



Department
for Environment
Food & Rural Affairs

Marine Strategy Part Two: UK Updated Monitoring Programmes

Summary of responses

Date: March 2021

We are the Department for Environment, Food and Rural Affairs. We're responsible for improving and protecting the environment, growing the green economy and supporting our world-class food, farming and fishing industries.

We work closely with our 33 agencies and arm's length bodies on our ambition to make our air purer, our water cleaner, our land greener and our food more sustainable. Our mission is to restore and enhance the environment for the next generation, and to leave the environment in a better state than we found it.



© Crown copyright 2021

This information is licensed under the Open Government Licence v3.0. To view this licence, visit www.nationalarchives.gov.uk/doc/open-government-licence/

This publication is available at www.gov.uk/government/publications

Any enquiries regarding this publication should be sent to us at

Marine.strategy@defra.gov.uk

www.gov.uk/defra

Contents

Introduction	4
Overview of responses	4
Summary of responses on general issues	6
Summary of responses on the proposals for Descriptors 1 & 4: Cetaceans	12
Summary of responses on the proposals for Descriptors 1 & 4: Seals	15
Summary of responses on the proposals for Descriptors 1 & 4: Marine Birds	18
Summary of responses on the proposals for Descriptors 1 & 4: Fish	23
Summary of responses on the proposals for Descriptors 1 & 4: Pelagic habitats	25
Summary of responses on the proposals for Descriptors 1 & 6: Benthic habitats	27
Summary of responses on the proposals for Descriptor 2: Non-indigenous species (NIS)	30
Summary of responses on the proposals for Descriptor 3: Commercial Fish and Shellfish	31
Summary of responses on the proposals for Descriptor 4: Food webs	34
Summary of responses on the proposals for Descriptor 5: Eutrophication	35
Summary of responses on the proposals for Descriptor 8: Contaminants	36
Summary of responses on the proposals for Descriptor 9: Contaminants in seafood	39
Summary of responses on the proposals for Descriptor 10: Marine litter	41
Summary of responses on the proposals for Descriptor 11: Underwater noise	43
Summary of responses on the proposals for monitoring Prevailing Conditions	47
Annex A: list of consultation questions	48
Annex B: respondents and comment summaries	48

Introduction

1. This document contains the government response to the consultation: Marine Strategy Part Two: UK Updated Monitoring Programmes which was held between 25 August and 17 November 2020.
2. The UK Marine Strategy outlines how we plan to achieve Good Environmental Status (GES), which is defined as 'ecologically diverse and dynamic ocean and seas which are clean, healthy and productive'. This is a requirement of the Marine Strategy Regulations 2010. The UK Marine Strategy helps to deliver against key international obligations and commitments to protect and preserve the marine environment under the UN Convention on the Law of the Sea (UNCLOS), the UN Sustainable Development Goal 14 (to conserve and sustainably use the ocean, seas and marine resources for sustainable development), the OSPAR North-East Atlantic Environment Strategy and the Convention on Biological Diversity.
3. Achieving GES involves protecting the marine environment, preventing its deterioration and restoring it where practical and/or necessary, whilst at the same time providing for sustainable use of marine resources.
4. The consultation marked the second phase of the second implementation cycle of the UK Marine Strategy Parts 1-3 and proposed monitoring programmes to provide the evidence to be used in the 2024 assessment of progress towards achieving GES.
5. A total of 35 responses to the consultation were received from a range of sectors including environmental Non-Governmental Organisations (eNGOs), marine industries, the energy industry, the marine research community and members of the public. Annex B contains a list of respondents and a breakdown of the number of comments contained within those responses referring to each Descriptor.
6. The UK government and Devolved Administrations would like to thank everyone who contributed to the consultation.

Overview of responses

The aims of this document are to provide a broad summary of stakeholder responses and to provide our position on the main issues raised. The summaries of consultation responses that follow highlight the main issues raised but are not an exhaustive

commentary on every response received. Nevertheless, all responses were considered when making final decisions about the proposed monitoring programme¹.

Reflecting the technical nature of the consultation document, numerous comments provided suggestions of specific datasets to integrate into our assessments. We thank all our respondents for their assistance in identifying new ways to improve the quality of our assessments. We are considering these datasets and programmes and will work to incorporate datasets that will improve our assessments wherever possible. More information on our approach to data use and integration is given in the General Issues section below. Within the updated UK Marine Strategy Part Two document, we have sought to provide greater clarity when detailing datasets or programmes flagged by respondents which already feed into our assessments.

Many comments touched on multiple Descriptors. For example, comments relating to marine mammal populations may have covered issues including underwater noise and contaminants. Where this was the case, the comments have either been broken down into their component points or have been addressed under the key Descriptor flagged for policy decisions. Some comments related to overarching elements of our approach that could apply across any Descriptor, for example increasing our integration and use of citizen science generated data. These comments have been addressed in the general issues section below.

Monitoring programmes provide a link between the assessments summarised as part of the UK Marine Strategy Part One and the evidence base of the effectiveness of measures outlined in the UK Marine Strategy Part Three. As a result, we received several comments regarding our assessment, appraisal methods and potential new measures. These comments have not been responded to directly within this document in order to maintain the focus on monitoring programmes. However, these comments have been noted and will be drawn on in our ongoing review processes for measures and assessments.

Generally, responses to the consultation advocated greater ambition, increased funding and resourcing for UK marine monitoring and greater integration of non-statutory data collection. The three Parts of the UK Marine Strategy form an adaptive management programme, which is under continual review. We will take into consideration the areas in which respondents believe funding and resourcing should be prioritised. As laid out in the Issues and Opportunities sections of the consultation document, we are committed to finding cost-effective means to improving the quality of our monitoring programmes and seeking out partnerships with industry and stakeholders to tap into new data streams.

¹ See the Updated UK Marine Strategy Part Two 2021 publication

Summary of responses on general issues

A number of respondents commented on issues that relate to several Descriptors, or that have a more overarching nature. We have provided a response to the main general issues below.

Issue raised: monitoring for measures

Questions arose regarding how our monitoring programmes contribute to the evaluation of effectiveness of our Programme of Measures, outlined in the UK Marine Strategy Part Three.

The purpose of the Programme of Measures is to put in place interventions that will help us achieve GES, in line with the revised objectives and targets set out in the updated UK Marine Strategy Part One.

Some aspects of marine management have dedicated monitoring, such as to support OSPAR assessments of the effectiveness of Marine Protected Areas (MPAs), which is achieved through condition monitoring and evaluation of evidence. In addition to this, monitoring of marine ecosystem elements allows us to assess status trends over time and many measures have associated metrics to monitor compliance. In general, where monitoring outputs indicate that the marine environment is not improving - despite the implementation of measures - we will derive that more effective measures are needed. Exceptions to this may arise where the drivers behind any lack of improvement are beyond our control or where the impact of existing measures will not yet be detectable in monitoring.

Issue raised: citizen science

Generally, respondents supported the use of citizen science and advocated taking advantage of the resource to achieve GES. Many felt that, with appropriate training and validation, citizen science could be a cost-effective source of evidence to address knowledge gaps and improve monitoring efforts.

We recognise the great value of citizen science for dissemination of and commitment to conservation and sustainability messages, as well as its role in supporting and supplementing statutory and NGO monitoring. Our bird monitoring schemes (e.g. the Seabird Monitoring Programme - SMP and Wetland Bird Survey - WeBS) are underpinned by citizen science and benefit from huge efforts by volunteers each year. Citizen derived science already plays an important role in the provision of data on marine litter, for example, through the Marine Conservation Society and Keep Northern Ireland Beautiful

beach litter monitoring. The Fishing for Litter programme operates in England, Scotland² and Northern Ireland³. This is a voluntary bycaught litter removal scheme by commercial fishermen that provides bags to dispose of marine-sourced litter collected during fishing operations and provides data to OSPAR. Similarly, appropriately validated citizen science is playing an increasing role in building the evidence base for MPA designations.

The government also supports a range of citizen science endeavours complimentary to our aims for marine conservation and sustainability. For example, the Green Recovery Challenge Fund, part of the government's wider green economic recovery, jobs and skills package, has supported the Cornwall Seal Research Trust's Watch Seals Well project. This project aims to train citizen scientists to undertake and assess seal/ human interaction surveys and to help people to understand how their behaviour impacts on these globally rare species

We are keen to make better use of citizen science observations across other Descriptors in addition to Birds and Litter, especially in support of marine mammal observations. In doing so we will need to take into account the stringent legal and practical requirements our data must be held to. Some citizen science, much like some other data sources, will not meet those standards.

We acknowledge the efforts of a number of NGOs to promote training, accreditation and validation of citizen science to ensure it is fit for purpose. As such, we will continue to consider how best to develop new tools to make best use of the citizen science resource. The Joint Cetacean Data Programme (JCDP), for example, which is a stakeholder-inclusive project run by the Joint Nature Conservation Committee (JNCC), is striving to standardise the quality of cetacean data, including citizen science data through development and promotion of a data standard. The JDCP also aims to share a data collection protocol for data collectors and will encourage its use to improve approaches to data collection.

Initiatives are also ongoing to make more use of citizen science datasets. The UK Marine Monitoring and Assessment Strategy (UKMMAS) community are currently revising their marine data strategy for implementation in 2022. A key part of this is to ensure existing datasets are in line with required standards, to improve accessibility and searchability, and to promote wide re-use of datasets wherever they may be applicable.

Defra is publishing an Evidence Statement in 2021 assessing the scope, benefits, barriers and opportunities for marine citizen science. We will use the outcomes of this to shape our

² <http://www.fishingforlitter.org.uk/>

³ <http://www.fishingforlitter.org.uk/project-areas/affiliated-projects>

approach to integrating citizen science data and supporting the inclusion of citizen science contributions going forward.

Issue raised: efficient and effective data usage

Issues were raised by eNGO, academic, and industry respondents relating to improving the integration of our data collection and making better use of existing datasets, including those generated by citizen science (discussed in more detail above) and by industry.

We thank the many respondents who suggested monitoring initiatives or specific datasets which might usefully be incorporated into our monitoring programmes or data pools for assessment. Where these have not previously been considered, we will review and pursue their incorporation wherever practicable before the next UK Marine Strategy assessment. We have clarified where programmes highlighted by respondents already feed into our monitoring programmes in the updated UK Marine Strategy Part Two document and will clearly identify data sources that contribute to the next update of the UK Marine Strategy Part One. Some data sets noted by respondents do not feed into our assessments as yet, but are ones that we have previously identified as valuable additions, such as the Marine Biological Association demersal fish time series. We are investigating how they might be incorporated in a cost-effective manner. Other datasets, whilst valuable, do not directly lend themselves to the descriptor and indicator analyses currently applied in the UK Marine Strategy.

We work on a basis of continual improvement through the UKMMAS community, identifying opportunities to glean data for multiple Descriptors from individual statutory monitoring programmes. As part of our efforts to improve efficacy of data use, we established a task group in 2020 to identify and develop integration and efficiencies in data usage between the assessments run for OSPAR and the UK Marine Strategy.

Several of our Descriptors rely on diverse data sources, often not from statutory programmes. We recognise that there are inefficiencies in the way that these data are acquired. Research and development projects are being devised to address inefficiencies in data flow and to make our assessments more robust by reducing issues, such as time lag in data acquisition. For example, a recently funded project working towards the development of a cost-effective approach to monitoring marine non-indigenous species (NIS) at high risk sites includes an objective to review potential new platforms and techniques to improve data collection and delivery. Additionally, the JCDP (detailed above under Citizen Science) will be an important platform for accessible government, industry, academic and NGO-collected cetacean data to support a wide range of conservation and policy needs.

We recognise that a large volume of data is generated as a matter of course by industry. Historical barriers to its incorporation into our assessments include accessibility and the costs incurred in ensuring formats are compatible. A pilot project has recently been

launched by the UKMMAS community to test the accessibility and utility of a subset of industry data taken from the Crown Estate's Marine Data Exchange (MDE).

In 2022, working with the Marine Environmental Data and Information Network (MEDIN), we aim to implement a revised data strategy to address data utilisation efficiencies across all our Descriptors and wide range of data sources. A key part of this is to ensure existing data sets (from any source) are reused wherever possible to carry out UK marine assessments (e.g. Regional Seabed Monitoring Plan Baseline Dataset – Centre for Environment, Fisheries and Aquaculture Science (Cefas)⁴). This will be achieved primarily by ensuring data can be found and accessed via the MEDIN portal.

Issue raised: use of Remote Electronic Monitoring

Several respondents called for uptake of Remote Electronic Monitoring (REM) to monitor bycatch, for us to access REM data and data types, and for the use of associated technologies.

Defra recognises the potential benefit of REM systems. That is why Defra ran a call for evidence between 19 October – 30 November 2020 on expanding the use of REM in England. Defra will use the outcomes of the call for evidence and work with interested parties to inform our future policy. The summary of responses will be published in due course.

Scotland is currently implementing a modernisation programme for the inshore fleet. The programme is tailoring the deployment of vessel tracking and REM solutions to each fleet segment, ensuring that they are both appropriate and proportionate. The scallop dredge fleet have been prioritised, although the whole fleet are within scope of the programme, regardless of vessel size, to help improve fisheries management and monitor activity in Marine Protected Areas more closely, whilst also aiding interaction and planning within our shared marine waters.

There is a range of work currently ongoing to look at the possibilities of REM, including on monitoring for fish, seabird and marine mammal bycatch. For example, Clean Catch UK⁵ is doing work on the use of REM to monitor seabird, mammal and elasmobranch bycatch. JNCC are also part of a project developing small and easily portable REM systems that include CCTV for monitoring cetacean bycatch.

Cefas are currently working with skippers of otter trawlers in the southwest of England, using REM to improve our understanding of catch composition in this fishery. The data

⁴ <https://www.cefas.co.uk/data-and-publications/doi/rsmp-baseline-dataset/>

⁵ <https://www.cleancatchuk.com/>

collected will provide more robust estimates of the catch of the whole fleet. This will hopefully result in better stock assessments, and therefore total allowable catches (TACs) and quotas based on more accurate scientific evidence. The data will also be used to inform the future development of improved technical measures within the fishery.

Issue raised: timeframes

A number of respondents called for plans for improvement listed in the Issues and Opportunities sections to include more explicit timeframes.

Where possible, we have provided timeframes for plans listed in the Issues and Opportunities sections of the updated UK Marine Strategy Part Two 2021. In cases where planned improvements are still in the early stages of development we will endeavour to include relevant updates in future iterations of the UK Marine Strategy or within the policy areas with which they overlap, as details become more defined.

Issue raised: use of new technologies

Many respondents recommended the use of a wide array of new and emerging technologies or novel techniques to address previously identified gaps in our knowledge.

Emerging technology is key to the development of monitoring programmes and we welcome the inclusion of cost-effective new technology to improve our assessments across spatial and temporal scales. Nevertheless, it is important to fully consider what is needed to fully integrate new technology. Issues can range from insufficient calibration, leading to errors when dealing with the high frequency data, to data gathered not being fit for our assessment purposes. Additionally, integration of the different datasets, ranging from in-situ water quality sampling, autonomous sensor sources, and high frequency earth observation data is a complex statistical question, and if not done properly, can risk overwhelming the data pool and biasing our results.

The UKMMAS community has a range of mechanisms in place to prioritise evidence needs and to work cooperatively across the UK and regionally to deliver these. At the UK level, the Marine Science Coordination Committee ensures that we continuously improve our understanding of the marine environment, ecosystem services and the pressures exerted upon them by supporting the long-term monitoring, mapping and observation of the marine environment.

At the regional level, the UK continues its commitment to have representatives at OSPAR, International Council for the Exploration of the Sea (ICES) and other international science and innovation working groups. Science cooperation and sharing of lessons is embedded in the UK's science approach. Our involvement with international work to explore new technologies, develop meaningful indicators, and assessment metrics with international partners allows us to broaden our opportunities to innovate.

Ongoing work to develop our monitoring programmes through emerging techniques and technologies includes the collaborative exploration of the suitability of remote sensing data (e.g. Automated Underwater Vehicles - AUVs) for marine monitoring by JNCC, Cefas and Natural England; research and development under the Clean Atlantic and Big Picture projects to investigate video surveying for marine litter and benthic surveys respectively; and fisheries monitoring work carried out under the seafood innovation fund⁶.

Issue raised: climate change

Numerous respondents called for the consideration of climate change impacts and/or integration of climate change factors into our monitoring programmes. The rationale given for this is, in part, was to better understand the pressures exerted by climate change relative to natural processes or human pressures, to inform future assessments and measures.

Under the current structure of the UK Marine Strategy, climate change is viewed as a suite of prevailing conditions, which we take into consideration within our assessments in order to better determine the impacts of direct human activity on GES.

A number of our existing monitoring and analytical processes are able to capture trends resulting from climate change and identify threats emerging as a result of climate change. For example, our current fisheries shelf surveys capture large scale shifts in distribution and we are investing in species distribution modelling approaches under different climate forcing scenarios to make best use of these data. Likewise, the screening tools and initiatives implemented to identify future threats from NIS (horizon species) consider the impact of climate change.

Whilst monitoring provides insight into the nature of currently observable impacts of climate change, we must acknowledge that many of these observable impacts and future shifts are locked in. To reflect this, resourcing has been prioritised to prepare for these changes. The UK Climate Change Risk Assessment (UKCCRA) is produced every 5 years by the independent UK Committee on Climate Change. It informs the development of adaptation programmes across the UK and Devolved Administrations. The next report is due to be published in 2022. Details on measures being taken at individual Administration, UK and international levels will be expanded upon in the forthcoming updated UK Marine Strategy Part Three document.

⁶ <https://www.seafoodinnovation.fund/>

Issue raised: cumulative and integrated marine impacts monitoring and assessment

Respondents wished to see prevailing conditions monitoring and assessment expanding to deliver integrated marine impact scenarios, considering climate change, terrestrial nutrient input and knock-on impacts of exploitation activities, such as fishing and energy infrastructure.

Section 3 of the Part Two document discusses the parameters we use to monitor climate change in the marine environment that set the prevailing conditions for marine environments, habitats and ecosystems. While a separate assessment of climate change impacts is not part of the UK Marine Strategy Part One we work with the Marine Climate Change Impacts Partnership⁷ (MCCIP) as they regularly assess our growing understanding of the way that climate change is altering the prevailing conditions and of the impacts these changes are already having across the marine environment. The MCCIP assessments on climate forcing, especially for temperature, salinity and ocean acidification, draw on a range of programmes but form the basis for our prevailing conditions assessment. Further to this, OSPAR is developing a cumulative impacts framework to develop the integration of climate change into indicators. The updated UK Marine Strategy Part One describes the importance of practically applying an ecosystem approach. This approach involves cumulative effects assessments, which consider the impacts of multiple pressures (as well as the potential for those pressures to be mitigated) on GES. This approach also underpins monitoring. We continue to develop methods and technologies to innovate and improve the efficiency of monitoring programmes, both through interdisciplinary surveys and the interpretation of outputs.

Summary of responses on the proposals for Descriptors 1 & 4: Cetaceans

Issue raised: survey coverage and population monitoring

It was flagged that cetacean surveys are carried out over limited localities, depth ranges, years and seasonal periods.

⁷ <http://www.mccip.org.uk/>

We are committed to continue the decadal Small Cetacean Abundance of the North Sea (SCANS) programme and are supportive of more frequent SCANS-type surveys. However increasing frequency requires the agreement of other participating nations.

We are mindful that conducting SCANS outside the summer season is likely to not be cost effective due to an increase in poor weather and reduction in daylight hours at that time making it extremely difficult to conduct effective surveys. Therefore, we have taken a different approach to better understand seasonal distribution and relative abundance. The UK has invested in the development of the JCDP (see Citizen Science section under General Issues for more details) led by JNCC to collate all available cetacean survey datasets that meet the agreed standard, covering a variety of spatial and temporal ranges into a central resource to support analyses. This database will become operational in early 2022.

Respondents sought clarification on how cetaceans found in offshore and/or in deep waters, which are sensitive to underwater noise, are being monitored.

Previously, cetaceans in offshore waters have been surveyed using visual shipboard and acoustic methods e.g. the SCANS-III and ObSERVE⁸ surveys in 2016 and the Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA) survey in July 2007. We intend to continue with SCANS-type projects and add to the existing time series, making better use of citizen science observations, as well as other sources of cetacean monitoring data, including industry and NGO sources (through the JCDP - see above), in order to enable analyses at relevant spatial and temporal scales.

Waters further offshore are also being monitored through the Collaborative Oceanography and Monitoring for Protected Areas Species (COMPASS) and SeaMonitor projects and we will continue to gather acoustic data and the UKMMAS community will further develop the integrated monitoring of cetaceans in the UK. In particular, the SeaMonitor project includes monitoring of the shelf edge near the Hebrides Terrace Seamount west of Scotland. The Agri-Food and Biosciences Institute (AFBI, Northern Ireland) have also developed a towed survey method whereby a passive acoustic monitoring survey for cetaceans has been integrated with an active acoustic clupeoid fish survey in the Irish Sea.

Issue raised: data deficient species

Respondents flagged that current monitoring of coastal bottlenose dolphin is focused on the Scottish and Welsh Special Areas of Conservation (SACs). They stated that monitoring is needed for the vulnerable Southwest (SW) England inshore population.

⁸ <https://www.gov.ie/en/publication/12374-observe-programme/>

There has been an exercise through the SW bottlenose dolphin consortium, to collate and analyse predominantly photo identification data to identify range, movements and distinct populations in the SW of England. Continuation of this work will contribute to knowledge of the abundance and distribution of bottlenose dolphins in the area.

There are also acoustic networks currently focused in Northern Ireland and Scotland (e.g. COMPASS, East Coast Acoustic Marine Mammal Study - ECOMMAS). We will consider the potential for geographic expansion of these programmes over the longer term, to help more fully understand the range of this population and the extent of monitoring required.

Respondents expressed concern about lack of data on deep water species of beaked whales and impacts of underwater noise created by the Royal Navy, commercial shipping and seismic exploration.

The continuation of acoustic monitoring projects, such as COMPASS, will help to address some of the knowledge gaps raised by respondents. The development of the JCDP (see above) will facilitate collation of data from additional datasets, which will be particularly valuable for accessing available data on species such as beaked whales.

Decadal SCANS surveys covering offshore waters will contribute to an increase in our understanding of beaked whale distribution and abundance. The last survey, in 2016, provided the first abundance estimate for this group of whale species.

The Marine Noise Registry (MNR) collects data on where and when activities, such as oil and gas surveys and unclassified anti-submarine warfare sonar occur in UK waters. These data are mapped alongside that of other activities that emit impulsive noise. Maps show the extent of impulsive noise in UK waters across space and time. Outputs are used to help establish a baseline level of impulsive noise and to look for patterns and trends. In addition, these data will be used as part of an OSPAR indicator of the risk of disturbance from impulsive noise to marine species in the northeast Atlantic. Furthermore, the Royal Navy has well established risk assessment and mitigation procedures to protect marine mammals from noise. These are reviewed regularly⁹.

The Cetacean Strandings Investigation Programme (CSIP) and the Scottish Marine Animal Strandings (SMAS) routinely collect and stranded cetaceans for post-mortem. This has included retrieval of stranded deep-water species, such as beaked whales, and thorough investigation into the causes of their death.

⁹ <https://www.royalnavy.mod.uk/environmental-protection>

Issue raised: cetacean bycatch

Many respondents stated that understanding of UK cetacean bycatch rates needed to be improved, believing progress to be – in part – limited by a low level of observer coverage. Remote Electronic Monitoring (REM) was suggested as a means to address this. Our approach to REM can be found in the General Issues section above. Respondents called for a spatially and temporally comprehensive bycatch monitoring programme including non-UK vessels fishing in the UK Exclusive Economic Zone (EEZ).

Defra is leading work under the UK Cetacean Bycatch Plan of Action driven by the need to identify the risk posed by bycatch to cetacean populations, involving stakeholders to recommend effective ways forward to reduce cetacean bycatch. The levels of bycatch are currently monitored through the UK Bycatch Monitoring Programme (BMP) and the CSIP. We are due to renew the contract for the BMP in 2021 and so can now develop programme specifications to monitor bycatch in a way that more accurately reflects the current conditions in UK waters.

Current monitoring effort prioritises the highest intensity fisheries and areas. The size of the UK fishing fleets means that increasing the number of on-board observers to achieve high levels of coverage is not cost-effective. Coverage is relatively low for individual gear types, but by pooling data and integrating the time series data we have been collecting for almost two decades, the programme is able to generate relatively precise estimates of marine mammal mortality. In addition to on-board observers, UK BMP currently monitors a select number of vessels using pingers, simultaneously collecting data on bycatch rates and mitigation effectiveness in prioritised areas.

As noted in the General Issues section above, work is ongoing to consider how REM could be used in the management of our fisheries.

Summary of responses on the proposals for Descriptors 1 & 4: Seals

Issue raised: population monitoring

ENGOs called for developments in distribution and abundance monitoring – particularly at sea – as well as habitat-use and stranding monitoring. Some respondents flagged that the status of harbour seals in the Celtic Seas was listed as “uncertain” in the UK Marine Strategy Part One assessments in 2019 and queried how the data gaps for these seal populations were being addressed.

Seal abundance surveys are not designed to detect changes in distribution, and they reflect the (on-land) distribution of seals only at specific times of the year. Change in distribution is therefore used as a ‘surveillance indicator’ to help interpret changes in

abundance, and it is monitoring these changes that provides crucial information on the status of seals around the UK coast.

GES has been achieved for grey seals and monitoring is established to review status. Recent population estimates have been reported by the Special Committee on Seals (SCOS, 2019). We acknowledge the need for additional monitoring of harbour seals in West Scotland. The UKMMAS community are considering ways to improve monitoring. For harbour seals, the Sea Mammal Research Unit (SMRU) undertake systematic monitoring across the entire coast of the UK.

In Northern Ireland, seals are monitored by land and sea at sites where they are a designated feature in their respective breeding seasons. However, other sites are also monitored due to the presence of large populations of seals. In 2018, the SMRU conducted an aerial survey of the coast of Northern Ireland and this will be repeated every three years within the six-year monitoring cycle. This will coincide with the autumn moult of harbour seals and will monitor the populations and distributions of grey and harbour seals along the Northern Ireland coast. At a UK level, the SCOS review seal datasets and determine how aerial resources should be managed to improve accuracy and to identify gaps in data.

Although not part of its formal remit, CSIP will continue to collect data on seal strandings in England and Wales and will include the information in their annual reports.

Issue raised: post-mortem data

NGOs put forward that post-mortems of seals should be included as part of the Cetacean Stranding Investigation Programme (CSIP) in England and Wales and that post-mortems on seals in Northern Ireland should be undertaken.

This request will be considered when new contract agreements for future post-mortem work on vulnerable marine species are put in place.

We recognise that "expanding the CSIP to include stranded seals in England and Wales" would allow us to better understand the reasons for seals stranding in England and Wales. Under the new contract for CSIP, rather than seal post-mortems being carried out routinely which would carry high resource requirements, Defra will request post-mortems to be carried out when a policy need has been identified, to understand more about specific issues and threats to seals.

Whilst post-mortems are not systematically carried out on all stranded seals in Northern Ireland, the Department for Agriculture, Environment and Rural Affairs (DAERA) monitor strandings of both grey and harbour seals and, where appropriate, post-mortems are undertaken by the Agri-Food and Bio-sciences Institute (AFBI).

Issue raised: seal interactions with fisheries

Respondents raised concerns regarding seal and fish stock population interactions. They suggested sampling stomach contents and using DNA analysis to identify feeding preferences with a view to quantifying seal predation impacts on fish stock recovery.

Improving our understanding of predator-prey interactions is an important part of D4 Food Webs indicator development, as discussed in the UK Marine Strategy Part One: Updated Assessment and Good Environmental Status - Summary of Responses (2019)¹⁰. A comprehensive diet survey covering the same regions as previous seal studies is a research priority. Rather than focusing solely on infrequent diet studies, we acknowledge the importance of developing the ability to estimate the likely quantities of commercial fish consumed in intervening years and predict quantities that might be consumed in future¹¹. Potential mechanisms to address this are being identified with Cefas and the Marine Management Organisation (MMO) through direct fisheries engagement and mobile App based data collection through the Clean Catch UK programme. In terms of seal predation impacts on demersal fish stocks, this is a natural process (and therefore not required to be addressed by the UK Marine Strategy) and research has shown that predation by seals is not one of the major factors; commercial fisheries and predation by other fish are more important.

NGOs called for us to ensure that records of seal entanglement in anti-predator netting or other aquaculture infrastructure are included in the UK Bycatch monitoring programme.

Entanglements in aquaculture are not monitored by the UK Bycatch Monitoring Programme. Entanglements in anti-predator nets should be reported, by contacting the industry's regulator who will then inform the appropriate statutory nature conservation body.

¹⁰

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/841233/marine-strategy-part1-summary-of-responses.pdf

¹¹ Report from the Special Committee on Seals (SCOS, 2019) <http://www.smru.st-andrews.ac.uk/files/2020/08/SCOS-2019.pdf>

Summary of responses on the proposals for Descriptors 1 & 4: Marine Birds

Issue raised: Seabird bycatch

ENGOs raised a number of issues pertaining to seabird bycatch monitoring including through the use of Vessel Monitoring Systems (VMS).

Defra and JNCC are developing the transposition of the Food and Agriculture Organization of the United Nations (FAO) Plan of Action on Seabird Bycatch into a National UK Plan of Action (PoA). As part of this process, we are working with a wide group of stakeholders including environmental groups and the fishing industry.

We aim for the UK PoA to be published in April 2021. Part of the PoA will set out plans for more systematic collection of seabird bycatch data and initiate regional projects to increase monitoring. The PoA will improve our understanding of the factors that influence seabird bycatch as well as population level impacts. Combined with current data collection frameworks, this information will provide robust data to inform future thresholds for mortality. In addition, a newly formed Expert Group on VMS and Logbook use in the UK, led by the MMO and Cefas, aims to scale up bycatch sample estimates to all vessels fishing in UK waters.

We will continue to work closely with European partners, via the OSPAR convention, to develop methods for monitoring and assessing seabird bycatch in the northeast Atlantic.

Issue raised: improvements to the Seabird Monitoring Programme

Some respondents suggested that the Seabird Monitoring Programme (SMP) is insufficient to deliver reliable abundance and productivity trend data for several seabird species, due to lack of adequate investment and resourcing. NGOs noted that a review of the SMP is underway but are concerned that progress with this review has been slow and, as a result, data taken forward for future assessments may not be representative.

The SMP provides good coverage for the UK to support our assessments of seabird abundance and demographic characteristics. However, we recognise that there are

opportunities to draw in more data and will continue to work to ensure that the data we analyse meets our evolving needs as set out in Part One¹².

Since 2019, JNCC has been coordinating a review of the SMP at the request of the Statutory Nature Conservation Bodies Chief Scientists' Group (SNCB - CSG). The SMP Partnership, which includes eNGOs, has contributed to all aspects of the review which has been split into three strands: 1) drivers for monitoring; 2) sampling and scope; and 3) governance, funding and operation. The SMP Partnership will finalise any changes to how the SMP is governed and funded by March 2022. Subsequently, it will start to implement any operational changes, such as improvements to its sampling strategy, which could increase the number of breeding seabird species for which trends can be delivered on an annual basis. It will also determine what the optimal census frequency is for species that cannot be monitored annually.

Some respondents believed that the SMP does not currently provide sufficient information on survival rate. They recommended supplementing it with a marine version of the Retrapping Adults for Survival (RAS) programme to identify levels of poor breeding (outside of extreme events) that have negative impacts to allow a more effective assessment of breeding success/failure.

The utility of the RAS scheme for delivering information on seabird adult survival rates has been explored. We recognise its potential to provide accurate estimates of adult survival rates and the incorporation of the RAS into a future SMP sampling strategy will be considered by the SMP partnership. Any incorporation of the RAS scheme within the SMP will be implemented tandem with other changes to its sampling strategy, following completion of the SMP Review in March 2022.

The breeding success/failure indicator is currently being redeveloped by the Joint OSPAR/HELCOM (Baltic Marine Environment Protection Commission)/ICES Working Group on Marine Birds (JWGBIRD) and the UK is taking a lead role. The methods under consideration use adult survival rates inferred from abundance trends, validated with observed levels of survival. JWGBIRD recently concluded that this use of survival data was preferable to developing a survival rate indicator as suggested by one respondent¹³.

¹²

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/921262/marine-strategy-part1-october19.pdf

¹³ ICES. 2020. Joint OSPAR/HELCOM/ICES Working Group on Seabirds (JWGBIRD; outputs from 2019 meeting). ICES Scientific Reports. 2:80. 101 pp. <http://doi.org/10.17895/ices.pub.7466>

Issue raised: at-sea data collection

Respondents called for at-sea data collection for the abundance and distribution indicators to cover a wider selection of waterfowl and at-sea distributions of seabirds to improve our ability to assess offshore environmental state.

The Volunteer Seabirds at Sea Survey programme was implemented in 2018 and aims to improve current knowledge on UK seabirds at sea distribution patterns and relative abundance. Following the recommendations from the UKMMAS Community, we are exploring the best means of implementing surveys for high priority marine waterbird species, whose non-breeding populations are beyond the scope of WeBS monitoring. This may include opportunities to coordinate with relevant Special Protection Area (SPA) monitoring to increase efficiency/reduce costs.

Issue raised: Inclusion of marine bird species

Several eNGOs questioned the robustness and representativity of the data collected through our bird monitoring programmes.

The data collected by UK bird monitoring are used to report against the UK Marine Strategy indicators¹⁴. For example, the indicator on marine bird abundance is reasonably comprehensive in terms of the number of species included that have sufficient data: in the North Sea subregion, the SMP generated trends in 22 out of 26 seabird species breeding in the UK and WeBS generated trends in 46 species of waterbirds wintering in the UK. The latter includes a comprehensive coverage of regularly occurring wader species using intertidal areas.

ENGOS asked us to address the exclusion of seabird species, including Manx shearwater, European storm petrel, Leach's storm petrel. They suggested using infrared to census burrowing birds such as these.

The pressures that affect achievement of GES are common to all seabird species. Although specific seabird sensitivity to these pressures can vary, many share the same sensitivity to discrete pressures. This enables us to refine monitoring efforts to target a select range of species that can provide by-proxy indications for others e.g. those with similar ecological characteristics.

Manx shearwaters, Leach's storm-petrels and European storm-petrels specifically are nocturnal burrow-nesting seabirds which breed on some of the most remote islands in the British Isles. These factors combined make them challenging to count and to monitor frequently. Breeding seabird censuses have enabled us to mobilise the resources needed

¹⁴ <https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/birds/>

to periodically survey most of the known colonies of these species. The first such census took place in 1988-2003 and is currently being repeated as part of the ongoing Seabirds Count census. This will provide us with the first accurate trend in the UK populations of shearwaters and storm-petrels. As noted above, the SMP sampling strategy will be reviewed in 2022, with a view to the implementation of a new strategy that will improve the accuracy and regional representativity of annual breeding seabird trends. The review will also aim to develop a sampling strategy that can increase the number of species for which annual trend information can be delivered.

Respondents put forward that monitoring priority should be given to the Balearic shearwater visiting the English Channel and Celtic Seas during the non-breeding season.

We are fully committed to protecting this Critically Endangered species when it leaves its breeding grounds in the Mediterranean and enters UK waters. We are implementing actions recommended for Balearic shearwater in line with the 2011 agreement with OSPAR. Monitoring this highly mobile species offshore of SW England has proved challenging. Nevertheless, surveys have provided evidence to underpin mitigation measures for the prevention of seabird bycatch in fixed fishing gears – probably the main threat facing Balearic shearwaters when at-sea.

Respondents asked that we include waterbird species, which are reliant on the marine environment for their breeding season in the Breeding Success, Abundance and Distribution indicators, notably the International Union for Conservation of Nature (IUCN) red-listed red-throated diver. ENGOS encouraged the use of the data from the UK Rare Breeding Birds Panel (RBBP) and surveys of Scarce and Rare Breeding Species (SCARRABS).

We are currently doing work to include more species of breeding waders and wildfowl in the distribution indicator, using data from breeding bird atlases, that have been undertaken periodically. The indicators of abundance and breeding success require data to be collected annually. When nesting, waders and wildfowl are more dispersed than colonial seabirds and so require greater effort to monitor representative portions of the population. While some data on breeding waders and wildfowl are collected by the land-based Breeding Bird Survey and Nest Records Scheme, too few coastal sites are included to provide representative indicators of abundance and breeding success.

During the previous version of the UK Marine Strategy Part Two, red-throated diver was amber-listed and monitoring was considered sufficient. We will consider the shift in IUCN listing and its implications for the monitoring needs of this species. We will incorporate data from RBBP and SCARRABS if appropriate.

Respondents suggested improving resource support to the Winter Gull roost Surveys (WinGS) to supplement WeBS data

We are currently reviewing opportunities to refine WinGS and will take responses to the consultation into account in this work.

Issue raised: seabird distribution

Respondents flagged that the distribution indicator currently only includes data for waders and a limited number of waterfowl along non-estuarine coasts, based on WeBS and Non-Estuarine Waterbird Survey (NEWS). The respondents flagged that it has so far not been possible to include existing data from seabird censuses or WinGS within the Distribution Indicator due to a technical issue (matching site data between different censuses).

We are currently doing work to further develop the distribution indicator. This will involve expanding the indicator to waders and waterfowl along all coastal habitats including estuaries using existing data from WeBS and periodic bird surveys (including NEWS and breeding bird atlases).

Delays to the completion of the Seabirds Count census of breeding seabirds, due to Covid-19 restrictions, has meant that plans to expand the marine bird distribution indicator to include breeding seabirds have also been delayed. Subject to the public health situation allowing for the resumption of census activity, we aim to implement this within the next update cycle.

Issue raised: invasive mammalian predators

ENGOs welcomed the inclusion of the Biosecurity for LIFE pilot non-native mammalian predator surveillance project for seabird island SPAs in the UK Marine Strategy Part Two. However, eNGOs believe the project's presence/absence monitoring is not sufficient to assess probability or severity of impacts on birds from these mammals. They also urged that we ensure long-term effective biosecurity monitoring to continue after the pilot's projected end date.

Surveillance of invasive mammals will be a key part of the UK Island Biosecurity Programme and is included in the UK Marine Strategy Part Two accordingly. This surveillance includes monitoring the effectiveness of biosecurity, which feeds directly into the UK indicator on invasive mammals on island seabird colonies¹⁵. This indicator is used to assess if the risks to island seabird colonies from invasive mammals have been reduced.

ENGOs recommended establishing a national island biosecurity database to collate data on surveillance check frequency and outcomes, intercepted incursions along pathways, and records of completed incursion responses.

¹⁵ <https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/birds/invasive-mammals/>

We recognise value in collating data on biosecurity implementation, as well as on the presence/absence of invasive mammals. Establishment of a National Island Biosecurity Database will be explored to direct conservation action beyond the 42 island SPAs that are included in the UK invasive mammal indicator and Biosecurity for LIFE.

Summary of responses on the proposals for Descriptors 1 & 4: Fish

Issue raised: monitoring coverage

Several respondents believed that International Bottom Trawl Surveys (IBTS) and Beam Trawl Surveys data were not representative of fish biodiversity reducing the meaningful analysis that can be undertaken. The respondents suggested that lack of inshore commercial and non-commercial fish data is a significant gap in understanding and hinders the development of purposeful management measures

The primary aim of the existing offshore groundfish and beam trawl surveys is to support commercial fish and shellfish assessments (Descriptor 3), principally those undertaken within the ICES community. These internationally coordinated surveys capture data on more than 200 species of fish and elasmobranchs, including both demersal and small pelagic species. Data are collected for both commercial and non-commercial fish species, as well as commercial shellfish, cephalopods and benthic invertebrates. The types of species sampled are also those that interact primarily with commercial fisheries, and thus in need of appropriate monitoring. Whilst we acknowledge that there are limitations to the spatial coverage and catchability of all species by these surveys, these surveys do provide abundance indices and biological data for a large range of species beyond just those for which stock assessments and advice are required. These data also contribute to community-based metrics for food web assessment and abundance metrics for the biodiversity assessment of abundance of sensitive species (including non-commercial species).

In the next cycle of assessments for the UK Marine Strategy Part One, we will include biogeographical reports on a wider range of fish species, many of which are inshore¹⁶.

¹⁶ <https://nature-art17.eionet.europa.eu/article17/species/report/?period=5&group=Fish&country=UK®ion=>

Issue raised: elasmobranch monitoring

Respondents suggested that the Government should address gaps in monitoring elasmobranch distributional range and supporting habitat condition. They also asked that we provide more information on monitoring of elasmobranch offshore or in deep waters.

Elasmobranchs are currently included within the indicator on "Abundance of sensitive fish" and a variety of elasmobranch species are included in stock assessments by ICES¹⁷. In Northern Ireland, the Sea-Deep project is working with sea anglers to tag elasmobranchs. This is a citizen science project led by Ulster Wildlife and is providing DAERA with information on important areas for Common skate and other elasmobranch species. A similar project exists in Scotland – Scottish Shark Tagging Programme (SSTP) which is part of the Scottish Sea Angling Conservation Network (SSACN). This aims to tag and record data on many of the shark, skate and ray species found in Scottish coastal waters to aid in their conservation. The Interreg Va SeaMonitor project is building on the Sea-Deep project and is using acoustic tags to gather provide information on the movements of Common skate. These initiatives combined with further scientific review (e.g. Ellis et al 2020¹⁸) will contribute to development of the sensitive species indicator and form a basis for understanding where risk from bycatch arises and where/when essential habitat occurs¹⁹.

Since 2012, Marine Scotland has undertaken a deep-water survey between 55°N and 59°N at depths of 300-2040 metres. These surveys provide data for the two deep water shark species the Portuguese dogfish and the Leafscale gulper shark. This data alongside other sources informs the stock assessment of these species by ICES²⁰. The survey also provides analysed catch data for a number of other deep-water elasmobranch species.

¹⁷ shorturl.at/wNPSX

¹⁸ Ellis, JR, Barker, J, McCully Phillips, SR, Meyers, EKM, Heupel, M. Angel sharks (Squatinidae): A review of biological knowledge and exploitation. *J Fish Biol.* 2020; 1– 30. <https://doi.org/10.1111/jfb.14613>

¹⁹ Griffiths CA, Wright SR, Silva JF, Ellis JR, Righton DA, et al. (2020) Horizontal and vertical movements of starry smooth-hound *Mustelus asterias* in the northeast Atlantic. PLOS ONE 15(10):e0239480. <https://doi.org/10.1371/journal.pone.0239480>

²⁰ ICES. 2020. Working Group on Elasmobranch Fishes (WGEF). ICES Scientific Reports. 2:77. 789 pp. <http://doi.org/10.17895/ices.pub.7470>

Issue raised: fishing industry input and bycatch

Respondents across NGOs, research and industry were in favour of government working with the fishing industry to collect data on sensitive fish species (particularly elasmobranchs). They recommended utilising reports from rare and unusual species passing through local fish markets (e.g. the SWME report). Fishing industry respondents recommended cooperation with the fishing industry to provide catch samples while on-board observers remain restricted by the pandemic.

We aim to use Scientific Observer data from the fishing industry to identify bycatch of non-target species. Clean Catch UK, a newly formed national steering group, and has representatives from a wide range of stakeholders in the bycatch of non-target species, including elasmobranchs. The initiative aims to facilitate collaborations and further work to bring about improvements in monitoring and mitigation to reduce bycatch of sensitive species.

Summary of responses on the proposals for Descriptors 1 & 4: Pelagic habitats

Issue raised: data limitations

Several respondents raised the concern that Descriptor 1 & 4 Pelagic Habitat assessments could not be described as accurate in light of the prevalent data gaps and limited scope of the included parameters, such as limited or lacking monitoring in the west of Scotland, of picoplankton, zooplankton and other trophic levels, offshore, and at inshore hydrodynamic features.

In Part One in 2019, we identified several data gaps that would need to be filled in order to increase the confidence in our assessments. These gaps included information to support our understanding of natural variability, climate drivers, and food web impacts on pelagic community structure²¹. We also acknowledged that it is only currently feasible for us to assess particular elements of planktonic component of this system. However, the Environment Agency (EA) does have an Estuary & inshore program that picks up some parts of our estuary plumes and CEFAS have smart buoys off the Thames and the Mersey, which are improving our monitoring coverage at hydrodynamic features.

²¹ <https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/pelagic-habitats/>

Issue raised: incorporating stock assessments

Respondents put forward that stock assessment data available for pelagic commercial fish and cephalopod species should be considered and included when determining the environmental status of the pelagic habitat.

Pelagic species are considered within the Descriptors 1 & 4 Fish and Descriptor 3 Commercial fish assessments.

A review carried out by the UKMMAS community for squid species showed that they are generally ephemeral in UK waters and therefore not within the remit of the UK Marine Strategy. Cuttlefish and octopus data collection is constrained by the limitations of inshore monitoring, which we are working to improve (see Descriptors 1 & 4 Fish – Monitoring Coverage above).

Issue raised: ecosystem approach to pelagic Good Environmental Status

Components of the pelagic ecosystem, including cephalopods, microbial communities, and other pelagic (teleost and elasmobranch) fish species, particularly those not targeted by commercial fisheries should be included to provide an accurate picture of pelagic status. Some respondents explicitly encouraged the use of jellyfish, elasmobranchs, nekton and turtle data.

We currently consider plankton as the ecosystem component for pelagic habitats and phytoplankton and zooplankton are picked up through a number of monitoring programmes including the Continuous Plankton Recorder (CPR), monitoring buoys and earth observation, which also pick up some fish species. In addition, jellyfish form part of one of our pelagic indicators (PH1), while fish, cephalopods and sharks are being considered to form a different indicator under the fish ecosystem component.

We aim to prepare indicators for proposal in future UK Marine Strategy cycles that would allow microbial and bacterial time series data to be incorporated, as they become available, into the assessment.

Turtles have been excluded from our assessments as they are infrequent visitors to UK waters.

Summary of responses on the proposals for Descriptors 1 & 6: Benthic habitats

Issue raised: knowledge of gear components interacting with the seabed

A number of respondents requested that we improve our knowledge and understanding of the specific gear components interacting with the seabed.

Work is underway to implement inshore monitoring systems, which will help to improve linking fishing pressure data and gear type interactions with the seabed in the future. Our focus during this cycle will be to work with the fishing industry and wider stakeholder community to improve the data available, interpretation and calculation of impacts. We will draw on available case studies testing the benthic indicators to determine what new data will improve our knowledge and work with the industry to plug any gaps to inform the need for any further measures.

Issue raised: coverage of benthic monitoring

Numerous respondents asked that we monitor more Marine Protected Areas (MPAs) to capture a range of habitats and seasonal variation and to prioritise habitats at the greatest risk of human impacts (i.e. sand, gravel and mud beds). They noted that monitoring of inshore benthic habitats is only undertaken in a small proportion of MPAs and habitat examples (e.g. in England, “Currently, monitoring is conducted within 12-16% of English inshore MPAs, targeting 10-14% of habitat examples”). They suggest that this will represent a significant barrier to creating good confidence of assessments of the status and trends in the wider benthic environment.

MPA features are assessed as part of a rolling programme on a six-yearly cycle to coincide with reporting requirements. In a similar way to terrestrial sites, a risk-based approach is undertaken to decide how frequently sites are monitored but consideration is also given to how soon management measures are expected to be in place.

To underpin confidence in our assessments, analyses are undertaken for offshore MPA surveys to ensure enough single replicate samples are taken to provide statistical power. Studies are being undertaken to test how many replicates might be needed to capture habitat and community variability at a single station.

Respondents encouraged the monitoring of areas outside of MPAs, in particular inshore and areas adjacent to MPAs, to ensure connectivity of the MPA network, provide representative data for benthic status, and inform policy-makers on the effectiveness of the different MPAs according to their level of protection.

Areas outside of MPAs are being considered for future monitoring and further opportunities for use of existing industry and academic data are being explored. For example, the Scottish MPA Monitoring Strategy – published in 2017 - sets out Marine Scotland's approach to monitoring the Scottish MPA network. This may include, where appropriate, monitoring examples of MPA features outside the MPA network.

The UKMMAS community are currently looking at different approaches to improve the data and methods being used for the evaluation of seafloor integrity and benthic condition within and outside MPAs. Work is also underway to develop better data for seabed impacts on benthic condition and food webs due to trawling in the UK EEZ.

Issue raised: deep sea monitoring

Respondents asked that we address the lack of baseline data for deep sea MPA monitoring

Deep sea MPAs are monitored by JNCC and partners including Cefas, Marine Scotland Science and the National Oceanography Centre. To date, all offshore shelf and deep sea MPA monitoring has been prioritised on a yearly basis, based on factors including risk from physical abrasion pressure and amount of data available. Long term plans are being developed to monitor a limited number of deep sea MPAs once every six years for MPAs deeper than 200m in UK waters.

Issue raised: capturing seasonal effects

Respondents suggested that we develop monitoring to capture seasonal effects, such as storm impacts, productivity and recruitment.

For the offshore MPA monitoring programme, we aim to sample at the same or similar time of year for site re-visits to ensure, as far as possible, that seasonal effects are controlled for. Storm impacts would be considered as Force Majeure and consequently outside of the scope of achieving GES.

Issue raised: regional and cross-sector cooperation

Respondents encouraged cooperation with OSPAR contracting parties to better monitor transboundary impacts and share data with the researchers, offshore energy and fisheries industries to address data gaps and gather data in a cost-effective manner.

As noted in the general issues section, the UKMMAS community have now scoped a pilot project to explore if/how industry data might be utilised (following recommendations in A

Review of Access to Industry Marine Environmental Data, 2015²²). JNCC and other government funded bodies are investigating existing sources of industry data and how they might be used in future GES assessments.

Regarding cooperation with OSPAR contracting parties, UK Marine Strategy and OSPAR monitoring programmes are aligned. Whilst the north east Atlantic presents an artificial boundary, our regional seas approach facilitates international cooperation and assessment both within OSPAR and with neighbouring regional sea conventions such as HELCOM.

Issue raised: use of fishing industry data

Several respondents recommended the use of fishing industry data to address coverage and data gaps, such as VMS, fish plotter data and Automated Identification Systems (AIS). VMS data would provide insight into fishing intensity and bottom-towed fishing gear on benthic habitats.

We are exploring the potential for fisheries surveys to be adapted to provide benthic biodiversity data.

Improving our knowledge and understanding of the specific gear components interacting with the seabed is an ongoing area of research. At present there is ongoing work and several projects to evaluate the results provided using VMS with other technologies such as AIS, which will help to improve the resolution of fishing data layers in the future. This has led to the establishment of a cross departmental group to capture UK Government needs for fisheries VMS and related data and to develop common datasets and tools to facilitate access to this and wider use. The group now exists as a sub-group of the UK Fisheries Science and Data Coordination Groups.

Issue raised: data collection as part of licensing

Respondents were in favour of incorporating data gathered by offshore developers as part of their licensing conditions and mandating data collection more widely across licences.

Appropriate evidence and data are required to enable a licence determination. This is targeted and proportionate to the potential environmental impacts of the proposal to the environment. Key licensing frameworks in the marine environment include marine licensing and Nationally Significant Infrastructure Projects (NSIPs). As these are public processes, any evidence used to inform a determination is publicly available. Defra is

²² See <https://www2.gov.scot/Topics/marine/science/MSCC/PSEG/data>

actively considering how to maximise the value of data gathered by offshore wind developers through its Offshore Wind Enabling Actions Programme.

Summary of responses on the proposals for Descriptor 2: Non-indigenous species (NIS)

Issue raised: addressing knowledge gaps

Respondents asked for clarification of what progress has been made to address knowledge gaps.

In 2016, a NIS monitoring programme was implemented to incorporate NIS monitoring into existing marine monitoring programmes. We are working towards creating a more comprehensive monitoring programme of NIS by including more existing programmes and implementing monitoring at high-risk/priority sites. This will increase our understanding of NIS status for future assessments. Improved spatial coverage in relevant habitats e.g. the intertidal zone, through improved integration with other marine monitoring initiatives, is also being considered. Defra recently funded a research and development project to review our NIS monitoring and surveillance approach. The review will provide recommendations on improvements in the way NIS monitoring data can be collected and delivered for statutory purposes by considering how NIS monitoring can be better integrated with other ongoing biodiversity monitoring in the UK; drawing on information from OSPAR Contracting Parties to examine their monitoring approaches; and reviewing new technologies with respect to their application to marine NIS monitoring.

Issue raised: NIS impacts and aquaculture

Respondents raised concerns regarding the impact of NIS on aquaculture, particularly in light of increased potential for NIS introductions or establishment as a consequence of climate change. They called for specific monitoring and targets relating to aquaculture.

Biosecurity in the UK aquaculture industry is exemplary. The Fish Health Inspectorates (FHI) are the national regulators in England and Wales (Cefas), in Northern Ireland (DAERA) and in Scotland (Marine Science Scotland) and works to prevent the introduction and spread of serious fish and shellfish diseases. This is achieved through various means including by implementing and managing risk based aquatic animal health surveillance programmes assessing the incidence, prevalence and significance of diseases and applying controls to stop the import and spread of disease. All authorised farms are required to operate to an agreed biosecurity measures plan.

Current monitoring of marine NIS under D2 is non-specific, resulting in limited coverage at high-risk sites, including aquaculture facilities. To address this, Defra have funded research and development exploring cost-effective monitoring of high-risk sites.

Summary of responses on the proposals for Descriptor 3: Commercial Fish and Shellfish

Issue Raised: data-limited stocks

Respondents stressed the need to address data gaps for shellfish populations (e.g. crab, lobster and scallop).

Development of shellfish assessments is ongoing (e.g. cuttlefish in the western English Channel)²³. Work has recently been commissioned to pilot a whelk stock assessment, with the long-term aim to establish an ongoing monitoring regime in Welsh waters. In time, as with the annual scallop survey, it is envisioned the data gathered will underpin advice on landing caps of whelk, helping to ensure the longevity of both the species and the livelihoods it supports.

While a proportion of stocks have unknown status, not all of these are without data since an unknown status may arise also from a lack of a reference point (e.g. Fmsy - the fishing pressure that gives long-term maximum sustainable yield - or MSY Btrigger - the spawning stock biomass reference point, a parameter in the ICES MSY framework which triggers advice on a reduced fishing mortality relative to Fmsy).

Respondents urged investment to develop long term datasets for historically data-limited stocks

Historical data (pre 1990) is available for many stocks but not presented since the management regime differs and it is inappropriate to consider the numbers of stocks as MSY in periods when MSY was not considered the aim. UK representatives also work to

23

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/923552/Western_Channel_Cuttlefish_Report_2018_19.pdf

promote and develop data-poor assessments internationally, for example, by supporting the chair of the ICES WKLIFEX meetings²⁴.

The UKMMAS community data strategy is being reviewed partly to ensure that ensuring historical data are findable, accessible and reusable wherever possible.

Issue Raised: bycatch and sustainable fishing

Multiple responses suggested that REM should be used for data collecting, giving its unbiased nature, reliability and cost-effectiveness. Additionally, it was proposed that VMS should be carried by all vessels and REM with CCTV for all larger vessels.

Unrecorded catches, whether ultimately landed or discarded, contribute significant uncertainty to the scientific assessment process and thereby enhance the risk that stocks are fished at levels beyond MSY and that fishing opportunities are not optimised. Fish size and age also represent key data to inform our understanding of fish stock health. Defra currently use multiple sources to collect information on our stocks including the collection of biological data from landed catches at markets and ports, the deployment of scientific observers on commercial fishing vessels and a variety of data from research vessel surveys. There is potential for new technologies, including REM, to be applied to enhance data collection programmes, and ensure that fisheries management is based on the best available evidence. The success of these programmes, regardless of the method, is dependent on having agreed objectives, a robust scientific design and producing quality assured data. As mentioned, Defra are exploring the potential use of REM in the future, alongside other monitoring and enforcement tools.

Monitoring systems like VMS play a crucial role in developing a framework for fisheries management that is both profitable and sustainable. Currently, under UK legislation VMS is required on fishing vessels 12 metres and over in length. There are plans in place to introduce Inshore Vessel Monitoring Systems (I-VMS) for under 12 metre vessels in English waters with the Devolved Administrations developing similar plans. When this comes into force, the requirements will apply to all vessels fishing in English waters. Some Inshore Fisheries and Conservation Authorities (IFCAs) have introduced I-VMS requirements, via statutory byelaws, which apply to under 12 metre vessels within their local districts (0-6 nautical miles).

²⁴ <https://www.ices.dk/community/groups/Pages/WKLIFEX.aspx>

Issue raised: estuarine and transitional waters fish monitoring

Respondents flagged that estuaries are essential habitats for many commercial fish species and species which cross the marine/freshwater boundaries. They put forward that tagging programmes may be of significant benefit here.

The improvement of estuarine fish stock assessments and inclusion of citizen science data and data-storage tags in this work is ongoing²⁵.

Estuaries are recognised as important habitats for fish communities as well as nursery grounds and important conduits for migratory species into freshwater catchments. Estuarine fish monitoring and assessment of migratory fish in the catchment are already the subject of ongoing monitoring studies. The resulting data will be incorporated into future assessments to provide a more complete assessment of fish.

Issue raised: non-target commercial species

Many respondents urged greater inclusion of non-target commercial species of fish and shellfish, such as gurnard and winkle, to aid assessment of GES and inform stock assessments to support future regulation. This should include not just species exploited for consumption but those also being caught for bait and species being translocated to support other commercial industries such as cleaner fish e.g. wrasse and lumpsuckers used in the aquaculture sector.

Data are lacking for certain non-target species as not all species can be routinely monitored. However, data on gurnard are collected by current fisheries surveys and included in our assessments. For example, tub gurnard are included within the current Abundance of sensitive fish species indicator: the species level changes within this indicator will be made clearer in future.

²⁵ For instance :Walker et al 2020 <https://doi.org/10.1016/j.ecolmodel.2020.109179> Gundelund et al 2020 <https://doi.org/10.1016/j.fishres.2020.105597>

Summary of responses on the proposals for Descriptor 4: Food webs

A number of issues were raised under the Food Web ecosystem component that related strongly to Pelagic Habitat, Benthic Habitat, and Fish policy. Those points have therefore been dealt with under those Descriptors or in the General Issues.

Issue raised: Good Environmental Status across the food web

Respondents put forward that data should be gathered to allow assessment of GES at all trophic levels of the food web including zooplankton and benthic invertebrates.

We are working within OSPAR to determine which trophic guilds should be assessed. This will guide how we might collect data for incorporation into our assessments at the lower trophic levels in food webs.

Novel data collection methods have been trialled to enable to automated collection of data for pelagic habitats on routine fisheries surveys²⁶ and we continue to look to integrate data across a range of sources to support food web understanding²⁷. Furthermore, studies linking trophic levels have also demonstrated the importance of lower trophic levels to food webs and fisheries^{28, 29} and ecosystem modelling is being advanced to understand the

²⁶ SG. Pitois, CA. Graves, H Close, C Lynam, J Scott, J Tilbury, J van der Kooij, P Culverhouse, 2021. *A first approach to build and test the Copepod Mean Size and Total Abundance (CMSTA) ecological indicator using in-situ size measurements from the Plankton Imager (PI)*, Ecological Indicators 123, 107307. <https://doi.org/10.1016/j.ecolind.2020.107307>

²⁷ Thompson MSA, Pontalier H, Spence M, Pinnegar JK, Greenstreet S, Moriarty M, Hélaouët P, Lynam CP (2020) A feeding guild indicator to assess environmental change impacts on marine ecosystem structure and functioning. *Journal of Applied Ecology* 00: 1–13 <https://doi.org/10.1111/1365-2664.13662>

²⁸ Capuzzo E, Lynam CP, Barry J, Stephens D, Forster RM, Greenwood N, McQuatters-Gollop A, Silva T, van Leeuwen SM, Engelhard GH (2018). A decline in primary production in the North Sea over twenty-five years, associated with reductions in zooplankton abundance and fish stock recruitment. *Glob Change Biol.* 24: e352–e364 <https://doi.org/10.1111/gcb.13916>

²⁹ Lynam CP, Llope M, Möllmann C, Hélaouët P, Bayliss-Brown GA, Stenseth NC (2017) Interaction between top-down and bottom-up control in marine food webs. *Proceedings of the National Academy of Sciences* 114 (8) 1952-1957; <https://doi.org/10.1073/pnas.1621037114>

mechanisms underlying these interactions (Mackinson et al 2018³⁰ and Spence et al 2020³¹).

Summary of responses on the proposals for Descriptor 5: Eutrophication

Issue raised: land-sea continuum

The terrestrial source of nutrients (agriculture inputs) for estuarine eutrophication was raised.

The UK Marine Strategy monitoring programme is closely linked with that of the WFD³² in estuarine waters. Estuarine monitoring will be covered by the updated River Basin Management Plans (RMBPs) which integrate estuarine and coastal water quality monitoring.

³⁰ Mackinson S, Platts M, Garcia C, Lynam CP (2018) Evaluating the fishery and ecological consequences of the proposed North Sea multi-annual plan. PLoS ONE 13(1): e0190015.

<https://doi.org/10.1371/journal.pone.0190015>

³¹ Spence MA, Bannister HJ, Ball JE, Dolder PJ, Griffiths CA, Thorpe RB (2020) LeMaRns: A Length-based Multi-species analysis by numerical simulation in R. PLoS ONE 15(2): e0227767.

<https://doi.org/10.1371/journal.pone.0227767>

³² Transposed to The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017, Water Environment and Water Services (Scotland) Act 2003

Summary of responses on the proposals for Descriptor 8: Contaminants

Issue raised: cumulative impacts of chemicals

Respondents recommended more ecological monitoring at different trophic levels to determine what real-world synergistic or cumulative effects contaminants are having on the marine ecosystem.

Contaminants being ingested by marine organisms and entering the marine food web is a concern. To further assess this, OSPAR are proposing to develop a candidate indicator on PCBs in tissues of marine mammals for the Quality Status Report (QSR) 2023, using data collected by the CSIP. The UK are supportive of this development.

On a national scale, the UKMMAS community is contributing to a Natural Environment Research Council (NERC) funded programme of work 'Emerging risks of chemicals in the environment'; which aims to address the issue of mixtures and multiple pressures. Additionally, our ecotoxicology programme will highlight where contaminants are having synergistic effects.

The Scottish mussel programme integrates contaminant monitoring with a range of general biological effects techniques, which should identify areas of concern. OSPAR are also integrating contaminants with exposure and effects data to come up with an overall status assessment, this will be presented as a case study for the QSR 2023.

Issue raised: emerging contaminants

ENGO respondents urged the monitoring of a wide range of contaminants (including chemical contaminants of emerging concern), harmonised with terrestrial and freshwater monitoring in order to act as an alert system. ENGOs were concerned that as the list of contaminants monitored in territorial water, sediment and biota has not been updated since 2012, therefore, that no emerging contaminants will have been taken into account since that time.

We acknowledge that the GES status for Descriptor 8 is based on the limited number of legacy hazardous chemicals that the OSPAR Convention uses to assess the status of the North East Atlantic. For these chemicals, the concentrations, and particularly their biological effects, are generally meeting agreed target thresholds for protecting sea life.

We aim to identify and prioritise Chemicals of Emerging Concern (CECs) which may pose risks to marine life. Cefas are holding a CEC workshop in 2021 to develop understanding of ongoing work in the UK and to identify potential gaps. Work led by the UK and OSPAR aims to permit a broader range of hazardous substances to be used in the assessment of

GES, so we are not reliant on only using legacy chemicals which have either been banned or restricted for considerable periods of time.

UK agencies are currently monitoring for a range of CECs and are involved in national and international programmes to identify new risks. This includes the OSPAR CONNECT (Contaminants of Emerging Concern and Threat in the marine environment) programme and the OSPAR Hazardous Substance and Eutrophication Committee, which is updating the OSPAR lists of Chemicals for Priority Action, and Possible Concern, based on updated risk assessments of chemicals likely to reach the marine environment. In addition, UK agencies are in discussion to form a watch system building on the Environment Agency's PEWS (Prioritisation and Early Warning System) to identify CECs and to understand which CECs need further monitoring for purposes of environmental risk assessments.

Through OSPAR and UK agencies, we also participate in the NORMAN network of European reference laboratories, research centres and related organisations for the monitoring and biomonitoring of emerging environmental substances. NORMAN has developed lists of CECs. It is necessary to identify the presence and assess the potential impacts of CECs using a source-to-sea approach. We are therefore aiming to align better with coastal and estuarine monitoring (carried out under RBMPs) and will be including the WFD³³ Priority Hazardous Substances in biota in the 2024 UK Marine Strategy assessment and monitoring programme. We also participate in the WFD³³ surface water Watch List (WL) programme of potential water contaminants.

Issue raised: impacts on biota

ENGOs were concerned by the introduction of microplastics into the food web, high levels of legacy persistent organic pollutants (POPs) including polychlorinated biphenyls (PCBs) exceeding toxic effect thresholds being reported in orcas, harbour porpoises and grey seals, and evidence of cancers in North Sea flatfish being linked with chemical contaminant exposure

We have operational targets for D10 litter to a) develop an indicator for micro-litter in sediment and biota, and b) establish, if practicable, whether the amount of litter and micro-litter ingested by marine animals adversely affects the health of the species concerned.

³³ Transposed to The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017, Water Environment and Water Services (Scotland) Act 2003

Work on POPs in marine mammals and incidence of fish disease is ongoing, including recent R&D projects³⁴ to determine and assess levels of POPs in a range of marine mammal species. In addition, we support the proposed development of an indicator by OSPAR to assess the impacts of contaminants in marine mammals, which are near the top of the food chain, using data collected by CSIP.

The flame-retarding chemicals polybrominated diphenyl ethers (PBDEs) and hexabromocyclododecanes (HBCDDs) are routinely monitored in UK fish, sediments and marine mammals, and per- and polyfluoroalkyl substances (PFAS) are also routinely monitored in fish and cetaceans by Cefas. In addition, Cefas routinely measure perfluorooctane sulfonate (PFOS) in biota. We are working with OSPAR to address further contaminants through the NORMAN Oyster survey. We also contributed mussel samples to the OSPAR CONNECT project (wide scale screening of contaminants in mussels across Europe). Concentrations of dechlorane plus and other replacement brominated flame retardants such as organophosphorous chemicals have been assessed in UK harbour porpoises. Levels were not found to be of concern so additional monitoring was not conducted³⁵.

Fish liver cancer incidence was an indicator in the 2012 UK Marine Strategy Part One and was found to be decreasing in prevalence.

Issue raised: scope of assessed chemicals

A number of respondents pointed out that the list of chemicals included in the assessment needs to be expanded. Rivers are ultimately the source to the sea and therefore the list of contaminants needs to be extended to adequately assess the achievement of GES in territorial waters. Of the water bodies tested, a respondent noted that several failed solely due to perfluorooctane sulfonate (PFOS).

³⁴ Rosie S. Williams, Susan Jobling, Andrew Brownlow, Jonathan L. Barber, Nicholas J. Davison, Robert Deaville, Matthew Perkins and Paul D. Jepson. Juvenile harbor porpoises in the UK are exposed to a more neurotoxic mixture of polychlorinated biphenyls than adults. *Sci. Total Environ.* 2020, 708, 134835.

Rosie S. Williams, Mariel ten Doeschate, Dave Curnick, Andrew Brownlow, Jonathan L. Barber, Nicholas J. Davison, Robert Deaville, Matthew Perkins, Paul D. Jepson and Susan Jobling. Levels of polychlorinated biphenyls are still associated with toxic effects in harbor porpoises (*Phocoena phocoena*) despite having fallen below proposed toxicity thresholds. *Environ. Sci. Technol.* 2020, 54, 2277-2286.

Rosie S. Williams, David J. Curnick, Andrew Brownlow, Jonathan L. Barber, James Barnett, Nicholas J. Davison, Robert Deaville, Mariel ten Doeschate, Matthew Perkins, Susan Jobling and Paul D. Jepson. Polychlorinated biphenyls are associated with reduced testes weights in UK harbour porpoises (*Phocoena phocoena*). *Environ. Int.* 106303. Pre-published online on 13/01/2021

³⁵ Papachlimitzou et al, 2015 *Mar Poll Bull*; Law et al, 2013 *Environ Int.*

We recognise the need to improve our assessment of the risks posed by the wide spectrum of chemicals entering the marine environment and to expand our assessment and monitoring programmes accordingly. Details of work on contaminants of emerging concern is described in the Emerging Contaminants section above.

We will be including certain priority chemical substances in biota in the 2024 UK Marine Strategy Part One assessment. PBDEs and PFOS and perfluorooctanoic acid (PFOA) are included in WFD³⁶ and OSPAR monitoring. PFOS in sediment, biota and seawater are included in OSPAR's pre-Coordinated Environmental Monitoring Programme (CEMP), however monitoring is not yet mandatory.

We also participate in the WFD³⁶ surface water Watch List (WL) programme of potential water contaminants. These substances require monitoring to determine the spatial distribution of their presence and the risk they pose to the wildlife and human health and whether Environmental Quality Standards (EQS) should be set for them.

Summary of responses on the proposals for Descriptor 9: Contaminants in seafood

Issue raised: inclusion of microplastic

Respondents noted that microplastics are not currently included in monitoring for contaminants in seafood.

We have been closely following the progress of research on microplastics and nanoplastics in food, including seafood. The Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) is reviewing the scientific evidence on microplastics. The necessary toxicological knowledge to conduct meaningful risk assessments is still being built up. Meanwhile, appropriate methodologies to monitor levels of microplastic in seafood are being investigated.

Research and development work on microplastic in biota has so far mainly focused on the detection and quantification of microplastics in the gastrointestinal tracts (GITs) of some pelagic and demersal fish for which the GITs are being removed before consumption. Challenges remain, however, for smaller species of pelagic fish (e.g. sardines) and for the

³⁶ Transposed to The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017, Water Environment and Water Services (Scotland) Act 2003

smaller sized individuals where GITs cannot be removed. For these species, the whole individuals are analysed for microplastic content.

With regard to chemical contaminants associated with microplastic, our current view is that this would represent a minor contribution to the overall level of contaminants present and therefore to overall consumer exposure.

Issue raised: cumulative effects of multiple contaminants

Respondents called for monitoring of real world mixtures of contaminants that are likely to be consumed through eating seafood.

Whilst we recognise that this is an important consideration, suitable methods for assessment of cumulative toxicity are not yet sufficiently developed. This is an issue that is actively being investigated in relation to pesticides, the toxicology of which is especially well characterised. It is anticipated that, in the longer term, methodologies established for cumulative risk assessment of pesticides will be transferable to environmental contaminants such as POPs.

Issue raised: imported seafood monitoring

Respondents were supportive of the “UK working with other countries at regional level to ensure that risks from contaminants that might pose significant risks to humans are taken into consideration”, but suggested that this cooperation should include extending the monitoring conducted for seafood caught in UK waters to seafood imported from outside the UK.

This is not an area covered by the UK Marine Strategy. Where new risks are identified in relation to seafood from specific sources, these will be considered for inclusion in existing regulations on special measures for imported food brought into UK law as part of retained EU legislation.

Summary of responses on the proposals for Descriptor 10: Marine litter

Issue raised: data from alternative monitoring programmes

Some respondents suggested utilising fish monitoring, such as trawl surveys, to gather data on marine litter.

Data from trawl surveys, typically carried out for fish stock assessments, is currently used to monitor the amount of litter on the seafloor.

Issue raised: trawl survey methodology

Trawl surveys for monitoring seafloor litter are spatially limited to softer substrates and include a bias towards sampling larger and heavier items.

We recognise trawl surveys have limitations for monitoring seafloor data. As leaders of the OSPAR Seafloor Litter Expert Group (SLEG), the UK continues to develop improvements to the assessment methodology to better account for these limitations. The next OSPAR assessment will include additional analysis of litter catchability with different gear types.

Issue raised: microplastic (micro-litter) monitoring

Several respondents acknowledge the candidate monitoring programme of microplastics in sediment, calling for continued and enhanced microplastic monitoring.

The UK is leading the OSPAR Microplastics in Sediment Expert Group (MPEG) which is developing a candidate indicator for microplastics in marine sediment. The indicator will allow for both a spatial and temporal assessment of microplastics. A case study on microplastics in seafloor sediments is underway as part of the UK's Clean Safe Seas Environmental Monitoring Programme (CSEMP) surveys.

Issue raised: land-sea continuum

With a focus on microplastics, respondents highlighted the terrestrial source of marine litter, which could be better integrated with marine indicators by monitoring across the land-sea continuum, as well extending litter monitoring to the deep sea.

We recognise that the land-sea continuum is particularly important for micro-litter and that seafloor sediments can act as final sinks for microplastics, which alongside presenting a

suitable matrix for short and long-term monitoring makes them well-suited for characterising the system. In light of the disproportionately high costs associated with alternative sampling methods such as Remote Operated Vehicles (ROVs), collecting riverine data presents a considerably more cost-effective means to assess micro-litter input.

In England, Environment Agency monitors the environmental status of the UK's rivers and publish the data³⁷. DAERA anticipates reviewing the Northern Ireland Marine Litter Strategy in 2021. The new Marine Litter Strategy is expected to increase focus on riverine litter measures. At the regional level, the OSPAR candidate indicator for microplastics in marine sediments would also be applicable to riverine/terrestrial sediments.

Issue raised: spatial coverage

Several responses called for increased spatial coverage of litter monitoring, across all three established monitoring programmes.

Seafloor monitoring for marine litter is incorporated into all existing fisheries monitoring surveys. Some spatial gaps are related to suitability of the seabed substrate as discussed in the Trawl Survey Methodology section above. A UK-led OSPAR Expert Group is continuing to work on improving statistical confidence in litter trend assessment based on the existing monitoring programme.

The OSPAR Beach Litter Expert Group takes spatial coverage of Beach Surveys into account as part of the assessment methodology. Selection of beaches is informed by the Coordinated Environmental Monitoring Programme (CEMP) guidelines, which require that each country's survey sites are representative of litter sources and provide sufficient coverage of spatial variation with that country or region. National coordinators of the beach survey programmes use their expert judgement for site selection within these guidelines.

The floating litter indicator relies on collection of deceased fulmar, which is currently the only species identified as suitable by OSPAR. Turtles have recently been added as an indicator for floating litter but cannot be used for the UK as they do not nest here.

Together the Marine Litter monitoring programmes aim to support assessment of short and long-term impacts of policies (e.g. under the 25 Year Environment Plan) so we can use a range of indicators to give a broader picture of the success of policy interventions.

³⁷ <https://environment.data.gov.uk/catchment-planning/>

Issue raised: landed waste

An industry respondent recommended the monitoring of passively fished waste. It was suggested that if the UK is to transpose into UK law the EU's Port Reception Facilities Directive, then there is the capability to put in place a robust monitoring scheme of both the tonnage and the composition of the waste landed. Monitoring of this waste could be an informative contributor to Descriptor 10, if it is implemented and managed well.

The Maritime and Coastguard Agency (MCA) has received ministerial approval to review the UK's current regime on Port Waste Reception Facilities (PWRF). Stakeholders will be informed of the review and will be invited to register their interest in participating in the policy review through consultation.

The existing PWRF regime already has in place a requirement for ships to submit a comprehensive Waste Notification Form, this form will detail the waste quantity and type to be landed. This information will be used to inform the development of the Port Waste Management Plans each port is required to hold. It is the intention of the MCA to keep the existing regime, and if during the review there is evidence received as to how the current regime could be enhanced, this will be considered. Further information can be found in the Marine Guidance Note 563 Amendment 1³⁸.

Summary of responses on the proposals for Descriptor 11: Underwater noise

Issue raised: regional cooperation on monitoring cumulative impacts

Respondents encouraged close collaboration with other countries across industries to build up an accurate picture of population-level impacts of noise across e.g. the North Sea.

38

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/899732/MGN_563_Amendment_1_R0720.pdf

The UK works closely with countries around the North Sea and beyond through OSPAR's expert group on noise. This group is responsible for a variety of initiatives such as the Regional Noise Registry³⁹, regional status assessments, the development of indicators and publication of inventories of noise mitigation measures⁴⁰. The UK also participates in two regional joint monitoring programmes for underwater noise: the Joint Framework for Ocean Noise in the Atlantic Seas (JONAS), and the Joint Monitoring Programme for Ambient Noise North Sea (JOMOPANS).

Issue raised: deep water and offshore monitoring

Concerns were raised by eNGOs that monitoring of noise from seismic exploration and sonar is insufficient to assess its impact on deep-water animals.

The MNR collects and stores data on where and when anti-submarine warfare sonar is used in UK waters, during training or testing (unclassified, thought to be the great majority of sonar use). Similarly, activity data on seismic surveys taking place in UK waters are collected in the MNR via the Department of Business, Energy and Industrial Strategy's (BEIS) consenting regime which covers all geophysical surveys for the oil and gas industry. These data are mapped alongside that of other activities resulting in impulsive noise. Maps show the extent of impulsive noise in UK waters across space and time. Outputs are used to help establish a baseline level of impulsive noise and to look for patterns and trends. In addition, these data will be used as part of regional OSPAR indicators of the impulsive noise pressure and of its risk of disturbance to marine species.

The Royal Navy has well established risk assessment and mitigation procedures to protect marine mammals from noise. These are reviewed regularly⁴¹. Seismic surveys are conducted consent with conditions that include the adherence to mitigation measures⁴². In addition, noise from sonar has been recorded as part of COMPASS.

Issue raised: data gaps

ENGOs called for us to gather data to establish threshold for impulsive noise and facilitate the implementation of effective measures

³⁹ <https://underwaternoise.ices.dk/impulsive/webservices.aspx>

⁴⁰ <https://www.ospar.org/work-areas/eiha/noise>

⁴¹ <https://www.royalnavy.mod.uk/environmental-protection>

⁴² <https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf>

Work towards the establishment of thresholds is currently ongoing at OSPAR Regional level through the development of indicators of the risk of impact from both ambient and impulsive noise. Once the indicators are established, the setting of thresholds can follow.

Defra's Offshore Wind Enabling Actions Programme is undertaking several projects to assess and address gaps in impulsive noise data, help outline noise baselines and develop changes to enable tracking of all activities that create impulsive noise at a level that may cause disturbance to marine mammals, in particular in harbour porpoise Special Areas of Conservation. These are expected to be completed in 2021.

Respondents noted that, at present, the modelling work on continuous noise produced by ships focuses only on those vessels that are tracked using the Automatic Identification System (AIS). They put forward that there is room for improvement here, e.g. through using VMS data (where possible) and incorporation of smaller vessels (e.g. recreational boats), as well as continued monitoring using a network of sites around the UK.

There are issues with the low temporal resolution of VMS data, and at present no clear solution for tracking vessels not carrying AIS transponders. Relying on VMS data in this case may lead to uncertainties using current modelling methods, which are based on AIS data. Research on these methods is ongoing, including through SATURN, a new international project which aims to improve ways of measuring and reducing the impact of shipping noise, in which the UK participates.

Respondents recommended the expansion of ambient noise monitoring outside of eastern English waters.

Defra is funding ambient noise monitoring at four locations in England and Wales, covering both the North Sea and Celtic Seas. UK Marine Strategy monitoring is also ongoing in Scotland and Northern Island with the intention of some sites being retained as ongoing monitoring locations. These measurements are being used to ground-truth spatial maps of shipping noise, which will be used for UK Marine Strategy assessments.

Issue raised: monitoring new infrastructure sites

ENGOS and academic respondents were concerned that the development of offshore wind infrastructure to meet Net Zero targets would not be adequately monitored for noise impacts

Some impact monitoring studies have been carried out by offshore wind developers and government in the last decade. Results from such studies can inform on the range of effects these activities have on marine mammals and potential population level impacts that would affect achievement of GES.

Defra's Offshore Wind Enabling Actions Programme will aim to increase knowledge of noise in the marine environment, building on the Statutory Nature Conservation Bodies (SNCB) noise guidance, and will support implementation of the noise guidance across

English waters. This work will aim to support a more strategic approach to monitoring noise and its effects and to managing it across industries.

Issue raised: licensing requirements and Acoustic Deterrent Device impacts

ENGOs proposed that noise registers be used for planning and deciding whether to grant licences to noise generating activities. They suggest noise registers should also include all the sources and information recommended by TG Noise, which would include Acoustic Deterrent Devices (ADDs) in aquaculture, for example.

The Scottish Government is working on gathering more information on the use of ADDs in aquaculture, including when and where these are used.

The MMO, in conjunction with DEFRA and the other offshore industry regulators have formulated a mechanism to record information on current and proposed activities to assist developers with cumulative impact assessment and avoid potential conflicts. The mechanism allows for the regulators to determine whether an activity, in combination with other activities, potentially exceeds the daily and annual noise threshold percentage of a protected area suggested by Statutory Nature Conservation Bodies (SNCB) guidance, and whether that activity should be permitted. Although regulators would be reluctant to stop an activity from commencing, the intention is for offshore industry to collaborate effectively and find resolution to any potential conflicts of cumulative noise events.

Issue raised: ecosystem and population-level impacts

Some respondents were concerned that proposed monitoring programmes were not investigating the impact of underwater noise on marine ecosystems and animals at a population level.

Under the conservation regulations of each of the Devolved Administrations and offshore⁴³, individual cetaceans are protected from killing, injury and disturbance. The UK

⁴³ England and Wales: The Conservation of Habitats and Species Regulations (to 12nm) 2017 consolidate and update the Conservation of Habitats and Species Regulations 2010 (as amended)

Scotland: The Conservation (Natural Habitats etc) Regulations 1994 (as amended); The Conservation of Habitats and Species Regulations 2017;

Northern Ireland: The Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 (as amended)

Marine Strategy focuses on the protection at population and ecosystem levels and cumulative effects.

Ecosystem and population impacts are being considered via JONAS, JOMOPANS and COMPASS for ambient noise and through the impulsive noise data collected by the MNR. These data feed into a regional OSPAR indicator in development – on which the UK leads - for the risk of disturbance from impulsive noise to marine species and populations.

Summary of responses on the proposals for monitoring Prevailing Conditions

Many of the comments we received for Prevailing Conditions related to dataset inclusion or use of technologies. The comments have been addressed either in the General Issues section of this document or in the updated UK Marine Strategy Part Two document (2021).

Annex A: list of consultation questions

Question 1: Are the proposed monitoring programmes sufficient to meet the requirements of the Marine Strategy Regulations 2010, bearing in mind our current knowledge base?

Question 2: Are the proposed monitoring programmes sufficient to provide the necessary data to assess progress towards the achievement of GES, and the related targets, as set out in the updated UK Marine Strategy Part One?

Question 3: Are any additional monitoring programmes needed in order to assess progress towards achieving GES and the related targets?

Question 4: Are you aware of any additional marine monitoring currently being carried out that we have not covered which could contribute to our assessments and make them more effective?

Annex B: respondents and comment summaries

List of respondents

APEM Ltd

British Sub Aqua Club

British Trust for Ornithology

Centre for Environmental Data and Recording (CEDaR)

Chartered Institute of Ecology and Environmental Management (CIEEM)

Historic England

Honor Frost Foundation Steering Committee on Underwater Cultural Heritage

IAGC

IMO International

International Fund for Animal Welfare (IFAW)

Irish Whale and Dolphin Group

Joint Nautical Archaeology Policy Committee

Marine Biological Association

Maritime and Coastguard Agency

Met Office (two separate responses)

National Federation of Fishermen's Organisations

National Oceanography Centre

Northern Lighthouse Board

Oil and Gas UK (OGUK)

Plymouth Marine Laboratory
 RSPB
 Scottish Association for Marine Science (SAMS)
 Scottish Fishermen's Federation
 Terry Scales (unaffiliated)
 The Crown Estate
 The Seaweed Alliance
 The Wildlife Trust
 University of Edinburgh (two separate responses, one from the Changing Oceans Research Group and one from The ATLAS and iAtlantic Projects (EU H2020))
 Wildlife and Countryside Link/ Environment Links UK (ELUK)
 WWF-UK

And three anonymous responses were received.

Descriptor comment summaries

Table 1: The number of comments received referring to each Descriptor

Descriptor	Number of comments
1 & 4: Cetaceans	37
1 & 4: Seals	10
1 & 4: Birds	38 (plus 14 duplicates)
1 & 4: Fish	11
1 & 4: Pelagic habitats	19
1 & 6: Benthic habitats	35
2: Non-indigenous species	18
3: Commercial fish	33
4: Food webs	14

5: Eutrophication	9
8: Contaminants	13
9: Contaminants in seafood	8
10: Marine litter	28
11: Underwater noise	36
Prevailing conditions	23