



Consultation on Marine Strategy Framework Directive: Proposals for UK Marine Monitoring Programmes

Response from the National Oceanography Centre response

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About us:

The National Oceanography Centre www.noc.ac.uk was formed on 1 April 2010 by bringing together into a single institution the Natural Environment Research Council's activity at the National Oceanography Centre, Southampton (NOCS) and the Proudman Oceanographic Laboratory (POL) in Liverpool. The NOC works in close partnership with the wider marine science community to create an integrated research capability. NOC is the focus for UK oceanography

Declaration of interests:

NOC welcomes the opportunity to respond to the DEFRA Consultation on the Marine Strategy Framework Directive: Proposals for UK Marine Monitoring Programmes. The National Oceanography Centre (NOC) and our parent body, the Natural Environment Research Council (NERC), have a long-standing of close scientific collaboration with DEFRA, especially through co funding of scientific programmes. We have discussed this consultation with colleagues and

experts in NOC (listed above) and the views expressed here are our own and do not necessarily reflect those of our parent body NERC. NERC has been apprised of this consultation response.

Purpose for responding:

- To ensure that NERC funded research undertaken by NOC scientists is fully utilised, to ensure that monitoring is comprehensive around the UK coastal regions and seas.
- To ensure that monitoring proposals are including the most current and up to date scientific data sources.
- To ensure that NOC scientific knowledge is translated into beneficial impacts for the UK economy and society, so better decisions can be made in the future.

Key messages:

- Generally the monitoring proposals are sufficient to meet the requirements of the MSFD.
- However, the proposal does not take into account many marine observation programmes undertaken by NOC/NERC.
- Some of these missing observation programmes and initiatives are co funded by DEFRA.
- Much of the NERC science remit is not aimed at long term monitoring. Nevertheless, data collected via short-term science programmes can still be used to provide background datasets and baselines. These data are important to have available in order to make future comparisons and determine if GES is being achieved.

Consultation questions:

1. **Are the proposed monitoring programmes for this Descriptor sufficient to meet requirements of the Directive, bearing in mind the current limitations in our knowledge base?**

Descriptors 1 and 4: Fish, Marine Mammals and Birds

Yes. However, it should be noted that this descriptor is outside the direct expertise of NOC research.

Descriptors 1, 4 and 6: Pelagic habitats

Yes they are largely sufficient, but could be further improved through the inclusion of additional monitoring programmes. See question 3.

Descriptors 1 and 6: Benthic habitats

Yes this descriptor adequately addresses the requirements of the directive. It could go further though by including data from additional initiatives. See question 3.

Descriptor 2: Non-indigenous species

Descriptor 3: Commercially exploited fish and shellfish

Yes. However, it should be noted that this descriptor is outside the direct expertise of NOC research.



Descriptor 5: Eutrophication

Yes this monitoring programme is sufficient. However, there should be some mention of nationally collaborative programmes, which will collect data that can be used to monitor eutrophication. See question 3.

Descriptor 7: Hydrographical conditions

Yes this monitoring programme is sufficient. However, there should be some mention of nationally collaborative programmes, which will collect data that can be used to monitor hydrographic conditions. See question 3.

Descriptor 8: Contaminants

Descriptor 9: Contaminants in fish and other seafood for human consumption

Descriptor 10: Marine litter

Yes. However, it should be noted that this descriptor is outside the direct expertise of NOC research.

Descriptor 11: Underwater noise

Yes. It should also be noted that NOC staff are involved in and run the secretariat for the MSCC's underwater sound forum

(<http://archive.defra.gov.uk/environment/marine/science/mscc.html1>,
http://www.oceannet.org/underwater_sound_forum/2), which is contributing to the understanding, quantification and methodology of underwater noise measurements.

2. Are the proposed monitoring programmes for this Descriptor sufficient to guide progress towards the achievement of GES, and the related targets, as set out in UK Marine Strategy Part 1?

Descriptors 1 and 4: Fish, Marine Mammals and Birds

Yes. However, it should be noted that NOC is not directly involved with the programmes mentioned to monitor this descriptor.

Descriptors 1, 4 and 6: Pelagic habitats

Overall, the proposed monitoring programmes are likely sufficient to guide the Descriptor towards the achievement of GES and the identified targets. However, there are other programmes that the UK and regional partners are involved with, which could benefit this descriptor and aid the achievement of targets and GES. See question 3.

Descriptors 1 and 6: Benthic habitats

Utilization of the existing WFD and Habitats directives should enable good progress to be made towards achieving GES and the related targets. However, there is still a lack of an integrated national approach to seabed mapping, which is being addressed using NERC core funding. See question 3.

Descriptor 2: Non-indigenous species

Descriptor 3: Commercially exploited fish and shellfish

Yes. However, it should be noted that NOC is not directly involved with the programmes mentioned to monitor this descriptor.



Descriptor 5: Eutrophication

Descriptor 7: Hydrographical conditions

Yes, however see question 3 for additional monitoring programmes the UK is undertaking, which will collect data that could contribute to achieving GES and the associated targets.

Descriptor 8: Contaminants and pollution

Descriptor 9: Contaminants in fish and other seafood for human consumption

Descriptor 10: Marine litter

Yes. However, it should be noted that NOC is not directly involved with the programmes mentioned to monitor this descriptor.

Descriptor 11: Underwater noise

The proposed monitoring is moving in the right direction ensuring that robust baselines are established. However a multifaceted approach, looking at the data management, impacts, methodologies and technologies used to monitor and reduce underwater noise, is needed to ensure that GES is achieved. See question 4 for further information.

3. Subject to the answer to Question 2, are any additional monitoring programmes needed in order to achieve GES and the related targets for this Descriptor?

Descriptors 1 and 4: Fish, Marine Mammals and Birds

No.

Descriptors 1, 4 and 6: Pelagic habitats

Other monitoring programmes which could contribute to achieving GES and related targets:

- Extended Ellet Line (<http://prj.noc.ac.uk/ExtendedEllettLine/home>)³
- Shelf Seas Biogeochemistry (CANDYFLOSS) NERC funded research programme (<http://www.nerc.ac.uk/research/programmes/shelfsea/background.asp>)⁴
- Ferrybox (<http://www.ferrybox.org/>)⁵

See question 4 for full details of how these programmes could contribute to the MSFD monitoring.

Descriptors 1 and 6: Benthic habitats

Another programme which could be included in the consultation is the NERC funded MAREMAP (Marine Environmental Mapping Programme;

<http://www.maremap.ac.uk/index.html>)⁶, led by BGS, NOC and SAMS. See question 4 for full details of how this programme could contribute to the MSFD monitoring.

Descriptor 2: Non-indigenous species

Descriptor 3: Commercially exploited fish and shellfish

No.

Descriptor 5: Eutrophication

Other programmes which could be included in the consultation include:

- Shelf Seas Biogeochemistry (CANDYFLOSS) NERC funded research programme (<http://www.nerc.ac.uk/research/programmes/shelfsea/background.asp>)⁴
- Extended Ellet Line (<http://prj.noc.ac.uk/ExtendedEllettLine/home>)³

See question 4 for full details of how these programmes could contribute to the MSFD monitoring.

Descriptor 7: Hydrographical conditions

Other programmes which could be included in the consultation include:

- Shelf Seas Biogeochemistry (CANDYFLOSS) NERC funded research programme (<http://www.nerc.ac.uk/research/programmes/shelfsea/background.asp>)⁴
- Extended Ellett Line (<http://prj.noc.ac.uk/ExtendedEllettLine/home>)³

See question 4 for full details of how these programmes could contribute to the MSFD monitoring

Descriptor 8: Contaminants and pollution

Descriptor 9: Contaminants in fish and other seafood for human consumption

Descriptor 10: Marine litter

No

Descriptor 11: Underwater noise

Further work into the impacts of underwater noise, database management and assessments of new technologies to reduce underwater noise should be undertaken to ensure that GES is achieved for the descriptor as a whole and its specific targets. See question 4 for full details.

4. Do you have any suggestions for additional or more effective monitoring programmes?

Answers in this section will not be divided as per the individual descriptor. Instead suggestions for additional/more effective monitoring programmes will be listed, and their relevance to particular descriptors highlighted.

- **Underwater Noise**^{1,2}

NOC scientists are closely involved with the Underwater Sound Forum. In order to ensure that GES for underwater noise is achieved holistically the USF also advises that the following areas are better understood:

- Ambient baseline data and standards, against which underwater noise measurements can be compared. It is important to have standard of ambient noise at both the nationally and international level to ensure good standards of monitoring in line with MSFD and the Marine and Coastal Access Act 2009.
- Impacts of underwater noise on organisms including fish, shellfish and crustaceans as well as marine mammals.
- The use of technologies and new methodologies for both monitoring/data collection and reducing underwater noise, for example looking into alternative technologies for pile driving.
- The use of sound in the marine environment to product sensitive areas, for example around coasts where industry has large water intake channels which could entrain fish.

Furthermore it is important that a proper database is developed to house, manage and disseminate the data gathered on underwater noise and MEDIN is the appropriate group for this data management. Gaynor Evans from BODC is currently working on putting together expert teams to work on the problem of how to best produce a database.



- **Extended Ellett Line³** (<http://prj.noc.ac.uk/ExtendedEllettLine/home>)

The Extended Ellett Line runs between Iceland and Scotland. It is a collaborative project between NOC and SAMS. The core measurements taken seek to understand ocean west of the UK, specifically focusing on how and why the currents, temperature and salinity have changed over the past few decades. It also looks at the impact those changes have on ecosystems and local climate. Biogeochemical parameters are also measured on the Ellett Line, include carbon, nutrients and iron as well as phytoplankton. The Extended Ellett Line began in 1948 and is one of a few long-term time series in UK waters. This has significant relevance for the MSFD monitoring programme because it offers a historical and continued monitoring of both hydrographic and biogeochemical parameters which are needed for achieving GES and the specified targets across a number of descriptors.

Applicable to D1, D4 and D6, D5 and D7.

- **Shelf Sea Biogeochemistry (SSB) research programme⁴**

(<http://www.nerc.ac.uk/research/programmes/shelfsea/background.asp>)

SSB is co-funded by the Department for Environment, Food & Rural Affairs (Defra). The aim of the programme is to reduce the uncertainty in our understanding of nutrient and carbon cycling within the shelf seas, and of their overall role in global biogeochemical cycles. The scientific scope of the programme includes understanding exchanges with the open ocean (transport on and off the shelf to a depth of around 500m), together with cycling, storage and release of carbon and nutrients on the shelf slope, and air-sea exchange of greenhouse gases (CO₂ and N₂O).

From a NOC perspective the SSB programme has a leading role in the collection of nutrient fluxes, ratios and concentrations, DIC/TA, pCO₂, phytoplankton community functioning and structure, hydrographic data across the shelf, North and Celtic Sea regions. This programme will conduct its process and transect monitoring cruises during 2014. It will also incorporate partner vessel surveys (from Marine Scotland, AFBI, CEFAS and the Marine Institute) and data from FerryBox survey lines (run by German, Spanish and Norwegian groups). SSB has strong links and data exchange arrangements with the FASTNET⁷ programme; the data from this will contribute to the UK monitoring strategy. The SSB programme will also utilise data from satellite, Earth Observations (EO). Each of these will enable the process and observational studies to be put into the context of the entire shelf system. Furthermore SSB will also feed its observational data to the modelling community in order to provide models with a reliable benchmark to support new developments.

The SSB programme will culminate with NOC PI's working collaboratively with other institutions to synthesise all the data collected in the programme. This will provide an estimate of the size of the Shelf Carbon Pump over the whole of the NW European Continental Shelf and determine the relative importance of external nutrient sources and internal biogeochemical cycling in maintaining the pump. Within this synthesis will

be a range of data, which can be utilised by the MSFD as baseline indices against which GES can be measured.

Applicable to D1, D4 and D6, D5 and D7.

- **FerryBox**⁵ (<http://www.ferrybox.org/>) was initially established as a EU FP5 Research programme. It utilises ships of opportunity, undertaking regular transects to and from the UK and other European countries. FerryBox measurements are taken onboard the ship from a continuous underway supply of seawater, measuring oceanographic parameters of the pelagic environment. Parameters include temperature, salinity, turbidity and chlorophyll. The FerryBox programme is now supported through the FP7 JERICO⁸ (<http://www.jerico-fp7.eu/>) programme which is looking to facilitate the harmonisation of protocols, installations, equipment and data access and management across the FerryBox programme.

Although the NOC FerryBox survey has now ended following the closure of the ferry route from Portsmouth to Bilbao, regional cooperation with other European partners (e.g. CNRS/INSU and Ifremer) continuing to operate FerryBox monitoring lines within UK MSFD waters, could help to enhance monitoring and achievement of targets and GES. Information on the participating partners can be found on the FerryBox website⁵ (<http://www.ferrybox.org/>).

Applicable to D1, D4 and D6.

- **MAREMAP**⁶ (<http://www.maremap.ac.uk/index.html>) brings together the marine geoscience activities within NERC under a single programme to provide effective collaboration and coordination. It was initiated due to the lack of an integrated national approach to seabed and habitat mapping in UK waters. NOC is a coordinating partner for this programme. To date, six organisations have joined the programme as associate partners. Each contributes marine data and specialist knowledge to the consortium, ensuring that the most up-to-date maps are made available to the outside community.

The research themes of MAREMAP, which are particularly relevant to the MSFD monitoring proposal, include coastal and shelf geological and habitat models, deep water geological and habitat models, sediment mobility and 4D monitoring/modelling and data and products. These research themes should facilitate increased efficiency in seabed and habitat mapping as well as the ability to take a multi-disciplinary approach, improving the overall performance of UK marine science. NOC are leaders in the field of seabed mapping and play a critical role in implementing this project. For more information on the MAREMAP project please see the link below.

Applicable to D1, D4 and D6.

5. Do you have any additional comments you wish to add to your formal consultation response?

- **NOC science remit**
Some of the NOC science programmes are funded through NERC National Capability (NC) funding programme and as such can provide continuous time series data, which

can contribute to the MSFD monitoring strategy. For example the NOC/SAMS led Ellett Line programme is supported through NERC NC funding and can make significant contributions to long-term sustained observations.

However, much of the NOC science is funded through fixed terms projects (e.g. EU FP7 funding). This means that longer-term monitoring programmes are more difficult to implement through NOC science. Nevertheless this short-term work undertaken by NOC scientists is often ideally placed to provide contextual or baseline information, against which longer term monitoring programmes can be measured. It is important to fully understand the baseline conditions against which change, or progress towards GES can be measured. An example of this is the Shelf Seas Biogeochemistry programme. The data collected in this programme is of direct relevance to the MSFD monitoring strategy, but will only be collected over a limited timeframe (2014).

- **Porcupine Abyssal Plain Site** (<http://noc.ac.uk/pap>⁹)
The PAP site observatory is a key programme in the NOC research programme. It is a sustained multidisciplinary observatory in the North Atlantic, coordinated by NOC researchers. The PAP site has been providing key time series data for over 20 years and contributes to function in real time, enabling scientists to analyse the effect of climate change on the open ocean and deep-sea ecosystems. Data includes a suite of meteorological, physical and biogeochemical parameters. Although the location of the PAP site falls outside of the MSFD regions, it may offer a useful database to help identify baseline conditions and understand biogeographic shifts in species over time. Understanding such shifts will help to better inform which target species of phytoplankton to monitor within MSFD D1, 4 and 6 Pelagic Habitats.
- **No mention of the UK IMON¹⁰ initiative** (<http://www.uk-imon.info/index.html>).
The Integrated Marine Observing Network (UK IMON), offer excellent scope for improving the quality of data from UK waters by bringing the UK observational science community together. The initiative will ensure that a national marine observatory is in place to improve the evidence base for future assessments of environmental status, using the most cost-effective technologies available. By including reference to UK IMON within the MSFD consultation, it will have a 2-fold benefit. Firstly, it will ensure that the MSFD includes fully comprehensive data, from public and private research and industrial sectors of the UK marine science community. Secondly, it will help to guide the development of the network by providing targets for the programme to deliver. UK IMON is coordinated through CEFAS (principal investigator Dr. David Mills) and the working partners include:
 - Plymouth Marine Laboratory (PML) - Western Channel Observatory (<http://www.westernchannelobservatory.org.uk/>¹¹)
 - Sir Alister Hardy Foundation for Ocean Science (SAHFOS) (<http://www.sahfos.ac.uk/sahfos-home.aspx>¹²)
 - Centre for Environment, Fisheries & Aquaculture Science (Cefas) – SmartBouy¹³ and Wavenet¹⁴ (<http://www.cefaz.defra.gov.uk/our-services/monitoring-and-mapping/autonomous-monitoring/smartbuoys.aspx>;



<http://www.cefas.defra.gov.uk/our-science/observing-and-modelling/monitoring-programmes/wavenet.aspx>

- Agri-Food and Biosciences Institute (AFBI) - Coastal Monitoring¹⁵
(<http://www.afbini.gov.uk/index/services/services-specialist-advice/coastal-science.htm>)
- Marine Scotland - Environmental monitoring programme¹⁶
(<http://www.scotland.gov.uk/About/People/Directorates/marinescotland>)
- National Oceanography Centre (NOC)/Scottish Association for Marine Science (SAMS) - Ellett Line¹
(<http://prj.noc.ac.uk/ExtendedEllettLine/extended-ellett-line>)
- SAMS - Tiree passage buoy¹⁷
(<http://www.sams.ac.uk/oceans-2025/tiree-passage/?searchterm=tiree mooring>¹⁷)
- NOC - Porcupine Abyssal Plain (PAP) Mooring⁹, Western Shelf Observatory¹⁸ and European Marine Ecosystem Observatory (EMECO)¹⁹
(<http://noc.ac.uk/pap>)
(<http://www.westernshelfobservatory.org/>)
(<http://www.emecogroup.org/>)
- NOC - Liverpool Bay sustained observations²⁰
(<http://noc.ac.uk/ocean-watch/shallow-coastal-seas/liverpool-bay-observatory>)
- Environment Agency (EA) - River basin management plans and monitored freshwater & coastal water²¹
(<http://www.environment-agency.gov.uk/research/planning/33106.aspx>)
- Cefas, for the Department for Environment, Food and Rural Affairs (Defra) - International Bottom Trawl Survey (IBTS) ²²
(<http://www.cefas.defra.gov.uk/publications-and-data/fishdac.aspx>)
- Met Office - Met Buoy programme²³
(http://www.metoffice.gov.uk/weather/marine/observations/gathering_data/buoys.html)

- **Terminology in descriptor 7.**

The monitoring proposal refers to 'Hydrographical conditions'. This terminology, hydrographical is not the standard scientific phrasing. The terminology hydrographic is recommended for standard use across the consultation. Furthermore care should be taken not to use terminology interchangeably.

The terminology hydrological implies water interactions with the land, which is out of the scope of the MSFD. It is therefore recommended to consistently use hydrographic throughout the consultation.

- **Access to data from the private sector.**

Marine environmental consultancies collect data on bird (from shore and ship based counts) and fish (from trawl and shore based push net surveys) populations as well as benthic and sub tidal habitats (including invertebrate populations) around the coast of the UK. Companies collect this data on behalf of industrial and other public/private



organisations/companies which need to comply with UK and EU legislation for marine coastal activities (e.g. energy industry). Where consultancies win contracts year on year there is often an excellent historical data set and guaranteed monitoring programme for a number of years down the line. Improved connections with private consultancies, or the industry contracting the consultancies, could enable access to this monitoring data, thereby improving data coverage around the UK.

Applicable to D1, D4, D6

Supporting Information/Links

1. <http://archive.defra.gov.uk/environment/marine/science/mscc.html>
2. http://www.oceannet.org/underwater_sound_forum/
3. <http://prj.noc.ac.uk/ExtendedEllettLine/home>
4. <http://www.nerc.ac.uk/research/programmes/shelfsea/background.asp>
5. <http://www.ferrybox.org/>
6. <http://www.maremap.ac.uk/index.html>
7. <http://www.sams.ac.uk/fastnet>
8. <http://www.jerico-fp7.eu/>
9. <http://noc.ac.uk/pap>
10. www.uk-imon.info/index.html
11. <http://www.westernchannelobservatory.org.uk/>
12. <http://www.sahfos.ac.uk/sahfos-home.aspx>
13. <http://www.cefasc.defra.gov.uk/our-services/monitoring-and-mapping/autonomous-monitoring/smartbuoys.aspx>
14. <http://www.cefasc.defra.gov.uk/our-science/observing-and-modelling/monitoring-programmes/wavenet.aspx>
15. <http://www.afbini.gov.uk/index/services/services-specialist-advice/coastal-science.htm>
16. <http://www.scotland.gov.uk/About/People/Directorates/marinescotland>
17. [http://www.sams.ac.uk/oceans-2025/tiree-passage/?searchterm=tiree mooring](http://www.sams.ac.uk/oceans-2025/tiree-passage/?searchterm=tiree%20mooring)
18. <http://www.westernshelfobservatory.org/>
19. <http://www.emecogroup.org/>
20. <http://noc.ac.uk/ocean-watch/shallow-coastal-seas/liverpool-bay-observatory>
21. <http://www.environment-agency.gov.uk/research/planning/33106.aspx>
22. <http://www.cefasc.defra.gov.uk/publications-and-data/fishdac.aspx>
23. http://www.metoffice.gov.uk/weather/marine/observations/gathering_data/buoys.html