Marine Strategy Part One: UK Updated Assessment and Good Environment Status

Response to Defra, DAERA, Marine Scotland and Welsh Government consultation by Environment Links UK

June 2019

Environment Links UK (ELUK) brings together environment and animal protection organisations to advocate for the conservation and protection of wildlife, countryside and the marine environment. The network comprises the combined memberships of Wildlife and Countryside Link, Scottish Environment LINK, Wales Environment Link and Northern Ireland Environment Link. Taken together, Environment Links UK members have the support of over eight million people in the UK.

This response is submitted on behalf of ELUK and is supported by our member organisations listed below:

- A Rocha UK
- Buglife
- CHEM Trust
- Client Earth
- Friends of the Earth
- Greenpeace
- Hebridean Whale and Dolphin Trust
- Institute of Fisheries Management
- International Fund for Animal Welfare
- Keep Northern Ireland Beautiful
- Marine Conservation Society
- MARINElife
- Northern Ireland Marine Task Force
- ORCA
- RSPB
- Salmon and Trout Conservation
- Scottish Wildlife Trust
- Shark Trust
- The Wildlife Trusts
- Whale and Dolphin Conservation
- Wildfowl and Wetlands Trust
- WWF
- Zoological Society of London (ZSL)

Executive Summary

We welcome the opportunity to comment on Marine strategy part one: UK updated assessment and Good Environmental Status Consultation. We are also pleased that the UK Government, Northern Ireland Department of Environment, Agriculture and Rural Affairs (DAERA), Scottish Government and Welsh Government have issued this consultation jointly. ***However, in view of the importance of the consultation for protection of UK seas, we are extremely disappointed that the consultation period has been limited to just 6 weeks. This does not allow stakeholders sufficient time to respond in full to the detailed evidence that has been compiled through extensive effort by UK governments and***

the statutory nature conservation bodies, and as such we do not consider that this has been a thorough consultation.

In our review of the consultation document, and the information included within the accompanying 'Marine Online Assessment Tool' (MOAT), our key conclusions are as follows:

- UK Seas are in a poor state, with only 4 out of 15 indicators meeting Good Environmental Status (GES), according to this assessment.
- The ambition of targets, baselines and actions in the Marine Strategy is weak, and there are no deadlines attached to operational targets. This does not align with the shared ambition of clean, healthy, biologically diverse seas and oceans.
- There has been a lack of progress since 2012 with no prospect of meeting the 2020 target of GES for most indicators.
- We do not agree with a number of the assessments of status (i.e. for pelagic habitats, commercial fisheries, contaminants, contaminants in seafood and underwater noise).
- There is a lack of data to enable an effective assessment to be reached in a number of cases (e.g. on seals and contaminants, and there is a general lack of data for the Celtic Seas Region). In these cases the assessment is often termed as '*uncertain*' when more accurately it should be termed '*unknown*'.
- For some indicators (e.g. commercial fish) the assessment is based on out-of-date data, which gives an inaccurate picture of current status.

We note that there is no full impact assessment accompanying this consultation. As a result, we consider this assessment incomplete, as it does not make any attempt to predict what the environmental, social and economic benefits would be of applying the operational targets and achieving GES (such as the benefits of fully restoring all commercial fish stocks to GES, or restoring coastal ecosystems that provide nature-based solutions to climate change). In addition, the figures for Gross Value Added of the marine economy of £51Bn in 2008 falling to £27Bn in 2015 give a distorted view of the current and future value of this sector. Extensive growth in offshore wind power and other marine industries is expected. This is mentioned in the assessment, but projected values are not included. **Therefore, this assessment must not be used as the basis for justifying government investment to deliver an environmentally sustainable marine economy, as any such investment would fall well short of what is actually required.**

The assessment of progress in achieving GES is, overall, extremely disappointing. Rapid and decisive action is needed if GES is to be met for the majority of indicators. The key actions needed are as follows:

- **Revise targets and actions in line with ELUK suggestions, ensuring clear timescales for achievement.** Across the UK Marine Strategy, most targets continue to simply call for no further declines to current conditions, which as the online assessment shows, are representative of a marine environment failing to meet GES. Strong evidence does exist in many cases to allow quantifiable targets to reach states considered to be close to or analogous to reference conditions, or where human impacts were considered to be negligible. Targets under Descriptors 1, 4 and 6 that aim for "no significant decrease" to key biodiversity areas should be amended to call for "a statistically significant increase", while the reverse should be the case for key pressure targets.

- **Increase resources to address data gaps, monitoring and implementation of measures.** The UK Marine Strategy does not discuss the sources or level of resources required for delivery. Without additional funding being ring-fenced for achievement of GES, there is a strong likelihood that little will have changed by the time of the 2024 assessment. It is not clear what (if any) core government funding is allocated to implementing the Marine Strategy, but we strongly recommend that additional funding should be allocated as a priority to fill data gaps and to support regulation of the marine environment.
- **In addition, current levels of funding from EU sources must be maintained by UK Governments' post-Brexit.** This includes funding streams such as the European Maritime and Fisheries Fund (EMFF) and 'INTERREG'. The loss of such funding would be incredibly detrimental to what is already a clearly under-resourced Marine Strategy.
- **Develop and implement a recovery plan for seabirds.** The assessment shows that seabirds are both failing GES and suffering continued decline. This clearly demonstrates that a step change in approach is needed. A major recovery plan should be developed, prioritising direct action to reverse and halt the continuing decline and investing in the development of measures to restore our ailing seabird populations.
- **Put Ecosystem Based Management at the core of the Marine Strategy.** In establishing targets and planning action, the interaction between marine species and habitats should be considered. For example, sandeels should be managed to increase seabird populations.
- **Better align management of the marine environment with management of freshwater and terrestrial habitats.** Marine litter and contaminants, for example, may derive from terrestrial or freshwater sources and only by addressing these pressures at source can pollution of the marine environment be prevented.
- **Include targets and actions to address new and emerging pressures.** New chemical contaminants and the increasing impact from pressures such as noise and aquaculture should be better represented in the Marine Strategy.
- **Collaborate effectively across the UK and internationally to deliver the Marine Strategy.** Consistent policies are needed across the countries of the UK and international collaboration must continue post Brexit. Sharing of data and partnership working, for example with Ireland for the Celtic Seas, is essential.

The UK Marine Strategy is the greatest opportunity in a generation to improve the health of marine ecosystems in a holistic way, particularly in that it does not exclude consideration of human use of the sea but deals with it through the different pressure Descriptors. The shocking conclusions of the assessment are a wakeup call that the current status of marine waters continues to be degraded due to long-term anthropogenic impacts.

Many of the points that we raised in our response to the initial assessment of GES in 2012 still hold true now, 7 years later. The lack of ambition in the setting of targets and the lack of resources to monitor, assess and regulate the marine environment have led, in large part, to the current poor state of UK seas. These deficiencies must be urgently addressed.

The Marine Strategy should be treated by UK governments as a priority mechanism for proactively improving the marine environment. The economic benefits of a healthy marine environment which can support sustainable use are vast and would only increase if Good Environmental Status was achieved.

1. Does the UK Marine Strategy Part One provide an accurate reflection of the state of UK marine waters and the economic and social uses of those waters?

D1, D4 - Cetaceans

In general, we agree that the status for cetaceans as a whole is uncertain for many populations and believe this is a cause for much concern.

We do not agree that the '*target for cetacean bycatch has been met in the North Sea*', where regional porpoise bycatch hotspots remain (including the south east of England[1]) and should continue to be a focus to meet ASCOBANS requirements towards zero bycatch[2]. We remain extremely concerned about the ongoing level of porpoise and other species bycatch in the Celtic Sea.

The assessment states that bottlenose dolphins in the Greater North Sea have also achieved GES, but populations elsewhere are unknown. Again, we do not believe this is an accurate assessment, given the ongoing issues of cetacean bycatch in UK waters affecting species around the UK. We believe a more accurate assessment would be GES not achieved, declining given that the population of bottlenose dolphins in Southwest England are declining, numbering just 28 individuals.[3]

We believe that the status for other cetaceans is accurate given the lack of monitoring. However, there is growing evidence to suggest that the West coast Orca population is declining and is expected to go extinct[4], humpback whales may not be recovering from whaling, as they are in some other regions of the world, due to entanglement in creel lines around the Scottish coastline,[5] harbour porpoise bycatch is high[6] and other coastal populations have high pollution burdens, including UK porpoises, which have longer calving intervals, lower pregnancy rates, later maturation and higher rates of reproductive abnormalities compared to unpolluted populations in other regions.[7]

D1, D4 - Seals

In general, we do not agree that the status for seals (as a whole) is '*uncertain and improving*[8]', for the reasons outlined below.

We believe that under the current criteria and targets for measuring GES of grey seals, that the assessment is accurate. However, we do not agree with the assessment of harbour seals.

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[1] https://www.google.com/url?q=https://www.wwf.org.uk/sites/default/files/2019-04/Review_of_harbour_porpoise_in_UK_waters_2019.pdf&sa=D&ust=1560156537820000&usg=AFQjCNFrFfHd0bSxJCZHc1zLmxAQ3kvKkg

[2] https://www.google.com/url?q=https://www.ascobans.org/en/species/threats/bycatch&sa=D&ust=1560156537819000&usg=AFQjCNG5TYdpPqdGSPjYC0VIlTdUsj38-w

[3] https://www.cornwallwildlifetrust.org.uk/news/introducing-cornwalls-resident-bottlenose-dolphin-community&sa=D&ust=1560156537848000&usg=AFQjCNGltuVS3ZHbQxrzyFB7vrIWzQ5voA

[4] https://science.sciencemag.org/content/361/6409/1373/tab-figures-data

[5] https://www.researchgate.net/publication/307477995_Entanglement_an_emerging_threat_to_humpback_whales_in_Scottish_waters

[6] https://nammco.no/wp-content/uploads/2019/02/final-report_hpws_2019.pdf

[7] https://www.nature.com/articles/srep18573

[8] https://moat.cefas.co.uk/summary-of-progress-towards-good-environmental-status/

Harbour seal populations on the east coast and Northern Isles of Scotland are declining dramatically and this is not reflected in the current environmental status. Given the data gaps that exist for harbour seals in the Celtic Seas region and GES not being met in the North Sea region, the headline status of '*uncertain*' for harbour seals is misleading. Furthermore, the integration score (for the Celtic Seas as a whole average) of harbour seal trends assessment units was concluded as '*unknown'* (0) not '*uncertain*[9]'.

D1, D4 - Seabirds

In general, we agree with the assessment that birds have not achieved GES and are declining. We are especially concerned that for all 11 descriptors measured, seabirds are the only group that are both failing and suffering continued decline.

We note that current status is specified only for *'non-breeding waterbirds'* and *'breeding seabirds'* so it is unclear whether *'non-breeding seabirds visiting UK waters'* are covered by the programme. We believe consideration should be given to visiting populations such as the critically endangered Balearic shearwaters visiting the English Channel and the Celtic Sea or wintering auks coming from further North.

With the exception of Atlantic Puffin (for which there are insufficient data), JNCC Seabird Monitoring Programme population trend data appear to support that '*gannet, cormorant and auks*' are achieving GES in the Greater North Sea. However, we disagree with this assessment given that the Online Assessment Tool[10] states: '*For this UK assessment in the Greater North Sea, species were only included in the indicators if sufficient data were available from sites in the UK. Great cormorant was the only species for which data on either breeding abundance or non-breeding abundance were available.* '

We are concerned that the Online Assessment Tool sub-section for '*Distribution of breeding and non-breeding birds*' addresses only waterbirds without any mention or explanation of why truly marine birds are not similarly assessed. Therefore this does not provide an accurate assessment and is disappointing as it is not replicated in other sub-sections such as *'Abundance*' for example.

Further, Page 25, Part 2.3 ('*Progress with developing the UK MPA network*') conveys a falsely optimistic overview of MPA designation, as does '*Progress and actions since 2012*' on page 53, which states that new measures taken since 2015 includes '*designation of Special Protection Areas*'. These statements overlook that no offshore SPAs have yet been designated to protect the key foraging grounds of the UK's cliff-nesting seabirds (Scottish sites and 2 Northern Irish sites are still only 'possible' SPAs).

That the majority of Marine Conservation Zones (MCZs) and Nature Conservation MPAs do not cater for seabirds (and other mobile species) as qualifying features compounds this deficit. So while we agree that Special Protection Areas (SPAs) and MPAs are '*likely to help reduce impacts from human activities and thus increase the resilience of seabirds facing the negative impacts of climate change*'[11], the designation of offshore SPAs - far less their eventual management - has not been commensurate

[9] https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/seals/abundance-and-distribution/ (Table 7)

[10] https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/birds/abundance/

[11] https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/birds/abundance/

with delivering the contribution they could potentially make to achieving GES. Furthermore, the absence of adequate and effective management on many existing MPAs across the UK (e.g. only 4.48 % of Northern Irish MPAs considered to be under favourable management in 2017/18[1]) is not accurately represented or addressed in Part 2.3. Reliance on MPAs to 'play a significant part in supporting the achievement of GES for a number of descriptors' will not be realised without adequate management measures to complete the MPA network.

Section 3 also states on page 53 that '*New measures put in place since the UK programme of measures was published in 2015 include designation of Special Protection Areas and black guillemot MPAs in Scotland*.' Marine SPAs have yet to be formally designated in Scotland and the black guillemot Nature Conservation MPAs in Scotland currently have no management plan in place , greatly hindering the effectiveness of these stated new measures.

Table 3 on page 35, omits identification of the relevant pressures and associated activities which may be affecting birds. However, these are identified in the Online Assessment Tool. We would like to see a summary of the main pressures included in the strategy itself.

Page 43, table 4, includes the statement that '*Changes in sea temperature also produce changes in density of sea water, affecting circulation, stratification and mixing*'. We believe it is an oversight, however, not to have included the reduction of sea water density due to sea warming increasing its volume, contributing significantly to sea level rise, with potential impacts on (e.g.) key habitats for waterbird populations. Also, while the potential impact of ocean acidification on calcium carbonate-secreting organisms is highlighted, it is also important to be aware of potential negative impacts of acidification on the larval growth and survival of fish which are keystone species in the ecosystems of UK waters, as shown in recent US research on sand lance.[12]

D1, D4 - Fish

Although taxonomically correct, the inclusion of elasmobranchs (sharks, skates and rays) in the Fish/Commercial Fish categories fails to take into account their more conservative life history strategy, and historic lack of management. With around 40 sharks and 30 skates and rays found in UK waters, and 11 species on the OSPAR Threatened species list, we believe that explicit reference (beyond single mention of Basking Sharks, deepwater sharks, and skate and ray) is warranted. Furthermore the report does not differentiate between those elasmobranchs now classified and protected as 'wildlife' (such as Basking sharks and Angelsharks) versus those still considered 'fish' and treated as a commercial commodity. Many elasmobranchs are of commercial interest, a number of species devoid of any management (e.g. Smoothhound), yet retained as a valued element of mixed fisheries.

D1, D4 - Pelagic Habitats

We do not agree with the assessment for pelagic habitats.

We do not believe the assessment for pelagic habitats can be described as an accurate assessment given the data gaps that exist and the limited scope of the included parameters. For example, phytoplankton biomass was not assessed for echohydrodynamic area of the Celtic Seas, as the model

[12] https://befel.marinesciences.uconn.edu/tag/sand-lance/#

was less reliable and detailed than that for the North Sea. Furthermore, the current assessment only focuses on the plankton component of the pelagic habitat, which results in an incomplete picture of this indicator. Given the data gaps, national vs OSPAR level data and assessment inconsistencies[13,14], low confidence in the drivers of change for the indicator and that zooplankton was not considered in 2012, a more appropriate determination of the status of pelagic habitats would be *unknown* rather than '*uncertain and stable since 2012*'. We also raise concerns over the use of the total length of the time series being considered as the '*reference period*' given its potential to introduce bias in the results.

D1, D6 - Benthic Habitats

In general, we agree with the assessment for benthic habitats and acknowledge there is regional variation in the condition of the seabed. We also recognise that many human activities impact the seabed and agree that the most challenging pressure to manage is the use of mobile demersal fishing gear[15]. In the broader context these challenges result from several issues, including lack of sufficient data (both ecological [baseline] monitoring and for the footprint of the fishing fleet), lack of adequate enforcement (insufficient reward for good practice or disincentives/penalties for illegal activities), lack of adequate governance (particularly in devolved UK countries, e.g. Scotland, where fishing is centrally managed with few regional authorities), lack of resources and across all of these a lack of political will to change the management regime. We suggest that without a progressive approach at the system level through strong future fisheries legislation across the UK and within the devolved countries, and the resources to implement it well, the targets proposed as part of the UK marine strategy are unlikely to be effective.

In relation to the assessment we note poor ICES advice on seafloor integrity that doesn't consider epibenthic species or habitats in both sensitivity and recoverability responses to impact by bottom towed fishing (only infauna is considered).

There is also poor spatial representivity of both fishing data (and only by >12m vessels), reporting positions only once every 2 hours, and benthic data for offshore habitats.

There is no true experimental design (e.g. long-term, large, effectively enforced) 'no trawl' zones to understand responses of environment to curtailing fishing impact. The majority of UK marine protected areas allow demersal fishing activity to continue within them in one form or another, with only the most sensitive habitats restricted often on a zonal basis. However, the issue here is that data is lacking with which to define what sustainable use actually is (see Hopkins and Bailey, 2016). The general ambition of MPAs has been to preserve features in their current state, therefore any expectation of an improvement to benthic habitat condition is unlikely to be realised when current levels of pressure are largely unchanged.

[13] https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/habitats/changes-phytoplankton-and-zooplankton-communities/

[14] https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/pelagic-habitats/plankton-communities/

[15] https://www.dropbox.com/sh/yd8l2v0u4jqptp3/AACpraYjOYWpTxAFv5H-2vrKa/1%20Global%20Assessment%20Summary%20for%20Policymakers?dl=0&preview=Summary+for+Policymakers+IPBES+Global+Assessment.pdf&subfolder_nav_tracking=1

Furthermore, ICES haven't used historical baselines to assess potential for biodiversity disturbance, ecosystem function or recoverability rates. They've used extant ecosystems, communities - and only from infauna, in order to assess seafloor integrity in relation to bottom towed fishing[16].

These uncertainties mean that, while it is clear from current data that benthic habitats do not currently qualify for Good Environmental Status (GES), it will be challenging to advance meaningfully without a more progressive approach that will seek to address the shortcomings listed above.

D2 - Non Indigenous Species

We agree with the assessment for Non Indigenous Species (NIS) but believe there are additional inaccuracies and gaps in this assessment.

While it is recognised that NIS can be a problem in the marine environment, there is no real acknowledgement that NIS are particularly hard to control in this environment. Therefore, it is hugely important that every measure possible should be taken to prevent introduction in the first place, rather than having to control species once they have become established.

The assessment only briefly mentions the risk of climate change increasing the establishment of NIS on page 42. Warmer temperatures are likely to create more favourable conditions for NIS to survive and establish themselves in UK waters, where they may not have been able to colonise easily in the past. Given recent declarations of a climate emergency in Government, plans to reduce and slow this likely occurrence should be a priority in future iterations.

The NIS section of the summary table on page 12 states '*Our ability to detect new NIS has improved*', but to ensure this translates into action on the ground we would like clarification on how the information and data collected are being used.

We believe the statement that '*no increase in the number of INNS species*' is unreliable. We do not believe the assessment should be based on the number of species because this is less significant compared to the impact invasive NIS may have. For example, a high number of NIS which aren't invasive could cause less damage than one or two which are invasive and harmful, despite their small number. This is further compounded by the clear lack of data, monitoring and reporting as highlighted on page 62 where it is stated that '*the conclusion that there was no significant change of new introductions of NIS between 2009 and 2014, is of low confidence, due largely to lack of consistent monitoring effort and/or reporting*'.

As stated on page 61, there has been no reduction in the risk of introductions and with the lack of reporting, monitoring and effective assessment methods, the risk remains high. We are therefore concerned that we are not sufficiently equipped or informed to rapidly deal with new NIS introductions when they occur. We therefore agree with the acknowledgement on page 11 that this issue can only be effectively addressed by working at an international level.

On page 62, the report acknowledges that '*Due to the large volume of international shipping in UK seas, the achievement of GES will to some extent be dependent on all flag states adopting international controls that prevent the introduction of NIS, such as the international ballast water control standards*

[16] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/Special_requests/eu.2017.13.pdf

of the Ballast Water Convention'. There has been little progress on this issue since the 2012. Recent pathway analysis conducted by the GB Non-Native Species Secretariat shows ballast water as one of the most significant ways of introducing new NIS. Though the Ballast Water Convention is now in force it needs ratification by more significant flag states, including the UK who have been disappointingly slow in signing up to the Convention.

We believe the report fails to account for the interaction of NIS on the achievement of other descriptors, such as seabird recovery, where mammalian predators on islands have a significant impact.

On page 10 of the report, the assessment suggests progress is being made on achieving GES for NIS by stating '*the impacts of these measures will take time to take effect*'. However, we cannot support this assessment without further clarification on what additional measures have been put in place.

Page 10 also states for the NIS that '*a key recommendation of the 2012 Strategy was to put in place the necessary monitoring programmes and indicators so that we could assess GES*'. Yet, given comments above in reference to page 62 ('*the conclusion that there was no significant change of new introductions of NIS between 2009 and 2014, is of low confidence, due largely to lack of consistent monitoring effort and/or reporting'*.) we do not believe progress has been made and are disappointed by the lack of information in the report on specific monitoring programmes in place.

The report fails to acknowledge recent evidence that marine litter can be a vector for NIS (although this was mentioned in Part 1 from 2012, paragraph 305 on page 95. Reducing marine litter could help slow the rate of introduction of new NIS.

D3 - Commercial fisheries

We do not agree with the assessments made for commercial fisheries.

The information provided to support the reflection of the current state of UK waters draws upon information which is four years old. While we appreciate that fisheries data is often a year out of date with regards to assessment, four years does not accurately reflect the current situation. We believe this is an oversight considering the significant pieces of legislation implemented since 2015, including the landing obligation. The landing obligation is likely to have had a significant impact on the state of fish stocks and the gradually-introduced requirement for fishing opportunities to be set at sustainable levels since 2015 is also likely to have had an influence on the current state of UK stocks. Therefore, we do not believe the report accurately reflects the current state because it fails to take into account these significant new pieces of legislation under the Common Fisheries Policy (CFP). We also believe the reference period used is insufficient to provide an accurate reflection of commercial fish stocks because the reference predates the Marine Strategy Framework Regulation. Therefore it does not take changes from this legislation into account.

The report also states on page 64 that '*assessments for 61% of shellfish stocks were not carried out and their status is not known*' and that of the remaining 39% of shellfish catches, 37% were fished unsustainably and '*no assessment was possible in relation to their reproductive capacity relative to MSY*'. This suggests that only 2% of shellfish stocks in UK waters had enough data to provide a full assessment, allowing catches to be set in line with sustainable levels. We therefore don't believe the

report provides an accurate reflection of UK fisheries because it lacks information on a large proportion of the UK's fishing industry.

The assessment should be based on up-to-date information on a much wider range of commercial fish stocks. This will provide a more accurate, and therefore useful, reflection of achievement towards GES.

D8 - Contaminants

We do not agree with the assessments made for contaminants.

The report states that GES for contaminants as of 2018 has been largely achieved, suggesting that marine pollution from contaminants is under control. However, we believe this provides an extremely misleading and narrow reflection of the state of contaminants in UK waters.

Marine pollution from legacy persistent organic pollutants (POPs) subject to a global ban, such as Polychlorinated Biphenyls (PCBs) which are jeopardizing the survival of the UK orca population[17], will remain a major issue for decades given that '*the removal and remediation of contaminated sediments on a large scale is regarded as being technically infeasible*'.[18]

Many emerging, very persistent, bioaccumulative and toxic synthetic chemicals that are still widely used (and not assessed in the Marine Strategy) are finding their way into the marine environment. These have the potential to create a similar situation to that seen with PCBs, in that they may reach critical concentrations that endanger marine biodiversity and become impossible to remove from the marine environment. Examples of such chemicals include per- and poly-fluorinated substances (a chemical family made up of more than 4,000 substances, which are also known as 'forever chemicals' due to their extreme persistence[19]) and unregulated brominated flame retardants.

Pharmaceuticals (again, not assessed in the Marine Strategy) are being found in UK estuaries[20]. They can have adverse impacts on organisms even at low concentrations[21].

Several pesticides not assessed in the Marine Strategy and part of the Water Framework Directive Watch list (e.g. neonicotinoids) have already being found in UK rivers[22], the pathways to the marine environment. Many ingredients in pesticide formulations are potentially toxic to marine organisms[23].

[17] Desforges, J. P., et al. 2018. Predicting global killer whale population collapse from PCB pollution. Science 361: 1373–1376.
[18] Marine Strategy Part 3: UK programme of measures. December 2015.
[19] Fair, P.A. and Houde, M., 2018. Chapter 5 - Poly- and Perfluoroalkyl Substances in Marine Mammals. Marine Mammals Ecotoxicology. Impacts of Multiple Stressors on Population Health. Pages 117-145. https://doi.org/10.1016/B978-0-12-812144-3.00005-X
[20] Letsinger, S., et al., 2019. Spatial and temporal occurrence of pharmaceuticals in UK estuaries. Science of The Total Environment, 678, pp.74-84. https://doi.org/10.1016/j.scitotenv.2019.04.182
[21] CHEM Trust, 2014. Pharmaceuticals in the Environment: A growing threat to our tap water and wildlife. https://chemtrust.org/medicines-in-the-environment-a-growing-threat-to-wildlife-and-drinking-water
[22] Casado, J., et al., 2019. Screening of pesticides and veterinary drugs in small streams in the European Union by liquid chromatography high resolution mass spectrometry. Science of The Total Environment. V 670, p 1204-1225. https://doi.org/10.1016/j.scitotenv.2019.03.207
[23] IPEN, 2018. Ocean pollutants guide. Toxic threats to human health and marine life. https://ipen.org/sites/default/files/documents/ipen-ocean-pollutants-v2_1-en-web.pdf

Over 22,000 substances produced or imported at over 1 tonne/year are registered for use in the EU; 1,045 chemicals are classified as 'very toxic to aquatic life' under the EU harmonized classifications; new substances are being added to the market each year and many legacy pollutants are being replaced by chemicals with similar properties[24]; a recent study demonstrated that "the diversity and quantity of synthetic chemicals created, distributed, and released into ecosystems have been increasing at rates greatly surpassing those of other drivers of global environmental change"[25]. Therefore, as concluded in the recent report '*Contaminants in Europe's seas*' from the European Environment Agency (EEA)[26], contamination of our seas remains a 'large-scale challenge' and not a battle that has been won.

Therefore, we believe that the conclusions drawn in the report are scientifically incorrect as progress against the targets for D8 has been conducted in a misleading way.

Even though estuarine waters were monitored for a larger group of contaminants, in alignment with the Water Framework Directive[27], the list of contaminants assessed in territorial waters is extremely limited.

In addition to metal contaminants, and polycyclic aromatic hydrocarbons (PAHs), the Strategy assessed just two groups of synthetic chemicals (PCBs and PBDEs) in sediment and biota in territorial waters. We believe this is unambitious and does not reflect the full range of chemical substances that pollute UK marine waters, as we have outlined above.

For a number of UK biogeographic regions in the Marine Strategy, all substances in sediment and biota were not monitored, and there was a lack of assessment criteria for PBDEs and alkylated PAHs. With such gaps in assessment criteria and a lack of monitoring data for a number of regions, we doubt that the Strategy can provide an accurate reflection of the state of UK marine waters.

It is encouraging to see that levels of PCBs in biota and sediment were below the Environmental Assessment Criteria thresholds in many regions. However, the UK was granted an exception for this descriptor as the PCB-contaminated sediment cannot be removed for '*technical and financial reasons*'[28]. It is therefore entirely misleading to state that GES has been achieved for Descriptor 8, as the target for PCBs set out in the Marine Strategy has not been met, and by the Government's own admission historic contamination from PCBs will not be resolved. It should not be possible to state GES has been achieved when contamination from PCBs has been exempted from the assessment,

[24] CHEM Trust, 2019. Regulating substances as groups: creating more rapid and effective risk management of hazardous chemicals. https://chemtrust.org/regulating-substances-as-groups/
[25] Bernhardt, E. S., et al., 2017: Synthetic chemicals as agents of global change. Frontiers in Ecology and the Environment 15(2), pp. 84-90. https://www.caryinstitute.org/sites/default/files/public/downloads/news/fee_1450_rosi.pdf
[26] EEA, 2019: Contaminants in Europe's seas. Moving towards a clean, non-toxic marine environment. Publications Office of the European Union, Luxembourg, European Environment Agency. https://publications.europa.eu/en/publication-detail/-/publication/f778c998-713e-11e9-9f05-01aa75ed71a1
[27] Environmental Quality Standards Directive (EQSD) list for WFD assessments. https://www.gov.uk/government/publications/list-of-chemicals-for-water-framework-directive-assessments/environmental-quality-standards-directive-eqsd-list-for-wfd-assessments
[28] https://moat.cefas.co.uk/pressures-from-human-activities/contaminants/

particularly given that PCBs continue to pose a threat to the health of marine wildlife, such as orca, and to humans[29, 30] .

The EEA monitored similar groups of substances in their report[31], but reached a different overarching conclusion compared to the Marine Strategy. The conclusion in the Marine Strategy is completely inappropriate for the reasons outlined above, and will likely result in the continuation of insufficient action on chemical substances in UK marine waters, and the continuation of environmental contamination.

For these reasons we do not believe the assessment provides an accurate reflection of the state of UK waters. Instead, we suggest an assessment of '*GES not achieved*' and a declining situation.

D9 - Contaminants in Seafood

We do not agree with the assessment for contaminants in seafood.

Though it is encouraging to see the high level of compliance with regulatory thresholds for the fish tested, many of the thresholds are under revision or will be revised soon and we cannot be confident the situation is as good as it seems. Moreover, the limited number of substances monitored, and the small sample sizes mean that we cannot be confident that the assessment provides an accurate reflection of contaminants in seafood in UK marine waters.

D10 - Marine litter

We agree with the assessment for marine litter as we do not believe GES has been achieved for this descriptor.

Plastic pollution is now deemed a major threat to marine biodiversity, known to negatively impact more than 800 species including birds, marine mammals and turtles.[32] Plastic waste accumulates rather than decomposes, causing near permanent pollution of the marine, freshwater and terrestrial environment.[33] When plastic fragments into micro- and nano-particles, it continues to pose significant risk to marine ecosystems. The River Tame has been identified as having the highest levels of microplastic pollution documented anywhere globally to date.[34] Another environmental cost incurred through plastic manufacturing is pre-production pellet loss, the second-largest direct source of marine microplastic pollution by weight.[35] Pellets used to manufacture all plastic products escape into

[29] CHEM Trust, 2008: Effects of pollutants on the reproductive health of male vertebrate wildlife – males under threat. https://www.chemtrust.org/wp-content/uploads/Male-Wildlife-Under-Threat-2008-full-report.pdf
[30] CHEM Trust, 2017: No Brainer: The impact of chemicals on children's brain development: a cause for concern and a need for action. https://www.chemtrust.org/wp-content/uploads/chemtrust-nobrainer-mar17.pdf
[31] European Environment Agency, 2019: Contaminants in Europe's seas: Moving towards a clean, non-toxic marine environment. Publications Office of the European Union, Luxembourg. https://www.eea.europa.eu/publications/contaminants-in-europes-seas/
[32] Secretariat of the Convention on Biological Diversity and the Scientific and Technical Advisory Panel—GEF, 2012. Impacts of Marine Debris on Biodiversity: Current Status and Potential Solutions, Montreal, Technical Series No. 67, 61 pages
[33] Geyer R et al, 2017. Production, use and fate of all plastics ever made, Science Advances, 3:7. Available at: http://advances.sciencemag.org/content/3/7/e1700782
[34] Hurley et al. 2018. Microplastic contamination of river beds significantly reduced by catchment-wide flooding. Nature Geoscience. https://doi.org/10.1038/s41561-018-0080-1
[35] Eunomia, 2018. Investigating Options for Reducing Releases in the Aquatic Environment of Microplastics Emitted by Products. Available at: https://www.eunomia.co.uk/reports-tools/investigating-options-for-reducing-releases-in-the-aquatic-environment-of-microplastics-emitted-by-products/

waterways if spills occur, which can happen at each stage of the production, transport or conversion process. Studies estimate that as many as 53 billion pellets could enter the environment from spillages by companies across the UK plastic supply chain each year.[36]

We are aware that the UK Government may be considering an Article 14 exemption for D10 (Marine Litter) due to historical litter and the fact that it travels widely. Though a proposed exemption to achieving GES for Descriptors Article 14 (1) requires Member States to "*continue pursuing the environmental targets, to prevent further deterioration in the status of marine waters*".

The consultation document identifies a series of strategies designed to prevent littering and other sources of leakage but has failed to review the efficacy of said strategies at preventing marine litter. Whilst some existing legislation provides a strong framework for preventing marine litter, strong implementation and enforcement are essential to achieving the aims. For example, the Landfill Directive, Packaging and Packaging Waste Directive and Urban Waste Water Treatment Directive are key to preventing terrestrial sources of marine litter, whilst MARPOL aims to prevent dumping of waste at sea. However inadequate implementation and enforcement are undermining their effectiveness.

Previous studies have identified approximately 1,200 Historic Landfill sites in the UK that are at risk of coastal flooding or erosion[37]. Many of these were filled under less stringent regulations than present day landfills and placed onto or near what are now environmentally valued marine conservation sites. The potential volume of waste that could be released into the marine environment from these sites is vast, with flooding and erosion over the next century expected to be exacerbated by sea level rise. Many landfill sites contain plastics which will persist and pollute the oceans if left to erode. Further measures are required to prevent litter escape and reduce waste going to landfill, through increased inspections and fines, closure of non-compliant landfills and illegal dumpsites and ultimately a phase-out of landfilling of plastics and other recyclable materials.

The SCOPAC report 2019 identified 144 historic coastal landfill sites on the English south coast alone, covering separate areas totalling 22sqkm[38]. The majority of these sites are on publicly owned land and there is a lack of information about their contents. The Shoreline Management Plan (SMP2) policy recommendation for most of these landfills is '*Hold the Line*' (HTL), i.e. to protect them from flooding and erosion. However, at present as far as protection of coastal landfill is concerned, this is aspirational because there is no appropriate funding mechanism for protection measures.

D11 - Underwater noise

We welcome the establishment of the noise registry as a collation tool for noisy activities which have taken place. However, improvements are required to have a tool which would be fit for purpose in managing future noisy activities such as capturing noise which is predicted to occur. The risks from cumulative noise impacts are significant if not adequately managed and currently there is no

[36] Eunomia, Study to Quantify Pellet Emissions in the UK (2016), available at http://www.eunomia.co.uk/reports-tools/study-to-quantify-pellet-emissions-in-the-uk/
[37] SCOPAC Coastal Landfills Study: Coastal Flooding, Erosion and Funding Assessment February 2019, https://scopac.org.uk/wp-content/uploads/2019/02/SCOPAC-LANDFILLS-REPORT-2019-v2-MAIN-REPORT.pdf
[38] SCOPAC Coastal Landfills Study: Coastal Flooding, Erosion and Funding Assessment February 2019, https://scopac.org.uk/wp-content/uploads/2019/02/SCOPAC-LANDFILLS-REPORT-2019-v2-MAIN-REPORT.pdf

mechanism in place for collating future noise impacts for management. Further gaps exists including, certain noise inputs have no licence condition to submit data to the register, and no noise activity from licenced activities in Northern Ireland has been included therefore it is not a complete assessment of noise in the UK region.

2. To what extent are the proposed new criteria and associated targets sufficient to guide progress towards achievement of GES?

D1, D4 - Cetaceans

We are concerned generally that the level of ambition for marine mammals simply relates to preventing further deterioration, even using baselines of the recent past, and that further declines are allowed in all species of up to 5% in 10 years from current conditions (which have not been shown to be in GES in most cases as part of this assessment). The choice of baselines is therefore obviously crucial in this regard. We understand that, as in 2012, the baseline relates to current conditions (for population abundance) or the inception of the Habitats Directive (for distribution). We infer this to mean that the current range is assumed to be the same as the date in which the Habitats Directive was enacted but we seek further clarification on this, as there are species, such as bottlenose dolphin, which have declined significantly in the last 10 years.

Even a baseline of the inception of conservation legislation is not acceptable, given the fact that the legislation was introduced as a response to declining populations, including of marine mammals. Indeed, as the detailed table in the appendix of the Cefas report states, evidence on the core distributional range of grey seals has been collected since the 1960s, well before the inception of the Habitats Directive.

We also seek clarification about the use of the "statistically significant" approach when describing declines, which may not be proven until there is adequate evidence to compare the current state with the baseline (i.e. the decline is shown after it has happened), when the aspiration should be to increase population numbers, in particular, and apply the Precautionary Approach given the current stated uncertainty and scientific cause for concern. If it is decided to follow the statistical significance path, at least a more precautionary level of 0.01 should be used rather than 0.05, which would not allow for further declines to be allowed as non-significant outcomes.

<u>Bycatch mortality</u>

The operational targets for cetacean bycatch are inadequate to guide progress towards achieving GES, given that they allow further declines of key cetacean populations due to cetacean bycatch. Even with a similar target six years ago, it is still thought that hundreds, if not thousands of cetaceans are killed in UK waters in fishing nets each year.[39] Further targets and increased monitoring and mitigation measures are required.

While we welcome the development of a UK cetacean bycatch strategy, it is imperative that delivery of this work is not further delayed and a pre-determined time frame is set. To deliver this, we propose a target to ensure '*bycatch rates for porpoises and dolphins and entanglement rates for whales are significantly reduced with the aim of achieving zero bycatch* and *adequate bycatch monitoring to accurately assess bycatch rates and to measure bycatch reductions against'.* We set out the necessary

[39] https://www.wwf.org.uk/sites/default/files/2019-04/Review_of_harbour_porpoise_in_UK_waters_2019.pdf

aim and measures for such a strategy in our proposal of 2017[40] where we stated that '*bycatch of non-target species, particularly endangered, threatened and protected species (including seabirds, marine mammals, sharks, rays and turtles) must be recorded and minimised, (i.e. ultimately reduced to zero). There should be a requirement for regulatory bodies to develop a bycatch strategy, with the aim to continually reduce bycatch, which will include the use of effective mitigation measures, robust data collection on board and annual reporting protocol, and a monitoring regime including the use of stranding data, and Remote Electronic Monitoring with cameras where higher levels of footage are reviewed on high risk vessels. To reduce unwanted catches in the first instance, regulatory bodies and decision-makers should be empowered to incentivise more selective fishing methods and gear types. This will deliver towards Commission decision (EU) 2017/848, namely D1C1 — 'Primary: The mortality rate per species from incidental bycatch is below levels which threaten the species, such that its long-term viability is ensured.'*

Population abundance

We note the change in target from "At the scale of the MSFD sub-regions abundance of cetaceans is not decreasing as a result of human activity: in all of the indicators monitored, there should be no statistically significant decrease in abundance of marine mammals caused by human activities" to "There should be no significant decrease in abundance caused by human activities". This continues to allow further decline from current baselines, rather than seek tangible recoveries in cetacean populations. We recommend that the target be amended to '*there is a statistically significant increase in the abundance of all cetacean groups'.*

We also recommend a target for monitoring cetacean populations, such '*adequate surveillance monitoring to assess population status of all the UKs regularly occurring cetaceans, as required under the Habitats Directive is undertaken'*. Though we acknowledge SCANS and COMPASS are important monitoring projects, we are concerned that it would not be possible to assess whether the current monitoring target is being achieved for most cetacean species in UK waters, through SCANS alone. To meet monitoring targets, inclusion of other surveillance surveys that take place at other times of the year, including those undertaken regularly by NGOs, will be necessary and we believe our proposed target could deliver that.

Marine activities that have the potential to cause disturbance or injury should be also brought in line with legislative requirements, including marine tourism and the use of Acoustic Deterrent Devices around fish farms, requiring oversight and potential reform. In combination with better monitoring of cetacean populations, a target on cumulative impacts could help achieve GES. We propose populations are not threatened by the combination of pressures that cetaceans face, including chemical and noise pollution, bycatch and disturbance.

The nutritional status of cetaceans should be included as an additional criterion. By measuring blubber thickness, changes in food supply and pressures on cetacean populations can be monitored. Currently, HELCOM aim to assess the nutritional status of all marine mammals, for determining GES. We believe a similar assessment would be beneficial to both the UK marine strategy and OSPAR members' marine strategies.

Population distribution

[40] https://www.wcl.org.uk/docs/Link%20briefing%20-%20MSFD%202nd%20cycle%20indicators%20and%20targets.pdf

We note the change in target for population distribution from '*At the scale of the MSFD sub-regions the distribution of cetaceans is not contracting as a result of human activities: in all of the indicators monitored there is no statistically significant contraction in the distribution of marine mammals caused by human activities*' to '*Population ranges are not significantly lower than favourable reference values for the species*.'. We believe, assuming that the baselines are the same, that this represents a weakening of the target.

The UK Dolphin and Porpoise Conservation Strategy should provide a useful tool to develop targets beyond bycatch, for other human activities, including cumulatively, but it lacks the legislative footing and is behind schedule on implementation. However, both the conservation strategy and this assessment fail to address the area and quality of habitat for cetacean populations. A target should be set to preserve the size and quality of known cetacean habitats. For all species indicators, a target should be included that addresses the lack of management plans for MPAs. Specifically, we proposed that '*all MPAs which have been designated for the protection of any cetacean species must have management plans and regular monitoring strategies in place'*.

D1, D4 - Seals

The two proposed criteria and indicators are not fully sufficient for monitoring progress towards achieving GES for seals. While population abundance and distribution, and, grey seal pup production are welcome criteria, they do not adequately address declines.

Bycatch mortality

Similar to cetaceans, we propose a target to ensure '*bycatch rates for seals are decreasing with an aim of achieving zero bycatch'* along with additional aims and measures from our 2017 proposal[41]. As bycatch of harbour seals has been reported in areas where declines are occurring, this should be a particular focus of attention and the areas of concern should be prioritised.

Furthermore, given the data gaps that currently exist (addressed in question 4) it is crucial that such gaps are addressed so that more ambitious criteria and targets can be included. We therefore propose the following target that '*adequate surveillance monitoring to assess population status of all the UKs regularly occurring seals, as required under the Habitats Directive is undertaken'*.

Population abundance and distribution

The new criteria and targets do not address the area and quality of habitat for seal populations. A target should be set to preserve the size and quality of known harbour seal and grey seal habitats. Protection should be included as a criterion and target for measuring progress towards GES. For all species indicators, a target should be included that addresses the lack of management plans for MPAs. All MPAs which have been designated for the protection of harbour and grey seals must have management plans and regular monitoring strategies in place.

Nutritional status of harbour and grey seals should be included as a criteria, with blubber thickness consistent with healthy condition set as a target for measuring progress towards GES in the future.

[41] https://www.wcl.org.uk/docs/Link%20briefing%20-%20MSFD%202nd%20cycle%20indicators%20and%20targets.pdf

Such criteria exists in under the HELCOM Baltic Sea Action Plan.[42] Blubber thickness can be measured from stranded, hunted and bycatch seal species. By measuring blubber thickness, changes in food supply and pressures on seal populations can be monitored.

The distribution of seals could be better understood by using telemetry data. Currently, distribution is not adequately assessed, as it is used as a surveillance indicator to help determine changes in abundance.

D1, D4 - Seabirds

The proposed criteria and targets for UK seabirds are not sufficient to achieve GES.

Bycatch mortality

As the report states, Seabirds are continuing to decline so a significant increase in ambition and delivery is required. Whilst the proposed targets will, if delivered in a timely fashion, make some progress in reversing the declines of UK seabirds, there is an absence of a coherent and timely plan of action.

For seabird bycatch, we would highlight that this is not a new plan of action. In the Marine Strategy Part Three: UK programme of measures 2015[43], The UK governments committed to '*translate the FAO and EU Seabird Bycatch Plans of Action into a UK relevant action plan outlining measures and actions necessary to ensure seabird bycatch in UK waters is not having a detrimental impact on seabird populations.*' While we welcome the addition of a new criterion regarding Seabird bycatch and that a UK Plan of Action on Seabird Bycatch is currently under development to address it, it is imperative that delivery of this work is not further delayed. As we have previously commented[44], this criterion should consider impacts across the defined seabird groups; e.g. *'Risk of bycatch of Marine Birds, across the defined species groups (Grazing birds, Wading Birds, Surface-feeding birds, Pelagic feeding birds and Benthic-feeding birds), should be reduced and where possible eliminated.'*

We set out the necessary aim and measures in our proposal of 2017[45,] which we outline in answer to D1, D4 cetaceans above.

We consider that the threshold mortality rate from incidental bycatch under Marine Strategy Criterion D1C1 should be *1% of natural annual adult mortality of the species*. This threshold aligns with the ORNIS Committee definition of "small numbers" within the context of allowing a derogation under Article 9 of the Birds Directive (in a bird hunting context) from no deliberate bird killing. As such, the 1% threshold exists as a precedent, accepted by the European Commission and upheld in European Court of Justice rulings, albeit in other contexts.

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[42] http://www.helcom.fi/Core%2520Indicators/Nutritional%2520status%2520of%2520seals%2520HELCOM%2520core%2520indicator%25202018.pdf&sa=D&ust=1559722939052000&usg=AFQjCNFWLVTBwfp-vVnhzdgFrFP32e6i2A

[43] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/486623/marine-strategy-part3-programme-of-measures.pdf

[44] https://www.wcl.org.uk/docs/Link%2520briefing%2520-%2520MSFD%25202nd%2520cycle%2520indicators%2520and%2520targets.pdf&sa=D&ust=1560502512463000&usg=AFQjCNEpsAnRHL-MQYOCvK8FaxIo9FQLBw

[45] IBID

The MSFD is clear that threshold values are to be used to assess whether a Member State has achieved GES, and not to set a minimum trigger for managing the impact of fisheries on seabirds. Therefore, even if a threshold under Criterion D1C1 is met, we maintain that fisheries measures are still required to 'minimise and where possible eliminate' bycatch in accordance with other legislation and agreements, in particular the EU Birds Directive and EU Seabird Plan of Action.

Population abundance

The population abundance proposals continue to use the assessment criteria of:

Population Size: At the scale of the Marine Strategy Framework Directive sub-regions abundance of marine birds is not significantly affected by human activities: Changes in abundance of marine birds should be within individual target levels in 75% of the species monitored.

In our response to the initial 2012 consultation on targets and indicators, we recommended that the UK set the target of *'changes in abundance of marine birds should be within individual target levels in 90% of species'*[46]. Within the 2012 consultation two targets were proposed, and views sought on each. Despite our calls for the second higher (90%) target, UK Governments opted for the much lower 75% target.

We have previously supported and welcomed the use of the ICES and OSPAR developed work on Ecological Quality Objectives (EcoQOs) for population abundance, which has since been officially adopted by OSPAR. We maintain that the UK should strongly encourage and support OSPAR to further develop this work in the light of the MSFD, to ensure this approach to seabird targets is taken across both the Celtic and Greater North Sea subregions and show a positive example by adopting the more ambitious 90% target supported by the HBDSEG group within the Cefas report[47] which states, in regards to setting bird indicators (p. 95) that '*Given that ICES (2008) considered 75% to be the limit below which remedial action should be instigated, the option of a higher target, up to 90%, is more likely to equate to GES*'. Given the continued decline of UK Seabirds adopting this change to a more ambitious target, would be a step towards delivering the UK's aspirations to be global leaders in the recovery of the marine environment.

Distributional range

The online assessment tool notes that the indicator for the distribution of marine birds requires further development before it can be included in an assessment of GES. We want to see far more ambitious, specific actions to improve this indicator that are reference to justify its inclusion, including the need for future monitoring of species such as sea ducks, divers and grebes.

The online assessment results[48] note that:

'The breeding seabirds in this assessment forage offshore, mostly on fish. The species that feed on fish within the water column are faring much better than those that feed at the surface in that a higher proportion were meeting targets for abundance. This agrees with the results of the indicator on marine bird breeding success/failure: the availability of small forage fish species such as sandeel and sprat at

[46] https://www.wcl.org.uk/docs/Link_response_to_MSFD_180612.pdf
[47] http://jncc.defra.gov.uk/pdf/2011_UKMMAS_FinalReport_BiodivTargetsIndicators_v1.pdf
[48] https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/birds/

the surface is probably limiting the breeding success of species like black-legged kittiwake. Ecosystem-specific changes are likely to determine food availability, possibly initiated by past and present fisheries, in combination with climate change.'

The UK Marine Strategy Regulations (2010) require an ecosystem-based approach to the management of human activities in the marine environment, to ensure that the pressure they exert '*is kept within levels compatible with the achievement of good environmental status*'. The sandeel is the staple diet of many seabird species (and essential for their successful breeding), as well as commercially important fish (e.g. cod, mackerel) and sea mammals. Despite this, the current ICES assessment model for sandeel does not take sufficient account of the provisioning needs of seabirds and other species highly reliant on this forage fish (see our suggestion, below, under Q8 on remedying this deficiency). Therefore, it is our view that further onus should be placed on the impacts of human activities on the abundance of species such as sandeels to reduce impacts and enable D1, D4 seabirds to achieve GES. To achieve this we would like to propose target or indicator regarding the impact of human activities directly on the prey species of marine birds, for example '*In UK waters where the sandeel fishery is allowed to operate, fishing mortality (f) should be reduced such that at least one-third of the maximum sandeel biomass is left to take account of the needs of seabirds, cetaceans and other dependent predators.'*

Population demographic characteristics

Though this target is based on OSPAR guidelines[49], there is so much detail behind the proposed target that as expressed it cannot be considered to be SMART.

Firstly, for example, The ICES / OSPAR / HELCOM Joint Working Group on Marine Birds (JWGBird) developed this indicator assessment but has acknowledged some limitations[50]. The assessment methods for the marine bird breeding success / failure indicator currently focus on the extreme events of almost no chicks being produced by a colony, on average, per year. In doing so, they fail to identify other years where poor breeding success could still have significant negative impacts on the population in the longer term.[51]

Secondly, that widespread breeding failure should occur in no more than three years in six seems very high for slow-breeding species which can only raise a single chick per year at best, and with very low rate of 1st-year survival. In addition, the attribution of failure to human activities seems difficult to measure, given that the report concedes that the indicators used are unable to distinguish between human impacts and the effects of prevailing environmental conditions.

We propose that an alert style system is used, similar to that already in place under WeBS alert system. For example, to indicate the severity of breeding failure, an alerts-style system was used, similar to that developed for the Wetland Bird Survey (Atkinson et al 2006). Where the breeding failure target

[49] https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/marine-birds/marine-bird-breeding-success-failure/

[50] http://www.ices.dk/sites/pub/Publication%2520Reports/Expert%2520Group%2520Report/acom/2015/JWGBIRD/JWGBIRD_2015.pdf&sa=D&ust=1560518678819000&usg=AFQjCNHnY_Im7VojkS-e5rDmJvjrN23O4g

[51] https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/marine-birds/bird-abundance/

was exceeded for three out of the previous six years, an "amber alert" was issued for that species in that sub-region. If the target was exceeded for four or more of the previous six years, a "red alert" was issued. In all other circumstances, the species concerned were classed as "green". Adopting such a system should aim to ensure that GES is achieved when seabird species are in the green, not Amber.

Adopting such a system would aid only if the threshold was set to Amber, rather than red, enabling action to be taken prior to mass breeding failure.

D1, D6 - Benthic Habitats

We believe the criteria and targets for benthic habitats should be much more ambitious.

Given the historic, long-term impact of commercial fishing, and other human activities, on the seabed we want to see explicit recognition that the seabed is already in a highly modified and unnatural state. It is therefore insufficient to aspire to a primary target of protecting the current extent and status of seabed habitats. Instead the UK Governments should be mainstreaming habitat recovery within these criteria and targets to increase ecosystem resilience, safeguard their intrinsic and ecosystem service value, and ultimately achieve GES.

To quote a recent report[52] commissioned by Scottish Environment LINK exploring the concept of 'seafloor integrity' (Hopkins and Bailey, 2016): *Achievement of "Good Environmental Status" (GES) under the Marine Strategy Framework Directive (MSFD) requires that marine systems are in "natural" condition, or at least that their current management is "sustainable"*… (p7) Given there are uncertainties around the footprint of the UK fishing fleet and sufficient definitive evidence of the long-term impact of sustained fishing activity on seabed habitats, we cannot conclusively affirm whether current fishing activity is '*sustainable*' or not under this definition. Therefore, in the context of such uncertainty, we want to see a more proactive, progressive and precautionary approach to ensure meaningful ecological change.

The targets propose to '*minimise*' habitats extent loss and damage, and only two out of the four targets proposed '*where possible/feasible reverse [loss of extent/condition]*'. Minimising loss of habitat extent and condition is unlikely to result in the positive progress required to achieve GES for benthic habitats. It implies that some level of damage is still acceptable. In our view this is not in keeping with the primary objectives of the Marine Strategy Framework Directive: *Protect and preserve the marine environment, prevent its deterioration or, where practicable, restore marine ecosystems in areas where they have been adversely affected*. Therefore the targets should seek to reverse and where possible restore the loss of spatial extent and habitat condition and reverse adverse effects on seabed habitats. This should also be relative to or reflective of the sensitivity and life history of features (e.g. slow-growing habitat forming species, such as Maerl) and should apply within and outwith MPAs. Rice et al.'s[53] description of sustainable management suggests that rapid recovery should be enabled with the removal of a pressure; if activities that damage the seafloor are not operating within these limits it then becomes clear that the level of activity is too great. This is

[52] http://www.scotlink.org/wp/files/documents/SEL_SeafloorIntegrity_Report_A4_March19-1.pdf
[53] Rice, J., C. Arvanitidis, A. Borja, C. Frid, J. Hiddink, J. Krause, P. Lorance, Á. Ragnarsson, M. Sköld, and B. Trabucco. 2010. Marine Strategy Framework Task Group 6 Report: Seafloor integrity. EUR 24334 EN – Joint Research Centre, Office for Official Publications of the European Communities, Luxembourg,.

fundamentally important, not just for the intrinsic improvement of habitat condition, but also for the benefit of the fishing industry. Targets and indicators should have particularly focus on the recovery of critical fish habitats (e.g. nursery grounds, refuges) and management measures should include but not be restricted to instruments such as no take zones and MPAs.

D2 - Non Indigenous Species

The targets for NIS will go some way to guiding progress on GES but, as with biological diversity criteria, there are gaps.

However, as the targets take into account the new criteria and thresholds published by the EU in 2017 and that these will become part of retained EU law post EU exit, there are definite improvements on the previous targets. We believe both the targets to be measurable due to their focus on numbers of new NIS and rate of spread.

We are disappointed to read in the 'How progress has been assessed' section on the Online Assessment Tool that *'Only a partial assessment of one of the targets, examining the introduction of non-indigenous species, was made using the developed indicator. Assessments relating to the spread of non-indigenous species, despite having a developed indicator, were not made due to insufficient data availability.'* Additionally, it is disappointing to note that (as stated on page 92) that there is no threshold value for either of the targets. Although we understand that work is underway in OSPAR to address the absence of a threshold, no indication is given regarding when the threshold value(s) will be set for the targets.

Neither of the new criteria or targets seek to address the issue of established NIS, particularly those which are invasive species. Although it is widely accepted that the majority of effort should go in to combatting NIS not yet established i.e. prevention, there may be some cases where already established NIS (particularly where invasive) should be controlled. A strategic approach, such as the one taken for grey squirrels in the terrestrial environment, i.e. to best protect the remaining red squirrel strongholds rather than attempting to remove every grey squirrel, would be the best approach, although this may be more difficult in the marine environment.

Our proposed target to resolve this would be '*The adverse impacts of NIS are reduced to a level that they do not adversely affect marine ecosystem functioning or the conservation status of particular marine taxa or habitat types.'* In line with Commission decision (EU) 2017/848, abundance and spatial distribution of established non-indigenous species, particularly of invasive species, contributing significantly to adverse effects on particular species groups or broad habitat types. While broadly similar to what is already within the current Marine Strategy, this proposed indicator is stronger, and specifically mentions prevention of adversely altering ecosystems. In addition to this we would like to see a target on management-based targets to reduce the risk from pathways and vectors which facilitate the introduction and spread of NIS.

We support the criteria and associated targets identified (subject to the suggested improvements) but there is scope to develop these to be more specific, focusing on prevention, early warning/rapid response and training. Ambitious targets already exist under the CBD and EU Invasive Alien Species Strategy and given that the high level objective also aims for a significant reduction in the rate on

introduction, spread and impact, we believe that this should be matched in the targets themselves. There are many examples from around the world of unsuccessful attempts to remove established NIS (accepting for the most part, eradication following successful colonisation and spread is not possible), and therefore GES for NIS in UK waters can best be achieved by preventing new introductions.

Finally, in our general comments we also want to request clarification on what development work has been completed on the remaining targets previously referenced on paragraph 411 of the UK Marine Strategy Part 1 2012 (page 128) *'the full range of targets proposed in [the Cefas CBA Report 2011] has not been put forward in this consultation because several of them were felt to need significant further development work before they could be implemented.'* Given the gaps we have highlighted and the time that has passed we want to see these revised targets included in the final version of the UK Marine Strategy part one.

NIS Introduction

We welcome the inclusion of this target as we have previously commented[54] on the need for such a measure within the second cycle of the MSFD. We are also pleased that the high-level objective/characteristic for NIS has been simplified.

We welcome the ambition to achieve a reduction to zero in the numbers of new NIS and are pleased that it covers all NIS, not just those that are invasive. This is useful as it is often hard to tell when an NIS is first introduced whether it will become invasive in the future. Many NIS also have a lag phase, meaning that small populations may be present for many years before 'taking off' and becoming successful and potentially invasive (for example Japanese knotweed in the terrestrial environment). Therefore, we agree that aiming to reduce the introduction of all NIS is the best approach. We especially want to ensure a new target on management is included.

NIS distribution

We would like to see the distribution target improved by quantifying the phrase 'minimise and reduce'.

This target states that the spread of 'invasive NIS' should be minimised, however we believe the spread of any NIS should be minimised whether it's considered invasive or not, due to the fact it's hard to predict which species may become a problem in future. The principle '*prevention is better than cure*' is highly applicable to combating NIS.

We are concerned that '*no assessments of the spread of non-indigenous species have been made so far*' but hope that greater detection efforts continue. We would like to see the improved data and monitoring in the future used to produce specific target species lists and baseline datasets as a result.

D3 - Commercial fisheries

The criteria set out in the strategy for commercial fisheries are useful but not sufficient to guide progress towards GES.

[54] https://www.wcl.org.uk/docs/Link%2520briefing%2520-%2520MSFD%25202nd%2520cycle%2520indicators%2520and%2520targets.pdf&sa=D&ust=1560502512463000&usg=AFQjCNEpsAnRHL-MQYOCvK8FaxIo9FQLBw

We agree that to achieve GES in UK waters we must have effective fisheries management based on the best available scientific advice and that this must ensure the recovery and long-term sustainability of all fish stocks. However, this is far from being successfully implemented and managed with regards to commercially exploited stocks of UK interest. The two criteria which measure progress towards GES, fishing mortality (3.1) and reproductive capacity (3.2), are appropriate indicators of stock size. However, a third criterion - the population age and size distribution (Criterion 3.3)[55] is notably absent. A failure to take into account the structural components of a stock, such as size and age ranges as required by the high level objective, could be detrimental to the long-term success and overall health of a stock.

We are also concerned with the suggestion that '*Indicator targets [for commercial fisheries] will be made consistent with multi-annual plans (MAPs) that are adopted for commercial fish stocks*'. Whilst we recognise that MAPs are now in place and offer some mechanism to maintain fishing at broadly sustainable levels for the main targeted stocks, these do not offer much to recover stocks which are already depleted. The MAPs are focussed on the main commercially targeted stocks, and in fact provide the ability to fish at the upper end of the MSY range, which if anything, decreases the likelihood of maintaining fish populations above levels that can produce MSY and achieving GES.

Fishing Mortality

We support the criteria for fishing mortality but are concerned that the existing progress and measures outlined are not consistent with meeting these criteria or that the Fisheries Bill effectively sets out objectives consistent with meeting these criteria.

Setting catch limits up to, or preferably below, MSY levels allows for the maximum proportion of fish to be removed from a stock, year on year without reducing the stock's ability to maintain its population at healthy levels. Fishing at levels above MSY will result in the stock being overfished and it could become depleted, in some cases irreversibly. Existing measures treat Fishing Mortality at Maximum Sustainable Yield (FMSY) as a target rather than a limit failing to account for the many other factors which can influence the health of fish stocks, including the size at which fish are captured, changes to predator and prey populations, natural environmental fluctuations, pollution, habitat loss and climate change. To help account for and provide a buffer against such factors, a precautionary approach is needed and catch levels generally need to be set below MSY, as described by the GES criteria. As mentioned above in response to D1, D4 - birds - this is especially important for low trophic level species like sand eels and sprat, which are fished in large amounts for use in aquaculture fish meal and fish oil. Such species play a critical role in the food chain and have dependent predator species that are themselves threatened (e.g. several seabird species). To properly account for this, fishing mortality may need to be kept well below FMSY to ensure these populations are maintained well above Biomass Maximum Sustainable Yield (BMSY).

The current assessment of the status of commercial fisheries states that GES '*has been achieved for some commercially exploited fish, but for most shellfish stocks GES has not yet been achieved or their status is uncertain'.* This is a particular concern as most commercially exploited shellfish stocks are

[55] EU-COM. 2010a. Commission decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters. In 2010/477/EU. Ed. by E. Commission. European Commission.

almost completely the UK's responsibility and fishing for them exists mainly within the 12nm limit. Additionally, there has been limited progress on the number of commercially exploited fish stocks, many of which already have MSY assessments, to have their exploitation limited to sustainable levels. The supporting evidence that '*fishing pressure has been reduced on marine fish (quota) stocks (including Nephrops) and that the percentage of these stocks fished within maximum sustainable yield (MSY) limits has increased from 12% in 1990 to 53% in 2015'* is a misleading reference range. GES targets did not exist in 1990 so using a period of time far earlier than that of the implementation of the legislation is not an accurate measure of success. Instead, success should be measured from the year of implementation.

Whilst we support the inclusion of this criterion, the operational targets must highlight the need for a legal commitment to fish stocks at or below FMSY in order to effectively deliver this target. We set out further detail on this in our response to questions 3 and 4 below.

Reproductive capacity of the stock

When stock biomass levels are recovered at or above MSY biomass levels they are healthier and more resilient. As a result, catch limits can often increase which can lead to increased profits and more consistent catches. Biomass is often viewed as a secondary target, as fishing mortality is the criterion which can be directly controlled through management. However, the biomass target is essential as it represents the desired outcome, and is the verification that management has been successful at ensuring we have healthy fish stocks that play a vital role in ensuring the wider marine environment is healthy, productive and biologically diverse. The improvements observed in the reproductive capacity of these stocks described in the supporting evidence, '*the proportion of marine fish spawning stock biomasses capable of producing MSY increasing from 28% in 1990 to 56% in 2016'* is once again misleading due to the extended reference range beyond the scope of the introduction of the MSFD. However, it remains a huge concern that the evidence provided states that with regards to shellfish in UK waters '*no assessment was possible in relation to their reproductive capacity relative to the level capable of producing MSY*' for any stock.

Again, whilst we are supportive of the inclusion of this criterion, the operational targets must reflect the need for full documentation of catches and a legal commitment to fish at or below FMSY in order to deliver this target.

A number of case studies are available to support our comments on the criteria for commercial fish.

Case study of Plaice in the North Sea - the benefits limiting fishing activity to within MSY limits

Overfishing in the North Sea led to significant reductions in plaice stocks. Reducing fishing mortality, to below MSY levels, has helped increase the size of the stock and has increased recent catches. Plaice caught in the North Sea was continuously fished at levels above MSY for almost 50 years. As a result, the size of the stock was constrained at relatively low levels. In 1987, catches were estimated to be around 130,000 tonnes, but this fell significantly to around 49,000 tonnes in 2007. Since then, fishing levels have been included in a management plan which also covers sole, and catches have been set in line with MSY. Following the introduction of the management plan, catches of North Sea plaice have risen year on year in line with the increasing size of the recovering stock. Fleets targeting plaice have, in response to this management, seen a significant economic improvement in their fishery.

Case study of Cod in the North Sea - the risks of not setting fishing activity in line with MSY

Cod stocks in the North Sea peaked at 270,000 tonnes in the 1970s, when North Sea cod was widely sold and enjoyed. However, stocks fell to just 44,000 tonnes in 2006. The need to curb this high fishing pressure and bring these stocks back to a level where they could be sustainably harvested was recognised by the European Union and Norway under their agreement to manage these stocks. This agreement was known as the 'Cod Recovery Plan' and included measures to control and reduce fishing effort, as well as introducing restrictions on catches of cod and other stocks. The plan linked the number of days fishing that boats were given to the conservation measures they signed up to. The plan aimed to reduce cod catches by 25 per cent in 2009, followed by subsequent annual reductions of 10 per cent. In response, the Scottish industry closed large spawning areas to fishing and introduced a system of real-time closures to protect aggregations while trialling new nets and developing a system of remote electronic monitoring using CCTV cameras on board boats. The combination of measures clearly had a positive effect on the cod and other whitefish populations in the North Sea, resulting in reduced fishing mortality and the beginnings of the recovery of the spawning stock[56].

However, despite the significant effort from all stakeholders to recover the stock, the fishing mortality has never been set at or below MSY. Additionally, according to the 2018 ICES advice[57] the biomass of the stock has never recovered to BMSY levels and is only just above its lower biomass limit. It now appears that the end of the additional management measures, the consistent setting of stock above MSY levels without recovering the biomass to sustainable levels combined with quota uplifts associated with the landing obligation and non-compliance is having a significant negative impact on the stock's recovery, negating years of work.

Additional criteria - Population age and size distribution that is indicative of a healthy stock

As outlined by the European Commission, the assessment of GES for commercially-exploited fish and shellfish should be based on three criteria: the level of fishing mortality, (Criterion 3.1), the reproductive capacity of the stock (Criterion 3.2) and the population age and size distribution (Criterion 3.3).[58] Whilst the first two criteria are reflected in the UK Marine Strategy, there is however an absence of Criterion 3.3 in both the current guide to achievement of GES and proposed plans. This is concerning as healthy stocks are characterised by a high proportion of old, large individuals. Development of targets in relation to this criterion would guide UK fisheries management in a direction that would not only help ensure the health of individual fish stocks, but also help to ensure that fish are fully functioning in their role at each trophic level – as is desired for ecosystem based management. This would not only support other marine strategy objectives such as 'food webs' but would also have a beneficial impact on achieving both a healthy biomass (above BMSY) and fishing mortality below MSY.

[56] Adapted from Seafish blog "the Story of North Sea Cod" https://www.seafish.org/article/the-story-of-north-sea-cod
[57] ICES, 2018. Cod (Gadus morhua) in Subarea 4, Division 7.d, and Subdivision 20 (North Sea, eastern English Channel, Skagerrak). November 2019. Available at http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/cod.27.47d20.pdf [Last accessed 13.06.2019].
[58] EU-COM. 2010a. Commission decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters. In 2010/477/EU. Ed. by E. Commission. European Commission

As recommended in the ICES workshop to review elements of MSFD Descriptor 3[59], targets for this criterion should capture three relevant properties that describe or are directly linked to this criterion, including: Size distribution of the species (state); Selectivity pattern of the fishery exploiting the species (pressure); Genetic effects of exploitation on the species (state). Targets based on these properties need to be incorporated into the future UK Marine Strategy.

Additional criteria - Assessments of stocks

Though not a current environmental descriptor under the MSFD or Marine Strategy, the assessments of stocks is a fundamental precursor to understanding the health of a fish population and the development of appropriate and effective management measures. Currently in the Northeast Atlantic, there are 66 stocks with MSY assessments.[60] This figure has been relatively stable in recent years, but there are hundreds of stocks in this region - including the UK - and many pressure caught or vulnerable stocks (including but not limited to: several species of sharks, skates, rays, and shellfish, halibut, john dory, mullets, sprat, squid and cuttlefish) do not have adequate assessments to inform management. Better stock assessments, particularly for commercially pressure caught or vulnerable stocks/species are essential if we are to improve fisheries management and truly achieve GES. As such, the Marine Strategy should include a target for the proportion of UK pressure caught or vulnerable stocks with an adequate stock assessment (i.e. which can provide an indication of stock status in relation to MSY or suitable proxy or surrogate with similar intent).

Additional indicators required to meet criteria

In order to achieve GES for commercial fisheries additional indicators and targets must be included. The three criteria highlighted above are underpinned by the need for full documentation of catches through the use of remote electronic monitoring (REM), including the use of CCTV, supplemented with the use of observers on boats. REM is a cost effective method of data capture which can be multi use. Without full documentation of UK fisheries, we will not have a true picture of what is being removed from the seas and therefore will not have accurate scientific data to ensure effective and sustainable management of the shared stocks in UK waters. This is of particular concern for the majority of shellfish stocks for which there is little if any scientific data to support their sustainable exploitation (as indicated in suggested criteria 3.4 above), given recent comments from the industry in the increases in catches of these stocks (add ref) it is imperative that data collection is improved to meet any one of the criteria outlined in D3. More detail on this is set out in our response to questions 3 and 4 below.

Fully documented catches are also of significant importance for the monitoring of bycatch and of the landing obligation. This has the potential to provide supportive evidence of compliance with legislation such as the landing obligation, which can improve consumer and buyer confidence in a fishery, and of any bycatch reductions and improved selectivity of new gear types. Such evidence will also be essential for the quantitative reporting required to evidence meeting the essential criteria of D3.

Additionally, in the event of Brexit the UK will have responsibility for the sustainable management of our seas as an independent coastal state, including shared stocks. If we fail to achieve full

[59] ICES 2014. Report of the Workshop on guidance for the review of MSFD Decision Descriptor 3 -commercial fish and shellfish (WKGMSFDD3), 4-5 September 2014, ICES HQ, Denmark. ICES CM 2014\ACOM:59. 47 pp.
[60] EC, 2018. Annex to the consultation on fishing opportunities for 2019. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=SWD:2018:329:FIN

documentation of UK fisheries we will not be able to ensure effective management of the shared stocks in UK waters. Again, more detail on this is set out in our response to questions 3 and 4 below.

Ecosystem Based Management (EBM) and the links between Marine and Terrestrial ecosystems

As a final comment, with regards to EBM there has been a consistent failure to link marine to terrestrial and freshwater systems. This has been damaging to the interests of migratory species, such as salmon and eels with a lack of acknowledgement that these migratory species require special management.

Recent evidence indicates that the optimal nursery grounds for the early life stages of important marine species such as sea bass (grey mullet and to a lesser extent common sole), lie within areas of low salinity (estuaries and saltmarshes). Some estuaries support critically important marine nursery grounds at a regional level and are designated as transitional waters under the Water Framework Directive (WFD). Just as there is an obligation to achieve Good Environmental Status under the MSFD, there is a similar obligation to achieve Good Ecological Status under the WFD. However, the lack of linkage between the two directives could result in a gap where neither successfully achieve 'GES' as a result e.g. in the management of transboundary species such as eel and salmon. Sustainable management of all species that move across these man-made boundaries can only be achieved with effective linkage between these two drivers and by an overhaul of environmental planning, management controls and funding mechanisms. This underlines the need for future sustainable management to take a much more holistic approach.

D8 - Contaminants

The new criteria and associated targets are not sufficient to guide progress towards the achievement of GES because they are entirely dependent on an appropriate list of contaminants to be monitored.

The current list of contaminants monitored in territorial waters has not been updated from the previous version, and as stated in our responses to Q1 and Q4. In its current form it is insufficient to effectively assess contaminants in UK marine waters. We also believe the criteria must contain an explorational aspect to assess emerging chemicals of concern as well as looking for chemicals in the marine environment that are not currently monitored in the Marine Strategy. The criteria are therefore not sufficient to guide progress towards achievement of GES for contaminants.

D9 - Contaminants in Seafood

The criteria and associated targets for contaminants in seafood are inadequate for reasons listed above in our response to D8. An up to date list of contaminants is lacking and the targets fail to take a precautionary or exploratory approach to contaminants. For example, we believe that alongside other contaminants, microplastics should be monitored through this descriptor, especially in light of recent reports from WWF and others on the amount of plastic consumed by humans[61], [62].

[61] https://www.dropbox.com/s/nxvyl3v5s9d0a1v/PLASTIC%20INGESTION%20Web%20spreads.pdf?dl=0

[62] https://www.theguardian.com/environment/2019/jun/05/people-eat-at-least-50000-plastic-particles-a-year-study-finds

D10 - Marine litter

The current UK marine litter targets are extremely weak and undefined and will therefore not deliver GES for marine litter in the future.

The proposed criteria focus solely on litter already in the marine environment, but this will fail to stem the continuous flow of land-based sources of plastic pollution. Exponential and growing production and consumption of single-use plastic (including biodegradable and compostables) mean that without a strong preventative focus which addresses the problem at source through reduction-based strategies, the targets will fail to contribute in any meaningful way to addressing the scale of the problem now faced.

A key part of tackling the microplastic problem is effective regulation to ensure that the multiple sources of microplastics in river catchments are brought under control. However, this must also be underpinned by an understanding of fundamental processes, robust monitoring protocols and the establishment of maximum acceptable microplastic concentrations, with effective sampling across drainage networks. This will help establish the full extent of the problem and trajectories of recovery following microplastic source management.

D11 - Underwater noise

The criteria and targets for measuring progress towards GES in the future regarding underwater noise are in principle adequate. However, with no mechanisms currently available to understand the levels of anthropogenic impulsive or continuous low-frequency noise which may adversely affect populations of marine animals, we are concerned that the UK will be no further forward in the next report period to have any certainty on whether Good Environmental Status in relation to underwater noise is achieved. Much clearer and defined operational targets are required to achieve this.

D1, 3, 5, 6, 8, 10 Aquaculture operations

Aquaculture is the fastest growing food sector in the UK and is rightfully flagged in the consultation as expecting 'strong growth'. It also cuts across many of the GES descriptors and we feel needs more specific mention and targets in the future Marine Strategy as we do not believe we can have healthy seas without having more responsibly managed aquaculture, particularly in light of the desired growth of the sector. The recently completed Scottish parliamentary review into salmon farming[63] produced several recommendations acknowledging the need for improvements.

The impact of aquaculture on priority marine features, both inside and outwith Marine Protected Areas. The unknowns in terms of dispersive pollutants, both organic and chemicals from fish farm sites needs to be both understood and considered in the licensing and planning of the sector.

Benthic habitats - as with the above point, there remain unknowns regarding the impact on benthic habitats from dispersive organic and chemical pollutants from fish farm sites. Whilst favourable environmental conditions may be achieved directly adjacent to a fish farm, the hydrographic nature of their location (higher energy environments) can lead to dispersion and deposition elsewhere on sensitive habitats that may be adversely affected.

[63] Rural Economy and Connectivity Committee, 2018. Salmon farming in Scotland. Available at https://digitalpublications.parliament.scot/Committees/Report/REC/2018/11/27/Salmon-farming-in-Scotland [Last accessed 11 June 2019].

Cumulative impacts - the impact of multiple fish farms, that may, in themselves be relatively benign, could, when operating in a shared water body reduce the status of that water body through their cumulative outputs.

Feed - as mentioned under comments for Descriptor 3, fisheries for low trophic level species such as sandeels can alter the fabric of the food web and lead to direct population impacts on seabirds such as kittiwakes. To achieve "environmentally sustainable" aquaculture the management of these fisheries needs to consider their place in the food web and reflect the need to support the communities of dependant predators.

Underwater noise - as mentioned in relation to cetaceans for Descriptor 1, the use of Acoustic Deterrent Devices (ADDs) to act as seal scarers on salmon farms and salmon netting stations cannot be allowed to continue without a robustly enforced licensing scheme, leading to an eventual phase out of use.

Non-indigenous species (NIS) - climate change is leading to the spawning of non-native Pacific oysters which in turn are out-competing the BAP Native Oyster.

Disease management and pesticide control - in fin fish, we are seeing sea lice levels at an exceptionally high level and widespread disease outbreaks. The use of chemicals to control and treat these issues is a contributory factor to not achieving GES targets.

Given the multitude of cross cutting factors noted above, we feel that specific targets are needed for aquaculture.

3. To what extent are the proposed operational targets sufficient to achieve GES?

D1, D4 - Cetaceans

The operational targets for meeting GES for cetaceans are unambitious and inadequate because they do not address recovery of species that may be in decline. They are also unachievable without substantial additional monitoring and mitigation resource. Targets should be time-bound, and incremental milestones identified.

D1, D4 - Seals

The operational targets for meeting GES of seals lack true ambition. No dates for the proposed actions have been set and as a whole they are not SMART targets.

We agree that more understanding is needed of the anthropogenic drivers of seal declines and how this impacts the ecosystem as a whole. We know there are direct pressures on seals due to their interactions with aquaculture sites, yet there is little evidence that killing seals addresses any predation problems. Instead, these can be effectively solved by implementing best practice techniques, such as using nets that reduce the opportunity of seals taking fish from sites. In addition,

the US Marine Mammal Protection Act acts as an additional motivation to stop the shooting of seals in Scotland, whereby the U.S.A will prohibit the import of any fisheries products that may have been associated with the deliberate killing of seals. With Scottish farmed salmon being a leading UK food export, along with the U.S.A being one of its largest importers, the incentives are strong. Scotland also exports farmed salmon to over 60 other countries. It is important to emphasise that the ending of seal shooting in Scotland should be applicable to all, regardless of whether customers are international or domestic. This is essential to protect valuable salmon exports to the US as well as ending the unnecessary killing which has not been demonstrated to achieve its stated purpose. Therefore we propose an operational target to *implement best practice techniques at aquaculture sites to ensure seal killings are eliminated.*

Currently, strandings of seals and suspicious deaths are recorded and investigated in Scotland and Northern Ireland respectively. We would therefore like to propose another operational target to introduce a UK wide strategy to investigate seal strandings and deaths in UK waters. Such a strategy may also help evidence gathering for other indicators such as marine litter and chemicals.

The status of harbour seals in the Celtic Seas region is unknown. An operational target must be made which addresses increasing monitoring of harbour seal populations in the Celtic Seas, we propose: *'Monitoring of harbour seals in the Celtic Seas region has evidently increased and their status is known by the next marine strategy assessment'.* The current criteria and targets for distribution and abundance of harbour seals are disconnected to any action on determining their status in the Celtic Seas region, in this marine strategy.

Bycatch rates are currently based on assumptions from sampling that is predominantly in the Western Channel and the Celtic Seas, evidencing the need for increased monitoring of seal bycatch. An operational target should be included which states *'The sampling region for seal bycatch has been expanded to the full UK biogeographic region, and monitoring of bycatch has evidently increased.*

Given that bycatch rates are based on assumptions, bycatch cannot be ruled out as a driver of declines, as is stated on page 50. The strategy states that a seal bycatch indicator will be developed, again, this operational target has no implementation date, we propose that the operational target states a seal bycatch indicator will be developed and is operational by the next assessment period'. Dates for action on the operational targets should be set here and across the marine strategy more generally.

Understanding of seal distribution at sea is an important consideration for determining their status, an operational target should be developed to increase the use of telemetry data in their monitoring. We propose that the operational target states t*o* further determine seal distribution at sea, the use of telemetry data in their monitoring is increased.

The ways to fill gaps that currently exist in this strategy (discussed in question 4), should be included as SMART operational targets.

D1, D4 - Seabirds

The 2019 assessment of progress towards the delivery of GES[64] clearly shows that for all 11 descriptors measured, seabirds are the only group that are both failing and suffering continued decline. This

[64] https://moat.cefas.co.uk/summary-of-progress-towards-good-environmental-status/

clearly demonstrates that a step change in approach is needed. It's clear we need a major recovery plan for seabirds, prioritising direct action to reverse and halt the continuing decline and investing in the development of measures to restore our ailing seabird populations.

The 2016 assessment of the UK network of SPAs[65] clearly indicates that '*SPA suites for 87 species/populations are considered to be insufficient to meet the requirements of Article 4 of the Birds Directive in some way. These relate to 38 breeding species and 49 nonbreeding species*.' Marine species are included in this shortfall, clearly demonstrating that the proposed operational targets must go further than just management of protected sites. Full implementation of the Birds directive is required to address shortfalls within the network. This is in addition to developing and implementing management plans and conservation objectives for all protected areas. Therefore, the proposed target must include clear targets for the completion of the UK network of marine SPAs, as required under Article 4 of the Birds Directive.

We would also like to propose a rolling programme of island restoration to remove invasive non-native mammals from seabird breeding colonies, twinned with biosecurity measures to prevent further introductions is created and delivered. This is critical in order to reduce the risks to island colonies from invasive predators. Please refer to the response submitted by the RSPB for full details regarding a program of island restoration.

As raised in response to question 2, we consider that the threshold mortality rate from incidental bycatch under MSFD Criterion D1C1 should be ***1% of natural annual adult mortality of the species***. Therefore the operational target should adopt this threshold mortality rate.

This threshold aligns with the ORNIS Committee definition of "small numbers" within the context of allowing a derogation under Article 9 of the Birds Directive (in a bird hunting context) from no deliberate bird killing. As such, the 1% threshold exists as a precedent, accepted by the European Commission and upheld in European Court of Justice rulings, albeit in other contexts.

Further even if a threshold under Criterion D1C1 is met, we maintain that fisheries measures are still required to '*minimise and where possible eliminate*' bycatch in accordance with other legislation and agreements, in particular the EU Birds Directive and EU Seabird Plan of Action.

The management of man-made activities and pressures is a key requirement of the Marine Strategy Regulations. One means of managing this activity and pressure is through the marine planning system. The marine planning system is still in its infancy with completion of a robust marine planning system in the UK is still underway. Despite this, the deployment of manmade structures to the marine environment is occurring at an increasingly rapid pace. Coupled with the absence of a complete network of marine protected areas, marine species such as seabirds are under increasing pressure.

Whilst it is welcomed that wider measures such as use of the *Environmental Impact Regulations* are identified as mechanisms to alleviate these pressures, to date their application has not prevented development on key foraging areas, or in creating physical barriers to seabird flight paths.

65 http://jncc.defra.gov.uk/pdf/UKSPA3_Chapters1-8.pdf

We acknowledge that another man made pressure is marine litter. Whist tackling marine litter is important, demonstrated by having a descriptor for this purpose (D10), there is no evidence to demonstrate that a reduction in marine litter will reverse declining seabird trends (as stated in the MOAT). The inclusion as an "operational target" for seabirds, and its absence for other taxa, suggests that Government consider this a major threat to seabird recovery. It is our view that the target, while well meaning, is misplaced and efforts should be placed on tackling more pressing threats to seabird recovery such as island restoration, seabird bycatch, prey availability, completion of a network of well managed marine protected areas and delivering a robust system of marine planning. If Governments intend to maintain this operational target for seabirds, then it should also be identified as an Operational Target for other taxa e.g. cetaceans, seals and potentially fish.

Alongside our concerns listed above, without a clear end date or cohesion between operational targets, the current proposals fail to convey the urgency needed to recover UK seabird populations. It is also unclear as to what weight the Operational Targets will receive. They have been identified as '*management actions identified by the assessments that are needed to move towards GES*'. We assume this means that if the management actions are not achieved this will result in the descriptor not achieving GES. Therefore, we do not believe the proposals are sufficient to achieve GES.

D1, D6 - Benthic Habitats

We do not believe the operational targets for Benthic Habitats are sufficient as they lack the ambition to deliver GES.

The UK Governments should not be setting targets for what habitat we could afford to lose, but rather targets for habitat extent we must gain. We agree that a baseline assessment for the extent of habitat loss is absolutely necessary, but this should inform a target to enable habitat recovery in order to achieve GES. We are also concerned with the word 'thresholds', which indicates a less than proactive approach and suggests that further habitat loss could be accommodated in an already depleted/modified ecosystem. An operational target for the reversal of damaging impacts and the recovery of habitats should be included. As such the UK governments should seek to protect the known extent of all vulnerable seabed habitats, where possible. A case in point is Loch Carron in Scotland, which was initially scoped out of initial designation of nature conservation MPAs in 2013-14, but later found to have the largest known flame shell bed in Europe following damage by a scallop dredger[66].

All the UK governments have a legislative requirement to deliver a '*well-managed ecologically coherent MPA network'* so this target is not new. The UK's commitment for 30% of the world's seas to be safeguarded as MPAs by 2030 is laudable, but this global leadership must be backed by demonstrating best practice in management at home (see for example Canada's recently adopted MPA standards[67]) The UK MPA network will only be meaningful with ecosystem-based management measures in place, which consider all human activities and impacts within them holistically and in combination with wider seas measures (including management of activities on sensitive habitats outwith MPAs). This should include significant areas of high protection/fisheries restriction, such as

[66] https://www2.gov.scot/Topics/marine/marine-environment/mpanetwork/developing/2017MPA
[67] http://www.dfo-mpo.gc.ca/oceans/conservation/advisorypanel-comiteconseil/index-eng.html%23response&sa=D&ust=1560413793142000&usg=AFQjCNFQU6zGlLDqkHV2IBcDkCyDr-g-fg

no-take zones, in order to enable biodiversity recovery for intrinsic and ecosystem service value. MPAs with areas of high protection have been demonstrated to be more successful (e.g. REF). We suggest a target that states: '*We will complete a well-managed ecologically coherent MPA network, with an overall objective to enable large-scale recovery of seabed habitats, which are assessed in relation to wider seas measures'*. We believe that well-managed MPAs should include a presumption against activities that cause seabed damage and must include highly protected reference areas to enable proper monitoring of progress.

D2 - Non Indigenous Species

We do not believe the operational targets for NIS are sufficient to achieve GES.

The proposed targets are not specific or measurable and lack timescales. For example, there is no date for when the pathway action plans will be developed or implemented. There is also no information provided on how the high-risk locations will be identified and what the timescales are for doing so.

More information on monitoring and surveillance must be provided to ensure the targets are deliverable. We would specifically like to see detail on who will complete the monitoring and how this will be implemented and enforced.

However, we are pleased that the development and implementation of Pathway Action Plans is one of the targets as these have the potential to be one of the most important ways to prevent new NIS arriving and gaining a foothold. We would like clarification on whether the action plans proposed are the same as those under development by the GB Non-Native Secretariat, as required under Article 13 of the Invasive Alien Species (IAS) Regulation (EU Regulation 1143/2014). The regulation requires member states to carry out a comprehensive analysis of the pathways of unintentional introduction and spread of IAS within 18 months of the adoption of the Union list which was mid 2016. Disappointingly, the UK missed this milestone, but at last it looks like progress is being made with the production of the comprehensive pathway analysis circulated in early May 2019.

We approve that the focus is on all NIS, not just those which are invasive, because as mentioned in response to Q2, it is not always apparent which species will become a problem in the future.

D3 - Commercial fisheries

We believe the proposed operational targets are woefully insufficient to achieve GES for commercial fisheries. The operational targets rely solely on the Fisheries Bill, stating that '*the Fisheries Bill provides the framework to enable us to continue to push towards further stocks being fished at MSY and delivering our ambition for sustainable fishing*'. The Fisheries Bill, as currently drafted, does not implement a legal framework that can effectively deliver GES or sustainable fisheries.

As the recent UN Report[68] from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) highlighted, overfishing is the primary cause of marine biodiversity loss.

[68] https://www.dropbox.com/sh/yd8l2v0u4jqptp3/AACpraYjOYWpTxAFv5H-2vrKa/1%20Global%20Assessment%20Summary%20for%20Policymakers?dl=0&preview=Summary+for+Policymakers+IPBES+Global+Assessment.pdf&subfolder_nav_tracking=1

Overfishing impacts not just fish stocks, and the associated decline of coastal communities that rely on our marine resources, but also the wider UK marine environment.

In light of the UN Report, together with the climate and environment emergency recently declared by Parliament, urgent and decisive action must be taken in order to deliver sustainable fishing. The operational targets must tie into clear, concrete and legally binding obligations to reverse the decline in marine biodiversity in the UK and bring fish stocks back to sustainable levels. In addition, the strategy should go further than focussing exclusively on fishing limits. Specific actions recommended by the UN Report include following an ecosystem-based approach to fisheries management and urgently taking all steps necessary to prevent, deter and eliminate illegal, unreported and unregulated fishing.

We set out below the key issues with the proposed operational targets, together with suggested solutions in our response to question 4 that will help the UK achieve this goal.

1. Fishing limits

The UN Report recommends '*targeted limits on catch or fishing efforts*' in order to achieve sustainable fisheries. Under the CFP, the UK is legally obliged to set fishing limits in line with MSY by 2020. By contrast, the Fisheries Bill removes both the legal commitment and 2020 deadline, replacing it with a high-level, aspirational objective to ensure that populations are restored above biomass levels capable of producing maximum sustainable yield in the long term.

Without a legally binding commitment to set fishing limits in line with MSY, there is no legal mechanism to prevent the fisheries minister bowing to short-term political pressure to set fishing limits at dangerously unsustainable levels. Further, failure to legally commit the minister to set fishing limits at maximum sustainable yield represents a regression in environmental standards from the CFP, together with a breach of international commitments under UN Sustainable Development Goal 14 to end overfishing by 2020.

The UK Government's stance on this is particularly disappointing given that the setting of fishing limits in line with MSY is entirely within the UK's control – this is one of the simplest and most effective ways that the UK can directly address this hugely concerning issue. In this context, it is important to highlight that the strategy notes the UK has an exemption from achieving GES for commercial fish (and indicator D1) because it will take time for fisheries measures to actually reduce exploitation rates. Setting fishing limits in line with MSY is the most efficient way for the UK to address this.

There have been recent discussions around the viability of fishing all stocks in a mixed fishery in line with MSY. There are various definitions, interpretations and proxies for MSY which together can be successfully applied to virtually all fisheries, provided they are justified by the best available science. MSY is traditionally applied to just single stocks, but it can be applied to groups of stocks and can be interpreted as a point value or range or values. Substitutes and proxies for MSY are also commonly used where data might be lacking or for certain species (like scallops, squid and Norway pout) which have traits which make proxies more appropriate. All such options can be applied under the general term of 'MSY', provided their use is supported by the best available science.

2. Full and verifiable documentation

The strategy states that '*several of the indicator targets may not be achieved for many years, unless there are further improvements to fisheries management. Stock assessments also need to be improved to enable effective assessment of the indicators*'. We agree with this statement; it is vitally important that the UK is able to achieve full and verifiable documentation of catches to give a true picture of what is being removed from the sea and in order to provide accurate scientific data to ensure effective management of stocks in UK waters.

This is particularly important in the context of shellfish stocks. The strategy highlights that '*as of 2015, we know that at least 37% of national shellfish stocks were exploited beyond maximum sustainable yield and that no assessment was possible in relation to their reproductive capacity relative to the level capable of producing MSY. Assessments for 61% of shellfish stocks were not carried out and their status is not known*.'

The accurate recording of catches is critical to understanding and managing fishing activities, impacts on the marine environment and the status of fish stocks. Catch information underpins stock assessments that dictate future fishing opportunities. If stock assessments are not accurate, we could end up fishing some stocks too much (or too little), resulting in overfishing and risk of stock depletion and flow on environmental and socioeconomic impacts. Whilst this is concerning enough, unsustainable fishing and unrecorded and illegal catches could severely damage consumer and business confidence in UK seafood.

3. Better monitoring and enforcement - bycatch and the landing obligation

The use of REM is an important and unbiased method of data collection and an important part of fully documented fisheries. The video data gathered from REM on boats can provide information on a huge number of areas where scientific data is currently lacking such as incidents of by-catch, estimates of non-target species being discarded, tracking invasive species, identifying threatened, endangered and protected species interactions and more.

EU legislation creates a framework for the enforcement of the rules of the CFP and combating illegal, unreported and unregulated fishing. However, the EU legislation lacks detail in various respects and the way the legislation is enforced in the UK is based on lengthy and expensive criminal proceedings. The Fisheries Bill provides an ideal opportunity for the UK to strengthen monitoring and enforcement mechanisms and ensure that these are actually effective in preventing illegal fishing, but as currently drafted the Fisheries Bill simply gives the Secretary of State the power to make secondary legislation on this in the future.

Vessel monitoring systems should be carried by all vessels and remote electronic monitoring with CCTV for all large vessels (over ten metres) and for select smaller vessels to ensure accountability, assist with data on removal rates and bycatch of all marine life, and improve enforcement. An appropriate sanctioning system should also be put in place to ensure that the provisions of the Fisheries Bill are effectively enforced.

One example of where better monitoring and enforcement can make a big difference to marine biodiversity in the UK is around monitoring compliance with the landing obligation. Proper implementation of the landing obligation can go a huge way towards reducing bycatch of both

commercial and non-commercial fish species, which will in turn contribute to an increase in fish stocks. However, recent evidence around the landing obligation suggests that virtually no catches were made outside of allocated quotas. Appropriate monitoring systems must be in place in order to provide evidence of the true impact of the landing obligation. If the landing obligation is not complied with or monitored properly, our understanding of what and how much is actually being caught will become much less accurate.

Beyond the Fisheries Bill, there are several other elements to the regulatory framework for fisheries and aquaculture management that will be needed to ensure achievement of GES in the future including: data collection requirements (e.g. the replacement of EU Commission Implementing Decision (EU) 2016/1251 of 12 July 2016) adopting a multiannual Union programme for the collection, management and use of data in the fisheries and aquaculture sectors for the period 2017-2019[69]; the completion and implementation and ongoing review of bycatch reduction plans; the need for review of retained EU fisheries technical and control regulations to ensure they adequately support the achievement of GES. Crucially, budgetary commitments are needed to proportionately support the increase in area of waters that will fall under UK (or devolved) jurisdiction, as well as an increasing need to fill important knowledge gaps such as the many data limited fish and shellfish species as highlighted earlier under the proposed environmental criteria and targets.

A financial target is needed for the future Marine Strategy to ensure appropriate funds are ring fenced and available to deliver the research, monitoring and management changes that are needed to truly deliver GES in our marine environments. Such expenditure should be considered a healthy investment in the state of our seas and coastal communities, and one that will deliver financial, social and economic returns in the future (e.g. article in Forbes[70]).

D8 - Contaminants

The operational targets listed in the UKMS are good in principle, and we welcome the target to work with other countries to investigate the cumulative effects of combinations of contaminants on sea life populations. But, they are incredibly vague and lack concrete details so cannot be described as SMART. Therefore, we cannot be confident that they are sufficient to achieve GES.

It is concerning that no progress has been made on the first two operational targets since the previous Marine Strategy in 2012. We want to see a detailed plan and timeline on how the UK Government will achieve these targets over the next 5 years.

It is also concerning that there is no operational target outlining the measures that will be taken to reduce the production and emission of contaminants, nor the removal of contaminants from UK marine waters. This is needed to address the chronic effects of chemical pollution and not just the acute.

[69] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2016.207.01.0113.01.ENG&toc=OJ:L:2016:207:TOC
[70] Amanda Leland. How Investing In Sustainable Fisheries Creates Healthier Oceans And People. Available at https://www.forbes.com/sites/edfenergyexchange/2018/03/08/how-investing-in-sustainable-fisheries-creates-healthier-oceans-and-people/#251c0355549a

D10 - Marine litter

Proposed operational targets are not sufficient to meet GES for marine litter because they lack definition, ambition, and timeframes.

We welcome the operational target to develop an appropriate indicator to measure micro-litter in the marine environment. However, this operational target should include a date for its development. Given the evidence that microplastics are vectors for POPs, PCBs and other contaminants microplastics ingestion must be measured across the entire food chain, from benthic and pelagic fish to marine mammals. The development of an indicator for ingested microplastics would also allow for better integration between the contaminants and marine litter sections of the strategy.

We believe that the presence of floating litter could be better assessed by including the use of aerial surveys (in addition to the current fulmar ingestion indicator). Aerial surveying for floating litter could be carried out in conjunction with annual aerial surveys for marine mammals, and indeed this is already happening in Scotland through the SCRAPbook project[71].

The proposed criteria focus solely on litter already in the marine environment, but this will fail to stem the continuous flow of land-based sources of plastic pollution. Exponential and growing production and consumption of single-use plastic (including biodegradable and compostables) mean that without a strong preventative focus which addresses the problem at source through reduction-based strategies, the targets will fail to contribute in any meaningful way to addressing the scale of the problem now faced.

For example, an operational target should be developed which recognises the need to upgrade and better integrate wastewater treatment, in turn reducing the input of microfibres to the marine environment. Current wastewater treatment plants cannot remove all microfibres nor can they eliminate all chemicals which are bound to the fibres and plastics. Reducing microfibre pollution by upgrading wastewater treatment facilities is a relevant target to both the WFD and MSFD. Given the known chemical and physical consequences of microfibre ingestion by aquatic organisms decisive action must be taken to remove this pollution from the source.
Microfibre release during fishing activities from dolly ropes should be reduced by finding alternative materials or banning the use of dolly ropes if such alternatives cannot be found within the next 3 years.

Another example would be to incorporate solid litter in the review of River Basin Management Plans. The inclusion of measures to control solid litter in river basins and coastal ecosystems would greatly affect the input of litter into the marine environment.

D11 - Underwater noise

We agree that working with OSPAR is the appropriate mechanism for delivering operational targets. To ensure transparency, we request that a mechanism is put in place for organisations to engage in the development and delivery of actions at an OSPAR level.

[71] https://www.scrapbook.org.uk/

We are equally supportive of the action '*conduct research to establish relevant information on the impacts of sound on marine animals*'. Current data and monitoring relied upon to understand cetacean population impacts from human activities are not adequate. There are a number of programmes underway or developing at a UK level (ScotMER, ORJIP2, Crown Estate Strategic Enabling Actions, Offshore Energy SEA research programme) which require coordinating to ensure the best use of resources to achieve research aims. This coordination also needs to be considered at an OSPAR level. Mapping of research activity would be a useful activity to identify future research gaps.

Though a focus on 'threshold values for levels of anthropogenic impulsive sound and anthropogenic continuous low frequency sound taking into account research on impacts and regional or sub regional specificities' is welcome, this is a very broad statement. Currently there are a number of different threshold values used on a North Sea scale (e.g. English area-based approach, German, Belgium and Netherlands noise limits but all set at different levels) which is resulting in an inconsistent seas level approach. It is essential that threshold values are coordinated at an OSPAR level to ensure a consistent approach. The OSPAR impulsive noise indicator will be a useful tool to link this together.

Once thresholds are in place, it will be important to consider requirements to reduce noise levels if sound sources are being exceeded which will have an impact on marine animals. This should be included as an operational target.

Overall however, we are concerned that the identified actions do not go far enough. If levels of impulsive or continuous noise are found to adversely affect marine animals, there are no targets in place to rectify the impact. We suggest that a noise reduction strategy should be included within the operational targets.

4. Where gaps have been identified do you have suggestions on how these could be filled?

D1, D4 - Cetaceans

There is an incomplete picture of the status and trends of most UK cetacean populations. Baseline monitoring of all cetacean species is currently a big and important gap, with too much dependence upon SCANS, which occurs every 10 years and only during July. Monitoring methods need to be broadened to include a wider range of survey types, and all seasons of the year. Resources need to be allocated for adequate monitoring of all BAP priority marine mammals.

More robust management measures are required to tackle chemical pollutants at source, fisheries bycatch, noise pollution and disturbance.

Cooperation between the Republic of Ireland and the UK must also be improved. Status of coastal bottlenose dolphin and minke whale are both unknown, (with the exception of West Scotland) resulting in a huge data gap for the Celtic Seas region. As such, "*An assessment of only the UK portion of the Celtic Seas Sub-Region would be misleading because cetaceans are very mobile and wide-ranging".* To improve this we suggest that collaboration between the Republic of Ireland and the UK must be improved.

D1, D4 - Seals

As discussed in the previous question, additional targets are required for seals within the marine strategy.

Firstly, there is an incomplete picture of harbour seal populations in the Celtic Seas region. This requires increased monitoring. An operational target should be set to determine the status of harbour seals in the Celtic Seas region by the next assessment period 2024.

The drivers of declining seal populations are not known. A UK wide stranding and post mortem strategy must be implemented to assist with determining the cause of declines. Investigating deaths and strandings will also further our knowledge on the impacts that chemicals, marine litter and microplastics can have on marine species, helping to fill gaps in other descriptors.

While bycatch has been ruled out as a driver of declining populations, this is presumptuous given that the sampling is based on assumptions from surveys carried out in the Western Channel and Celtic Seas region. Knowledge on bycatch of seals should therefore be considered a gap and addressed appropriately. Monitoring of bycatch must be increased using a standardised approach and a seal bycatch indicator developed. A timeframe for its development should be included in the operational targets, as previously discussed in question 3.

At sea distribution data of harbour and grey seals is a gap which needs to be addressed in order to depict a more holistic picture of their status. Resources should therefore be directed to utilising telemetry data to determine better spatial distribution of harbour and grey seals.

MPAs for all mobile species and effective management plans must be implemented. Without management plans, MPAs are not an effective protection tool for species and habitats. Furthermore, a whole site approach to MPA management is needed.

D1, D4 - Seabirds

There are a number of knowledge gaps for seabirds which need to be urgently filled if we are to reverse the decline of seabirds, as highlighted in this latest assessment.

In the Online Assessment Tool, 'Knowledge gaps' in Marine bird breeding success[72] address the more frequent and widespread breeding failure of surface-feeding marine birds relative to those feeding in the water column. It is clear that further knowledge is needed on the threshold density of sandeels and other prey species for seabirds to maintain a steady population state. As outlined in response to questions above, the changing availability of sandeels is a specific concern for seabirds. This concern is support in a recent Marine Climate Change Information Partnership (MCCIP) briefing[73] that highlights the particular sensitivity of surface-feeding seabirds to sandeel availability and makes the important observation that: *'the ICES advice does not explicitly consider the food requirements of predators in estimating a TAC'* The ICES assessment model does include estimates of the quantity of sandeels consumed by seabirds and other natural predators to assess natural mortality in estimating sandeel stock biomass. However, it fails to assessment of the ecological needs of dependent

[72] https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/birds/breeding-success/
[73] http://www.mccip.org.uk/media/1818/mccip-sandeels-and-their-availability-as-prey.pdf

predators. Seabirds, and other predators of sandeels require a greater biomass of their prey species than just what they consume to enable viable foraging. The current catch limits are not precautionary in relation to the declining status of sandeel-dependent marine bird predators.

This deficiency in the ICES assessment model should be addressed by engagement with ICES and its appropriate working group (WKSand), possibly through the intermediate work of JWGBIRD, to amend the model. First, possible values for the 'ecological multiplier' (i.e. the difference between the biomass of fish that seabirds actually consume and the often much greater biomass that must be available to them in order to find what they actually eat) for a relevant suite of marine birds must be established, with the aim of informing the way in which catch limits for sandeels (and other forage fish, notably sprats) are set. We recommend that this exercise be informed by Cury et al (2011).[74]

As with comments made in response to gaps for cetaceans and seals, a knowledge gap for the Celtic Seas has been identified and must be addressed. For seabirds specifically, we note that the Kittiwake Breeding indicator could not be developed for the Celtic Seas '*because no relationship between sea surface temperature (SST) and kittiwake breeding success could be found by this and other studies*[75],[76].' This highlights an obvious evidence gap regarding the relationship between SST and Kittiwake breeding success in the Celtic Seas, which is in part due to limited amount of research on this. Given the dramatic declines of Kittiwakes in the Celtic Seas, for example on Skomer Island[77] we would welcome research to determine with more certainty the predominant drivers of breeding success in this area.

Benthic Habitats

As we have outlined in responses to questions, 1, 2 and 3, large knowledge gaps exist for the benthic habitats descriptor. To progress the achievement of GES, aspirations for ecological recovery of seabed habitats and species, coupled with an overhaul of fisheries management are required.

For benthic habitats we believe this should include a greater ambition for seabed habitat recovery, with clear SMART targets for increasing the extent of habitats, with priority on sensitive and high ecosystem services value habitats including biogenic reef and 'blue carbon', based on best available scientific evidence.

The key theme in point one is summarised in the aforementioned *Seafloor Integrity* commissioned report[78], which states that: *In order to turn these definitions* [of GES] *into something which can be used operationally there needs to be some clarity about what should be measured and what would constitute success. While this could result in detailed targets for literally dozens of taxa and geological or geochemical traits we suggest that the key metrics can be reduced to the following two categories.*

- ***Recovery -*** *under management 'the impacted seafloor attributes show a clear trend towards their pre-perturbation conditions, and the trend is expected to continue (if pressures continue to be managed) until the attributes lie within their range of historical natural variation. Benthic*

[74] https://archimer.ifremer.fr/doc/00056/16770/14307.pdf
[75] http://jncc.defra.gov.uk/pdf/Report_538_web.pdf
[76] https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0047408
[77] Lauria et al. (2012) Influence of Climate Change and Trophic Coupling across four trophic levels in the celtic sea. PLOS one. Available online: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0047408
[78] Hopkins, C. R. and Bailey, D. (2016) Seafloor Integrity. A report commissioned by Scottish Environment LINK

communities are not static entities, and thus recovery does not require that the ecosystem attributes return to their exact prior state.' [79]

- ***Rapid -*** *'must be interpreted in the context of the life histories of the species and natural rates of change in the community properties being perturbed. For some seafloor habitats and communities, recovery dynamics from perturbation would require multiple decades or more, and in such cases, management should strive to prevent perturbations.*[80]

The report further qualifies this concept: *Seabed types which do not show recovery within a decade of protection cannot contribute to GES* (p10).

These recommendations also have clear linkages with other Descriptors (e.g. D3 Commercial Fisheries, D4 Food Webs, D4 Fish) and could be applied to achieve multiple benefits.

D2 - Non Indigenous Species

As the online assessment tool acknowledges, there are significant gaps for the NIS descriptor but it is not clear what additional targets will be set or what monitoring and research is planned to address the huge uncertainties that mean we're not going to achieve GES for NIS by 2020.

We believe a first step in filling these gaps should be the urgent delivery of the proposed monitoring programmes. These will provide reliable scientific data to aid our understanding of cause, extent and spread of the problems, all of which have been identified as gaps in the online assessment tool. We recommend these programmes are rapidly delivered because there remains a high risk of incoming novel NIS which could establish and become invasive until they are introduced. When developing the programmes it is important that they are consistent, otherwise, only a precautionary interpretation of data can be produced and changes may not be detected in time (in terms of numbers and/or new species and/or the spread of NIS).

A thorough Risk Management analysis of all established NIS populations that impact upon UK seas should be undertaken with the aim of identifying priority NIS populations for either population control, population containment, or eradication. A recommended target to follow on from this would be '*Where ever possible and following a prioritisation of resources, all already established NIS populations are either: i) prevented from increasing in their abundance; ii) prevented from increasing in their spatial distribution; or iii) eradicated entirely*' . We would like to see a target which aims to reduce the annual rate of establishment of marine NIS via biofouling.

This should then be followed by the rapid development and implementation of species action plans. A measurable target could be set for the number of species action plans anticipated by 2020. Then progress could be measured by number of plans produced against the total e.g. 10 plans developed out of 20 and the number of those subsequently implemented. We recommend that these plans also deliver improved data flow and management for NIS detection, in conjunction with improved monitoring.

[79] ICES. 2014a. EU request to ICES for review of the Marine Strategy Framework Directive: Descriptor 6 – Seafloor integrity. ICES Advice 2014, Book 11:1–20. Pg 10

[80] Ibid

Both the risk management analysis and species action plans would be a logical next step for reducing the risk of introductions of NIS at identified locations. As we note, though the identification work has been completed, no follow up measures have been proposed.

We suggest that additional criteria for NIS impact and monitoring, Biosecurity and control/eradication of existing NIS are included alongside NIS introductions and NIS distribution. For each target, we would like to see the inclusion of quantifiable aims (e.g. a xx% reduction or improvement) which would allow progress to be measured appropriately.

In the absence of any specific targets relating to ballast water, despite it being a key pathway for NIS, we recommend a new target be introduced. This new target should be in line with any forthcoming IMO Ballast Water Convention, which will take measures to reduce the likelihood of introducing NIS/slow the rate of NIS introduction.

We also believe there should be a target specifically relating to training among industry and scientific research into building up knowledge of NIS and pathways, as this represents a high-value use of resources to raise awareness of the issue and take preventative measures across as many industries as possible.

As mentioned in response to the seabirds descriptor, we welcome the recognition of the risk of invasive mammals on islands for high risk or highly vulnerable seabird colonies in a specific operational target under the Birds section. However, we want this to be mentioned under measures for D2, in addition to marine invasive species, recognising that any invasive species affecting marine ecosystems are valid under this Descriptor. The target for the reduction of the threat of invasives to seabirds is unclear as it isn't quantified, or even qualified in any way and the indicator on the *'presence of invasives on islands'* is also not clear or measurable. There is currently no suggestion as to how the UK may achieve this target or attempt to tackle this threat.

We would like to see a call for a UK-wide island biosecurity strategy and funding plan, with clear targets and a commitment to implementation from the devolved administrations. For example, there should be a target for writing and implementing biosecurity plans for each of the key UK seabird islands/island groups, with a realistic target for plans to be in place during the second cycle of MSFD and delivering before 2024.

Where technically feasible, an effective proactive programme of eradication of non-native mammals should be completed at the key UK seabird islands/island groups.

Ultimately, if Governments fail to fill the gaps, GES for NIS will never be achieved.

D3 - Commercial fisheries

As per our response to question 2 above, additional criteria and indicators are required. In addition, the operational targets must also be vastly improved in order to truly deliver sustainable commercial fisheries.

As a general point, the reliance in the Marine Strategy on the policy statements envisaged by the Fisheries Bill is concerning. The policy statements will set out policies around how fisheries authorities will achieve the sustainability objectives set out in clause 1 of the Fisheries Bill. Whilst these objectives are relatively strong, there is no legal duty on public authorities to actually achieve them. As a result, there is no guarantee that the statements will contain effective policies to actually deliver the objectives. The statements can also be disregarded in a wide range of circumstances. The delivery of key targets in the marine strategy therefore cannot rely on the implementation of policy statements that have no real legal teeth. The operational targets must instead be revised to include the concrete commitments we are suggesting below.

The operational targets should reflect the need for a legal commitment in the Fisheries Bill that fishing limits cannot be set above MSY. The CFP sets out (a) an *objective* to restore fish stocks above biomass levels capable of producing MSY and (b) a *legal commitment* to set fishing limits in line with MSY by 2020 in order to achieve that objective. By way of contrast, whilst the Fisheries Bill transposes the aspirational objective described in (a) above, it does not transpose the legal commitment set out in (b) that would ensure fishing limits are set at or below MSY. This represents a regression in environmental standards from the stronger ambition set out in the White Paper and the UK's existing international commitments under UN agreements and EU law, and presents a huge threat to sustainable fishing. The operational targets must reflect the need for the Fisheries Bill to include this legal commitment.

For data-limited stocks, a precautionary approach is required to ensure they are resilient to change and protected in the long-term and as an interim step a suitable MSY proxy should be developed, with the intention of moving towards a full MSY assessment through the collection of more data. The use of this principle would ensure fishing activity is managed within environmental limits and that in addition stocks (and ecosystems) are protected against external factors such as climate change which may affect their viability and distribution.

To be effective, the marine strategy must also be underpinned and supported by effective monitoring, control and enforcement methods that are sufficiently resourced. Yet such measures are not included in existing targets or criteria.

In order to ensure that stocks are being harvested sustainably and to minimise, and where possible eliminate, negative impacts of fisheries on the wider marine environment, fisheries must operate in a fully transparent and accountable manner. To this end, the operational targets should include a commitment to fully documented catches. Records of all catches should be publicly available. This is particularly pressing given recent evidence around the landing obligation, which suggests that the landing obligation is not being complied with, ultimately leading to overfishing due to the fact that activity at-sea is not being monitored.

To help achieve this, REM should be introduced as standard for all over 10m vessels and selected under 10m vessels. Importantly, REM will contribute to an ecosystem-based approach to fisheries management, as it will generate information on non-target and protected species captured by fishing gear. Knowledge of this is very much lacking at present. Only by understanding the true extent of incidental capture can we develop and deliver effective mitigation measures. The use of this technology will also improve understanding of the spatial and temporal extent of fishing activities in

and around marine protected areas, increase vessel accountability and boost consumer confidence, raising the UK's sustainability reputation globally.

The House of Lords EU Energy & Environment subcommittee stated in its recent report[81] that without remote electronic monitoring '*there will be no way of determining whether discards are still occurring and consequently whether the catch limits that are set to prevent overfishing are being adhered to*'. The Government has also recognised the benefits of introducing remote electronic monitoring in its response[82] to the above House of Lords report stating '*the Government recognises that Remote Electronic Monitoring (REM) is one of the most cost effective and efficient tools to monitor fishing activity and bring full compliance with the landing obligation'.*

The operational targets should therefore highlight the need for carriage of REM with cameras as a condition of fishing in UK waters. Cameras must be capable of recording both target and non-target species caught to enable authorities to identify what is being taken out of the sea. They should be required for vessels fishing in UK waters, regardless of origin, and also UK vessels fishing elsewhere. This will send a clear signal that the UK is serious about its sustainability credentials.

The UK Government and the Devolved Administrations should also ensure that effective enforcement policies are in place. Recent studies and reports have shown that the UK fisheries enforcement policy does not currently guarantee that infringements attract penalties high enough to be dissuasive or effective. For example, a 2017 report[83] from the European Court of Auditors highlighted that, in Scotland, '*most of the action taken following infringements involved advisory letters and verbal and written warnings. These "soft measures" were applied even in cases of serious infringements (e.g. catching fish after the closure of the respective fishery) and the measures did not seem to prevent recurrence. Even though the inspection efforts and coverage were higher than in other Member States, the recurrence was greater, which indicates that the sanctions are less dissuasive'*.

The operational targets should ensure that all infringements to fisheries law are effectively sanctioned by penalties set at a level high enough to be dissuasive and to act as a deterrent.

D8 - Contaminants

We have raised a number of concerns in responses to questions 1, 2 and 3 relating to gaps in the assessments and proposed targets for contaminants.

As a first step to filling these gaps we recommend reformulating the high-level objective to include '*specified contaminants*', in the same way it is formulated for D9. This will better reflect that the Marine Strategy is not monitoring all possible contaminants.

We recommend that simultaneously, the list of contaminants being monitored must also be extended. Since the 2012 UK Marine Strategy, the list of contaminants to be monitored in territorial waters hasn't been updated, despite stating in the Marine Strategy Part 2 that '*further substances of concern may need to be targeted in future*'. The list has remained the same, focusing on metals, hydrocarbons and

[81] House of Lords EU Energy & Environment sub-Committee "Fisheries: implementation and enforcement of the EU landing obligation", HL Paper 276 published 8 February 2019.

[82] UK response to the Energy and Environment Sub-Committee inquiry report on implementation and enforcement of the EU landing obligation, 4 April 2019.

83 Special Report 08/2017: "EU fisheries controls: more efforts needed". https://www.eca.europa.eu/Lists/ECADocuments/SR17_8/SR_FISHERIES_CONTROL_EN.pdf

two groups of legacy contaminants that have been banned for decades. The list of synthetic chemicals to be monitored is obsolete, being highly insufficient and outdated.

The Technical guidance on monitoring for the Marine Strategy Framework Directive published by the Joint Research Centre in 2014[84] states that: *'As the type and quantities of emissions have changed and environmental legislation has led to reductions in pollution for certain substances and areas, the monitoring of contaminants needs to be adapted and focused to address present and upcoming risks that might affect the achievement of Good Environmental Status (GES).'* The guidance document gives some indication on where to look for new compounds to be monitored, for example, Substance of Very High Concern (SVHC) in REACH, problem substances identified in river basin districts.

In 2018, the JRC published a list of substances to consider for MSFD Descriptor 8[85]. This list is based on a refining of an initial list of 2,700 potential marine contaminants[86]. Experts from 17 Member States (including the UK) shortlisted 333 substances or groups of substances. Following a survey on monitoring practices in the Member States, the report noted: *"The number of contaminants reported also varies considerably between MS, with some countries reporting on less than 20 substances or groups of substances and others on more than 100'* The report also stated: *'While it is true that the substances of concern can vary depending upon the local area, country and (sub)region, the differences found, also between countries sharing regional waters, seem to point to a lack of harmonized criteria for selecting relevant contaminants.'*

The list of contaminants to monitor should include, at a minimum, the following key synthetic chemicals and groups of chemicals of concern for the marine environment:

- Per- and Polyfluorinated substances from the PFAS (Per- and polyfluoroalkyl substances) family[87]. Both legacy PFAS (e.g. PFOA, Perfluorooctanoic acid and PFOS, Perfluorooctanesulfonic acid) and emerging PFAS (such as PFBS, Perfluorobutane sulfonate) used as substitute for legacy PFAS should be monitored[88]. 70 PFAS substances are present in the List of Emerging Substances from the NORMAN Network[89], and some are already listed in the priority list of the WFD. OSPAR published guidelines on how to monitor for perfluorinated substances[90].

[84] Zampoukas, N., et al. 2014: Technical guidance on monitoring for the Marine Strategy Framework Directive. Publications Office of the European Union, Luxembourg. https://mcc.jrc.ec.europa.eu/documents/201702074231.pdf

[85] Tornero, V. and Hanke, G., 2018. Marine chemical contaminants – support to harmonized MSFD reporting: Substances considered for MSFD descriptor 8. Publications Office of the European Union, Luxembourg https://mcc.jrc.ec.europa.eu/documents/201808102056.pdf

[86] Tornero, V. and Hanke, G., 2017: Potential chemical contaminants in the marine environment: An overview of main contaminants lists. Publications Office of the European Union, Luxembourg http://publications.jrc.ec.europa.eu/repository/bitstream/JRC108964/potential_chemical_contaminants_in_the_marine.pdf

[87] PFAS are detected on the French coast of the English Channel: Munshy, C., et al., 2019. Perfluoroalkyl substances (PFASs) in the marine environment: Spatial distribution and temporal profile shifts in shellfish from French coasts. Chemosphere, 228, pp.640-648. https://doi.org/10.1016/j.chemosphere.2019.04.205

[88] Fair, P.A. and Houde, M., 2018. Chapter 5 - Poly- and Perfluoroalkyl Substances in Marine Mammals. Marine Mammals Ecotoxicology. Impacts of Multiple Stressors on Population Health. Pages 117-145. https://doi.org/10.1016/B978-0-12-812144-3.00005-X

[89] See List of Emerging Substances available here: https://www.normandata.eu/?q=node/19

[90] See EMP Guidelines for Monitoring Contaminants in Sediments (Agreement 2002-16). Technical annexe 9 and JAMP Guideline on the analysis of PFCs in Seawater (Agreement 2010-08). Both available here: https://www.ospar.org/work-areas/cross-cutting-issues/cemp

- Flame retardant chemicals, including those that are still on the market such as 'novel' brominated flame retardants[91] and organophosphorous flame retardants[92].
- Pharmaceuticals, such as those identified in CHEM Trust's 2014 report[93].
- Pesticides[94], see for instance those listed in OSPAR, the WFD watch list etc.
- Other groups of chemicals known to contaminate the marine environment which have EDC or other properties of concern[95], including UV filters, parabens[96], bisphenols[97], phthalates[98].

Regarding synthetic chemicals, the monitoring program proposed by the revised Marine Strategy Part 1 is solely focussing on legacy contaminants which have been banned or restricted for decades. The current proposal reiterates the need to investigate emerging contaminants, but no progress has been made at all in this area since the 2012 Marine Strategy. Therefore, in addition to extending the list of contaminants being monitored, we believe a system for monitoring emerging chemicals is also required.

The Technical guidance on monitoring for the Marine Strategy Framework Directive published by the JRC in 2014 insists that the monitoring plans need to be proactive, not reactive: '*Monitoring programs need to (…) be adaptive, responding to new and emerging pollution issues.*' It also states that '*The effective monitoring of time trends, the investigation of emerging issues and pollution incidents and the identification of contaminant pathways and sources are additional aims of the monitoring programme*.'

Lessons should be learned from the PCB case and monitoring processes should be put in place to provide earlier warnings. Non-target analysis[99] could be used to identify novel contaminants of concern.

We were concerned to see the lack of reference in the UKMS to the UK's departure from the EU, despite stating the many links between the strategy and many pieces of EU legislation. Given these links, we are deeply concerned by the lack of information on how GES will be achieved and maintained post-Brexit.

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[91] de Wit, C.A., et al., 2010. Emerging brominated flame retardants in the environment. In Brominated flame retardants (pp. 241-286). Springer, Berlin, Heidelberg. https://link.springer.com/chapter/10.1007/698_2010_73

[92] Wei, G.L., et al., 2015. Organophosphorus flame retardants and plasticizers: sources, occurrence, toxicity and human exposure. Environmental Pollution, 196, pp.29-46. https://www.researchgate.net/profile/Siyi_Zhang7/publication/266561267_Organophosphorus_flame_retardants_and_plasticizers_Sources_occurrence_toxicity_and_human_exposure/links/5bd212b8a6fdcc3a8da641a6/Organophosphorus-flame-retardants-and-plasticizers-Sources-occurrence-toxicity-and-human-exposure.pdf

[93] CHEM Trust, 2014. Pharmaceuticals in the Environment: A growing threat to our tap water and wildlife. https://chemtrust.org/medicines-in-the-environment-a-growing-threat-to-wildlife-and-drinking-water

[94] Casado, J., et al., 2019. Screening of pesticides and veterinary drugs in small streams in the European Union by liquid chromatography high resolution mass spectrometry, Science of the Total Environment, Vol. 670, pp. 1204-1225. https://www.sciencedirect.com/science/article/pii/S0048969719311969

95 IPEN, 2018. Ocean pollutants guide: Toxic threats to human health and marine wildlife. https://ipen.org/sites/default/files/documents/ipen-ocean-pollutants-v2_1-en-web.pdf

96 Jeong, Y., et al., 2018. Tissue-Specific Accumulation and Body Burden of Parabens and Their Metabolites in Small Cetaceans. Environmental science & technology, 53(1), pp.475-481. https://doi.org/10.1021/acs.est.8b04670

97 CHEM Trust, 2018. From BPA to BPZ: a toxic soup? How companies switch from a known hazardous chemical to one with similar properties, and how regulators could stop them. https://www.chemtrust.org/wp-content/uploads/chemtrust-toxicsoup-mar-18.pdf

98 Hart, L., B., et al., 2018. Urinary phthalate metabolites in common bottlenose dolphins (*Tursiops truncates*) from Sarasota Bay, FL, USA. Geohealth, 2, pp. 313-326. https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2018GH000146

99 Samanipour, S. et al., 2019. Letter to the Editor: Optimism for Nontarget Analysis in Environmental Chemistry. Environ. Sci. Technol., 53, 10, p 5529-5530. https://doi.org/10.1021/acs.est.9b01476

D10 - Marine litter

We would like to see Marine Plans used to develop a coordinated marine litter strategy for each Plan area. This should encourage agencies and local authorities to work collaboratively to tackle this issue. All Marine Plans should include specific measures to reduce marine litter including spatial management of users to avoid gear conflicts and loss, requirements for waste management plans for marine-related developments that ensure minimisation and safe disposal of waste and regular consultations with stakeholders by relevant local authorities to ensure the adequacy of port reception facilities. Waste prevention and management plans should form a part of all licensing agreements.

Introduce an integrated, comprehensive suite of measures to adopt circular economy approaches, reducing waste at source and so preventing litter. This includes a transfer of the cost of managing packaging waste to producers to encourage reduction, reuse and recycling and phase out non-recyclable materials that are most prevalent in the marine environment; the introduction of coherent and comprehensive deposit return schemes for drinks containers across the UK and of measures to reduce marine litter from the fishing industry which should include waste management on board, waste management in harbours and operational losses/net cutting leading to ghost gear.. Encourage fishing for litter initiatives, removing barriers to the processing or adequate disposal of marine litter collected, by ensuring that vessels can land non-operational waste collected at sea at any participating harbour at no extra cost.

D11 - Underwater noise

We are pleased that the UK Marine Noise Registry has been established and is now operational in recording impulsive noise. However, it is disappointing that the amount of evidence available is still inadequate to assist in the determination of Good Environment Status in relation to noise. Furthermore, the noise registry currently only collates information on low and medium frequency noise. To gain a full understanding of underwater noise impacts on marine animals, high frequency noise should also be collected.

The Marine Online Assessment Tool recognises that 'direct observation of population and ecosystem-scale effects will require detailed long-term studies which are able to distinguish the effects of man-made sound from the effects of other human stressors or natural factors'.[100] Current data and monitoring relied upon to understand population impacts from human activities is not adequate. For example, the power to detect population changes using current survey methods such as SCANs is poor[101], as mentioned in our response to question 2 for cetaceans. A strategic approach to monitoring at both a Greater North Seas and Celtic Seas scale is required to understand the impacts of underwater noise on marine animals.

To aid monitoring, we recommend an assessment of the impact from underwater noise on GES is included in future marine licensing decisions. Though mentioned in this process already, this could be easily strengthened.

[100] https://moat.cefas.co.uk/pressures-from-human-activities/underwater-noise/impulsive-noise/

[101] Wilson, L.J., Booth, C.G., Burt, L., Verfuss, U.K. & Thomas, L. (2019) Design of a monitoring plan for the Southern North Sea candidate Special Area of Conservation and wider area. JNCC Report No: 629

We question whether just using impulsive block days will be an adequate way to assess the impact of impulsive noise on marine mammals. This level of data provides no information on the characteristics of noise which will be important in determining population and ecosystem impacts e.g. noise levels, area of impact, and length of time of noisy activity. Therefore, we would like to see a comparison analysis of any trends in impulsive block days in the future assessment compared to this assessment. This can be used to monitor whether this is an adequate assessment tool.

Similarly to this, we are pleased that OSPAR is developing an impulsive noise impact indicator and request transparency and stakeholder involvement in its development. Future analysis of pulse block days, as suggested above, with species distribution maps would be useful in future assessments. This would allow 'hot spots' of noisy areas in areas of high density of sensitive marine species. However, as highlighted through the initial impulsive block noise maps on the Marine Online Assessment Tool, noisy areas change significantly year on year depending on the location of noise-producing human activities. However, the use of these data alone would not be enough to determine population and ecosystem effects of impulsive underwater noise. A tool is required to determine potential future impacts from predicted noise-producing human activities to effectively manage underwater noise to ensure GES.

The cumulative impacts of underwater noise are of the biggest threat to marine animals. Research should be implemented to understand and manage cumulative underwater noise effects and this should include stakeholder engagement to develop tools and ensure underwater noise management is practical and fit for purpose. Cumulative impacts should then be incorporated as a future action and linked with work undertaken by OSPAR and in the UK, potentially through The Crown Estate's future Strategic Enabling Works as identified in the Offshore Wind Farm Sector Deal.

We are supportive of the ambient noise projects underwater to gather evidence on ambient noise levels in UK seas. However, monitoring of noise levels from human activities is poor. Regulation should be improved to ensure better monitoring of both noise levels and marine animal activity in relation to noise when noisy human activities take place.

We hold strong concerns that trend data on ambient noise modelling will only be sufficient when three decades of data are available[102]. If this is the reality of the situation, then a precautionary approach must be to manage future increases in shipping traffic e.g. by introducing noise reduction mitigation and technology.

We accept that this would require negotiations at an international level but as the UK Government has highlighted its support for activities at the International Maritime Organization, it is in a strong position to lead these negotiations. We would like UK Governments to support calls for an overall speed reduction to be applied across global fleets. This would reduce underwater noise, risks of ship strikes to marine mammals and greenhouse gases. This could be achieved through contributing to suggestions at the IMO for a work programme item on underwater noise to be included on the agenda of the IMO Marine Environment Protection Committee. To show their support for this work, the UK could begin developing a strategy to implement the 2014 IMO guidelines on reducing underwater

[102] https://moat.cefas.co.uk/pressures-from-human-activities/underwater-noise/ambient-noise/

noise for all UK flagged vessels and vessels calling at UK ports. This could include incentive schemes to encourage modifications (e.g. new propellers or wake flow devices) to improve efficiency and reduce underwater noise.

We are pleased that going forward, the UK Government '*will work with other countries sharing our seas to develop threshold values for levels of impulsive and continuous sound which are likely to cause harm at population level so that common quantitative targets can be established in the future.*'[103] It is important that targets set at a regional seas level are set to ensure consistency and protection of marine mammals at a population level. However, we hold strong concerns regarding the current inconsistent approach to underwater noise management, especially in the Southern North Sea. For example, an area based approach is proposed which is inconsistent with a noise limit approach currently used in Germany, Belgium and the Netherlands. In fact, the approach used across all German waters is more precautionary than the approach proposed in England designated areas e.g. Southern North Sea SAC.[104] The UK Marine Strategy can act as the ideal mechanism in the future to streamline underwater noise management to achieve GES.

Measures taken to address underwater noise impacts, especially in the English portion of the Southern North Sea area are inadequate. Mitigation measures used in the English area of the Southern North Sea is poor in comparison to neighbouring countries. For example, mitigation technology such as bubble curtains is used as standard practice to reduce underwater noise impacts, where as it is a rare occurrence for this to be a requirement in the English portion of the Southern North Sea. Considerations of noise reduction technology is essential when working towards GES.

In addition to the suggestions above, we recommend the introduction of a comprehensive Noise Reduction Strategy for UK seas, working with countries with shared seas and linked to OSPAR noise management policies. This strategy should be underpinned by monitoring of both ambient and impulsive noise. All noise measurements should be entered into the UK Marine Noise Registry. This should give certainty of no adverse effect on marine life and drive innovation and investment by both government and industry in noise reducing technologies. Combined with a strong regulatory system, these measures would drive innovation and investment by both government and industry in noise reducing technologies.

We believe all our recommendations for underwater noise management require broad stakeholder engagement to ensure that management methods are practical and fit for purpose.

[103] https://consult.defra.gov.uk/marine/updated-uk-marine-strategy-part-one/supporting_documents/UKmarinestrategypart1consultdocumentfinal.pdf (noise)

[104] Wilson, L.J., Booth, C.G., Burt, L., Verfuss, U.K. & Thomas, L. (2019) Design of a monitoring plan for the Southern North Sea candidate Special Area of Conservation and wider area. JNCC Report No: 629