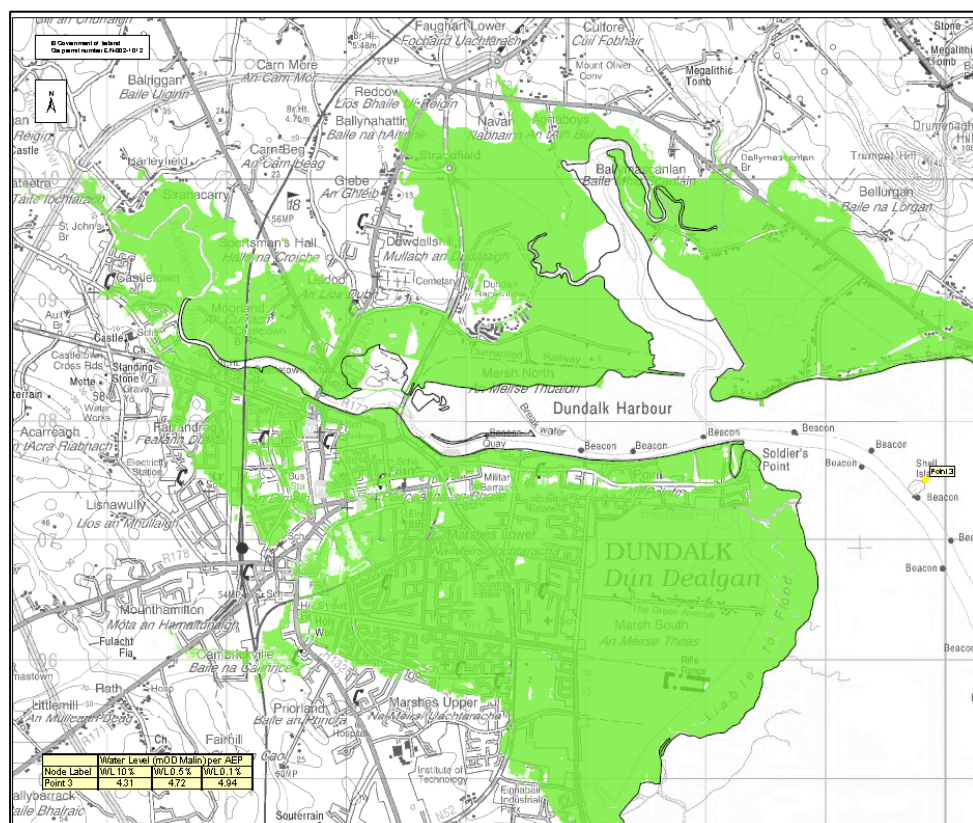
Data Product Description	This data product will provide a data layer identifying Coastal flood risk from ICPS for the current epoch
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Relevant existing Atlas data layers	None
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Proposed names for new Atlas data layers	Current coastal flood risk (10, 100, 200 RP events)
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**Outline methodology**

- Data sources and permissions to use the data:
  - Obtain flood risk data layers from OPW. Will be available for display purposes
- Required data processing tools
  - Data products can be created using standard ArcGIS software
- Outline tasks for creating data product
  - Display the data layers on base maps (to be obtained from OSI under National Mapping Agreement)
  - Create metadata record consistent with ISDE requirements
  - Create data processing log
  - Establish update frequency (align to OPW updates)



**Figure 1. Example flood map dataset displayed in ArcGIS from OPW**

Estimated staff effort/cost	Estimated 5 days staff effort (5 days GIS analyst) cost approx. €2,500
Required skills	GIS analyst
Estimated time scales	2 weeks

<b>MSP Topic: Coastal Flood Risk and Coastal Defence</b>	
<b>Future spatial distribution/location of flood risk extents</b>	<b>Priority Rating: 1</b>
Data Product Description	Coastal flood risk from ICPSS for the potential future epoch to the end of the century (10, 100, 200 RP events)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Future coastal flood risk (10, 100, 200 RP events)
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ OPW has maps for coastal flood risk maps for current epoch and climate change predictions - data sought from OPW. Will be available for display purposes <ul style="list-style-type: none"> <li>▪ Mid-range future scenario (0.5 m SLR to end century);</li> <li>▪ High-end future scenario (1 m SLR to end century).</li> </ul> </li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Display the data layers on base maps (to be obtained from OSI under National Mapping Agreement)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (align to OPW updates)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 5 days staff effort (5 days GIS analyst) cost approx. €2,500
Required skills	GIS analyst
Estimated time scales	2 weeks

<b>MSP Topic: Coastal Flood Risk and Coastal Defence</b>	
<b>Coastal erosion – spatial distribution/location</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide information on the current coastal erosion to the shoreline
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Coastal erosion
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Some historic data on coastal erosion (EuroSION, 2004) exist but are very incomplete – freely available from <a href="http://www.euroSION.org/database/">http://www.euroSION.org/database/</a> .</li> <li>○ ICPSS coastal erosion hazard maps with coastline recession to 2030 and 2050 - data sought from OPW. Will be available for display purposes</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Need to review coverage/quality of OPW data to determine suitability for national mapping;</li> <li>○ If suitable, display the data layers on base maps (to be obtained from OSI under National Mapping Agreement)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (align to OPW updates)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 5 days staff effort (5 days GIS analyst) cost approx. €2,500
Required skills	GIS Analyst
Estimated time scales	2 weeks

<b>MSP Topic: Coastal Flood Risk and Coastal Defence</b>	
<b>Current spatial distribution/location of flood and coastal defence structures</b>	Priority Rating: 2
Data Product Description	This data product will provide information on the current spatial distribution and description of coastal flood defence assets.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Coastal and flood defences
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ No data layers are currently known to be available. Two methods for deriving the data are presented below</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software.</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ The follow can be done in two methods based on available data and will focus on areas covered by flood risk maps only:</li> <li>○ Option 1: <ul style="list-style-type: none"> <li>▪ Data requirements: Google Earth® to manually digitise and map defence layers,</li> <li>▪ Set out descriptive methodology for defence typology. <ul style="list-style-type: none"> <li>• E.g. Vertical wall, Rock armour, earth bank.</li> </ul> </li> <li>▪ This method will be adequate for planning as it will be able to provide the location and type of flood defence.</li> </ul> </li> <li>○ Option 2: <ul style="list-style-type: none"> <li>▪ Data requirements: Oblique helicopter survey of coastline (available on request from OPW) to map defence layers,</li> <li>▪ Set out descriptive methodology for defence typology. <ul style="list-style-type: none"> <li>• E.g. Vertical wall, Rock armour, earth bank.</li> </ul> </li> <li>▪ This method will be time consuming and the quality because it will be challenging to georeferenced video footage and will be reliant on the completeness of the flights.</li> </ul> </li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (5 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	<p>Option 1: Estimated 25 days staff effort (25 days GIS analyst) cost approx. €10,000</p> <p>Option 2: Estimated 50 days staff effort (50 days GIS analyst) cost approx. €20,000</p>
Required skills	GIS analyst
Estimated time scales	8 -12 weeks depending on option

## B.13 Cultural heritage and assets

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Cultural Heritage topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet [Prioritisation-MASTER\\_compiled\\_2018-10-31](#)

Two key priorities (priority 1) data products have been identified for the Cultural Heritage topic.

- Current spatial distribution/location of World Heritage Sites.
- Current spatial distribution/location of wreck extents.

Important gaps (priority 2) have been identified for the following data products:

- Data/spatial data on current value of World Heritage Sites.
- Data/spatial data on current value of wreck extents.
- Current spatial distribution/location of terrestrial heritage assets.
- Data/spatial data on current value of terrestrial heritage assets.
- Current spatial distribution/location of historic buildings (subset of the terrestrial heritage assets roadmap).
- Data/spatial data on current value of historic buildings (subset of the terrestrial heritage assets roadmap).
- Current/spatial distribution/location of palaeo-landscapes.

<b>MSP Topic: Cultural Heritage</b>	
<b>World Heritage Sites</b>	<b>Priority Rating: 1</b>
Data Product Description	This data product will provide a data layer identifying the current spatial distribution/location of World Heritage Sites in Ireland interacting with the marine environment
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	World Heritage Sites
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li><b>Option 1</b> <ul style="list-style-type: none"> <li>○ World Heritage Site boundaries and, where defined, 'buffer zones' delineated to aid their management, are digitised as part of the nomination process. Boundaries of the WHS and key features have been provided to UNESCO by the Irish government, as the State Party. Mapping/spatial data will therefore be available from the National Monuments Service and/or The Office of Public Works. Request data from the National Monuments Service and/or The Office of Public Works. No points of contact established yet, email <a href="mailto:nationalmonuments@chg.gov.ie">nationalmonuments@chg.gov.ie</a> and <a href="mailto:info@opw.ie">info@opw.ie</a></li> </ul> </li> <li><b>Option 2</b> <ul style="list-style-type: none"> <li>○ If the site boundaries of the WHS are not available, the two designated WHSs and the 24 sites on the tentative list are also available in point format from World Heritage Ireland (Department of Culture, Heritage and the Gaeltacht). Request data from World Heritage Ireland. No point of contact established yet.</li> </ul> </li> <li><b>Option 3</b> <ul style="list-style-type: none"> <li>○ Boundaries could readily be digitised for the nominated WHS from the information submitted to UNESCO; engagement with World Heritage Ireland would be required to understand extents / information availability on sites on the tentative list.</li> </ul> </li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be directly imported to ArcGIS, or converted from format in which it is held (e.g. other GIS, such as MapInfo, or CAD)</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Create data layer clipping data to remove inland locations (using agreed 'coastal' areas of search).</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (as Needed)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Option 1: €550 (~1 day) Option 2: €550 (~1 day) Option 3: €2,200 (~4 days)
Required skills	GIS technician
Estimated time scales	Option 1 or 2: 1 week Option 3: 2 weeks

<b>MSP Topic: Cultural Heritage</b>	
<b>Wreck extents</b>	<b>Priority Rating: 1</b>
Data Product Description	This data product will provide a data layer identifying the current spatial distribution/location and extent of known wreck sites, surveyed by the INFOMAR programme
Relevant existing Atlas data layers	INFOMAR Surveyed Shipwrecks
Proposed names for new Atlas data layers	Wreck extents
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Base data to be drawn from National Monument Service Wreck Inventory of Ireland and INFOMAR (Integrated Mapping for the Sustainable Development of Ireland's Marine Resource) wreck locations (point data). Request data from the National Monument Service Underwater Archaeology Unit and INFOMAR. Available under CC licence.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Liaison with National Monument Service/INFOMAR to determine whether polygonised wreck extents already exist:</li> </ul> </li> </ul> <p><b>Option 1</b></p> <ul style="list-style-type: none"> <li>▪ If wreck extent polygon data is available from either, it is anticipated that this could be sourced directly and imported to the Marine Atlas.</li> <li>▪ Consideration should be given to applying a buffer to the wreck location polygons to better safeguard assets in the marine planning and development management process. If deemed desirable, a standard buffer would then be applied to the polygon dataset.</li> </ul> <p><b>Option 2</b></p> <ul style="list-style-type: none"> <li>▪ If wreck extent data is not available, rasterised and georeferenced sonar scans for wrecks are available from INFOMAR (included on the ArcGIS Online browser). While this can be downloaded for small areas, sourcing all the available data in a single tranche directly from the originators is likely to be more time efficient – both upfront and in terms of subsequent data processing. Once obtained, tasks would include: <ul style="list-style-type: none"> <li>• Georeference / transform data to appropriate coordinate system</li> <li>• Manually digitise maximum wreck extents (automated approach investigated but discounted due to substantial differences across available sonar extracts, making scripting for AI feature recognition unfeasible.)</li> <li>• Transpose INFOMAR and Wreck Inventory of Ireland attribution via 'join/relate' table operations</li> </ul> </li> <li>○ This would potentially result in a two-tier hierarchy of accuracy as Inventory wreck sites not surveyed by INFOMAR would need their extents extrapolated by the method set out in Option 3. Nevertheless, this would make the best use of available data, improving accuracy where possible.</li> </ul>	

**Option 3**

- If sonar data cannot be provided, or would need to be downloaded individually for each wreck site, or could only be provided at an unacceptably high additional cost, a third option is available.
- Create data layer merging location shapefiles, removing overlapping /duplicate data
- A standard buffer could be applied to the wreck point data (INFOMAR and Wreck Inventory of Ireland) to ensure that the likely extent of the wreck is identified and protected. (This would obviously be less accurate than primary digitising – particularly for wrecks that are in more than one piece on the seafloor – but could be a proportionate solution.)

The following steps would be required:

- Source shipwreck data from INFOMAR and the National Monuments Service
  - Determine an appropriate buffer extent (e.g. 250 m diameter)
  - Run standard buffer tool in ArcGIS
  - Transpose INFOMAR and Wreck Inventory of Ireland attribution to polygon data via 'join/relate' table operations
- Create metadata records consistent with ISDE requirements
  - Create data processing logs
  - Establish update frequency (As required, depending on source data update schedule)

Estimated staff effort/cost	Option 1: €550 (~1 day) Option 2: €4,400 (~8 days) Option 3: €1,650 (~3 days)
Required skills	GIS technician
Estimated time scales	Option 1: 1 week Option 2: 2 months Option 3: 3 days

<b>MSP Topic: Cultural Heritage</b>	
<b>World Heritage Sites</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a data layer identifying the current value of World Heritage Sites (cultural value)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Value of World Heritage Sites
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data           <ul style="list-style-type: none"> <li><b>Option 1</b> <ul style="list-style-type: none"> <li>○ World Heritage Site boundaries and, where defined, 'buffer zones' delineated to aid their management, are digitised as part of the nomination process. Boundaries of the WHS and key features have been provided to UNESCO by the Irish government, as the State Party. Mapping/spatial data will therefore be available from the National Monuments Service and/or The Office of Public Works. Request data from the National Monuments Service and/or The Office of Public Works. No points of contact established yet, email <a href="mailto:nationalmonuments@chg.gov.ie">nationalmonuments@chg.gov.ie</a> and <a href="mailto:info@opw.ie">info@opw.ie</a></li> </ul> </li> <li><b>Option 2</b> <ul style="list-style-type: none"> <li>○ If the site boundaries of the WHS are not available, the two designated WHSs and the 24 sites on the tentative list are also available in point format from World Heritage Ireland (Department of Culture, Heritage and the Gaeltacht). Request data from World Heritage Ireland.</li> </ul> </li> <li><b>Option 3</b> <ul style="list-style-type: none"> <li>○ Boundaries could readily be digitised for the nominated WHS from the information submitted to UNESCO; engagement with World Heritage Ireland would be required to understand extents / information availability on sites on the tentative list.</li> </ul> </li> </ul> </li> <li>• Required data processing tools           <ul style="list-style-type: none"> <li>○ Data layer can be directly imported to ArcGIS, or converted from format in which it is held (e.g. other GIS, such as MapInfo, or CAD)</li> </ul> </li> <li>• Outline tasks for creating data layer           <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Create data layer clipping data to remove inland locations (using agreed 'coastal' areas of search).</li> <li>○ Cultural value would then be assigned on the basis that nominated WHSs are of recognised international importance ('Very high' cultural value); sites on the tentative list have not yet had their 'Outstanding Universal Value' ratified ('High' cultural value).</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (as Needed)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Option 1: €550 (~1 day) Option 2: €550 (~1 day) Option 3: €550 (~1 day)
Required skills	GIS technician
Estimated time scales	1 week

<b>MSP Topic: Cultural Heritage</b>	
<b>Wreck extents</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a data layer identifying the current value (cultural value) of known wreck sites, surveyed by the INFOMAR programme
Relevant existing Atlas data layers	INFOMAR Surveyed Shipwrecks
Proposed names for new Atlas data layers	Value of wrecks
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Base data to be drawn from National Monument Service Wreck Inventory of Ireland and INFOMAR (Integrated Mapping for the Sustainable Development of Ireland's Marine Resource) wreck locations (point data). Request data from the National Monument Service Underwater Archaeology Unit and INFOMAR. Available under CC licence.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Liaison with National Monument Service/INFOMAR to determine whether polygonised wreck extents already exist:</li> </ul> </li> </ul> <p><b>Option 1</b></p> <ul style="list-style-type: none"> <li>▪ If wreck extent polygon data is available from either, it is anticipated that this could be sourced directly and imported to the Marine Atlas.</li> <li>▪ Consideration should be given to applying a buffer to the wreck location polygons to better safeguard assets in the marine planning and development management process. If deemed desirable, a standard buffer would then be applied to the polygon dataset.</li> </ul> <p><b>Option 2</b></p> <ul style="list-style-type: none"> <li>▪ If wreck extent data is not available, rasterised and georeferenced sonar scans for wrecks are available from INFOMAR (included on the ArcGIS Online browser). While this can be downloaded for small areas, sourcing all the available data in a single tranche directly from the originators is likely to be more time efficient – both upfront and in terms of subsequent data processing. Once obtained, tasks would include: <ul style="list-style-type: none"> <li>• Georeference / transform data to appropriate coordinate system</li> <li>• Manually digitise maximum wreck extents (automated approach investigated but discounted due to substantial differences across available sonar extracts, making scripting for AI feature recognition unfeasible.)</li> <li>• Transpose INFOMAR and Wreck Inventory of Ireland attribution via 'join/relate' table operations</li> </ul> </li> <li>○ This would potentially result in a two-tier hierarchy of accuracy as Inventory wreck sites not surveyed by INFOMAR would need their extents extrapolated by the method set out in Option 3. Nevertheless, this would make the best use of available data, improving accuracy where possible.</li> </ul>	

**Option 3**

- If sonar data cannot be provided, or would need to be downloaded individually for each wreck site, or could only be provided at an unacceptably high additional cost, a third option is available.
- Create data layer merging location shapefiles, removing overlapping /duplicate data
- A standard buffer could be applied to the wreck point data (INFOMAR and Wreck Inventory of Ireland) to ensure that the likely extent of the wreck is identified and protected. (This would obviously be less accurate than primary digitising – particularly for wrecks that are in more than one piece on the seafloor – but could be a proportionate solution.)

The following steps would be required:

- Source shipwreck data from INFOMAR and the National Monuments Service
- Determine an appropriate buffer extent (e.g. 250 m diameter)
- Run standard buffer tool in ArcGIS
- Transpose INFOMAR and Wreck Inventory of Ireland attribution to polygon data via 'join/relate' table operations
- Engagement with the National Monuments Service to agree an appropriate value rating framework (e.g. combining date, rarity, historical associations etc.)
- Create metadata records consistent with ISDE requirements
- Create data processing logs
- Establish update frequency (As required, depending on source data update schedule)

Estimated staff effort/cost	Time/costs pertains to assigning of value, not initial processing options (covered under 'Wreck extents' and included for completeness)  €5,500 (10 days)
Required skills	GIS technicians; archaeological specialists
Estimated time scales	3 months

<b>MSP Topic: Cultural Heritage</b>	
<b>Terrestrial heritage assets</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a data layer identifying the current spatial distribution/location and extent of known terrestrial heritage assets
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Terrestrial heritage assets
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Archaeological Survey of Ireland Record of Monuments and Places (formerly the Sites and Monuments Record); National Monuments Service National Monuments dataset(s) (NMs, NM zones, NM in state care); Record of Protected Structures; Local authority historic environment surveys for coastal authorities (e.g. Cork Archaeological Survey); National Inventory of Architectural Heritage (point data / building footprint polygons); Local authority Conservation Areas; National Inventory of Architectural Heritage (point data / building footprint polygons)</li> <li>○ Data will be sourced in the first instance from the Heritage Council and the National Monuments Service (layers collated from a range of sources to populate 'Heritage Maps' online service and representing protected sites respectively). <i>It is understood that some data collated and held as part of the 'Heritage Maps' browser is derived from local authority materials, and that there may be some reluctance to share this information. Liaison with the Heritage Council will be necessary to unpack local authority concerns and, where necessary, provide overarching assurance that data will be used appropriately and within the bounds of any licence agreement.</i> Request data from the National Monument Service and the Heritage Council. No point of contact established yet for the National Monument Service <a href="mailto:nationalmonuments@chg.gov.ie">nationalmonuments@chg.gov.ie</a>. Contact the Heritage Council <a href="mailto:gisdata@heritagecouncil.ie">gisdata@heritagecouncil.ie</a> to obtain data available on Heritage Maps.</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Standard ArcGIS tools</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Create data layer merging location shapefiles, removing overlapping /duplicate data and clipping data to remove inland locations (using agreed 'coastal' areas of search).</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (as Needed)</li> </ul> </li> </ul>	
Estimated staff effort/cost	€5,500-15,000 (depending on level of input required to clean and integrate datasets) (~20 days)
Required skills	GIS technician; archaeological specialist; historic buildings specialist
Estimated time scales	3-6 months (dependent on speed of agreement / data supply by local authority stakeholders)

<b>MSP Topic: Cultural Heritage</b>	
<b>Terrestrial heritage assets</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a data layer identifying the current value of known heritage assets (cultural value)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Value of terrestrial heritage assets
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Archaeological Survey of Ireland Record of Monuments and Places (formerly the Sites and Monuments Record); National Monuments Service National Monuments dataset(s) (NMs, NM zones, NM in state care); Record of Protected Structures; Local authority historic environment surveys for coastal authorities (e.g. Cork Archaeological Survey); National Inventory of Architectural Heritage (point data / building footprint polygons); Local authority Conservation Areas; National Inventory of Architectural Heritage (point data / building footprint polygons)</li> <li>○ Data will be sourced in the first instance from the Heritage Council and the National Monuments Service (layers collated from a range of sources to populate 'Heritage Maps' online service and representing protected sites respectively). <i>It is understood that some data collated and held as part of the 'Heritage Maps' browser is derived from local authority materials, and that there may be some reluctance to share this information. Liaison with the Heritage Council will be necessary to unpack local authority concerns and, where necessary, provide overarching assurance that data will be used appropriately and within the bounds of any licence agreement.</i> Request data from the National Monument Service and the Heritage Council. No point of contact established yet for the National Monument Service <a href="mailto:nationalmonuments@chg.gov.ie">nationalmonuments@chg.gov.ie</a>. Contact the Heritage Council <a href="mailto:gisdata@heritagecouncil.ie">gisdata@heritagecouncil.ie</a> to obtain data available on Heritage Maps.</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Standard ArcGIS tools</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Create data layer merging location shapefiles, removing overlapping /duplicate data and clipping data to remove inland locations (using agreed 'coastal' areas of search).</li> <li>○ Assign value rating to data, based on 'high/moderate/low/uncertain' scale (National Monuments, NIAH = High; Protected Structure/within Conservation Area = Moderate; SMR assets and other assets = low/uncertain)</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (as Needed)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Time/costs pertains to assigning of value, not initial processing options (covered under 'Terrestrial heritage assets' and included for completeness)  €5,500 (10 days)
Required skills	GIS technicians; archaeological specialists; historic buildings specialist
Estimated time scales	3 months

<b>MSP Topic: Cultural Heritage</b>	
<b>Palaeo-landscapes</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a data layer identifying the current spatial distribution/location and extent of known areas of high archaeological potential within palaeo-landscapes in the marine environment.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Palaeo-landscapes
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Build on palaeo-landscapes layer compiled under geology topic - this layer will provide the total extent of palaeo-landscapes in Irish waters</li> <li>○ Marine Institute is a partner in a current survey and research project looking at the potential for submerged landscapes (palaeolandscapes) in the Irish Sea. The 'Europe's Lost Frontiers' programme includes extensive seismic/bathymetric survey, the extraction of sediment cores and interpretation of archaeological potential in the Irish Sea.</li> </ul> <p>Engagement with the project team, led by Principal Investigator from Bradford University and Irish colleagues from IT Sligo, Cork, and the Marine Institute is necessary to understand:</p> <ul style="list-style-type: none"> <li>▪ Project timelines, processes and outputs</li> <li>▪ Availability of data at an appropriate resolution to facilitate incorporation / interpretation and inclusion in the Marine Atlas</li> <li>▪ Failing that, an understanding of timescales to enable future updates of the atlas.</li> </ul> <li>○ There may be potential reluctance to share/release data as this may conflict with the proposed publication cycle for the project and/or may be seen as undermining the potential research impact of future publications.</li> <li>○ It is not currently clear whether data will actually be available from the 'Lost Frontiers' project, although this would be the preferred option – particularly as MI is a research partner (including through the provision of RV Celtic Voyager).</li> </li></ul> <p>Additional engagement with the National Monuments Service Underwater Archaeology Unit is required to determine the extent to which information/data is held on palaeo-landscapes and non-wreck marine archaeology in the intertidal and inshore zones.</p>	
Estimated staff effort/cost	Cannot be estimated at the moment
Required skills	GIS technician; archaeological specialist
Estimated time scales	TBC

## B.14 Defence and national security

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the aviation topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- Danger areas – activity specific administrative boundary
- Danger areas – current spatial distribution / location and intensity of activity
- Naval bases – current location of activity

Important gaps (priority 2) have been identified for the following data products:

- Naval bases – data / spatial data on current value of activity

<b>MSP Topic: Naval Defence</b>	
<b>Danger areas - boundaries</b>	<b>Priority Rating: 1</b>
Data Product Description	Map of the location of danger areas
Relevant existing Atlas data layers	No layer to date.
Proposed names for new Atlas data layers	Danger areas – boundary
<p><b>Outline methodology</b></p> <p>Data sources and permissions to use the data:</p> <ul style="list-style-type: none"> <li>○ Request data from Naval Defences</li> </ul> <p>Licence agreement:</p> <ul style="list-style-type: none"> <li>○ Unclear</li> </ul> <p>Update:</p> <ul style="list-style-type: none"> <li>○ Unclear</li> </ul> <p>Required data processing tools:</p> <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> <p>Outline tasks for creating data product:</p> <ul style="list-style-type: none"> <li>○ Acquire layer of boundary of danger areas from the Naval Defence Forces</li> <li>○ Create data layer identifying danger areas boundary</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Confirm update frequency with the Naval Defence Forces</li> </ul>	
Estimated staff effort/cost	Estimated 1 day effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Naval Defence</b>	
<b>Danger areas – location and intensity of activity</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing the intensity of danger areas
Relevant existing Atlas data layers	No layer to date
Proposed names for new Atlas data layers	Intensity of danger areas
<p><b>Outline methodology</b></p> <p>Data sources and permissions to use the data:</p> <ul style="list-style-type: none"> <li>○ Request data from Naval Defences</li> </ul> <p>Licence agreement:</p> <ul style="list-style-type: none"> <li>○ Unclear</li> </ul> <p>Update:</p> <ul style="list-style-type: none"> <li>○ Unclear</li> </ul> <p>Required data processing tools:</p> <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> <p>Outline tasks for creating data product:</p> <ul style="list-style-type: none"> <li>○ Acquire layer of boundary of danger areas from the Naval Defence Forces</li> <li>○ Create data layer identifying danger areas distribution and intensity</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul>	
Estimated staff effort/cost	Estimated 2 days effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Naval Defence</b>	
<b>Location of naval bases</b>	<b>Priority Rating: 1</b>
Data Product Description	Map location of naval bases
Relevant existing Atlas data layers	No layer to date
Proposed names for new Atlas data layers	Location of naval bases
<p>Data sources and permission to use the data:</p> <p>Data Sources: Department of Defence Naval Defence Forces</p> <p>Licence:</p> <ul style="list-style-type: none"> <li>○ To be clarified.</li> </ul> <p>Update:</p> <ul style="list-style-type: none"> <li>○ Unclear</li> </ul> <p>Required data processing tools:</p> <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> <li>○ Excel</li> </ul> <p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>○ Outline tasks for creating data product (if base + branches):</li> <li>○ Acquire layer of identifying locations of base and branches from the Naval Defence Forces/ Department of Defence</li> <li>○ Create data layer identifying location of facilities</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li>   <li>○ Outline tasks for creating data product (base only)</li> <li>○ Acquire layer of identifying locations of base from the Naval Defence Forces</li> <li>○ Create data layer identifying location of facilities</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 days GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 day

<b>MSP Topic: Naval Defence</b>	
<b>Value of Naval Defence forces</b>	<b>Priority Rating: 2</b>
Data Product Description	Map Value of naval defence forces
Relevant existing Atlas data layers	No layer to date
Proposed names for new Atlas data layers	Value of naval defence forces
<p>Data sources and permission to use the data:</p> <p>Data Sources:            Department of Public Expenditure and Reform            Central Statistics Office (for NACE code classification): <a href="mailto:Business_Stats@.cso.ie">Business_Stats@.cso.ie</a>            Department of Defence</p> <p>Licence:</p> <ul style="list-style-type: none"> <li>• CSO data in public domain, no restriction</li> <li>• Data extracted from Department of Public Expenditure in public domain</li> <li>• If obtaining data from Department of Defence, clarify licence.</li> </ul> <p><b>Outline methodology</b></p> <p>Identify direct employment from Naval Defence Forces (method used in MMO Economic Baseline Assessment for the North East, North West, South East and South West marine plans report)</p> <ul style="list-style-type: none"> <li>○ Extract workforce data presented <a href="file:///C:/Users/User/Downloads/Defence-Expenditure-1.pdf">file:///C:/Users/User/Downloads/Defence-Expenditure-1.pdf</a> <b>or</b></li> <li>○ Extract data from the Central Statistics Office using the NACE code classification</li> <li>○ <b>Or</b> Obtain data from Department of Defence</li> <li>○ Identify locations of all naval defence offices and bases (only one base, branches elsewhere).</li> <li>○ If indirect employment considered, use a multiplier (to be determined).</li> <li>○ Desk based review of options for assigning economic value (salary, public expenditure; other)</li> <li>○ Apply preferred method to naval bases and other identified locations</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Establish update frequency (5 years)</li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (1 day economist; 1 day GIS analyst) cost approx. €1100
Required skills	Economist; GIS analyst
Estimated time scales	1 week

## B.15 Energy (petroleum, renewables, transmission systems)

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Energy topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- Current spatial distribution/location and intensity of power interconnectors
- Current spatial distribution/location and intensity of gas interconnectors
- Current spatial distribution/location and intensity of offshore wind infrastructure

Important gaps (priority 2) have also been identified for the following data products:

- Current spatial distribution/location and intensity of fossil fuel power stations
- Potential future spatial distribution/location and intensity of electricity interconnectors
- Data/spatial data on current value of electricity interconnectors
- Potential future spatial distribution/location and intensity of gas interconnectors
- Data/spatial data on current value of gas interconnectors
- Potential future spatial distribution/location and intensity of offshore wind development
- Data/spatial data on current value of offshore wind infrastructure
- Potential future spatial distribution/location and intensity of oil and gas activity
- Data/spatial data on current value of oil and gas activity
- Current spatial distribution/location of tidal range energy resource
- Potential future spatial distribution/location and intensity of tidal stream energy development
- Data/spatial data on current value of tidal stream energy projects
- Potential future spatial distribution/location and intensity of wave energy development
- Data/spatial data on current value of wave energy development

Note – electricity and gas distribution networks covered under terrestrial infrastructure

<b>MSP Topic: Energy</b>	
<b>Existing Power Interconnectors</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing current location of power interconnectors (live and dead)
Relevant existing Atlas data layers	Undersea Cables
Proposed names for new Atlas data layers	Power Interconnectors
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ KIS-ORCA</li> <li>○ Based on initial discussions with KIS-ORCA, MI will need to agree an amendment to its licence in order to display power cables maps on the MSP Portal.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire power interconnector shapefiles form KIS-ORCA</li> <li>○ Create data layer identifying live and dead cables</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual check for updates)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Energy</b>	
<b>Existing Gas Interconnectors</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing location of existing gas interconnectors
Relevant existing Atlas data layers	Offshore Gas Pipeline
Proposed names for new Atlas data layers	Gas Interconnectors
<ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ Gas Networks Ireland</li> <li>○ Licence agreement:                   <ul style="list-style-type: none"> <li>▪ No download possible, display only. Business agreement to be organised between parties</li> <li>▪ Scale resolution restriction as follows: 500,000 for transmission; 50,000 for distribution</li> <li>▪ GNI to carry out a check prior to public access.</li> </ul> </li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Acquire data from GNI</li> <li>○ Create data layer</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (6 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Energy</b>	
<b>Existing Offshore Wind Infrastructure</b>	
<b>Priority Rating: 1</b>	
Data Product Description	Map showing location of existing offshore wind infrastructure
Relevant existing Atlas data layers	Arklow Bank Wind Park Connection Cable
Proposed names for new Atlas data layers	Offshore Wind Infrastructure
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ DHPLG/MIDA for Arklow Bank windfarm DHPLG Foreshore licensing database</li> <li>○ Atlas/DHPLG for Galway Bay Test Area (now includes floating wind)</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire data on existing infrastructure locations</li> <li>○ Create data layer</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual check for updates)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Energy</b>	
<b>Existing Coastal Power Stations</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing location of existing coastal power stations
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Coastal Power Stations
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ MIDA <a href="http://mida.ucc.ie/">http://mida.ucc.ie/</a> Alternatively, a map could be created from web sources such as Wikipedia which lists all power stations in Ireland</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire MIDA point data and/or undertake websearch to validate existing coastal power stations</li> <li>○ Create data layer</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (6 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 day GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Energy</b>	
<b>Future Power Interconnectors</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing location of planned and potential future power interconnectors
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Future Power Interconnectors
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ Greenlink – route corridor shapefile sought from Greenlink</li> <li>○ Celtic Interconnector – route corridor sought form Eirgrid</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Acquire corridor data from developers/DHPLG</li> <li>○ Create data layer</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual check with DHPLG)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 day GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Energy</b>	
<b>Value of Power Interconnectors</b>	<b>Priority Rating: 2</b>
Data Product Description	Map indicating spatial distribution of value of existing power interconnectors
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Value of Power Interconnectors
	<ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ KIS-ORCA</li> <li>○ Based on initial discussions with KIS-ORCA, MI will need to agree an amendment to its licence in order to display telecom cable maps on the MSP Portal.</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Acquire power interconnector shapefiles form KIS-ORCA</li> <li>○ Create data layer identifying live and dead cables</li> <li>○ Desk-based review of options for assigning economic value (value of power transferred; replacement cost; current investment in power interconnectors)</li> <li>○ Apply preferred method to live power interconnectors</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (6 years)</li> </ul> </li> </ul>
Estimated staff effort/cost	Estimated 5 days staff effort (3 days economist; 2 days GIS analyst) cost approx. €2900
Required skills	Economist; GIS analyst
Estimated time scales	3 weeks

<b>MSP Topic: Energy</b>	
<b>Future Gas Interconnectors</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing location of planned and potential future gas interconnectors
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Future Gas Interconnectors
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ No planned new gas interconnectors have been identified.</li> <li>○ Data layer not required</li> </ul> </li> </ul>	
Estimated staff effort/cost	N/A
Required skills	N/A
Estimated time scales	N/A

<b>MSP Topic: Energy</b>	
<b>Value of Gas Interconnectors</b>	<b>Priority Rating: 2</b>
Data Product Description	Map indicating spatial distribution of value of existing gas interconnectors
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Value of Gas Interconnectors
<ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Use 'Gas Interconnectors' layer created above.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Desk-based review of options for assigning economic value (value of gas transferred; replacement cost; current investment in gas interconnectors)</li> <li>○ Apply preferred method to gas interconnectors</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (6 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (1 day economist; 1 day GIS analyst) cost approx. €1100
Required skills	Economist; GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Energy</b>	
<b>Future Offshore Wind Development</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing location of planned and potential future offshore wind development
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Future Offshore Wind Development
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ DHPLG Foreshore licensing database (need to confirm that all current licences and proposals are included and understand status of licences)</li> <li>○ Individual developers – for data not held by DHPLG</li> <li>○ SEA Assessment Areas for OREDP - DCCAE (formerly DCENR)</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire data from developers/DHPLG/DCCAE</li> <li>○ Create data layers (licensed areas; OREDP areas)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual update)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 3 days staff effort (3 day GIS analyst) cost approx. €1200
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Energy</b>	
<b>Value of Offshore Wind</b>	<b>Priority Rating: 2</b>
Data Product Description	Map indicating spatial distribution of value of existing offshore wind development
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Value of Offshore Wind
	<ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Atlas/MIDA location of existing offshore wind development</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Desk-based review of options for assigning economic value (value of electricity generated; replacement cost; current investment in offshore wind)</li> <li>○ Apply preferred method to existing offshore wind development</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (6 years)</li> </ul> </li> </ul>
Estimated staff effort/cost	Estimated 3 days staff effort (2 days economist; 1 day GIS analyst) cost approx. €1900
Required skills	Economist; GIS analyst
Estimated time scales	2 weeks

<b>MSP Topic: Energy</b>	
<b>Future Oil and Gas Development</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing location of planned and potential future oil and gas development
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Future Oil and Gas Development
Outline methodology	<ul style="list-style-type: none"> <li>○ No new production facilities currently planned</li> </ul>
Estimated staff effort/cost	None
Required skills	n/a
Estimated time scales	n/a

<b>MSP Topic: Energy</b>	
<b>Value of Oil and Gas</b>	<b>Priority Rating: 2</b>
Data Product Description	Map indicating spatial distribution of value of existing oil and gas development
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Value of Oil and Gas
<ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Atlas/PAD data on location of operational oil and gas production facilities</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Desk-based review of options for assigning economic value (value of oil and gas produced; GVA; replacement cost)</li> <li>○ Apply preferred method to existing oil and gas development</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (6 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 3 days staff effort (2 days economist; 1 day GIS analyst) cost approx. €1900
Required skills	Economist; GIS analyst
Estimated time scales	2 weeks

<b>MSP Topic: Energy</b>	
<b>Tidal Range Energy Resources</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing location/distribution of tidal range energy resources
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Tidal Range Energy Resources
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ Use MI operational tidal model – identify locations &gt;7 m &gt;5 m Mean Spring tidal range</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Extract tidal range data from MI model</li> <li>○ Create data layers</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (would only require update if tidal range technology developed that could harness energy from smaller tidal ranges)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 3 days staff effort (2 days modeller; 1 day GIS analyst) cost approx. €1400
Required skills	Numerical modeller; GIS analyst
Estimated time scales	2 weeks

<b>MSP Topic: Energy</b>	
<b>Future Tidal Stream Energy Development</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing location of planned and potential future tidal stream energy development
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Future Tidal Stream Energy Development
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ DCCAIE OREDP assessment zones for tidal stream energy</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Obtain tidal stream assessment areas from DCCAIE OREDP</li> <li>○ Create data layer</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual update DHPLG foreshore Licensing database/DCCAIE)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Energy</b>	
<b>Value of Tidal Stream Energy</b>	<b>Priority Rating: 2</b>
Data Product Description	Map indicating spatial distribution of value of existing tidal stream energy development
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Value of Tidal Stream Energy
There is currently no tidal stream infrastructure, so no value to map.	
Estimated staff effort/cost	N/A
Required skills	N/A
Estimated time scales	N/A

<b>MSP Topic: Energy</b>	
<b>Future Wave Energy Development</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing location of planned and potential future wave energy development
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Future Wave Energy Development
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ DCCAE OREDP zones</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Acquire data from DCCAE</li> <li>○ Create data layer (OREDPA assessment areas)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual update)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Energy</b>	
<b>Value of Wave Energy</b>	<b>Priority Rating: 2</b>
Data Product Description	Map indicating spatial distribution of value of existing wave energy development
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Value of Wave Energy
<ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ MI Atlas has location of existing test facilities</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Desk-based review of options for assigning economic value (value of wave energy produced; GVA; replacement cost)</li> <li>○ Apply preferred method to existing wave energy development</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (6 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 3 days staff effort (2 days economist; 1 day GIS analyst) cost approx. €1900
Required skills	Economist; GIS analyst
Estimated time scales	2 weeks

## B.16 Energy (carbon capture and storage)

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the CCS topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- Current spatial distribution of CCS resource

Important gaps (priority 2) have also been identified for the following data products:

- Potential future distribution/location and intensity of CCS activity

<b>MSP Topic: Carbon Capture and Storage</b>	
<b>Potential Carbon Capture and Storage Locations</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing locations for potential CCS storage
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Potential Carbon Capture Storage Resources
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Data sought from SEAI relating to following report  <a href="https://www.seai.ie/resources/publications/Assessment-of-the-Potential-for-Geological-Storage-of-CO2-for-the-Island-of-Ireland.pdf">https://www.seai.ie/resources/publications/Assessment-of-the-Potential-for-Geological-Storage-of-CO2-for-the-Island-of-Ireland.pdf</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Obtain shapefiles from SEAI</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 day

<b>MSP Topic: Carbon Capture and Storage</b>	
<b>Potential Future Carbon Capture and Storage Activity</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing potential future distribution/location and intensity of CCS activity
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Potential Future CCS Activity
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Data sought from SEAI relating to following report <a href="https://www.seai.ie/resources/publications/Assessment-of-the-Potential-for-Geological-Storage-of-CO2-for-the-Island-of-Ireland.pdf">https://www.seai.ie/resources/publications/Assessment-of-the-Potential-for-Geological-Storage-of-CO2-for-the-Island-of-Ireland.pdf</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Obtain shapefiles from SEAI of potential storage locations</li> <li>○ Create shapefile of most likely potential future storage locations (Kinsale Head Gas Field <a href="https://www.powerengineeringint.com/articles/2017/10/cork-for-carbon-capture-and-storage.html">https://www.powerengineeringint.com/articles/2017/10/cork-for-carbon-capture-and-storage.html</a>)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (5 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 day

## B.17 Fisheries and shellfisheries

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Fisheries and Shellfisheries topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gaps have been identified:

- Closed areas / management areas (inc. BSA)
- Inshore (<12 m) fishing – distribution/intensity, layers by gear type (beam trawl, demersal trawl and seine, dredge, static nets, longline, potting, pelagic/midwater trawl). Each layer can distinguish polygons for different fisheries e.g. potting distinguish between shrimp, lobster, Nephrops, green crab, whelk)
- Offshore (>12 m) fishing (Irish vessels) – distribution/intensity, layers by gear type (beam trawl, demersal trawl and seine, dredge, static nets, longline, potting, pelagic/midwater trawl)

Important gaps (priority 2) have also been identified for the following data products:

- Fishing rights in 6-12 nm zone
- Landings by port – quantity (broken down by deepwater/demersal/pelagic/shellfish?)
- Landings by port – value (broken down by deepwater/demersal/pelagic/shellfish?)
- Vessel numbers by port (can show number of vessels by length group)
- Vessel steaming routes to fishing grounds
- Fishing grounds - Shellfish beds (cockles, seed mussels, razor clam, scallop habitat, oysters etc)
- Fishing grounds - other species
- Inshore (<12 m) fishing – value, layers by gear type (beam trawl, demersal trawl and seine, dredge, static nets, longline, potting, pelagic/midwater trawl). Each layer can distinguish polygons for different fisheries e.g. potting distinguish between shrimp, lobster, Nephrops, green crab, whelk)
- Salmon fisheries – distribution/intensity (commercial salmon catch, salmon drift nets)
- Salmon fisheries – value (commercial salmon catch, salmon drift nets)
- Offshore (>12 m) fishing (Irish vessels) – value, layers by gear type (beam trawl, demersal trawl and seine, dredge, static nets, longline, potting, pelagic/midwater trawl)
- Offshore (>12 m) fishing (non-Irish vessels) – intensity, layers by gear type (beam trawl, demersal trawl and seine, dredge, static nets, longline, potting, pelagic/midwater trawl)

<b>MSP Topic: Fisheries</b>	
<b>Closed areas / fisheries management areas (inc. BSA)</b>	<b>Priority Rating: 1</b>
Data Product Description	This data product will provide layers identifying areas that are subject to specific management measures or restrictions relating to fishing
Relevant existing Atlas data layers	Special Area Conservation, Offshore Special Area of Conservation, Offshore SAC UK (not in MSP area), Biologically sensitive area
Proposed names for new Atlas data layers	Irish Sea Cod Box Prawn Net Regulation area 1 Prawn Net Regulation area 2 (with separator panel) Celtic Sea Conservation Area Biologically Sensitive Area Hake Box Deep Sea Closure Haddock Closure Porcupine Bank Nephrops Closure Coral Protection Area ICES Area VIa Restrictions Mackerel/Herring Restrictions
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ BIM produces a poster showing 'Fisheries Management 2018' (produced by La Tene Maps on behalf of Bord Iascaigh Mhara). The fisheries management areas shown in Irish waters on the main map, and the Herring/Mackerel Restrictions (map on right hand side) should be incorporated as layers in the MSP Atlas.</li> <li>○ See: <a href="http://www.bim.ie/media/bim/content/downloads/BIM-fisheries-management-chart-2018.pdf">http://www.bim.ie/media/bim/content/downloads/BIM-fisheries-management-chart-2018.pdf</a></li> <li>○ Contact: fisheries@bim.ie.</li> <li>○ Note that the SACs currently shown on the Marine Atlas do not necessarily impose restrictions on fishing – the 'Coral Protection Areas' shown on the BIM map relate to the areas within SACs that restrict fishing.</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software.</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Obtain shapefiles and metadata from BIM.</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual check)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €1,000
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Fisheries</b>	
<b>Inshore Fishing (&lt;12 m vessels)</b>	<b>Priority Rating: 1</b>
Data Product Description	Layers showing distribution (and intensity if available) by gear type (beam trawl, demersal trawl and seine, dredge, static nets, longline, potting, pelagic/midwater trawl) of under-12 m vessels' activity. Each layer can distinguish polygons for different fisheries e.g. potting distinguish between shrimp, lobster, Nephrops, green crab, whelk)
Relevant existing Atlas data layers	Inshore – Periwinkle Harvesting Collecting Inshore – Dredge Fishing Inshore – Line Fishing Inshore – Nets Fishing Inshore – Bottom Trawl Fishing Inshore – Midwater Trawl Fishing Inshore – Pot Fishing
Proposed names for new Atlas data layers	Inshore fishing (<12 m) – Bottom trawl fishing areas/intensity Inshore fishing (<12 m) – Dredge fishing areas/intensity [Inshore fishing (<12 m) – Hydraulic dredge fishing areas/intensity] Inshore fishing (<12 m) – Pelagic/midwater trawl fishing areas/intensity Inshore fishing (<12 m) – Pot fishing areas/intensity Inshore fishing (<12 m) – Line fishing areas/intensity Inshore fishing (<12 m) – Net fishing areas/intensity  <i>If option 2 or 3 is progressed, amalgamated layers for all gears, mobile demersal, pelagic and static gears could also be created (see 'VMS Fishing Intensity (&gt;12 m vessels) (2013-2017)' roadmap). If the existing polygons are used, amalgamated layers are of less value as the various polygons from all layers can be displayed together to show the overall fishing area for under 12 m vessels</i>
<b>Outline methodology – Option 1 (Collation of best-available layers)</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ <a href="#">Atlas of Commercial Fisheries for Shellfish around Ireland</a> ('Shellfish Atlas'): Marine Institute</li> <li>○ Marine Atlas</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data products</li> <li>• See map created for National Marine Plan Baseline Report (Commercial Fisheries – Inshore, p58)</li> <li>• Decide whether to include periwinkle harvesting points as a layer (retain from existing Atlas layer)</li> <li>• Inshore fishing – Bottom trawl fishing activity <ul style="list-style-type: none"> <li>○ Create polygons for the following target species categories (show each with different symbology on the layer):</li> <li>○ Mixed demersal (from 'Inshore – Bottom trawl fishing' on Marine Atlas, for 'mixed demersal species')</li> <li>○ Prawns/Nephrops (from Fig 18 in Shellfish Atlas, excluding any areas in Clew Bay and Inver Bay)</li> <li>○ Queen scallop (from 'Inshore – Bottom trawl fishing' on Marine Atlas, for 'Queen scallop')</li> </ul> </li> </ul>	

- Outline tasks for creating data product: **Inshore fishing – Dredge fishing activity**
  - Create polygons for the following target species categories (show each with different symbology on the layer) (from 'Inshore – Dredge fishing' on Marine Atlas):
    - Clams, cockles, razor clams
    - Mussels, seed mussel
    - Native oyster
    - Scallop
- [If it is possible to differentiate between mechanical dredges and hydraulic dredges, the above layer could be split into two separate layers, to include **Inshore fishing – Hydraulic dredge fishing activity** (e.g. razor clam, cockle, clam etc)]
- Outline tasks for creating data product: **Inshore fishing – Pot fishing activity**. Each sub-bullet below can be shown in a different colour in the layer:
  - Create polygons for the following target species categories (show each with different symbology on the layer) (from 'Inshore – Pot fishing' on Marine Atlas and relevant figures from Shellfish Atlas):
    - For 'crab and lobster', combine polygons from Shellfish Atlas (also shown on Marine Atlas) that show: Lobster fishing; Crab potting (do not show VMS as well, as this will be included in the VMS layers, see separate Roadmap); Crayfish/spiny lobster if caught by pots
    - For 'Shrimp', combine polygons from expert knowledge and questionnaire data in the Shellfish Atlas
    - 'Whelk'
    - 'Nephrops' (Shellfish Atlas shows trawl and potting areas combined – need to differentiate and show just pot fishing areas. Some are coded within the 'Inshore Pot Fishing Activity' layer on the Marine Atlas, as 'Prawn Pot'). Shellfish Atlas indicates that areas in Clew Bay and Inver Bay are fished with pots
- Outline tasks for creating data product: **Inshore fishing – Line fishing activity**
  - Create polygons for line fishing (from 'Inshore – Line fishing' on Marine Atlas and relevant figures from Shellfish Atlas). All polygons appear to relate to 'pollack and mackerel'; so no need to distinguish by target species
- Outline tasks for creating data product: **Inshore fishing – Net fishing activity**
  - Create polygons for the following target species categories by combining polygons for relevant species (show each with different symbology on the layer) (from 'Inshore – Net fishing' on Marine Atlas and relevant figures from Shellfish Atlas):
    - Bait
    - Crayfish
    - Pelagic
    - Demersal
- General tasks for all layers
  - Create metadata record consistent with ISDE requirements
  - Create data processing log
  - Establish update frequency (check and update with expert knowledge from BIM, SPPA, MI, every five years)

#### **Outline methodology – Option 2 (New primary data collection from under 12 m vessels on fishing areas)**

- Data sources and permissions to use the data:
  - New data collection required – may require survey approval/permission

- Required data processing tools
  - Data products can be created using standard ArcGIS software
- Outline tasks for creating data product
  - Interview inshore fishermen (vessels <12 m) and carry out participatory mapping exercise of fishing areas by gear type and target species
  - If a full census is not possible to obtain, a representative sample of inshore fishermen should be obtained
  - Digitise mapped polygons and attribute fishing gear and target species to each polygon
  - Grid the data and count number of vessels reported to use each grid cell (by target species and/or gear type)
  - Create GIS layers showing number of vessels by gear type
  - Create metadata record consistent with ISDE requirements
  - Create data processing log
  - Establish update frequency (10 years)

### **Outline methodology – Option 3 (Await roll-out of vessel monitoring systems on under-12 m vessels)**

- Data sources and permissions to use the data:
  - Data will start to come on stream as iVMS is increasingly implemented across under-12 m vessels. This is already starting to happen for certain fleet segments (razor clam vessels must have VMS; some potting vessels in the south of Ireland are beginning to trial it). As fleet coverage increases, data availability will increase and it will become easier to develop GIS layers showing distribution of under-12 m activity in a similar way to the over-12 m vessels with VMS.
- Required data processing tools
  - Data products can be created using standard ArcGIS software
- Outline tasks for creating data product
  - Using VMS or iVMS data, create similar layers to those for the over-12 m vessels (see 'VMS Fishing Intensity (>12 m vessels) (2013-2017)' roadmap)
  - Create metadata record consistent with ISDE requirements
  - Create data processing log
  - Establish update frequency (10 years)

Estimated staff effort/cost	Option 1: Estimated 6.5 days staff effort (6 days GIS analyst, 0.5 days fisheries expert) cost approx. €3,000 Option 2: €100-150k. Option 3: €20k for data processing over implementation period (5-10 years), in addition to cost of implementing iVMS on vessels and data collection system
Required skills	Option 1: GIS, fisheries knowledge Option 2: Fisheries expert, social science/survey expert, GIS analyst Option 3: GIS, fisheries knowledge
Estimated time scales	Option 1: 2 weeks Option 2: 18 months Option 3: 5-10 years as iVMS is rolled out across the inshore fleet.

MSP Topic: Fisheries	
VMS Fishing Intensity (> 12 m vessels) (2013-2017)	Priority Rating: 1
Data Product Description	Layers showing distribution and intensity (value shown in separate Roadmap, but could be incorporated here) of Irish over-12 m vessels' activity by gear type (e.g. beam trawl, demersal trawl and seine, dredge, static nets, longline, potting, pelagic/midwater trawl).
Relevant existing Atlas data layers	Offshore – Fishing Method All Gears Offshore – Fishing Method Mobile Bottom Offshore – Fishing Method Mobile Other Offshore – Fishing Method Mobile Seine Offshore – Fishing Method Passive
Proposed names for new Atlas data layers	<p><b>Amalgamated layers:</b></p> <p>VMS All Gears (2013-2017) fishing intensity VMS Mobile demersal gears (2013-2017) fishing intensity VMS Pelagic gears (2013-2017) fishing intensity VMS Static gears (2013-2017) fishing intensity</p> <p><b>Individual gear types:</b></p> <p>VMS Beam trawl (2013-2017) fishing intensity VMS Demersal trawl (2013-2017) fishing intensity VMS Demersal seine (2013-2017) fishing intensity (<i>could be combined with demersal trawl</i>) VMS Scallop dredge (2013-2017) fishing intensity VMS Hydraulic dredge (2013-2017) fishing intensity VMS Pelagic/midwater trawl (2013-2017) fishing intensity VMS Pots (2013-2017) fishing intensity VMS Lines (2013-2017) fishing intensity VMS Nets (2013-2017) fishing intensity VMS Pot fishing (2013-2017) fishing intensity</p> <p><i>N.B. there is a degree of judgement involved in deciding the relevant gear types and gear groupings. MI/SFPA/BIM fisheries experts with good knowledge of the Irish sector will be well placed to make such judgements.</i></p>
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Vessel monitoring system (VMS) ping data from Naval Service</li> <li>○ Logbook data from Irish logbooks database from Sea Fisheries Protection Authority</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ GIS</li> <li>○ R can also be used for processing VMS data – Vmstools package (see Hintzen <i>et al.</i>, 2012<sup>1</sup>).</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Identify 'fishing' VMS pings. This can be done using a speed rule (UK uses speed up to 6 knots to indicate 'fishing'. Netherlands uses specific speeds for different fleet segments, based on an analysis of the frequency distribution of speeds of the pings).</li> </ul> </li> </ul>	

<sup>1</sup> <http://orbit.dtu.dk/files/56377631/Hinzen.pdf>

MI has a method for doing this (see Atlas of Commercial Fisheries around Ireland, speeds for each gear type shown below). Pings near to port (e.g. 3 nm radius<sup>2</sup>) that are likely to be vessels transiting into/out of port should be classified as 'not fishing'.

Gear	Min Speed	Max Speed
Otter trawl	1.5	4.5
Beam trawl	1.5	6.0
Seine	0.5	4.0
Gill net	0.5	5.0
Longline	0.5	5.0
Dredge	1.5	4.0
Pots	0.5	5.0
Pelagic trawl	1.5	6.0

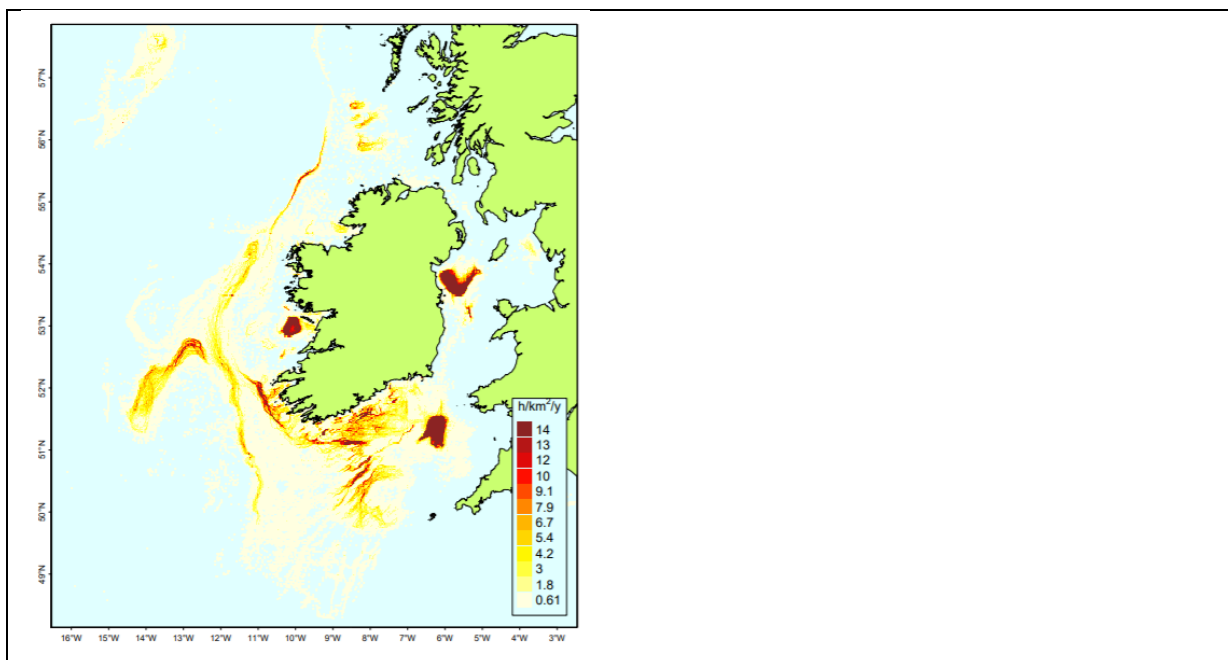
- Link VMS fishing pings with Logbook returns, using vessel ID. Use this to identify gear type associated with the pings. To avoid landings mis-allocation, assign fishing pings to overlapping ICES rectangles. It should be checked that this satisfactorily links pings to logbook returns (vessels only need to report one ICES rectangle per day but fishing activity may range over several ICES rectangles; it may therefore be preferable to link with voyage start date/time and end date/time).
- Create a grid and carry out non-parametric density analysis (which gives better results than the commonly used grid count method) to develop GIS layers describing annual distribution of fisheries. Produce contour maps from the density grids – this can be done using a smoothing function (e.g. Marine Scotland use a Gaussian kernel density estimation with a data-driven bandwidth selection approach (smoothed cross-validation) resulting in high quality contour maps which form a better estimate of the spatial extent of fishing activity and intensity).
- Create metadata record consistent with ISDE requirements
- Create data processing log
- Establish update frequency, options:
  - Rolling annual update to show latest 5 years' data (2014-2018; 2015-2019 etc);
  - Create annual layers and every 5 years create a new 5 year summary (2018-2022);
  - Update every 5 years with a new 5 year summary (2018-2022) in 2023, accepting that by 2022 the 2013-2017 layers will be quite outdated.

Layers similar to the maps of 'distribution of xxx effort by Irish vessels  $\geq 15$  m' in the 'Atlas of Commercial Fisheries around Ireland' can be produced: <http://oar.marine.ie/bitstream/10793/958/5/Atlas%20of%20Commercial%20Fisheries%20Around%20Ireland%202nd%20Edition.pdf>

<sup>2</sup>

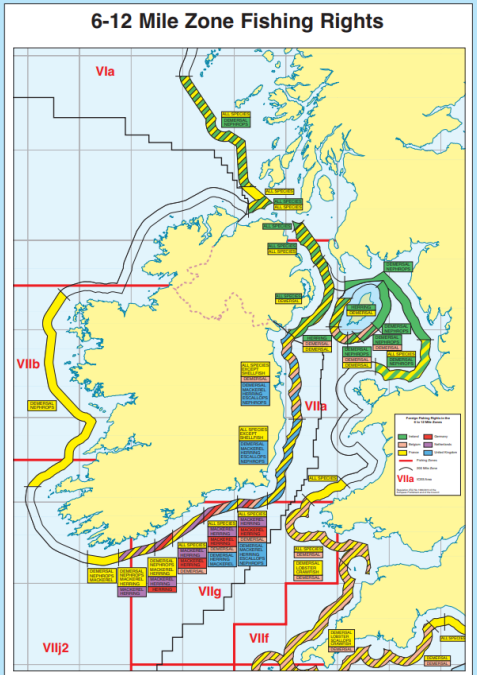
[Copy and paste link into browser]

<https://brage.bibsys.no/xmlui/bitstream/handle/11250/103734/sgvms10.pdf?sequence=1&isAllowed=y>



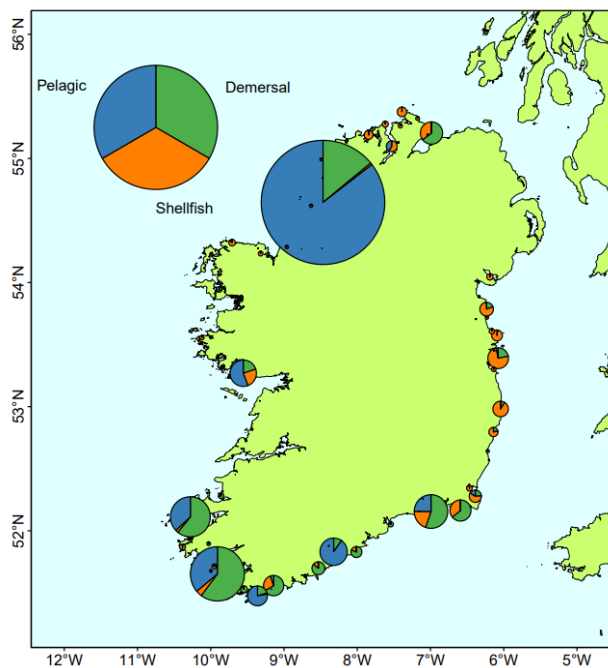
Or similar layers on Scotland’s NMPi (which are done by métier, i.e. target species and gear type combined):

Estimated staff effort/cost	€10k. 3 weeks’ GIS input <i>N.B. Cost/time savings if produced in conjunction with ‘Offshore (&gt;12 m) fishing (Irish vessels) – value’ data layers.</i>
Required skills	GIS analyst, Fisheries expertise
Estimated time scales	1 month

MSP Topic: Fisheries	
Fishing rights in 6-12 nm zone	Priority Rating: 2
Data Product Description	This data product will provide a layer that shows which EU Member States have access to waters within 6-12 nautical miles
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Fishing rights in 6-12 nm zone
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data:                             <ul style="list-style-type: none"> <li>○ BIM holds relevant data/layers. They are shown on 'Fisheries Management 2018' (produced by La Tene Maps on behalf of Bord Iascaigh Mhara) (image below). See: <a href="http://www.bim.ie/media/bim/content/downloads/BIM-fisheries-management-chart-2018.pdf">http://www.bim.ie/media/bim/content/downloads/BIM-fisheries-management-chart-2018.pdf</a></li> <li>○ Contact: fisheries@bim.ie.</li> </ul> </li> <li>• Required data processing tools                             <ul style="list-style-type: none"> <li>○ GIS</li> </ul> </li> <li>• Outline tasks for creating data product:                             <ul style="list-style-type: none"> <li>○ Data should be available as shapefiles; if not, create shapefiles from BIM data/information/map</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (areas do not change from year-to-year, so probably only require update to reflect any Brexit-related changes, and then check every 10 years in line with revision of CFP).</li> </ul> </li> </ul>	
	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €1,000
Required skills	GIS analyst
Estimated time scales	1 week

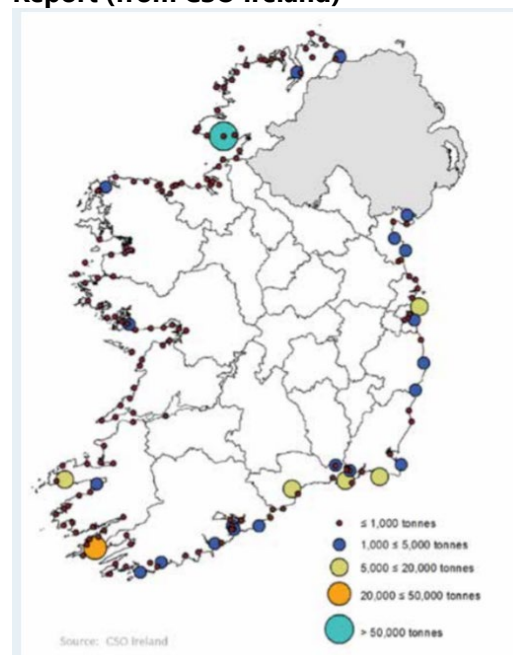
<b>MSP Topic: Fisheries</b>	
<b>Fish and shellfish landings by port (tonnes)</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide layers that show the quantity of fish and shellfish landings to each main port, broken down by pelagic/demersal/deepwater/shellfish species
Relevant existing Atlas data layers	'Fishing ports' (from MarEI, in 'Transport networks/Traffic') 'Fishery Harbours Centres' (designated by DAFM, in 'Administrative units') <i>[These layers should not be replaced by, but rather will feed in to, the layers to be created]</i>
Proposed names for new Atlas data layers	Fish landings by port (tonnes) (2013) Fish landings by port (tonnes) (2014) Fish landings by port (tonnes) (2015) Fish landings by port (tonnes) (2016) Fish landings by port (tonnes) (2017) Fish landings by port (tonnes) (2013-2017 annual average)
<b>Outline methodology</b> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Use 'fishing ports' layer from MarEI (already on Atlas) for location of fishing ports</li> <li>○ Obtain landings data by port from SFPA, by species type (demersal, pelagic, deepwater and shellfish) – need to request for all ports; only top 20 ports are shown in the summary statistics on the website: <a href="http://www.sfpa.ie/Sea-Fisheries-Conservation/Fisheries-Statistics-and-Quota-Uptake/Annual-Landing-Statistics/2017-Landings">http://www.sfpa.ie/Sea-Fisheries-Conservation/Fisheries-Statistics-and-Quota-Uptake/Annual-Landing-Statistics/2017-Landings</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Excel</li> <li>○ GIS</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Check spelling of port names in SFPA data and in 'fishing ports' layer</li> <li>○ Link SFPA landings data with fishing ports</li> <li>○ Display landings as pie charts (showing breakdown of demersal/pelagic/deepwater/shellfish), with size of pie chart representing tonnage. Attributes could identify actual values.</li> <li>○ Layers could be created for most recent published year (2017); annually for last 5 years (2013, 2014, 2015, 2016, 2017); and/or annual average over last 5 years (2013-2017)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency, options: <ul style="list-style-type: none"> <li>○ Rolling annual update to show latest 5 years' data (2014-2018; 2015-2019 etc);</li> <li>○ Create annual layers and every 5 years create a new 5 year summary (2018-2022);</li> <li>○ Update every 5 years with a new 5 year summary (2018-2022) in 2023, accepting that by 2022 the 2013-2017 layers will be quite outdated</li> </ul> </li> </ul> </li> </ul>	

**Example figure from Atlas of Commercial Fisheries around Ireland – 2<sup>nd</sup> Edition**



▲ Landings by port and species group; the size of the pie plots corresponds to the landings volume.

**Example figure from MSP Baseline Report (from CSO Ireland)**



Estimated staff effort/cost

Estimated 6 days staff effort (5 days GIS analyst; 1 day fisheries scientist) cost approx. €3,000  
*There will be cost savings if this is done in conjunction with the 'Fish and shellfish landings by port (Euros)' roadmap, as products will be similar and draw on same data sources.*

Required skills

Fisheries scientist  
 GIS analyst

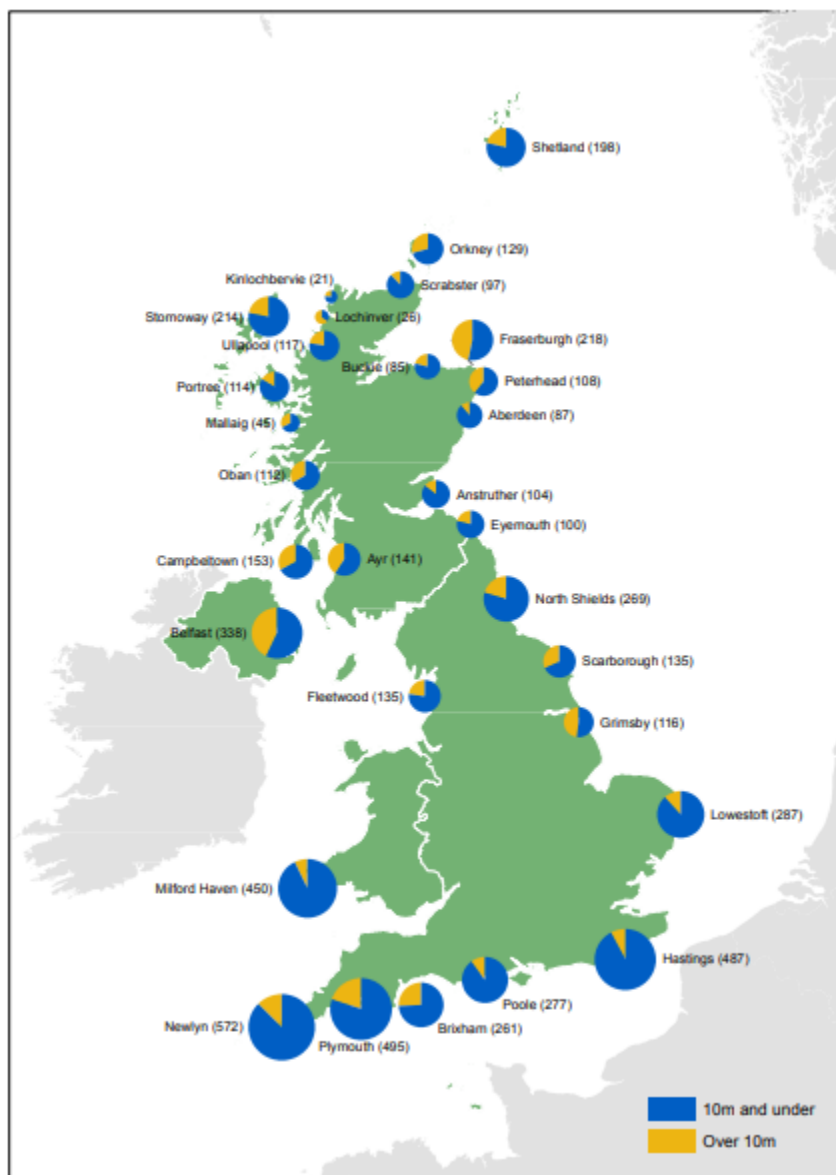
Estimated time scales

2-3 weeks

<b>MSP Topic: Fisheries</b>	
<b>Fish and shellfish landings by port (Euros)</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide layers that show the value of fish and shellfish landings to each main port, broken down by pelagic/demersal/deepwater/shellfish species
Relevant existing Atlas data layers	'Fishing ports' (from MarEI, in 'Transport networks/Traffic') 'Fishery Harbours Centres' (designated by DAFM, in 'Administrative units') <i>[These layers should not be replaced by, but rather will feed in to, the layers to be created]</i>
Proposed names for new Atlas data layers	Fish landings by port (Euros) (2013) Fish landings by port (Euros) (2014) Fish landings by port (Euros) (2015) Fish landings by port (Euros) (2016) Fish landings by port (Euros) (2017) Fish landings by port (Euros) (2013-2017 annual average)
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Methodology will be very similar to that for 'Fish and shellfish landings by port (tonnes)', but to present value instead.</li> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Use 'fishing ports' layer from MarEI (already on Atlas) for location of fishing ports</li> <li>○ Obtain landings data by port from SFPA, by species type (demersal, pelagic, deepwater and shellfish) – need to request for all ports; only top 20 ports are shown in the summary statistics on the website: <a href="http://www.sfpa.ie/Sea-Fisheries-Conservation/Fisheries-Statistics-and-Quota-Uptake/Annual-Landing-Statistics/2017-Landings">http://www.sfpa.ie/Sea-Fisheries-Conservation/Fisheries-Statistics-and-Quota-Uptake/Annual-Landing-Statistics/2017-Landings</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Excel, GIS</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Check spelling of port names in SFPA data and in 'fishing ports' layer</li> <li>○ Link SFPA landings data with fishing ports</li> <li>○ Display landings as pie charts (showing breakdown of demersal/pelagic/deepwater/shellfish), with size of pie chart representing value. Attributes could identify actual values.</li> <li>○ Layers could be created for most recent year (2017); annually for last 5 years (2013, 2014, 2015, 2016, 2017); and/or annual average over last 5 years (2013-2017)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency, options: <ul style="list-style-type: none"> <li>○ Rolling annual update to show latest 5 years' data (2014-2018; 2015-2019 etc);</li> <li>○ Create annual layers and every 5 years create a new 5 year summary (2018-2022);</li> <li>○ Update every 5 years with a new 5 year summary (2018-2022) in 2023, accepting that by 2022 the 2013-2017 layers will be quite outdated</li> </ul> </li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 6 days staff effort (5 days GIS analyst, 1 day fisheries scientist) cost approx. €3,000 <i>There will be cost savings if this is done in conjunction with the 'Fish and shellfish landings by port (tonnes)' roadmap, as products will be similar and draw on same data sources.</i>
Required skills	GIS analyst; Fisheries scientist
Estimated time scales	2-3 weeks

MSP Topic: Fisheries	
Fishing vessels by port	Priority Rating: 2
Data Product Description	This data product will provide a layer that shows the number of fishing vessels registered to each 'home port'.
Relevant existing Atlas data layers	'Fishing ports' (from MarEI, in 'Transport networks/Traffic') 'Fishery Harbours Centres' (designated by DAFM, in 'Administrative units') <i>[These layers should not be replaced by, but rather will feed in to, the layers to be created]</i>
Proposed names for new Atlas data layers	Fishing vessels by port (by length) Fishing vessels by port (by tonnage) Fishing vessels by port (by power)
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ 'Fishing ports' layer from MarEI</li> <li>○ Irish Fishing Boat Register, held by DAFM <a href="https://www.agriculture.gov.ie/seafood/seafisheriesadministration/seafisheriesadministration/seafishingfleetregister/">https://www.agriculture.gov.ie/seafood/seafisheriesadministration/seafisheriesadministration/seafishingfleetregister/</a></li> <li>○ Note that the publically-available register does not include the Home Port of vessels. This should be requested from DAFM. Contacts page: <a href="https://www.agriculture.gov.ie/seafood/seafisheriesadministration/contact/">https://www.agriculture.gov.ie/seafood/seafisheriesadministration/contact/</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Excel</li> <li>○ GIS</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Check spelling of port names in vessel register data and in 'fishing ports' layer</li> <li>○ Link vessel register data with fishing ports</li> <li>○ Display data as pie charts for each port. Size of pie chart represents the number of vessels registered to that port. Individual layers can be created to show: <ul style="list-style-type: none"> <li>○ Vessel length (showing breakdown of under 10 m; 10-12 m; 12-15 m; 15-24 m; 24-40 m; over 40 m). Attributes could identify actual values.</li> <li>○ Layers could be created for most recent year (2017); annually for last 5 years (2013, 2014, 2015, 2016, 2017); and/or annual average over last 5 years (2013-2017)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency, options: <ul style="list-style-type: none"> <li>○ Rolling annual update to show latest 5 years' data (2014-2018; 2015-2019 etc);</li> <li>○ Create annual layers and every 5 years create a new 5 year summary (2018-2022);</li> <li>○ Update every 5 years with a new 5 year summary (2018-2022) in 2023, accepting that by 2022 the 2013-2017 layers will be quite outdated</li> </ul> </li> </ul> </li> </ul> </li> </ul> <p><b>Example figure from UK sea fisheries statistics. Other figures show by GT and power (see <a href="https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/742793/UK_Sea_Fisheries_Statistics_2017.pdf">https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/742793/UK_Sea_Fisheries_Statistics_2017.pdf</a> )</b></p>	

Chart 2.5: Number of vessels by administration port: 2017



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Estimated staff effort/cost	Estimated 6 days staff effort (5 days GIS analyst, 1 day Fisheries Scientist) cost approx. €3,000 There will be cost savings if this is done in conjunction with the 'Fish and shellfish landings by port (Euros)' roadmap, as products will be similar and draw on same data sources.
Required skills	GIS analyst; Fisheries scientist
Estimated time scales	2-3 weeks

<b>MSP Topic: Fisheries</b>	
<b>Fishing vessel steaming routes to fishing grounds</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a layer that shows the main steaming routes to fishing grounds for fishing vessels
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Fishing vessel steaming routes to fishing grounds
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Vessel monitoring system (VMS) ping data from Naval Service</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ GIS</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Identify 'steaming' pings (pings at a speed that exceeds the 'fishing' pings identified in the 'VMS Fishing Intensity (&gt; 12 m vessels) (2013-2017)' roadmap. It would also be possible to incorporate additional information from processed AIS data for fishing vessels if available (see Ports &amp; Shipping proforma)</li> <li>○ Create a grid and carry out non-parametric density analysis (which gives better results than the commonly used grid count method) to develop GIS layers describing distribution of steaming pings</li> <li>○ A minimum density cut-off could be used to clearly show only the main steaming routes</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (5 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 6 days staff effort (5 days GIS analyst; 1 day Fisheries Scientist) cost approx. €3,000
Required skills	GIS analyst; Fisheries scientist
Estimated time scales	2-3 weeks

<b>MSP Topic: Fisheries</b>	
<b>Fishing grounds – shellfish beds</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a layer that shows shellfish beds for cockle, seed mussel, scallop habitat, razor clam, oyster
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Fishing grounds – shellfish beds
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• There is likely to be overlap between this roadmap and the 'Key shellfish beds' and 'scallop habitat' roadmaps in the 'Fish and shellfish' topic. The three roadmaps and suggested data sources should be checked and compared, and potentially this one could be merged with the Fish and Shellfish roadmaps.</li> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Combine maps from MI's <a href="#">'Atlas: Commercial fisheries for shellfish around Ireland'</a> for:</li> <li>○ Locations of main commercial fisheries for native oysters (Fig 22) and Distribution of oyster fisheries in Lough Foyle, Lough Swilly, Blacksod Bay and Clew Bay (Fig 23), check against BIM surveys of oyster beds</li> <li>○ Distribution of razor clam beds off the west coast of Ireland based on surveys in 2016, and detail of individual areas</li> <li>○ Distribution of known cockle stocks around Ireland</li> <li>○ Distribution of surf clam, and detail of individual areas</li> <li>○ Distribution of potential seed mussel beds in the south Irish Sea and in Castlemaine Harbour (from BIM surveys)</li> <li>○ Scallop habitat (see Fish &amp; Shellfish Topic)</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data products can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Obtain data layers from BIM and/or MI – shapefiles not available online</li> <li>○ Create national location maps for each species</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 5 days staff effort (4 days GIS analyst; 1 day fisheries scientist) cost approx. €2,500
Required skills	GIS analyst; fisheries scientist with knowledge of shellfisheries surveys data
Estimated time scales	2 weeks

**MSP Topic: Fisheries**

**Fishing grounds – other species** **Priority Rating: 2**

Data Product Description	This data product will provide a layer that shows key fishing grounds for other species (not shown in the shellfish beds layer)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Fishing grounds – other species

**Outline methodology**

- Data sources and permissions to use the data:
  - Atlas of Commercial Fisheries of Ireland – 2<sup>nd</sup> Edition
- Required data processing tools
  - GIS
- Outline tasks for creating data product:
  - Obtain data from Atlas of Commercial Fisheries of Ireland – 2<sup>nd</sup> Edition
  - If available as a shapefile, use as a layer in the Atlas. If not, create shapefile based on map in the publication
  - Create metadata record consistent with ISDE requirements
  - Create data processing log
  - Establish update frequency

**Figure/map from Atlas of Commercial Fisheries of Ireland – 2<sup>nd</sup> Edition:**



Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €1,000
Required skills	GIS analyst
Estimated time scales	1 week

MSP Topic: Fisheries	
Inshore (<12 m) fishing – value	Priority Rating: 2
Data Product Description	This data product will provide layers that show the distribution of value of landings from under-12 m vessels
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	<p><b>Amalgamated layers:</b>            Inshore All Gears (2013-2017) fishing value            Inshore Mobile demersal gears (2013-2017) fishing value            Inshore Pelagic gears (2013-2017) fishing value            Inshore VMS Static gears (2013-2017) fishing value</p> <p><b>Individual gear types:</b>            Inshore fishing (&lt;12 m) – Bottom trawls value (2013-2017)            Inshore fishing (&lt;12 m) – Dredges value (2013-2017)            [Inshore fishing (&lt;12 m) – Hydraulic dredges value (2013-2017)]            Inshore fishing (&lt;12 m) – Pelagic/midwater trawls value (2013-2017)            Inshore fishing (&lt;12 m) – Pots value (2013-2017)            Inshore fishing (&lt;12 m) – Lines value (2013-2017)            Inshore fishing (&lt;12 m) – Nets value (2013-2017)</p>
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data:               <ul style="list-style-type: none"> <li>○ Value of landings by ICES rectangle (2013-2017) from SFPA for under-12 m vessels</li> <li>○ Depending on which option is progressed, the inshore fishing intensity layers (see 'Inshore Fishing (&lt;12 m vessels)' roadmap) may also be required</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ GIS.</li> </ul> </li> </ul> <p><b>Option 1 – show value of landings by ICES rectangle</b></p> <ul style="list-style-type: none"> <li>• Outline tasks for creating data product:               <ul style="list-style-type: none"> <li>○ Create data layers based on available data</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency</li> </ul> </li> </ul> <p><b>Option 2 – show value of landings for gear types attributed to inshore fishing polygons (linked to Option 1 in 'Inshore Fishing (&lt;12 m vessels)' roadmap)</b></p> <ul style="list-style-type: none"> <li>• Outline tasks for creating data product:               <ul style="list-style-type: none"> <li>○ For each gear type/target species combination, take the reported landings value in an ICES rectangle and attribute it pro-rata across the relevant polygons in that ICES rectangle (use 2013-2017 annual average values)</li> <li>○ Create layer for each gear type that combines the values for the different target species</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency</li> </ul> </li> </ul> <p><b>Option 3 – show value of landings for gear types attributed to new inshore fishing areas created</b></p>	

### through participatory mapping exercise (linked to Option 2 in 'Inshore Fishing (<12 m vessels)' roadmap)

- Outline tasks for creating data product:
  - Combine the mapped fishing areas with reported value of landings by gear type. This can be done in different ways. Examples:
    - MCZ model method: For each vessel included in participatory mapping exercise, attribute reported value of landings with the gear type across the fishing areas identified for that gear/vessel. For vessels that did not participate in the mapping exercise, attribute reported landings value across the combined fishing areas for interviewed fishers using that gear type. See <http://publications.naturalengland.org.uk/file/1958806>.
    - Scotmap: participatory mapping interviews included questions on earnings from fishing, and percentage contribution each fishing area makes to the gross vessel earnings. These were used, for individual vessels, to map value. Scotmap methodology details here <https://www2.gov.scot/Topics/marine/science/MSInteractive/Themes/ScotMap/scotmap-description#smmethodology> . It should be noted that using only value from interviews means that the value becomes out-of-date, and only reflects those vessel interviewed. It is therefore preferable to combine reported landings by ICES rectangle for <12 m vessels, with the mapped fishing areas (using some measure of intensity/effort or proportion of value derived from each area).
  - Create layer for each gear type that shows the value of reported landings
  - Create metadata record consistent with ISDE requirements
  - Create data processing log
  - Establish update frequency

### Option 4 – show value of landings by gear type based on iVMS data (linked to Option 3 in 'Inshore Fishing (<12 m vessels)' roadmap)

- Outline tasks for creating data product:
  - Build on steps/products from Option 3 in Inshore Fishing (<12 m vessels)' roadmap (identification of fishing pings, link pings with logbook returns)
  - The value of landings from logbook returns (demersal/pelagic/deepwater/shellfish) are then equally distributed across the assigned pings in that day/from that trip.
  - Create layer showing value for each gear type, and for each amalgamated gear grouping
  - Create metadata record consistent with ISDE requirements
  - Create data processing log
  - Establish update frequency

#### Estimated staff effort/cost

Option 1: Estimated 3 days staff effort (2.5 days GIS analyst, 0.5 days fisheries expert) cost approx. €1,500

Option 2: Estimated 2 weeks staff effort (9 days GIS analyst, 1 day fisheries expert) cost approx. €5k.

Option 3: €20k for additional data processing, in addition to cost of mapping exercise and processing required in 'Inshore Fishing (<12 m vessels)' roadmap

	Option 4: €5k for additional data processing over implementation period (5-10 years), in addition to cost of implementing iVMS on vessels and data collection system, and processing required in 'Inshore Fishing (<12 m vessels)' roadmap
Required skills	Option 1: GIS, fisheries knowledge Option 2: GIS, fisheries knowledge Option 3: GIS, fisheries knowledge, social science/survey expert Option 4: GIS, fisheries knowledge
Estimated time scales	Option 1: 2 weeks Option 2: 1 month Option 3: 18 months-2 years Option 4: 5-10 years as iVMS is rolled out across the inshore fleet.

<b>MSP Topic: Fisheries</b>	
<b>Salmon fisheries – distribution</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a layer that shows the distribution of commercial salmon catch
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Salmon fisheries – distribution of catches
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Inshore Fisheries Ireland – statistics on commercial salmon catch: <a href="https://www.fisheriesireland.ie/Salmon-Management/wild-salmon-and-sea-trout-statistics.html">https://www.fisheriesireland.ie/Salmon-Management/wild-salmon-and-sea-trout-statistics.html</a></li> <li>○ Latest year published is 2016. Could contact IFI for more recent data.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ GIS</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Use data on commercial salmon harvest (numbers of fish) in Table 12 on p26.</li> <li>○ Spatialise according to fishery district and/or river name. Engine type could also be included. Data in Table 13 on commercial sea trout harvest could also be included.</li> <li>○ P109 and 112 of 2016 publication has a map of areas and table showing fishery districts <a href="https://www.fisheriesireland.ie/extranet/fisheries-management-1/1461-wild-salmon-and-sea-trout-statistics-report-2016/file.html">https://www.fisheriesireland.ie/extranet/fisheries-management-1/1461-wild-salmon-and-sea-trout-statistics-report-2016/file.html</a></li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 3 days staff effort (3 days GIS analyst) cost approx. €1,500 <i>N.B. Cost/time savings if produced in conjunction with 'Salmon fisheries – value' data layers.</i>
Required skills	GIS
Estimated time scales	1-2 weeks

<b>MSP Topic: Fisheries</b>	
<b>Salmon fisheries – value</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a layer that shows the value of commercial salmon fisheries
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Salmon fisheries – value of catches
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Inshore Fisheries Ireland – statistics on commercial salmon catch: <a href="https://www.fisheriesireland.ie/Salmon-Management/wild-salmon-and-sea-trout-statistics.html">https://www.fisheriesireland.ie/Salmon-Management/wild-salmon-and-sea-trout-statistics.html</a></li> <li>○ Latest year published is 2016. Could contact IFI for more recent data.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ GIS</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Use data on commercial salmon harvest (numbers of fish) prepared in the roadmap on 'Salmon fisheries – distribution'.</li> <li>○ Attribute value based on information in the IFI publication: 'commercial sales for salmon ranged from €10-25/kg depending on quality but averaged €15/kg' (p2); and '2.7kg average weight per fish' (salmon) (p6)</li> <li>○ Spatialise according to fishery district and/or river name of catches. Engine type could also be included.</li> <li>○ P109 and 112 of 2016 publication has a map of areas and table showing fishery districts <a href="https://www.fisheriesireland.ie/extranet/fisheries-management-1/1461-wild-salmon-and-sea-trout-statistics-report-2016/file.html">https://www.fisheriesireland.ie/extranet/fisheries-management-1/1461-wild-salmon-and-sea-trout-statistics-report-2016/file.html</a></li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 3 days staff effort (3 days GIS analyst) cost approx. €1,500 <i>N.B. Cost/time savings if produced in conjunction with 'Salmon fisheries – distribution' data layers.</i>
Required skills	GIS
Estimated time scales	1-2 weeks

MSP Topic: Fisheries	
Offshore (> 12 m) fishing (Irish vessels) – value	Priority Rating: 2
Data Product Description	Layers showing value (distribution and intensity shown in separate Roadmap) of Irish over-12 m vessels' activity by gear type (e.g. beam trawl, demersal trawl and seine, dredge, static nets, longline, potting, pelagic/midwater trawl).
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	<p><b>Amalgamated layers:</b></p> <p>VMS All Gears (2013-2017) fishing value  VMS Mobile demersal gears (2013-2017) fishing value  VMS Pelagic gears (2013-2017) fishing value  VMS Static gears (2013-2017) fishing value</p> <p><b>Individual gear types:</b></p> <p>VMS Beam trawl (2013-2017) fishing value  VMS Demersal trawl (2013-2017) fishing value  VMS Demersal seine (2013-2017) fishing value (<i>could be combined with demersal trawl</i>)  VMS Scallop dredge (2013-2017) fishing value  VMS Hydraulic dredge (2013-2017) fishing value  VMS Pelagic/midwater trawl (2013-2017) fishing value  VMS Pots (2013-2017) fishing value  VMS Lines (2013-2017) fishing value  VMS Nets (2013-2017) fishing value</p> <p><i>N.B. there is a degree of judgement involved in deciding the relevant gear types and gear groupings. MI/SFPA/BIM fisheries experts with good knowledge of the Irish sector will be well placed to make such judgements.</i></p> <p><i>Similar layers could be produced for tonnage as well.</i></p>
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Vessel monitoring system (VMS) ping data from Naval Service (contact Tony Geraghty, <a href="mailto:anthony.geraghty@defenceforces.ie">anthony.geraghty@defenceforces.ie</a>)</li> <li>○ Logbook data from Irish logbooks database from Sea Fisheries Protection Authority</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ GIS</li> <li>○ R can also be used for processing VMS data – Vmstools package (see Hintzen <i>et al.</i>, 2013<sup>3</sup>).</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Build on steps/products from the 'VMS Fishing Intensity (&gt; 12 m vessels) (2013-2017)' roadmap (identification of fishing pings, link pings with logbook returns). The value of landings from logbook returns (demersal/pelagic/deepwater/shellfish) are then equally distributed across the assigned pings in that day/from that trip.</li> <li>○ Note similar layers could be produced for tonnage as well.</li> <li>○ Create layer showing value for each gear type, and for each amalgamated gear grouping</li> </ul> </li> </ul>	

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<http://orbit.dtu.dk/files/56377631/Hinzen.pdf>

<ul style="list-style-type: none"> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency, options: <ul style="list-style-type: none"> <li>○ Rolling annual update to show latest 5 years' data (2014-2018; 2015-2019 etc);</li> <li>○ Create annual layers and every 5 years create a new 5 year summary (2018-2022);</li> <li>○ Update every 5 years with a new 5 year summary (2018-2022) in 2023, accepting that by 2022 the 2013-2017 layers will be quite outdated.</li> </ul> </li> </ul>	
Estimated staff effort/cost	€10k. 3 weeks' GIS input <i>N.B. Cost/time savings if produced in conjunction with 'VMS Fishing Intensity (&gt; 12 m vessels) (2013-2017)' data layers.</i>
Required skills	GIS analyst, Fisheries expertise
Estimated time scales	1 month

MSP Topic: Fisheries	
Offshore (> 12 m) fishing (non-Irish vessels) – fishing intensity	Priority Rating: 2
Data Product Description	Layers showing distribution and intensity of non-Irish over-12 m vessels' activity by gear type (e.g. beam trawl, demersal trawl and seine, dredge, static nets, longline, potting, pelagic/midwater trawl).
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	<p><b>Amalgamated layers:</b> Non-Irish VMS All nationalities (2013-2017) fishing intensity</p> <p><b>Individual nationalities:</b> Non-Irish VMS UK fishing intensity (2013-2017) Non-Irish VMS France fishing intensity (2013-2017) Non-Irish VMS Spain fishing intensity (2013-2017) Non-Irish VMS Belgium fishing intensity (2013-2017) Non-Irish VMS Other nationality fishing intensity (2013-2017)</p>
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Vessel monitoring system (VMS) ping data from Naval Service</li> <li>○ As non-Irish vessels do not submit logbooks to the Irish authorities, it is not possible to create layers by gear type, only nationality</li> <li>○ The EU Community Fleet Register (CFR) (<a href="http://ec.europa.eu/fisheries/fleet/index.cfm">http://ec.europa.eu/fisheries/fleet/index.cfm</a>) could be used to identify the registered primary gear type for each vessel (by linking vessel ID from the VMS data to vessel ID in the CFR), but there are uncertainties involved (vessels may use more than one gear, often only the main gear type when the vessel is first registered is included on the CFR, but vessels may subsequently change gears and not update the CFR records). MI has previously used this approach for non-Irish vessels in the <a href="#">Atlas of Commercial Fisheries around Ireland – 2<sup>nd</sup> Edition</a> (see p4 of Data Chapter, and map on p9 includes all nationalities)</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ GIS</li> <li>○ R can also be used for processing VMS data – Vmstools package (see Hintzen <i>et al.</i>, 2013<sup>4</sup>).</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Identify 'fishing' VMS pings for non-Irish vessels. This can be done using a speed rule (UK uses speed up to 6 knots to indicate 'fishing'. Netherlands uses specific speeds for different fleet segments, based on an analysis of the frequency distribution of speeds of the pings). MI has a method for doing this (see <a href="#">Atlas of Commercial Fisheries around Ireland – 2<sup>nd</sup> Edition</a>). Pings near to port (e.g. 3 nm radius<sup>5</sup>) that are likely to be vessels transiting into/out of port should be classified as 'not fishing'.</li> <li>○ Create a grid and carry out non-parametric density analysis (which gives better results than the commonly used grid count method) to develop GIS layers describing annual distribution of fisheries. Produce contour maps from the density grids – this can be done using a smoothing function (e.g. Marine Scotland use a</li> </ul> </li> </ul>	

<sup>4</sup> <http://orbit.dtu.dk/files/56377631/Hinzen.pdf>

<sup>5</sup> [Copy and paste link into browser]

<https://brage.bibsys.no/xmlui/bitstream/handle/11250/103734/sgvms10.pdf?sequence=1&isAllowed=y>

Gaussian kernel density estimation with a data-driven bandwidth selection approach (smoothed cross-validation) resulting in high quality contour maps which form a better estimate of the spatial extent of fishing activity and intensity.

- Maps will show fishing intensity (effort, of number of hours' fishing)
- Create metadata record consistent with ISDE requirements
- Create data processing log
- Establish update frequency, options:
- Rolling annual update to show latest 5 years' data (2014-2018; 2015-2019 etc);
- Create annual layers and every 5 years create a new 5 year summary (2018-2022);
- Update every 5 years with a new 5 year summary (2018-2022) in 2023, accepting that by 2022 the 2013-2017 layers will be quite outdated.

Estimated staff effort/cost	€10k. 3 weeks' GIS input
Required skills	GIS analyst, Fisheries expertise
Estimated time scales	1 month

## B.18 Infrastructure – Land-side (roads, rail, urban development, utilities)

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the landside infrastructure topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- n/a

Important gaps (priority 2) have been identified for the following data products:

- Eirgrid Transmission Network – Current spatial distribution / location and intensity of activity
- Gas pipeline network – Current spatial distribution / location and intensity of activity
- Interconnector (Onshore only) – potential future spatial distribution / location and intensity of activity
- Rail network – Current spatial distribution / location and intensity of activity
- Road network – Current spatial distribution / location and intensity of activity
-

<b>MSP Topic: Landside infrastructure</b>	
<b>Electricity Transmission Network</b>	<b>Priority Rating: 2</b>
Data Product Description	Map of the electricity transmission network
Relevant existing Atlas data layers	No layer to date.
Proposed names for new Atlas data layers	Electricity Transmission Network
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Request data from ESB/Eirgrid</li> <li>○ Licence agreement: Unlikely data will be allowed for download on marine atlas. Scale resolution likely to be applied for safety and security reasons.</li> <li>○ Update frequency: Unclear</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Acquire data from the data holder</li> <li>○ Create data layer identifying the transmission network</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (every 2 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 day

<b>MSP Topic: Landside infrastructure</b>	
<b>Gas Distribution Network</b>	<b>Priority Rating: 2</b>
Data Product Description	Map of the gas distribution network
Relevant existing Atlas data layers	No layer to date.
Proposed names for new Atlas data layers	Gas Distribution Network
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Request data from Gas Network Ireland</li> <li>○ Request data from operators of Corrib Gas and Kinsale operations (as confirmed by Gas Network Ireland)</li> <li>○ Licence agreement: No download possible, display only. Business agreement to be organised between parties</li> <li>○ Scale resolution restriction as follows: 500,000 for transmission; 50,000 for distribution</li> <li>○ GNI to carry out a check prior to public access.</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Acquire data from the data holder</li> <li>○ Create data layer identifying the pipeline network</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (every 5 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 day

<b>MSP Topic: Landside infrastructure</b>	
<b>North South Interconnector</b>	
	<b>Priority Rating: 2</b>
Data Product Description	Map showing the alignment of the permitted North South Interconnector
Relevant existing Atlas data layers	No layer to date
Proposed names for new Atlas data layers	North South Interconnector
<b>Outline methodology –</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Request data from ESB/Eirgrid</li> <li>○ Licence agreement: Unlikely data will be allowed for download on marine atlas. Scale resolution likely to be applied to safety and security reasons.</li> </ul> </li>   <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li>   <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Acquire data from the data holder</li> <li>○ Create data layer identifying the transmission network</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (every 2 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 day

<b>Land side infrastructure</b>	
<b>Railway Network</b>	
<b>Priority Rating: 2</b>	
Data Product Description	Map showing the railway network
Relevant existing Atlas data layers	No layer to date
Proposed names for new Atlas data layers	Railway Network
<b>Outline methodology</b> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ OSI</li> <li>○ Licence agreement: National Mapping Agreement</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Acquire data from the data holder</li> <li>○ Create data layer identifying the railway network</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (every 10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 day

<b>Land side infrastructure</b>	
<b>Road Network</b>	
<b>Priority Rating: 2</b>	
Data Product Description	Map showing the road network
Relevant existing Atlas data layers	No layer to date
Proposed names for new Atlas data layers	Road Network
<b>Outline methodology</b> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ OSI</li> <li>○ Licence agreement: National Mapping Agreement</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Acquire data from the data holder</li> <li>○ Create data layer identifying the railway network</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (every 10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 day

## B.19 Marine aggregates

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Marine Aggregates topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- Current spatial distribution of marine aggregates resource

MSP Topic: Marine Aggregates	
Marine aggregate resources	Priority Rating: 1
Data Product Description	Map showing current distribution of marine aggregate resources by type
Relevant existing Atlas data layers	Irish Sea Marine Aggregate Resource Area
Proposed names for new Atlas data layers	Marine Aggregate Resources
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Irish Sea Marine Aggregate Resource Area <a href="http://oar.marine.ie/bitstream/10793/277/1/No%2036%20marine%20Environment%20and%20Health%20Series.pdf">http://oar.marine.ie/bitstream/10793/277/1/No%2036%20marine%20Environment%20and%20Health%20Series.pdf</a></li> <li>○ INFOMAR Sediment samples <a href="https://jetstream.gsi.ie/iwdds/map.jsp">https://jetstream.gsi.ie/iwdds/map.jsp</a></li> <li>○ GSI core/borehole data (GSI do not make this publicly available) EMODNET Geology data layer can be downloaded from <a href="https://jetstream.gsi.ie/iwdds/map.jsp">https://jetstream.gsi.ie/iwdds/map.jsp</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Create map of marine aggregate resources based on method of Green et al (2013) <a href="http://nora.nerc.ac.uk/id/eprint/502151/1/OR13013.pdf">http://nora.nerc.ac.uk/id/eprint/502151/1/OR13013.pdf</a> delineating <ul style="list-style-type: none"> <li>▪ Construction aggregate: <ul style="list-style-type: none"> <li>• Fine aggregate (fine sand)</li> <li>• Fine aggregate (coarse sand)</li> <li>• Coarse aggregate</li> </ul> </li> <li>▪ Fill aggregate</li> </ul> </li> <li>○ Validate outputs for Irish Sea against IMAGIN outputs (visual comparison)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 40 days staff effort (30 days geologist (GSI/INFOMAR), 10 days GIS analyst) cost approx. €19,000
Required skills	Geologist with knowledge of GSI borehole data holdings; GIS analyst
Estimated time scales	3 months

## B.20 Ports, harbours and shipping

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Ports and Shipping topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- Current spatial distribution/location and intensity of commercial and recreational shipping activity
- Current spatial distribution/location and intensity of port activity
- Current spatial distribution/location and intensity of dredge locations
- Current spatial distribution/location and intensity of dredge material disposal sites
- IMO Routing measures
- Commercial anchorages

Important gaps (priority 2) have also been identified for the following data products:

- Location of navigation buoys
- Data/spatial data on current value of port activity - considered to be sufficiently covered by intensity of port activity above. Not considered feasible to establish economic value of individual ports
- Particularly Sensitive Sea Areas
- Statutory Harbour Areas
- Maintained navigation channels
- Point locations of slipways

<b>MSP Topic: Ports &amp; Shipping</b>	
<b>Existing commercial shipping and recreational boating activity</b>	<b>Priority Rating: 1</b>
Data Product Description	Maps showing current distribution of commercial shipping and recreational boating activity and vessel transects for key commercial vessel types (cargo, tanker, passenger, fishing).
Relevant existing Atlas data layers	Coastguard AIS Traffic Frequency
Proposed names for new Atlas data layers	Commercial shipping density; Recreational boating density; Cargo Vessel Transects; Tanker Vessel Transects; Passenger Vessel Transects; Fishing Vessel Transects
<p><b>Outline methodology – Option 1 (post-processing of Irish Coastguard’s processed AIS data)</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Irish Coastguard</li> <li>○ Need to agree data release</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire processed AIS data for 2016 and/or 2017 (one file per day, first week of every month) with details of processing and quality checks undertaken</li> <li>○ Parse files together using Python code (as used by MI for AIS 2015)</li> <li>○ Create point data layers in ArcGIS and then create vessel transit line data layer(s) for all vessel types, using similar method to the one used by MI for AIS 2015</li> <li>○ Create 1 km x 1 km density grid for Ireland’s EEA and spatially join the vessel transit line data layers to the grid, using similar method to the one used by MI for AIS 2015</li> <li>○ Investigate whether further analyses can be carried out with the dataset, for example, seasonal plots, smaller, higher resolution density grids for specific areas of interest, annual comparisons.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (annual updates)</li> </ul> </li> </ul> <p><b>Outline methodology – Option 2 (processing of Irish Coastguard’s encoded AIS data)</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Irish Coastguard – MI are in contact with the coastguard re AIS data</li> <li>○ Need to agree data release</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard .Net, SQL, SQLite, Python, ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product (using similar method to the one described in MMO, 2014) <ul style="list-style-type: none"> <li>○ Acquire processed AIS data for 2016 and/or 2017 (one file per day, first week of every month) with details of processing and quality checks undertaken</li> <li>○ Decode AIS data: <ul style="list-style-type: none"> <li>➤ Positional data accuracy</li> <li>➤ Identification of vessel transits</li> <li>➤ Quality assurance of vessel transit lines</li> <li>➤ Simplification of transit information</li> <li>➤ Identification of appropriate vessel voyage statistics</li> </ul> </li> </ul> </li> </ul>	

	<ul style="list-style-type: none"> <li>○ Create transit ID dataset from the decoded AIS data using the vessel position data, MMSI number, Speed over the Ground (SOG) threshold and time</li> <li>○ Create point data layers in ArcGIS and then create vessel transit line data layers in GIS for all vessel types based on transit ID, position and time</li> <li>○ Create high resolution MHWS polyline, edited to include port/dock areas, etc. Clean the vessel transit data by removing any transits crossing over the MHWS polyline</li> <li>○ Create 1 km x 1 km density grid for Ireland's EEA and spatially join the vessel transit line data layer(s) to the grid with a calculation of the total number of transits per cell within the annual dataset, resolved back to a representative week. Each grid cell will be visualised into a colour scale relating to annual average number of vessel transits per week</li> <li>○ Investigate further analyses with the dataset(s), for example, seasonal plots, smaller, higher resolution density grids for specific areas of interest, annual comparisons.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (annual updates)</li> </ul>
Estimated staff effort/cost	<p>Option 1: Estimated 12 days staff effort (2 days Maritime Consultant; 10 days GIS analyst) cost approx. €5,200 (Based on €600 per day for Maritime Consultant or Programmer &amp; €400 per day for GIS analyst)</p> <p>Option 2: Estimated 52 days staff effort (10 days Programmer; 2 days Maritime Consultant; 12 days GIS analyst) cost approx. €12,000</p>
Required skills	Maritime consultant; GIS analyst
Estimated time scales	<p>Option 1: 2 weeks</p> <p>Option 2: 8 weeks</p>

<b>MSP Topic: Ports &amp; Shipping</b>	
<b>Port activity</b>	<b>Priority Rating: 1</b>
Data Product Description	Maps showing current spatial distribution/location and intensity of port activity
Relevant existing Atlas data layers	Ferry Port, Commercial Port, Fishing Port, Offshore Energy Port Infrastructure and Marina
Proposed names for new Atlas data layers	Passenger Ferry Port, Commercial Port, Fishing Port, Offshore Energy Port, Marina
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Existing point data layers for Ferry Port, Commercial Port, Fishing Port, Offshore Energy Port Infrastructure and Marinas</li> <li>○ CSO cargo and passenger statistics (last 5 years data) <a href="https://www.cso.ie/px/pxeirestat/Database/eirestat/Maritime%20Statistics/Maritime%20Statistics_statbank.asp?SP=Maritime%20Statistics&amp;Planguage=0">https://www.cso.ie/px/pxeirestat/Database/eirestat/Maritime%20Statistics/Maritime%20Statistics_statbank.asp?SP=Maritime%20Statistics&amp;Planguage=0</a></li> <li>○ Fisheries landings statistics, <a href="http://www.sfpa.ie/Sea-Fisheries-Conservation/Fisheries-Statistics-and-Quota-Uptake/Annual-Landing-Statistics">http://www.sfpa.ie/Sea-Fisheries-Conservation/Fisheries-Statistics-and-Quota-Uptake/Annual-Landing-Statistics</a></li> <li>○ Offshore Energy Port Infrastructure <a href="http://www.opengis.net/def/crs/EPSSG/0/4326">http://www.opengis.net/def/crs/EPSSG/0/4326</a></li> <li>○ ICC Sailing Directions (to be purchased) and Coastal Atlas of Recreational Boating Ireland</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire data</li> <li>○ Create data layers merging location and activity volume data (Passenger ferry ports, commercial ports, fishing ports, marinas); for offshore energy port infrastructure, include IMDO category and type of port.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (5 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 8 days staff effort (1 day Maritime Consultant; 7 days GIS analyst) cost approx. €3,400
Required skills	Maritime consultant; GIS analyst
Estimated time scales	2 weeks

<b>MSP Topic: Ports &amp; Shipping</b>	
<b>Dredge Locations</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing current location and intensity of navigation dredging
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Navigation Dredging
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ DHPLG Foreshore licensing database (need to confirm that all current dredge licences are included)</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Acquire data</li> <li>○ Create data layer based on location and licensed dredge volume</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (annual)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 3 days staff effort (1 day Maritime Consultant; 2 days GIS analyst) cost approx. €1300
Required skills	Maritime consultant; GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Ports &amp; Shipping</b>	
<b>Dredge Disposal Sites</b>	<b>Priority Rating: 1</b>
Data Product Description	Maps showing current spatial distribution/location and intensity of dredge material disposal at disposal sites
Relevant existing Atlas data layers	Dumping at Sea Boundary
Proposed names for new Atlas data layers	Dredge Disposal Sites
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Dumping at Sea Boundary (on Atlas) available under CC licence from EPA</li> <li>○ Dumping at Sea Register - available under CC licence <a href="http://www.epa.ie/pubs/forms/lic/das/dumpingatsearegister.html">http://www.epa.ie/pubs/forms/lic/das/dumpingatsearegister.html</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire data</li> <li>○ Create data layer for current disposal sites merging location shape files and licensed dredging volumes. It may also be able to incorporate information on actual amounts of disposal based on Annual Environmental Reports, Categorise by permit type: <ul style="list-style-type: none"> <li>▪ Active/inactive</li> <li>▪ Plough, water injection, conventional disposal</li> </ul> </li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (annual check with EPA)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 3 days staff effort (1 day Maritime Consultant; 2 days GIS analyst) cost approx. €1300
Required skills	Maritime consultant; GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Ports &amp; Shipping</b>	
<b>IMO Routeing Measures</b>	<b>Priority Rating: 1</b>
Data Product Description	Maps showing location and nature of IMO Routeing Measures
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	IMO Routeing Measures
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ Option 1 - Shapefiles can be obtained from Claymore Clan Design free of charge but source unclear.</li> <li>○ Option 2 - In discussion with UKHO about accessing UKHO data</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Acquire shapefiles</li> <li>○ Create data layer</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (annual updates)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Option 1 - Estimated 1 day staff effort (1 day GIS analyst) cost approx. €400 Option 2 – await outcome of UKHO discussions
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Ports &amp; Shipping</b>	
<b>Commercial Anchorages</b>	<b>Priority Rating: 1</b>
Data Product Description	Maps showing location of commercial anchorages
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Commercial Anchorages
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ Available on UKHO charts - in discussion with UKHO about data access.</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Acquire data from UKHO charts</li> <li>○ Create data layers</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (annual updates)</li> </ul> </li> </ul>	
Estimated staff effort/cost	TBC
Required skills	GIS analyst
Estimated time scales	TBC

<b>MSP Topic: Ports &amp; Shipping</b>	
<b>Location of Navigation Buoys</b>	<b>Priority Rating: 2</b>
Data Product Description	Location of navigation buoys
Relevant existing Atlas data layers	Navigation Buoys
Proposed names for new Atlas data layers	Navigation Buoys
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Commissioner of Irish Lights – more comprehensive data set than currently on Atlas</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire data from Commissioner of Irish Lights</li> <li>○ Create data layer identifying buoy location/type</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Ports &amp; Shipping</b>	
<b>Location of Particularly Sensitive Sea Areas</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing location of Particularly Sensitive Sea Areas
Relevant existing Atlas data layers	Potentially Sensitive Sea Areas
Proposed names for new Atlas data layers	Potentially Sensitive Sea Areas
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ Data layer already on Atlas</li> <li>○ Add additional detail on Western European Waters PSSA from IMO <a href="https://puc.overheid.nl/nsi/doc/PUC_1517_14/1/">https://puc.overheid.nl/nsi/doc/PUC_1517_14/1/</a></li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Enhance information about the PSSA (metadata)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (5 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Ports &amp; Shipping</b>	
<b>Statutory Harbour Areas</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing Statutory Harbour Areas
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Statutory Harbour Areas
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Available on UKHO charts - in discussion with UKHO about data access</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Use electronic chart data or digitize</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	TBC
Required skills	GIS analyst
Estimated time scales	TBC

<b>MSP Topic: Ports &amp; Shipping</b>	
<b>Maintained Navigation Channels</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing Maintained Navigation channels
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Maintained Navigation Channels
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Available on UKHO charts - in discussion with UKHO about data access</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Use electronic chart data or digitize</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	TBC
Required skills	GIS analyst
Estimated time scales	TBC

<b>MSP Topic: Ports &amp; Shipping</b>	
<b>Location of Slipways</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing point location of slipways
Relevant existing Atlas data layers	
Proposed names for new Atlas data layers	Location of Slipways -
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ <a href="http://www.boatlaunch.co.uk">www.boatlaunch.co.uk</a> - can be provided by Boatlaunch at low cost on request</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Create shapefile with slipway locations</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800 plus payment to Boatlaunch €100
Required skills	GIS analyst
Estimated time scales	1 week

## B.21 Seascape

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the seascapes topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet [Prioritisation-MASTER\\_compiled\\_2018-12-03](#)

The following priority (priority 1) data product has been identified for the Seascapes topic.

- Current spatial distribution of seascape character areas/types

No other priority 1 or priority 2 gaps have been identified.

<b>MSP Topic: Seascapes</b>	
<b>Seascape character areas/types</b>	<b>Priority Rating: 1</b>
Data Product Description	This data product will provide a data layer classifying coastal waters within the Irish Marine Spatial Plan Assessment Area.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Seascapes
<p><b>Outline methodology for Options A and B</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Mean high water mark – Available on the Marine Atlas</li> <li>○ 12 nautical mile limit – Available on the Marine Atlas</li> <li>○ Marine Spatial Plan Assessment Area - New data layer created under the 'Administrative Boundaries' topic.</li> <li>○ Territorial Sea Limits – Available on the Marine Atlas</li> <li>○ Local Authorities – Available on the Marine Atlas</li> <li>○ County Landscape/Seascape Character Assessments (Clare, Cork, Donegal, Galway, Kilkenny, Limerick, Louth, Mayo, Meath, South Dublin, Wexford and Wicklow) – Contact Pat Reid at the Heritage Council <a href="mailto:gisdata@heritagecouncil.ie">gisdata@heritagecouncil.ie</a> to obtain landscape/seascape datasets available on Heritage Maps.</li> <li>○ Scenic routes and views - Data layer will be created under the 'Tourism and Recreation' topic.</li> <li>○ Bathymetry (depth analysis, dredged areas, bathymetry lines) - Data layers will be created under the 'Geology' topic.</li> <li>○ DTM for the Ocean Bed (European Marine Observation and Data Network) – Data layer will be created under the 'Sea Bed Sediments' topic.</li> <li>○ Special Areas of Conservation (SACs) – Available on the Marine Atlas</li> <li>○ Offshore Special Areas of Conservation – Available on the Marine Atlas</li> <li>○ Special Protection Areas (SPAs) – Available on the Marine Atlas</li> <li>○ Natural Heritage Area and Proposed Natural Heritage Area - Available on the Marine Atlas</li> <li>○ National Parks and Nature Reserves – Download data from National Parks and Wildlife Service. Available under CC licence.</li> <li>○ Local nature and landscape designations – Request datasets on local nature designations from each coastal county/city council. Contact Mayo CC Deirdre Cunningham <a href="mailto:heritageofficer@mayococo.ie">heritageofficer@mayococo.ie</a> ; Donegal County Council <a href="mailto:info@dongealcoco.ie">info@dongealcoco.ie</a> ; Limerick County Council; Cork County Council; Cork City <a href="mailto:heritage@corkcity.ie">heritage@corkcity.ie</a> ; Wexford County Council <a href="mailto:environment@wexfordcoco.ie">environment@wexfordcoco.ie</a> ; Wicklow County Council <a href="mailto:env@wicklowcoco.ie">env@wicklowcoco.ie</a>; Dublin City Council; Kilkenny County Council <a href="mailto:environment@kilkennycoco.ie">environment@kilkennycoco.ie</a>; Meath County Council; no points of contact established for the following councils: Galway County, Galway City, Clare, Kerry, Louth, South Dublin County, and Fingal County.</li> <li>○ Ancient and Long Established Woodland – Contact Heritage Council <a href="mailto:gisdata@heritagecouncil.ie">gisdata@heritagecouncil.ie</a> to obtain ancient &amp; long established woodland dataset available on Heritage Maps.</li> <li>○ Fish Nursery and Fish Spawning Grounds (CEFAS) - Data layers will potentially be created under the 'Fish' topic.</li> <li>○ RAMSAR Ireland – New data layer is being created under the 'Administrative Boundaries' topic.</li> </ul> </li> </ul>	

- Wetlands Waterbirds - Available on the Marine Atlas
- EMODnet broad-scale seabed habitat map for Europe (EUSeaMap 2012) – Data layer will be created under the 'Sea Bed Sediments' topic.
- Biosphere Reserves – Contact the Heritage Council [gisdata@heritagecouncil.ie](mailto:gisdata@heritagecouncil.ie) to obtain biosphere reserve data layer available on Heritage Maps.
- Bedrock and superficial geology –terrestrial and off-shore – Data layers will potentially be created under the 'Geology' topic.
- Landcover / vegetation – OSPAR Habitats (EMODnet / DG Mare) - Data layers will be created under the 'Benthic Habitats & Species' and 'Terrestrial Habitats' topics.
- Terrestrial heritage assets – Data layer will be created under the 'Cultural Heritage' topic.
- Historic buildings – Data layer will be created under the 'Cultural Heritage' topic.
- Palaeolandscapes – Data layer will be created under the 'Cultural Heritage' topic.
- World Heritage Sites – Data layer will be created under the 'Cultural Heritage' topic.
- INFOMAR Surveyed Shipwrecks – Available on the Marine Atlas
- Marine and coastal recreation activity (angling, kitesurfing, windsurfing, surfing, coasteering / bouldering, diving, snorkelling, drones, beach activities, hovercrafting, quad biking, sand yachting, kite buggying, kite landboarding, light aircraft, motorboating, motorised sailing, wakeboarding / water skiing, parascending, un-motorised sailing, kayaking, canoeing, paddleboarding, rowing / sculling, dinghy/day boat/small keel boat use, personal watercraft use, visiting attractions, coastal walking, coastal cycling, wildlife watching / wildfowling) – Data layers will potentially be created under the 'Tourism and Recreation' topic.
- Green Coast / Blue Flag beaches - Data on Green Coast and Blue Flag beaches will be requested as part of the 'Tourism and Recreation' topic from Ian Diamond, Coastal Awards Manager, An Taisce <http://beachawards.ie/green-coast/contact/> Available under CC licence.
- Harbours and Statutory Harbour Areas - Data layers will potentially be created under the 'Ports and Shipping' topic.
- Pier Quay Slip Infrastructure - Available on the Marine Atlas
- Marinas - Available on the Marine Atlas although will be updated in the 'Tourism and Recreation' topic to include more marinas.
- Ferry port, fishing port, commercial port - Available on the Marine Atlas
- Ferry routes – Available on the Marine Atlas
- IMO Routeing – Data layer will potentially be created under the 'Ports & Shipping' topic.
- Maintained navigation channels – Data layer will potentially be created under the 'Ports & Shipping' topic.
- Commercial anchorages – Data layer will potentially be created under the 'Ports & Shipping' topic.
- AIS shipping density - Data layer will potentially be created under the 'Ports & Shipping' topic and under the 'Tourism and Recreation' topic for recreational crafts.
- Offshore energy developments (wind, tide, wave) – Data layers will potentially be created under the 'Energy' topic.
- Light pollution – VIIRS/DMSP 2018 and ATLAS 2015 data available on [www.lightpollutionmap.info](http://www.lightpollutionmap.info) No point of contact established yet.

- Visibility – land with sea views, sea with views of the land – Purchase Digital Terrain Model or LIDAR datasets from Ordnance Survey Ireland. Contact [digitals@osi.ie](mailto:digitals@osi.ie) Will be used in an intervisibility analysis to see which areas of the sea are most visible from land and from which areas of land it is possible to see the sea.
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
  - Option 1: Desk and consultation based classification
- Outline tasks for creating data layers
  - Data gathering, assimilation and analysis. The first stage involves acquiring and creating data layers from the range of datasets identified above, literature, plans and strategies available to inform the work. The work analyses the different aspects which combine to create 'seascape character', under the general themes of natural, cultural/social and perceptual and aesthetic. Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - Desk based seascape assessment to develop a classification of marine character areas (MCAs), covering the entirety of the Marine Plan Area. The classification would comprise smaller seascape units closer to the shoreline where the influence of coastal morphology and landscape character is greatest. Further off-shore, character areas are likely to be more extensive. The boundaries drawn for the MCAs represent broad transitions in character from MCA to MCA, tending to reflect natural breaks or the clustering of characteristics and/or features deciphered from available data and information. The use of GIS is a key tool in the process of seascape character assessment, enabling different information layers to be interrogated in tandem and therefore allowing spatial patterns relevant to character to be investigated. Metadata records consistent with ISDE requirements and data processing logs will be created for the marine character areas data layer.
  - The draft MCAs would be subject to consultation using a combination of stakeholder workshops and face to face meetings to ensure that they correspond to local understanding of the marine environment.
  - Following consultation, the mapping and description of MCAs would be finalised.
  - There would not be a field survey component and there would be no analysis of factors such as condition, sensitivity and future management needs.
  - Option 2: Comprehensive classification
- Outline tasks for creating data layers
  - Data gathering, assimilation and analysis. The first stage involves acquiring and creating data layers from the range of datasets identified above, literature, plans and strategies available to inform the work. Our approach will follow strategic approaches and best practice already developed elsewhere, including Natural England's [An Approach to Seascape Character Assessment](#) (2012), to underpin marine planning. We will draw on our experience of seascape character assessments and visual resource mapping to support marine planning in England, Scotland and Wales. The Seascape Character Assessment will also reflect the aspirations of the [National Landscape Strategy for Ireland 2015-2025](#). The work analyses the different aspects which combine to create 'seascape character', under the general themes of natural, cultural/social and perceptual and aesthetic. Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.

	<ul style="list-style-type: none"> <li>○ Desk based seascape assessment to develop a classification of marine character areas (MCAs), covering the entirety of the Marine Plan Area. The classification would comprise smaller seascape units closer to the shoreline where the influence of coastal morphology and landscape character is greatest. Further off-shore, character areas are likely to be more extensive. The boundaries drawn for the MCAs represent broad transitions in character from MCA to MCA, tending to reflect natural breaks or the clustering of characteristics and/or features deciphered from available data and information. The use of GIS is a key tool in the process of seascape character assessment, enabling different information layers to be interrogated in tandem and therefore allowing spatial patterns relevant to character to be investigated. Metadata records consistent with ISDE requirements and data processing logs will be created for the marine character areas data layer.</li> <li>○ Field survey to verify and test the draft MCA classification, gather additional qualitative information and representative photography. Field survey would allow the analysis of condition, sensitivity and future management needs.</li> <li>○ The draft MCAs would be subject to consultation using a combination of stakeholder workshops and face to face meetings to ensure that they correspond to local understanding of the marine environment.</li> <li>○ Following consultation, the mapping and description of MCAs would be finalised.</li> </ul>
Estimated staff effort/cost	<p>Option 1: 120 days / €75,000 (based on a total of 40 MCAs - 30 0-12 nm and 10 MCAs 12 nm+)</p> <p>Option 2: 235 days / €150,000 (based on a total of 40 MCAs - 30 0-12 nm and 10 MCAs 12 nm+)</p>
Required skills	Seascape and landscape character assessment experience, GIS, analysis and reporting
Estimated time scales	<p>Option 1: 6 months</p> <p>Option 2: 8 months (to allow time for field survey)</p>

## B.22 Social and economic factors

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Socioeconomics topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- Deprivation Index
- Population Distribution
- Unemployment
  -

Important gaps (priority 2) have also been identified for the following data products:

- Employment by Sector

<b>MSP Topic: Socioeconomics</b>	
<b>Deprivation Index</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing current deprivation index
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Deprivation Index
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ Data can be viewed at <a href="https://www.pobal.ie/Pages/New-Measures.aspx">https://www.pobal.ie/Pages/New-Measures.aspx</a></li> <li>○ Need to agree conditions of use (limited to viewing data)</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Acquire shapefile for 2016 Deprivation Index by Small Area</li> <li>○ Create data layer</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (6 years – in line with census)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Socioeconomics</b>	
<b>Population</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing current population distribution
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Population Distribution
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ 2016 data can be downloaded from ONS under CC licence <a href="https://www.cso.ie/en/census/census2016reports/census2016smallareapopulationstatistics/">https://www.cso.ie/en/census/census2016reports/census2016smallareapopulationstatistics/</a></li> <li>○ Small Areas can be downloaded from same source</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire ONS population data</li> <li>○ Acquire Small Areas shapefile</li> <li>○ Merge population and small area data</li> <li>○ Create data layer indicating population density by Small Area</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (6 years – in line with census)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800 – can be created in conjunction with other socio-economic products using CSO data
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Socioeconomics</b>	
<b>Unemployment</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing current distribution of unemployment
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Unemployment
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ 2016 data can be downloaded from ONS under CC licence <a href="https://www.cso.ie/en/census/census2016reports/census2016smallareapopulationstatistics/">https://www.cso.ie/en/census/census2016reports/census2016smallareapopulationstatistics/</a></li> <li>○ Small Areas can be downloaded from same source</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire ONS unemployment data</li> <li>○ Acquire Small Areas shapefile</li> <li>○ Merge unemployment and small area data</li> <li>○ Create data layer indicating unemployment density by Small Area</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (6 years – in line with census)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800 – can be created in conjunction with other socio-economic products using CSO data
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Socioeconomics</b>	
<b>Employment by Sector</b>	<b>Priority Rating: 2</b>
Data Product Description	Maps showing employment by sector
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Employment by sector (Agriculture, forestry and fishing; Building and construction; Manufacturing industries; Commerce and trade; Transport and communications; Public administration; Professional services; Other )
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ 2016 data can be downloaded from ONS under CC licence <a href="https://www.cso.ie/en/census/census2016reports/census2016smallareapopulationstatistics/">https://www.cso.ie/en/census/census2016reports/census2016smallareapopulationstatistics/</a></li> <li>○ Small Areas can be downloaded from same source</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire ONS employment by sector data</li> <li>○ Acquire Small Areas shapefile</li> <li>○ Merge employment by sector and small area data</li> <li>○ Create data layers indicating employment density by sector by Small Area</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (6 years – in line with census)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 4 days staff effort (4 days GIS analyst) cost approx. €1600 – can be created in conjunction with other socio-economic products using CSO data
Required skills	GIS analyst
Estimated time scales	2 weeks

## B.23 Telecommunications

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Telecom Cables topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- Current spatial distribution/location and intensity of telecom cables
- Potential future spatial distribution/location and intensity of telecom cables (next 20 years)

Important gaps (priority 2) have also been identified for the following data products:

- Data/spatial data on current value of telecom cables

<b>MSP Topic: Telecom Cables</b>	
<b>Existing Telecom Cables</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing current location of telecom cables (live and dead)
Relevant existing Atlas data layers	Undersea Cables
Proposed names for new Atlas data layers	Telecom Cables
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ KIS-ORCA</li> <li>○ Based on initial discussions with KIS-ORCA, MI will need to agree an amendment to its licence in order to display telecom cable maps on the MSP Portal.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire Telecom cable shapefiles form KIS-ORCA</li> <li>○ Create data layer identifying live and dead cables</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual check for updates)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 1 day staff effort (1 day GIS analyst) cost approx. €400
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Telecom Cables</b>	
<b>Future Telecom Cables</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing potential new telecom cables
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Future Telecom Cables
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Route corridors for planned telecom cables (e.g. IFC-1) – permission/shapefile being sought. Also check with DHPLG about any other proposals/applications e.g. Deep Sea Fibre Rockabill cable</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire route corridors for new/replacement telecom cables</li> <li>○ Create data layer identifying locations/route corridors for proposed new telecom cables</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual check for updates)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Telecom Cables</b>	
<b>Value of Telecom Cables</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing value of existing telecom cables
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Value of Telecom Cables
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ KIS-ORCA</li> <li>○ Based on initial discussions with KIS-ORCA, MI will need to agree an amendment to its licence in order to display telecom cable maps on the MSP Portal.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire Telecom cable shapefiles form KIS-ORCA</li> <li>○ Create data layer identifying live and dead cables (see separate proforma)</li> <li>○ Desk-based review of options for assigning economic value (value of data transfer; replacement cost; current investment in marine telecoms)</li> <li>○ Apply preferred method to live telecom cables</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 5 days staff effort (3 days economist; 2 days GIS analyst) cost approx. €2900
Required skills	Economist; GIS analyst
Estimated time scales	3 weeks

## B.24 Tourism, sport and recreation

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Tourism and Recreation topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet `Prioritisation-MASTER_compiled_2018-12-03`

No key priorities (priority 1) data products have been identified for the Tourism and Recreation topic.

Important gaps (priority 2) have been identified for the following data products:

- Current spatial distribution/location and intensity of angling (shore, boat and bait collection).
- Data/spatial data on current value of angling.
- Current spatial distribution/location and intensity of kitesurfing.
- Data/spatial data on current value of kitesurfing.
- Current spatial distribution/location and intensity of windsurfing.
- Data/spatial data on current value of windsurfing.
- Current spatial distribution/location and intensity of surfing.
- Data/spatial data on current value of surfing.
- Current spatial distribution/location and intensity of climbing/coasteering/bouldering at the coast.
- Data/spatial data on current value of climbing/coasteering/bouldering at the coast.
- Current spatial distribution/location and intensity of diving/snorkelling.
- Data/spatial data on current value of diving/snorkelling.
- Current spatial distribution/location and intensity of recreational drone use at coast.
- Data/spatial data on current value of recreational drone use at coast.
- Current spatial distribution/location and intensity of general beach leisure (beach combing, beach games, sun bathing, rock pooling, sea swimming).
- Data/spatial data on current value of general beach leisure (beach combing, beach games, sun bathing, rock pooling, sea swimming).
- Current spatial distribution/location and intensity of general coastal tourism activities.
- Data/spatial data on current value of general coastal tourism activities.
- Current spatial distribution/location and intensity of hovercrafting.
- Data/spatial data on current value of hovercrafting.
- Current spatial distribution/location and intensity of cycling along the coast.
- Data/spatial data on current value of cycling along the coast.
- Current spatial distribution/location and intensity of quad biking/scramble biking/cars on the foreshore.
- Data/spatial data on current value of quad biking/scramble biking/cars on the foreshore.
- Current spatial distribution/location and intensity of sand-yachting/land-sailing/land-yachting.
- Data/spatial data on current value of sand-yachting/land-sailing/land-yachting.
- Current spatial distribution/location and intensity of kite buggying.
- Data/spatial data on current value of kite buggying.
- Current spatial distribution/location and intensity of kite landboarding.
- Data/spatial data on current value of kite landboarding.

- Current spatial distribution/location and intensity of light aircraft (motorised and un-motorised) use.
- Data/spatial data on current value of light aircraft (motorised and un-motorised) use.
- Current spatial distribution/location and intensity of motor/power boating.
- Data/spatial data on current value of motor/power boating.
- Current spatial distribution/location and intensity of motorised sailing.
- Data/spatial data on current value of motorised sailing.
- Current spatial distribution/location and intensity of wakeboarding/waterskiing.
- Data/spatial data on current value of wakeboarding/waterskiing.
- Current spatial distribution/location and intensity of parascending.
- Data/spatial data on current value of parascending.
- Current spatial distribution/location and intensity of un-motorised sailing.
- Data/spatial data on current value of un-motorised sailing.
- Current spatial distribution/location and intensity of kayaking.
- Data/spatial data on current value of kayaking.
- Current spatial distribution/location and intensity of Canadian canoeing.
- Data/spatial data on current value of Canadian canoeing.
- Current spatial distribution/location and intensity of stand-up paddleboarding (SUP).
- Data/spatial data on current value of stand-up paddleboarding (SUP).
- Current spatial distribution/location and intensity of rowing/sculling.
- Data/spatial data on current value of rowing/sculling.
- Current spatial distribution/location and intensity of dinghy/day boat/small keelboat use.
- Data/spatial data on current value of dinghy/day boat/small keelboat use.
- Current spatial distribution/location and intensity of personal watercraft use.
- Data/spatial data on current value of personal watercraft use.
- Current spatial distribution/location and intensity of visiting attractions.
- Data/spatial data on current value of visiting attractions.
- Current spatial distribution/location and intensity of walking.
- Data/spatial data on current value of walking.
- Current spatial distribution/location and intensity of wildlife/bird watching/wildfowling.
- Data/spatial data on current value of wildlife/bird watching/wildfowling.
- Marine recreation infrastructure, specifically piers/slipways/pontoons/recreational anchorages.
- Marine tourism infrastructure, specifically accommodation.

<b>MSP Topic: Tourism and Recreation</b>	
<b>Angling (shore, boat and bait collection)</b>	
	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of angling.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Angling locations and clubs/centres/operators/schools Intensity of angling activity
<b>Outline methodology for Option 1 – Desk based</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for angling locations and angling operators/guides.</li> <li>○ Tourism Ireland – Request data on angling operators. Data is likely to overlap with that provided by Failte Ireland. No point of contact established yet.</li> <li>○ Inland Fisheries Ireland – Point data on shore angling locations along the Wild Atlantic Way. Request data from IFI and enquire about availability of other data on sea angling, boat angling and bait collection. No point of contact established yet.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layer should distinguish between locations for activity and activity provider.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p>Unknown whether the Angling Council of Ireland holds data on location of angling clubs. Contact ACI to enquire if data is available. No point of contact established yet.</p> <p>Inland Fisheries Ireland has prepared a series of guides which include maps on angling locations along the coast. Enquire if data on sea angling, boat angling and bait collection is available. No point of contact established yet.</p>	
<b>Outline methodology for Option 2: Tourism and Recreation Survey</b>	
<p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this</p>	

approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of angling locations identified in the Tourism and Recreation Survey of Ireland.
  - Create angling specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations of angling clubs/centres/operators/schools.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,044 for angling (2 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Kitesurfing</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of kitesurfing.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Angling locations and clubs/centres/operators/schools Intensity of kitesurfing activity
<p><b>Outline methodology for Option 1 – Desk based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Irish Kitesurfing Association – Request data on registered kitesurfing operators/schools. No point of contact established yet.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Plot kitesurfing locations from website Local Kite Spots and KiteSurf Ireland (only 22 locations identified).</li> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layer should distinguish between locations for activity and activity provider.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p>	

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of kitesurfing locations identified in the Tourism and Recreation Survey of Ireland.
  - Create kitesurfing specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for kitesurfing and kitesurfing clubs/centres/operators/schools.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,044 for kitesurfing (2 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Windsurfing</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of windsurfing.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Windsurfing locations and clubs/centres/operators/schools Intensity of windsurfing activity
<b>Outline methodology for Option 1 – Desk-based</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Irish Windsurfing Association – Request data on approved training centres for windsurfing and popular locations for windsurfing. No point of contact established yet.</li> <li>○ Maps.ie– Request data on popular beaches for windsurfing from Maps.ie. No point of contact established yet.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ If data on windsurfing locations is not supplied by Maps.ie, it is possible to plot this data in GIS.</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layer should distinguish between locations for activity and activity provider.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
<p>If the data on windsurfing locations is not available from Maps.ie it is possible to plot the locations in GIS (14 windsurfing locations identified on Maps.ie).</p>	
<b>Outline methodology for Option 2: Tourism and Recreation Survey</b>	
<p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline.</p>	

With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of windsurfing locations identified in the Tourism and Recreation Survey of Ireland.
  - Create windsurfing specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for windsurfing and windsurfing clubs/centres/operators/schools.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,044 for windsurfing (2 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Surfing</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of surfing.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Surfing locations and clubs/centres/operators/schools Intensity of surfing activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Irish Surfing Association – Surf Directory (not geocoded data) received from Irish Surfing Association (<a href="mailto:info@irishsurfing.ie">info@irishsurfing.ie</a>) on 12<sup>th</sup> November 2018. 53 registered surf/SUP schools/clubs identified. Also identified in email an additional nine adventure centres offering surfing/SUP.</li> <li>○ Magic Seaweed – Request data on popular surfing locations in Ireland. No point of contact established yet.</li> <li>○ Maps.ie – Request data on popular beaches for surfing from Maps.ie as the locations do not overlap with those identified on Magic Seaweed. No point of contact established yet.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ If data on surfing locations is not supplied by Magic Seaweed or Maps.ie, it is possible to plot this data in GIS.</li> <li>○ Co-ordinates from the addresses listed in the spreadsheet provided by the Irish Surfing Association will need to be obtained to convert data to a shapefile.</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layer should distinguish between locations for activity and activity provider.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p>If the data on surfing locations is not available from Magic Seaweed or Maps.ie it is possible to plot the locations in GIS (44 surf locations identified on MS and 17 on Maps.ie).</p> <p>Data is likely to overlap considerably with data on Stand-Up Paddleboarding.</p> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection</p>	

Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of surfing locations identified in the Tourism and Recreation Survey of Ireland.
  - Create surfing specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for surfing and surfing clubs/centres/operators/schools.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,566 for surfing (3 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1.5 weeks Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Climbing/coasteering/bouldering at the coast</b>	
	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of climbing/coasteering/bouldering at the coast.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Coastal climbing/coasteering/bouldering locations and clubs/ centres/ operators/ schools Intensity of coastal climbing/coasteering/bouldering activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Extreme Sports – Request data on adventure centres offering climbing/coasteering/bouldering. No point of contact established yet.</li> <li>○ UK Climbing – Request data on climbing locations along the coast. Good coverage of popular climbing locations. No point of contact established yet.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layer should distinguish between locations for activity and activity provider.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p>Unknown whether Climbing.ie holds data on locations for coasteering/bouldering. Contact Climbing.ie to enquire if data is available. No point of contact established yet.</p> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline.</p>	

With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of climbing/coasteering/bouldering locations identified in the Tourism and Recreation Survey of Ireland.
  - Create climbing/coasteering/bouldering specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for climbing/coasteering/bouldering and adventure centres/operators offering climbing/coasteering/bouldering.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,044 for coasteering/bouldering (2 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Diving/snorkelling</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of diving/snorkelling.
Relevant existing Atlas data layers	INFOMAR Surveyed Shipwreck
Proposed names for new Atlas data layers	Diving/snorkelling locations and clubs/centres/operators/schools, and shipwreck sites Intensity of diving/snorkelling activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Irish Underwater Council – Request data on registered dive clubs and diving sites. No point of contact established yet.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layer should distinguish between locations for diving, diving activity providers and the locations of shipwrecks.</li> <li>○ Create metadata records consistent with ISDE requirements (refer to metadata for INFOMAR Surveyed Shipwreck)</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency - 10 years for diving locations and clubs; continual for shipwreck sites in line with INFOMAR Surveyed Shipwreck dataset.</li> <li>○</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p>	

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of diving/snorkelling locations identified in the Tourism and Recreation Survey of Ireland.
  - Create diving/snorkelling specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for diving/snorkelling and diving/snorkelling clubs/centres/operators/schools.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,044 for diving/snorkelling (2 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Recreational drone use at the coast</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of recreational drone use at the coast.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Locations for recreational drone use at the coast Intensity of recreational drone use activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <p>There is no existing data on the locations for recreational drone use at the coast. There are also no clubs/centres/operators/schools offering this as an activity. Therefore, it is not possible to create a data layer of existing data on recreational drone use at the coast.</p> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Activity locations identified in the Tourism and Recreation Survey of Ireland</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Analyse, clean and create raw data layer (point, polygon, polyline) of recreational drone use locations identified in the Tourism and Recreation Survey of Ireland.</li> <li>○ Create recreational drone use specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.</li> <li>○ Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.</li> </ul> </li> </ul>	

- The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – N/A Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – N/A Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>General Beach Leisure – Beach combing, beach games, sun bathing, rock pooling, sea swimming</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location of beaches and clean bathing water locations which provide an indication of locations for general beach leisure.
Relevant existing Atlas data layers	Bathing Water Quality
Proposed names for new Atlas data layers	Beach locations for general beach leisure High quality bathing water
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 of beaches.</li> <li>○ An Taisce – Request data on Green Coast and Blue Flag beaches from Ian Diamond, Coastal Awards Manager, An Taisce <a href="http://beachawards.ie/green-coast/contact/">http://beachawards.ie/green-coast/contact/</a> Available under CC licence.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layers, removing overlapping/duplicate data in relation to beach locations and clipping data to remove inland locations (within 5 km of the coastline). Point data layer should distinguish between Green Coast, Blue Flag and un-awarded beaches.</li> <li>○ The Bathing Water Quality polygon data layer should only show areas of 'excellent' and 'good' quality bathing water.</li> <li>○ Create metadata records consistent with ISDE requirements (not required for data layer showing high quality bathing water, see Bathing Water Quality metadata)</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency - 10 years for beach locations; as needed for high quality bathing water in line with Bathing Water Quality dataset.</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this</p>	

approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of general beach leisure locations identified in the Tourism and Recreation Survey of Ireland. Shorter walks will be included in this category, walking (more than 5 km) will be included in the 'Walking' category.
  - Create general beach leisure specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for general beach leisure.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,044 for general beach leisure (2 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>General Coastal Tourism Activities</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide a data layer identifying the current spatial distribution/location of touring/scenic routes along the coast.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Coastal touring/scenic routes Intensity of coastal touring activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 of tour operators (point data) and discovery points. Contact Failte Ireland to request if tour route data is available.</li> <li>○ Tourism Ireland – Request data on boat, bus and scenic tours. Likely to be point data (tour operator registered address) and not the tour route. No point of contact established yet.</li> <li>○ ActiveMe.ie – Request data on 25 most scenic routes from ActiveMe.ie (available as a polyline) (includes all popular routes like the Wild Atlantic Way, Ring of Kerry, Burren Loop, etc.). No point of contact established yet.</li> <li>○ Heritage Council – Request data on scenic routes, views and areas. Data not available for Wexford, Dublin, Kerry (scenic routes), Clare (scenic views), Cork (scenic views), Sligo (scenic views), Waterford (scenic views). Contact the Heritage Council <a href="mailto:gisdata@heritagecouncil.ie">gisdata@heritagecouncil.ie</a> to obtain data available on Heritage Maps.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layers (point and polyline) removing overlapping/duplicate data in relation to tour operators and clipping data to remove inland locations (within 5 km of the coastline).</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p>If only point data is available from Tourism Ireland and Discover Ireland (Failte Ireland) this data should not be used as it does not accurately depict tour/scenic coastal routes.</p> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps,</p>	

backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of general coastal tourism activity locations identified in the Tourism and Recreation Survey of Ireland.
  - Create general coastal tourism activities specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for general coastal tourism activities.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,566 for general coastal tourism activities (3 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1.5 weeks Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Hovercrafting</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of hovercrafting.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Hovercrafting locations and adventure centres/operators Intensity of hovercrafting activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer clipping data to remove inland locations (within 5 km of the coastline). Data layer should identify that the locations refer to hovercrafting adventure centres/operators.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Activity locations identified in the Tourism and Recreation Survey of Ireland</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Analyse, clean and create raw data layer (point, polygon, polyline) of hovercrafting locations identified in the Tourism and Recreation Survey of Ireland.</li> </ul> </li> </ul>	

- Create hovercrafting specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
- Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
- The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
- Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations of hovercrafting clubs/centres/operators/schools.

#### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €522 for hovercrafting (1 day) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 0.5 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Cycling along the coast</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of cycling along the coast
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Cycling locations and clubs/centres/operators/schools Intensity of cycling activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Irish Trails.ie (formerly National Trails Office) – Request on and off road cycling routes from Sport Ireland</li> <li>○ Cycling Ireland – Request data on cycling clubs. No point of contact established yet.</li> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 of cycling routes and bike hire locations (point data). Contact Failte Ireland to request if cycling route data is available.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layers (point and polyline) clipping data to remove inland locations (within 5 km of the coastline). Data layers should distinguish between locations for activity and activity provider.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Activity locations identified in the Tourism and Recreation Survey of Ireland</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> </ul>	

- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of cycling locations identified in the Tourism and Recreation Survey of Ireland.
  - Create cycling specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the routes identified for cycling and cycling clubs/centres/operators/schools.

#### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,044 for cycling (2 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Quad biking/scramble biking/cars on the foreshore</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of quad biking/scramble biking/cars on the foreshore.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Quad biking/scramble biking/cars foreshore locations and adventure centres/operators Intensity of quad biking/scramble biking/cars on the foreshore
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer clipping data to remove inland locations (within 5 km of the coastline). Data layer should identify that the locations refer to quad biking/scramble biking/cars adventure centres/operators.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Activity locations identified in the Tourism and Recreation Survey of Ireland</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> </ul>	

- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of quad biking/scramble biking/cars locations identified in the Tourism and Recreation Survey of Ireland.
  - Create quad biking/scramble biking/cars specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations of adventure centres/operators that offer quad biking/scramble biking/cars on the foreshore.

#### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €522 for quad biking (1 day) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 0.5 week Option 2 – 7 months Option 3 – 2 months

MSP Topic: Tourism and Recreation	
Sand-yachting/land-sailing/land-yachting	Priority Rating: 2
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of sand-yachting/land-sailing/land-yachting
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Sand-yachting/land-sailing/land-yachting locations and clubs/centres/operators/schools Intensity of sand-yachting/land-sailing/land-yachting activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer clipping data to remove inland locations (within 5 km of the coastline). Data layer should identify that the locations refer to quad biking/scramble biking/cars adventure centres/operators.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p>Unknown whether the Irish Power Kite Sandyacht Association holds data on locations of activity or level of use. Contact Irish Power Kite Sandyacht Association to enquire if data is available. No point of contact established yet.</p> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Activity locations identified in the Tourism and Recreation Survey of Ireland</li> </ul> </li> </ul>	

- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of sand-yachting/land-sailing/land-yachting locations identified in the Tourism and Recreation Survey of Ireland.
  - Create sand-yachting/land-sailing/land-yachting specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations of adventure centres/operators that offer sand-yachting/land-sailing/land-yachting.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €522 for sand yachting (1 day) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 0.5 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Kite bugging</b>	
<b>Priority Rating: 2</b>	
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of kite bugging
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Kite bugging locations and clubs/centres/operators/schools Intensity of kite bugging activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer clipping data to remove inland locations (within 5 km of the coastline). Data layer should identify that the locations refer to kite bugging adventure centres/operators.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p>Unknown whether the Irish Power Kite Sandyacht Association holds data on locations of activity or level of use. Contact Irish Power Kite Sandyacht Association to enquire if data is available. No point of contact established yet.</p> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Activity locations identified in the Tourism and Recreation Survey of Ireland</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> </ul>	

- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of kite bugging locations identified in the Tourism and Recreation Survey of Ireland.
  - Create kite bugging specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations of adventure centres/operators that offer kite bugging.

#### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €522 for kite bugging (1 day) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 0.5 week Option 2 – 7 months Option 3 – 2 months

MSP Topic: Tourism and Recreation	
Kite landboarding	Priority Rating: 2
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of kite landboarding
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Kite landboarding locations Intensity of kite landboarding activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <p>There is no existing data on the locations for kite landboarding. There are also no clubs/centres/operators/schools offering this as an activity. Therefore, it is not possible to create a data layer of existing data on kite landboarding.</p> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Activity locations identified in the Tourism and Recreation Survey of Ireland</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Analyse, clean and create raw data layer (point, polygon, polyline) of kite landboarding locations identified in the Tourism and Recreation Survey of Ireland.</li> <li>○ Create kite landboarding specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.</li> <li>○ Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.</li> <li>○ The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.</li> </ul> </li> </ul>	

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – N/A Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – N/A Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Light aircraft (motorised and un-motorised) use</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of light aircraft (motorised and un-motorised) use
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Light aircraft (motorised and un-motorised) locations and clubs/centres/operators/schools Intensity of light aircraft (motorised and un-motorised) use
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer clipping data to remove inland locations (within 5 km of the coastline). Data layer should identify that the locations refer to adventure centres/operators offering light aircraft activities.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p>Unknown if Irish Powered Paragliding and Hangliding Association, Irish Hang Gliding &amp; Paragliding Association and Irish Light Aviation Society hold information on flying sites, number of members and level of use. Contact these organisations to enquire if data is available. No points of contact established yet.</p> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p>	

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of light aircraft locations identified in the Tourism and Recreation Survey of Ireland.
  - Create light aircraft specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations of adventure centres/operators that offer light aircraft activities.
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### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,044 for light aircraft (2 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Motor/power boating</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of motor/power boating
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Motor/power boating locations and clubs/centres/operators/schools Intensity of motor/power boating activity
<b>Outline methodology for Option 1 – Desk-based</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Irish Sailing – Request data on motor/power boating clubs/schools/operators/adventure centres.</li> <li>○ Digitise sailing routes (heavy, medium and light traffic), sailing areas and racing areas identified in the Coastal Atlas of Recreational Boating in Ireland (2018).</li> <li>○ Piers/slipways/pontoons/recreational anchorages data layer created under the 'Marine Recreation Infrastructure' Roadmap.</li> <li>○ Harbours and marinas data layer created under the 'Ports &amp; Shipping' topic.</li> <li>○ Marine Traffic – AIS-A and AIS-B data will be purchased for a sample year for the whole of the Irish waters. The AIS-B data will provide information on recreational density and routes, although it is largely only larger motor boats/sailing yachts that have AIS-B.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layers (point and polyline) merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layers should identify the sailing routes for motor/power boats and the different types of marine infrastructure.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
<b>Outline methodology for Option 2: Tourism and Recreation Survey</b>	
<p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the</p>	

approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of motor/power boating locations identified in the Tourism and Recreation Survey of Ireland.
  - Create motor/power boating specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for motor/power boating and motor/power boating clubs/centres/operators/schools.

**Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €2,088 for motor / power boating (4 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 2 weeks Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Motorised sailing</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of motorised sailing
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Motorised sailing locations and clubs/centres/operators/schools Intensity of motorised sailing activity
<b>Outline methodology for Option 1 – Desk-based</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Irish Sailing – Request data on motorised sailing clubs/schools/operators/adventure centres.</li> <li>○ Digitise sailing routes (heavy, medium and light traffic), sailing areas and racing areas identified in the Coastal Atlas of Recreational Boating in Ireland (2018).</li> <li>○ Piers/slipways/pontoons/recreational anchorages data layer created under the 'Marine Recreation Infrastructure' Roadmap.</li> <li>○ Harbours and marinas data layer created under the 'Ports &amp; Shipping' topic.</li> <li>○ Marine Traffic – AID-A and AIS-B data will be purchased for a sample year for the whole of the Irish waters. The AIS-B data will provide information on recreational density and routes, although it is largely only larger motor boats/sailing yachts that have AIS-B.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layers (point and polyline) merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layers should identify the sailing routes for motorised sailing and the different types of marine infrastructure.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
<b>Outline methodology for Option 2: Tourism and Recreation Survey</b>	
<p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the</p>	

approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of motorised sailing locations identified in the Tourism and Recreation Survey of Ireland.
  - Create motorised sailing specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for motorised sailing and motorised sailing clubs/centres/operators/schools.

**Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €2,088 for motorised sailing (4 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 2 weeks Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Wakeboarding/waterskiing</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of wakeboarding/waterskiing
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Wakeboarding/waterskiing locations and clubs/ centres/ operators/schools Intensity of wakeboarding/waterskiing
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Dataset not required from the Irish Waterski and Wakeboard Federation as all the club locations are inland with the exception of Wakedock which is identified in the Discover Ireland shapefile.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer clipping data to remove inland locations (within 5 km of the coastline). Data layer should identify that the locations refer to wakeboarding/waterskiing adventure centres/operators.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Activity locations identified in the Tourism and Recreation Survey of Ireland</li> </ul> </li> </ul>	

- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of wakeboarding/waterskiing locations identified in the Tourism and Recreation Survey of Ireland.
  - Create wakeboarding/waterskiing specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations of adventure centres/operators that offer wakeboarding/waterskiing.

**Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €522 for wakeboarding/waterskiing (1 day) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 0.5 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Parascending</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of parascending
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Parascending locations Intensity of parascending activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <p>There is no existing data on the locations for parascending. There are also no clubs/centres/operators/schools offering this as an activity. Therefore, it is not possible to create a data layer of existing data on parascending.</p> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Activity locations identified in the Tourism and Recreation Survey of Ireland</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Analyse, clean and create raw data layer (point, polygon, polyline) of parascending locations identified in the Tourism and Recreation Survey of Ireland.</li> <li>○ Create parascending specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.</li> <li>○ Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.</li> <li>○ The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.</li> </ul> </li> </ul>	

### Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – N/A Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – N/A Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Un-motorised sailing</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of un-motorised sailing
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Un-motorised sailing locations and clubs/centres/operators/schools Intensity of un-motorised sailing activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Irish Sailing – Request data on un-motorised sailing clubs/schools/operators/adventure centres.</li> <li>○ Digitise sailing routes (heavy, medium and light traffic), sailing areas and racing areas identified in the Coastal Atlas of Recreational Boating in Ireland (2018).</li> <li>○ Piers/slipways/pontoons/recreational anchorages data layer created under the 'Marine Recreation Infrastructure' Roadmap.</li> <li>○ Harbours and marinas data layer created under the 'Ports &amp; Shipping' topic.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layers (point and polyline) merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layers should identify the sailing routes for un-motorised sailing and the different types of marine infrastructure.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p>	

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of un-motorised sailing locations identified in the Tourism and Recreation Survey of Ireland.
  - Create un-motorised sailing specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for un-motorised sailing and un-motorised sailing clubs/centres/operators/schools.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €2,088 for un-motorised sailing (4 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 2 weeks Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Kayaking</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of kayaking
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Kayaking locations and clubs/centres/operators/schools Intensity of kayaking activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Canoeing Ireland – Request data on registered kayaking clubs and providers. Data likely to overlap with clubs/providers of canoeing. No point of contact established yet.</li> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Extreme Ireland – Request data on operators who offer sea kayaking tours. No point of contact established yet.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layer should identify that the locations refer to kayaking clubs/adventure centres/operators/schools.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p>Unknown if the Irish Sea Kayaking Association has information on registered clubs and routes. Contact ISKA to enquire if data are available. No point of contact established yet.</p> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p>	

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of kayaking locations identified in the Tourism and Recreation Survey of Ireland.
  - Create kayaking specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations of kayaking clubs/centres/operators/schools.

### Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,044 for kayaking (2 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Canadian canoeing</b>	
<b>Priority Rating: 2</b>	
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of Canadian canoeing
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Canadian canoeing locations and clubs/centres/operators/schools Intensity of Canadian canoeing activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Canoeing Ireland – Request data on registered canoeing clubs and providers. Data likely to overlap with clubs/providers of kayaking. No point of contact established yet.</li> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layer should identify that the locations refer to canoeing clubs/adventure centres/operators/schools.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Activity locations identified in the Tourism and Recreation Survey of Ireland</li> </ul> </li> </ul>	

- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of canoeing locations identified in the Tourism and Recreation Survey of Ireland.
  - Create canoeing specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations of canoeing clubs/centres/operators/schools.

#### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,044 for canoeing (2 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Stand Up Paddleboarding (SUP)</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of stand up paddleboarding
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Stand up paddleboarding locations and clubs/ centres/ operators/schools Intensity of stand up paddleboarding activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Irish Surfing Association – Surf Directory (not geocoded data) received from Irish Surfing Association (<a href="mailto:info@irishsurfing.ie">info@irishsurfing.ie</a>) on 12<sup>th</sup> November 2018. 53 registered surf/SUP schools/clubs identified. Also identified in email an additional nine adventure centres offering surfing/SUP.</li> <li>○ Extreme Sports – Request data on SUP and paddle surfing. No point of contact established yet.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Co-ordinates from the addresses listed in the spreadsheet provided by the Irish Surfing Association will need to be obtained to convert data to a shapefile.</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layer should identify that the locations refer to SUP clubs/adventure centres/operators/schools.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p>Data is likely to overlap considerably with data on surfing.</p> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps,</p>	

backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of SUP locations identified in the Tourism and Recreation Survey of Ireland.
  - Create SUP specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for SUP and SUP clubs/centres/operators/schools.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,566 for SUP (3 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1.5 weeks Option 2 – 7 months Option 3 – 2 months

MSP Topic: Tourism and Recreation	
Rowing/sculling	Priority Rating: 2
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of rowing/sculling
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Rowing/sculling locations and clubs/centres/operators/schools Intensity of rowing sculling activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Rowing Ireland – Request list of rowing clubs. Contact RI to enquire if data is available in shapefile.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Co-ordinates from the rowing club addresses will need to be obtained to convert data to a shapefile.</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layer should identify that the locations refer to rowing/sculling clubs/adventure centres/operators/schools.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p>	

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of rowing/sculling locations identified in the Tourism and Recreation Survey of Ireland.
  - Create rowing/sculling specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations of rowing/sculling clubs/centres/operators/schools.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,044 for rowing/sculling (2 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Dinghy/day boat/small keelboat use</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of dinghy/day boat/small keelboat use
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Dinghy/day boat/small keelboat locations and clubs/centres/operators/schools Intensity of dinghy/day boat/small keelboat use
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> <li>○ Irish Sailing – Request data on motor/power boating clubs/schools/operators/adventure centres.</li> <li>○ Digitise sailing routes (heavy, medium and light traffic), sailing areas and racing areas identified in the Coastal Atlas of Recreational Boating in Ireland (2018).</li> <li>○ Piers/slipways/pontoons/recreational anchorages data layer created under the 'Marine Recreation Infrastructure' Roadmap.</li> <li>○ Harbours and marinas data layer created under the 'Ports &amp; Shipping' topic.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layers (point and polyline) merging location shapefiles, removing overlapping/duplicate data in relation to clubs/centres/operators/schools and clipping data to remove inland locations (within 5 km of the coastline). Data layers should identify the sailing routes for dingy/day boat/keel boat sailing and the different types of marine infrastructure.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline.</p>	

With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of dinghy/day boat/small keelboat activity locations identified in the Tourism and Recreation Survey of Ireland.
  - Create dinghy/day boat/small keelboat activity specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for dinghy/day boat/small keelboat use and adventure centres/operators that offer dinghy/day boat/small keelboat activities.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €2,088 for dinghy/day boat/small keelboat use (4 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 2 weeks Option 2 – 7 months Option 3 – 2 months

MSP Topic: Tourism and Recreation	
Personal watercraft use	Priority Rating: 2
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of personal watercraft use
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Personal watercraft use locations and adventure centres/operators Intensity of personal watercraft use activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for activity operators. There is no distinction between the different activities provided by each activity operator. Contact Failte Ireland to request additional information on activities provided by each operator.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer clipping data to remove inland locations (within 5 km of the coastline).</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Activity locations identified in the Tourism and Recreation Survey of Ireland</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Analyse, clean and create raw data layer (point, polygon, polyline) of personal watercraft activity locations identified in the Tourism and Recreation Survey of Ireland.</li> </ul> </li> </ul>	

- Create personal watercraft activity specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
- Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
- The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
- Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations of adventure centres/operators offering jet-skiing.

#### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €522 for personal watercrafting (1 day) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 0.5 week Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Visiting attractions</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of visiting attractions.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Locations of attractions Intensity of visiting attractions
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 on museums and attractions; zoos and aquariums; historic houses and castles; churches, abbeys and monasteries.</li> <li>○ Heritage Ireland – Request data on heritage sites in Ireland. No point of contact established yet.</li> <li>○ Heritage Council – Request data on maritime museums and OPW Heritage sites. Contact the Heritage Council <a href="mailto:gisdata@heritagecouncil.ie">gisdata@heritagecouncil.ie</a> to obtain data.</li> <li>○ Trip Advisor – Request data on most rated visitor attractions. No point of contact established yet.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles, removing overlapping/duplicate data in relation to attractions/venues and clipping data to remove inland locations (within 5 km of the coastline). Data layer should identify most visited/popular attractions.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p>	

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of visitor attraction locations identified in the Tourism and Recreation Survey of Ireland.
  - Create visitor attractions specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations of visitor attractions.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,566 for visitor attractions (3 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1.5 weeks Option 2 – 7 months Option 3 – 2 months

MSP Topic: Tourism and Recreation	
Walking	Priority Rating: 2
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of walking
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Walking routes Intensity of walking activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Irish Trails.ie (formerly National Trails Office) – Request National Looped Walks, Sli na Slainte Walking Routes, Waymarked Ways, Walking/Hiking Trails from Sport Ireland</li> <li>○ Heritage Council – Request Pilgrim Paths (point) shapefile. Available under CC licence.</li> <li>○ Wild Atlantic Way.com – Request shapefile on the Wild Atlantic Way. No point of contact established yet.</li> <li>○ The Irish Walking Guide – Request dataset, identifies the starting point of walking routes from a variety of sources, but not the routes. No point of contact established yet.</li> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 for coastal walking; linear walking; long distance way marked ways; looped walks; parks and forests. All point data. Contact Failte Ireland to request if walking route data is available.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles (point and polyline), removing overlapping/duplicate data, clipping data to remove inland locations (within 5 km of the coastline). Data layer should distinguish between wildlife centres/operators and designations.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline.</p>	

With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of walking routes (more than 5 km) identified in the Tourism and Recreation Survey of Ireland. Shorter walks will be included in the 'General Beach Leisure' category.
  - Create walking (more than 5 km) specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the routes identified for walking.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,566 for walking (3 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1.5 weeks Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Wildlife/bird watching/wildfowling</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying the current spatial distribution/location and intensity of wildlife/bird watching/wildfowling
Relevant existing Atlas data layers	Natural Heritage Area Proposed Natural Heritage Area Special Area Conservation Special Protection Area
Proposed names for new Atlas data layers	Wildlife/bird watching/wildfowling locations and centres/operators Intensity of wildlife/bird watching/wildfowling activity
<p><b>Outline methodology for Option 1 – Desk-based</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Data received from Failte Ireland on 03/12/18 of nature and wildlife sites; and natural landscapes.</li> <li>○ National Parks and Wildlife Service – Request data on Natural Heritage Areas, Wildfowl Sanctuaries, OSPAR Sites (Marine Protected Areas), National Parks, Nature Reserves. Data on protected sites is available to download under CC licence. Data on wildfowl sanctuaries and OSPAR Sites is listed in an Excel spreadsheet – Contact National Parks and Wildlife Service <a href="mailto:natureconservation@environ.ie">natureconservation@environ.ie</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layers <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer merging location shapefiles (point and polyline), removing overlapping/duplicate data, clipping data to remove inland locations (within 5 km of the coastline). Data layer should distinguish between wildlife centres/operators and designations</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul> <p><b>Outline methodology for Option 2: Tourism and Recreation Survey</b></p> <p>We propose developing an interactive web-based survey to gather spatial and other information about coastal and marine recreation and tourism in Ireland. The survey will allow participants to indicate which activities they have undertaken during the previous twelve months and then to mark on a scalable map the locations they had visited using the Tourism and Recreation Data Collection Tool. Data capture will be tailored to reflect the differing character of activities, with some taking place at single locations (e.g. shore angling [point]), some across wider areas (e.g. sailing racing areas [polygon]) and others along routes or transects (e.g. walking along the coast [polyline]). Our approach would build on the survey and data mapping tool LUC developed and deployed in Scotland in 2015 which represents a saving of around €30,000 on the cost of developing the approach from scratch. The spatial outputs will include a series of activity specific heat maps, backed by raw data maps, showing the locations and intensity of activity around the Irish coastline. With careful preparation and appropriate promotion and dissemination amongst user groups, this approach would generate a rich spatial dataset which would provide new insights into the recreation use of Irish seas and coasts.</p>	

- Data sources and permissions to use the data
  - Activity locations identified in the Tourism and Recreation Survey of Ireland
- Required data processing tools
  - Data layers can be created using standard ArcGIS software
- Outline tasks for creating data layers
  - Analyse, clean and create raw data layer (point, polygon, polyline) of wildlife/bird watching/wildfowling locations identified in the Tourism and Recreation Survey of Ireland.
  - Create wildlife/bird watching/wildfowling specific heat data layer and a heat data layer identifying the intensity of all activities around the Irish coastline. Polygon data is stacked on top of each other and counted with a red colour attributed to a higher count and a green colour attributed to a lower count. For point and line data, use the Kernel Density Tool from ArcGIS Spatial Analyst Toolbox to create a buffer or area around each point and line using a defined cell size and radius (e.g. cell size of 250 m and a radius of 2.5 km). These values will then be used to calculate how closely points and lines are drawn on a map. The more these areas overlap the higher density of activity that is displayed in the data layers.
  - Metadata records consistent with ISDE requirements and data processing logs will be created for new data layers.
  - The responses from the questionnaire that accompanies the Tourism and Recreation Data Collection Tool will be collated, analysed and presented in the final report to MI.
  - Opportunity to combine the raw data collected as part of the survey with Option 1 data to include the locations identified for wildlife/bird watching/wildfowling and wildlife/bird watching/wildfowling centres/operators.

### **Outline methodology for Option 3: Developing a Tourism and Recreation Data Collection Tool**

This option proposes to develop the tool described in Option 2 but not implement the survey or collate the results. No data layers would be created.

Estimated staff effort/cost	Option 1 – approx. €34,452 for data collection of all activities - €1,566 for wildlife/bird watching/wildfowling (3 days) Option 2 – approx. €90,000 for Tourism and Recreation Survey of all activities (4.5 months) Option 3 – approx. €20,000 for developing a Tourism and Recreation Data Collection Tool (1 month)
Required skills	GIS analyst
Estimated time scales	Option 1 – 1.5 weeks Option 2 – 7 months Option 3 – 2 months

<b>MSP Topic: Tourism and Recreation</b>	
<b>Marine recreation infrastructure</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying existing infrastructure that supports marine recreation activities.
Relevant existing Atlas data layers	Pier Quay Slip Infrastructure
Proposed names for new Atlas data layers	Piers/slipways/pontoons/recreational anchorages
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Harbours and marinas data layer created under the 'Ports &amp; Shipping' topic.</li> <li>○ Digitise data on piers/slipways/pontoons/recreational anchorages from the Coastal Atlas of Recreational Boating in Ireland.</li> <li>○ ICC Sailing Directions – Purchase the South and West Coasts of Ireland and the East and North Coasts of Ireland ICC Sailing Directions books. €60 for both publications. Digitise relevant data such as anchorages, piers from publications.</li> <li>○ Marinas.com – Request data from marinas.com on piers/slipways/pontoons/recreational anchorages. No point of contact established yet.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Acquire data from above sources</li> <li>○ Create data layer, removing overlapping/duplicate data and clipping data to remove inland locations (within 5 km of the coastline). Data should be combined with the existing layers on the Marine Atlas, overlapping/duplicate data should be removed. Data layer for marine infrastructure should distinguish between the different types of infrastructure.</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Approx. €34,452 for data collection of all activities - €2,088 for marine recreation infrastructure (4 days)
Required skills	GIS analyst
Estimated time scales	2 weeks

<b>MSP Topic: Tourism and Recreation</b>	
<b>Marine infrastructure</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying coastal accommodation infrastructure.
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Coastal accommodation infrastructure
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data <ul style="list-style-type: none"> <li>○ Discover Ireland (Failte Ireland) – Data received from Failte Ireland on 03/12/18 of registered accommodation providers in Ireland.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data layer <ul style="list-style-type: none"> <li>○ Convert Failte Ireland data to shapefile.</li> <li>○ Create data layer, removing overlapping/duplicate data and clipping data to remove inland locations (within 5 km of the coastline).</li> <li>○ Create metadata records consistent with ISDE requirements</li> <li>○ Create data processing logs</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Approx. €34,452 for data collection of all activities - €1,044 for coastal tourism infrastructure (2 days)
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Tourism and Recreation</b>	
<b>Data/spatial data on current value of ALL tourism and recreation activities</b>	<b>Priority Rating: 2</b>
Data Product Description	This data product will provide data layers identifying data/spatial data on the current value of ALL tourism and recreation activities
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	<p>Current value of ALL tourism and recreation activities.</p> <p>Data layers can also be created for each activity:            Current value of angling; Current value of kitesurfing; Current value of windsurfing; Current value of surfing; Current value of climbing/coasteering/bouldering at the coast; Current value of diving/snorkelling; Current value of recreational drone use at the coast; Current value of general beach leisure; Current value of general coastal tourism activities; Current value of hovercrafting; Current value of cycling along the coast; Current value of quad biking/scramble biking/cars on the foreshore; Current value of sand-yachting/land-sailing/land-yachting; Current value of kite buggying; Current value of kite landboarding; Current value of light aircraft (motorised and un-motorised) use; Current value of motor/power boating; Current value of motorised sailing; Current value of wakeboarding/waterskiing; Current value of parascending; Current value of un-motorised sailing; Current value of kayaking; Current value of Canadian canoeing; Current value of stand Up Paddleboarding; Current value of rowing/sculling; Current value of dinghy/day boat/small keelboat use; Current value of visiting attractions; Current value of walking; Current value of wildlife/bird watching/wildfowling</p>
<b>Outline methodology</b>	
<p>A review of existing literature, studies and surveys could provide a picture of the current value of individual activities or groups of activities. However, it is likely that these alone could not confidently be amalgamated to provide a comprehensive and reliable picture of the current value of recreation and tourism around the Irish coastline.</p> <p>The Tourism and Recreation Survey proposes to ask people to provide information on how much they spent the last time they undertook their chosen activity, and how much they typically spend each year participating in their chosen activity. It is proposed to include categories such as overnight accommodation, petrol/diesel/LPG, bus/train fares, mooring or transit fees, entrance to visitor attractions, hire of equipment, etc. and to present the outputs as max, mean and median figures.</p> <p>In order to monitor the number of responses across the 30 tourism and recreation categories some benchmarking will be necessary as it is anticipated that the survey may under-represent more casual tourism and recreation activities, less active participants and less popular or more specialist activities. This may draw from the recently published report on Valuing Ireland's Blue Ecosystem Services (NUI Galway &amp; Whitaker Institute, 2018) which estimates that the value of recreational services provided by marine ecosystems has an economic value of €1.7 billion with 96 million marine recreation trips per year. Extrapolation would be undertaken to generate figures for total trip spend by activity and for the sector as a whole.</p>	

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Estimated staff effort/cost	Part of the overall cost for the Tourism and Recreation Survey (€90,000) (4.5 months)
Required skills	GIS analyst
Estimated time scales	Part of the overall time required for the Tourism and Recreation Survey (7 months)

## B.25 Wild seaweed harvesting

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the aviation topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- Current spatial distribution/location and intensity of activity

Important gaps (priority 2) have been identified for the following data products:

- Current spatial distribution of resource
- Data / spatial data on current value of activity

<b>MSP Topic: Wild seaweed harvesting</b>	
<b>Wild seaweed harvesting – locations and quantity harvested</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing the current spatial distribution and quantity of wild seaweed harvested
Relevant existing Atlas data layers	No layer to date.
Proposed names for new Atlas data layers	Wild Seaweed harvesting – location and quantity
<p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Department of Housing, Planning and Local Government</li> <li>○ Licence agreement: Creative commons</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product (without quantity): <ul style="list-style-type: none"> <li>○ Acquire data from the data holder -&gt; already done</li> <li>○ Create data layer identifying the location of wild seaweed harvesting</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (every year)</li> </ul> </li> <li>• Outline tasks for creating data product (with quantity) <ul style="list-style-type: none"> <li>○ Acquire data from the data holder -&gt; <a href="https://www.housing.gov.ie/search/sub-topic/applications">https://www.housing.gov.ie/search/sub-topic/applications</a></li> <li>○ Create data layer identifying the location of wild seaweed harvesting</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (every year)</li> </ul> </li> <li>• Update frequency: <ul style="list-style-type: none"> <li>○ To be determined with DHPLG</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

MSP Topic: Wild seaweed harvesting	
Wild seaweed harvesting – distribution of seaweed resources	Priority Rating: 2
Data Product Description	Maps showing the location of potential commercial seaweed resources ( <i>Laminaria hypoborea</i> , <i>Saccharina latissima</i> , <i>L. digitata</i> and <i>Sacchoriza polyschides</i> )
Relevant existing Atlas data layers	No layer to date.
Proposed names for new Atlas data layers	Location of potential commercial [species] resources
<p>There is a lack of comprehensive spatial data on the distribution of commercial seaweed resources. The location of existing wild harvesting activity provides an indication of some resource areas. Elsewhere, modelling has been used to predict the distribution of key commercial kelp species (e.g. Burrows et al, 2018 <a href="http://eprints.whiterose.ac.uk/137123/1/02376_WildWeed_Report_Clean_Issue.pdf">http://eprints.whiterose.ac.uk/137123/1/02376_WildWeed_Report_Clean_Issue.pdf</a>). This is based on associations with a range of physical variables including water depth, wave fetch, ocean colour, seabed substrate, temperature and tidal flow with validation against existing observations on species distribution.</p> <p>The methodology outlined below is based on Burrows et al (2018) but it is anticipated that the model outputs will be of limited quality without further significant investment in the underpinning data.</p> <p><b>Outline methodology</b></p> <ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Seabed substrate data layer</li> <li>○ Bathymetry data layer</li> <li>○ Create wave fetch data layer based on method of Burrows et al (2018)</li> <li>○ Ocean colour (chlorophyll-a) - MODIS Aqua Satellite L3m analysis product - NASA Giovanni data portal <a href="https://giovanni.gsfc.nasa.gov/giovanni/">https://giovanni.gsfc.nasa.gov/giovanni/</a></li> <li>○ Sea surface temperature MODIS Aqua NEMO-ERSEM - NASA Giovanni data portal <a href="https://giovanni.gsfc.nasa.gov/giovanni/">https://giovanni.gsfc.nasa.gov/giovanni/</a></li> <li>○ Tidal flow – MI tidal model or SEASTATES model <a href="https://www.seastates.net/">https://www.seastates.net/</a></li> <li>○ Available data on observed kelp distributions</li> </ul> </li> <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Data layers can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Literature review for spatial data on kelp distribution in Ireland</li> <li>○ Acquire model data – there are likely to be limitations in the seabed substrate layer. It may be possible to address some of these limitations through further review of GSI data</li> <li>○ Create model data layers</li> <li>○ Create predictive maps for 4 kelp species</li> <li>○ Validate maps with available data on observed kelp distribution</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish Frequency update (every 10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated day effort (20 days for marine scientist and 30 day GIS analyst) cost approx. €22,000 for basic model
Required skills	Marine scientist; GIS analyst
Estimated time scales	3 months

<b>MSP Topic: Wild seaweed harvesting</b>	
<b>Wild Seaweed harvesting – value</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing the current value of seaweed harvesting
Relevant existing Atlas data layers	No layer to date.
Proposed names for new Atlas data layers	Wild seaweed harvesting – location of the resource
<b>Outline methodology</b>	
<ul style="list-style-type: none"> <li>• Data sources and permissions to use the data: <ul style="list-style-type: none"> <li>○ Joint Committee on Environment, Culture and the Gaeltacht – Report of the Committee on Developing the Seaweed Industry in Ireland <a href="https://www.oireachtas.ie/parliament/media/seaweed-report-15.docx">https://www.oireachtas.ie/parliament/media/seaweed-report-15.docx</a></li> <li>○ Possible contacts: All details in attached report</li> <li>○ Licence agreement: Public domain (Parliamentary report)</li> </ul> </li>   <li>• Required data processing tools: <ul style="list-style-type: none"> <li>○ Excel</li> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li>   <li>• Outline tasks for creating data product: <ul style="list-style-type: none"> <li>○ Extract data from the Joint Committee on Environment, Culture and the Gaeltacht – Report of the Committee on Developing the Seaweed Industry in Ireland (attached)</li> <li>○ Desk based review of options for assigning economic value (salary, public expenditure; other)</li> <li>○ Apply preferred method to harvesting locations</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Establish update frequency (5 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 5 days staff effort (3 days economist; 2 days GIS analyst) cost approx. €2,900
Required skills	Economist; GIS analyst
Estimated time scales	2 weeks

## B.26 Water quality

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Water Quality topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- Current Bathing Water Quality
- Current bivalve Mollusc Production Area Quality
- Current Shellfish Water Quality
- 

Important gaps (priority 2) have also been identified for the following data products:

- Location and Status of Nutrient Sensitive Areas

<b>MSP Topic: Water Quality</b>	
<b>Bathing Water Quality</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing current quality of designated bathing waters
Relevant existing Atlas data layers	Bathing Water Quality
Proposed names for new Atlas data layers	Designated Bathing Water Quality (Original Layer to be renamed 'Designated Bathing Waters')
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ Location of designated bathing waters available from Atlas ('Bathing Water Quality')</li> <li>○ Data on quality of designated bathing waters available from EPA (obtained from Robert Wilkes)</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Merge designated bathing water location with bathing water quality data (lowest class in past 5 years (2014 – 2018 (2018 results will be available Jan 2019))</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (every 5 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Water Quality</b>	
<b>Bivalve Mollusc Production Area Quality</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing current quality of bivalve mollusc production areas
Relevant existing Atlas data layers	Bivalve Mollusc Production Areas
Proposed names for new Atlas data layers	Bivalve Mollusc Production Area Quality
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Location of Bivalve Mollusc Production Areas available from Atlas ('Bivalve Mollusc Production Areas')</li> <li>○ Data on quality of area available from SFPA – need to discuss and agree data access with SFPA</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Merge bivalve Production Area location with quality data (lowest class in past 5 years)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (every 5 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Water Quality</b>	
<b>Shellfish Water Quality</b>	<b>Priority Rating: 1</b>
Data Product Description	Map showing current quality of shellfish waters
Relevant existing Atlas data layers	Shellfish Waters Directive Areas
Proposed names for new Atlas data layers	Shellfish Water Quality
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Location of Shellfish Waters available from Atlas ('Shellfish Waters Directive Areas')</li> <li>○ Data on quality of shellfish waters available from SFPA -- need to discuss and agree data access with SFPA</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Merge Shellfish waters location with quality data (lowest class in past 5 years)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (every 5 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Water Quality</b>	
<b>Nutrient Sensitive Areas</b>	<b>Priority Rating: 2</b>
Data Product Description	Maps showing nutrient status of coastal waters and designated sensitive areas (eutrophic)
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Nutrient Status of Coastal Waters Sensitive Areas (Eutrophic)
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ Nutrient status of coastal waters (obtained from EPA Summary_Indicators_NP_1517 spreadsheet)</li> <li>○ Shapefiles for WFD waterbodies (from EPA)</li> <li>○ Location of Sensitive Areas (Eutrophic) (from EPA) – these are defined in the Urban Wastewater Treatment (Amendment) Regulations 2010 SI No 48.</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Obtain data on nutrient status of coastal waters, shapefiles for WFD water bodies and list of designations of sensitive areas (eutrophic)</li> <li>○ create maps indicating nutrient status of coastal waters by water body and identifying those areas classified as sensitive areas (eutrophic)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (annual check with EPA)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

## B.27 Marine litter

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Marine Litter topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- No priority 1 gaps

Important gaps (priority 2) have also been identified for the following data products:

- Spatial data on current distribution of coastal litter
- Spatial data on current distribution of seabed litter

<b>MSP Topic: Marine Litter</b>	
<b>Coastal Litter</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing distribution and intensity of coastal marine litter
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Coastal litter
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ Coastwatch data – Available under CC licence</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Acquire Coastwatch litter data for 2013 – 2017</li> <li>○ Acquire Coastwatch shapefile for survey locations</li> <li>○ Develop suitable method for displaying data (by year, by litter type etc)</li> <li>○ Create annual and/or combined data layers</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (every 5 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 3 days staff effort (3 days GIS analyst) cost approx. €1200
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Marine Litter</b>	
<b>Seabed Litter</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing distribution and intensity of seabed litter
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Seabed Litter
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ IGFS – MI hold this data</li> <li>○ IA seabed litter survey <a href="https://odims.ospar.org/layers/geonode:ospar_fishing_litter_2016_01">https://odims.ospar.org/layers/geonode:ospar_fishing_litter_2016_01</a></li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire data</li> <li>○ Create data layer identifying location and intensity of litter based on OSPAR method – number of items per trawl) – need to clarify with MI whether IGFS data already included in this assessment and whether additional data may be available from other fisheries surveys to provide greater coverage</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800 (assumes limited additional data is identified beyond OSPAR dataset)
Required skills	GIS analyst
Estimated time scales	1 week

## B.28 Other human pressures

This plan presents prioritised and costed options for improving the quality and spatial coverage of data products for the Human Pressures topic drawing on the findings of the gap analysis and prioritisation process. It includes detailed plans for the creation of data products that are considered to be of high priority to support the marine plan preparation process and/or to support marine licensing decisions once the plan is adopted.

The outcome of the prioritisation process is presented in the accompanying Excel spreadsheet *Prioritisation-Master\_compiled – 2018-12-03*.

Key priorities (priority 1) for which data gap has been identified:

- No priority 1 gaps

Important gaps (priority 2) have also been identified for the following data products:

- Spatial data on historic land claim (Physical loss)
- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion
- Marine litter – see marine litter topic
- Underwater noise
- Introduction or spread of non-indigenous species

**MSP Topic: Human Pressures**

**Historic Land Claim** **Priority Rating: 2**

Data Product Description	Map indicating potential extent of historic land claim
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Land Claim

There is no national source of data on historic land reclamation in Ireland. Some data exists for the Shannon Estuary. Areas at risk of coastal flooding can be used as proxy for potential areas of historic land claim (e.g. ABPmer, 2004) although the quality of such a data layer will be limited.

Outline methodology

- Data sources and permissions
  - ICPS Coastal Flood Risk Maps Current 1:100 year return period – available from OPW
  - Data layer can be created using standard ArcGIS software
- Outline tasks for creating data product
  - Obtain coastal flood risk data layer
  - Seek to validate extent of reclamation with other data where available e.g. Healy & Hickey, 2002 <https://core.ac.uk/download/pdf/47241642.pdf>
  - Create metadata record consistent with ISDE requirements
  - Create data processing log
  - Establish update frequency (annual check for updates)

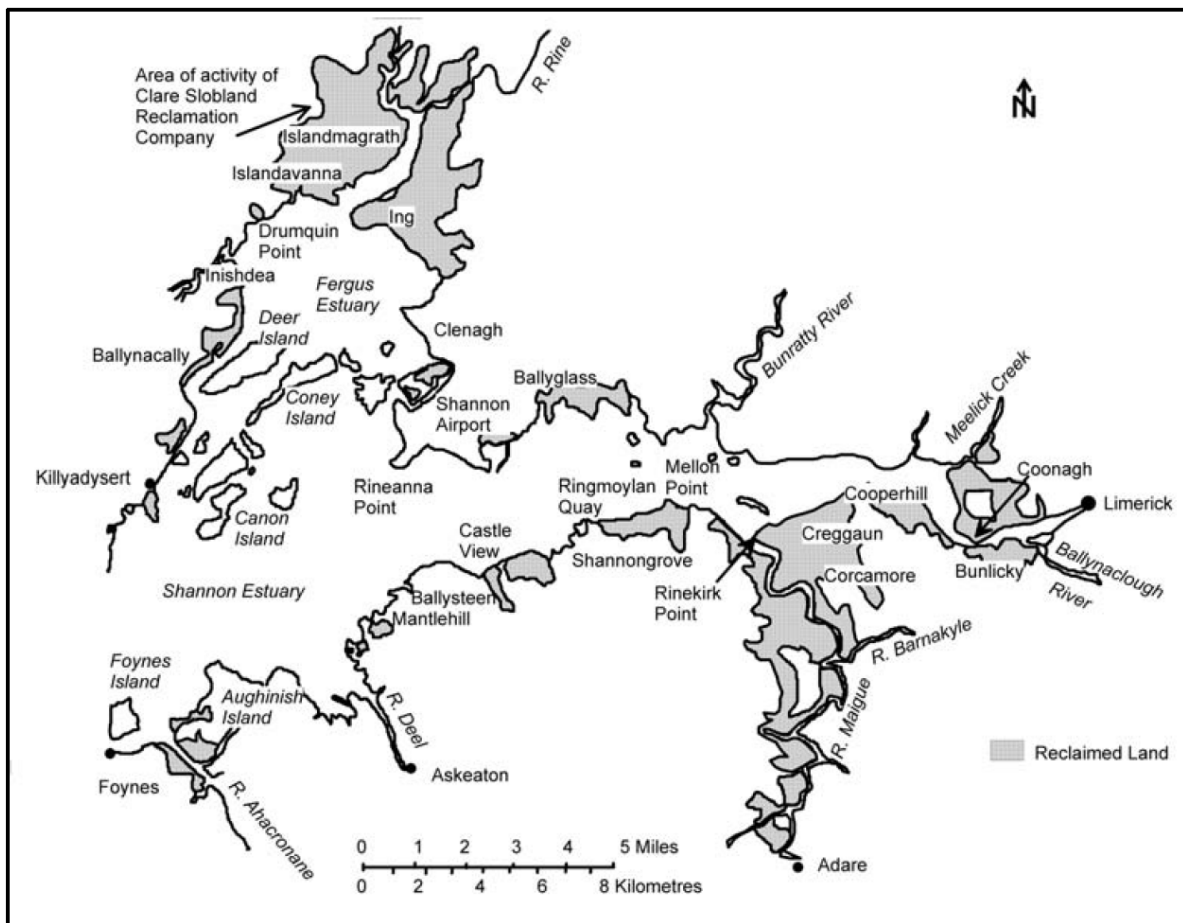


Figure 1: The upper estuary of the Shannon showing the Fergus and Maigue sub-estuaries and the extent of reclaimed areas so far identified.

## References

ABPmer, 2004. Methodology for the Identification and Designation of Heavily Modified Waster Bodies in England. Report to Environment Agency.

Healy, M.G. and Hickey, K.R. (2002) Historic land reclamation in the intertidal wetlands of the Shannon estuary, western Ireland, *Journal of Coastal Research*, Special Issue, 36, 365-373.

Estimated staff effort/cost	Estimated 5days staff effort (3 days Environmental Scientist, 2 days GIS analyst) cost approx. €2000
Required skills	Environmental Scientist; GIS analyst
Estimated time scales	2 weeks

<b>MSP Topic: Human Pressures</b>	
<b>Seabed Penetration and Abrasion</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing spatial distribution of seabed penetration and abrasion from mobile fishing gears
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Seabed Penetration and Abrasion
<p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions <ul style="list-style-type: none"> <li>○ ICES/OSPAR layers on surface and subsurface penetration from mobile demersal fishing gears: <a href="http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2018/Special_requests/ospar.2018.14.pdf">http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2018/Special_requests/ospar.2018.14.pdf</a></li> <li>○ Shapefile datasets are available at ICES (2018a): <a href="http://doi.org/10.17895/ices.pub.4505">http://doi.org/10.17895/ices.pub.4505</a></li> <li>○ (<a href="http://www.ices.dk/sites/pub/Publication%20Reports/Forms/DispForm.aspx?ID=35169">http://www.ices.dk/sites/pub/Publication%20Reports/Forms/DispForm.aspx?ID=35169</a>)</li> </ul> </li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Acquire data</li> <li>○ Create data layers identifying location and intensity of litter (need method)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 2 days staff effort (2 days GIS analyst) cost approx. €800
Required skills	GIS analyst
Estimated time scales	1 week

<b>MSP Topic: Human Pressures</b>	
<b>Continuous Anthropogenic Underwater Noise</b>	<b>Priority Rating: 2</b>
Data Product Description	Map showing spatial distribution and intensity of continuous anthropogenic underwater noise
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Continuous Anthropogenic Underwater Noise
Outline methodology <ul style="list-style-type: none"> <li>• Data sources and permissions               <ul style="list-style-type: none"> <li>○ Processed AIS-A and AIS-B data (see Ports &amp; Shipping)</li> </ul> </li> <li>• Required data processing tools               <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product               <ul style="list-style-type: none"> <li>○ Acquire data</li> <li>○ Create data layers using methodology of MMO (2014) (annual hours above 100, 130, 160 dB) <a href="https://www.gov.uk/government/publications/underwater-noise-1097">https://www.gov.uk/government/publications/underwater-noise-1097</a></li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (10 years)</li> </ul> </li> </ul>	
Estimated staff effort/cost	Estimated 40 days staff effort (5 days underwater noise specialist 35 days GIS analyst) cost approx. €16,500
Required skills	Underwater noise specialist, GIS analyst
Estimated time scales	10 weeks

MSP Topic: Human Pressures	
Invasive Non-native Species	Priority Rating: 2
Data Product Description	Maps showing spatial distribution of key invasive non-native species ( <i>Amphibalanus amphitrite</i> , <i>Asterocarpa humilis</i> , <i>Botrylloides violaceus</i> , <i>Celtodoryx ciocalyptoides</i> , <i>Crepidula fornicata</i> , <i>Didemnum vexillum</i> , <i>Ensis directus</i> , <i>Eriocheir sinensis</i> , <i>Ficopomatus enigmaticus</i> , <i>Gracilaria vermiculophylla</i> , <i>Grateloupia turuturu</i> , <i>Hemigrapsus sanguineus</i> , <i>Hemigrapsus takanoi</i> , <i>Hesperibalanus fallax</i> , <i>Homarus americanus</i> , <i>Mnemiopsis leidyi</i> , <i>Ocenebra inornata</i> , <i>Rapana venosa</i> , <i>Spartina anglica</i> , <i>Styela clava</i> , <i>Urosalpinx cinerea</i> , <i>Watersipora subtorquata</i> )
Relevant existing Atlas data layers	None
Proposed names for new Atlas data layers	Species X distribution
<p>The list of potential INNS has been drawn from the UKTAG WFD alien species 'High Impact' list (UKTAG, 2015), and the 2017 version of the Welsh marine INNS 'high Risk' list (Welsh Government, 2017). Maps could be created for those species for which there are records on the NBDC database.</p> <p>Outline methodology</p> <ul style="list-style-type: none"> <li>• Data sources and permissions</li> <li>• <a href="https://maps.biodiversityireland.ie/Map">https://maps.biodiversityireland.ie/Map</a> available under CC licence</li> <li>• Required data processing tools <ul style="list-style-type: none"> <li>○ Data layer can be created using standard ArcGIS software</li> </ul> </li> <li>• Outline tasks for creating data product <ul style="list-style-type: none"> <li>○ Download INNS records</li> <li>○ Create data layers for the high impact or high risk species identified above indicating distribution within 10 km squares (where data is available)</li> <li>○ Create metadata record consistent with ISDE requirements</li> <li>○ Create data processing log</li> <li>○ Establish update frequency (5 years)</li> </ul> </li> </ul> <p>References</p> <p>UK Technical Advisory Group (UKTAG) on the Water Framework Directive (2015). Revised classification of aquatic alien species according to their level of impact. [Online] Available at: <a href="https://www.wfduk.org/resources/classification-alien-species-according-their-level-impact-revised-list">https://www.wfduk.org/resources/classification-alien-species-according-their-level-impact-revised-list</a></p> <p>Welsh Government (2017) Marine Invasive Non-native Species Priority Monitoring and Surveillance List for Wales. Welsh Government, Cardiff, 12p. Available at: <a href="http://gov.wales/docs/drah/publications/180122-marine-invasive-non-native-species-priority-list-monitoring-surveillance-en.pdf">http://gov.wales/docs/drah/publications/180122-marine-invasive-non-native-species-priority-list-monitoring-surveillance-en.pdf</a></p>	
Estimated staff effort/cost	Estimated 5 days staff effort (5 days GIS analyst) cost approx. €2000
Required skills	GIS analyst
Estimated time scales	2 weeks

## C Provenance Sheet Template

Entity	Description
<b>Dataset Name</b>	The Name of the dataset
<b>Data Owning Organisation</b>	The Name of the source organisation/s
<b>DOI</b>	A digital object identifier (DOI) is a unique alphanumeric string assigned to identify published content and provide a persistent link to its location on the Internet [ <a href="#">where applicable</a> ]
<b>Purpose</b>	Summary of intended outcomes conveyed by the data owner for which the resource was developed.
<b>Abstract</b>	Brief narrative summary of the resource. This should answer the who, what, when, where, why, how of a dataset.
<b>Point of Contact</b>	A named individual or job title within the Data Owning Organisation (The contact who supplied the dataset)
<b>Data Source URL</b>	A link to the location of the source data [ <a href="#">where applicable</a> ]
<b>Licence</b>	When publishing data, it's important to add a license, providing official permission to do, use or own something. Data licenses exist on a spectrum from totally open to very restricted.
<b>Lineage Statement</b>	Information and references for sources and processes that were used to create the dataset and an audit trail for modifications to the original data. This should include a summary of the ABPmer data processing log.
<b>Spatial reference system</b>	A spatial reference system defines a specific map projection.
<b>Time Period</b>	Temporal Coverage - Start date is essential
<b>GDPR Sensitivities</b>	Yes/No - General Data Protection Regulation. Regulation on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (Data Protection Directive).
<b>Classification</b>	Environmental Data', 'Personal Data', 'Sensitive Personal Data', 'Confidential Data', 'Open Data', 'Reporting Data', Intermediate Data' (See Classification worksheet)

Entity	Description
<b>Retention</b>	Defined in either a Licence or a Data Retention Policy, specifies which data will be archived, how long it will be kept, what happens to the data at the end of the retention period (archive or destroy) and any other Funder or other stipulations.
<b>Distribution Format</b>	If vector record as 'shp'. If raster record as 'tiff'.
<b>Data Availability</b>	Is the data immediately downloadable or via a Data Request only – linked to License conditions - online, near-online, offline
<b>Viewable</b>	Yes/No – permission for data to be made viewable on the MI Atlas
<b>Downloadable</b>	Yes/No – permission for data to be downloaded directly from the MI Atlas
<b>Last Updated</b>	When the data was last taken from source
<b>BODC Parameter Usage Vocabulary (P01 Code)</b>	Where possible, provide a P01 code. The SeaDataNet website can be used to find the codes by expanding selections from P08. ( <a href="http://seadatanet.maris2.nl/v_bodc_vocab_v2/vocab_relations.asp?lib=P08">http://seadatanet.maris2.nl/v_bodc_vocab_v2/vocab_relations.asp?lib=P08</a> )
<b>BODC Parameter Usage Vocabulary Preferred Label (prelab)</b>	Structured label based on a semantic model; this comes with the P01 code but needs to be included to ensure accuracy.
<b>Parameter Detailed Description</b>	Detailed description in the absence of the P01 code & prelab. Only required if P01 and label have not been allocated.
<b>Dataset Review period</b>	Date of next contact between MI and Dataset owner -see roadmap for update frequency
<b>INSPIRE Resource type</b>	Dataset/Series/Service
<b>Update Frequency</b>	Update requirements of the dataset; is it an ongoing Timeseries, a standalone dataset etc.

## Contact Us

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Further details available on [www.emff.marine.ie](http://www.emff.marine.ie)

Managing Authority EMFF 2014-2020	Specified Public Beneficiary Body
<p>Department of Agriculture Food &amp; the Marine</p> <p>Clogheen, Clonakilty, Co. Cork. P85 TX47</p> <p>Tel: (+)353 (0)23 885 9500</p> <p><a href="http://www.agriculture.gov.ie/emff">www.agriculture.gov.ie/emff</a></p>	<p>Marine Institute</p> <p>Rinville, Oranmore, Co. Galway, H91 R673</p> <p>Phone: (+)353 (0)91 38 7200</p> <p><a href="http://www.marine.ie">www.marine.ie</a></p>



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**An Roinn Talmhaíochta,  
Bia agus Mara**  
Department of Agriculture,  
Food and the Marine



**EUROPEAN UNION**

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*Marine Institute*  
Foras na Mara