Offshore Wind Evidence + Change Programme

Strategic Net Gain Targets for Coastal and Marine Environments

Task and Finish Group Final Report

THE CROWN ESTATE

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Executive Summary

There is increasing recognition of the need for greater action to restore the marine environment in the face of a continued decline in marine biodiversity. Net gain has been identified as a potential approach to development which can contribute to halting and reversing biodiversity loss by leaving the natural environment in a measurably better state than before. Developments which adopt Biodiversity Net Gain (BNG) aim to have positive impact by delivering an overall increase in biodiversity.

Currently, there is no formal requirement for Net Gain as part of marine development or Nationally Significant Infrastructure Projects in the marine environment. However, it is understood that both are likely to become mandatory in the near future. Introducing a system of Net Gain in the marine environment is recognised as being particularly challenging owing to the dynamic nature of the marine environment and the complex interactions with marine development. It is therefore important that there are clear objectives and targets for Marine Net Gain (MNG) which provide a focus for developer action.

Defra's Offshore Wind Enabling Actions (OWEAP) Programme is working to increase understanding of the environmental impacts of offshore wind and find strategic solutions to manage and mitigate impacts in order to reduce barriers to the expansion of offshore wind in English waters. One of the key areas being addressed under OWEAP is MNG.

In order to help inform the development of Defra policy in relation to MNG and its implementation, the Offshore Wind Evidence and Change Strategic Net Gain Task and Finish Group (T&F Group) was established to work closely with OWEAP to identify suitable targets for marine and intertidal Net Gain. The T&F Group comprised a range of organisations including Defra, Energy UK, Natural England, Renewable UK, RSPB, SUDG, The Crown Estate, The Wildlife Trusts and UK Major Ports Group, supported by an experienced consultancy, ABPmer. The Group aimed to identify a set of strategic targets for the delivery of MNG and, through consultation, achieve agreement for these targets from all sectors.

The T&F Group began by undertaking a gap analysis of existing legal and policy objectives and targets, to inform and support discussion around possible priorities for MNG. Following this, two on-line stakeholder surveys were conducted to gather views from marine stakeholders about MNG opportunities and priorities. The findings from these surveys informed the suggested recommendations for MNG priorities.

In addition, to ensure that the T&F Group was operating with a common understanding the Group defined a set of assumptions that would guide the work discussions. The assumptions outlined were central to the Group's determination of targets whilst also informing their application and deliverability by industry to meet potential future MNG obligations. The development of these assumptions was supported by the information gathered through the stakeholder surveys. It is also important to stress that all discussions of the T&F Group on MNG were based on the foundation that the mitigation hierarchy will still apply to development.

The outcome of the work carried out by the T&F Group is a robust set of suggested strategic targets for MNG, which have strong consensus and agreement from all sectors; industry, regulators and conservation bodies. The targets set a clear direction for how developments could contribute towards MNG to restore and improve the marine environment, linked to national strategic priorities. On a national and regional level, the T&F Group considers that

MNG should be a strategically managed process led by the government to which funding and delivery of projects is contributed to by industry.

Importantly, MNG should not just encompass habitat restoration but also include species restoration and human activity pressure reduction, as important measures to support restoration and enhancement of the marine environment.

As such the recommendations from the T&F Group, to support further discussions on MNG, and assist Defra in its development of MNG policy, are:

- The identified strategic target areas should be used by government to inform the development of MNG policy and principles of implementation;
- Strategic targets should be based on our understanding of where we are already failing intertidal and marine environments, and the need to halt and reverse marine biodiversity loss;
- MNG should as a minimum achieve BNG;
- The primary goal of intertidal and marine BNG at a national scale should be to place marine and intertidal ecosystems into recovery;
- Multi-purpose projects providing secondary benefits that contribute to the following targets should also be prioritised, but these benefits should be delivered in addition to the primary goal of achieving ecosystem recovery: to reduce disaster risk from the continuing loss of natural coastal defences such as salt marsh (e.g. flood risk/ coastal erosion); and to combat climate change, through mitigation and adaptation;
- The T&F Group recognises the urgency in halting and reversing marine biodiversity loss, particularly in the context of accelerating pressure from climate change and the likelihood of the need to relate to planning decisions. Overall targets for MNG should be presented without reference to specific timescales as the requirement for MNG interventions will depend on the nature and pace of relevant development projects and their impacts. Where specific MNG interventions are progressed, there should be clear objectives, linked to measures of success for these interventions supported by effective monitoring;
- MNG should be secured 'in perpetuity', but this is dependent on the type of intervention, the mechanism for delivery and the custodianship of responsibility and may be subject to natural change. The aim should be to contribute to an overall recovery;
- MNG policy must be developed in the context of the dynamic nature of the marine and intertidal environments. MNG projects must be considered with an understanding of the complexities of marine systems, and that pre-existing causes of loss may need to be addressed if the outcomes of MNG activities are to be successful and sustained;
- There is some potential that research and data gathering could be considered as MNG (for example, a research project to support better MNG delivery in the future), but only if it is delivered as part of a broader strategic approach as part of a package of measures;
- MNG will have a greater impact on the recovery of the marine environment if funding is pooled into a national fund to assist in the delivery of the strategic Net Gain targets. There is also a need to involve industry as a partner throughout the Net Gain process to ensure positive outcomes can be credited to developers, allowing them to build funding this into their business models;

- Delivery of MNG could be assisted by Regional Delivery Groups, distributing pooled funds and operating under a clear set of agreed principles. Delivery groups should be represented by a range of organisations with marine expertise including government, SNCBs, industry and eNGOs; and
- Development of MNG policy should appropriately consider the question of custodianship of responsibility to deliver Net Gain.

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1. Introduction

1.1 Net Gain and development: background and progress

Since the launch of the 25 Year Environment Plan (25YEP) and the growth in understanding of natural capital, there is increasing discussion about Net Gain as a concept to be associated with development. Net Gain can be defined as building measures into a development that would ensure that biodiversity and/ or the environment is improved when work is completed. Marine industries are accustomed to protecting the environment and the legislation that requires this, but there is a growing view that we need to be working towards restoration and improvement as well. Net Gain is one way in which developers can make a positive contribution to the environment through the activities they undertake.

Some progress has been made on this in terrestrial development, where metrics have been developed and it is accepted that Net Gain will soon be mandatory under the Environment Bill down to the mean low water mark. In addition, the movement towards Net Gain as an integral aspect of development is almost certainly going to increase in importance as people look more towards corporate and social responsibility in industry. Some industries are already acknowledging this in their future planning and corporate identities and their policies and proposals on the environment are increasingly reflected in corporate publications. Good examples relevant to the marine environment are Scottish and Southern Energy's Biodiversity report 'Protect, Restore, Enhance'[1] and Ørsted's 2030 net positive biodiversity commitment[2].

As yet, there is no clear statement that Net Gain will be required for marine development and there is no requirement for Net Gain as part of developments considered to be NSIPs in the marine environment. However, it is understood that both are likely to become a mandatory aspect of development through Statutory Instrument within a short number of years. There is also some uncertainty whether the requirement will be to deliver Biodiversity Net Gain (BNG) or wider environmental improvements (Environment Net Gain (ENG)). BNG, as its name suggests, specifically seeks to enhance biodiversity while the growing adoption of the natural capital approach suggests that wider environmental benefits (i.e. ENG) could also be examined which could also incorporate BNG[3]. This distinction may be important in determining what Marine Net Gain (MNG) should entail when it becomes a mandatory aspect of development.

The Environment Bill cites BNG, but there are also references to ENG by policy makers, and it is assumed that this will become clearer as policy on Net Gain, and MNG in particular, is prepared by Government.

How this will be done and how compliance with evolving legislation will be determined and regulated remains unclear at this stage, but there are some areas of work being undertaken to look at this:

[1] https://sse.com/media/575256/Biodiversity-Report-2019_WEB.pdf

[2] https://orsted.com/en/media/newsroom/news/2021/06/697759855099726

[3] It should be noted that wider environmental Net Gain should not include measures to improve public access that could have detrimental impacts for biodiversity and the environment, such as the creation of new footpaths or signage.

1. Natural England (NE) has developed and launched a metric for the delivery of terrestrial and intertidal Net Gain and this is linked to compliance with the Town and Country Planning Act, which applies down to mean low water. Although a metric has been prepared further clarity is needed about how the intertidal metric will be applied and NE has also emphasised that the metric will be reviewed over time ahead of mandatory inclusion of Net Gain, currently expected in 2023.
2. Defra has established a number of groups under its Offshore Wind Enabling Actions Programme (OWEAP) and one of these is looking at the policies, principles and possible application of Net Gain in the marine environment.

There are also some related activities looking at the potential for improvement of the marine environment being undertaken by NE including:

- Defining Marine Irreplaceable Habitats (those habitats that would be outside the scope of MNG);
- Application and applicability of the Environmental Benefits for Nature (EBN) tool to the marine environment (exploring the wider benefits of marine Nature Based Solutions);
- Evaluating the benefits of artificial habitats (better understanding of the contribution to biodiversity and wider ecosystem functioning); and
- Comparing the value of natural vs assisted marine habitat recovery (identifying situations where active restoration interventions can promote and accelerate recovery).

When complete the outcomes of these initiatives may help to assist in the planning and delivery of aspects of Net Gain.

1.2 Industry and Marine Net Gain

The Seabed User & Developer Group (SUDG) held a number of workshops in Autumn 2018, 2019 and 2020 with industry, Statutory Nature Conservation Bodies (SNCBs) and non-government organisations (NGOs), including The Wildlife Trusts (TWT) and Royal Society for the Protection of Birds (RSPB). The aim of these workshops has been to plan how Net Gain could be adopted as a principle that would ensure marine industries can make a significant contribution to improving the environment, whether it became mandatory or remained as a voluntary process. This work was predicated on the understanding that if Net Gain becomes part of the development process, then it is beneficial for industry to take the opportunity to form a view from the outset which could be considered as part of the process for implementing and delivering Net Gain.

Importantly, a significant outcome of the workshops was that if Net Gain is to provide maximum benefit to all stakeholders, it must be seen by industry as an opportunity rather than a further burden on development. There is also need for Government, NGOs, industry and regulators to work together to ensure this is the case.

In developing thinking on Net Gain and the opportunities it creates, the workshops and other discussions have raised a number of specific questions which need to be considered as part of any work taking Net Gain forward:

1. There are still decisions to be made as to where Net Gain may apply; one view is that it can only be applied in areas outside any formal conservation designation, to ensure that any gains are additional to those that would otherwise happen. A steer is needed on this and we understand this will form part of a government consultation on MNG later this year. One possible approach is that Net Gain could potentially be applied in designated areas where it is not directly associated with the habitats and features that are cited in designations but could contribute to ecosystem enhancement and conservation value of the whole site.
2. It is widely accepted that many marine developments will impact on terrestrial, intertidal and subtidal habitats, so there is wide scope how and where Net Gain could be applied and how this would impact on opportunities for Net Gain. Would subsequent regulation allow for wider and more ambitious Net Gain actions covering a range of habitats and features, or will regulation require different and more specific Net Gain actions for each zone? This is widely considered as a key point to ensure that Net Gain delivers the maximum possible value.
3. A possible approach to Net Gain raised during the workshops is to not treat Net Gain as distinct from mitigation and compensation (the 'mitigation hierarchy'), but rather use it as an opportunity to provide more than compensation, so that the environment is not just protected but improved. The recent Defra consultation on 'Best practice guidance for developing compensatory measures in relation to Marine Protected Areas' touched on this issue[4]. A feature of this approach is that it could be applied regardless of whether work takes place in designated areas or outside. Logically, this should also apply on an ecosystem-wide basis, acknowledging that some species require access to terrestrial, marine and intertidal habitats throughout their lifecycles. This has been referred to as 'ecosystem enhancement' and may be of considerable value.
4. Many of the discussions about Net Gain have emphasised that a paradigm shift to move beyond environmental protection to improvement and restoration will require innovation and creativity; developing new ways of working rather than simply adjusting the way we currently deliver outcomes. This view is predicated on the understanding that regulation to protect the environment works well, but that simply applying an extension of this would not deliver wider and more ambitious Net Gain benefits.
5. Linked to the increasing recognition that the marine environment requires more than just protection, there is an incredible amount of work being undertaken by a range of bodies to develop ambitious and large-scale projects to restore both habitats and species. For example, major managed realignment projects have been implemented in the Crouch/ Roach (Wallasea Island Wild Coast), Medmerry in Sussex and at Steart Peninsula in the Severn Estuary. A number of significant oyster restoration projects are being progressed at various sites, including in the Solent, Essex Estuaries, Dornoch Firth and Milford Haven. Large-scale initiatives to restore seagrass are also being taken forward in Pembrokeshire and the Solent. Clearly, there is a possible role for industry to provide funding to assist in the delivery of similar projects through partnership.

[4] https://www.gov.uk/government/consultations/marine-protected-areas-guidance-for-developing-compensatory-measures

6. The open and connected nature of the marine environment means that human activity pressures may be expressed over wide spatial scales, affecting not just marine habitats but also key species such as invertebrates, fish, birds and marine mammals. Restoration of some ecological features of the marine environment may require active intervention where it is ecologically feasible but for other features recovery may need to be facilitated simply through the removal of existing pressures. In contrast to the terrestrial environment where Net Gain is focused solely on habitat lost to development, there is greater opportunity within the marine environment to consider wider possibilities for Net Gain, including species restoration and removal or reduction of human activity pressures.
7. In order to maximise the environmental outcomes of delivering Net Gain projects, a strategic approach should be taken, whereby broader overarching needs for environmental improvement are considered, rather than Net Gain opportunities being identified solely at a development-specific scale.
8. Finally, the potential for contribution to Net Gain from the planned growth of marine industries and, in particular, offshore wind and associated cables and infrastructure is huge. Consequently, it may be important that the outcome from Net Gain actions should be ambitious and highly significant in helping to reverse environmental loss in marine and coastal areas.

None of these points, however, replace the existing obligations of legislation to protect the environment, but, as with 7 above, Net Gain may create an opportunity where development could contribute to better ecosystem management beyond delivery of Net Gain actions aimed at specific aspects of single developments. Such approaches could ensure that development has a material and significant impact in helping to meet, for example, Good Environmental Status (GES) under the Marine Strategy and avoid the potential for Net Gain to be described as 'greenwash'; where actions would simply be delivered without addressing clearly understood issues in the marine environment.

1.3 Strategic targets for Marine Net Gain

The result of discussions within the SUDG MNG workshops held between 2018 and 2020 was that many of the aspects considered in examining how best to take forward Net Gain could possibly be facilitated with the identification and subsequent delivery of agreed strategic targets for Net Gain. These targets would be aimed at assisting in the improvement and restoration of the marine environment, which has been documented through a number of important reviews and monitoring programmes. Strategic targets could be delivered by industry and statutory bodies, working in partnership to deliver their respective statutory duties, or with other bodies working towards recognised conservation objectives, such as RSPB and TWT. The benefit of having strategic approaches is also increasingly recognised by Defra, NE and others, which will need to be further explored to understand how they could be incorporated into legislative processes.

Consequently, SUDG and TWT proposed that we should work with a range of marine stakeholders to identify strategic targets for MNG that would improve and restore the marine environment that could support an approach to Net Gain with marine industry sectors. The development of these strategic targets could be based on a number of information sources that already recognise that there are considerable opportunities to restore and improve the marine environment.

These include:

- Failure to achieve GES for many of the descriptors which are reported through the Marine Strategy including for cetaceans, benthic habitats, seabirds, fish and underwater noise;
- Failure of many features within designated sites to achieve favourable condition;
- Continued failure of many rivers and estuaries to meet Water Framework Directive (WFD) standards which, as a consequence, will continue to prevent effective restoration work of features such as seagrass. For example, the impact of nitrogen inputs in the Solent has caused harm to the coastal environment in that area and the issue led to the suspension of the granting of planning permissions in south Hampshire while a solution was found;
- The immense and growing pressure on the marine environment from climate induced changes and the inability of many marine features to be able to naturally respond to this; and
- Increased understanding of the extent of loss of habitats such as saltmarsh, including the REstoring MEadows, MArshes and REef (ReMeMaRe) work of the Environment Agency (EA) and the LIFE Recreation: Reducing and Mitigating Erosion and Disturbance Impacts affecting the Seabed (ReMEDIES) project lead by NE.

1.4 Strategic Marine Net Gain Task and Finish Group

To develop the idea of strategic MNG targets further, SUDG and TWT prepared a successful proposal to the Offshore Wind Evidence and Change Programme[5]. The terms of reference for the work had the following key roles and objectives:

- Examine the sources of information that could be used to identify strategic MNG targets;
- Use the information to develop draft strategic Net Gain targets for marine and coastal environments;
- Consult widely on these to determine acceptability across a broad range of stakeholders;
- Finalise agreed strategic targets; and
- Publicise the final outputs.

A multi-disciplinary Group from a range of organisations was established and supported by an experienced consultancy, ABPmer, with the aim of identifying strategic targets for MNG which, to be successful, would be widely agreed across a range of stakeholders.

[5] The Offshore Wind Evidence and Change programme was established by The Crown Estate in December 2020 and aims to facilitate the sustainable and coordinated expansion of offshore wind to help meet the UK's commitments to low carbon energy transition whilst supporting clean, healthy, productive and biologically diverse seas. It is a collaborative programme led by The Crown Estate, together with its programme partners, the Department for Business, Energy and Industrial Strategy (BEIS) and Defra. It is being delivered in collaboration with devolved government bodies and organisations from across the UK that have an interest in planning for the future of offshore wind.

The group agreed that it should be established as a Task and Finish Group (T&F Group) and comprised:

- Defra;
- Energy UK;
- Natural England;
- Renewable UK;
- RSPB;
- SUDG;
- The Crown Estate;
- The Wildlife Trusts; and
- UK Major Ports Group.

The range of representation in the T&F Group ensured that there was experience from industry, which would be critical in maintaining the positive approach to MNG; conservation bodies, whose experience and understanding would be invaluable in highlighting conservation needs. Defra and NE were also invited to ensure full linkage to their work on Net Gain policy development and regulation.

The T&F Group began by undertaking a gap analysis (see Section 3) of existing legal and policy objectives and targets, to inform and support discussion around possible priorities for MNG. Following this, two on-line stakeholder surveys were conducted (see Section 4) to gather views from marine stakeholders about MNG opportunities and priorities. The findings from these surveys informed the suggested recommendations for MNG priorities (as outlined in Section 5).

1.5 Defra's Offshore Wind Enabling Actions Programme (OWEAP)

Defra's Offshore Wind Enabling Actions (OWEAP) Programme is a two-year programme designed to increase understanding of the environmental impacts of offshore wind and find strategic solutions to manage and mitigate impacts in order to reduce barriers to the expansion of offshore wind in English waters. The aim is to enable the responsible and sustainable growth of offshore wind, recognising its essential contribution to meeting the Government's climate change commitments, whilst ensuring the protection of our marine environment.

OWEAP has four key areas, one of which is addressing Net Gain. The Net Gain Workstream is developing the policy and approach and is examining the legislative aspects of Net Gain in the marine environment. It is developing a comprehensive programme of work which will be carried out over the coming months.

The MNG work area in OWEAP is preparing a consultation on the aims and principles of MNG which it intends to open later this year. The responses will help to shape the development of government policy for introducing an approach to Net Gain in the marine environment. It is important therefore to stress that the work of the T&F Group has not looked at policies associated with the delivery of Net Gain, and from the outset the work of the T&F Group was restricted by design and agreement to develop strategic Net Gain targets. The aim is for these targets to be used by Defra as building blocks when developing its own policy for MNG. The

two aspects of work have therefore been kept distinct, but Defra has been part of the T&F Group to ensure close liaison and coordination between the two initiatives.

The discussions within the T&F Group and the feedback from the surveys also identified a number of points about the ability for some of the strategic targets to be delivered and possible mechanisms for doing this. These have been included later in this report as assumptions made by the T&F Group (Section 2.1). These are not intended to set out policy, but have been included as considerations which can inform the public consultation and subsequent work which Defra will undertake later this year.

2. Assumptions

In order to identify strategic targets for MNG, ongoing discussion within the T&F Group ensured that it was operating with a common understanding of the assumptions being made. Therefore, the assumptions outlined in this section are central to the group's determination of targets whilst also providing information on their application and deliverability by industry to meet potential future Net Gain obligations. The development of these assumptions has also been supported by information gathered through the stakeholder surveys (see Section 4) undertaken by the T&F Group to collect views on strategic targets and priorities. It is also important to stress that all discussions of the T&F Group were based on the foundation that the mitigation hierarchy will still apply to development.

2.1 Assumptions made by the T&F Group when determining strategic targets for Marine Net Gain

The assumptions agreed were as follows:

1. As a basic premise, strategic MNG targets should be based on our understanding of where we are already failing intertidal and marine environmental objectives, and the need to not only halt but also reverse marine biodiversity loss. This is well documented by existing monitoring of statutory as well as non-statutory obligations; for example, the failure to meet GES as part of the Marine Strategy requirements and the failure of designated Marine Protected Areas (MPAs) to meet favourable conservation status. In addition, numerous reports prepared by eNGOs and others highlight the continuing depletion of marine species and habitats. For example, only 4 out of 15 indicators for meeting GES have been achieved so far[6] and the latest State of Nature report estimated that only approximately half of fisheries in the UK are assessed as being fished sustainably[7]. The UK Breeding Seabird Indicator showed a 28% decline in average abundance between 1986 and 2018[8]. Recent seal counts from 2019 show that harbour seal populations on the east coast of England have declined by approximately 27.6% compared to the previous year[9].
2. The primary goal of MNG at a national scale should be:
   - *to place marine and intertidal ecosystems into recovery.*

   Multi-purpose projects providing secondary benefits that contribute to the following targets should also be prioritised, but these benefits should be delivered in addition to the primary goal of achieving ecosystem recovery:

   a. *to reduce disaster risk from the continuing loss of natural coastal defences such as saltmarsh (e.g. flood risk/ coastal erosion); and*

   b. *to combat climate change, through mitigation, adaptation or through the storage of blue carbon.*

[6] Summary of progress towards Good Environmental Status: Marine Online Assessment Tool

[7] State of Nature Report 2019: NBN https://nbn.org.uk/stateofnature2019/

[8] https://jncc.gov.uk/our-work/ukbi-c5-birds-of-the-wider-countryside-and-at-sea/#:~:text=In%202018%2C%20the%20breeding%20seabird,higher%20than%20in%201975%2F76.

[9] Scientific Advice on Matters Related to the Management of Seal Populations: 2020.

Both primary and secondary goals should be planned with an ultimate overall aim of generating lasting improvements in marine and coastal environments.

3. The T&F Group fully recognise the importance of the opportunity to pool funding from industry and other partners to undertake projects that would have a significant and positive impact on the marine environment, which will be important in avoiding piecemeal and possibly inappropriate or unsustainable actions. Grasping such opportunities involves not only the identification of the right strategic priorities, but also considerations such as aligning incentives and practical viability. It may be that this would be critical to the success of more ambitious projects such as those outlined in 5, 7, 8 and 9 below.
4. Targets should be presented without reference to specific timescales (unless these are evidenced). The delivery of MNG will be inherently linked to biodiversity recovery priorities, the timeframes for action, and the timescale and scale of development in the marine environment, but any argument to identify targets for immediate delivery needs some consideration. Although timing of delivery will be an important principle in determining how MNG should be delivered by developers (and will need to be addressed in statutory aspects developed by Defra) it will be important to avoid solely focusing on quick wins that do not necessarily contribute to strategic targets (see point 6 below).
5. It is accepted that where possible, MNG should ideally be secured 'in perpetuity' although the dynamic characteristics of intertidal and marine environments need to be recognised (see 6 below). However, the definition of 'in perpetuity' may alter depending upon the type of intervention in question (i.e. pressure reduction verses habitat creation), as well as the mechanism for delivery (e.g. if net gain is delivered at a project level, 'in perpetuity' would be limited to the lifetime of the project). The definition of 'in perpetuity' must also be considered in the question of custodianship/ liability for ensuring delivery of gains (see point 3 in the 'Further Thoughts' section below).
6. By definition, strategic targets for MNG may be large and ambitious, reflecting the scale and opportunities for restoring and improving the marine and coastal environments. Consequently, MNG targets for individual developments should be made on the basis that rather than stand alone, they could contribute to wider delivery of agreed conservation targets and that they are just one of the mechanisms that will help restore biodiversity through partnerships:
    a. For intertidal goals, a good example is that of the EA; they are preparing targets based on their understanding of the current status of saltmarsh, seagrass and other habitats, and these could be important opportunities where industry could assist in delivering MNG as part of the EA's own actions to manage flood and coastal defences. Such an approach also lends itself to even wider partnership working, such as that carried out at Wallasea Island by RSPB and others, and in the delivery of more ambitious campaigns for restoration. For example, Essex Wildlife Trust and the EA worked in partnership on a coastal re-alignment project in the Blackwater Estuary, where land was purchased, and the old sea wall was allowed to be breached[10]. This has created valuable saltmarsh habitat that now supports internationally important bird populations and acts as a fish nursery for

[10] Coastal Defence and Realignment at Abbotts Hall Farm.

bass, herring and 14 other fish species, whilst also providing a natural defence against rising sea levels; and

b. No similar examples exist for achieving marine goals and it is recognised that restoring and improving the marine environment is likely to be complex. Therefore, delivering these marine targets will require novel and innovative approaches, outside of traditional habitat restoration, in order to succeed.

7. Intertidal and marine environments are not constrained by boundaries and are very dynamic in nature. This needs to be recognised in strategic targets for MNG within these dynamic systems. As a general principle, activities and possible loss of biodiversity in the intertidal zone should deliver MNG in the intertidal area and, equally, impacts in the subtidal zone should deliver MNG in the marine environment. By extension, this should mean that Net Gain for marine and intertidal activities should not be delivered in the terrestrial environment, in particular, so that potentially easier options terrestrially are not taken to avoid more difficult marine choices. However, it should be recognised that clear exceptions exist, where opportunities may be identified to deliver ambitious strategic Net Gain projects, for example to address the upstream root cause of a failing habitat in the marine environment (e.g. water quality management to enable seagrass restoration where existing legal requirements for water quality standards do not necessarily apply, such as some farming methods).

8. Activities which create a pressure on the environment may need to be addressed, including some forms of fishing. While this may create opportunities for MNG, it is important to recognise that the responsibility to assess the removal of many pressures as a means of delivering MNG must be with Government, as this will often also require statutory intervention. An important principle of successful MNG is that external pressures resulting in loss of biodiversity may need to be addressed if the outcomes of net gain activities are to be successful and sustained. Consequently, targets need to acknowledge the complexity of the environment and examine and treat causes of loss as well as direct restoration actions. For example, simply planting seagrass, or laying native oysters or mussels, without considering the underlying reasons for the initial loss, such as nutrient enrichment, may be unsuccessful and may place a liability on the developer to maintain features which the current ecosystem is incapable of sustaining. This emphasises the importance of careful design of any proposed interventions and highlights how strategic delivery of targets could alleviate this issue.

9. 'Additionality' is considered by the T&F Group to mean providing Net Gain improvements or restoration within existing protected sites, specifically to improve the condition of failing sites. The T&F Group put the issue of 'additionality' aside for discussions as this is currently being addressed by Government. It was agreed by the group, however, that the issue of additionality would not restrict the group's thinking on where and how MNG could be applied strategically, and this would be reflected in the targets.

10. There is some potential for research and data gathering to contribute to MNG (for example a research project to investigate better MNG delivery in the future), but only if it is delivered as part of a broader strategic approach, and as a supporting action to delivering MNG. It would not be appropriate, for example, for research to determine how to deliver MNG for a specific development to be considered as MNG.

2.2 Further thoughts from the T&F Group on the potential delivery of Marine Net Gain

In addition to the points made above about the nature of strategic MNG, the T&F Group identified a number of points for further consideration on the delivery of MNG, the design of MNG principles and how MNG should be administered through regulation. These thoughts should not be taken as recommendations for policy, but as ideas for further consideration in the development of MNG policy:

1. MNG will have a greater impact on the recovery of the marine environment if funding is pooled into a national fund to assist in the delivery of strategic Net Gain targets. Pooled funds would allow important and large-scale, ambitious projects to be delivered, which will have the greatest contribution towards delivering the strategic targets and helping marine recovery. Any funding mechanism should be accompanied by comprehensive guidance to ensure the pooling and delivery of funds will have the greatest impact. Recognition of developer contributions to specific interventions is likely to be important to developers in demonstrating their environmental commitments as well as evidencing their compliance with legal Net Gain requirements.
2. The T&F Group also discussed the potential benefits of distributing Net Gain funds at a regional level with the assistance of regional groups including:
   - Regional strategic and project priorities developed by experts with regional knowledge to support delivery of national strategic targets;
   - Avoiding issues with regional boundaries, where appropriate, by pooling and distributing national funds to deliver strategic priorities to deliver projects across regional boundaries where this would have the biggest impact on marine recovery;
   - The opportunity for a monitoring and reporting forum to report nationally on delivery of Net Gain priorities; and
   - Consistency in the delivery of Net Gain projects against the national priorities.

   Such an approach could help to ensure regional priorities for marine restoration and enhancement were delivered in an effective manner while still enabling wider scale issues to be addressed. The regional groups could also link in with other initiatives such as Environmental Land Management (ELM) and Local Nature Recovery Strategies (LNRS).
3. Ambitious restoration projects will require greater funding and therefore a strategic/ collaborative approach. The Aggregates Levy provides an example for how a funding mechanism might work. A strategic approach is also potentially better for smaller developments; they could contribute to large-scale projects through a pooled fund that could result in larger gains than several small individual projects. However, funding doesn't need to be one or the other, there could be a strategic fund as well as a developer-led approach to suit project/ industry needs. The ReMeMaRe project is preparing a series of bids to try and highlight restoration opportunities on a large scale. A strategic fund comprising Net Gain contributions could be used to help support these more ambitious projects.
4. It may be that to safeguard the permanence of MNG interventions, legal protection, or safeguarding through tenure rights, would be required. While this needs examination, there are questions about custodianship and who will have responsibility to maintain the interventions. At the same time there is a need to monitor the effectiveness and success of the interventions and overarching responsibility for this also needs to be addressed. This becomes especially important where MNG may be delivered through

partnership working, where there is more than one key player, or where Net Gain is delivered on behalf of a developer by a third party, in which case the chain of liability would need to be clear.

5. The strategic targets developed by the T&F Group are England-focused, but there will be many opportunities to use the delivery of MNG to develop good practice which can be shared with the devolved administrations, for example in cross-border estuaries. This should also be reciprocated as they develop their own approaches. For example, the development of the partnership funding approach, Scottish Marine Environmental Enhancement Fund (SMEEF), may prove to be of real value in developing practical application of funds for strategic Net Gain target delivery.

3. Gap Analysis

3.1 Introduction

To support the identification of objectives and targets to which MNG might contribute, ABPmer was contracted to carry out a gap analysis, with support and input from members of the T&F Group, to identify existing coastal and marine environmental targets and objectives, and the extent to which they are currently met or have the potential to be met in the future as a result of existing actions.

The study reviewed and summarised a wide range of international, European and national legislation and policy drivers for managing the coastal and marine environment that could directly or indirectly support habitats and species.

Some legislation and policy is specific to particular physical, chemical or ecological features/ receptors (for example the Eel Regulation applies only to the European eel) while other commitments, such as the Marine Strategy, apply to a wide range of different feature/ receptor categories. In conducting the gap analysis, it was therefore considered helpful to conduct a cross-cutting review focused on the following broad feature/ receptor categories, which broadly reflect Marine Strategy descriptors:

- Contaminants (metals, trace organics, radioactive substances);
- Eutrophication;
- Marine litter;
- Underwater noise;
- Marine habitats;
- Marine species:
  - Plants and invertebrates;
  - Fish;
  - Birds;
  - Mammals.

Where relevant, the gap analysis differentiated between intertidal/ coastal features and offshore features.

The gap analysis highlighted targets and objectives considered most relevant to MNG. The focus for this work was to identify gaps in progress towards existing targets; for example, declining condition of some inshore and offshore habitats, failure to achieve targets in relation to some fish, seabird or marine mammal populations. However, it is also clear that many existing targets have been set without taking full account of historical losses of habitats and species within the marine environment; for example, over 90% of UK saltmarshes, oyster reefs and seagrass meadows have been lost as a result of anthropogenic pressures or disease. Therefore, it is important to note that there are much wider opportunities for industry to contribute to restoring the marine environment beyond those identified in existing targets.

The T&F Group notes that the issue of 'additionality' under the Birds & Habitats Directives is currently being reviewed by Defra. Depending on the outcome of this review, there may be greater opportunity for industry to contribute to actions to improve the condition of European sites.

3.2 Summary of findings

A summary of key findings from the gap analysis is presented in Table 1 and highlights the initial thinking of the T&F Group; the full analysis is shown in Appendix A.

Table 1 is superseded by Tables 3 to 5 which refine the T&F Groups priorities for MNG following development of the assumptions (see Section 2) and outcomes of the stakeholder surveys (see Section 4).

Table 1 Summary of key gaps and opportunities for each feature category

Marine Feature Category	Extent of Any Current or Anticipated Future Gap	Suggested Scale of Opportunity for Industry Contributions
Contaminants	Relatively few failures of WFD EQS in transitional and coastal waters. Offshore waters considered to be at GES.	**Low**. In line with 'polluter pays principle', owners of significant point source discharges should be responsible for limiting emissions.
Eutrophication	A significant proportion of transitional and coastal water bodies have elevated concentrations of dissolved organic nitrogen. A smaller number of water bodies show evidence of eutrophication. The UK has largely achieved its aim of GES for eutrophication (D5).	**Low.** Opportunity to contribute to nutrient cycling as a result of habitat restoration and enhancement is moderate.
Marine litter	GES has not been achieved for marine litter (D10). Litter is abundant on beaches and widespread on the seafloor. The OSPAR target relating to plastic litter in fulmar stomachs has not been met.	**Low**. Scope to contribute funding to litter removal initiatives or to removal specific debris.
Underwater noise	GES has been partially achieved for underwater noise (D11). The UK has set up a Marine Noise Registry to monitor impulsive noise, however, data needs to be collected into the future to be able to assess any patterns and trends. Continuous ambient noise has also been recorded which will serve as a benchmark to assess future ambient noise levels.	**Low**. Underwater noise from marine industry is increasingly being addressed through regulation and therefore unlikely to be appropriate for Net Gain. Some scope to contribute funding to underwater noise reduction research.

Marine Feature Category	Extent of Any Current or Anticipated Future Gap	Suggested Scale of Opportunity for Industry Contributions
	Overall, the achievement of GES for underwater noise, however, remains uncertain, given that the consequence of noise on populations and ecosystems is not currently assessed.	
Intertidal/ near coastal habitats	A number of habitats have been identified as in short-term decline including estuaries, mudflats, lagoons, inlets and bays, vegetated sea cliffs, *Spartina* and Atlantic salt meadows. In addition, larger historic declines of seagrass meadows, saltmarsh and native oyster reefs have been reported.	**High.** Scope for direct habitat restoration and enhancement in intertidal and near coastal areas in particular saltmarsh, intertidal mudflat and sandflat, oyster (and other bivalve) beds and seagrass beds. Possible scope for other shallow sublittoral habitats such as kelp, pink sea fan, etc through pressure removal.
Offshore habitats	A number of habitats have been identified as in decline including major historic losses of offshore structuring features (native oyster reef, Modiolus, serpulid reef and other biogenic reef). Many offshore MPAs designated for benthic habitats are currently in unfavourable condition, particularly sandbanks, e.g. Dogger Bank SAC, Inner Dowsing, Race Bank and North Ridge SAC, Haisborough Hammond and Winterton SAC, North Norfolk Sandbanks and Saturn Reef SAC.	**High**. Limited opportunities to restore habitat offshore directly. Pressure removal (particularly fisheries pressure removal) likely to be important to support long-term habitat recovery and ecological benefits.
Intertidal/ near coastal plants and invertebrates	A number of WFD transitional and coastal water bodies are reported to have failed for angiosperms, invertebrates and macroalgae. Numerous MCZ plant and invertebrate features need to 'restore feature to favourable condition'.	**High**. Scope for direct restoration of either associated habitat through managed realignment, etc or direct reintroduction of species (replanting saltmarsh/ seagrass, laying oysters).

Marine Feature Category	Extent of Any Current or Anticipated Future Gap	Suggested Scale of Opportunity for Industry Contributions
Offshore marine invertebrates	A number of habitats critical to marine invertebrates have been identified as in decline, including major historic losses of offshore structuring features (native oyster reef, *Modiolus*, serpulid reef and other biogenic reef features).	**Medium**. Some scope for direct restoration and enhancement of offshore invertebrates, such as native oyster, *Modiolus*, edible crab, European lobster, spiny lobster, scallop, but mostly requiring reduction in (fishing) pressures.
Intertidal/ near coastal fish	Urgent and high priority actions have been identified for six s41 fish species, namely Allis shad, Twaite shad, Arctic char, European eel, Long-snouted seahorse and Short-snouted seahorse.	**High**. Scope to contribute to direct restocking, removal of migratory barriers, or management of spawning, nursery or foraging habitats.
Offshore fish	GES has not been achieved for some commercial fish species (D1, D3 and D4) due to overfishing. A reduction in availability of small fish (Sandeel and Sprat/ Herring) has also been linked with failure to achieve GES in relation to seabirds.	**Medium/ High**. Scope to contribute to funding of fisheries measures for key food chain species such as Sandeel, Herring and Sprat but implementation of measures will need to be led by government. Industry role to ensure future project designs minimise impacts, and/ or project location does not impact essential fish habitats where practicable.
Intertidal/ near coastal birds	GES has not been achieved for bird species (D1 and D4). Of 140 seabirds/ wader's waterfowl (including breeding and non-breeding populations) some 39 have been assessed as showing long-term decline and 62 showing short-term decline. A reduction in availability of small fish (Sandeel and Sprat/ Herring) has been linked with failure to achieve GES in relation to seabirds.	**High**. Scope to provide alternative nesting and roosting sites (e.g. nesting platforms) or to create foraging habitats for waders and wildfowl (e.g. through managed realignment, regulated tidal exchange)

Marine Feature Category	Extent of Any Current or Anticipated Future Gap	Suggested Scale of Opportunity for Industry Contributions
Offshore birds	GES has not been achieved for bird species (D1 and D4). Of 140 seabirds/ wader's waterfowl (including breeding and non-breeding populations) some 39 have been assessed as showing long-term decline and 62 showing short-term decline. A reduction in availability of small fish (Sandeel and Sprat/ Herring) has been linked with failure to achieve GES in relation to seabirds.	**High**. Scope to provide alternative nesting and roosting sites (e.g. nesting platforms), predator control/ removal, etc to directly support seabirds at breeding colonies. Potential to improve prey availability through fisheries management measures offshore but implementation of measures would need to be led by government.
Intertidal/ near coastal marine mammals	Latest Article 17 reports show an increasing trend for otter populations.	**Low**. Scope to create/ improve habitat for otter.
Offshore marine mammals	GES has been partially achieved for cetaceans and seals (D1 and D4). Stable or increasing trends for bottlenose dolphin and grey seal. The level of pressure from by-catch has remained the same but there is an increasing level of pressure from underwater noise for all relevant species. The east coast has seen the number of harbour (common) seals decline by 25% in the last year.	**Low**. Measures to support cetaceans and seals are all currently focused on pressure reduction which should be the responsibility of those industries contributing to the pressure.

Even though the issues faced by the marine environment and the pressures upon it are well documented, the gap analysis identified many areas where additional action is needed to maintain or restore marine ecosystems. However, the analysis also identified a lack of SMART targets for known failures, particularly for ecological receptors, which makes it difficult to assess whether targets have been achieved.

The findings from the gap analysis and outcomes from the first stakeholder survey, reported below, in conjunction with the assumptions outlined in Section 2, were used by the T&F Group to identify draft priorities for MNG. These draft priorities (and the accompanying assumptions paper) were the focus of the second stakeholder survey.

4. Stakeholder Surveys

4.1 Introduction

Two stakeholder surveys were carried out as informal consultation exercises to inform the T&F Group's development of priority targets to which marine industry could contribute. Both surveys were conducted on-line using SurveyMonkey. The surveys were promoted through the T&F Group, ABPmer's corporate website and LinkedIn pages, and CMS Marine News.

The first survey was deliberately broad and invited respondents to identify their priorities for restoring and/ or enhancing the marine environment and to identify those priorities to which marine industries might contribute.

The second survey solicited views on the draft priorities identified through the first survey and by the T&F Group, and also sought views on the extent to which industry might be able to contribute to those priorities. Some additional questions were included relating to specific assumptions that had been made in developing the draft priorities. The second survey also invited separate comment on an accompanying assumptions paper.

An analysis of responses to the first and second surveys is provided in Appendices B and C respectively, and a summary of key findings is presented below.

4.2 Responses to first survey

A total of 58 unique responses were received to the first survey, with representation from 14 out of 18 listed sectors.

Government agencies and consultancies provided the two highest sector responses.

No responses were received from the aquaculture, cables, recreation or shipping sectors.

From the 58 responses, 293 actions were identified by respondents as potential priorities and targets for marine restoration and enhancement in UK waters.

These actions were subsequently classified into a number of overarching themes (Table 2). The number of suggested actions by theme is shown in Figure 1.

Table 2 Summary of the overarching action themes and suggested actions

Action Theme	Action Subject
Climate change	Encourage renewable energy Manage climate change impacts
Economic	Green jobs for communities
Education/ Engagement	Educate Engage stakeholders: restoration/ enhancement schemes
Eutrophication	Habitat restoration: Reduce pressure on eelgrass Reduce pollution Reduce pollution: improve sewage works
Habitat restoration or creation	Bivalve reefs (mussels, oysters) Cold-water coral reefs/ biogenic reef Estuaries General seabed habitats Identify restoration targets and priorities Improving existing infrastructure (enhancement/ 'greening the grey') Kelp forests Maerl Managed realignment to prevent rising sea level Mudflats Restoration or creation of habitats Saltmarsh Seagrass Subtidal mud (inc. sea pen and burrowing megafauna communities)
Human pressure:	Shipping
Human pressure: Aquaculture	Sustainable aquaculture
Human pressure: Aggregates	Aggregate extraction
Human pressure: Fisheries	Ecosystem-based fisheries management Fisheries management Fisheries management: By-catch Fisheries management: reduce pressure on cetaceans
Human pressure: Recreation	Manage recreational disturbance
Invasive Non-Native Species (INNS)	Prevention and monitoring of INNS
Litter	Reduce plastic/ litter Reduce plastic: screening of effluents/ sewage

Action Theme	Action Subject
Policy	Nature recovery and resilience in spatial planning Development in low quality habitat Mitigation hierarchy to development Nature-based solutions (NBS) Protect sensitive features/ areas from development
Protection	MPA creation MPA creation: collaborative areas MPA management, condition improvement
Research	Delivery of enhancement/ environmental funding Industry innovation/ sustainability
Species restoration/ protection	Birds Fish Sandeel
Underwater noise	Reduce underwater noise

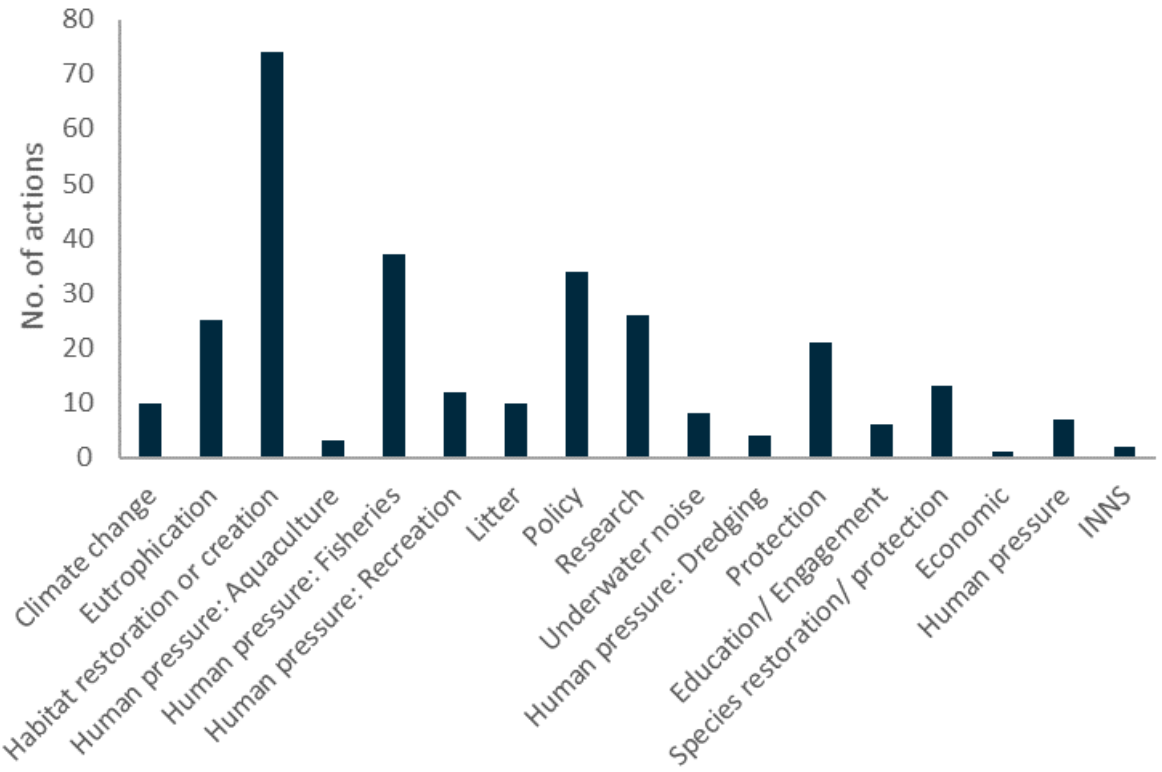

Figure 1 Number of suggested actions by overarching theme

Respondents highlighted that industry could contribute to actions within the majority of themes identified. In general, the most recognised way that industry could contribute was through provision of funding; however, in some areas such as intertidal/ near coastal habitat creation, there was greater scope for industry to directly implement schemes.

The actions most frequently suggested were the restoration and/ or creation of habitats, protection of bird and fish species and their habitats and the management of recreational disturbance. The provision of funding through pooled funds to support restoration was the most recognised form of industry contribution by respondents to support such actions. Types of funds could include, for example, nature recovery funds or environmental improvement funds.

Another area in which industry funding could contribute included financial support of research into environmental enhancement and sustainability (particularly in terms of plastic and marine litter).

Managing pressures from fisheries was the second most recognised priority, however such actions would likely need to be led or facilitated by government. Respondents highlighted several other actions that would also need to be led by government. These included actions in themes such as MPA designation and management, management of human pressures (e.g. aggregate dredging, recreation) and species and habitat restoration or protection. These actions mostly related to the closure of areas, the formal protection or designation of species and habitats and changing legislation/ policy. Where actions were identified as being led by government, it was often recognised that industry could potentially contribute through working with the relevant bodies to consider further opportunities, sharing of data and supporting the development of strategic goals.

The feedback received from the first survey, along with results from the gap analysis were used to inform draft priorities for MNG for consultation in the second survey.

4.3 Responses to second survey

A total of 37 unique responses were received to the second survey, covering 9 of the 17 listed sectors including, consultancies, government agencies, local authorities, marine minerals, NGO's, offshore renewables, oil and gas, power generation and the recreation sector. It was noted that many responses to the second consultation were from organisations rather than individuals, accounting to some extent for the reduced overall number of responses compared to the first survey. One respondent also provided comment on the assumptions document.

A number of questions were asked as part of the second survey relating to specific assumptions that had been made in developing the draft priorities. These questions provided important context for the consideration of priorities for MNG strategic targets. While the T&F Group's work was not intended to explore matters of MNG policy, the information collected will be useful to Defra in informing its policy development.

Respondents mostly agreed (64% strongly or somewhat agreeing) with the approach to focus on BNG as opposed to ENG and explained that it would be consistent with terrestrial Net Gain and that BNG should be the priority to effectively tackle marine biodiversity loss.

There was general agreement (61% strongly or somewhat agreeing) with the approach to deliver Net Gain separately between intertidal and offshore environments. However, respondents often acknowledged that it is important to consider the high level of connectivity in the marine environment, especially where developments span coastal and offshore ecosystems. Similarly, it was identified that Net Gain in one environment could deliver benefits

to other marine environments. Implementing Net Gain targets in the offshore environment was considered difficult overall but deemed important to target Net Gain in relevant areas affected by development projects.

A number of suggestions for options for the application for MNG were provided to respondents; a levy, a metric similar to that created for terrestrial/ intertidal Net Gain, a new metric designed for the offshore (subtidal) marine environment or a combination of approaches. Half of respondents (50%) agreed that an industry levy to support a strategic fund would be beneficial. This approach was described as allowing investment into strategic or large-scale projects and avoiding the complications of a metric approach. If MNG is to encompass species and human activity pressures as well as habitat loss, it is noted that development of a metric encompassing all of these factors would be extremely challenging. It was suggested that developers would potentially prefer the use of a levy over a metric due to its ease of making payments and overall clarity. However, one industry respondent described that such a levy may reduce the willingness of offshore companies 'to go above and beyond' by reducing the credit given to industry, especially where they are already moving towards net positive models.

The majority of respondents agreed that species should be included in Net Gain targets (77%). The majority also agreed that all species groups, invertebrates, birds, fish and marine mammals should be included where appropriate. However, respondents explained that the focus should be on species of particular concern and that measures to benefit one species should not be detrimental to another. Respondents who did not support the inclusion of species in BNG targets indicated that the focus should be on habitats, and that the recovery and restoration of habitats would fundamentally lead to increased biodiversity of target species. However, respondents in favour of including species also raised that BNG should encompass both species and habitats, as opposed to one or the other.

Survey feedback provided broad and majority support for all of the specific draft priorities for MNG identified by the T&F Group. Respondents generally agreed that actions within the pressure categories 'contaminants', 'marine litter' and 'underwater noise' were lower priority for strategic MNG targets. There was a general consensus that measures to reduce such pressures should be the responsibility of the accountable developer/ industry.

Across all other marine feature categories there was broad consensus on the suggested overall prioritisation for Net Gain (Figure 2). This was also true for the suggested scale of opportunity and the technical feasibility of delivery for each marine feature category.

There was general agreement with the suggested scope for industry and government-led delivery of Net Gain across the different marine feature categories. However, it was highlighted that the implementation of MNG must be in addition to the delivery of existing government commitments. Industry funding should be focused on active interventions, delivered alongside the strategic management of pressures affecting marine biodiversity by government, and that there are opportunities for government-led and industry partnership projects, depending on the scale and circumstances.

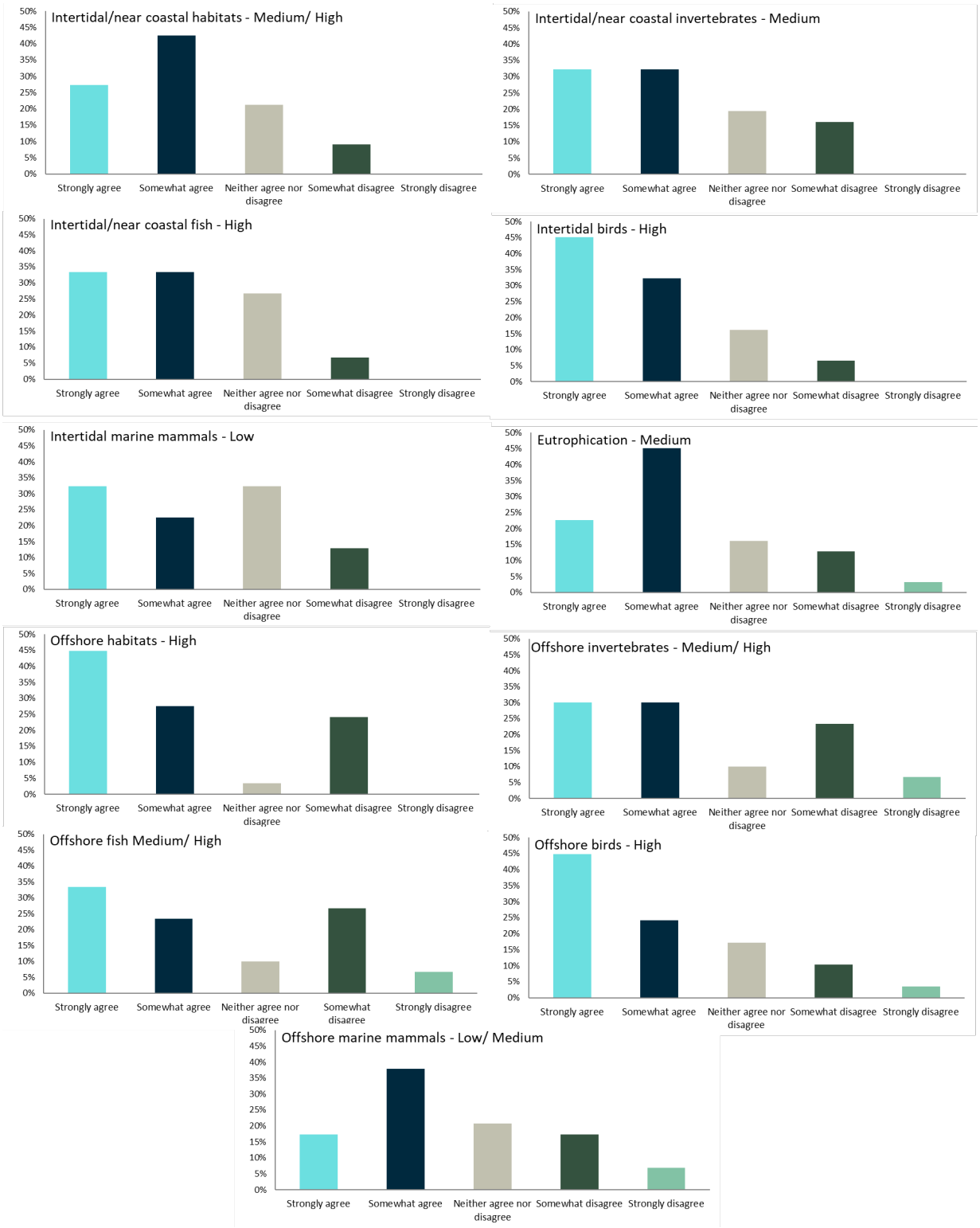

Figure 2 Respondents view on the overall prioritisation for Net Gain

5. Priorities for Strategic Marine Net Gain

5.1 Towards Priorities for Strategic Marine Net Gain

Analysis of the survey results has been refined and presented below in Tables 3, 4 and 5 as the potential strategic priorities identified for MNG. These include a suggested route for implementation to be considered by Defra at a later stage of policy development. The initial draft priorities for MNG, developed by members of the T&F Group, were consulted on in the second stakeholder survey. In light of stakeholder feedback received (see section 4.3), minor refinements were made to the draft priorities. Importantly, survey responses indicated broad and majority support for all of the draft priorities presented.

There were also some areas where there was a degree of contention including:

- Marine pressures to which the T&F Group had assigned a low priority for Marine Net Gain:
  - Water quality: some respondents highlighted nutrient issues as being relevant (although these were covered separately under eutrophication); other respondents highlighted the links between elevated concentrations of contaminants and ecological health. While the T&F Group acknowledges these linkages, it remains of the view that such measures should be a low priority for MNG, reflecting the disproportionate cost of remediating contaminated sediments and the existing legislation and mechanisms for managing point source pollution. However, the T&F Group recognises that there could be site and situation specific circumstances where water quality measures could be an appropriate contribution to MNG;
  - Marine litter and debris: some respondents made the point that it is feasible to remove substantial amounts of litter which prevents ghost fishing and other wildlife entrapment (for example, initiatives such as 'Fishing for Litter') and argued for inclusion of marine litter as a Net Gain action. The T&F Group recognises that there may be circumstances in which removal of litter and debris can contribute to localised ecological enhancement on a site-specific basis but remains of the view that such interventions are generally of lower value than other potential measures. In addition, there is possibly greater certainty of benefit where specific debris is removed or where measures address specific litter sinks. However, while the group considered litter to be a low priority for MNG it is aware of, and strongly supports, the actions of an increasing number of industries which are directly involved in litter removal activities;
  - Underwater noise: stakeholders generally agreed that this was a mitigation issue and that there was little that could be done in the context of MNG.
- Fish in offshore environments: several respondents argued that this should be assigned a high priority similar to intertidal/ near coastal fish rather than a medium-high priority, given the scale of historic impacts and the importance of certain species in marine food chains;
- Marine mammals in offshore environments: several respondents felt that this should be high priority rather than low to medium priority and that the issue of improving prey availability was particularly important in supporting population recovery.

Based on the above views, the T&F Group has increased the priority for offshore fish to 'High' and increased the priority for offshore marine mammals to 'Medium to High'. A summary of the T&F Group's views on priorities for MNG is provided in Table 3 to Table 5.

The recommended priorities are subject to a number of assumptions about the nature and form of MNG, set out in Section 2.

In particular, it is recognised that many of the priorities for restoration and enhancement of the marine environment, particularly offshore, are only likely to be achievable with government-led action/ support and cannot be delivered by industry alone. This is particularly the case where management of human activity pressures from other marine activities (such as commercial fishing) is required; for example, to restore seabed habitats or facilitate natural recovery of species. In recommending priorities for strategic Net Gain targets, the T&F Group assumes that MNG is implemented as a strategic approach with government-led action where necessary to underpin delivery of strategic measures.

The T&F Group's views on priorities for MNG is provided in Table 3 to Table 5. The opportunities have been identified based on an understanding of stakeholder views, historic losses, feasibility of measures and consideration of the extent to which marine industry might sensibly contribute to such targets. The opportunities have been split into three tables; Table 3: pressure reduction opportunities which are seen as low priority, Table 4: intertidal/ near coastal priorities and Table 5: offshore priorities. This is based on the assumption that offshore development will be required to deliver Net Gain offshore and that coastal projects will need to deliver net gain in intertidal/ near coastal areas. We have therefore sought to differentiate targets that might be relevant to offshore areas and those relevant to intertidal/ near coastal areas.

Table 3 Pressure reduction opportunities which are seen as low priority

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
Action to reduce contaminants	Water quality – **medium**; Sediment quality - **medium**	Water quality: Technically feasible to deliver improvements in water quality, potential for government to work with farmers and other landowners; Sediment quality: disproportionately costly to undertake large scale remediation of contaminated sediments.	**Government led**	**Low**	Relatively few failures of WFD EQS in transitional and coastal waters. Offshore waters considered to be at GES. In line with 'polluter pays' principle, those responsible for significant point source discharges should be responsible for limiting their emissions.
Action to reduce and clean up marine litter and debris	**Medium**	Other than removal of intertidal litter for aesthetic reasons, it is not technically feasible to remove meaningful amounts of litter from the marine environment.	**Direct implementation by industry and Government led**	**Low/ infeasible**	Scope to contribute funding to litter or debris removal initiatives but this would primarily deliver ENG not BNG.

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
		Specific items of debris can be removed but are often small scale			
Action to reduce underwater noise	The significance of current levels of ambient anthropogenic underwater noise is uncertain.	Technically feasible to reduce anthropogenic underwater noise at source but this would be considered a mitigation measure when implemented by industry on its own projects.	**Direct implementation by industry**	**Low**	Measure to reduce industries own ambient underwater noise would be considered as mitigation.

Table 4 Intertidal/ near coastal priorities

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain (1)	Additional Comments
Action to restore and/ or create intertidal/ near coastal habitats (including characterising species)	**High** – major historic losses of mudflat/ sandflat, saltmarsh/ reedbed, seagrass, native oyster reef, maerl **Medium** – kelp Uncertain – intertidal under-boulder communities, other bivalve beds (blue mussel, cockles, clams)	Feasibility of direct mudflat/ sandflat and saltmarsh/ reedbed creation well established; seagrass and blue mussel restoration likely to be feasible given suitable conditions; direct native oyster reef restoration remains challenging and experimental; kelp uncertain but potential to seed gravel to allow restoration; cockle/ clam restoration best managed through control of fishing pressure. Maerl restoration only possible	**Direct implementation by industry and Government led**	**High** (mudflat/ sandflat, saltmarsh/ reedbed, seagrass, native oyster **Medium** (kelp, other bivalves, maerl) **Low/ N/A** (intertidal under-boulder communities)	Scope for habitat restoration and enhancement in intertidal and near coastal areas in particular for intertidal mudflat and sandflat, saltmarsh/ reedbed, seagrass and native oyster. Some scope for restoration and enhancement of other features. Interventions could be led by industry or government (with industry funding). Opportunities for kelp restoration may be limited and likely to be site-specific and to

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain (1)	Additional Comments
		through pressure reduction.			require management of fishing gear abrasion pressures. Measures entailing management of commercial fishing pressure would need to be government led.
Action to restore and enhance intertidal/ near coastal invertebrates	**High** – native oyster, *Modiolus*, edible crab, European lobster, spiny lobster, scallop	Direct restoration of species remains challenging, but potential to restore edible crab, European lobster, spiny lobster populations through fishing pressure reduction and targeted restocking (e.g. lobster hatcheries).	**Direct implementation by industry and Government led** (primarily Government led as most interventions likely to require management of (fishing) pressures)	**Medium** (edible crab, European lobster, spiny lobster, Modiolus, other invertebrates)	Some scope for restoration and enhancement of habitats for intertidal/ nearshore invertebrates, mostly requiring reduction in (fishing) pressures which would need to be government led.

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain (1)	Additional Comments
		Other invertebrate species can be enhanced as a result of pressure reduction (primarily fisheries abrasion and penetration pressure).			
Action to support and restore intertidal/ near coastal fish	**High** – Atlantic salmon, sea trout, allis and twaite shad, smelt, eel, river and sea lamprey, sturgeon	Some success in restoration of salmon but more challenging in southern rivers due to climate change; some experience with allis and twaite shad (Unlocking the Severn[11] – removal of migratory barriers; water quality improvements); restoration of eel populations dependent on	**Direct implementation by industry and Government led**	**High**	Scope to contribute to direct restocking, removal of migratory barriers, or management of spawning and, nursery habitats.

[11] https://www.unlockingthesevern.co.uk/

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain (1)	Additional Comments
		pressure reduction (reduction in fishing pressure (glass eel/ elver); recovery of lamprey dependent on populations of other migratory fish.			
Action to support populations of intertidal birds	**High** - a number of intertidal birds have a long-term declining trend, in part due to climate change	Intertidal birds can be supported through habitat creation/ enhancement and through reduction in disturbance pressures.	**Direct implementation by industry and Government led**	**High**	Scope for restoration/ enhancement of intertidal habitats and funding of initiatives to reduce disturbance.
Action to support populations of intertidal/ near coastal marine mammals	**Low** - Scope to enhance coastal otter populations	Measures to improve otter habitat on land.	**Direct implementation by industry and Government led**	**Low**	Generally seen as more of a terrestrial than coastal issue and unlikely to be many issues arising for coastal developers.

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain (1)	Additional Comments
Action to address eutrophication	**Medium** - a significant proportion of transitional and coastal water bodies have elevated concentrations of dissolved inorganic nitrogen. A smaller number of water bodies show evidence of eutrophication. The UK has largely achieved its aim of GES for eutrophication in offshore waters (D5).	Technically feasible to deliver improvements in water quality.	**Government led**	**Medium**	In line with the 'polluter pays' principle significant sources should be responsible for limiting their own emissions. However, significant scope remains to contribute to wider projects tackling diffuse pollution that results in eutrophication. Other (direct) habitat interventions may also contribute to nutrient cycling (e.g. saltmarsh creation) and reducing nutrient pollution will benefit ongoing restoration projects

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain (1)	Additional Comments
					e.g. seagrass cannot grow in nutrient polluted waters.
(1) An advisory group mechanism may be required to assess if projects are appropriate at a regional or national scale in meeting the objective of recovery. It is important that spatial considerations are taken into account e.g. are the projects in the appropriate locations and how will they affect existing habitats and species.					

Table 5 Offshore priorities

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
Action to restore offshore habitats	**High** - major historic losses of offshore structuring features (native oyster reef, *Modiolus*, serpulid reef and other biogenic reef) particularly as a result of bottom-towed fishing gears (seabed abrasion and penetration, removal of organisms), damage of seabed habitats e.g. sandbanks).	Direct native oyster restoration remains challenging and experimental – may be more feasible offshore away from Bonamia infected areas; removal of abrasion pressures from fishing gears may lead to long-term recovery of biogenic reefs (serpulid reef, pink sea fan etc).	**Direct implementation by industry** (for direct restoration) but **Government led** for pressure reduction	**High**	Recognised that there are limited opportunities to restore habitat offshore directly. Pressure removal (particularly fisheries pressure removal) likely to be important to support long-term habitat recovery and ecological benefits e.g. Sandeel recovery. Achieving this at scale would require government intervention and leadership.

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
	Medium – historic losses of offshore habitats within development footprints (for a relatively small area of seabed)	Removal of development infrastructure as part of decommissioning to restore offshore habitats. Decommissioning programmes already seek to remove most significant infrastructure. Additional removals may be disproportionately expensive or too risky.	**Direct implementation by industry** (for removal of own infrastructure) **Government led** (for removal of third-party infrastructure)	**High**	Developers may have limited opportunity to decommission their own existing structures (most decommissioning activity relates to oil and gas, but most new development relates to offshore wind). Enhanced removal of infrastructure may be disproportionately expensive or pose unacceptable health and safety risks. Potential for Net Gain could incentivise more decommissioning and drive

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
					innovation of a) decommissioning techniques which are less damaging and b) encourage projects at build phase to create infrastructure which is easier to install and remove
Action to restore and enhance offshore invertebrates	**High** – native oyster, *Modiolus*, edible crab, European lobster, Spiny lobster, scallop	See comments under offshore habitats above. Direct restoration of species such as native oyster remains challenging. Also, potential to restore edible crab, European lobster, Spiny lobster populations through fishing pressure reduction and targeted	**Direct implementation by industry and Government led** (mostly Government led as most interventions likely to require management of (fishing) pressures)	**High** (native oyster) **Medium** (edible crab, European lobster, Spiny lobster, *Modiolus, other* invertebrates)	Some scope for restoration and enhancement of habitats for offshore invertebrates, mostly requiring reduction in (fishing) pressures which would need to be government led.

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
		restocking (e.g. lobster hatcheries). Other invertebrate species can be enhanced as a result of pressure reduction (primarily fisheries abrasion and penetration pressure).			
Action to support populations of offshore fish	**High** – many commercial fish species below Maximum Sustainable Yield (MSY). Populations of key food chain species such as Sandeel, Herring and Sprat significantly depleted compared to historic levels	Populations can be enhanced through fisheries management measures (including management of direct fishing pressures and seabed abrasion/ penetration).	**Government led** (measures to reduce pressure on fish stocks/ limit abrasion damage would likely need to be government led)	**High**	Scope for industry to contribute to funding of fisheries measures for key food chain species such as Sandeel, Herring and Sprat but measures would need to be led by government.

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
Action to support populations of offshore birds	**High** – a number of seabird species are in long-term decline due to reductions in prey availability (from overfishing and climate change) pressures at nesting colonies (predation, disturbance) and bycatch	Seabird species can be supported through measures to reduce pressures at breeding colonies (predator removal, disturbance reduction, provision of nesting sites), at sea (by-catch reduction) and through enhancement of prey abundance (fisheries measures).	**Direct implementation by industry and Government led** (measures at colonies can be directly funded, but measures to reduce fishing pressures would likely need to be government led)	**High**	Scope to directly support seabirds at breeding colonies and at sea and potential to improve prey availability through fisheries management measures offshore.
Action to support populations of offshore marine mammals	**Medium** - Cetacean populations are depleted compared to historical levels. Harbour seal populations depleted in some UK regions (e.g. East coast)	Scope to reduce fisheries by-catch mortality. Populations could also be enhanced through reductions in commercial fishing pressure on prey resources.	**Government led**	**Medium to High**	Opportunity for industry to contribute funding to fisheries management measures.

6. Conclusions and Recommendations

6.1 Conclusion

Discussions on the development of MNG are evolving rapidly, and the T&F Group has worked at pace to identify strategic targets for the delivery of MNG, recognising the importance of maximising this vital opportunity to help restore and enhance the UK's marine environment. If MNG is to contribute to national/ regional priorities for the marine environment, the responses gathered through this work consider that it should primarily be progressed as a strategically managed process led by government in partnership with industry. Marine industry would contribute funding to deliver priority projects.

If MNG is solely developer led there will be a much more limited set of options that marine industry can deliver. Particularly in offshore areas, this may lead to a paucity of actions that industry might take and limit the application and effectiveness of MNG policy. Pursuing such a strategic approach has important implications for the nature of MNG, how the requirement for MNG might be assessed and how projects might be delivered and managed. However, this work indicates there is strong consensus that this approach will deliver better outcomes for the marine environment.

The outcome of the work carried out by the T&F Group is a strong set of suggested strategic targets for MNG and that there is strong consensus and agreement about these from all sectors; industry, regulators and conservation bodies. These targets therefore set a clear direction for what MNG could deliver and how that would be widely welcomed as a significant and important contribution to the restoration and improvement of the marine environment.

It is not considered appropriate to establish overall quantitative targets for MNG nor delivery time scales because the demand for Net Gain interventions will be driven by the nature, scale and pace of marine development. However, where specific MNG interventions are being progressed, it will be important that there are clear and measurable objectives for the interventions, linked to robust monitoring plans.

Importantly, in contrast to the terrestrial environment where Net Gain is solely focused on achieving a Net Gain in habitat, our recommendations for MNG also encompass species restoration and human activity pressure reduction as important measures to support restoration and enhancement of our marine environment.

6.2 Recommendations from the T&F group

To support the further discussions on the topic of MNG, and to assist Defra in their development of Marine Net Gain policy, the T&F Group have identified the following recommendations for further consideration.

- The identified strategic target areas should be used by government to inform the development of MNG policy and principles of implementation;
- Strategic targets should be based on our understanding of where we are already failing intertidal and marine environments, and the need to halt and reverse marine biodiversity loss;

- MNG should as a minimum achieve BNG;
- The primary goal of MNG at a national scale should be to place marine and intertidal ecosystems into recovery;
- Multi-purpose projects providing secondary benefits that contribute to the following targets should also be prioritised, but these benefits should be delivered in addition to the primary goal of achieving ecosystem recovery: to reduce disaster risk from the continuing loss of natural coastal defences such as salt marsh (e.g. flood risk/ coastal erosion); and to combat climate change, through mitigation and adaptation;
- The T&F Group recognises the urgency in halting and reversing marine biodiversity loss, particularly in the context of accelerating pressure from climate change and the likelihood of the need to relate to planning decisions. Overall targets for MNG should be presented without reference to specific timescales as the requirement for MNG interventions will depend on the nature and pace of relevant development projects and their impacts. Where specific MNG interventions are progressed, there should be clear objectives, linked to measures of success for these interventions supported by effective monitoring;
- MNG should be secured 'in perpetuity', but this is dependent on the type of intervention, the mechanism for delivery and the custodianship of responsibility and may be subject to natural change. The aim should be to contribute to an overall recovery;
- MNG policy must be developed in the context of the dynamic nature of the marine and intertidal environments. MNG projects must be considered with an understanding of the complexities of marine systems, and that pre-existing causes of loss may need to be addressed if the outcomes of MNG activities are to be successful and sustained;
- There is some potential that research and data gathering could be considered as MNG (for example a research project to support better MNG delivery in the future), but only if it is delivered as part of a broader strategic approach as part of a package of measures;
- MNG will have a greater impact on the recovery of the marine environment if funding is pooled into a national fund to assist in the delivery of the strategic Net Gain targets. There is also a need to involve industry as a partner throughout the Net Gain process to ensure positive outcomes can be credited to developers, allowing them to build funding MNG into their business models;
- Delivery of MNG could be assisted by Regional Delivery Groups, distributing pooled funds and operating under a clear set of agreed principles. Delivery groups should be represented by a range of organisations with marine expertise including government, SNCBs, industry and eNGOs; and
- Development of MNG policy should appropriately consider the question of custodianship of responsibility to deliver Net Gain.

7. Abbreviations

25YEP	25 Year Environment Plan
ABPmer	ABP Marine Environmental Research Ltd
BEIS	Business, Energy and Industrial Strategy
BNG	Biodiversity Net Gain
CMS	Communications and Management for Sustainability
Defra	Department for Environment Food and Rural Affairs
EA	Environment Agency
EBN	Environmental Benefits for Nature
ELM	Environmental Land Management
ENG	Environmental Net Gain
eNGO	Environmental Non-government Organisation
EQS	Environmental Quality Standard
GES	Good Environmental Status
INNS	Invasive Non-Native Species
LIFE	L'Instrument Financier pour l'Environnement (The Financial Instrument for the Environment)
LNRS	Local Nature Recovery Strategies
MNG	Marine Net Gain
MCZ	Marine Conservation Zone
MPA	Marine Protected Area
MSY	Maximum Sustainable Yield
NBS	Nature-based Solutions
NE	Natural England
NGO	Non-government Organisation
NSIP	Nationally Significant Infrastructure Project
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OWEAP	Offshore Wind Enabling Actions Programme
ReMeMaRe	REstoring MEadows, MArshes and REef
ReMEDIES	Reducing and Mitigating Erosion and Disturbance Impacts affecting the Seabed

RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SMART	Specific-Measurable-Achievable- Realistic-Timebound
SMEEF	Scottish Marine Environmental Enhancement Fund
SNCB	Statutory Nature Conservation Body
SUDG	Seabed User & Developer Group
T&F Group	Task and Finish Group
TWT	The Wildlife Trusts
UK	United Kingdom
WFD	Water Framework Directive

Appendices

Appendix A Gap Analysis Report

Offshore Wind Evidence and Change Net Gain:
Strategic Targets Task and Finish Group

Strategic Net Gain Targets

Gap Analysis

October 2021

Innovative Thinking - Sustainable Solutions

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Strategic Net Gain Targets

Gap Analysis

October 2021



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Executive Summary

The Net Gain Strategic Targets Task and Finish Group is working to identify suitable strategic targets for marine and intertidal net gain. The outputs from the work will help to inform Defra policy in relation to marine and intertidal net gain and its subsequent implementation. ABPmer has been commissioned to support the work of the Task and Finish Group.

There is a wide range of international, European and national legislation and policy drivers for managing the coastal and marine environment that could directly or indirectly support habitats and species. This report presents the findings of a gap analysis which identifies existing agreed coastal and marine objectives and targets, and the extent to which they are currently met or are likely to be met in the future as a result of existing actions. The objectives and targets which are considered most relevant to support the work of the Task and Finish Group have been highlighted.

A number of key drivers and associated objectives and targets have been considered in the gap analysis, which involved identifying and reviewing the latest publicly available information on each of the relevant key drivers, including: relevant objectives and targets, including any relevant indicators; deadlines for meeting objectives and targets; extent to which targets are binding; current progress towards objectives and targets, and extent to which they are currently being met; and anticipated future progress towards objectives and targets, and extent to which they have the potential to be met in the future.

The findings from the gap analysis have been structured according to marine feature category to assist in the identification of possible actions that could be taken to address any gaps and the extent to which industry might be able to contribute. The analysis has focused on the following feature categories:

- Contaminants (metals, trace organics, rad subs);
- Eutrophication;
- Marine litter;
- Underwater noise;
- Marine habitats;
- Marine species:
  - Plants and invertebrates;
  - Fish;
  - Birds;
  - Mammals.

It is clear from the review that there are many existing objectives and targets for the marine environment which are not being achieved and to which industry might contribute through net gain, although it is recognised that many of the objectives and targets are not particularly SMART (Specific, Measurable, Achievable, Realistic, Time-bound).

The analysis indicates that there is potential to contribute to restoration and enhancement of the marine environment both through direct habitat and species interventions and also through indirect interventions such as removal or reduction of existing human activity pressures. It is notable that in offshore areas, most of the potential measures for habitats and species are related to removal or reduction of existing human activity pressures. From an industry perspective, management of pressures from other human activities is likely to need to be government led as part of a strategic approach to marine management. If industry is required to identify and deliver marine net gain measures on its own, this will significantly limit the scope to deliver offshore net gain. The extent to which marine net gain

might contribute to national priorities for marine restoration and enhancement will depend on the nature and scope of marine net gain.

The demand for marine net gain will depend on the scale and nature of future marine development. It is thus not possible to set quantitative targets for marine net gain; rather this study has focused on identifying the types of interventions that are required to support marine restoration and enhancement having regard to the current legal and policy drivers.

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1 Introduction

The Net Gain Strategic Targets Task and Finish Group is working to identify suitable strategic targets for marine and intertidal net gain. The outputs from the work will help inform Defra policy in relation to marine and intertidal net gain and its subsequent implementation. ABPmer has been commissioned to support the work of the Task and Finish Group.

Net Gain has been identified as an important mechanism that could contribute to halting and reversing marine biodiversity loss. Its application is designed to leave biodiversity in a better state and secure wider benefits for people and the environment. The net gain approach sits within the mitigation hierarchy and should be considered as the last step in the process. Marine net gain should thereby be a mechanism to ensure that there is lasting improvement to the marine environment.

ABPmer was commissioned by the Task and Finish Group to prepare a gap analysis that identifies existing agreed coastal and marine environmental targets and objectives, and the extent to which they are currently met or have the potential to be met in the future as a result of existing actions. This was seen as important in helping to identify possible priorities for marine net gain to which industry could contribute. The study has sought to highlight those targets and objectives considered most relevant to the work of the Task and Finish Group. The review has primarily focused on targets and objectives to achieve biodiversity net gain, but also included some wider aspects of the marine environment such as marine litter. This has involved identifying common areas / themes (in terms of specific features or parameters), and recommendations for target identification. Additional sources of information to support the development of strategic targets have also been identified.

Although the focus for this work has been in identifying where there are gaps in progress towards targets, it is recognised that where targets are currently being met there may have been historical losses of key ecological features. The opportunity exists, therefore, for industry to not only maintain what features currently remain but also to restore these features.

2 Methodology

There is a wide range of international, European and national legislation and policy drivers for managing the coastal and marine environment that could directly or indirectly support habitats and species. The key drivers and associated targets and objectives that have been considered in the gap analysis are as follows:

- Habitats Directive (92/43/EEC)- Special Areas of Conservation (SACs);
- Birds Directive (2009/147/EC) - Special Protection Areas (SPAs);
- Marine & Coastal Access Act 2009 – Marine Conservation Zones (MCZs);
- Wildlife & Countryside Act (1981 as amended)- Sites of Special Scientific Interest (SSSIs);
- Objectives, targets and indicators for each of the descriptors under the UK Marine Strategy;
- Environmental objectives of the Water Framework Directive (WFD) (2000/60/EC) including measures in relation to Nitrates Directive (91/676/EEC), Urban Wastewater Treatment Directive (91/271/EEC), former shellfish Waters Directive, Bathing Water Directive (2006/7/EC);
- Fisheries conservation environmental targets or objectives under the Fisheries Act 2020,, NASCO Salmon Implementation Plan, Environment Agency Salmon Strategy and Eel Management Plans);
- OSPAR Convention;
- Biodiversity Convention;
- Objectives and measures under the Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS);
- UN Sustainable Development Goals (SDG 14 – Life Below Water);
- UK Marine Policy Statement and marine planning under Marine & Coastal Access Act 2009;
- Environment Bill and Twenty-five-year Environment Plan;
- Natural Environment and Rural Communities Act 2006 (s40/41 conservation duties regarding habitats and species of principal importance);
- UK-Post 2010 Biodiversity Framework and Biodiversity 2020 Strategy;
- Objectives of Shoreline Management Plans (SMP) and the Regional Habitat Compensation Programme (RHCP); and
- Other voluntary initiatives (e.g. ReMeMaRe).

A number of other drivers were considered but did not include specific objectives or targets beyond those already included:

- Ramsar Convention – the objectives of the Ramsar Convention are considered to be adequately covered through the objectives and targets established for SPAs and SSSIs;
- Bern Convention – the objectives of the Bern Convention are considered to be adequately covered through the objectives and targets established for SACs and MCZs;
- National Policy Statements (e.g. renewable energy, Ports) – no specific objectives and targets relevant to the marine environment were identified that were not covered elsewhere; and
- National Planning Policy Framework – no specific objectives and targets relevant to the marine environment were identified that were not covered elsewhere.
- G7 2030 Nature Compact – leaders of G7 nations have pledged to protect at least 30% of their land and oceans by 2030. The goal is included in the draft for the global nature pact however agreement on the treaty has not yet been reached.

The gap analysis involved identifying and reviewing the latest publicly available information on each of the relevant key drivers listed above to determine:

- Relevant objectives and targets, including any relevant indicators;
- Deadlines for meeting objectives and targets;
- Extent to which targets are binding;
- Current progress towards objectives and targets; and
- Anticipated future progress towards objectives and targets.

This information is presented in a series of tables in Appendix A.

Within the main report, the findings from the gap analysis have been structured according to marine feature category to assist in the identification of possible actions that could be taken to address any gaps and the extent to which industry might be able to contribute. The outcome of this work is presented in Section 3 of this report.

3 Analysis

In this section, the findings from the review are presented by marine feature category to facilitate identification of potential actions that could be taken to improve aspects of the marine environment. The analysis summarises current objectives and targets, the extent of any gap to achieving these objectives and targets, the key actions required to address current gaps and the extent to which industry might contribute to these actions. The feature categories have been loosely based on the descriptors for Good Environmental Status under the Marine Strategy. This includes marine habitats, marine species groups and some key anthropogenic pressures. Anthropogenic pressures such as seabed abrasion are not considered separately as such pressures are directly reflected in the condition of seabed habitats.

The analysis has thus focused on the following feature categories:

- Contaminants (metals, trace organics, radioactive substances);
- Eutrophication;
- Marine litter;
- Underwater noise;
- Marine habitats;
- Marine species:
  - Plants and invertebrates;
  - Fish;
  - Birds;
  - Mammals.

3.1 Contaminants

3.1.1 Existing objectives, targets and indicators

Key objectives, targets and indicators for contaminants are established by the WFD and Marine Strategy and, in relation to radioactive substances, by the OSPAR Strategy, and include:

- WFD:
  - Achievement of good chemical status (for Priority and Priority Hazardous substances); and
  - Concentrations of other (Annex VIII) pollutants consistent with the achievement of Good Ecological Status (GES).
- Marine Strategy:
  - Concentrations of contaminants are at levels not giving rise to pollution effects (D8):
    - Concentrations of priority chemicals in sediments and biota;
    - The biological effects of contaminants; and
    - The number of oil spills against agreed thresholds where available.
  - Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards (D9):
    - Concentrations of contaminants in fish and seafood.
- OSPAR Strategy 2011-2020:
  - To prevent pollution of the OSPAR maritime area from ionising radiation through progressive and substantial reductions of discharges, emissions and losses of radioactive substances, with the ultimate aim of concentrations in the environment near background values for naturally occurring radioactive substances and close to zero for artificial radioactive substances.

Details of the key targets including the source, target and indicator are provided in Appendix A.

3.1.2 Progress towards achieving objectives and targets

Based on the latest available national assessment dataset (2015), a number of WFD transitional and coastal water bodies failed (as shown in brackets below) to achieve relevant EQS for Priority or Priority Hazardous substances or other pollutants (Annex VIII pollutants):

- Transitional waters:
  - Polybrominated diphenyl ethers (PBDE) (1)[1];
  - Mercury and its compounds (2);
  - TBT compounds (5);
  - Zinc (5).
- Coastal waters:
  - Hexachlorocyclohexane (1);
  - Mercury and its compounds (1);
  - TBT compounds (1).

The updated assessment for the Marine Strategy (Defra, 2019) reports that GES has been achieved in relation to descriptors D8 and D9. The 2017 OSPAR Intermediate Assessment[2] indicates general reductions in the concentrations of contaminants in the marine environment.

The OSPAR Intermediate Assessment reports that there have been substantial reductions in discharges in many cases, as required by the OSPAR Radioactive Substances Strategy. Cefas (2020) reports that '*Overall, between 2018 and 2019 there have been no major changes in radioactivity in samples measured around UK nuclear sites and other locations remote from these sites. Exposure from all sources of man-made radioactivity to members of the public was well below legal limits, demonstrating that radioactivity in food and the environment is safe*'.

3.1.3 Key actions required to address any gaps

The main issues associated with contaminants in the marine environment relate to EQS failures within some transitional and coastal waters. Concentrations of TBT in the marine environment have been reducing over several decades, following a ban on use of TBT in antifouling coatings. These reductions are expected to continue. Bans on the production and use of harmful chemicals such as polychlorinated biphenyls (PCBs), organochlorine pesticides and PBDEs has led to reductions in the concentrations of these substances in the UK marine environment. There is strict regulation of point source discharges which has been successful in contributing to the reduction of inputs of trace metal and trace organic contaminants into the marine environment over the past few decades. Continued regulation of point source discharges and better management of diffuse pollution is expected to lead to continued reduction of contaminant inputs and higher levels of compliance with marine EQS.

In some locations, high concentrations of contaminants remain locked within marine sediments, particularly in industrialised estuaries. The cost of treating such sediments is prohibitive and it is unlikely that specific measures will be implemented.

3.1.4 Extent to which industry might contribute

Apart from managing its own emissions, there is limited opportunity for industry to contribute to reducing contaminant levels in the marine and coastal environment. While it would be possible for

[1] While there is currently no national summary analysis after 2015, interim classification results are available for 2019. These highlight significantly more failures for PBDE in transitional and coastal waters compared to 2015.

[2] https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/

industry to contribute financially to projects that are seeking to reduce contaminant inputs, it would normally be expected that those responsible for causing the pollution would pay for any necessary measures.

The costs of any wide scale remediation of sediment are prohibitive and would not represent value for money.

3.2 Eutrophication

3.2.1 Existing objectives, targets and indicators

Key objectives, targets and indicators for nutrients, dissolved oxygen and eutrophication indicators (phytoplankton, angiosperms, macroalgae) are established by the WFD and Marine Strategy, and include:

- WFD:
  - Concentrations of nutrients and dissolved oxygen consistent with the achievement of GES; and
  - Phytoplankton, angiosperms and macroalgae biological quality elements
- Marine Strategy:
  - Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters (D5):
    - The inputs of nutrients to UK regional seas;
    - Trends in nutrient concentrations in the water column;
    - Chlorophyll concentrations in the water column; and
    - Concentrations of dissolved oxygen near the seafloor.

Details of the key targets including the source, target and indicator are provided in Appendix A.

3.2.2 Progress towards achieving objectives and targets

Based on the latest available national assessment dataset (2015), a number of WFD transitional and coastal water bodies failed (shown in brackets below) to achieve relevant standards for dissolved inorganic nitrogen and dissolved oxygen or did not meet good status for the biological quality elements 'phytoplankton' or 'macroalgae', indicating a degree of eutrophication:

- Transitional waters:
  - Dissolved inorganic nitrogen (49);
  - Dissolved oxygen (1);
  - Phytoplankton blooms (8);
  - Macroalgae (12).
- Coastal waters:
  - Dissolved inorganic nitrogen (17);
  - Phytoplankton blooms (3).

The updated assessment for the Marine Strategy (Defra, 2019) reports that the UK has largely achieved its aim of GES for eutrophication. A small number of eutrophication problems remain in coastal and estuarine waters, representing 0.03% of the total UK Exclusive Economic Zone, and 0.41% of estuarine and coastal waters. These findings are consistent with those reported in the 2017 OSPAR Intermediate Assessment[3].

[3] https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/

There are a number of factors contributing to elevated inorganic nitrogen concentrations and eutrophication in transitional and coastal waters. These are particularly a result of inputs via rivers from diffuse agricultural and rural pollution and from diffuse urban pollution, as well as direct inputs from point source discharges. Where eutrophication occurs, this can affect the quality of intertidal and coastal habitats such as saltmarsh, intertidal mudflats and seagrass beds.

Concern has been raised that climate change may lead to reductions in bottom water dissolved oxygen concentrations in areas receiving elevated nutrient inputs, as a result of increased water temperatures. Such increased temperatures reduce the amount of oxygen dissolved in the water column and increase rates of chemical and biological activity which can also increase rates of oxygen consumption.

These two processes can lead to deoxygenation of bottom waters, particularly in circumstances where the water column is stratified and there is little replenishment of water column dissolved oxygen. The issue can be exacerbated where there are elevated concentrations of nutrients as a result of rapid decay of algal blooms in bottom waters.

3.2.3 Key actions required to address any gaps

Further investment and education are required to reduce diffuse inputs via rivers from land, including the agricultural sector and management of urban run-off. Further investment could be made in wastewater treatment works to reduce direct and indirect nutrient inputs.

3.2.4 Extent to which industry might contribute

Apart from managing its own emissions, there is limited opportunity for industry to directly contribute to reducing nutrient inputs to the intertidal / near coastal environment.

While it would be possible for industry to contribute financially to projects that are seeking to reduce diffuse agricultural or urban inputs, it would normally be expected that those responsible for causing the pollution would pay for any necessary measures. Any required improvements to wastewater treatment works (e.g. nutrient removal) would be expected to be considered as part of the water industry's asset management planning process. It is recognised that reductions in nutrient inputs may be an essential precursor to restoring some marine features such as seagrass which are intolerant of eutrophic conditions.

Various intertidal and coastal habitats can play an important role in nutrient cycling, including saltmarsh, mudflats, oyster and mussel beds, seagrass beds, kelp beds. Where industry contributes to the creation of such habitats, their role in nutrient cycling should be recognised and quantified. The potential opportunities for industry involvement in supporting the restoration and/or creation of these key habitats is captured in Section 3.5.

3.3 Marine litter

3.3.1 Existing objectives, targets and indicators

Key objectives, targets and indicators for marine litter are established by the Marine Strategy, the OSPAR Strategy and the 25-year Environmental Plan. These include:

- Marine Strategy:
  - Properties and quantities of marine litter do not cause harm to the coastal and marine environment (D10):
    - Beach litter – trends in UK beach litter;

    - Floating litter – plastic particles in fulmar stomachs; and
    - Seafloor litter – trends and status in UK seafloor litter.
- OSPAR Strategy 2011- 2020:
    - Beach Litter - Abundance, Composition and Trends;
    - Composition and Spatial Distribution of Litter on the Seafloor; and
    - Plastic Particles in Fulmar Stomachs in the North Sea.
- 25 Year Environment Plan:
    - Outcome Indicator C1 - changes in the amount of litter in the marine environment, including litter on beaches, on the seafloor and floating litter.

Details of the key targets including the source, target and indicator are provided in Appendix A.

3.3.2 Progress towards achieving objectives and targets

The updated assessment for the Marine Strategy (Defra, 2019) reports that GES has not been achieved for D10. The report states that the main pressures preventing GES from being achieved are commercial fishing and the introduction of marine litter. Beach litter levels in the Celtic Seas have remained largely stable since the assessment in 2012, whilst beach litter levels in the Greater North Sea have slightly increased.

The OSPAR Intermediate Assessment[4] reports that litter is abundant on beaches in the OSPAR Maritime Area. Plastic fragments, fishing-related litter and packaging are the most common types of litter found. Plastics comprise over 90% of items in some areas. There are no overall trends in the number of beach litter items recorded in the period 2009–2014. Litter is widespread on the seafloor across the area assessed, with plastic the predominant material encountered. Higher amounts of litter are found in the Eastern Bay of Biscay, Southern Celtic Seas and English Channel than in the northern Greater North Sea and Celtic Seas. Currently 58% of beached North Sea fulmars have more than 0.1 g of plastic in their stomachs, exceeding OSPAR's long-term goal of 10%. This reflects the abundance of floating litter in their environment. There has been no significant change in the amount of plastic in fulmar stomachs over the past ten years.

3.3.3 Key actions required to address any gaps

Marine litter can be highly persistent and requires coordinated local, regional, and global action on land and at sea. Some actions have been taken to ban specific sources of plastic pollution such as microbeads in cosmetics, plastic straws, stirrers and cotton buds. Action has also been taken to reduce plastic bag usage through the plastic bag tax. There needs to be a further reduction in reliance on non-reusable plastic items and better control of plastic waste at source.

There is limited scope for removing significant quantities of plastic once it has entered the marine environment, although, there is a range of initiatives that can remove local concentrations of floating debris, including plastic. For example, 'seabins' can be effective in removing floating debris within marinas and docks. Floating booms have also been successfully used to collect aggregations of floating debris at sea. Local authorities maintain amenity beaches and regularly remove litter during the bathing season. Voluntary beach cleans are also locally effective in removing litter from beaches. The 'Fishing for Litter' programme is a simple mechanism supporting fishermen to bring to shore any litter they collect during fishing activity, for safe disposal.

There are currently no cost-effective mechanisms for removing microplastics from the sea or form marine sediments.

[4] https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/

3.3.4 Extent to which industry might contribute

The removal of marine litter would generally not be considered as materially contributing to biodiversity net gain because localised, temporary removal of litter would not achieve a meaningful ecological benefit.

However, industry can contribute to meeting litter targets by effectively managing its solid waste streams to avoid littering the marine environment or could contribute funding to initiatives that seek to remove litter from the marine environment. In addition, there is scope for a programme, similar to that implemented with some fishermen, whereby industry collect litter encountered during their regular activities at sea, where feasible.

3.4 Underwater noise

3.4.1 Existing objectives, targets and indicators

Key objectives, targets and indicators for anthropogenic sources of underwater noise are established by the Marine Strategy and the OSPAR Strategy, and include:

- Marine Strategy:
  - Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment (D11)
    - Distribution of loud, low and mid frequency impulsive sounds; and
    - Continuous low frequency sound (ambient noise).
- OSPAR Strategy 2011- 2020:
  - Introduction of energy:
    - Distribution in time and place of loud, low and mid frequency impulsive sounds.

Details of the key targets including the source, target and indicator are provided in Appendix A.

3.4.2 Progress towards achieving objectives and targets

The updated assessment for the Marine Strategy (Defra, 2019) reports that GES has been partially achieved for D11. Research and monitoring programmes established since 2012 have provided an improved understanding of the impacts of sound on marine ecosystems, however, the achievement of GES for underwater noise in the UK is uncertain.

The UK has achieved the operational target for loud, low to mid frequency impulsive noise through the development of the Marine Noise Registry, which is now active. In 2015, the Marine Noise Registry collected monitoring data on the distribution and duration of impulsive sound in UK waters. In 2015, impulsive sound, especially from seismic surveys, was found to be prevalent in the Greater North Sea, but some events were also recorded in the Celtic Sea, including the deep waters off the northwest coast of Scotland, and in the western English Channel and Irish Sea (UKMMAS, 2021). Data will continue to be collected into the future, which will establish a baseline for impulsive sound in UK seas, allowing for assessment of patterns and trends.

The continuous ambient noise indicator recorded field data in 2013 and 2014 from activities such as shipping which provides baseline levels for a number of monitoring locations in the Greater North Sea and the Celtic Sea. These will serve as a benchmark to assess future ambient noise levels. However, the analysis revealed that trend detection for this indicator will require several decades of monitoring, which is incompatible with the 6-year assessment cycle of the UK Marine Strategy (UKMMAS, 2021).

The OSPAR Intermediate Assessment[5] reports the distribution and intensity of impulsive sound sources in the OSPAR Maritime Area in 2015. Reported activity was more prevalent in the northern and eastern North Sea, to the west of Scotland and in the Skagerrak, and was largely due to seismic survey activity. Sound sources categorised as Low or Very Low intensity were more common than higher intensity sources. This distribution is likely to vary year-by-year, depending upon the activities undertaken. More comprehensive reporting in future years should result in improved assessments of pressure from impulsive sound generation in the OSPAR Maritime Area. This assessment highlights the locations where marine animals, if present, may have been affected (in 2015), although the occurrence of effects would also depend on the distribution and susceptibility of the marine organisms to sound exposure.

3.4.3 Key actions required to address any gaps

Further research, monitoring, and assessment over a number of years is required before a comprehensive quantitative assessment of the status and trends of impulsive sound in UK seas can be completed. Similarly, at least three decades of monitoring continuous ambient noise is required to detect statistically significant trends at the existing monitoring locations (UKMMAS, 2021). Improved reporting in the future will also allow the assessment of cumulative effects[6].

The key knowledge gap is to understand whether and how levels of man-made marine noise lead to effects at the population and ecosystem scales, particularly for vulnerable/threatened species and key functional groups, and how to quantify the risk of impact at these scales (UKMMAS, 2021). Risks to populations need to be more clearly established in order to develop proportionate measures. While there is clear and mounting evidence for negative effects of man-made noise on individual animals (and effects on animal interactions) which indicates a risk of population-level impacts, it is scientifically challenging to isolate the effect of man-made noise on a particular animal population or ecosystem from other potential sources of variability.

The likelihood and consequences of the effects of impulsive sounds or ambient noise are not currently assessed by any of the existing indicators. Further evidence and research would help to better understand whether current levels of noise are having an impact on marine ecosystems and noise sensitive marine animals at a population level. Work to develop further indicators to assess the risk of impact from these sources is planned. The UK will work with other countries that share the UK sea border to develop threshold values for levels of impulsive and continuous ambient sound which are likely to cause harm at population levels so that common quantitative targets can be established in the future (UKMMAS, 2021). Continued work in international forums such as IMO will also help to ensure that continuous underwater noise from shipping is controlled at a global level.

3.4.4 Extent to which industry might contribute

Industry can contribute by effectively managing, mitigating and monitoring its own sources of underwater noise, and could try to address the lack of underwater noise evidence by providing monitoring data to the Noise Registry[7] for all applicable activities.

While it would be possible for industry to contribute financially to projects that are seeking to reduce underwater noise within the marine environment, it would normally be expected that those responsible for causing the pollution would pay for any necessary measures.

5 https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/

6 https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/pressures-human-activities/distribution-reported-impulsive-sounds-sea/

7 https://mnr.jncc.gov.uk/

In terms of impulsive noise, the sectors generating these sources of noise should seek to use alternative best available technologies and mitigation measures or scheme designs that avoid impact pile driving or the use of airgun arrays as far as practicable. Further research to develop more effective mitigation measures should also be progressed. Duplicate seismic surveys should be avoided, and data shared wherever possible. Noise exclusion zones and noise buffer zones around sensitive areas, or timing restrictions during sensitive periods should also be considered as required.

The primary issues with ambient underwater noise are through cumulative impacts on marine species. Any required reductions in ambient underwater noise levels (which largely comprises shipping noise) would generally be expected to be considered by the port and shipping industry, however all industries can be a part of the collective solution.

In general, a reduction in underwater noise could be achieved through reducing levels of activity. For example, there may be potential issues from vessels associated with regular trips for example, maintenance/repair of offshore infrastructure, industry could therefore reduce underwater noise from shipping by 'sharing' vessels where possible.

Potential initiatives that could also be introduced include encouraging all industry areas industry to utilise quieter engines on their ships, this could be encouraged by implementing incentive programmes for quieter ships (e.g. by reducing port fees for ships that use newer, quieter engines), slowing ship steaming in sensitive areas where slower ship speeds are shown to significantly reduce noise levels, improving ship engine maintenance and optimising propeller performance. Another example of simple noise-reducing measures that can be undertaken is the use of shore-based power instead of generators or engines.

3.5 Marine habitats

3.5.1 Existing objectives, targets and indicators

Key objectives, targets and indicators for marine habitats are established by a wide range of drivers including:

- Habitats Directive:
  - Subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status (FCS) of its qualifying features (Subtidal sandbanks, Estuaries, Mudflat and sandflat, Lagoons, Inlets and Bays, Reefs, Submarine structures of leaking gases, Annual vegetation of drift lines, Perennial vegetation of stony banks, Vegetated Sea Cliffs, *Salicornia* and other annuals, *Spartina*, Atlantic Salt meadows and Sea Caves);
  - The EU Biodiversity Strategy 2020 included a target that by 2020, 34% of the habitats should either have reached FCS or shown a significant improvement in their status.
- Birds Directive:
  - Subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:
    - The extent and distribution of the habitats of the qualifying features;
    - The structure and function of the habitats of the qualifying features;
    - The supporting processes on which the habitats of the qualifying features rely.

- Marine & Coastal Access Act (nature conservation provisions):
  - Site conservation objectives apply to the Marine Conservation Zone and the individual habitats for which the site has been designated (Blue mussel beds, Cold-water coral reefs, Coral gardens, Deep sea sponge aggregations, estuarine rocky habitats, Fragile sponge and anthozoan communities on subtidal rocky habitats, Intertidal under-boulder communities, littoral chalk communities, Maerl beds, Horse mussel beds, Sea-pen and burrowing megafauna communities, Native oyster beds, Peat and clay exposures, Honeycomb worm reefs, ross worm reefs, Seagrass beds, Sheltered muddy gravels, subtidal chalk, Tide swept channels);
  - The conservation objective of the zone is that the protected habitats:
    - Are maintained in favourable condition if they are already in favourable condition;
    - Be brought into favourable condition if they are not already in favourable condition.
- Wildlife & Countryside Act (SSSIs):
  - Natural England's objective is to achieve 'favourable condition' status for all SSSIs. Favourable condition means that the SSSI's habitats and features are in a healthy state and are being conserved by appropriate management.
  - Biodiversity 2020: A strategy for England's wildlife and ecosystem services (Defra, 2011) has a higher-level outcome to achieve "… at least 50% of SSSIs in favourable condition, while maintaining at least 95% in favourable or recovering condition".
- WFD:
  - Protect, enhance and restore all surface water bodies with the aim of achieving good surface water status by 2015 (now working towards 2021) or later assuming grounds for time limited derogation (Article 4.1 (a)(ii)).
- Marine Strategy:
  - Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions (D1):
    - Pelagic habitats - changes in plankton communities and changes in plankton biomass against targets covering habitat condition and habitat distribution; and
    - Benthic habitats – rock and biogenic habitats, predominant sediment habitats and intertidal habitats against targets covering habitat extent, habitat and community condition and physical damage.
  - Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected (D4).
    - The breeding success, species and size composition, abundance and population condition for the ecosystem components included under D1 (see above and Section 3.6.1).
- OSPAR Strategy 2011-2020:
  - To halt and prevent by 2020 further loss of biodiversity in the OSPAR maritime area, to protect and conserve ecosystems, and to restore, where practicable, marine areas which have been adversely affected.
- Biodiversity Convention:
  - By 2020, the rate of loss of all-natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced (Target 5);
  - By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning (Target 10);
  - By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically

representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes (Target 11);
    - By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable (Target 14); and
    - By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification (Target 15).
- UK Marine Policy Statement/Marine Plans:
    - Biodiversity is protected, conserved and where appropriate recovered and loss has been halted;
    - Healthy marine and coastal habitats occur across their natural range and are able to support strong, biodiverse biological communities and the functioning of healthy, resilient and adaptable marine ecosystems;
    - Marine plans will support proposals that:
        - Enhance essential fish habitat, including spawning, nursery and feeding grounds, and migratory routes;
        - Enhance habitats that provide flood defence or carbon sequestration;
        - Support the objectives of marine protected areas and the ecological coherence of the marine protected area network;
        - Enhance a marine protected area's ability to adapt to climate change, enhancing the resilience of the marine protected area network;
        - Enhance the distribution of priority habitats and priority species;
        - Enhance or facilitate native species or habitat adaptation or connectivity, or native species migration; and
- 25-Year Environment Plan:
    - Reaching or exceeding objectives for rivers, lakes, coastal and ground waters that are specially protected, whether for biodiversity or drinking water as per our River Basin Management Plans;
    - Reversing the loss of marine biodiversity and, where practicable, restoring it;
    - Increasing the proportion of protected and well-managed seas, and better managing existing protected sites; and
    - Ensuring seafloor habitats are productive and sufficiently extensive to support healthy, sustainable ecosystems.
- NERC Act:
    - Section 40 of the NERC Act places duty on public bodies to conserve biodiversity, namely the habitats and species which are set out in Section 41 (habitats of principal importance). Marine priority habitats include: Intertidal under-boulder communities, *Sabellaria alveolata* reefs, coastal saltmarsh, intertidal mudflats, seagrass beds, sheltered muddy gravels, peat and clay exposures with piddocks, subtidal chalk, tide-swept channels, fragile sponge and anthozoan communities on subtidal rocky habitats, estuarine rocky habitats, seamount communities, carbonate mounds, cold-water coral reefs, deep-sea sponge communities, *Sabellaria spinulosa* reefs, subtidal sands and gravels, horse mussel beds, mud habitats in deep water, file shell beds, maerl beds, serpulid reefs, blue mussel beds on sediment and saline lagoons.
- Biodiversity 2020:
    - To develop a well-managed Marine Protected Area network that covers in excess of 25 % of English waters by 2016;
    - To have marine plans in place covering the whole of England's marine area by 2022.

- Regional Habitat Compensation Programme:
  - To deliver the creation of new coastal and wetland habitats to replace those damaged or lost by flood or coastal defence works and sea level rise. The targets for habitat creation vary across regions and can change with new analyses and as habitat creation projects are implemented.
- ReMeMaRe (long term targets):
  - Restore at least 2 % by 2025 and 15 % of our current extent of saltmarsh, seagrass and oyster reef habitats by 2043;
  - Achieve Good Ecological Status in our River Basin Management Plans for estuarine and coastal waters water bodies for angiosperm (seagrass / saltmarsh) elements with newly restored habitats and contribute to Good Environmental Status for Regional Sea Areas for biodiversity and seabed habitats; and

    Begin the restoration of 5250 ha of functioning saltmarsh, 300 ha of seagrass and 200 ha of oyster beds by 2043.

Details of the key targets including the source, target and indicator are provided in Appendix A.

3.5.2 Progress towards achieving objectives and targets

Progress against relevant objectives and targets is reported against the specific policy/legislative drivers. For more recent drivers such as MCAA nature conservation provisions and the 25 Year Environment Plan the focus has been on establishing baselines against which future change can be measured. Information on progress against objectives and targets is available for Habitats & Birds Directives, Wildlife & Countryside Act, Water Framework Directive, UK Marine Strategy, OSPAR and the Biodiversity Convention.

In relation to habitat features protected under the Habitats Directive, the latest Article 17 progress reports[8] indicate that of the 14 habitats with a marine connection, 7 of these showed a declining short-term trend (estuaries, mudflats, lagoons, inlets and bays, vegetated sea cliffs, *Spartina* and Atlantic salt meadows). There is no specific reporting in relation to marine habitats protected under the Birds Directive, but the condition of these is assessed in relation to the underpinning SSSIs. There is no separate published summary analysis of the condition of marine habitats within SSSIs. Over the past 5 years, there has been a small increase in the area of SSSIs in favourable condition, from 37.5% in 2015 to 38.9% in 2020. The area in unfavourable recovering condition has increased substantially from 13.0% in 2003 to 54.2% in 2020. The overall proportion of SSSIs in favourable or unfavourable recovering condition remained above the 95% target from 2011 to 2016 but has since fallen slightly year-on-year to 93.1% in 2020[9].

It is noted that in relation to some MCZ habitat features, conservation objectives have been established as 'restore feature to favourable condition'. This indicates that favourable condition is not currently being achieved for all habitat features. The UK Biodiversity Action Plan highlights report also assessed over 40% of priority habitats to be declining in its most recent analysis.

The UK Marine Strategy (Defra, 2019) indicates that GES has not been achieved for marine habitats (D1 and D6) due to the extent of physical damage. Such damage is primarily attributed to seabed damage form towed fishing gears but infrastructure (oil and gas infrastructure, power and telecom cables and offshore energy development) is also identified as a contributing factor.

[8] https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-habitats/

[9] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/925414/1_Extent__and_condition_of_protected_areas_2020_accessible.pdf

A number of WFD transitional and coastal water bodies are reported to have failed to achieve relevant standards for angiosperms, invertebrates and macroalgae, indicating a level of damage to associated habitats:

- Transitional waters:
  - Angiosperms (11);
  - Invertebrates (20);
  - Macroalgae (12).
- Coastal waters:
  - Angiosperms (2);
  - Invertebrates (5).

The OSPAR 2017 Intermediate Assessment (OSPAR, 2017) notes that within the OSPAR region, bottom contacting fishing physically disturbs seafloor habitats. Approximately 86% of the assessed areas in the Greater North Sea and the Celtic Seas have physical disturbance, of which 58% showed higher disturbance. Around 74% of all assessed areas experience consistent pressure year on year, which is very likely to affect the ability of habitats to recover.

JNCC (2019) reports that progress against most of the habitat related AICHI targets under the Biodiversity Convention is insufficient.

It is recognised that climate change will pose risks to marine habitats in the future as a result of sea level rise, storminess, temperature shifts and ocean acidification (Jones *et al*, 2013). The introduction of non-native species is also recognised as a risk to marine habitats as a result of displacement of species, altered biodiversity and reduced resilience of marine habitats to wider impacts.

It is further recognised that in a number of instances, anthropogenic activity over time has led to very significant changes in the extent of some marine habitats. For example, the ReMeMaRe initiative notes that England has lost 90% of its seagrass meadows, an 85 % decline in the area of saltmarsh and a 95 % decline in the area of native oyster reefs[10]. Most of the existing legal and policy drivers focus on restoring or maintaining the condition of the current extent of habitat features and little consideration is given to the desirability of significantly restoring the spatial extent of lost habitats. However, such habitats play very important roles in the functioning of marine ecosystems, for example, in carbon storage and sequestration, nutrient storage and cycling and waste assimilation. The desirability of restoring such features is now being given greater recognition, for example, within the 25 Year environment Plan and marine plans.

The RHCP that is being implemented on a regional basis in England has delivered more than 800 ha of habitat to offset losses (RSPB, 2018). A similar programme is now led by NRW in Wales (NRW, 2020). There are currently no similar programmes in Scotland and Northern Ireland.

3.5.3 Key actions required to address any gaps

A wide range of measures and actions are being implemented particularly in relation to Marine Protected Areas (MPAs) and under the WFD and UK Marine Strategy to support achievement of objectives and targets for marine habitats. To date, these measures have primarily entailed management of human activity pressures with some limited scale habitat restoration and enhancement in intertidal and near coastal areas.

[10] https://ecsa.international/sites/default/files/docs-reach/20201208_Blue%20Recovery%20Fund_Feb2021.pdf

It is anticipated that there will continue to be a focus on implementing appropriate management measures for human activity pressures within MPAs to support achievement of feature-based conservation objectives. Such management may also be extended to areas outside of MPAs to protect vulnerable habitats where necessary. For example, Sussex IFCA has established a Nearshore Trawling Byelaw to facilitate restoration of sites of historic dense kelp forest from Bognor Regis to Brighton[11].

For a limited number of intertidal and coastal habitats, there is potential to undertake more direct restoration and enhancement activity including for:

- Saltmarsh;
- Intertidal mudflat and sandflat;
- Intertidal under-boulder communities;
- Kelp;
- Oyster (and other bivalve) beds; and
- Seagrass beds.

Approaches to the creation of saltmarsh and intertidal mud and sandflat habitat are well established (MMO, 2021). These include:

- Managed realignment (including regulated tidal exchange (RTE));
- Beneficial Use / Sediment recharge; and
- The manipulation of natural processes (encompassing sedimentation polders etc.).

Methods for restoring seagrass beds include replanting and reseeding as well as managing key human activity pressures such as towed fishing gears and nutrient enrichment (MMO, 2021).

There is growing interest in the potential for restoration of kelp forests through seeding of juvenile kelp. However, kelp restoration has so far only been undertaken on small to medium scales (not at the large-scale that loss can occur) (Layton *et al*., 2020).

Shellfish restoration techniques for species such as the native oyster can include (MMO, 2021):

- Translocation of adult shellfish, juveniles (spat), or larval shellfish; and
- Provision of substrate / cultch (substratum for larvae to settle) directly on the seabed.

In addition, seabed sediment type can be manipulated to some extent in subtidal areas, for example, placement of soft sediment (sand/gravel) or rock on existing substrate. The use of sand and gravel to restore seabed conditions following aggregate extraction has been considered, but generally, licence conditions require that aggregate extraction avoids significant changes to seabed characteristics. Placement of rock or other hard substrate in the marine environment occurs regularly as part of construction projects, for example, provision of scour protection around offshore structures or for the protection of exposed cables. However, such interventions are usually of quite limited spatial extent and are at the expense of existing seabed habitat. The extent to which such activities contribute meaningfully or positively to enhancement of the marine environment, therefore remains unclear.

Natural England's IPENS project[12] identified a wide range of pressures and impacts on marine SACs or SACs with a marine component and identified specific actions to address these pressures and impacts. For example, within the sites protected within the Solent, Natural England (2015) identified a wide range of measures that could be taken to support achievement of species conservation objectives:

[11] https://www.sussex-ifca.gov.uk/kelp
[12] http://publications.naturalengland.org.uk/publication/5682306693988352

- Coastal squeeze - investigate options to create alternative habitat;
- Management of commercial fisheries pressures to protect habitats- Introduce appropriate management measures where required and ensure compliance;
- Water pollution - implement actions in the Diffuse Water Pollution Plan, and investigate further pollution;
- Invasive species - implement the management options to control invasive non-native species (INNS);
- Land management to protect sensitive habitats - ensure appropriate ditch management, and assess the effects of tidal sluice operation;
- Air pollution – better management of air pollution (NOx deposition) to protect key habitats (such as Estuaries (including sub-features such as *Zostera*), Coastal lagoons, Glasswort and other annuals colonising mud and sand, Atlantic salt meadows and Shifting dunes with marram;
- Hydrological changes - review abstraction licences to protect sensitive habitats including Coastal lagoons, Cord-grass swards and Atlantic salt meadows.

The OSPAR Measures and Actions Programme[13] includes recommendations on managing human activity pressures and protecting a wide range of habitats. This includes measures, for example, to protect *Zostera* beds, mudflats, native oyster, ocean quahog, carbonate mounds, coral gardens, deep sea sponges and littoral chalk. The recommendations also include consideration of the desirability of active conservation or restoration measures for the following habitats: intertidal mudflat, native oyster and blue mussel. While there are no specific targets associated with these recommendations, there is significant potential to reverse the ongoing declines in key marine habitat features through such measures.

3.5.4 Extent to which industry might contribute

There is significant scope for industry to contribute to objectives and targets to protect and restore marine and coastal habitats.

It is noted that the issue of 'additionality' under the Birds & Habitats Directives is currently being reviewed by Defra. Depending on the outcome of this review, there may be greater opportunity for industry to contribute to actions to improve the condition of European sites.

Intertidal/ near coastal habitats

Industry can directly lead or contribute to restoration and enhancement projects for relevant intertidal/ near coastal habitats which will contribute to key marine objectives relating to the restoration and enhancement of the marine environment. To indicate the scale of potential opportunity, the ReMeMaRe initiative is seeking to begin the restoration of 5250 ha of functioning saltmarsh, 300 ha of seagrass and 200 ha of oyster beds by 2043. However, it is noted that this represents a very small fraction of the historical extent of these habitats that has been lost.

The Environment Agency's Estuarine and Coastal Monitoring and Assessment Service (ECMAS) has collated and created a set of online maps which identify locations around the English coastline that could be suitable for marine habitat restoration work. Currently, there are three such maps which describe where saltmarsh, seagrass or native oyster habitats[14] could be restored. These maps are shown here as Figure 1 to Figure 3 and are accessible online via the Defra Data Services Platform[15].

[13] https://www.ospar.org/matrix

[14] The native oyster map identifies opportunities within WFD waterbodies. It is of note that historically, oyster reefs were widespread within the southern North Sea and along the English Channel.

[15] https://environment.data.gov.uk/

Collectively, these maps contain 3,037 potential restorations sites (774 saltmarsh, 1,028 seagrass and 1,235 native oyster) covering 323,305 ha in total. They therefore provide a valuable illustration of the potential that exists for future habitat restoration in England.

Similarly, Natural England produced a series of habitat creation and restoration potential maps for saline lagoons, coastal saltmarsh, coastal vegetated shingle, coastal sand dunes and maritime cliffs and slopes. The maps are broken down by National Character Areas (NCA) and show the relative contribution that each NCA might make to each of the individual habitat aspirations.

Offshore habitats

Where industry is contributing to pressures on marine habitats, there may be potential through operational management and decommissioning processes to deliver improvements in the condition and extent of affected habitats. There may also be scope for industry to contribute financially to addressing other pressures on marine habitats within and outside of MPAs, for example, funding of IPENS actions or removal of abrasion pressures from fishing gears may lead to long-term recovery of biogenic reefs (serpulid reef, pink sea fan etc) and other habitats.

Direct restoration and enhancement opportunities are limited within offshore habitats. Direct native oyster restoration remains challenging and experimental but may be more feasible offshore away from *Bonamia* infected areas.

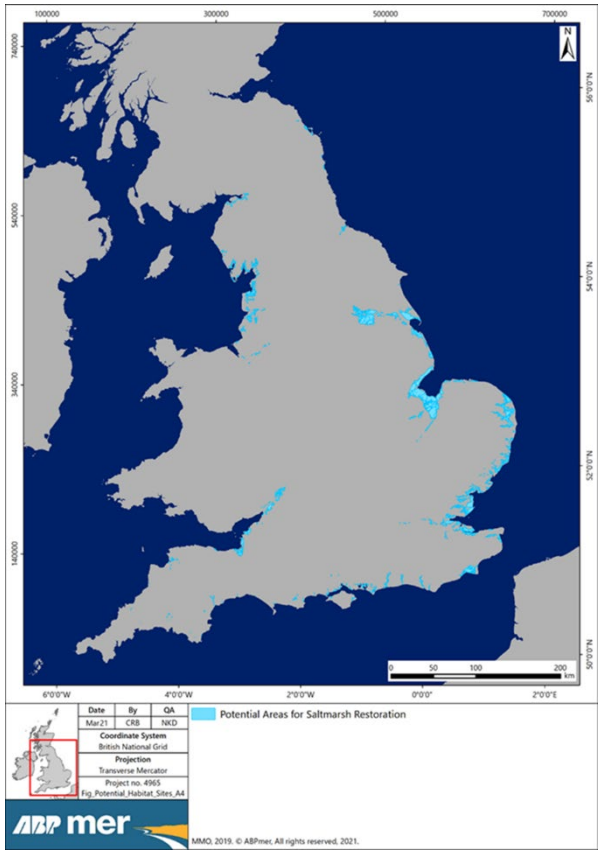

Figure 1. **Potential sites for sea wall realignment and saltmarsh restoration in England**

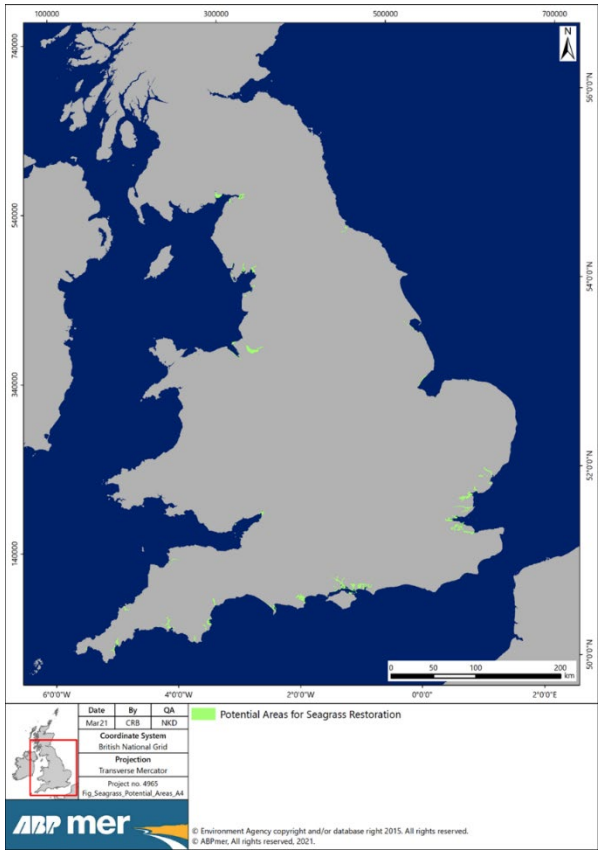

Figure 2. **Potential areas in England for the creation or restoration of seagrass beds**

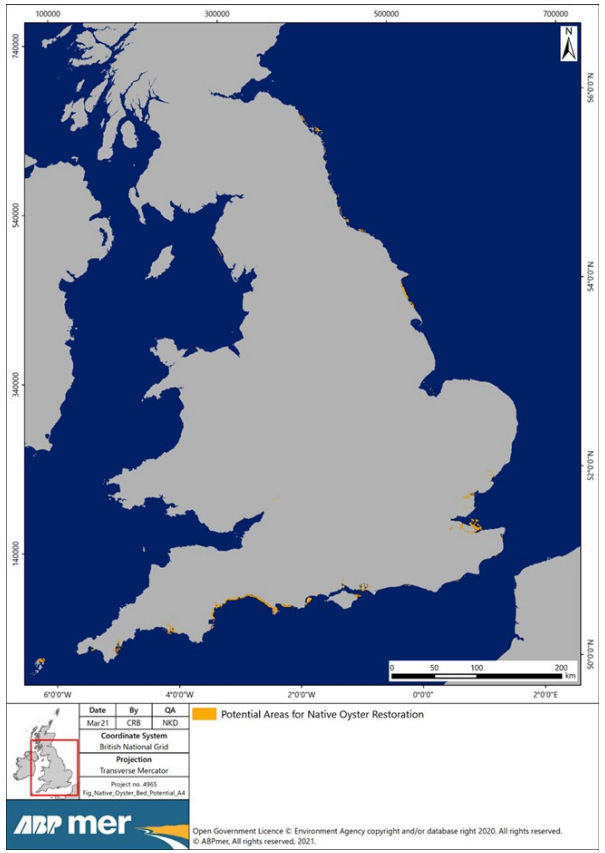

Figure 3. **Potential areas in England for the creation or restoration of native oyster beds**

3.6 Marine species

3.6.1 Existing objectives, targets and indicators

Key objectives, targets and indicators for marine species are established by a wide range of drivers including:

- Habitats Directive:
  - Subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status of its qualifying features (Sea Lamprey, River Lamprey, Common Sturgeon, Allis Shad, Twaite Shad, Atlantic Salmon, Bottlenose Dolphin, Harbour porpoise, Otter, Grey Seal, Common Seal; and
  - The EU Biodiversity Strategy 2020 included a target that by 2020, 26% of the species should either have reached a favourable conservation status or shown a significant improvement in their status.
- Birds Directive:
  - Subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:
    - The populations of each of the qualifying features; and
    - The distribution of qualifying features within the site.
- Marine & Coastal Access Act (nature conservation provisions):
  - Site conservation objectives apply to the Marine Conservation Zone and individual species for which the site has been designated (Peacock's tail (*Padina pavonica*), Burgundy maerl paint weed (*Cruoria cruoriaeformis*), Grateloup's little-lobed weed (*Grateloupia montagnei*), Coral maerl (*Lithothamnion corallioides*), Common maerl (*Phymatolithon calcareum*), Tentacled lagoon-worm (*Alkmaria romijni*), Lagoon sandworm (*Armandia cirrhosa*), Giant goby (*Gobius cobitis*), Couch's goby (*Gobius couchi*), Long snouted seahorse (*Hippocampus guttulatus*), Short snouted seahorse (*Hippocampus hippocampus*), Trembling sea mat (*Victorella pavida*), Sea-fan anemone (*Amphianthus dohrnii*), Pink sea-fan (*Eunicella verrucosa*), Stalked jellyfish (*Haliclystus species*), Sunset cup coral (*Leptopsammia pruvoti*), Stalked jellyfish (*Lucernariopsis campanulata*), Stalked jellyfish (*Lucernariopsis cruxmelitensis*), Starlet sea anemone (*Nematostella vectensis*), Lagoon sand shrimp (*Gammarus insensibilis*), Amphipod shrimp (*Gitanopsis bispinosa*), Gooseneck barnacle (*Pollicipes pollicipes*), Spiny lobster (*Palinurus elephas*), Ocean quahog (*Arctica islandica*), Fan mussel (*Atrina fragilis*), Defolin`s lagoon snail (*Caecum armoricum*), Native oyster (*Ostrea edulis*), Lagoon sea slug (*Tenellia adspersa*), Smelt (*Osmerus eperlanus*), Undulate ray (*Raja undulata*));
  - The conservation objective of the zone is that the protected species:
    - Are maintained in favourable condition if they are already in favourable condition; and
    - Be brought into favourable condition if they are not already in favourable condition.
- Wildlife & Countryside Act (SSSIs):
  - Natural England's objective is to achieve 'favourable condition' status for all SSSIs. Favourable condition means that the SSSI's habitats and features are in a healthy state and are being conserved by appropriate management; and
  - Biodiversity 2020: A strategy for England's wildlife and ecosystem services (Defra, 2011) has a higher-level outcome to achieve "… at least 50% of SSSIs in favourable condition, while maintaining at least 95% in favourable or recovering condition".

- Water Framework Directive:
  - Protect, enhance and restore all surface water bodies with the aim of achieving good surface water status by 2015 (now working towards 2021) or later assuming grounds for time limited derogation (Article 4.1 (a)(ii)).
- Marine Strategy (indicators):
  - Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions (D1):
    - Cetaceans - the abundance and distribution of coastal bottlenose dolphins; the abundance and distribution of other cetaceans; and harbour porpoise bycatch;
    - Seals - population size and condition of grey and harbour seals;
    - Birds - population size and population condition;
    - Fish - aspects of population abundance; size-structure; and species composition against targets based on population size and ecosystem structure;
  - Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock (D3):
  - All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity (D4):
    - The breeding success, species and size composition, abundance and population condition for the ecosystem components included under D1 (see above and Section 3.5.1).
- OSPAR Strategy 2011-2020:
  - To halt and prevent by 2020 further loss of biodiversity in the OSPAR maritime area, to protect and conserve ecosystems, and to restore, where practicable, marine areas which have been adversely affected.
- Biodiversity Convention:
  - By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits (Target 6);
  - By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment (Target 9); and
  - By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained (Target 12).
- ASCOBANS:
  - To achieve and maintain a favourable conservation status for small cetaceans.
- NASCO Salmon Implementation Plan Management Guidelines (NASCO, 2009):
  - Maintaining stocks in line with Conservation Limits (CLs).
- Eel Regulation
  - To reduce anthropogenic mortality enough to allow at least 40 % of "natural levels" of silver eel to escape - swim into the sea to reproduce.
- UK Marine Policy Statement/Marine Plans:
  - Biodiversity is protected, conserved and where appropriate recovered and loss has been halted;
  - Marine plans will support proposals that:
    - Support the objectives of marine protected areas and the ecological coherence of the marine protected area network;

        - Enhance the distribution of priority habitats and priority species;
        - Enhance or facilitate native species or habitat adaptation or connectivity, or native species migration; and
- 25-Year Environment Plan:
    - Reaching or exceeding objectives for rivers, lakes, coastal and ground waters that are specially protected, whether for biodiversity or drinking water as per our River Basin Management Plans;
    - Reversing the loss of marine biodiversity and, where practicable, restoring it; and
    - Increasing the proportion of protected and well-managed seas, and better managing existing protected sites.
- NERC Act:
    - Section 40 of the NERC Act places duty on public bodies to conserve biodiversity, namely the habitats and species which are set out in Section 41 (species of principal importance).
- Biodiversity 2020:
    - Take targeted action for the recovery of priority species, whose conservation is not delivered through wider habitat-based and ecosystem measures
- Fisheries Act 2020:
    - Fisheries are environmentally, socially and economically sustainable; and
    - Stocks are harvested in a way that restores and maintains populations and maintained above biomass levels capable of producing Maximum Sustainable Yield.
- Environment Agency Salmon Strategy 2008 -21 (Environment Agency, 2008) - Environmental targets:
    - 70% of rivers outside the 'at risk' category in 2011;
    - To exceed previous 6-year mean for condition of juvenile fish production;
    - Increase accessible habitat by 200 hectares;
    - 76% of rivers outside the 'at risk' category in 2013 based on condition of stocks subject to conservation designation;
    - To exceed previous 5-year mean for stock diversity of salmon;
    - No outbreaks of disease or parasites; and
    - To exceed previous 5-year mean for number of rivers sustaining fisheries.
- ReMeMaRe (long term targets):
    - Restore at least 2 % by 2025 and 15 % of our current extent of saltmarsh, seagrass and oyster reef habitats by 2043;
    - Achieve GES in our River Basin Management Plans for estuarine and coastal waters water bodies for angiosperm (seagrass / saltmarsh) elements with newly restored habitats and contribute to Good Environmental Status for Regional Sea Areas for biodiversity and seabed habitats; and
    - Begin the restoration of 5250 ha of functioning saltmarsh, 300 ha of seagrass and 200 ha of oyster beds by 2043.

Details of the key targets including the source, target and indicator are provided in Appendix A.

3.6.2 Progress towards achieving objectives and targets

Progress against relevant objectives and targets is reported against the specific policy/legislative drivers. The UK Biodiversity Action Plan highlights report assessed over 30% of priority species to be declining in its most recent analysis. For more recent drivers such as MCAA nature conservation provisions and the 25 Year Environment Plan the focus has been on establishing baselines against which future change can be measured. Information on progress against objectives and targets is available for Habitats & Birds Directives (fish, birds, marine mammals), Water Framework Directive, UK Marine Strategy, OSPAR, NASCO Convention (Atlantic salmon), Eel Regulation (European eel), the Biodiversity Convention and ASCOBANS (cetaceans). Progress is reported against individual species groups below.

Plants and Invertebrates

It is noted that in relation to some MCZ plant and invertebrate features, conservation objectives have been established as 'restore feature to favourable condition'. This indicates that favourable condition is not currently being achieved for all plant and invertebrate features.

A number of WFD transitional and coastal water bodies are reported to have failed to achieve relevant standards for angiosperms, invertebrates and macroalgae, indicating a level of damage to plant and invertebrate species:

- Transitional waters:
  - Angiosperms (11);
  - Invertebrates (20);
  - Macroalgae (12).
- Coastal waters:
  - Angiosperms (2);
  - Invertebrates (5).

It is also of note that some habitats characterised by key marine species (e.g. saltmarsh, seagrass, oyster, biogenic reefs) are identified as not being in favourable condition within SACs or MCZs. Furthermore, the habitats characterised by these species have shown very marked reductions in spatial extent compared to their historical abundance and extent as a result of human activity pressures (reclamation, eutrophication, bottom towed fishing gears). Other species such as kelps have also shown a reduction in spatial extent as a result of storm damage, coastal nutrients and fishing pressure at some locations[16].

In 2014, a number of actions were identified by an expert taxonomic group as necessary to support the recovery of England's s41 species and the achievement of Outcome 3 of the Government's Biodiversity 2020 strategy. The group identified 16 marine invertebrate species that required urgent or high priority actions to enable the species to recover[17], for example, oyster, fan mussel and crayfish.

Fish

In relation to fish features protected under the Habitats Directive, the latest Article 17 progress reports[18] indicate that for four of the six features (sea lamprey, river lamprey, Allis shad and Twaite shad) the short-term trends are assessed as stable, although current abundance and distribution of all of these features are well below historical levels. For Atlantic salmon, the short and long-term trend is one of steep decline. For common sturgeon there is no data.

Urgent and high priority actions have been identified for six s41 fish species, namely Allis shad, Twaite shad, Arctic sharr, European eel, long-snouted seahorse and short-snouted seahorse, to ensure that water quality, and wider habitat management, is suitable to maintain populations at sites where the species currently exist.

It is noted that in relation to some MCZ fish features (Couch's goby, giant goby, long-snouted seahorse, short-snouted seahorse, smelt and undulate ray) conservation objectives have been established as 'restore feature to favourable condition'. This indicates that favourable condition is not currently being achieved for all these features.

16 https://www.sussex-ifca.gov.uk/kelp
17 http://publications.naturalengland.org.uk/publication/4958719460769792
18 https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-habitats/

The UK Marine Strategy (Defra, 2019) indicates that GES has not been achieved for some commercial fish species (D1, D3 and D4) due to overfishing. A reduction in availability of small fish (sandeel and sprat/herring) has also been linked with failure to achieve GES in relation to seabirds.

The OSPAR 2017 Intermediate Assessment (OSPAR, 2017) reports that typical Length for the assessed demersal fish has been recovering across the OSPAR Maritime Area since 2010, although remaining low compared to the 1980's. Recovery in the proportion of large fish in the demersal fish community is evident in the Greater North Sea. Assessment values indicating recovery are only met in the northern part of the Celtic Seas. In many individual survey-based assessments where assessment values are not currently met, recent recovery trends suggest they could be achieved by 2022, if current pressure levels are not increased. The decline in abundance of sensitive fish species was reported to have been halted in the Celtic Seas and Greater North Sea. However, significant recovery of populations is only apparent in the Celtic Seas.

For Atlantic salmon, NASCO (2020) notes that UK salmon stocks remain in a depleted state. It is estimated that 94% of principal salmon rivers in England and Wales will be 'At Risk' or 'Probably At Risk' in 5 years' time (NASCO, 2020). No specific report on progress against the targets in Environment Agency's Salmon Strategy (Environment Agency, 2008) is available.

The 2015 Eel Management Plans report (Defra, 2015) indicated that three of the 14 River Basin Districts are presently assessed as meeting or exceeding their eel management targets'. It further notes '*It is not yet possible to predict whether and when measures will achieve the required additional silver eel production across the UK. Therefore, it is not yet possible to predict when the UK will meet its targets across all RBDs*'.

Birds

In relation to bird features protected under the Birds Directive, the latest Article 12 progress report[19] indicates that of the 140 seabirds/waders waterfowl (including breeding and non-breeding populations) around 39 were showing long-term decline and 62 were showing short-term decline. Features such as fulmar, lapwing and black-legged kittiwake were showing both short- and long-term decline. It is also of note that features such as mudflat that are protected under the Habitats Directive, which are important feeding resource for wading birds, are indicating a decline in condition.

The UK Marine Strategy (Defra, 2019) indicates that GES has not been achieved for bird species (D1 and D4). Reduced availability of small fish, on which the seabirds feed, has been largely responsible for declines in seabird breeding abundance and the frequent, widespread breeding failures in some species. There is a lack of understanding of how climate change is driving shifts in the food web that have led to these reductions in food availability. The decline in wintering waterbird abundance in the Celtic Seas is thought to be part of a north-east shift in their distribution in response to milder winters. Climate change is thought to be driving these shifts, but the role of additional human impact is unclear.

The OSPAR 2017 Intermediate Assessment (OSPAR, 2017) reports that the abundance of marine bird species assessed across the OSPAR Maritime Area has not been considered healthy since the mid-2000s. Since the mid-2000s, the breeding abundance of more than a quarter of the marine bird species assessed in the OSPAR Maritime Area has been below the baseline set in 1992, indicating that the populations are not healthy. Species that use intertidal and inshore areas of the Greater North Sea during migration or over wintering are the exception, and have been present in healthy numbers since the early 1990s. Seabird species have experienced frequent and widespread breeding failure over the period assessed (2010 to 2015 inclusive) in Norwegian parts of Arctic Waters, the Greater North Sea and

[19] https://hub.jncc.gov.uk/assets/2d17c45b-a004-4ed1-9d73-06bd9a2eabe4

in the Celtic Seas. The surface feeding birds in the Greater North Sea and Celtic Seas frequently failed to raise young. In the Greater North Sea and Celtic Seas, all seabird species that frequently failed to raise young feed on small fish in surface waters.

Marine Mammals

In relation to marine mammal features protected under the Habitats Directive, the latest Article 17 progress reports[20] indicate that for two of the six features (Bottlenose dolphin and Grey seal) the short-term trends are assessed as stable. For Harbour porpoise the short-term trend is not known and for Common seal is uncertain. For otter, the short-term trend is increasing form historic low numbers.

The UK Marine Strategy (Defra, 2019) indicates that GES has been partially achieved for cetaceans and seals (D1 and D4).

The OSPAR 2017 Intermediate Assessment (OSPAR, 2017) reports that Harbour seal abundance is stable or increasing in most of the Greater North Sea but declining in a few areas. The reasons for this decline are unclear. Grey seal abundance is increasing, and distribution is stable. In the Greater North Sea and in parts of the Celtic Seas, the number of grey seals born each year has increased substantially since 1992 and has continued to rise in recent years (2009–2014).

Bycatch is recognised as a major cause of human-induced mortality of harbour porpoise. Nearly 4000 harbour porpoises of a total population in excess of 490 000 are drowned in fishing nets annually in the areas assessed. However, there is low confidence in these bycatch estimates due to incomplete monitoring data.

Coastal bottlenose dolphin populations declined through the 19th and 20th century and have remained low, but stable, in the 21st century. Cetaceans are widely distributed and abundant in the OSPAR Maritime Area. They are challenging to monitor. There is no evidence of changes in abundance for white-beaked dolphin, minke whale and harbour porpoise since 1994; there is insufficient evidence for other species. The distribution of harbour porpoise and minke whale has shifted southward in the Greater North Sea.

ASCOBANS (2020b) notes the following progress in relation to GB waters:

- Level of pressure from by-catch staying the same;
- Several North Sea stocks analytically assessed by ICES have current fishing mortality rates above FMSY, including cod, whiting, haddock, mackerel, and blue whiting. The over-exploitation of such stocks may therefore be of concern to cetaceans that predate on these species. However, it should be noted that 24 of 32 North Sea stocks assessed by ICES are exploited at rates at or below FMSY, therefore any reduction in prey as a result of over-exploitation is likely to be localised;
- Overall fishing pressure on the commercial fish and shellfish stocks in the Celtic Seas ecoregion has decreased since its peak in 1998;
- Level of pressure from underwater noise increasing for all relevant species in the Southern/Central North Sea and Northern North Sea, development of offshore wind farms, combined with ongoing oil and gas surveys, other construction and shipping means underwater noise has increased between 2016-2019 and will continue to increase in the future as the UK looks to meet our green / net zero targets;

[20] https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-habitats/

- Level of pressure from underwater noise staying the same for all relevant species in the Irish and Scottish West Coast, development of offshore wind farms, and other construction remains limited. Shipping level are expected to remain the same. Therefore, underwater noise has not thought to have increased between 2016-2019;
- Level of pressure from ocean energy increasing;
- Level of pressure from commercial small cetacean watching is increasing for Bottlenose dolphin, Common dolphin, Killer whale, Harbour porpoise and Risso's dolphin based on expert opinion, and surveys of commercial trip boat encounters. Staying the same for White-beaked dolphin based on expert opinion;
- Change in pressure from marine debris is unknown;
- Change in level of pressure from pollution and hazardous substances is unknown;
- Potential issues associated with climate change: shift or contraction in range; changes to physical habitat; changes to food web, prey distribution and availability and predator-prey relationships; increased susceptibility to disease and contaminants; effects on reproductive success.

3.6.3 Key actions required to address any gaps

A wide range of measures and actions are being implemented particularly in relation to MPAs, under the WFD, the UK Marine Strategy, the NASCO Convention, Eel Regulation, and ASCOBANS to support achievement of objectives and targets for marine species. To date, these measures have primarily entailed management of human activity pressures with some limited scale habitat restoration and enhancement on land (to support water dependent birds), in rivers (to support migratory fish) and in intertidal and near coastal areas.

It is anticipated that there will continue to be a focus on implementing appropriate management measures for human activity pressures within MPAs to support achievement of feature-based conservation objectives. Such management may also be extended to areas outside of MPAs to protect vulnerable species where necessary.

For some species, there is potential to undertake more direct restoration and enhancement activity (MMO, 2021; ABPmer, 2020) including for:

- Plants and invertebrates – reintroduction of species (replanting saltmarsh, or seagrass) or laying of oysters, or through creation of physical conditions for the restoration of plant and invertebrate species (e.g. through processes such as managed realignment or regulated tidal exchange or the manipulation of sediment type through the placement or trapping of sediment)
- Fish – direct restocking (for example Atlantic salmon or eel), removal of migratory barriers, or management of spawning, nursery or foraging habitats (Atlantic salmon, Allis and Twaite shad[21], eel)
- Birds - various measures have been successfully implemented including:
  - Provision of alternative nesting and roosting sites (e.g. nesting platforms for terns and kittiwake; roosting platforms for waterbirds)
  - Creation of foraging habitats for waders and wildfowl (e.g. through managed realignment, regulated tidal exchange)
- Marine mammals – Improvement or creation of habitat for otter, such as through construction of artificial holts/installation of viaducts, underpasses or bridge ledges. Measures to support cetaceans and seals are all currently focused on pressure reduction (reduction in by-catch, disturbance, enhancing prey availability).

[21] https://www.unlockingthesevern.co.uk/

Natural England's IPENS project[22] identified a wide range of pressures and impacts on marine SPAs and SACs and identified specific actions to address these pressures and impacts. For example, within the sites protected within the Solent, Natural England (2015) identified a wide range of measures that could be taken to support achievement of species conservation objectives:

- Waders and waterfowl - reduce disturbance through access management, awareness raising and wardening;
- Coastal squeeze - investigate options to create alternative habitat;
- Management of commercial fisheries pressures - Introduce appropriate management measures where required and ensure compliance;
- Water pollution - implement actions in the Diffuse Water Pollution Plan, and investigate further pollution;
- Invasive species - implement the management options to control invasive non-native species (INNS);
- Egg collection - appropriate egg collection licensing;
- Land management for birds - ensure appropriate ditch management, and assess the effects of tidal sluice operation;
- Predator control at bird colonies - increase control of foxes;
- Air pollution – better management of air pollution (NOx deposition) to protect key species (such as *Zostera*) on which various bird species are dependent;
- Hydrological changes – review abstraction licences to protect Desmoulin`s whorl snail.

The OSPAR Measures and Actions Programme[23] includes recommendations on managing human activity pressures and protecting a wide range of habitats and species. This includes measures, for example, to protect *Zostera,* native oyster, ocean quahog, carbonate mounds, coral gardens, deep sea sponges, lesser black-backed gull, black-legged kittiwake, roseate tern, allis shad, eel, Atlantic salmon, common skate, Angelshark, basking shark, short and long-snouted seahorse.

The recommendations also include consideration of the desirability of active conservation or restoration measures for the following species: native oyster, blue mussel, lesser black-backed gull, black-legged kittiwake, roseate tern, European sturgeon, allis shad, European eel, common skate, Angelshark, basking shark, long-snouted seahorse, sea lamprey, Atlantic salmon, harbour porpoise. While there are no specific targets associated with these recommendations, there is significant potential to reverse the ongoing declines in key marine species features through such measures.

3.6.4 Extent to which industry might contribute

There is significant scope for industry to contribute to objectives and targets to restore and protect intertidal and marine species.

Intertidal/ near coastal species

Industry can directly lead or contribute to restoration and enhancement projects for relevant marine species which will contribute to key marine objectives relating to the restoration and enhancement of the marine environment.

Actions to restore important habitats such as saltmarsh, mudflat, seagrass and oyster reef will directly benefit relevant species. Restoration of habitats such as seagrass will also benefit dependent species such as long and short-snouted seahorses as well as wildfowl which forage on intertidal seagrass beds.

22 http://publications.naturalengland.org.uk/publication/5682306693988352
23 https://www.ospar.org/matrix

Direct restoration of intertidal/ near coastal species remains challenging, but there is potential for industry to contribute to restoration of edible crab, European lobster and spiny lobster populations through fishing pressure reduction and targeted restocking (e.g. lobster hatcheries).

There is also some scope for industry to contribute to direct restocking of some coastal fish populations such as salmon and Allis/ Twaite shad, additionally removal of migratory barriers, or management of spawning and, nursery habitats could also be undertaken to support and restore intertidal/ near coastal fish.

Offshore species

Where industry is directly contributing to pressures on marine species, there may be potential through operational management and decommissioning processes to deliver improvements in the condition and extent of those species. There may also be scope for industry to contribute financially to addressing other pressures on marine species within and outside of MPAs, for example, funding of IPENS actions. It is noted that the issue of 'additionality' under the Birds & Habitats Directives is currently being reviewed by Defra. Depending on the outcome of this review, there may be greater opportunity for industry to contribute to actions to improve the condition of Marine Protected Areas.

There is potentially some industry scope for restoration and enhancement of offshore invertebrates, such as direct restoration of species such as native oyster, however this remains challenging. There is also potential to restore edible crab, European lobster, spiny lobster populations through fishing pressure reduction and targeted restocking (e.g. lobster hatcheries).

Industry could also contribute to funding of fisheries management measures (including management of direct fishing pressures and seabed abrasion/ penetration), to support offshore fish populations, such as for key food chain species sandeel, herring and sprat and to support offshore marine mammal populations.

Seabird species could similarly be supported through fisheries management measures offshore to improve prey availability. However, there is also some scope for industry to directly support seabirds at breeding colonies through predator removal, disturbance reduction and provision of nesting sites.

4 Discussion

A summary of the key outcomes of the gap analysis structured according to specific features or parameters is presented in Table 1.

The analysis indicates that the greatest potential for industry to contribute is likely to be in relation to intertidal/ near coastal habitat restoration and enhancement and in relation to intertidal/ near coastal plants/invertebrates, fish and birds. The restoration of offshore habitats/species through interventions is significantly more challenging than for intertidal habitats. It is recognised that the scope to contribute to objectives and targets relating to features protected by European site designations may be constrained by existing policies on additionality, although it is recognised that these policies are under review within Defra.

Table 1. Summary of key gaps and opportunities for each feature category.

Marine Feature Category	Extent of Any Current or Anticipated Future Gap	Suggested Scale of Opportunity for Industry to Contribute
Contaminants	Relatively few failures of WFD EQS in transitional and coastal waters. Offshore waters considered to be at GES.	**Low**. In line with polluter pays principle, significant point source discharges should be responsible for limiting emissions.
Eutrophication	A significant proportion of transitional and coastal water bodies have elevated concentrations of dissolved organic nitrogen. A smaller number of water bodies show evidence of eutrophication. The UK has largely achieved its aim of GES for eutrophication (D5).	Scale of opportunity to contribute directly is **low**. Opportunity to contribute to nutrient cycling as a result of habitat restoration and enhancement is **moderate.**
Marine litter	GES has not been achieved for marine litter (D10). Litter is abundant on beaches and widespread on the seafloor. The OSPAR target relating to plastic litter in fulmar stomachs has not been met.	**Low**. Scope to contribute funding to litter removal initiatives.
Underwater noise	GES has been partially achieved for underwater noise (D11). The UK has set up a Marine Noise Registry to monitor impulsive noise, however, data needs to be collected into the future to be able to assess any patterns and trends. Continuous ambient noise has also been recorded which will serve as a benchmark to assess future ambient noise levels. Overall, the achievement of GES for underwater noise, however, remains uncertain given that the consequence of noise on the population and ecosystem is not currently assessed.	**Low**. Scope to contribute funding to underwater noise reduction initiatives.

Marine Feature Category	Extent of Any Current or Anticipated Future Gap	Suggested Scale of Opportunity for Industry to Contribute
Intertidal/ near coastal habitats	A number of habitats have been identified as in short-term decline including estuaries, mudflats, lagoons, inlets and bays, vegetated sea cliffs, *Spartina* and Atlantic salt meadows. In addition, larger historic declines of seagrass meadows, saltmarsh and native oyster reefs have been reported.	**High.** Scope for direct habitat restoration and enhancement in intertidal and near coastal areas in particular saltmarsh, intertidal mudflat and sandflat, oyster (and other bivalve) beds and seagrass beds. Possible scope for other shallow sublittoral habitats such as kelp, pink sea fan etc through pressure removal.
Offshore habitats	A number of habitats have been identified as in decline including major historic losses of offshore structuring features (native oyster reef, *Modiolus*, serpulid reef and other biogenic reef)	**High.** Limited opportunities to restore habitat offshore directly. Pressure removal (particularly fisheries pressure removal) likely to be important to support long-term habitat recovery and ecological benefits.
Intertidal/ near coastal plants and invertebrates	A number of WFD transitional and coastal water bodies are reported to have failed for angiosperms, invertebrates and macroalgae in transitional and coastal waters. Numerous MCZ plant and invertebrate features need to 'restore feature to favourable condition'.	**High.** Scope for direct restoration of either associated habitat through managed realignment etc or direct reintroduction of species (replanting saltmarsh/ seagrass, laying oysters).
Offshore marine invertebrates	A number of habitats have been identified as in decline including major historic losses of offshore structuring features (native oyster reef, *Modiolus*, serpulid reef and other biogenic reef features).	**Medium.** Some scope for direct restoration and enhancement of offshore invertebrates, such as native oyster, *Modiolus*, edible crab, European lobster, spiny lobster, scallop, but mostly requiring reduction in (fishing) pressures.
Intertidal/ near coastal fish	The Biodiversity 2020 strategy identified, urgent and high priority actions for six s41 fish species, namely Allis shad, Twaite shad, Arctic charr, European eel, long-snouted seahorse and short-snouted seahorse.	**High.** Scope to contribute to direct restocking, removal of migratory barriers, or management of spawning, nursery or foraging habitats.
Offshore fish	GES has not been achieved for some commercial fish species (D1, D3 and D4) due to overfishing. A reduction in availability of small fish (sandeel and sprat/herring) has also been linked with failure to achieve GES in relation to seabirds.	**Medium/ High.** Scope to contribute to funding of fisheries measures for key food chain species such as sandeel, herring and sprat. Industry role to ensure future project designs minimise impacts, and/or project location does not impact essential fish habitats where practicable.

Marine Feature Category	Extent of Any Current or Anticipated Future Gap	Suggested Scale of Opportunity for Industry to Contribute
Intertidal/ near coastal birds	GES has not been achieved for bird species (D1 and D4). Of 140 seabirds/ wader's waterfowl (including breeding and non-breeding populations) some 39 have been assessed as showing long-term decline and 62 showing short-term decline. A reduction in availability of small fish (sandeel and sprat/herring) has been linked with failure to achieve GES in relation to seabirds.	**High.** Scope to provide alternative nesting and roosting sites (e.g. nesting platforms) or to create foraging habitats for waders and wildfowl (e.g. through managed realignment, regulated tidal exchange)
Offshore birds	GES has not been achieved for bird species (D1 and D4). Of 140 seabirds/ wader's waterfowl (including breeding and non-breeding populations) some 39 have been assessed as showing long-term decline and 62 showing short-term decline. A reduction in availability of small fish (sandeel and sprat/herring) has been linked with failure to achieve GES in relation to seabirds.	**High.** Scope to provide alternative nesting and roosting sites (e.g. nesting platforms) , predator control/removal etc to directly support seabirds at breeding colonies. Potential to improve prey availability through fisheries management measures offshore.
Intertidal/ near coastal marine mammals	Latest Article 17 reports show an increasing trend for otter populations,	**Low.** Scope to create/ improve habitat for otter.
Offshore marine mammals	GES has been partially achieved for cetaceans and seals (D1 and D4). Stable or increasing trends for bottlenose dolphin and grey seal. The level of pressure from by-catch has remained the same but there is an increasing level of pressure from underwater noise for all relevant species.	**Low.** Measures to support cetaceans and seals are all currently focused on pressure reduction which should be the responsibility of those industries contributing to the pressure.

It is clear from the review that there are many objectives and targets for the marine environment which are not being achieved and to which industry might contribute through net gain, although it is recognised that many of the objectives and targets are not particularly SMART (Specific, Measurable, Achievable, Realistic, Time-bound). The scope for marine industry to contribute to these objectives and targets will depend on the form that marine net gain takes. In particular, it is recognised that the majority of measures to restore or enhance offshore areas relate to reductions in pressure from other marine activities, particularly commercial fishing. Such measures would need to be led by government, but marine industry could fund such measures as part of marine net gain. If industry is required to identify and deliver marine net gain measures on its own, this will significantly limit the scope to deliver offshore net gain.

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6 Abbreviations/Acronyms

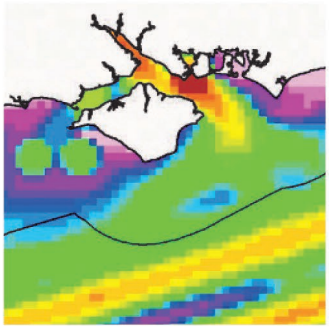
ABNJ	Areas Beyond National Jurisdiction
AICHI	Biodiversity Targets under the Convention on Biological Diversity
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas
ATL	Advance the Line
AWB	Artificial Water Bodies
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CFP	Common Fisheries Policy
CLs	Conservation Limits
Defra	Department for Environment, Food and Rural Affairs
DIN	Dissolved Inorganic Nitrogen
DIP	Dissolved Inorganic Phosphorus
E&W	England and Wales
EC	European Commission
ECMAS	Estuarine and Coastal Monitoring and Assessment Service
EEC	European Economic Community
EMP	Eel Management Plans
EQS	Environmental Quality Standards
ES	Ecosystem Services
EU	European Union
FCERM	Flood and Coastal Erosion Risk Management
FCS	Favourable Conservation Status
FMSY	Fisheries Maximum Sustainable Yield
G7	Group of Seven is an inter-governmental political forum consisting of Canada, France, Germany, Italy, Japan, the United Kingdom and the United States.
GB	Great Britain
GCS	Good Chemical Status
GEP	Good Ecological Potential
GES	Good Ecological Status
HLS	Higher-Level Stewardship
HM	Her Majesty's
HMWB	Heavily Modified Water Bodies
HPMA	Highly Protected Marine Areas
HTL	Hold the Line
IA	Immediate Assessment
IAS	Invasive Alien Species
ICES	International Council for the Exploration of the Sea
IFCA	Inshore Fisheries and Conservation Authorities
IMO	International Maritime Organization
INNS	Invasive Non-Native Species
IPENS	Improvement programme for England's Natura 2000
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
LCPA	List of Chemicals or Priority Action
MCAA	Marine and Coastal Access Act
MCCIP	Marine Climate Change Impacts Partnership
MCZ	Marine Conservation Zone

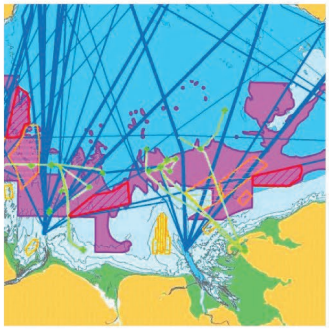
MMO	Marine Management Organisation
MPA	Marine Protected Area
MR	Managed Realignment
MSFD	Marine Strategy Framework Directive
MSY	Maximum Sustainable Yield
NAI	No Active Intervention
NASCO	North Atlantic Salmon Conservation Organization
NCA	National Character Area
NE	North East
NERC	Natural Environment Research Council
NGOs	Nongovernmental Organisations
NHCP	National Habitat Creation Programme
NIS	Non-Native, Invasive Species
NOx	Nitrogen Oxide
NRW	Natural Resources Wales
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic
PAH	Polycyclic Aromatic Hydrocarbons
PBDE	Polybrominated diphenyl ethers
PCB	Polychlorinated biphenyl
RBDs	River Basin Districts
RBMP	River Basin Management Plan
REACH	Restoring Estuarine and Coastal Habitats
ReMeMaRe	REstore MEadows, MArshes and REefs
RHCP	Regional Habitat Compensation Programme
RSPB	Royal Society for the Protection of Birds
RTE	Regulated Tidal Exchange
SAC	Special Area of Conservation
SAP	Species Action Plan
SCOPAC	Standing Conference on Problems Associated with the Coastline
SDG	Sustainable Development Goal
SE	South East
SMART	Specific, Measurable, Achievable, Realistic, Time-bound
SMP	Shoreline Management Plans
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TBT	Tributyltin
UK	United Kingdom
UKMMAS	UK Marine Monitoring and Assessment Strategy
UKTAG	UK Technical Advisory Group
UN	United Nations
WCL	Wildlife & Countryside Link
WFD	Water Framework Directive
YEP	(25) Year Environment Plan

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

Appendices




Innovative Thinking - Sustainable Solutions

ABP mer

A Review of Existing Objectives and Targets

Table A1. Habitats Directive

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
Site conservation objectives have been developed for each site and the individual species and/or assemblage of species for which the site has been classified (the "Qualifying features"). The objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring: • The extent and distribution of qualifying natural habitats and habitats of the qualifying species • The structure and function (including typical species) of qualifying natural habitats • The structure and function of the habitats of the qualifying species • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely • The populations of each of the qualifying species • The distribution of qualifying species within the site	The EU Biodiversity Strategy 2020 included a target that by 2020, 34% of the habitats and 26% of the species should either have reached a favourable conservation status or shown a significant improvement in their status.	The objectives/targets are not binding, but non-achievement of objectives/targets should prompt further action.	The UK Government submitted Article 17 Progress Reports for SAC habitats and species to the European Commission in 2019[24]. Of the 14 habitats with a marine connection, 7 of these showed a declining short-term trend (estuaries, mudflats, lagoons, inlets and bays, vegetated sea cliffs, *Spartina* and Atlantic salt meadows). Of the 11 migratory fish and key marine mammal species, only one - Atlantic salmon - was identified as having a clear declining trend. Natural England's IPENS project[25] identified a wide range of pressures and impacts on marine SACs or SACs with a marine component and identified specific actions to address these pressures and impacts.	Various measures have been and continue to be implemented to protect key habitats including management of commercial fishing pressure, and habitat creation and enhancement. Climate change at the coast, particularly sea level rise, may lead to long-term reductions in intertidal habitats. A range of actions are in progress to support migratory fish populations including catch restrictions, removal of migratory barriers, improvements to spawning habitat and improvements to water quality. In the longer-term climate change is likely to pose significant risks to migratory fish such as Atlantic Salmon. Various actions have been and will be implemented to support populations of marine mammals, including measures to reduce disturbance, reduce by-catch within fisheries and to protect and enhance prey species.

Table A2. Birds Directive

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
Site conservation objectives have been developed for each site and the individual species and/or assemblage of species for which the site has been classified (the "Qualifying features"). The objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring: • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The populations of each of the qualifying features • The distribution of qualifying features within the site	The EU Biodiversity Strategy 2020 set a target that 80 % of species assessments under the Birds Directive show a secure or improved status by 2020.	The objectives/ targets are not binding, but non-achievement of objectives/targets should prompt further action.	The UK Government submitted its Article 12 report to the European Commission in 2019[26]. The report indicated that of the 140 seabirds/wader's waterfowl (including breeding and non-breeding populations) around 39 were showing long-term decline and 62 were showing short-term decline. Features such as fulmar, lapwing and black-legged kittiwake were showing both short- and long-term decline.	Coastal change, climate change, sea level rise and future fishing practices will all influence future water bird populations. A range of measures are being taken to support SPA water birds including better management of habitats and food resources within SPAs, control of disturbance, predator control creation of artificial nesting sites etc. Mitchel *et al* (2020) indicates that some further declines in seabird populations are anticipated as a result of climate change and that anticipated sea-level rise may reduce available breeding habitat for shoreline-nesting species (e.g. terns). Coastal squeeze may also affect the extent of foraging habitat for waders.

[24] Species: https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-species/; Habitats: https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-habitats/

[25] I PENS: http://publications.naturalengland.org.uk/publication/5682306693988352

[26] https://hub.jncc.gov.uk/assets/2d17c45b-a004-4ed1-9d73-06bd9a2eabe4

Table A3. Marine & Coastal Access Act: marine nature conservation

Objectives and Targets	Deadline(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
Site conservation objectives apply to the Marine Conservation Zone and the individual species and/or habitat for which the site has been designated (the "Designated features"). The conservation objective of the zone is that the protected habitats and/or species: 1. Are maintained in favourable condition if they are already in favourable condition 2. Be brought into favourable condition if they are not already in favourable condition For each protected feature, favourable condition means that, within a zone: 1. Extent is stable increasing 2. Its structures and functions, its quality, and the composition of its characteristic biological communities (including the diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that it remains healthy and does not deteriorate	No deadlines established for achieving conservation objectives	The objectives are not binding, but non-achievement of objectives should prompt further action.	Some management measures have been implemented, for example measures to manage certain types of commercial fishing activity. JNCC has prepared a number of 'Statements on conservation benefits, condition and conservation measures'[27] for offshore MCZ which provide their views on the condition of designated features. Where features are identified as not being in favourable condition, the reasons for this are identified, including mobile demersal fishing, static fishing, oil and gas infrastructure, telecommunications infrastructure. There is currently limited information available on the condition of inshore MCZ. However, where conservation objectives have been established to 'recover' features, it is clear that they are not currently in favourable condition.	The process of identifying and implementing management measures for MCZ is continuing. The UK's exit from the EU may facilitate implementation of fisheries measures in offshore MCZs. There is no clear timescale for implementing management measures or achieving favourable condition. Climate change is likely to have long-term impacts on the condition of some protected habitats and species.

[27] https://hub.jncc.gov.uk/search?q=MCZ%20Conservation%20Advice&p=1

Table A4. Wildlife & Countryside Act

Objectives and Targets	Deadlines(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
Sites of Special Scientific Interest (SSSIs): Natural England's objective is to achieve 'favourable condition' status for all SSSIs. Favourable condition means that the SSSI's habitats and features are in a healthy state and are being conserved by appropriate management. Biodiversity 2020: A strategy for England's wildlife and ecosystem services (Defra, 2011) has a higher-level outcome to achieve "… at least 50% of SSSIs in favourable condition, while maintaining at least 95% in favourable or recovering condition".	By 2020	The objectives/ targets are not binding, but non-achievement of objectives/targets should prompt further action.	Within the marine environment, SSSIs are typically designated to underpin SPA/Ramsar and coastal SACs. Necessary management measures are normally identified in the context of achieving conservation objectives for European or internationally designated sites. For SSSIs as a whole (including terrestrial and freshwater sites) there has been a net decrease in the area of SSSIs in favourable condition; down from 44.0% in 2003 to 38.9% in March 2020. The sudden drop in the SSSI area in favourable condition from 43.2% in 2010 to 36.6% in 2011 was largely due to a more rigorous application of the 'Common Standard for Monitoring' protocols in assessing feature condition. However, over the past 5 years, there has been a small increase in the area of SSSIs in favourable condition, from 37.5% in 2015 to 38.9% in 2020. The area in unfavourable recovering condition has increased substantially from 13.0% in 2003 to 54.2% in 2020. The overall proportion of SSSIs in favourable or unfavourable recovering condition remained above the 95% target from 2011 to 2016 but has since fallen slightly year-on-year to 93.1% in 2020[28].	Improvement in the condition of coastal/marine SSSI will depend on management measures being implemented primarily in relation to European and internationally designated sites. A large number of actions to maintain and improve European sites are documented in the IPENS reports. These include measures to support adaptation to a changing climate, tackling diffuse pollution and managing grazing, habitat fragmentation, inappropriate coastal management, invasive species and public access and disturbance.
Schedule 5 species: Schedule 5 lists Animals Species that are protected under Section 9. Section 9 prohibits the intentional killing, injuring or taking of the species listed in Schedule 5 and also prohibits their possession and the trade in the wild animals listed. The species listed are also further protected from disturbance by prohibiting actions that affect places they use for shelter.	No deadlines established, Reviewed every 5 years (2021)	The objectives/ targets are not binding	The fifth review was published in December 2008. The following marine species were recommendations for addition to Schedule 5 (protected animals other than birds): Common skate, Porbeagle shark, Spiny lobster: England and Wales, Undulate ray, White skate, Spiny dogfish. Increased protection was proposed for allis shad, twaite shad, spiny seahorse (Scotland only), short nosed seahorse (Scotland only) and angel shark, while reduced protection was proposed for the tentacled lagoon worm and the lagoon sand shrimp. In August 2011, the Governments for England and Wales published their response, of those species suggested all except the spiny lobster, porbeagle shark, common skate, undulate ray, and spiny dogfish, received the protection recommended,	The government response for the sixth review has not yet been published but a number of additional species were suggested for protection due to increasing pressure on populations. Improvement in the condition of species populations will depend on management measures being implemented to prevent species decline and reduce pressures e.g. fishing. The seventh review process started on 8 April 2021.

[28] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/925414/1_Extent__and_condition_of_protected_areas_2020_accessible.pdf

Objectives and Targets	Deadlines(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
			The sixth review was submitted to Defra, the Welsh Government and the Scottish Government in April 2014. *Osmerus eperlanus* European Smelt was recommended for addition as a commercially valuable and threatened by illegal overexploitation and as populations are in rapid decline (80% in Scotland; 33% in England & Wales). *Palinurus elephas* Spiny lobster was also re-recommended following rejection in the firth review. New research shows an 87% decrease between 1963 and 2008 providing evidence of very low population sizes. Fishing threats continue and recovery rates remain slow as a result of the species late maturity. The government response has not been published.	

Table A5. UK Marine Strategy

Objectives and Targets	Target date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
There are 11 descriptors (D1 to D11, see below) and associated high level objectives for good environmental status (GES).	The UK Marine Strategy includes a target to achieve GES by 31 December 2020. The extent that GES has been achieved in 2018 and progress made since 2012 has been reported in the updated UK Marine Strategy Part 1 (Defra, 2019). The next reporting cycle is 2018 to 2024.	Article 1 of the Marine Strategy Regulations (2010) states that there is a requirement "*to take the necessary measures to achieve or maintain GES*". Article 15 identifies a number of exceptions where the environmental targets or GES cannot be achieved and, therefore, the duty under these Regulations to take necessary measures to achieve GES does not apply. The objectives and targets for GES are, therefore, not binding, but non-achievement of objectives or targets should prompt further action.	GES has been achieved in 2018 for D5, D7, D8 and D9. GES has been partially achieved for D1 and D4 (cetaceans, seals, pelagic habitats), D4 (food webs) and D11 (Defra, 2019). GES has not been achieved for D1 and D4 (birds, fish), D1 and D6 (benthic habitats), D2, D3 and D10.	The main predominant pressures and activities which are preventing or likely to delay the achievement of GES are commercial and recreational fishing (for D1, D3, D4 and D6) and input or spread of NIS as a result of shipping and climate change (for D2). There are also some pressures where the impacts are uncertain, so it is not clear whether GES will be compromised or not. For example, it is not yet clear whether continuous noise from shipping affects various marine species at a population level. Natural ecosystem interactions, such as competition and predation are probably affecting species such as marine mammals and birds, and changing temperatures are affecting pelagic and benthic habitats that are leading to changes in the distribution, growth and reproduction of some populations of fish, marine mammals, birds and NIS. The objectives, targets and indicators that will be used for the next reporting cycle (2018 to 2024) are set out in the updated UK Marine Strategy Part 1 (Defra, 2019).
D1. Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions. *Indicators:* • *Cetaceans - the abundance and distribution of coastal bottlenose dolphins; the abundance and distribution of other cetaceans; and harbour porpoise bycatch* • *Seals – population size and condition of grey and harbour seals* • *Birds - population size and population condition* • *Fish - aspects of population abundance; size-structure; and species composition against targets based on population size and ecosystem structure* • *Pelagic habitats - changes in plankton communities and changes in plankton biomass against targets covering habitat condition and habitat distribution* • *Benthic habitats – rock and biogenic habitats, predominant sediment habitats and intertidal habitats against targets covering habitat extent, habitat and community condition and physical damage.*			GES has been partially achieved for D1 (cetaceans, seals, pelagic habitats). GES has not been achieved for D1 (birds, fish, benthic habitats). The extent to which GES has been achieved remains variable or uncertain across species/habitat groups (cetaceans, seals, birds, fish, pelagic food webs) and marine regions. The achievement of GES is uncertain for intertidal and soft sediment habitats. The levels of physical damage to soft sediment habitats are considered to be consistent with the achievement of GES in UK waters to the west of the Celtic Seas, but not in the Celtic Seas or in the Greater North Sea. For sublittoral rock and biogenic habitats, GES has not yet been achieved.	D1 (Birds). Reduced availability of small fish, on which the seabirds feed, has been largely responsible for declines in seabird breeding abundance and the frequent, widespread breeding failures in some species. There is a lack of understanding of how climate change is driving shifts in the food web that have led to these reductions in food availability. The decline in wintering waterbird abundance in the Celtic Seas is thought to be part of a north-east shift in their distribution in response to milder winters. Climate change is thought to be driving these shifts, but the role of additional human impact is unclear. D1 (Fish). Interpretation of trends in the indicators of pelagic fish communities was problematic because the underlying relationships between pressure, environment, and state are not clear. Most indicators used in this assessment are new, and it is currently unclear how to integrate results across indicators to quantitatively assess targets. Assessments were limited to the scale of the entire Marine Strategy Framework Directive Sub-Regions, or to the survey area. Assessments at a finer scale would help to underpin the best management advice.

Objectives and Targets	Target date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
D2. Non-indigenous species (NIS) introduced by human activities are at levels that do not adversely alter the ecosystems. *Indicators:* • *Community structure of NIS* • *Trends in newly recorded NIS introduced by human activities*			GES has not been achieved for D2. The ability to detect new NIS has improved but there has been no significant change in the number of new records of NIS made between 2003 and 2014.	D2. Detection of new introductions of non-indigenous species is limited by the number of locations currently monitored and the frequency at which they are monitored. The effectiveness of current biosecurity at reducing rates of the introduction and spread of non-indigenous species also needs to be better understood.
D3. Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock. *Indicators:* • *Commercial fishing pressure for stocks of UK interest* • *Reproductive capacity of commercially exploited stocks of UK interest*			GES has not been achieved for D3. The UK has achieved its aim of GES for some commercially exploited fish. In 2015, 53% of marine fish (quota) stocks were fished below maximum sustainable yield (MSY). However, most national shellfish stocks have either not yet achieved GES or their status is uncertain.	D3. Stock assessments are limited by current data collection. Without expanding the monitoring of some stocks, particularly shellfish, their assessment status may remain "unknown".
D4. All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity. *Indicators:* • *The breeding success, species and size composition, abundance and population condition for the ecosystem components included under D1 (see above)*			GES has been partially achieved for D4 (cetaceans, seals, pelagic habitats, food webs). GES has not been achieved for D4 (birds, fish) The extent to which GES has been achieved remains variable or uncertain across species/habitat groups (cetaceans, seals, birds, fish, pelagic food webs) and marine regions. Plankton communities are changing; some fish communities are recovering, but others are not; breeding seabird populations are in decline; grey seal numbers are increasing and trends in cetacean populations are unclear. It is known that components of the marine food web are changing, but it is not clear how they are affecting each other.	D4. It is likely that changes in the biomass and/or spatial distribution of fish populations, has contributed to the change in prey availability for seabirds and grey seals. However, the full extent of changes in the predator-prey interactions and the importance of climatically driven changes impacting the plankton requires further investigation.
D5. Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters. *Indicators:* • *The inputs of nutrients to UK regional seas* • *Trends in nutrient concentrations in the water column* • *Chlorophyll concentrations in the water column* • *Concentrations of dissolved oxygen near the seafloor*			GES has been achieved for D5. The UK has largely achieved its aim of GES for eutrophication. A small number of eutrophication problems remain in coastal and estuarine waters, representing 0.03% of the total UK Exclusive Economic Zone, and 0.41% of estuarine and coastal waters.	
D6. Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected. *Indicators:* • *Benthic habitats – rock and biogenic habitats, predominant sediment habitats and intertidal habitats against targets covering habitat extent, habitat and community condition and physical damage*			GES has not been achieved for D6. The achievement of GES is uncertain for intertidal and soft sediment habitats. The levels of physical damage to soft sediment habitats are considered to be consistent with the achievement of GES in UK waters to the west of the Celtic Seas, but not in the Celtic Seas or in the Greater North Sea. For sublittoral rock and biogenic habitats GES has not yet been achieved.	D6. Soft Sediments habitats - The wide-ranging and enduring impacts on soft sediments make it difficult to establish reference conditions against which habitats can be assessed. Data on invertebrate communities were collected mostly in inshore areas and were very sparse in offshore habitats. In contrast, data on pressure from fishing was mainly from offshore areas. Data from other activities were included at only a few sites.

Objectives and Targets	Target date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
				Rocky and biogenic habitats - There is limited data from surveys of biogenic and rocky habitats, so much of their extent and distribution had to be predicted from environmental modelling based on known locations of existing habitats. The mapping of pressures was incomplete because of the lack of data on inshore fisheries. Data on pressure from other activities were only included for the assessment of biogenic habitats. Intertidal habitats - Assessments represent a small proportion of the overall UK coastline. Integration across indicators has not been possible at this stage due to the limited development of approaches to combine individual indicator results.
D7. Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems. *Indicators:* • *A number of indicators, such as sea surface temperature, salinity, turbidity, species and habitat condition indicators, are available to assess the likely impacts of infrastructure developments*			GES has been achieved for D7. The UK continues to achieve its aim of GES for hydrographical conditions.	
D8. Concentrations of contaminants are at levels not giving rise to pollution effects. *Indicators:* • *Concentrations of priority chemicals in sediments and biota* • *The biological effects of contaminants* • *The number of oil spills against agreed thresholds where available*			GES has been achieved for D8. The UK has largely achieved its aim of GES for contaminants. Concentration of hazardous substances and their biological effects are generally meeting agreed target thresholds. Highly persistent legacy chemicals are the cause of the few failures, mainly in coastal waters close to polluted sources.	
D9. Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards. *Indicators:* • *Concentrations of contaminants in fish and seafood.*			GES has been achieved for D9. The UK has achieved its aim of GES for contaminants in seafood. There is a high level of compliance with agreed safety levels.	
D10. Properties and quantities of marine litter do not cause harm to the coastal and marine environment. *Indicators:* • *Beach litter – trends in UK beach litter* • *Floating litter – plastic particles in fulmar stomachs* • *Seafloor litter – trends and status in UK seafloor litter*			GES has not been achieved for D10. The UK has not yet achieved its aim of GES for litter. Beach litter levels in the Celtic Seas have remained largely stable since the assessment in 2012, whilst beach litter levels in the Greater North Sea have slightly increased.	D10. Marine litter may require a Marine Strategy Framework Directive Article 14 exception due to historical litter. Litter travels across oceans. It can be highly persistent and requires coordinated local, regional, and global action on land and at sea. Confidence in litter monitoring methods needs to be improved.
D11. Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment. *Indicators:* • *Distribution of loud, low and mid frequency impulsive sounds* • *Continuous low frequency sound (ambient noise)*			GES has been partially achieved for D11. The achievement of GES for underwater noise in the UK is uncertain. Research and monitoring programmes established since 2012 have provided an improved understanding of the impacts of sound on marine ecosystems.	

Table A6. Water Framework Directive

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
The environmental objectives of the WFD are to: • Prevent deterioration in status of all surface water bodies (Article 4.1 (a)(i)); • Protect, enhance and restore all surface water bodies with the aim of achieving good surface water status by 2015 (now working towards 2021) or later assuming grounds for time limited derogation (Article 4.1 (a)(ii)); • Protect and enhance all HMWBs/AWBs, with the aim of achieving GEP and GCS by 2015 (now working towards 2021) or later assuming grounds for time limited derogation (Article 4.1 (a)(iii)); • Reduce pollution from priority substances and cease or phase out emissions, discharges and losses of priority hazardous substances (Article 4.1 (a)(iv)); • Prevent or limit the input of pollutants into groundwater and prevent deterioration of the status of all groundwater water bodies (Article 4.1 (b)(i)); • Protect, enhance and restore all groundwater water bodies and ensure a balance between abstraction and recharge of groundwater (Article 4.1 (b)(ii)); • Ensure achievement of objectives in other water bodies is not compromised (Article 4.8); and • Ensure compliance with other community environmental legislation (Article 4.9).	The target is to meet environmental objectives by the end of relevant management cycle: • WFD RBMP Cycle 1: 2009 to 2015 • WFD RBMP Cycle 2: 2015 to 2021 • WFD RBMP Cycle 3: 2021 to 2027	Regulation 3 of the Water Environment (WFD) (England and Wales) Regulations 2017 states that there is a requirement "*to support the achievement of the environmental objectives set for a body of water*". The environmental objectives are, therefore, not binding, but non-achievement of objectives should prompt further action.	Of the 96 transitional water bodies in England, 1 is classified (2015) as high, 11 as good, 77 as moderate, 5 as poor and 2 as bad. Of the 60 coastal water bodies in England, 1 is classified (2015) as high, 24 as good and 35 as moderate (Environment Agency, 2020a). Priority areas for action across all waterbodies are (Environment Agency, undated): • Habitat restoration, improvement and creation; • Diffuse agricultural and rural pollution; • Diffuse urban pollution; • Managing pollution from metal mines; • Managing the problem of invasive non-native species; • Managing flood risk by measures at a landscape scale; and • In-river habitat improvements.	Of the 96 transitional water bodies in England, 1 is predicted to be high (by 2021), 15 good, 74 moderate, 4 poor and 2 bad (Environment Agency, 2020a). Of the 60 coastal water bodies in England, 1 is predicted to be high by 2021, 27 good and 32 moderate. The waterbodies that deteriorated in status in the first management cycle (2009 to 2015) was due to two classification items, mercury and its compounds and tributyl tin (TBT) compounds, from diffuse sources. The reasons for not achieving good status in transitional waters (2015) was identified to be due to a number of classification items, namely angiosperms (11), Polybrominated diphenyl ethers (PBDE) (1), dissolved inorganic nitrogen (49), dissolved oxygen (1), fish (3), hydrological regime (7), invertebrates (20), macroalgae (12), mercury and its compounds (2), mitigation measures assessment (54), phytoplankton blooms (8), TBT compounds (5) and zinc (5). The reasons for not achieving good status in coastal waters (2015) was identified to be due to a number of classification items, namely angiosperms (2), dissolved inorganic nitrogen (17), hexachlorocyclohexane (1), invertebrates (5), mercury and its compounds (1), mitigation measures assessment (15), phytoplankton blooms (3) and TBT compounds (1). It is anticipated that failures in achieving GES due to PBDE and TBT and its compounds are anticipated to decline over time given that these are related to a legacy of historic contamination.

Table A7. Fisheries Conservation

Objectives and Targets	Deadline(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
Fisheries Act 2020 Objectives: 1 Sustainability. Fisheries are environmentally, socially and economically sustainable 2 Precautionary. Stocks are harvested in a way that restores and maintains populations and maintained above biomass levels capable of producing Maximum Sustainable Yield 3 Ecosystem. An ecosystem-based approach to management is used and bycatch of sensitive species is minimised and where possible eliminated 4 Scientific Evidence. Data is collected and shared between authorities and the best scientific advice is used to develop management measures 5 By catch. Bycatch of undersized fish is minimised and avoided, catches are recorded and accounted for, and by catch of commercial species is still landed but disincentivized. 6 Equal Access. British fishing boats have access to fish in all UK waters 7 National Benefit. The fishing activities of UK boats bring economic and social benefits to UK communities 8 Climate change. The impacts of fisheries on climate change (e.g. through emissions) is reduced and fisheries are able to adapt to the effects of climate change (e.g. shifting stocks).	No deadlines	Objectives are not binding	Progress towards the environmental objectives is reported in relation to the Marine Strategy. Legally binding targets may be established for some aspects of the environmental objectives in accordance with the requirements of the impending Environment Act.	
NASCO Salmon Implementation Plan Management Guidelines (NASCO, 2009) recommend setting Conservation Limits (CLs) and Management Targets (above CLs) to provide confidence that CLs are being achieved.	No deadlines	Objectives are not binding but non-achievement of objectives should prompt further action.	The majority of river stocks in E&W, however, remain in a depleted state when assessed against Conservation Limits (CLs). 94% of principal salmon rivers in England and Wales are predicted to be At Risk or Probably At Risk in 5 years' time (NASCO, 2020).	Risks to salmon stocks are acknowledged to be exacerbated as a result of climate change
Environment Agency Salmon Strategy 2008 -21 (Environment Agency, 2008) - Environmental targets: • 70% of rivers outside the 'at risk' category in 2011 • To exceed previous 6 year mean for condition of juvenile fish production • Increase accessible habitat by 200 hectares • 76% of rivers outside the 'at risk' category in 2013 based on condition of stocks subject to conservation designation • To exceed previous 5-year mean for stock diversity of salmon • No outbreaks of disease or parasites • To exceed previous 5-year for number of rivers sustaining fisheries	See previous column – all by 2021	Targets are not binding but non-achievement of objectives should prompt further action.	No specific report on progress available. 94% of principal salmon rivers in England and Wales are predicted to be At Risk or Probably At Risk in 5 years' time (NASCO, 2020).	Risks to salmon stocks are acknowledged to be exacerbated as a result of climate change

Objectives and Targets	Deadline(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
Eel Regulation - The Eel Regulation has a fairly limited number of targets agreed to aid the recovery of the Critically Endangered European eel (*Anguilla anguilla*), all of which are to be implemented through national Eel Management Plans (EMPs): • To reduce anthropogenic mortality enough to allow at least 40 % of "natural levels" of silver eel to escape – swim into the sea to reproduce • The use of at least 60 % of the EU glass eel catch for restocking in natural eel habitats in the EU • In the absence of an EMP, ensure at least a 50 % reduction of fishing effort or catches of eel. • Member States operating an eel fishery in Community waters also have to ensure at least a 50 % reduction of fishing effort or catches of eel. As a part of their EMPs, Member States must include: • In the absence of an EMP, ensure at least a 50 % reduction of fishing effort or catches of eel • Measures to attain, monitor and verify the objective of reducing eel deaths caused by humans (40 % silver eel escapement) • A timetable for reaching the 40 % escapement target • Control and enforcement measures in their own waters (not Community waters), including a catch monitoring system • Countries with glass eel fisheries also have to include provisions for transfer of eels for restocking and an appropriate reporting system.	No set date for achieving 40% escapement target	Targets are not binding but non-achievement of targets should prompt further action.	2015 EMP report (Defra, 2015) indicated that 'Three of the 14 RBDs are presently assessed as meeting or exceeding their eel management targets'. It further notes 'It is not yet possible to predict whether and when measures will achieve the required additional silver eel production across the UK. Therefore, it is not yet possible to predict when the UK will meet its targets across all RBDs'.	

Table A8. OSPAR Convention

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
The OSPAR NE Atlantic Strategy (OSPAR, 2010) contains a range of objectives including: • To halt and prevent by 2020 further loss of biodiversity in the OSPAR maritime area, to protect and conserve ecosystems, and to restore, where practicable, marine areas which have been adversely affected; • To combat eutrophication in the OSPAR maritime area, with the ultimate aim to achieve and maintain a healthy marine environment where anthropogenic eutrophication does not occur; • To prevent pollution of the OSPAR maritime area by continuously reducing discharges, emissions and losses of hazardous substances, with the ultimate aim to achieve concentrations in the marine environment near background values for naturally occurring substances and close to zero for man-made synthetic substances; • To prevent and eliminate pollution and take the necessary measures to protect the OSPAR maritime area against the adverse effects of offshore oil and gas activities by setting environmental goals and improving management mechanisms, so as to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected; • To prevent pollution of the OSPAR maritime area from ionising radiation through progressive and substantial reductions of discharges, emissions and losses of radioactive substances, with the ultimate aim of concentrations in the environment near background values for naturally occurring radioactive substances and close to zero for artificial radioactive substances; • To ensure integrated management of human activities in order to reduce impacts on the marine environment, taking into account the impacts of, and responses to, climate change and ocean acidification; to facilitate and coordinate the work of relevant Contracting Parties in achieving good environmental status under the EU Marine Strategy Framework Directive by 2020.	The Strategy set objectives to 2020	The objectives are not binding but non-achievement of objectives should prompt further action. A new OSPAR Strategy is being developed covering the period 2021 to 2030.	The OSPAR 2017 Intermediate Assessment[29] documents progress at the OSPAR regional level against a wide range of indicators. Many of these indicators are aligned with the requirements of the Marine Strategy Framework Directive, reported in relation to the Marine Strategy in the UK. Appendix B summarises trends against these indicators at the level of the OSPAR region.	A new strategy covering the period 2021 to 2030 is being prepared. Implementation of measures under the Marine Strategy, WFD and in relation to MPAs will support improvement against the indicators for UK waters. Climate change is likely to continue to affect marine habitats and species as a result of range shifts, ocean acidification and extreme events.

[29] https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
The OSPAR Measures and Actions Programme[30] includes recommendations on managing human activity pressures and protecting a wide range of habitats and species. This includes, for example, *Zostera* beds, native oyster, ocean quahog, carbonate mounds, coral gardens, deep sea sponges, littoral chalk, mudflats, lesser black backed gull, blacklegged kittiwake, roseate tern, Allis shad, eel, Atlantic salmon, common skate, angel shark, basking shark, short and long-snouted seahorse etc. The recommendations include consideration of the desirability of active conservation or restoration measures for the following habitats and species: intertidal mudflat, native oyster, blue mussel, Lesser black-backed gull, Black-legged kittiwake, Roseate tern, European sturgeon, Allis shad, European eel, Common skate, Angel shark, Basking shark, Long-snouted seahorse, sea lamprey, Atlantic salmon, harbour porpoise,	No dates for implementing recommendations	The recommendations are not binding	The recommendations are not binding but do provide information on where action can be taken to restore and enhance marine habitats and species.	Progress in implementing recommendations for particular habitats and species will depend on political will and availability of funding. Climate change is likely to continue to affect marine habitats and species as a result of range shifts, ocean acidification and extreme events.

30 https://www.ospar.org/matrix

Table A9. Biodiversity Convention

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
The Biodiversity Convention has three main goals: the conservation of biodiversity; the sustainable use of its components; and the fair and equitable sharing of benefits arising from genetic resources. Its objective is to develop national strategies for the conservation and sustainable use of biological diversity. In 2010 the Convention established a number of specific biodiversity targets (the Aichi Targets). Targets particularly relevant to the marine environment include: • Target 5: By 2020, the rate of loss of all-natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced. • Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits. • Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity. • Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment. • Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning. • Target 11: By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes. • Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	By 2020	The targets are not binding. Many of the targets lack specificity and are thus not directly measurable	The UK reported progress against the Aichi targets in 2019 (JNCC, 2019) Target 5: This target requires two outcomes: a reduction in the rate of loss and an improvement in condition and connectivity of natural habitats. In relation to disturbance of marine habitats the report referenced findings from the OSPAR 2017 Intermediate Assessment (see Appendix C). The assessment concludes that progress against the target has been **insufficient** due to the need to maintain action to further reduce past degradation and fragmentation. Target 6: This target requires action to ensure that fish stocks are harvested sustainably and threats to those stocks are addressed. The report states that the UK has made '*significant progress in introducing sustainable fisheries measures, including landing obligations, gear subsidies and incentives, accreditation schemes, and area-based management measures. UK fish stocks are now showing signs of recovery following their historic over-exploitation as the proportion of stocks fished at or below the level capable of producing MSY, and the proportion of stocks with biomass above the level capable of producing MSY, have increased significantly since 1990; both to around 50%. In addition, increases in the proportion of large fish in demersal fish populations have been recorded in UK regional seas*'. However, progress against the target was assessed as **insufficient** because recovery of fish populations has not been consistent across all UK regional seas and ongoing action is required to ensure all stocks are fished at sustainable levels. Target 8: The target requires action to reduce pollution from all sources, with a particular focus on nutrient run-off and deposition from the atmosphere. The assessment considers both the trajectory of pollution levels and the distance from levels where they are considered not detrimental using standards applied in the UK. The assessment states that progress has been made '*in reducing levels of air, water and marine pollution, these include long-term reductions in air pollutants that, in turn, have led to a decline in the area of sensitive habitats being harmed by acidification, and long-term reductions in hazardous materials in the marine environment, supported by recent initiatives to tackle plastic waste*'.	Future progress towards the targets relevant to the marine environment will depend on further management action to limit damaging human activity pressures, including implementation of management measures within MPAs. It will also require investment in marine restoration and enhancement initiatives. Climate change is likely to continue to affect marine habitats and species as a result of range shifts, ocean acidification and extreme events. It is anticipated that a new set of targets will be established in 2021 covering the period to 2030.

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
• Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable. • Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.			However, progress against the target was assessed as **insufficient** because specific some sources of pollution remain above target levels. In particular, 65 % of inland and coastal surface waters remained below target levels for ecological status under the Water Framework Directive. Although countries across the UK have recently introduced a range of measures to tackle marine litter, since 2010, levels of marine litter, especially marine plastics, has continued to rise, on beaches, in the water column, on the seafloor and in seabird stomachs. Target 9: This target requires action to be in place to stop the establishment and spread of invasive non-native species. The assessment notes that the number of INNS established in Britain has increased in the marine environment. Progress has been assessed as **insufficient**. Target 10: This target requires action to be in place to minimise impacts on vulnerable ecosystems. The assessment states that '*coastal ecosystems such as saltmarsh, sand dunes and machair are vulnerable to sea-level rise and increased air and water temperature. Marine ecosystems, such as corals and other biogenic reefs, are also vulnerable to increased water temperature and ocean acidification'*. Progress in relation to managing human pressures in the marine environment is documented against Targets 5 to 9 above. Progress was assessed as **insufficient** as some vulnerable ecosystems (including marine) remain degraded. Target 11: This target sets a quantitative outcome (extent of protected areas). The assessment notes that as of March 2018, marine protected areas covered 24% of UK sea area. It was noted that '*work to fully implement marine protected area management measures and monitor their effectiveness is ongoing*'. Target 12: This target relates to known threatened species and has two components: prevention of extinction and improvement in conservation status. No specific assessments were provided in relation to marine habitats and species, other than for seabirds (based on OSPAR 2017 Intermediate Assessment) which noted declines in breeding seabirds across the OSPAR area. Progress was assessed as **insufficient** because evidence suggests that there have been widespread and significant ongoing declines across many species (including some marine species).	

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
			Target 14: This target requires that the provision of essential ecosystems services, such as climate mitigation, flood protection, pollination and wildlife conservation should be maintained. The assessment notes some recovery of fish stocks but that a significant proportion of UK inland and coastal waters and the diverse ecosystem services they provide are in a degraded state. Progress was assessed as **insufficient**, with recognition that further work is required to restore habitats. Target 15: This target has two main components. It requires that the contribution from ecosystems to carbon stocks has been enhanced; and that 15% of degraded ecosystems have been restored. No specific assessment was made in relation to the state of blue carbon stocks. Progress was assessed as **insufficient** with further work required to understand the actual and potential contributions of wetland and marine ecosystems to climate mitigation.	

Table A10. ASCOBANS

Objectives and Targets	Deadline(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) - to cooperate closely in order to achieve and maintain a favourable conservation status for small cetaceans. Species actions plans have been prepared for Common Dolphin (in NE Atlantic (ASCOBANS, 2020a) and Harbour Porpoise in North Sea (ASCOBANS, 2009). These action plans identify the need for fisheries bycatch measures and research in relation prey resources and effects of underwater sound	No deadlines	Objectives are not binding but non-achievement of objectives should prompt further action.	ASCOBANS (2020b) notes the following progress in respect of GB: • UK has continued to enforce pinger use (as per Reg. 812/2004) • Level of pressure from by-catch staying the same • Several North Sea stocks analytically assessed by ICES have current fishing mortality rates above FMSY, including cod, whiting, haddock, mackerel, and blue whiting. The over-exploitation of such stocks may therefore be of concern to cetaceans that predate on these species. However, it should be noted that 24 of 32 North Sea stocks assessed by ICES are exploited at rates at or below FMSY, therefore any reduction in prey as a result of over-exploitation is likely to be localised. • Overall fishing pressure on the commercial fish and shellfish stocks in the Celtic Seas ecoregion has decreased since its peak in 1998. • Level of pressure from underwater noise increasing for all relevant species in the Southern/Central North Sea and Northern North Sea, development of offshore wind farms, combined with ongoing oil and gas surveys, other construction and shipping means underwater noise has increased between 2016-2019 and will continue to increase in the future as the UK looks to meet our green / net zero targets. • Level of pressure from underwater noise staying the same for all relevant species in the Irish and Scottish West Coast, development of offshore wind farms, and other construction remains limited. Shipping level are expected to remain the same. Therefore, underwater noise has not thought to have increased between 2016-2019. • Level of pressure from ocean energy increasing • Level of pressure from commercial small cetacean watching is increasing for Bottlenose dolphin, Common dolphin, Killer whale, Harbour porpoise and Risso's dolphin based on expert opinion, and surveys of commercial trip boat encounters. Staying the same for White-beaked dolphin based on expert opinion. • Change in pressure from marine debris is unknown. • Change in level of pressure from pollution and hazardous substances is unknown. • Potential issues associated with climate change: Potential issues: shift or contraction in range; changes to physical habitat; changes to food web, prey distribution and availability and predator-prey relationships; increased susceptibility to disease and contaminants; effects on reproductive success.	Further implementation of the Marine Strategy should lead to a reduction in pressure on prey species and from underwater noise. There may also be further measures to reduce by-catch. Climate change may cause a shift or contraction in range; changes to physical habitat; changes to food web, prey distribution and availability and predator-prey relationships; increased susceptibility to disease and contaminants; effects on reproductive success ASCOBANS 2020b).

Table A11. UN Sustainable Development Goal 14

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
SDG14 relates to the conservation and sustainable use the oceans, seas and marine resources for sustainable development. Various targets have been identified: Target 14.1. By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution; Target 14.2. By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans; Target 14.3. Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels; Target 14.4. By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics; Target 14.5. By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information; Target 14.6. By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation; Target 14.7. By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism; Target 14.A. Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries; Target 14.B. Provide access for small-scale artisanal fishers to marine resources and markets; Target 14.C. Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources.	See previous column	The targets are not binding. There is limited reporting of progress against the targets and few mechanisms for promoting further action.	The UN Statistical Commission has developed a global indicator framework comprising 230 indicators to monitor the SDGs' 169 targets but there is very limited reporting against these targets. No specific reporting has bene identified for the UK.	Progress towards these targets will be driven by actions taken in response to other initiatives, for example under the Marine Strategy.

Table A12. Marine & Coastal Access Act: marine planning

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
The UK Marine Policy Statement (HM Government, 2011) includes various high-level marine objectives. Key environmental objectives (Living within environmental limits) include: • Biodiversity is protected, conserved and where appropriate recovered and loss has been halted; • Healthy marine and coastal habitats occur across their natural range and are able to support strong, biodiverse biological communities and the functioning of healthy, resilient and adaptable marine ecosystems. • Our oceans support viable populations of representative, rare, vulnerable, and valued species.	No specific dates	The objectives are not binding.	Progress towards achieving the objectives is monitored through other initiatives, for example, The Marine Strategy	Future progress will depend on actions taken under other initiatives such as The Marine Strategy
Marine Plans for English waters incorporate the high-level marine objectives from the Marine Policy Statement. They do not include specific targets, but policies encourage proposals which contribute to environmental enhancement. For example, the draft SE Marine Plan[31] includes supportive policies in relation to the following: • Proposals enhancing essential fish habitat, including spawning, nursery and feeding grounds, and migratory routes; • Proposals which enhance habitats that provide flood defence or carbon sequestration; • Proposals that facilitate waste re-use or recycling to reduce or remove marine litter; • Proposals that enhance and restore water quality; • Proposals that support the objectives of marine protected areas and the ecological coherence of the marine protected area network; • Proposals that enhance a marine protected area's ability to adapt to climate change, enhancing the resilience of the marine protected area network; • Proposals that enhance the distribution of priority habitats and priority species; • Proposals that enhance or facilitate native species or habitat adaptation or connectivity, or native species migration; • Proposals that deliver environmental net gain for coastal habitats where important in their own right and/or for ecosystem functioning and provision of ecosystem services; • Proposals that reduce the risk of introduction and/or spread of invasive non-native species.	No specific dates	The objectives are not binding. While the policies encourage positive action, they do not drive investment decisions.	Progress towards achieving the objectives is monitored through other initiatives, for example, The Marine Strategy	Future progress will depend on actions taken under other initiatives such as The Marine Strategy

[31] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/857296/DRAFT_SE_Marine_Plan.pdf

Table A13. Environment Bill/ 25 Year Plan

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
Environment Bill - it is proposed that legally binding long-term targets will be established under the Act supported by Environmental Improvement Plans. Targets will be developed in consultation with experts. e.g. 'increasing the proportion of protected and well-managed seas by implementing effective management measures in our network of Marine Protected Areas – all by 2042'.	Not defined	The targets once set will become binding and will encourage a strong focus for action	Targets not yet established	Targets not yet established
The 25-year Environment Plan includes various objectives relevant to the marine environment: • Reaching or exceeding objectives for rivers, lakes, coastal and ground waters that are specially protected, whether for biodiversity or drinking water as per our River Basin Management Plans; • Reversing the loss of marine biodiversity and, where practicable, restoring it; • Increasing the proportion of protected and well-managed seas, and better managing existing protected sites; • Making sure populations of key species are sustainable with appropriate age structures; • Ensuring seafloor habitats are productive and sufficiently extensive to support healthy, sustainable ecosystems • Ensuring that all fish stocks are recovered to and maintained at levels that can produce their maximum sustainable yield; • Significantly reducing and where possible preventing all kinds of marine plastic pollution – in particular material that came originally from land. Progress against these objectives is to be monitored through a number of key outcome indicators (Defra, 2021) including: • C1 Clean seas: marine litter - changes in the amount of litter in the marine environment, including litter on beaches, on the seafloor and floating litter; • C2 Seabed subject to high pressure from human activity - changes in the distribution and intensity of potential physical disturbance caused by human activities on the seabed; • C3 Diverse seas: status of mammals, birds and fish - changes in status assessments of marine mammals and marine birds; • C4 Diverse seas: condition of seafloor habitats; • C5 Diverse seas: condition of pelagic habitats - changes in the Good Environmental Status (GES) of pelagic habitats; • C6 Diverse seas: status of threatened and declining features- changes in the status of vulnerable features flagged for protection; • C7 Healthy seas: fish and shellfish populations - health of our seas using assessments of fish populations;	No deadlines	The outcome indicators do not represent targets	Defra (2021) provides some baseline information in relation to the majority of indicators. Some indicators are still being developed.	The Environment Act is expected to provide for the setting of clear species targets and preparation of Environmental Improvement Plans.

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
• C8 Healthy seas: marine food webs functioning - health of our seas using metrics on the size, structure and function of different feeding (trophic) levels in marine food webs; • C9 Healthy seas: seafloor habitats functioning - changes in the natural functionality and extent of seafloor habitats able to support a healthy and productive ecosystem; • C10 Productive seas: fish and shellfish stocks safe and environmentally sustainable - changes in the proportion of commercial fish and shellfish stocks that are within safe biological limits and fished sustainably; • C11 Productive seas: status of sensitive fish and shellfish stocks - changes in the abundance, distribution and condition of fish and shellfish species at risk of depletion; • D1 Quantity, quality and connectivity of habitats - changes in extent, condition, connectivity and function of terrestrial and freshwater habitats in England; • D2 Extent and condition of protected sites – land, water and sea - a) extent (hectares) of protected sites on land, freshwater and at sea and (b) condition of protected sites on land, water and at sea; • D5 Conservation status of our native species - changes in the national (GB) extinction risk faced by terrestrial, freshwater and marine species using the International Union for Conservation of Nature's (IUCN) Red List categories and criteria; • D6 Abundance and distribution of priority species in England - (a) changes in the relative abundance of those priority species for which suitable abundance data are available; and, (b) changes in distribution (the number of 1 km grid squares in which species are recorded in any given year) of those priority species for which distribution data are available; • D7 Species supporting ecosystem functions – to be developed; • H1 Abatement of the number of invasive non-native species entering and establishing against a baseline - how the number of invasive non-native species entering Great Britain has been abated (reduced) by comparing a predicted trend for establishment of invasive non-native species against actual establishment.				

Table A14. Natural Environment and Rural Communities (NERC) Act 2006/Biodiversity 2020 Strategy

Objectives and Targets	Deadline(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
Section 41 NERC Act lists the living organisms and types of habitat which are considered of principal importance for the purpose of conserving biodiversity in England. Section 40 of the NERC Act places duty on public bodies to conserve biodiversity, namely the habitats and species which are set out in Section 41.	No deadlines	The targets are not binding. There is limited reporting of progress.	The UK Biodiversity Action Plan highlights report assessed over 40% of priority habitats and 30% of priority species to be declining in the most recent analysis[32]. Eight priority species were lost entirely from the UK between 2002 and 2008.	Actions have been identified specifically related to the recovery of each S41 species[33]. These actions have been categorised and prioritised to support the recovery of England's s41 species and the achievement of Outcome 3 of the Government's Biodiversity 2020 strategy. These include actions to support education and awareness, habitat and/ or species management, changes to policy or legislation and site protection or designation.
UK Post-2010 Biodiversity Framework identifies the activities required at a UK level to complement the biodiversity strategies of each of the four countries, aiming to achieve the 'Aichi Targets' and the aims of the EU Biodiversity Strategy. In total, 23 'activities' were originally identified, including various objectives relevant to the marine environment: • A1 - Integrate Biodiversity Values. Office for National Statistics to publish Accounting for the value of nature in the UK - A roadmap for the development of natural capital accounts within the UK including pilot wetland and marine accounts. • B1 – Fisheries. Represent UK biodiversity priorities in EU during reform of the Common Fisheries Policy. • B3 – EU policy and practice. Meet the UK's reporting obligations for EU directives including: Habitats Directive Article 17 (Dec 2013), Birds Directive Article 12 (Mar 2014), WFD, MSFD (2018) • B4 – Pollution. Continued development of Environmental Quality Standards for the Water Framework Directive via UK Technical Advice Group (UKTAG) and support implementation of the UK Marine Strategy • B5 – IAS. Review and refresh the GB Invasive Non-Native Species Strategy • B6 – Habitats and climate change. Research to determine species responses to climate change, to develop a biodiversity climate change indicator, and to assess potential impacts of low carbon energy technologies on habitats and species • C5 – MPAs. The UK to submit an initial Marine Strategy Framework Directive assessment of UK seas, and the determination of good environmental status (GES), • including targets and indicators, establish monitoring programmes, develop a programme of management measures and achieving GES by 2020.	2020	The targets are not binding and were revised in 2018 from the initial 2011 targets.	JNCC reported progress on the initial implementation plan in October 2015 (JNCC, 2015). A1: Published reports on UK natural capital accounts and scoping studies on marine ecosystem accounts. B1: The reformed CFP policy came into effect 1 January 2014 B3: Habitats Directive Article 17: Article 17 report submitted to European Commission and published on JNCC website Oct 2013: http://jncc.defra.gov.uk/page-6387 Birds Directive Article 12: 10th Article 12 reported submitted to European Commission and published on JNCC website: http://jncc.defra.gov.uk/default.aspx?page=6526. MSFD: Detailed information on the UK monitoring programmes for MSFD was submitted to the Commission on 15 October 2014. B4: Defra and the Welsh Government published a consultation document in May 2014 detailing the new and updated standards on which the updated River Basin Management Plans (RBMPs) would be based. The updated RBMPs were published in 2015. B5: The renewed GB Invasive Non-native Strategy was published on 19 August 2015. Since 2008, there has been significant progress underpinned by the Strategy. The UK has also argued for collective action across Europe to address these issues, resulting in the European Union's Invasive Alien Species Regulation, which came into force on 1 January 2015.	The revised plan was published in 2015 however the activities within the Framework's implementation Plan (particularly the revised Plan) have primarily a terrestrial and freshwater focus and do not push targets for the marine environment. Beyond 2020, it is anticipated that there will be an opportunity to develop a new UK 'Framework' and reporting mechanism, in response to post-2020 ambitions

[32] UK Biodiversity Action Plan highlights report, 2008 reporting round.

[33] http://publications.naturalengland.org.uk/publication/4958719460769792

Objectives and Targets	Deadline(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
Revised Implementation Plan Targets (2018): A1.1 – Develop and publish the UK Biodiversity Indicators and scope the development of relevant metrics/indicators linked to the UK elements of the 25-year Environment Plan A2.1 - Undertake a review of Common Standards' Monitoring guidance and SSSI Guidelines, to ensure they remain fit for purpose.			B6: UK Climate Change Risk Assessment published in 2013 and the second assessment underway. No other objectives met. C5: Detailed information on the UK monitoring programmes for MSFD was submitted to the Commission on 15 October 2014. No updates are available for progress on the revised implementation plan (2018).	
Biodiversity 2020: A strategy for England's wildlife and ecosystem services (Defra, 2011) **Outcome 2 – Marine habitats, ecosystems and fisheries** • 2A. By the end of 2016 in excess of 25% of English waters will be contained in a well-managed Marine Protected Area network that helps deliver ecological coherence by conserving representative marine habitats; • 2B. By 2020 we will be managing and harvesting fish sustainably; • 2C. By 2022 we will have marine plans in place covering the whole of England's marine area, ensuring the sustainable development of our seas, integrating economic growth, social need and ecosystem management. **Outcome 3 – Species** 'By 2020, we will see an overall improvement in the status of our wildlife and will have prevented further human-induced extinctions of known threatened species.' This includes protecting and enhancing England's S41 species. • 3. Take targeted action for the recovery of priority species, whose conservation is not delivered through wider habitat-based and ecosystem measures **Outcome 4 – People** • 4. By 2020, significantly more people will be engaged in biodiversity issues, aware of its value and taking positive action.	2020	The targets are not binding. Some targets lack specificity and are thus not directly measurable and for others there is limited reporting of progress.	Defra reported progress against the targets in 2013 (Defra, 2013): 2A: The UK reported progress against the Aichi targets in 2019 where they stated that as of March 2018, Marine Protected Areas covered 24% of UK sea area (JNCC, 2019). 2B: Revised approach to fisheries management implemented and in time to ensure effective management of European sites by 2016 2C: Currently draft marine plans exist for the South West (inshore, offshore), South East (inshore), North East (inshore, offshore), and North West (inshore and offshore now combined to one plan) The MMO has, however, committed to deliver the 10 marine plans for England by 2021. 3: Over 40% of priority habitats and 30% of priority species to be declining. Eight priority species were lost entirely from the UK between 2002 and 2008. 4: No specific target update. A group of environmental NGOs and independent engagement are identifying how the sector can be more effective in its engagement work.	Aim to move towards a more integrated, rather than conventional sectoral approach to ecosystem management in order to "*halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks*" Future progress will depend on actions taken under other initiatives such as The Marine Strategy. Additionally, improvement in the condition of coastal/marine SSSI will depend on management measures being implemented primarily in relation to European and internationally designated sites. A large number of actions to maintain and improve European sites are documented in the IPENS reports. These include measures to support adaptation to a changing climate, tackling diffuse pollution and managing grazing, habitat fragmentation, inappropriate coastal management, invasive species and public access and disturbance. Climate change is likely to have long-term impacts on the condition of some protected habitats and species.

Table A15. Shoreline Management Plans and Regional Habitat Creation Programme

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
An SMP should provide the basis for policies for a length of coast and set the framework for managing risks along the coastline in the future (Defra, 2006, Environment Agency, 2009). The objectives of an SMP need to be in line with the Government's strategy for managing risks from floods and coastal erosion and should: • Set out the risks from flooding and erosion to people and the developed, historic and natural environment within the SMP area; • Identify opportunities to maintain and improve the environment by managing the risks from floods and coastal erosion; • Identify the preferred policies for managing risks from floods and erosion over the next century; • Identify the consequences of putting the preferred policies into practice; • Set out procedures for monitoring how effective these policies are; • Inform others so that future land use, planning and development of the shoreline takes account of the risks and the preferred policies; • Discourage inappropriate development in areas where the flood and erosion risks are high; and • Meet international and national nature conservation legislation and aim to achieve the biodiversity objectives. The four SMP policies which can be considered for each section of coastline in England and Wales are: • Hold the Line (HTL): Maintain or upgrade the level of protection provided by existing coastal defences; • Advance the Line (ATL): Build new defences seaward of the existing defence line; • Managed Realignment (MR): Allowing the shoreline to move backwards or forwards, with management to control or limit movement; and • No Active Intervention (NAI): a decision not to invest in providing or maintaining any defences. In terms of the Regional Habitat Compensation Programme (RHCP) in England, the targets for habitat creation vary across regions, and can be updated following new analyses and as habitat creation projects are implemented. The latest available targets for the Solent and South Downs RHCP, for example, is 342 hectares of intertidal habitat (mainly saltmarsh) by Epoch 3 in the year 2105 (Environment Agency, 2020b).	The overall aim of an SMP is to set out a plan for a 100-year period indicating how our coastline should be managed, taking into account the wider implications on the neighbouring coastline and the environment. The SMP policies cover the short term (0-20 years), the medium term (20-50 years) and the long term (50-100 years). These are referred to as Epochs 1, 2 and 3 respectively.	SMPs are non-statutory and, therefore, the targets are and non-binding.	Each SMP proposes different ways in which to manage the implementation of SMP policies. These are generally defined in an action plan, where actions cover the development of flood and erosion defence strategies and schemes. It can also include actions for the Local Authorities, for example to incorporate the plan into the land use planning system or support adaptation of affected people, businesses and organisations. Around 170 km of coastal defences (approximately 20 % of the total in England) will be highly vulnerable to failure by the 2080s assuming a 2°C warming scenario (Climate Change Committee, 2018). However, the areas highlighted as being at risk of failure do not correlate with areas where managed realignment is currently planned between now and the end of the century in the SMPs. In addition, managed realignment is not happening at the pace needed to meet the aspirations of the SMPs. Previous analysis showed that only 1 % of the coastline has been realigned since 1990, with another 0.8 % planned in the next three years (Climate Change Committee, 2013). The current rates of managed realignment are five times lower than those required to meet the level set out in the SMPs for 2026 (Epoch 2). In England, the Regional Habitat Compensation Programme (RHCP) is co-ordinated by the Environment Agency in partnership with Natural England, Local Authorities and other organisations. It aims to strategically deliver the creation of new coastal and wetland habitats to replace those damaged or lost by flood or coastal defence works and sea level rise. This also takes into account the losses caused by the continued maintenance of defences (called coastal squeeze), including those from existing privately maintained defences. The RHCP aims to create new habitat through various mechanisms, including land purchase from willing landowners, or working with landowners wishing to create and manage habitat on their land in return for agri-environment payments (e.g. Higher-Level Stewardship (HLS) or for other business reasons. The programme led by the Environment Agency in England is now referred to as the National Habitat Compensation Programme (NHCP) in recognition of the fact that it is replacing lost habitat not creating new habitat and has delivered more than 800 ha of habitat to offset losses (RSPB, 2018).	There is considerable uncertainty about the scale of future climate change and sea level rise; however, the rate of future sea level rise is expected to accelerate due to continued global warming and more rapid melting of the ice caps and ice sheets. In addition, it is likely that climate change will bring about increased storminess. Despite the uncertainty over rates of future sea level rise, it is essential that SMPs take into account the possibility of sea level rise, regardless of the cause.

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
In the Thames, there is predicted to be a total loss of 598 ha of designated habitat due to coastal squeeze by 2105 (Environment Agency, 2021) which would need to be created through the RHCP. A similar national habitat creation programme (NHCP) is now being led by NRW in Wales (NRW, 2020). There is estimated total loss of 7,310 ha of designated intertidal habitat due to coastal squeeze across Wales. There are currently no similar programmes in Scotland and Northern Ireland.			Schemes that have been successfully delivered through the NHCP include the Medmerry Managed Realignment, the largest open coast scheme in Europe, which created 183 hectares of new intertidal habitat comprising of 158 hectares of saltmarsh and 25 hectares of mudflat (Southern Coastal Group and SCOPAC, 2021).	

Table A16. Other Initiatives

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
ReMeMaRe (REstore MEadows, MArshes and Reefs) is part of the Restoring Estuarine and Coastal Habitats in the NE Atlantic (REACH) initiative. England has lost 90% of its seagrass meadows, an 85 % decline in the area of saltmarsh and a 95 % decline in the area of native oyster reefs. ReMeMaRe has proposed 4 year target for restoration of 800 ha of saltmarshes, 25 ha of seagrass meadows and 50 ha oyster beds, plus a pilot study for restoring 2 ha of kelp forests[34]. Longer term targets: i. Restore at least 2 % by 2025 and 15 % of our current extent of saltmarsh, seagrass and oyster reef habitats by 2043; ii. Achieve Good Ecological Status in our River Basin Management Plans for estuarine and coastal waters water bodies for angiosperm (seagrass / saltmarsh) elements with newly restored habitats and contribute to Good Environmental Status for Regional Sea Areas for biodiversity and seabed habitats; iii. Begin the restoration of 5250 ha of functioning saltmarsh, 300 ha of seagrass and 200 ha of oyster beds by 2043; iv. Restore or initiate the creation of up to 800 ha of saltmarsh, 25 ha of seagrass and 50 ha of oyster beds by 2025, both inside and outside of marine protected areas; v. Store up to 200 kT of carbon emissions by 2043 (end of the Defra 25 YEP), and sequester an additional 27 kT C per year by 2043; vi. Remove up to 6.4 kT of nitrogen from the water by 2043 (end of the Defra 25 YEP); vii. Work to set up a pioneering aquaculture facility that will generate up to 12 million seed oysters per year by 2030 to restore oyster habitats around the UK.	See previous column	The targets are aspirational	The ReMeMaRe project is not fully funded. There are other initiatives which are seeking to take forward marine habitat and species restoration that will contribute towards these targets	Progress towards achieving these targets will be dependent on funding availability.
The Wildlife & Countryside Link (WCL) Marine Scorecard (WCL, 2021) makes a number of key proposals for improving the marine environment. In particular: • The Environment Bill should be amended to set a legally binding State of Nature target to halt and begin to reverse the decline of nature by 2030 at the latest in law, on land and at sea; • The Marine Strategy should be revised as a new 'Ocean Recovery Strategy', running up to 2030. Such a revision should lay out a clear path to delivering the 2030 State of Nature target and ensuring that at least 30% of UK oceans are fully or highly protected by 2030 (30x30). Wildlife continues to be caught and killed in UK fisheries. The Government must take urgent and effective action to address this, including:	See previous column	The targets are aspirational	The Scorecard was published in April 2021. The Environment Bill is currently being considered by Parliament. It is understood that species targets are to be provided for within the Bill.	Progress towards these strategic targets will depend on political decisions taken in relation to the Environment Bill and future funding of nature recovery.

[34] https://ecsa.international/sites/default/files/docs-reach/20201208_Blue%20Recovery%20Fund_Feb2021.pdf

Objectives and Targets	Target Date(s)	Extent to Which Targets are Binding	Current Progress Towards Objectives and Targets	Anticipated Future Progress Towards Objectives and Targets
i. Establishing clear targets for reductions in sensitive species bycatch in order to minimise and, where possible, eliminate bycatch within a set timeframe; ii. Establishing a programme to urgently increase testing and deployment of alternative fishing gear and effective mitigation measures at the fleet level; iii. Ensuring effective at-sea monitoring of fishing activity and bycatch reporting to improve knowledge, using human observers and/or Remote Electronic Monitoring. This would help to ensure that there is sufficient data to determine and reduce bycatch rates; iv. The Government should identify areas with potential for the greatest natural carbon storage around the coast of England and prioritise the creation, protection and restoration of these sites based on their potential to capture carbon. As a first step, at least one of the pilot HPMAs should focus on Blue Carbon protection and restoration, as recommended in the Benyon Review.				

B Review of Article 17 Report for SAC Habitats and Species

Table B1. Article 17 Reports: Habitat features

Feature	Pressures/Impacts
Subtidal sandbanks – no clear statement on condition, other than it has been stable between 2013-18	▪ Extraction of minerals, wind, wave and tidal power, fish/shellfish harvesting – biological removal and abrasion – all classed as 'high' pressure category.
Estuaries – short term trend - extent of good condition decreasing	▪ Modification of coastline, sea-level and wave exposure changes due to climate change, Agricultural activities generating marine pollution, fish/shellfish harvesting, Mixed source marine water pollution – all classed as 'High' pressure category.
Mudflat – short term trend - extent of good condition decreasing	▪ Modification of coastline, fish/shellfish harvesting, invasive alien species, sea-level and wave exposure changes due to climate change, Mixed source marine water pollution – all classed as 'High' pressure category.
Lagoons – short term trend - extent of good condition decreasing	▪ Sea-level and wave exposure changes due to climate change - classed as 'High' pressure category.
Inlets and Bays – short term trend - extent of good condition decreasing	▪ Modification of coastline, sea-level and wave exposure changes due to climate change, Agricultural activities generating marine pollution, fish/shellfish harvesting, Mixed source marine water pollution – all classed as 'High' pressure category.
Reefs – short term trend - extent of good condition increasing	▪ Fish/shellfish harvesting biological removal and abrasion, Sea-level and wave exposure changes due to climate change; Temperature changes due to climate change – all classed as 'High' pressure category.
Submarine structures of leaking gases – short term trend uncertain	▪ Fish/shellfish harvesting – biological removal and abrasion - both classed as 'high' pressure category.
Annual vegetation of drift lines – short term trend recovering	▪ Sports, tourism and leisure activities, Modification of coastline - both classed as 'high' pressure category.
Perennial vegetation of stony banks – short term trend recovering	▪ Modification of coastline, Sea-level and wave exposure changes due to climate change - both classed as 'high' pressure category.
Vegetated Sea Cliffs – short term trend declining	▪ Extensive grazing or under grazing by livestock, Modification of coastline, Sea-level and wave exposure changes due to climate change, invasive alien species - all classed as 'high' pressure category.
Salicornia and other annuals – assessed as stable	▪ No 'high' pressure categories identified.
Spartina - short term trend declining	▪ Invasive alien species, Sea-level and wave exposure changes due to climate change - both classed as 'high' pressure category.

Feature	Pressures/Impacts
Atlantic Salt meadows - short term trend declining	▪ Wind, wave and tidal power, Shipping lanes, ferry lanes and anchorage infrastructure, Modification of coastline - all classed as 'high' pressure category.
Sea Caves - condition not documented	▪ Modification of coastline, Residential or recreational activities and structures generating marine macro- and micro- particulate pollution, Industrial or commercial activities and structures generating marine macro- and micro- particulate pollution - all classed as 'high' pressure category.

Table B2. Article 17 Reports: Species

Feature	Pressures/Impacts
Sea Lamprey – long term trend considered stable	▪ Physical alteration of water bodies, Modification of hydrological flow, Mixed source pollution to surface and ground waters - all classed as 'high' pressure category.
River Lamprey – short term trend considered stable	▪ Physical alteration of water bodies, Modification of hydrological flow, Mixed source pollution to surface and ground waters - all classed as 'high' pressure category.
Common sturgeon	▪ No data provided.
Allis Shad - short term trend considered stable	▪ Physical alteration of water bodies, Modification of hydrological flow, Mixed source pollution to surface and ground waters, Hydropower (dams, weirs, run-off-the-river), Wind, wave and tidal power- all classed as 'high' pressure category.
Twaite Shad - short term trend considered stable	▪ Physical alteration of water bodies, Modification of hydrological flow, Mixed source pollution to surface and ground waters - all classed as 'high' pressure category.
Atlantic Salmon – short term and long-term trend declining	▪ Physical alteration of water bodies, Modification of hydrological flow, Mixed source pollution to surface and ground waters - all classed as 'high' pressure category.
Bottlenose Dolphin - short term trend considered stable	▪ Mixed source marine water pollution classed as 'high' pressure category.
Harbour porpoise - short term trend not known	▪ Bycatch and incidental killing, Mixed source marine water pollution, Interspecific relations (competition, predation, parasitism, pathogens) classed as 'high' pressure category.
Otter - short term trend increasing	▪ Roads, paths, railroads and related infrastructure, Bycatch and incidental killing, Modification of hydrological flow or physical alteration of water bodies for agriculture - all classed as 'high' pressure category.
Grey seal - short term trend considered stable	▪ No pressures assessed as high.
Common Seal - short term trend uncertain	▪ No pressures assessed as high.

C Review of OSPAR 2017 Intermediate Assessment

Table C1. OSPAR IA 2017

Element	Target/Indicator	Progress
Extent of Physical Damage to Predominant and Special Habitats	D1.6 - Habitat condition D6.1 - Physical damage, having regard to substrate characteristics	https://oap-cloudfront.ospar.org/media/filer_public/f6/c3/f6c30268-2e27-4f67-9f47-8b550cfc3163/physical_damage_bh3.pdf Bottom contacting fishing physically disturbs seafloor habitats. 86% of the assessed areas in the Greater North Sea and the Celtic Seas have physical disturbance, of which 58% showed higher disturbance. 74% of all assessed areas experience consistent pressure year on year, which is very likely to affect the ability of habitats to recover.
Changes in Phytoplankton and Zooplankton Communities	D1.4 - Habitat Distribution D1.6 - Habitat condition D4.3 - Abundance/ distribution of key trophic groups/species	https://oap-cloudfront.ospar.org/media/filer_public/9a/d8/9ad86283-ed6d-4f16-8505-e131e0d499a7/plankton_changes.pdf Plankton form the base of the marine food web and respond rapidly to environmental change, making them important indicators of ecosystem state. Between 2004-2014 plankton communities experienced significant changes in relative abundance, indicating alterations to key aspects of ecosystem functioning. Those changes are widely accepted to be linked to prevailing conditions and may be driven by climate change, nutrient enrichment or other factors.
Condition of Benthic Habitat Communities: Assessment of Coastal Habitats in relation to Nutrient and/or Organic Enrichment	D1.6 - Habitat condition D5.3 - Indirect effects of nutrient enrichment	https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/habitats/condition-of-benthic-habitat-defining-communities/condition-benthic-habitat-communitites-assessment-coastal-habita/ This assessment indicated that 89% of the coastal water bodies in the OSPAR Maritime Area, for which European Union Water Framework Directive assessment data were provided, have benthic habitats in good status in relation to nutrient and / or organic enrichment and with regard to macroalgae and angiosperms and 74% with regard to benthic invertebrates. However, there were wide regional variations and some data gaps.
Condition of Benthic Habitat Communities: Subtidal Habitats of the Southern North Sea	D1.6 - Habitat condition D6.2 - Condition of benthic community	https://oap-cloudfront.ospar.org/media/filer_public/81/05/810559b7-6477-4c6b-809d-56323172e4e9/subtidal_habs_snorth_sea.pdf Benthic habitat community quality has been sub-regionally assessed in terms of species richness in the southern North Sea. Community quality is generally lower in coastal areas than offshore areas and this is partly due to higher fishing pressure in coastal areas.

Element	Target/Indicator	Progress
Seal Abundance and Distribution	D1.1 - Species distribution D1.2 - Population size	https://oap-cloudfront.ospar.org/media/filer_public/78/63/7863b517-88dd-4565-84e8-f8c30e513d79/m3_seals.pdf Atlantic grey seals and harbour seals are resident in the Greater North Sea and Celtic Seas. Harbour seal abundance is stable or increasing in most of the Greater North Sea but declining in a few areas. The reasons for this decline are unclear. Grey seal abundance is increasing, and distribution is stable.
Grey Seal Pup Production	D1.3 - Population condition	https://oap-cloudfront.ospar.org/media/filer_public/69/5f/695f91ed-cd2f-42e2-a674-dfa2dbfe696d/m5_seal_pups.pdf In the Greater North Sea and in parts of the Celtic Seas, the number of grey seals born each year has increased substantially since 1992 and has continued to rise in recent years (2009–2014).
Harbour Porpoise Bycatch	D1.3 - Population condition	https://oap-cloudfront.ospar.org/media/filer_public/f3/43/f343edf0-55e0-4ec0-bc92-428f9d9b1745/harbour_porpoise_bycatch_m6.pdf Bycatch is recognised as a major cause of human-induced mortality of harbour porpoise. Nearly 4000 harbour porpoises of a total population in excess of 490 000 are drowned in fishing nets annually in the areas assessed. However, there is low confidence in these bycatch estimates due to incomplete monitoring data.
Abundance and Distribution of Coastal Bottlenose Dolphins	D1.1 - Species distribution D1.2 - Population size D4.3 - Abundance/ distribution of key trophic groups/species	https://oap-cloudfront.ospar.org/media/filer_public/c6/49/c6494052-fa8c-4562-b479-36dba3c2e761/cetacean_abundance_cbndolphins.pdf Coastal bottlenose dolphin populations declined through the 19th and 20th century and have remained low, but stable, in the 21st century. However, the population in the Sado Estuary (Portugal) has declined since monitoring began (1980s). Abundance and distribution of bottlenose dolphins (as top predators) is indicative of environmental health
Abundance and Distribution of Cetaceans	D1.1 - Species distribution D1.2 - Population size D4.3 - Abundance/ distribution of key trophic groups/species	https://oap-cloudfront.ospar.org/media/filer_public/2f/1e/2f1eeeaf-9e63-4ca2-b7a5-8d6e76a682e5/cetacean_abundance_other.pdf Cetaceans are widely distributed and abundant in the OSPAR Maritime Area. They are challenging to monitor. There is no evidence of changes in abundance for white-beaked dolphin, minke whale and harbour porpoise since 1994; there is insufficient evidence for other species. The distribution of harbour porpoise and minke whale has shifted southward in the Greater North Sea.

Element	Target/Indicator	Progress
Recovery in the Population Abundance of Sensitive Fish Species	D1.2 - Population size	https://oap-cloudfront.ospar.org/media/filer_public/ab/87/ab87caa4-ed14-42bd-aec5-812597334cc9/fish_abundance.pdf The decline in abundance of sensitive fish species has been halted in the Celtic Seas and Greater North Sea. However, significant recovery of populations is only apparent in the Celtic Seas.
Marine Bird Abundance	D1.2 - Population size Annual estimates of breeding or non-breeding abundance of each species are compared against assessment values that are designed to reflect the resilience of different species to population decline. It is desirable for the annual 'relative abundance' of a species to be above 0.8 (80% of the baseline) for species that lay one egg or 0.7 (70% of the baseline) for species that lay more than one egg. If 75% or more of species assessed exceed their individual assessment values, an assemblage of bird species is considered to be healthy.	https://oap-cloudfront.ospar.org/media/filer_public/24/51/24511232-82c5-4f95-83cf-823bfb7a40d4/marine_bird_abundance_b1.pdf Abundance of marine bird species assessed across the OSPAR Maritime Area has not been considered healthy since the mid-2000s. Since the mid-2000s, the breeding abundance of more than a quarter of the marine bird species assessed in the OSPAR Maritime Area has been below the baseline set in 1992, indicating that the populations are not healthy. Species that use intertidal and inshore areas of the Greater North Sea during migration or over wintering are the exception and have been present in healthy numbers since the early 1990s.

Element	Target/Indicator	Progress
Marine Bird Breeding Success / Failure	D1.3 - Population condition	https://oap-cloudfront.ospar.org/media/filer_public/be/60/be607ad5-7b1c-43ab-9e45-d04cf060d7ea/marine_bird_breeding.pdf Seabird species have experienced frequent and widespread breeding failure over the period assessed (2010 to 2015 inclusive) in Norwegian parts of Arctic Waters, the Greater North Sea and in the Celtic Seas. The surface feeding birds in the Greater North Sea and Celtic Seas frequently failed to raise young. In the Greater North Sea and Celtic Seas, all seabird species that frequently failed to raise young feed on small fish in surface waters. Widespread breeding failure in seabird species feeding in deeper waters or at the seabed was far less frequent. This difference could be linked to the availability of small forage fish species at the surface (e.g. lesser sandeel and sprat) that are typical prey for various surface feeding species (e.g. black-legged kittiwake).
Trends in New Records of Non-Indigenous Species Introduced by Human Activities	MSFD D2 - Non-Indigenous Species D2.1 - Abundance and state characterisation of non-indigenous species, in particular invasive species	https://oap-cloudfront.ospar.org/media/filer_public/b6/d5/b6d52040-e30a-4179-8580-9d4b6de4e069/non_indigenous_species.pdf Excluding a few years with high rates of non-indigenous species (NIS) introduction, new species have been encountered at a relatively constant rate for the three regions assessed (Greater North Sea, Celtic Seas and the Bay of Biscay and Iberian Coast). Therefore, more effort to reduce the current rate of introduction should be considered. Differences in the rates of introduction are relatively small between regions, and not statistically significant between the two six-year reporting periods (2003–2008 and 2009–2014). Continued implementation of the European Union MSFD, Invasive Alien Species Regulation, and Water Framework Directive, and the International Maritime Organization Ballast Water Management Convention, should ensure some of the identified gaps in monitoring are addressed.
Size Composition in Fish Communities	D4.2 - Proportion of selected species at the top of food webs	https://oap-cloudfront.ospar.org/media/filer_public/e0/59/e0594934-5508-48ec-b3e6-0d28072e02af/size_composition_fish_communities.pdf The Typical Length indicator measures the size-structure of fish and elasmobranch communities and it decreases under high fishing pressure. Although low compared to the 1980s, Typical Length for the assessed demersal fish has been recovering across the OSPAR Maritime Area since 2010. Pelagic fish generally show fluctuations but no trend. Locally, there are deviations from these patterns.

Element	Target/Indicator	Progress
Proportion of Large Fish (Large Fish Index)	D4 - Marine Food Webs D1.7 - Ecosystem Structure	https://oap-cloudfront.ospar.org/media/filer_public/98/f6/98f66c62-9087-4fbe-8c22-7deaf4487a0f/large_fish_index.pdf Recovery in the proportion of large fish in the demersal fish community is evident in the Greater North Sea. Assessment values indicating recovery are only met in the northern part of the Celtic Seas. In many individual survey-based assessments where assessment values are not currently met, recent recovery trends suggest they could be achieved by 2022, if current pressure levels are not increased.
Nutrient Inputs to the Greater North Sea and the Bay of Biscay and Iberian Coast	D5.1 - Nutrients levels	https://oap-cloudfront.ospar.org/media/filer_public/1d/0a/1d0a2e54-f61c-44c3-99ab-603e90791956/nutrient_inputs.pdf Inputs of nitrogen to the Greater North Sea via water and air show a weak downward trend. Waterborne phosphorus inputs have reduced significantly. The decline slowed in the early 2000s but continues. Waterborne phosphorus inputs to the Bay of Biscay and Iberian Coast have decreased but nitrogen inputs have not.
Concentrations of Chlorophyll-a in the Greater North Sea and Celtic Seas	D5.2 - Direct effects of nutrient enrichment	https://oap-cloudfront.ospar.org/media/filer_public/85/18/8518dd81-798c-4627-adf8-a440808e518e/chlorophyll.pdf Decreasing (improving) trends in chlorophyll-a concentration are found in the Sound and Skagerrak (1990–2014), and in the offshore parts of the Greater North Sea (2006-2014). There is a small upward trend (low confidence) in the offshore Celtic Seas. Elevated concentrations are found in some coastal areas.
Winter Nutrient Concentrations in the Greater North Sea, Kattegat and Skagerrak	D5.1 - Nutrients levels	https://oap-cloudfront.ospar.org/media/filer_public/64/6a/646a99bd-dba7-4d68-a8be-fc372bfc10a9/nutrient_concentrations.pdf Winter concentrations of dissolved inorganic nitrogen (DIN) and phosphorus (DIP) have decreased significantly in the southern North Sea and, for DIN, in the Kattegat, Sound and offshore areas of the Skagerrak since 1990. Since 2006, average winter concentrations of DIN and DIP in the area assessed have shown little change.
Concentrations of Dissolved Oxygen Near the Seafloor	D5.3 - Indirect effects of nutrient enrichment	https://oap-cloudfront.ospar.org/media/filer_public/e3/23/e323b6b5-fcba-44d2-bf7c-0412905db780/dissolved_oxygen.pdf Dissolved oxygen is necessary for healthy marine ecosystems. Overall, there is not a problem with dissolved oxygen concentrations near the seafloor in the areas assessed. However, there is oxygen depletion in some localised areas. Improvements in levels of dissolved oxygen concentrations have been observed in the Kattegat.

Element	Target/Indicator	Progress
Trends in discharges, spills and emissions from offshore oil and gas installations	D8.1 - Concentration of contaminants	https://oap-cloudfront.ospar.org/media/filer_public/9a/84/9a847d26-5a28-4194-bbfd-50d8e36dff5a/oic_ia2017.pdf Results indicate a general downward trend for several indicators: ▪ The amount of dispersed oil discharged in produced water decreased by 18% between 2009 and 2014; ▪ The use of chemicals on OSPAR's List of Chemicals or Priority Action (LCPA) has reduced by over 90% since 2009, and in 2014 no LCPA chemicals were discharged; ▪ There has been a 30% decrease in the use of chemicals carrying substitution warnings, and a 40% decrease in their discharge.
Status and Trends in the Concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) in Shellfish	D8.1 - Concentration of contaminants	https://oap-cloudfront.ospar.org/media/filer_public/51/2d/512d0d00-3b3e-4756-b4e1-00830c9b0ae4/pah_biota.pdf Although mean concentrations of polycyclic aromatic hydrocarbons (PAHs) in shellfish in all ten assessed areas are above natural background concentrations, they are below levels likely to harm marine species. Mean concentrations are decreasing or show no statistically significant change in the areas assessed in the period 1995–2015.
Status and Trends in the Concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) in Sediment	D8.1 - Concentration of contaminants	https://oap-cloudfront.ospar.org/media/filer_public/99/66/99667447-90ba-4e70-a08d-ed1443d1cf4c/pah_sediment.pdf Mean concentrations of polycyclic aromatic hydrocarbons (PAHs) in sediment are below levels likely to harm marine species in the areas assessed but are above natural background concentrations in four of the six areas assessed. Mean concentrations show no statistically significant change in four areas and are decreasing in two
Status and Trends of Polychlorinated Biphenyls (PCB) in Fish and Shellfish	D8.1 - Concentration of contaminants	https://oap-cloudfront.ospar.org/media/filer_public/d7/5f/d75faf12-d5c6-4f3e-81c7-754a85897ade/pcb_biota.pdf Polychlorinated biphenyls (PCBs) were banned in many countries in the mid-1980s. Since then, while local problems remain, PCB concentrations in shellfish and fish have decreased in most OSPAR contaminants assessment areas. With the exception of the most toxic congener (CB118), concentrations in biota are below the level at which they could present an unacceptable risk to the environment.

Element	Target/Indicator	Progress
		Mean concentrations of CB118 in biota are above this level in eight of the 11 areas assessed (Figure 2), and so adverse effects on marine organisms may still be possible in these areas. PCBs remain in the sediment for long periods and have the potential to accumulate in biota and bio magnify up food chains. Due to past industrial uses and the persistence of PCBs in the environment, it will take several more decades before concentrations are close to zero, the ultimate aim of the OSPAR Hazardous Substances Strategy.
Status and Trends of Polychlorinated Biphenyls (PCB) in Sediment	D8.1 - Concentration of contaminants	https://oap-cloudfront.ospar.org/media/filer_public/21/54/2154817d-b686-45fd-ad1f-212657e5dba0/pcb_sediment.pdf Polychlorinated biphenyls (PCBs) were banned in many countries in the mid-1980s. Since then, while local problems remain, mean PCB concentrations in sediment have decreased in three of five OSPAR contaminants assessment areas. With the exception of the most toxic congener CB118, concentrations in sediment are below the level at which they could present an unacceptable risk to the environment.
Trends in Concentrations of Polybrominated Diphenyl Ethers (PBDEs) in Fish and Shellfish	D8.1 - Concentration of contaminants	https://oap-cloudfront.ospar.org/media/filer_public/3c/d4/3cd49cda-02b4-4937-baa8-3117f56151f0/pbde_biota.pdf Concentrations of polybrominated diphenyl ethers (PBDEs) detected in biota (fish, mussels, oysters) are declining in the majority of areas assessed. The exception is the Skagerrak and Kattegat where concentrations show no statistically significant change. The lack of assessment criteria means the environmental significance of the concentrations cannot be assessed.
Trends in Concentrations of Polybrominated Diphenyl Ethers (PBDEs) in Sediments	D8.1 - Concentration of contaminants	https://oap-cloudfront.ospar.org/media/filer_public/b9/59/b9593e27-3c7d-490d-ae8e-e38303a0ba69/pbde_sediment.pdf Concentrations of polybrominated diphenyl ethers (PBDEs) detected in sediment in the areas assessed either show no statistically significant change (Northern North Sea) or are declining (Irish Sea). The lack of assessment criteria means the environmental significance of the concentrations cannot be assessed.
Status and Trends in the Levels of Imposex in Marine Gastropods (TBT in Shellfish)	D8.2 - Effects of contaminants	https://oap-cloudfront.ospar.org/media/filer_public/7a/f2/7af27774-818e-490c-b18f-a6ea9c170260/imposex.pdf Following bans on tributyltin in antifouling paints there has been a marked improvement in the reproductive condition of marine snails over the assessment period 2010–2015.

Element	Target/Indicator	Progress
Trends of Organotin in Sediments in the Southern North Sea	D8.1 - Concentration of contaminants	https://oap-cloudfront.ospar.org/media/filer_public/d7/49/d749bbbe-b2b7-448d-b549-01d90a4e5b88/organotin.pdf Following bans on tributyltin, mean concentrations in sediment have measurably reduced in the Southern North Sea and are very low or undetectable elsewhere.
Status and Trend for Heavy Metals (Mercury, Cadmium, and Lead) in Fish and Shellfish	D8.1 - Concentration of contaminants	https://oap-cloudfront.ospar.org/media/filer_public/8f/6d/8f6d931b-2e3c-42b7-a390-688f74b6504a/metals_biota.pdf In most areas assessed (since 2009) concentrations of mercury, cadmium and lead in mussels and fish are above background levels. Nevertheless, all concentrations are below European Commission limits for foodstuffs. Concentrations are decreasing or show no significant change in all areas assessed; except for cadmium in a few North Sea and Irish Sea locations.
Status and Trend for Heavy Metals (Cadmium, Mercury and Lead) in Sediment	D8.1 - Concentration of contaminants	https://oap-cloudfront.ospar.org/media/filer_public/55/6c/556c5f40-b4aa-47dc-abd1-f589b466cfd6/metals_sediment.pdf Mean concentrations of mercury, cadmium and lead concentrations in marine sediments are decreasing or show no significant change in the majority of areas assessed. Nevertheless, concentrations in all areas are above natural background levels, and in four of the six areas assessed are above levels where adverse ecological effects cannot be ruled out.
Inputs of Mercury, Cadmium and Lead via Water and Air to the Greater North Sea	D8.1 - Concentration of contaminants	https://oap-cloudfront.ospar.org/media/filer_public/75/88/758843ab-323f-4ef4-919b-4104a5699839/heavy_metal_inputs.pdf Total inputs of the heavy metals mercury, cadmium and lead to the Greater North Sea have reduced, since 1990. However, improved analytical procedures for mercury and cadmium since 1990 make it difficult to be certain what proportion of observed changes are due to reduced discharges and emissions.
Beach Litter - Abundance, Composition and Trends	D10.1 - Characteristics of litter in the marine and coastal environment	https://oap-cloudfront.ospar.org/media/filer_public/28/ec/28eceda5-27b9-40de-8195-27d757a076be/beach_litter.pdf Litter is abundant on beaches in the OSPAR Maritime Area. Plastic fragments, fishing-related litter and packaging are the most common types of litter found. Plastics comprise over 90% of items in some areas. There are no overall trends in the number of beach litter items recorded in the period 2009–2014.

Element	Target/Indicator	Progress
Composition and Spatial Distribution of Litter on the Seafloor	D10.1 - Characteristics of litter in the marine and coastal environment	https://oap-cloudfront.ospar.org/media/filer_public/82/19/8219c6d3-7270-400a-9466-149903d7e2ba/seabed_litter.pdf Litter is widespread on the seafloor across the area assessed, with plastic the predominant material encountered. Higher amounts of litter are found in the Eastern Bay of Biscay, Southern Celtic Seas and English Channel than in the northern Greater North Sea and Celtic Seas.
Plastic Particles in Fulmar Stomachs in the North Sea	D10.1 - Characteristics of litter in the marine and coastal environment D10.2 - Impacts of litter on marine life	https://oap-cloudfront.ospar.org/media/filer_public/f4/34/f434a292-3fad-466c-9e89-c2ff09dc9e9d/fulmar.pdf Currently 58% of beached North Sea fulmars have more than 0.1 g of plastic in their stomachs, exceeding OSPAR's long-term goal of 10%. This reflects the abundance of floating litter in their environment. There has been no significant change in the amount of plastic in fulmar stomachs over the past ten years.
Distribution of Reported Impulsive Sounds	D 11.1 - Distribution in time and place of loud, low and mid frequency impulsive sounds OSPAR endeavours to keep the introduction of energy, including underwater noise, at levels that do not adversely affect the marine environment.	https://oap-cloudfront.ospar.org/media/filer_public/55/6d/556daf62-ccbe-48e1-b352-1ed918f4a7ee/impulsive_noise.pdf First assessment. No assessment of trends.
Summary status of the OSPAR Network of Marine Protected Areas	In 2003, OSPAR set the goal to establish a network of marine protected areas (MPAs) across the North-East Atlantic and to ensure that it is ecologically coherent and well-managed.	https://oap-cloudfront.ospar.org/media/filer_public/2a/c6/2ac64164-623f-426a-a11b-e686ea2c41c1/mpa_status.pdf Since the 2010 Quality Status Report, OSPAR countries have nominated a further 289 marine protected areas to the Network, now comprising 448 protected areas, representing 5.9% of the OSPAR Maritime Area. Considerable progress has been made towards an ecologically coherent and well-managed network, particularly within the Greater North Sea and Celtic Seas. Nevertheless, further work is required.

Element	Target/Indicator	Progress
	It is intended that the MPA network makes a significant contribution to the sustainable use, protection and conservation of marine biodiversity across the North-East Atlantic, including in Areas Beyond National Jurisdiction (ABNJ).	
Progress towards the Objective of the Radioactive Substances Strategy	The OSPAR Commission's strategic objective regarding radioactive substances is to prevent pollution of the OSPAR Maritime Area through progressive and substantial reductions in discharges, emissions and losses of radioactive substances.	https://oap-cloudfront.ospar.org/media/filer_public/69/f4/69f49a94-d887-46d4-8423-a3c00d0fd07a/fourth_pe.pdf OSPAR Contracting Parties have achieved substantial reductions in discharges in many cases, as required by the OSPAR Radioactive Substances Strategy. In general terms, the situation for the nuclear sector has improved since the Third Periodic Evaluation. In particular there has been a 2.5-fold reduction in discharges of total alpha since the baseline period (1995 – 2001): ▪ There has now been a 12-fold reduction in discharges of total beta (excluding tritium) since the baseline period (1995 – 2001); ▪ Discharges of Tc-99 have continued to decline with a reduction of 38-fold in the discharges since the baseline period.
Dumping and Placement of Dredged Material		https://oap-cloudfront.ospar.org/media/filer_public/0d/66/0d668c99-d415-4625-8983-58d0d3d89723/dredged_material.pdf No trends were identified in the amounts of dredged material dumped or placed within the OSPAR Maritime Area in the period 2008–2014, or in the average contaminant concentrations or contaminant loads associated with this material. The 2014 data show that there are many cases where dredged material is being put to beneficial use. However not enough data have been collected on placement activities for a trend assessment to be undertaken.

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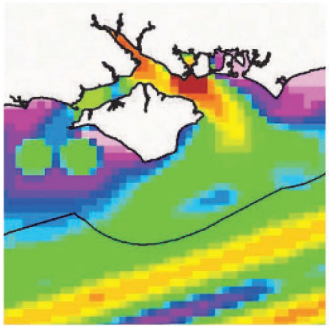
Appendix B First Stakeholder Survey Report

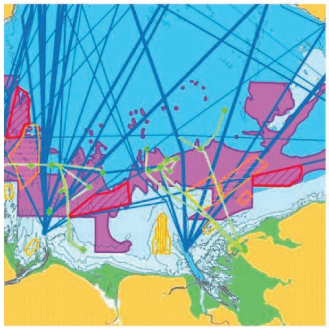
Offshore Wind Evidence and Change Net Gain:
Strategic Targets Task and Finish Group

Strategic Net Gain Targets

Results from the First Stakeholder Survey

October 2021




Innovative Thinking - Sustainable Solutions

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Strategic Net Gain Targets

Results from the First Stakeholder Survey

October 2021

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Summary

Net Gain has been identified as an important mechanism that could contribute to halting and reversing marine biodiversity loss. Net Gain is an approach to development that leaves the environment in a better state than before. It can include concepts such as Biodiversity Net Gain as well as wider environmental gains, including natural capital benefits and ecosystem services. Its application is designed to leave biodiversity in a better state and secure wider benefits for people and the environment.

The Net Gain Strategic Targets Task and Finish Group (T&F Group) is working closely with Defra's Offshore Wind Enabling Actions Programme (OWEAP) to identify suitable targets for marine and intertidal net gain. ABPmer has been commissioned to support the work of the T&F Group.

To support the development of recommendations for strategic targets for coastal and marine Net Gain an on-line survey was held to gain the views of marine stakeholders. The findings will shape the Group's views on strategic net gain priorities and support to the development of draft priorities for coastal and marine net gain opportunities. The priorities developed by the T&F Group could inform OWEAP's development of Marine Net Gain policy for England, which will be consulted on later this year and will enable marine industries to play a significant role in restoring marine environments through their commitment to net gain.

The survey was designed using SurveyMonkey and a number of questions posed to respondents to gain the views of marine stakeholders on potential actions and targets to prioritise marine restoration and enhancement in UK waters. The questionnaire was launched on 16 June 2021 and ran for two weeks.

The survey generated a total of 58 responses across a wide range of industries/ sectors. From the 58 responses, 293 actions were identified by respondents as potential priorities and targets for marine restoration and enhancement in UK waters. These actions were subsequently classified into a number of overarching themes:

- Climate change;
- Education and engagement;
- Eutrophication;
- Habitat restoration and creation;
- Species restoration and protection;
- Human pressures (general industry pressure, aquaculture, dredging, recreation)
- Human pressure: fisheries
- Marine litter
- Policy;
- Protection;
- Research;
- Underwater noise;
- Economic; and
- Invasive non-native species (INNS).

Of the themes identified, actions relating to habitat restoration and creation were the most common, closely followed by actions relating to pressure from fishing. The themes which were identified least by respondents were INNS, economic and education/engagement. The most common timescale proposed for the implementation of identified targets was within the next 5 years, suggesting that quick wins could be made for a large number of identified actions.

Key areas in which industry could contribute towards these actions are focussed on the provision of funding, particularly for the restoration of habitats, or through directly creating habitats or implementing net gain strategies into developments. Whilst there were several actions where industry contributions are limited, such as aspects of MPA designation and management or changes in policy, it was highlighted that industry could work with statutory bodies and support the development and implementation of strategies. Industry could also deliver and/or fund relevant measures to support achievement of conservation objectives, subject to additionality considerations.

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Appendix

Table

Figures

1 Introduction

There is widespread recognition of the need to take positive action to restore and enhance our marine environment. This is supported by the commitment in the Government's 25-year Environment Plan[1] to reverse the loss of marine biodiversity and, where practicable, restore it.

Net Gain has been identified as an important mechanism that could contribute to halting and reversing marine biodiversity loss. Net Gain is an approach to development that leaves the environment in a better state than before. It can include concepts such as Biodiversity Net Gain as well as wider environmental gains, including natural capital benefits and ecosystem services. Its application is designed to leave biodiversity in a better state and secure wider benefits for people and the environment.

The Net Gain Strategic Targets Task and Finish Group (T&F Group) is working closely with Defra's Offshore Wind Enabling Actions Programme (OWEAP) to identify suitable targets for marine and intertidal net gain. The outputs from the work will help to inform Defra policy in relation to marine and intertidal net gain and its subsequent implementation. ABPmer has been commissioned to support the work of the T&F Group.

To support the development of recommendations for strategic targets for Marine Net Gain, an on-line survey was held to gain the views of all marine stakeholders on the potential priorities and targets for marine restoration and enhancement in UK waters. The findings will shape the Group's views on strategic net gain priorities and support to the development of draft priorities for coastal and marine net gain opportunities. The priorities developed by the T&F Group could inform OWEAP's development of Marine Net Gain policy for England, which will be consulted on later this year and will enable marine industries to play a significant role in restoring marine environments through their commitment to net gain.

[1] https://www.gov.uk/government/publications/25-year-environment-plan

2 Methodology

2.1 Questionnaire

A questionnaire survey was designed using SurveyMonkey and a number of questions posed to respondents to gain the views of marine stakeholders on potential actions and targets to prioritise marine restoration and enhancement.

The survey was shared through a number of forums to reach a wide-ranging audience including through Communications and Management for Sustainability (CMS) newsletter, LinkedIn, the ABPmer website and shared via an email circular through member networks of the T&F Group.

The questionnaire was launched on 16 June 2021 and ran for two weeks.

Question 1 focused on identifying the sector of the respondent to indicate the perceived priority actions and targets across different sectors. This question provided a drop-down list of sectors from which the respondent could select one. The list of options included:

- Academia
- Aquaculture
- Cables
- Commercial fishing
- Consultancy
- Environmental NGO/charity
- Government agency
- Government department/ministry
- Local authority
- Marine minerals
- NGO
- Offshore renewables
- Oil and gas
- Ports and harbours
- Power generation
- Recreation
- Shipping
- Water utility
- Other (please specify)

The subsequent section involved a series of question to identify priority actions for restoration and enhancement and the targets required to meet these objectives. Respondents could suggest up to 7 actions and then identify the reasoning, targets and timescales for achievement associated with each.

The questions were as follows:

2. Thinking about restoring and/or enhancing the marine and coastal environment, please tell us what you consider to be key priority actions?
3. Why do you consider each of these actions to be a priority?
4. For any of the priorities you have outlined above, can you suggest a quantitative target?
5. When do you think it would be feasible to achieve these targets by?
    a. Quick wins (within the next 5 year)
    b. Medium term (5-20 years)
    c. Long term (20+ years)
6. What is the basis for your suggested targets (statutory/non-statutory published target or other source) and why do you consider each target to be important?
7. Do you think industry could contribute to any of the targets you have identified, and how?

Two final open response questions completed the survey:

8. Do you know of ways that industry is already contributing to marine restoration or enhancement in the UK or elsewhere?
9. Is there anything else you would like to say about marine net gain or marine restoration/enhancement priorities?

2.2 Analysis of responses

Following closure of the survey all of the responses were collated into one Excel database to allow sorting of the results.

In the first instance the identified actions were assigned to overarching themes to enable grouping of the responses for meaningful analysis. Within these themes the actions were then grouped by subject. The assigned action themes and suggested subjects are shown in Table 1.

Where respondents identified more than one target or action within one response these were separated into separate actions. For example, creating 100 ha of seagrass and 100 ha of saltmarsh would be split into two actions/ targets.

Table 1. Summary of the overarching action themes and suggested actions.

Action Theme	Action Subject
Climate change	Encourage renewable energy Manage climate change impacts
Economic	Green jobs for communities
Education/ Engagement	Educate Engage stakeholders: restoration/ enhancement schemes
Eutrophication	Habitat restoration: Reduce pressure on eelgrass Reduce pollution Reduce pollution: improve sewage works
Habitat restoration or creation	Bivalve reefs (mussels, oysters) Cold-water coral reefs/ biogenic reef Estuaries General seabed habitats Identify restoration targets and priorities Improving existing infrastructure (enhancement/ greening the grey)Kelp forests Maerl Managed realignment to prevent rising sea level Mudflats Restoration or creation of habitats Saltmarsh Seagrass Subtidal mud (inc. sea pen and burrowing megafauna communities)
Human pressure:	Shipping
Human pressure: Aquaculture	Sustainable aquaculture
Human pressure: Aggregates	Aggregate extraction

Action Theme	Action Subject
Human pressure: Fisheries	Ecosystem based fisheries management Fisheries management Fisheries management: By-catch Fisheries management: reduce pressure on cetaceans
Human pressure: Recreation	Manage recreational disturbance
INNS	Prevention and monitoring of INNS
Litter	Reduce plastic/ litter Reduce plastic: screening of effluents/ sewage
Policy	Nature recovery and resilience in spatial planning Development in low quality habitat Mitigation hierarchy to development Nature based solutions (NBS) Protect sensitive features/ areas from development
Protection	MPA creation MPA creation: collaborative areas MPA management, condition improvement
Research	Delivery of enhancement/ environmental funding Industry innovation/ sustainability
Species restoration/ protection	Birds Fish Sandeel
Underwater noise	Reduce underwater noise

3 Results

The survey generated a total of 58 responses across a wide range of industries/ sectors.

From the 58 responses, 293 actions were identified by respondents as potential priorities and targets for marine restoration and enhancement in UK waters. These actions were subsequently classified into a number of overarching themes (Table 1) and the actions within each theme are discussed in more detail in Section 3.2 below. A summary of the responses is presented in Appendix A.

3.1 Responses by sector

Responses were received from 14 of the 18 listed sectors. Government agencies and consultancies provided the two highest sector responses. No responses were received from the aquaculture, cables, recreation or shipping sectors.

Six responses came from 'Other' sectors including the defence sector, dredging, power transmission and from the Seabed User Development Group (SUDG). There was also a response from a freelance geologist and a Coastal Partnership.

A breakdown of the percentage of responses by sector is shown in Figure 1 and the number and type of suggested actions in Figure 2.

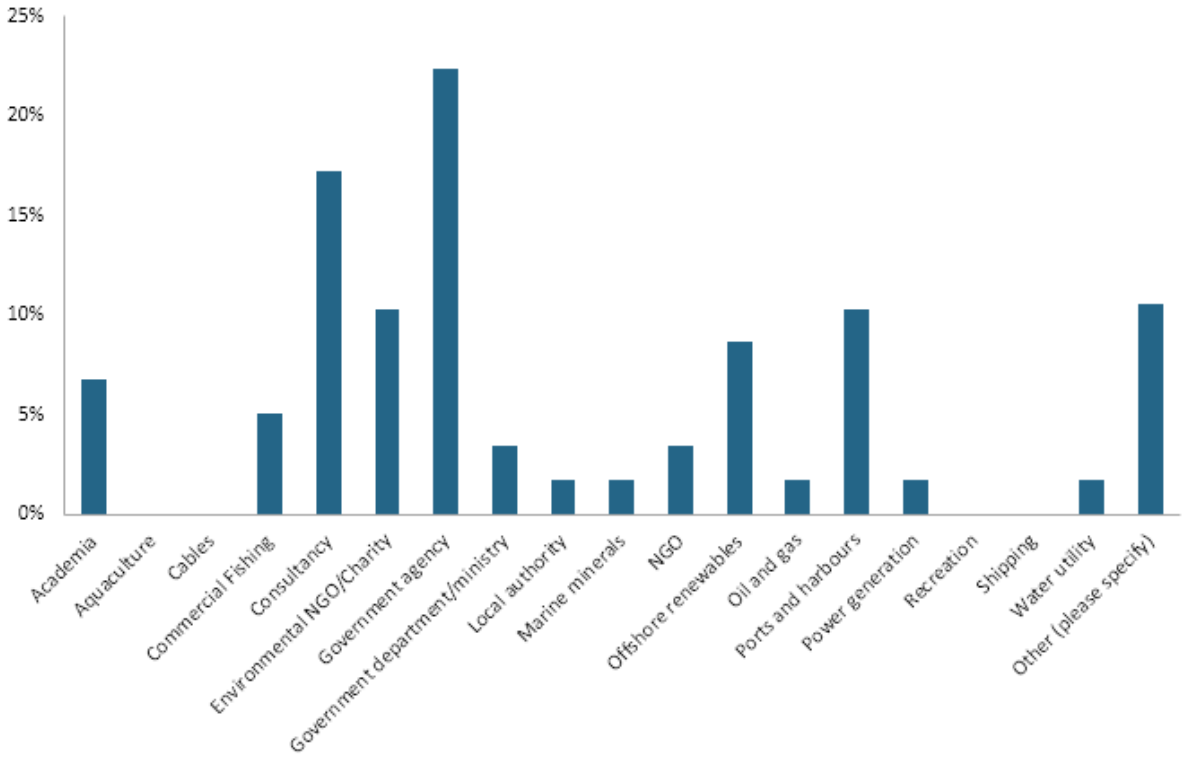


Figure 1. Percentage of responses from each sector

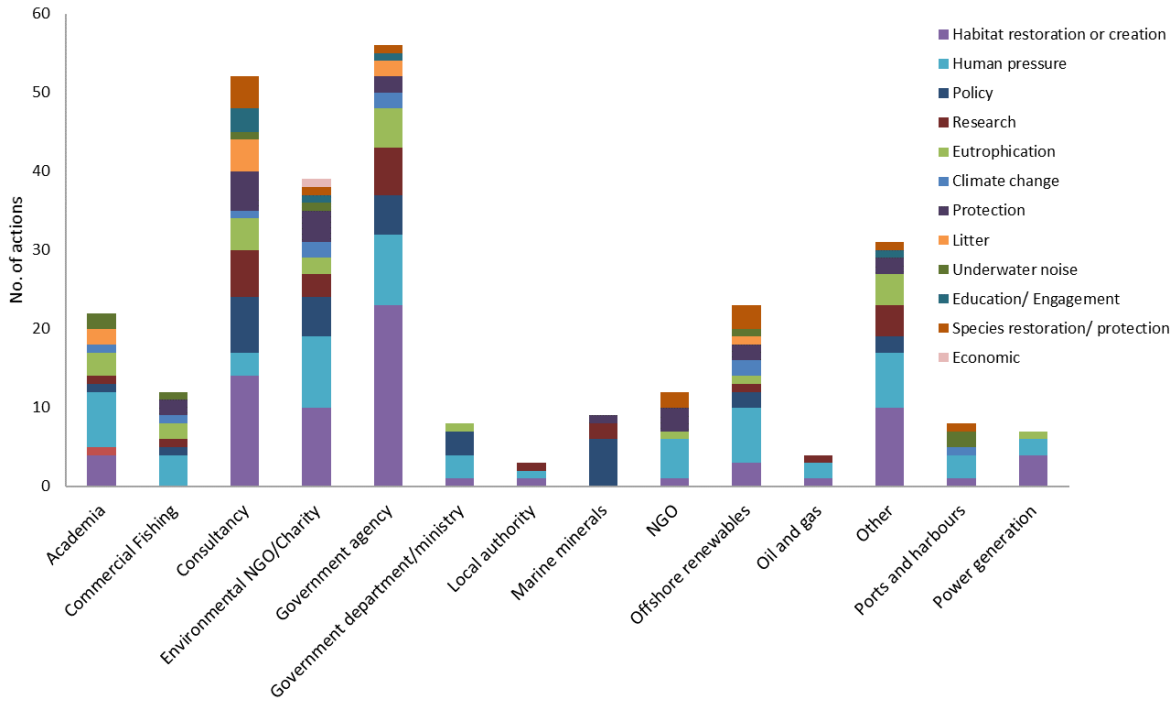


Figure 2. Number and type of suggested actions by each sector

3.2 Identified actions

3.2.1 Climate change

Ten climate change actions were identified by respondents along two key subjects which included encouraging further use of renewable energy and managing climate change impacts.

Managing the impacts of climate change was the main identified action covering the need to protect blue carbon stores, reduce emissions to meet net zero and reduce ocean acidification. The targets suggested by respondents included limiting temperature rise to 1.5 °C, reaching net zero emissions by 2050 and reversing biodiversity decline within the next 5–20 years.

Blue Economy Framework Action Plans were also suggested with a timescale of within the next 5 years. Industry could contribute towards these targets by accounting for natural capital within the full supply chain, funding strategic monitoring work and considering nature-based solutions to development.

Within the next 5 years it was suggested that the use of renewable energy be encouraged with 30% of the new Environmental Land Management Schemes being dedicated to coastal sustainability activities. This is a target which would likely need to be government led.

3.2.2 Education and engagement

Six actions were identified by respondents relating to education or engagement with stakeholders to enhance the success of restoration and enhancement schemes.

Suggestions included educating the public on the importance of coastal and marine habitats, and natural coastal defences. Similarly, the engagement of stakeholders with regard to restoration and enhancement schemes was suggested through the use of media campaigns with media outlets, national organisations and councils over the next 5–20 years. Industry could contribute to these targets by funding and undertaking media campaigns to engage stakeholders.

3.2.3 Eutrophication

Twenty-five actions relating to eutrophication and the reduction of pollution entering the marine environment were suggest by respondents.

Respondents identified priority actions relating to habitat restoration of seagrass and the reduction of pollution through improving water quality and reducing pollutants and nutrient pressure. One respondent suggested that nutrient run-off from land, sewage and diffuse, should be reduce by 50% within the next 5 years. Over the next 5–20 years, respondents suggested that a reduction in nitrogen and other pollutants (including sediment) should be a priority and that targets should be implemented through the Water Framework Directive to reduce such pollution. Over the longer term (20 + years), the restoration of eutrophic waterbodies to good environmental standard by 2050 was suggested. Similarly, it was suggested to reduce waste to pre-1990 levels by 2030. Predominately, these targets would be the responsibility of water companies, but it was suggested that industry could offset nutrient pressure by restoring/crating habitats with filtration capacities, such as mussel beds.

The improvement of sewage works for reducing pollution was identified as a key priority by one respondent with suggestions of investment into sewage treatment infrastructure over the next 5–20 years. It is likely that this target would need to be led by water companies.

Overall, respondents felt that actions to reduce eutrophication were the responsibility of the responsible pollutant, but that industry could contribute through a pooled fund. It was felt most actions identified could be achieved in the medium term (5-20 years).

3.2.4 Habitat restoration and creation

One of the most common themes identified as a key priority by respondents was habitat restoration and creation with 74 actions identified.

General targets suggested for the restoration and creation of habitats included restoring and enhancing a combination of habitats in a transboundary context and considering the potential effects of climate change in restoration over the next 5–20 years.

Identifying restoration targets and priorities was proposed as an action by respondents with suggested targets including identifying and mapping of restoration possibilities and priorities and using ecosystem services to determine the value of habitats within the next 5 years. One respondent suggested targets of 10% net gain by 2025, 15% by 2030 and 20% by 2035. It was suggested that these targets would need to be predominately government led, however industry could facilitate in reaching targets through the sharing of data, providing funding or incorporating net gain as part of development plans. Improving existing infrastructure was also proposed through targets such as government-led guidance on nature-inclusive design and appropriate enhancement measures within the next 5 years. Although government led, industry could contribute by funding research. Similarly, the 'greening' of coastal infrastructure could be implemented by industry.

In terms of general seabed habitats, respondents indicated that the creation of benthic protected habitats or features and habitat creation such as wetlands for preventing inland flooding and providing natural habitats should generally occur within the next 5 years and 5–20 years. The restoration of coastal and subtidal habitats which provide carbon sequestration and coastal protection was suggested over a period of the next 20+ years. One respondent recommended the development of a comprehensive strategic framework over the next 5–20 years. Industry could contribute to these targets through net gain, habitat restoration and climate adaptation work, intertidal creation through managed realignment and providing funding to support restoration efforts.

Several different habitat types were identified as key priorities by respondents. These included bivalve reefs (oyster, blue mussel, horse mussel), saltmarsh, seagrass, mudflats, maerl, kelp forests, estuaries, cold-water coral reefs and subtidal mud. The targets and timescales suggested by respondents for each of these each are detailed below along with how industry could contribute to these targets.

Overall, respondents felt that habitat restoration targets could be implemented by industry, through direct small-scale habitat creation/ restoration in intertidal areas, as well as through government-led initiatives at a more strategic level. It was however felt that any actions which required pressure reduction, such as removal of fishing pressure would need to be government led. A number of actions were identified, some which could be achieved within the next 5 years and some medium-term actions to be achieved in 5-20 years. These are summarised in Table 2.

Bivalve reefs

Two respondents proposed targets for the creation or restoration bivalve reefs. This included one suggestion of restoring 1,000 ha of oyster reefs, horse mussel beds and blue mussel beds over the next 5–20 years, whilst the other suggested 200 ha of blue mussels with increased management of farming practices over the same timescale.

Saltmarsh

Quantitative targets for the creation and restoration of saltmarsh habitats ranged from 10,000 ha to 25,000 ha, with timescales of predominately 5–20 years. The highest suggested target of 25,000 ha of saltmarsh had a proposed timescale of 20 + years.

Seagrass

Seagrass restoration and creation quantitative targets ranged from 500 ha to 10,000 over 5–20 years. Other targets included increasing the extent of seagrass beds across the UK by 10% within the next 5 years and a doubling of the total area of both subtidal and intertidal seagrass over the next 5–20 years. One respondent proposed the use of eco-friendly moorings within seagrass beds for seagrass restoration which should be implemented within the next 5 years.

Mudflats

One respondent suggested a target of 10,000 ha of mudflats be created or restored over the next 5–20 years as a priority.

Maerl beds

It was suggested that increased protection of maerl beds be implemented through the creation of Highly Protected Marine Areas (HPMA) and No Take Zones (NTZ). Areas suggested by the respondent included The Manacles, St Mawes, Helford River, Swanage Bay, Bembridge and other recognised beds. It was proposed this takes place within the next 5 years, but creation of these designations would need to be government led.

Kelp forests

The restoration of kelp forests was suggested with a target to reduce damaging pressure on historic forests over the next 5–20 years.

Estuaries

Targets for the restoration of estuarine habitats were proposed by two respondents. Firstly, through assessing heavily modified water bodies (HMWB, a water body significantly altered by human activity, e.g. a harbour) for 'Good Ecological Potential' under the WFD. Secondly, by reconnecting estuary habitats to tributary catchments. Timescales for both were suggested to be 20 + years.

Cold water coral reefs and biogenic reefs

Cold-water coral reef habitats and biogenic reefs were identified as a priority by respondents with targets including increasing the extent of biogenic reefs across the UK by 10% within the next 5 years and increasing current habitats levels by 50% over the next 5–20 years. Reducing damage to reef habitats from fishing and other activities was also suggested as a target for the next 5–20 years, however, reducing fishing pressures on these habitats would likely need to be government led.

Subtidal mud habitats

Lastly, subtidal mud habitats (including sea pen and burrowing megafauna communities) were proposed as a priority by one respondent with a target of protecting or restoring 30% of these habitats over the next 5–20 years.

Respondents indicated that industry could contribute to the majority of these targets through providing funding to support restoration efforts, for example nature recovery funds or environmental improvement funds. Equally, industry has the potential to lead on habitat creation/restoration, for example, through managed realignment.

3.2.5 Species restoration and protection

Species restoration and protection was recognised was a key priority by respondents with thirteen actions identified. These were in addition to the numerous targets for characterising species of habitats covered under habitats above. Two key species groups were identified - birds and fish/shellfish - in addition to plants and invertebrates. No actions were identified by respondents for marine mammals. The suggested targets and timescales for each of these each are detailed below along with how industry could contribute to these targets.

In general respondents agreed that actions to support the restoration and protection of birds could be achieved within the next 5 years. Most actions focused on the removal of predation pressures and creating nesting habitat. In contrast actions to restore fish, including sandeel, populations were more variable in timescale ranging from 'quick wins' to long-term targets (20+ years) (Table 2). For sandeel the majority of actions related to the reduction of fishing pressure. For other species such as salmon and shad, the restoration of populations through habitat improvement or farming/ rearing programmes were the main suggestions. It was agreed that pressure reduction approaches would need to be government led but there was potential for industry to provide funding to a pooled fund to support restoration efforts.

Birds

Firstly, targets for the restoration of birds included protective measures such as the eradication of mammalian predation at current and historic sites of seabird colonies and the protection of salt stacks as bird resting areas. Creation of artificial habitats was proposed, with targets including 10 new tern colonies using floating rafts, and nesting habitats for 1,000 nesting pairs of seabirds such as kittiwakes and gannets. One respondent also proposed a ban of the UK sandeel fisheries within the next 5 years to support key bird species such as Black-legged kittiwake and terns. Whilst reducing fishing pressure would need to be government led, industry could provide funding to support seabird restoration efforts.

Fish and shellfish

For the restoration of fish and shellfish, short-term targets included the captive breeding and release of target species, such as lobsters, eels and other fish within the next 5 years. Longer-term targets of between 5–20 years involved the restoration of salmon populations to within conservation limits, restore breeding populations of allis and twaite shad and smelt in 10 estuaries and achieving silver eel escapement targets. Protection of fish populations would likely need to be Government led; however, industry could provide funding to support restoration projects or develop farming/rearing techniques.

The restoration and protection of sandeel populations was identified as a priority by respondents. Two targets focussed on area closures/exclusion zones to improve the breeding and nursery grounds within the next 5 years. Other targets covered the restoring of sandeel populations, including reducing sandeel catches by 66% and reducing trawling in sandeel habitats within the next 5 years. Although area closures would need to be government led, industry could work collaboratively to reduce cumulative pressures, reduce the demand for sandeel in animal feed and fund research into alternatives, and potentially use wind farm arrays as fishing exclusion zones.

3.2.6 Human pressures

A range of human pressures were identified as key priorities, including disturbance from marine aggregates, aquaculture, commercial fishing, ports & shipping and recreation. Sixty-two actions were identified by respondents, two for shipping, two for marine aggregates, three for aquaculture, 37 for commercial fishing and 12 for recreational disturbance.

In terms of industry disturbance, it was suggested that the disturbance from shipping, aggregate and navigation dredging, and fishing activities could be reduced in the next 5–20 years. There was overwhelming consensus by respondents that actions to address these issues would need to be defined and led by government. However, respondents felt that industry could contribute through collaborative reduction in cumulative pressures, funding research into more sustainable methods/ materials e.g. for fishing and could research the use of wind farm arrays as fishing exclusion zones.

Shipping

Suggestions included reducing disturbance from shipping (creating 10% of our oceans as no go areas) and reducing impacts from large vessel anchorage by implementing safe anchorage to reduce disturbance to the seabed within the next 5 years.

Aggregate dredging

It was suggested that a target might include research to address the impacts of sediment removal and the recycling of aggregate material to reduce extraction requirements over the next 5–20 years.

Aquaculture

The need for sustainable aquaculture was suggested with targets including the encouragement of establishment of sustainable seaweed and shellfish farming within the next 5 years and the reduction of open cage aquaculture with more sustainable approaches in the next 5–20 years.

Commercial fishing

Actions relating to pressures associated with fisheries were the second most common theme identified by respondents with 37 suggested actions across a range of subjects including fisheries management, by-catch, ecosystem-based management and reducing pressure on cetaceans.

Respondents identified several key priorities and targets identified regarding fisheries management. Firstly, suggested targets for bottom gear fisheries included reducing all bottom trawling efforts by 50% in the next 5–20 years and reducing bottom gear in vulnerable or protected habitats by 50% or more within the next 5 years. The designation of no trawl zones and fishing exclusion zones was also suggested, with one respondent proposing the creation of 3 x 120,000 square miles of no trawl zones within the next 5 years.

Targets proposed by several respondents covered the prohibition of scallop dredging, firstly the suggestion of ceasing scallop dredging within a 5-mile radius of the coast within the next 5 years, secondly prohibiting scallop dredging throughout UK waters within 5–20 years, and lastly a ban on scallop dredging in areas such as the Irish Sea within the next 5 years.

Several respondents covered targets relating to lost fishing gear. This included the use of biodegradable nets and materials and the tracking of fishing gear, for example with GPS, within suggested timescales of the next 5 years and the 5–20 years.

Reducing fishing pressures on cetaceans was also identified with targets for reducing the major causes of cetacean loss, such as by catch, by 10% and through the use of by-laws to reduce entanglement over the next 5 years.

Lastly, ecosystem-based fisheries management was identified as a priority by respondents. Suggested targets were the amending the ICES approach to include predator and prey relationships, and for fisheries management to be at a scale that matched ecosystem processes on temporal and spatial scales. It was suggested these targets take place within the next 5 years.

The implementation of these targets, such as area closures or restrictions, ecosystem-based management and changes to fishing gear would need to be government or fishing industry led. Potential contributions from industry may include funding research into more sustainable methods and materials, the use of wind farm arrays as fishing exclusion zones and a collaborative reduction in cumulative pressures.

Recreation

Managing recreational disturbance (from activities such as paddle boarding, bait digging, drones, jet skis, boating, trampling) was identified as a priority by several respondents. Suggested targets included management of existing and new activities in the marine area, and the licencing of all coastal commercial activities. Introducing rangers and setting codes of conduct for recreational use was also a suggested target within the next 5 years.

The reduction in disturbance to habitats was suggested with targets of regularly surveying protected habitats by monitoring and surveying impacts of visitor numbers on wildlife over the next 5–20 years. The reduction in disturbance on wildlife was also suggested by enforcing that all commercial water users (particularly those involved in wildlife watching activities) are accredited for minimising disturbance on marine life within the next 5 years.

Lastly, it was proposed that recreational vessels and other craft have more appropriate effluent disposal in place within the next 5 years.

Overall, the majority of these targets are required to be government led, however, industry could contribute to through providing funding for research or nature recovery funds, sharing data and potentially reducing cumulative pressures from these activities collaboratively.

3.2.7 Marine litter

Ten actions to reduce plastic and marine litter were identified as a priority by respondents. Suggested targets for the general reduction in plastic and litter were the removal of 100 tonnes of marine litter from the oceans per year, and the total ban on the use of microplastics within the next 5 years. Industry could contribute to these targets though investing in plastic reduction policies research and implementing a general reduction of plastic waste where possible.

Targets were also suggested for reducing plastic specifically in effluents and sewage. It was proposed that all sewage treatment works should ‘micro-screen’ final effluents to remove plastics and remedial action to crude sewage screens to reduce plastics within the next 5 years. Screening of combined sewage overflow over the next 5–20 years to reduce plastics was also suggested. Water companies would need to lead on these actions; however, implementation could be supported by funding from industry.

3.2.8 Policy

Thirty-four actions relating to changes in policy were identified by respondents. These were split into five key subjects:

- Nature recovery and resilience in spatial planning, including:
  - Climate change considerations;
  - Strategic approach;
  - Integrated development ;
- Protecting sensitive features/ areas from development;
- Development in low quality habitat;
- Mitigation hierarchy to development; and
- Nature based solutions (NBS).

Respondents identified a range of priorities and targets under the theme of policy. The development of low-quality habitat within 100 m of an estuary or the coast was proposed with a target of reclaiming habitats by demolishing derelict or non-occupied property vacant for more than 1 year. It was suggested this should take place over the next 5–20 years, however such a target would need to be government led.

Under the theme of nature recovery and resilience in spatial planning, it was suggested that medium/long-term ecosystem change is considered in decision making, including the impacts of climate change and ocean acidification. The use of restoration policies that tackle biodiversity and climate change and the establishment of regional biodiversity credit or bank schemes were also suggested actions, with for example at least one per Marine Plan Area in England. These targets were given a suggested timescale of within the next 5 years. Targets of ensuring that net gain is equitable across all sectors over the next 5–20 years were also indicated. These would all need to government led; however, industry could support the development of strategic goals and provide data to inform decision making.

Application of the mitigation hierarchy for developments was proposed with targets such as the use of checklists for developments to ensure mitigation is properly implemented, which could be implemented within the next 5 years. Other targets included restoring 10 ha of seagrass habitat over the next 5–20 years and the re-use of abandoned buildings and use of nature-based solutions within the next 5 years. Contributions from industry could include working with councils and respondents to prevent destructive practices in sensitive habitats (e.g. no dredging in seagrass) and encourage development in low quality habitats.

It was suggested that nature-based solutions (NBS) be included in legislation over the next 5–20 years (by 2030), including a 25% uplift on species/habitat diversity over the same time scale. Although changes to legislation would be government led, industry could incorporate ecosystem services into planning applications and incorporate net gain to achieve habitat uplift.

Lastly, two targets proposed by respondents covered the protection of sensitive features and areas from development. These targets included the creation of 100 ha per year of marine exclusion zones and prevention of properties being built or redeveloped in coastal flood risk zones. Timescales for these targets were within the next 5 years and 5-20 years, respectively.

3.2.9 Protection

Twenty-one actions along four main subjects were identified by respondents regarding protection of habitats and species, these included MPA management and condition improvement, MPA creation, MPA creation in collaborative areas and other habitats and species protections. For MPA management and condition improvement, two respondents both suggested that designated sites be in favourable conditions, with one respondent specifying a target of all MPAs be in favourable condition within the next 5 years.

Targets suggested by respondents for MPA creation included the designation of 10 further MPAs across the UK by 2030, increasing the number of NTZs/HPMAs to cover 10% of English waters and a target of 33% of UK waters to be fully protected (with no activities such as fishing, aggregate extraction, oil and gas extraction etc.). It was suggested these targets would take place over the next 5–20 years.

Respondents identified two targets under the creation of MPAs in collaborative areas. Firstly, the protection of areas from fishing in partnership with cables or wind farms and the co-location of renewable energy arrays with protected areas. Both targets had suggested timescales of 5–20 years.

Four targets were suggested specifically for the protection of habitats and species, these included the protections for keystone species over the next 5–20 years and the creation of special protected areas for bird nesting habitats and their prey species. One respondent suggested that permits not be granted for development on any existing priority habitats and another proposed the use of exclusion zones around shared cables, both with suggested timescales of the within the next 5 years.

Formal protections in the marine environment would need to be government led, however, there is the potential for industry and developers to contribute to these targets by working with statutory bodies to consider opportunities.

3.2.10 Research

Under the theme of research, industry innovation/sustainability was identified as a priority by respondents. Two targets were suggested in terms of industry innovation/sustainability, including the support of innovation in the propagation of maricultural technology within the next 5 years, and a target to understand the cumulative effects of offshore wind within the next 5 years.

Another action identified was the delivery of enhancement/environmental funding with nine potential targets suggested. Firstly, exploring practical tools and mechanisms for delivery of enhancements through environmental enhancement funds within the next 5 years. Three targets referring to funding of research included the commitment of £10 million per year to marine environmental research, specifically net gain opportunities within the next 5 years, funding to be provided to development for achieving net loss/net gain, although no suggested targets or timescales were provided, and the funding of post-mortems of 30% of all marine species stranding's to facilitate research of human impacts over the next 5–20 years. Two other targets were the designation of 5 'quiet ocean areas' around the UK for research purposes, and the improvement of research on habitat and species restoration methods both with timescales within the next 5 years. Lastly, funding scientific research over the next 5–20 years was suggested as a target for understanding the cumulative effects of development on habitats and species. Industry could contribute to these targets by providing funding to pooled funds such as nature recovery funds or environmental improvement funds and providing funding to support such research.

A number of wider comments and actions relating to research were identified by respondents however many did not have specific targets associated with them.

The actions identified were:

- Understanding the true flood risk on lowland landscapes behind barrier beaches;
- Develop a common understanding of terminology (maintain, restore, enhance, resilience, net gain, net benefits etc) and how these might apply differently across administrations;
- Identify and acknowledge the specific human contributors impacting the environment, direct and indirect, and impacting biodiversity in particular;
- Create a system and guidance on how to implement biodiversity net gain in both intertidal and subtidal environments, perhaps incorporating biodiversity banking to help fund large scale restoration schemes;
- Build on the evidence to improve ecological resilience, targeting the best locations and avoiding possible conflicts. For example, the role of ecostructures in supporting resilience;
- Research the reason of loss of the habitat which is to be restored;
- Identify key species that are resilient to future changes; and
- Collect and collate evidence and meta-data of myriad human impacts, direct and indirect, deliberate and accidental.

3.2.11 Underwater noise

Eight actions were identified by respondents all regarding the reduction of underwater noise. Two targets were suggested, first, the implementation of noise guidance on all seabed activity and not just within MPAs, and second the funding of grants to encourage boat manufacturers to develop quieter engines. Timescales of within the next 5 years were proposed for both targets. Although government will be required to implement and define acceptable levels of underwater noise, industry can support the implementation.

3.2.12 Other

Economic

Targets suggested by respondents proposed that funding be provided to first, increase employment in green jobs and second, for research into nature-based solutions within the next 5 years. There is potential opportunity for industry to provide such funding.

INNS

Two targets were suggested by respondents regarding the prevention and monitoring of INNS. First, a target for robust monitoring programs to be in place by 2025, and second the development of evidence-based action plans and management options to prevent INNS. Industry could implement monitoring programs and management options to control INNS.

3.2.13 Timescale for delivery

Table 2 identifies the different actions suggested by respondents within the different suggested timescales for delivery; within the next 5 years. 5-20 years and 20+ years, in order to help define recommendations for 'quick wins', medium- and long-term targets. It was considered that most actions could be achieved within the next 20-years. Details of specific actions identified are presented in Appendix A.

Table 2. Target time scales for net gain actions identified by respondents

Action Theme	Within the Next 5 Years	5 - 20 Years	20 + Years
Climate change	▪ Encourage renewable energy ▪ Manage climate change impacts	▪ Manage climate change impacts	-
Education/ Engagement	-	▪ Educate: Importance of natural coastal defences; coastal and marine habitats ▪ Engage stakeholders: restoration/ enhancement schemes	-
Economic	▪ Green jobs for communities	-	-
Eutrophication	▪ Reduce pollution: improve water quality, nitrogen and sediment, reduce nutrient pressure	▪ Habitat restoration: Reduce pressure on eelgrass ▪ Reduce pollution: improve sewage works ▪ Reduce pollution: improve water quality, nitrogen and sediment, reduce nutrient pressure	▪ Reduce pollution: improve water quality, nitrogen and sediment, reduce nutrient pressure
Habitat restoration or creation	▪ Biogenic reef ▪ General seabed habitats ▪ Identify restoration targets and priorities ▪ Improving existing infrastructure (enhancement/ greening the grey) ▪ Maerl ▪ Managed realignment to prevent rising sea level ▪ Restoration or creation of habitats ▪ Seagrass	▪ Biogenic reef ▪ Bivalve reefs (mussels, oysters) ▪ Cold-water coral reefs/ ▪ General seabed habitats ▪ Kelp forests ▪ Managed realignment to prevent rising sea level ▪ Mudflats ▪ Restoration or creation of habitats ▪ Saltmarsh ▪ Seagrass ▪ Subtidal mud (inc. sea pen and burrowing megafauna communities)	▪ Estuaries ▪ General seabed habitats ▪ Saltmarsh
Human pressure	▪ Shipping	▪ Shipping	-

Action Theme	Within the Next 5 Years	5 - 20 Years	20 + Years
Human pressure: Aquaculture	▪ Sustainable aquaculture	▪ Sustainable aquaculture	-
Human pressure: Dredging	-	▪ Aggregate extraction	-
Human pressure: Fisheries	▪ Ecosystem based fisheries management ▪ Fisheries management: By-catch ▪ Fisheries management: reduce pressure on cetaceans ▪ Fisheries management: Sustainable fisheries, Bottom gear	▪ Fisheries management: By-catch ▪ Fisheries management: Sustainable fisheries, Bottom gear	-
Human pressure: Recreation	▪ Manage recreational disturbance	▪ Manage recreational disturbance	-
INNS	▪ Prevention and monitoring of INNS	-	-
Litter	▪ Reduce plastic/ litter ▪ Reduce plastic: screening of effluents/ sewage	▪ Reduce plastic: screening of effluents/ sewage	-
Policy	▪ Mitigation hierarchy to development ▪ Nature recovery and resilience in spatial planning ▪ Protect sensitive features/ areas from development	▪ Development in low quality habitat ▪ Mitigation hierarchy to development ▪ Nature based solutions (NBS) ▪ Nature recovery and resilience in spatial planning ▪ Protect sensitive features/ areas from development	-
Protection	▪ MPA management, condition improvement ▪ Other habitat/ species protection	▪ MPA creation ▪ MPA creation: collaborative areas ▪ Other habitat/ species protection	-
Research	▪ Delivery of enhancement/ environmental funding ▪ Industry innovation/ sustainability	▪ Delivery of enhancement/ environmental funding	-
Species restoration/ protection	▪ Birds ▪ Fish ▪ Sandeel	▪ Birds ▪ Fish	-
Underwater noise	▪ Reduce underwater noise		-

4 Discussion

It was highlighted by respondents that industry could contribute to actions within the majority of themes identified. In general, the most recognised way that industry could contribute was through providing funding but in some areas such as habitat creation, there was greater scope for industry to directly implement schemes.

The actions with the greatest support by respondents were the restoration and creation of habitats, protection of bird and fish species and their habitats, and the management of recreational disturbance. The provision of funding through pooled funds to support restoration was the most recognised form of industry contribution by respondents to support such actions. Types of funds could include, for example, nature recovery funds or environmental improvement funds.

Other areas in which respondents felt industry funding could contribute, included the funding of research into environmental enhancement and sustainability (particularly in terms of plastic and marine litter). However, the T&F Group would not consider research actions by themselves to constitute net gain but may form part of net gain where it constitutes part of a strategic programme, for which the funding could contribute to delivery.

Managing pressures from fisheries was the second most recognised priority, however all actions would likely need to be led or facilitated by government and statutory bodies. Several other suggestions from respondents highlighted actions which would need to be led by government or statutory bodies. These included actions in themes such as MPA designation and management, human pressures (e.g. aggregate dredging, recreation), and species and habitat restoration or protection. These actions mostly related to the closure of areas, the formal protection or designation of species and habitats, and changing legislation/policy. Where actions were identified as being led by statutory bodies, it was often recognised that industry could potentially contribute through working with those statutory bodies to consider further opportunities, the sharing of data and supporting the development of strategic goals.

The responses included actions which involved managing the impacts of climate change. Climate change is one of the top impacts and concerns for the marine environment, however it will be important to look at how marine net gain can target actions that help address the resilience of the marine environment and its ability to adapt to climate change pressures. It was felt that areas of this work would need to be government led but that industry could contribute by accounting for natural capital within the full supply chain of business practice and considering nature-based solutions to development.

The stakeholder feedback received during this survey has been used to identify initial draft priorities for marine net gain, developed by the T&F Group, upon which marine stakeholder will be asked to comment in a second survey. A limitation of the current survey methodology is that the survey was purposefully kept broad to identify stakeholder priorities for marine and intertidal restoration and enhancement and was not to be constrained by additionality or preconceived ideas of net gain, the Group therefore cautions against over-interpretation of the responses received. However, the results from this and the second survey, to follow, will be used to inform the Group's final recommended priorities for marine net gain.

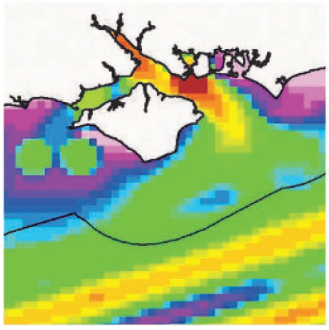
5 Abbreviations/Acronyms

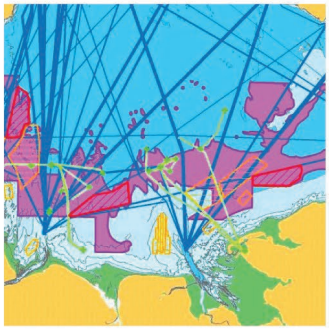
CMS	Communications and Management for Sustainability
CSO	Combined Sewage Overflow
Defra	Department for Environment, Food and Rural Affairs
EEZ	Exclusive Economic Zone
ELMS	Environmental Land Management schemes
GES	Good Environmental Status
GPS	Global Positioning System
HMWB	Heavily Modified Water Body
HPMA	Highly Protected Marine Areas
ICES	International Council for the Exploration of the Seas
IFCAs	Inshore Fisheries and Conservation Authorities
INNS	Invasive Non-Native Species
MPA	Marine Protected Area
NBS	Nature Based Solution
NGO	Non-Governmental Organisation
NTZ	No Take Zones
OWEAP	Offshore Wind Enabling Actions Programme
REM	Remote Electronic Monitoring
SPA	Special Protection Area
STW	Sewage Treatment Works
SUDG	Seabed User Development Group
T&F Group	Task and Finish Group
UK	United Kingdom
WFD	Water Framework Directive
WiSe	Wildlife-Safe

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

Appendix




Innovative Thinking - Sustainable Solutions

ABP mer

A Summary of Responses

Action Theme	Action Subject	Suggested Targets	Target Time Scales	Can and How Could Industry Contribute?
Climate change	Manage climate change impacts ▪ Protect blue carbon stores ▪ Reduce emissions to meet net zero ▪ Reduce ocean acidification	1. Limit temperature rise to 1.5 °C 2. Net zero emissions by 2050 3. Reverse biodiversity decline 4. Blue Economy Framework Action Plans	1. 5 - 20 years 2. 5–20 years 3. 5–20 years 4. within the next 5 years	**Yes.** Account for natural capital within the full supply chain of business practice, fund strategic monitoring work, consider nature-based solutions to development
	Encourage renewable energy	1. 30% of the new ELMS scheme dedicated to coastal sustainable activities	1. within the next 5 years	**No.** Government led
Economic	Green jobs for communities	1. Fund employment in green jobs and research in NBS	1. within the next 5 years	**Yes**. Provide funding
Education/ Engagement	Educate: ▪ Importance of natural coastal defences ▪ Importance of coastal habitats ▪ Importance of marine habitats	1. One 'Environmental, Habitat, Species and Awareness Raising Ranger' for every 100 overnight stays	1. 5–20 years	**Yes**. Provide funding
	Engage stakeholders: restoration/ enhancement schemes	1. Media campaigns collaboratively with media outlets, national organisations and councils	1. 5–20 years	**Yes**. Provide funding for, or undertake, media campaigns to engage stakeholders
Eutrophication	Habitat restoration: Reduce pressure on eelgrass	1. Start in one major estuary where eelgrass loss has been extensive	1. 5–20 years	**Yes.** Provide funding to pooled fund e.g. to reduce nutrients
	Reduce pollution: ▪ improve water quality ▪ nitrogen and sediment ▪ reduce nutrient pressure	1. WFD targets 2. xx % reduction in nitrogen and other pollutants (inc. sediment) 3. Restore eutrophic waterbodies to GES by 2050 4. Reduce nutrient runoff (land, sewage, diffuse) but 50% 5. Reduce waste to pre-1990 levels by 2030 6. Introduce alternative farming sites to cut down on nitrates	1. 5–20 years 2. 5–20 years 3. 20 + years 4. within the next 5 years 5. 5–20 years 6. -	**Yes.** Predominantly the responsibility of wastewater companies but industry could help offset nutrients by restoring/ creating habitats with a filtration capacity e.g. mussel beds.
	Reduce pollution: improve sewage works	1. Investment in sewage treatment infrastructure	1. 5–20 years	**No.** Led by water treatment companies
Habitat restoration or creation	Restoration or creation of habitats	1. Consider restoration and enhancement in a transboundary context 2. Restore combinations of habitats, focus should not be around just one 3. Include climate change considerations in restoration 4. Development of a comprehensive strategic framework	1. within the next 5 years; 5-20 years 2. – 3. - 4. 5–20 years	**Yes.** Through net gain, habitat restoration and climate adaptation work and combined working e.g. offshore wind farms or farming/culturing facilities collaborating and providing new artificial habitat for biodiversity. artificial 3D structures. Provide funding to pooled fund to support restoration efforts e.g. to a nature recovery fund or environmental improvement funds.
	Identify restoration targets and priorities	1. Identify and map restoration possibilities and priorities 2. 10% net gain by 2025, 15% by 2030, 20 % by 2035. 3. Use ecosystem services to determine the value	1. within the next 5 years 2. within the next 5 years 3. within the next 5 years	**Yes.** Government led however sharing of data might help or providing funding e.g. nature recovery fund. Undertaking net gain required as part of development.
	Improving existing infrastructure (enhancement/ greening the grey)	1. Government to produce guidance on nature-inclusive design/ determine appropriate enhancement measures 2. xx no. of structures 'greened'	1. within the next 5 years 2. within the next 5 years	**Yes.** No.1 is Government led however industry could provide funding for research. Ports, harbours, developers with coastal infrastructure could implement 'greening'
	General seabed habitats	1. Habitat creation 2. Create wetlands to prevent inland flooding and provide natural habitats 3. Creation of xx ha of benthic protected habitats or features 4. Restoration of coastal and subtidal habitats that provide carbon sequestration, coastal protection 5. Identify 5 areas for each priority habitat which has been lost in the UK and re-create half of this area for each habitat	1. within the next 5 years; 5-20 years 2. 5- 20 years 3. within the next 5 years 4. 20 + years 5. 5–20 years	**Yes**. Through net gain, habitat restoration and climate adaptation work. Intertidal creation through managed realignment Provide funding to pooled fund to support restoration efforts e.g. to a nature recovery fund or environmental improvement funds

Action Theme	Action Subject	Suggested Targets	Target Time Scales	Can and How Could Industry Contribute?
	Managed realignment to prevent rising sea level	1. Coastal realignment and controlled retreat (to rising seas) 2. By 2030 only develop brown coastal land 3. xx hectares of land reclaimed 4. xx number of Natural flood management schemes implemented in freshwater systems covering xx kms of waterbody	1. 5–20 years 2. within the next 5 years 3. within the next 5 years 4. within the next 5 years	**Yes.** Through direct habitat creation/ restoration e.g. managed realignment, net gain Provide funding to pooled fund to support restoration efforts e.g. to a nature recovery fund or environmental improvement funds.
	Bivalve reefs (mussels, oysters)	1. Create/restore 1,000 ha oyster reef, 1,000 ha Modiolus beds and 1,000 ha mussel bed 2. 200 ha blue mussels + increased management of farming	1. 5–20 years 2. 5–20 years	**Yes.** Provide funding to pooled fund to support restoration efforts e.g. to a nature recovery fund or environmental improvement funds. Through direct habitat creation/ restoration e.g. managed realignment, net gain
	Saltmarsh	1. Create 10,000 ha of saltmarsh (both restoring old poor habitat, and new) 2. 10,000 ha saltmarsh 3. 25,000 ha saltmarsh 4. 20,000 ha saltmarsh	1. 5–20 years 2. 5–20 years 3. 20 + years 4. 5–20 years	**Yes.** Provide funding to pooled fund to support restoration efforts e.g. to a nature recovery fund or environmental improvement funds. Through direct habitat creation/ restoration e.g. managed realignment, net gain
	Seagrass	1. Create 100% more ha of both subtidal and intertidal seagrass 2. 10,000 ha seagrass 3. 5,000 ha seagrass 4. 1,000 ha seagrass (create or restore) 5. 5-10 ha in 2 years, 10-50 ha in 5 years, 500 ha within 20 years 6. Increase the extent of seagrass beds across the UK by 10% 7. Eco-friendly moorings within seagrass	1. 5–20 years 2. 5–20 years 3. 5–20 years 4. 5–20 years 5. within the next 5 years; 5-20 years 6. within the next 5 years 7. within the next 5 years	**Yes.** Provide funding to pooled fund to support restoration efforts e.g. to a nature recovery fund or environmental improvement funds. Through direct habitat creation/ restoration e.g. managed realignment, net gain
	Mudflats	1. 10, 000 ha mudflats	1. 5–20 years	**Yes.** Provide funding to pooled fund to support restoration efforts e.g. to a nature recovery fund or environmental improvement funds.
	Maerl	1. Increase protection of maerl beds - Discrete HPMA/NTZs for The Manacles, St Mawes, Helford River, Swanage Bay, Bembridge and other recognised beds	1. within the next 5 years	**No.** Government led
	Kelp forests	1. Reduce damaging pressure on areas of historic forest	1. 5–20 years	**No.** Industry not able to reduce fishing pressure, must be government led. **Potential options for industry**: Provide funding to pooled fund to support restoration efforts e.g. to a nature recovery fund or environmental improvement funds.
	Estuaries	1. Good Ecological Potential (WFD objective in HMWB) 2. Reconnect estuary habitats to tributary catchments 3. Reducing the impact of water flow speed increases in estuaries	1. 20 + years 2. 20 + years 3. 20 + years	**Yes.** Provide funding to pooled fund to support restoration efforts e.g. to a nature recovery fund or environmental improvement funds.
	Cold-water coral reefs/ biogenic reef	1. 50% increase in current levels 2. Reduce damage by fishing and other activities 3. Increase the extent of biogenic reefs across the UK by 10%	1. 5–20 years 2. 5–20 years 3. within the next 5 years	**No.** Industry not able to reduce fishing pressure, must be government led. **Potential options for industry**: Provide funding to pooled fund to support restoration efforts e.g. to a nature recovery fund or environmental improvement funds.
	Subtidal mud (inc. sea pen and burrowing megafauna communities)	1. 30% of the subtidal mud habitat is either protected or subject to restorative measures, and a minimum of 15% under MPA protection	1. 5–20 years	**No.** Protection is government led and industry not able to reduce fishing pressure/ damage **Potential options for industry**: Provide funding to pooled fund to support restoration efforts e.g. to a nature recovery fund or funding for research e.g. development of less destructive gear.

Action Theme	Action Subject	Suggested Targets	Target Time Scales	Can and How Could Industry Contribute?
Species restoration/ protection	Birds	1. Eradicate rat and fox predation as a significant pressure on seabird colonies 2. Create 10 new tern colonies using floating rafts 3. Ban UK sandeel fishery 4. Protect salt stacks as bird resting areas 5. Creation of artificial nesting habitat for seabirds e.g. kittiwake, gannet – 1,000 nesting pairs as a trial 6. eradicate all non-native invasive mammalian predators from all current and historically used breeding seabird islands	1. within the next 5 years 2. within the next 5 years 3. within the next 5 years 4. within the next 5 years 5. within the next 5 years 6. 5–20 years	**Yes.** Provide funding to pooled fund to support restoration efforts e.g. to a nature recovery fund or environmental improvement funds. Predator control at nesting sites **No.** Industry not able to reduce fishing pressure, must be government led. Protection must be government led
	Fish	1. Captive breeding and release of e.g. lobsters, eels, other fish 2. Restore salmon populations within conservation limits; 3. Achieve silver eel escapement target; 4. Restore breeding populations of allis and twaite shad and smelt in 10 estuaries	1. within the next 5 years 2. 5–20 years 3. 5–20 years 4. 5–20 years	**Yes.** Provide funding to pooled fund to support restoration efforts – develop farming/ rearing techniques or funding specific projects. Protection will be government led but could create nursery areas within wind farm arrays
	Sandeel	1. Improve breeding and nursery grounds for sandeel and other key fish species by creating exclusion zones 2. Restore sandeel population 3. Reduce sandeel catches by 66% 4. Reduction to trawling in sandeel habitat 5. Area closures: whole of the UK EEZ, or as a minimum Dogger Bank and Scottish EEZ.	1. within the next 5 years 2. 20 + years 3. within the next 5 years 4. within the next 5 years 5. within the next 5 years	**No.** Government led **Potential options for industry**: collaborative reduction in cumulative pressures, reduce sandeel use in animal feed and find a more sustainable alternative (research), use wind farm arrays as fishing exclusion zones
Human pressure	Shipping	1. Reduce the amount of disturbance in marine areas shipping, dredging, fishing activities – 10% of the world coastal areas as no access zones 2. Control large vessel anchorage/ implement safe anchorage points	1. 5–20 years 2. within the next 5 years	**No.** Government led
Human pressure: Aquaculture	Sustainable aquaculture	1. Reduce open cage aquaculture, replacement options 2. Encourage establishment of sustainable aquaculture seaweed and shellfish farming	1. 5–20 years 2. within the next 5 years	-
Human pressure: Dredging	aggregate extraction	1. Research to address impacts of sediment removal 2. Recycle aggregate material to reduce extraction requirement	1. 5–20 years 2. 5–20 years	**No.** preventing fishing/ dredging will be government led. **Potential options for industry**: collaborative reduction in cumulative pressures, fund research, share data
Human pressure: Fisheries	Fisheries management ▪ Sustainable fisheries ▪ Bottom gear	1. Stop all bottom dredging in UK waters 2. Stop dredging within a 5-mile radius of the coast 3. Manage bottom towed fishing gear 4. Ban on scallop dredgers e.g. in Irish sea 5. Licence and reduce trawling effort in vulnerable habitats to zero 6. Reduce bottom trawling by 50%, develop no trawl zones which cover a minimum of 30% of marine area 7. Create xx ha per year of fishing exclusion zones 8. Reduce the extent of bottom impacting fishing activities within protected sites by 50% or more 9. Create at least 3 120,000 square mile NTZs 10. Biodegradable fishing net/ materials 11. Complete ban on super trawlers within the 12 nm limit	1. 5 - 20 years 2. within the next 5 years 3. within the next 5 years 4. within the next 5 years 5. within the next 5 years 6. 5–20 years 7. within the next 5 years 8. within the next 5 years 9. within the next 5 years 10. 5–20 years 11. 5–20 years	**No.** preventing fishing/ dredging will be government led. **Potential options for industry**: collaborative reduction in cumulative pressures, research more sustainable methods/ materials, use wind farm arrays as fishing exclusion zones
	Fisheries management: By-catch	1. Requirements for 75% of fishers to use biodegradable, traceable nets by 2030. 2. 100 % biodegradable gear by 2040 3. Reduce ghost fishing with GPS tracking on gear and penalties 4. Monitoring improvements through rollout of G(REM) with cameras	1. within the next 5 years 2. 5–20 years 3. within the next 5 years 4. within the next 5 years	**No.** fishing industry and government led. IFCAs to support/ implement

Action Theme	Action Subject	Suggested Targets	Target Time Scales	Can and How Could Industry Contribute?
	Ecosystem based fisheries management	1. ICES approach amended to include key predator sp. and prey relationships 2. Fisheries management is at a scale that matches ecosystem processes (1-10 km, 3-6 months)	1. within the next 5 years 2. within the next 5 years	**No**. Government to define
	Fisheries management: reduce pressure on cetaceans	1. Remove major causes of cetacean loss including by catch in fishing nets – 10% prevention of loss 2. Implement noise guidance for seabed habitats 3. By-laws to implement rope-less creel fishing to reduce marine mammal entangle (trial within windfarms)	1. within the next 5 years 2. within the next 5 years 3. within the next 5 years	**No.** Government led **Potential options for industry:** support in implementation of guidance and windfarm industry could support trials (target 3)
Human pressure: Recreation	Manage recreational disturbance ▪ paddle sport, bait digging, drones, jet skis, boats, trampling	1. Managing existing and new activities in the marine area 2. Introducing rangers and setting codes of conduct for recreational use 3. Environmental recovery tax for every overnight stay. All coastal commercial activities to be licenced funded by relevant industry 4. No disturbance to protected habitats – monitor number of visitors per year, observations of impact, wildlife surveys to report/reflect any changes 5. Change land habitat to take pressures off the coast; strategic alternative green space for recreation 6. All commercial water users to be accredited (e.g. WiSe) – funding used to monitor/ police activity 7. xx % recreational/other craft using "better" effluent disposal, xx signs erected to warn recreational users of impacts	1. within the next 5 years 2. within the next 5 years 3. within the next 5 years 4. 5–20 years 5. - 6. within the next 5 years 7. within the next 5 years	**No.** Government and tourist industry led **Potential options for industry:** support in implementation of guidance or provide funding to pooled fund e.g. nature recovery fund or environmental improvement funds.
INNS	Prevention and monitoring of INNS	1. Monitoring program in place by 2025 2. Action plan/ management options developed based on evidence	1. within the next 5 years	**Yes**. Implement management options to control invasive non-native species
Litter	Reduce plastic/ litter	1. Remove 100 tonnes of marine litter per year 2. Total ban on use of micro plastics	1. within the next 5 years 2. within the next 5 years	**Yes**. Investing in plastic reduction policies and research. Reducing plastic use where possible. Government/ industry collaboration on carbon-pricing and credits
	Reduce plastic: screening of effluents/ sewage	1. All sewage treatment works (STWs) to micro-screen final effluents to reduce plastics 2. Remedial action to crude sewage screens to reduce plastics 3. Screening combined sewage overflow (CSO) to reduce plastics - greatest load (spill frequency and volume) 10%ile	1. within the next 5 years 2. within the next 5 years 3. 5–20 years	**No.** Wastewater/ sewage treatment company led. **Potential options for industry:** provide funding to pooled fund to support implementation
Policy	Nature recovery and resilience in spatial planning, including: ▪ Climate change considerations ▪ Strategic approach ▪ Integrated development	1. Medium/long-term ecosystem change considered in decision making, inc. climate change and ocean acidification impacts 2. Restoration policies that tackle biodiversity and climate change 3. Establish regional biodiversity credit or bank schemes, at least one per Marine Plan Area in England 4. Ensure net gain is equitable across all sectors	1. within the next 5 years 2. within the next 5 years 3. within the next 5 years 4. 5–20 years	**No**. All policy decisions will be government led. **Potential for industry**. Support development of strategic goals, provide data to inform decision making
	Protect sensitive features/ areas from development	1. Create 100 ha per year of marine exclusion zones 2. No properties built or redeveloped in a coastal flood risk zone by 2030 3. No development in protected areas that have any impact or loss of habitats/species	1. within the next 5 years 2. 5–20 years 3. within the next 5 years	**No.** Government led
	Development in low quality habitat	1. Derelict or non-occupied property vacant for more than 1 year should be demolished and reclaimed to habitat if within 100 m of an estuary or coastal edge	1. 5–20 years	**No.** Government led
	Mitigation hierarchy to development no net loss, net gain	1. Checklists to licencing/ policy developments to ensure mitigation hierarchy appropriately implemented 2. Restore 10 ha seagrass habitat 3. Re-use of abandoned buildings, include nature-based solutions	1. within the next 5 years 2. 5–20 years 3. within the next 5 years	**Yes.** Prevent destructive practices in sensitive habitats (e.g. no dredging in seagrass) and encourage development in low quality habitats, work alongside councils and stakeholders

Action Theme	Action Subject	Suggested Targets	Target Time Scales	Can and How Could Industry Contribute?
	Nature based solutions (NBS)	1. Legislation to include NBS by 2030 2. 25% uplift on species/ habitat diversity by 2030	1. 5–20 years 2. 5–20 years	**Yes.** Elements government led but can incorporate ecosystem services into planning applications and incorporate net gain to achieve habitat uplift.
Protection	MPA management, condition improvement	1. All Marine Protected Areas to be in Favourable Condition 2. Bring all designated sites into favourable condition 3. Ensure MPAs are not seen as 'paper parks'	1. within the next 5 years 2. – 3. within the next 5 years	**Potentially.** Management of MPAs is government led **Potential for industry.** Developers could deliver or financially contribute to measures to achieve favourable condition, subject to additionality considerations.
	MPA creation	1. Designate 10 further MPAs across the UK by 2030 2. Increase the numbers of NTZs/ HPMAs to cover 10% of English waters to 12 nm limit 3. 33% of UK waters to be fully protected (no fishing, aggregate extraction, oil and gas etc.)	1. 5–20 years 2. 5–20 years 3. 5–20 years	**No.** Government led
	MPA creation: collaborative areas	1. Protect areas from fishing in partnership with cables or wind farms 2. Co-locate renewable energy arrays within protected areas	1. 5–20 years 2. 5–20 years	**No.** Government led **Potential for industry.** Industry, in particularly offshore wind, could work with statutory bodies to consider opportunities.
	Other habitat/ species protection	1. Do not permit development on any existing priority habitat 2. Protection for keystone species 3. Classification of new SPAs to protect bird nesting habitats and prey species 4. Exclusion zones around shared cables	1. within the next 5 years 2. 5–20 years 3. - 4. within the next 5 years	**No.** Government led **Potential for industry.** Industry could work with statutory bodies to consider opportunities
Research	Delivery of enhancement/ environmental funding	1. Explore practical tools and mechanisms for delivery of enhancements through environmental enhancements funds 2. Commit £10 million per year to marine environmental research, specifically Net Gain opportunities 3. Improve research on restoration methods 4. Designate 5 quiet ocean areas around the UK for study 5. Marine industries funding post-mortems for 30% of all marine species stranding's 6. Explore whether existing marine works have environmental benefits 7. Fund scientific research on the cumulative impacts to habitats and species 8. Develop blended finance mechanisms to provide funding to development to achieve net loss/ net gain	1. within the next 5 years 2. within the next 5 years 3. within the next 5 years 4. within the next 5 years 5. 5–20 years 6. within the next 5 years 7. within the next 5 years 8. 5–20 years	**Yes.** Provide funding to pooled fund to support research.
	Industry innovation/ sustainability	1. Supporting innovation in the propagation of mariculture technology 2. Understand cumulative effects of offshore wind	1. within the next 5 years 2. within the next 5 years	**Yes.** Provide funding to pooled fund to support research. Government to define use but industry can support implementation
Underwater noise	Reduce underwater noise	1. Implement noise guidance on all seabed (not just MPAs) 2. Funding grants to encourage boat manufacturers to develop quieter engines	1. within the next 5 years 2. within the next 5 years	**Yes.** Government to implement/ define levels but industry can support implementation

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Appendix C Second Stakeholder Survey Report

Offshore Wind Evidence and Change Net Gain:
Strategic Targets Task and Finish Group

Strategic Net Gain Targets for Coastal and Marine Environments

Results from the Second Stakeholder Survey

October 2021

Innovative Thinking - Sustainable Solutions

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Strategic Net Gain Targets for Coastal and Marine Environments

Results from the Second Stakeholder Survey

October 2021



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Executive Summary

There is widespread recognition of the need to take positive action to restore and enhance our marine environment. This is supported by the commitment in the Government's 25-year Environment Plan to reverse the loss of marine biodiversity and, where practicable, restore it.

Net Gain has been identified as an important mechanism that could contribute to halting and reversing marine biodiversity loss. Its application is designed to leave biodiversity in a better state and secure wider benefits for people and the environment.

The Offshore Wind Evidence and Change Strategic Net Gain Task and Finish Group (T&F Group), working closely with Defra's Offshore Wind Enabling Actions Programme (OWEAP), is working to identify suitable strategic targets for Marine Net Gain (MNG). ABPmer has been commissioned to support the work of the T&F Group.

The T&F Group commissioned an initial survey in July 2021, inviting respondents to identify priorities for MNG, the findings from which helped to shape the Group's views on strategic Net Gain priorities. This led to the development of draft priorities for coastal and Marine Net Gain opportunities.

To further support the development of recommendations for strategic targets for coastal and Marine Net Gain, a second on-line survey was held to gain views on the draft priorities identified by the T&F Group and also sought views on the extent to which industry might be able to contribute to measures to address those priorities.

The T&F Group also prepared a document which pulls together the results of the discussions within the group, the resulting assumptions determining strategic targets, and how these may be delivered, known as the draft assumptions paper. The second survey also invited separate comment on the accompanying assumptions paper.

The survey was designed using SurveyMonkey and a number of questions were posed to respondents relating to specific assumptions that had been made in developing the draft priorities and in relation to the draft priorities identified by the T&F Group. The questionnaire was launched on 27 August 2021 and ran for two weeks.

The survey generated a total of 37 unique responses, with representation from 9 of the 17 listed industries/ sectors, including, consultancies, government agencies, local authorities, marine minerals, NGO's, offshore renewables, oil and gas, power generation and the recreation sector.

Survey feedback provided broad majority support for all of the draft priorities for MNG identified by the T&F Group. Respondents generally agreed that priorities within the pressure categories 'contaminants', 'marine litter' and 'underwater noise' were of a lower priority for strategic MNG targets. There was a general consensus that measures to reduce such pressures should be the responsibility of the accountable developer/industry.

Across all other marine feature categories there was broad consensus on the suggested overall prioritisation for Net Gain. This was also true for the suggested scale of opportunity and the technical feasibility of delivery for each marine feature category.

Across the different marine feature categories there was general agreement with the suggested scope for industry and government-led delivery of Net Gain. However, some respondents argued that the implementation of MNG should be in addition to the delivery of existing government commitments. It was also suggested that industry funding should be focused on active interventions, delivered alongside the strategic management of pressures affecting marine biodiversity by government. It was noted that there are opportunities for government-led and industry partnership projects, depending on the scale and circumstances.

There were also some areas where there was a degree of contention including:

- Marine pressures to which the T&F Group had assigned a low priority for Marine Net Gain:
    - Water quality: some respondents highlighted nutrient issues as being relevant (although these were covered separately under eutrophication); other respondents highlighted the links between elevated concentrations of contaminants and ecological health;
    - Marine litter and debris: some respondents made the point that it is feasible to remove substantial amounts of litter which prevents ghost fishing and other wildlife entrapment (initiatives such as 'Fishing for Litter') and argued for inclusion of marine litter as a Net Gain action. The T&F Group recognises that there may be circumstances in which removal of litter and debris can contribute to localised ecological enhancement on a site-specific basis but remains of the view that such interventions are generally of lower value than other potential measures;
    - Underwater noise: stakeholders generally agreed that this was a mitigation issue and that there was little that could be done in the context of MNG.
- Fish in offshore environments: several respondents argued that this should be assigned a high priority similar to intertidal/near coastal fish rather than a medium-high priority;
- Marine mammals in offshore environments: several respondents felt that this should be high priority rather than low to medium priority, and that the issue of improving prey availability was particularly important in supporting population recovery.

The stakeholder feedback received during the second survey, has been used to refine the initial draft priorities for MNG developed by the T&F Group. The final priorities developed by the T&F Group will help to inform OWEAP's development of MNG policy for England, which will be consulted on later this year.

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1 Introduction

Net Gain has been identified as an important mechanism that could contribute to halting and reversing marine biodiversity loss. Net Gain is an approach to development that leaves the environment in a better state than before. It can include concepts such as Biodiversity Net Gain (BNG) as well as wider environmental gains, including natural capital benefits and ecosystem services (Environmental Net Gain – ENG). Its application is designed to leave biodiversity in a better state and secure wider benefits for people and the environment.

The Offshore Wind Evidence and Change Strategic Net Gain Task and Finish Group (T&F Group), working closely with Defra's Offshore Wind Enabling Actions Programme (OWEAP), is working to identify suitable strategic targets for Marine Net Gain (MNG). The outputs from the work will help to inform Defra policy in relation to MNG and its subsequent implementation. ABPmer has been commissioned to support the work of the T&F Group.

The T&F Group commissioned an initial survey in July, inviting respondents to identify priorities for MNG. The findings from the first survey (ABPmer, 2021a), along with results from the gap analysis (ABPmer, 2021b) helped to shape the Group's views on strategic Net Gain priorities. This led to the development of draft priorities for coastal and Marine Net Gain opportunities (Appendix A). The suggested priorities were identified based on an understanding of stakeholder views, historic losses of marine habitats and species, feasibility of measures and consideration of the extent to which industry might effectively contribute to them.

To further support the development of recommendations for strategic targets for coastal and Marine Net Gain, a second on-line survey was held via SurveyMonkey to gain the views of a diverse range of marine stakeholders on the potential priorities and targets for marine restoration and enhancement in UK waters.

The second survey elicited views on the draft priorities identified by the T&F Group and also sought views on the extent to which industry might be able to contribute to measures to address those priorities. Some additional questions were included in the survey relating to specific assumptions that had been made in developing the draft priorities (Appendix B).

The targets developed by the T&F Group will inform OWEAP's development of MNG policy for England, which will be consulted on later this year. They will also enable marine industries to play a significant role in restoring marine environments through their commitment to Net Gain.

2 Method

2.1 Questionnaire

A questionnaire survey was designed using SurveyMonkey and a number of questions posed to respondents to gain the views of marine stakeholders on potential actions and targets to prioritise marine restoration and enhancement. An overview of the questionnaire is provided in Box 1 with a copy of the questionnaire provided in Appendix C.

The T&F Group also prepared an assumptions document which sets out various assumptions that the group has made in developing the proposed strategic targets. As part of the second survey, respondents were also invited to provide separate comment on the assumptions paper (Appendix B).

The survey was shared through a number of forums to reach a wide-ranging audience, including the Communications and Management for Sustainability (CMS) newsletter, LinkedIn, the ABPmer website and via an email circular through member networks of the T&F Group.

The questionnaire was launched on 27 August 2021 and ran for two weeks.

Box 1. Overview of Survey

- Question 1 - to identify the marine sector the respondent is affiliated to
- Section 1: Thoughts on the delivery of Net Gain:
  - Question 2 - The extent to which strategic targets should incorporate BNG
  - Question 3 – the extent to which separate targets should be established for intertidal/nearshore environments and offshore environments
  - Question 4 – a series of questions about how natural interventions need to be to constitute BNG to determine views on the possible scope of interventions that might be considered to be BNG
  - Question 5 - the extent to which species enhancement and recovery might be included within MNG?
  - Question 6 - views on different approaches that might be adopted to implementing Net Gain (ranging from detailed metrics through to simpler levy-based approaches)

- Section 2: Strategic priorities for MNG:
  - Specific questions relating to each of the focus categories (pressure reduction categories (contaminants, litter, underwater noise), intertidal/near coastal environments (habitats, invertebrates, fish, birds, marine mammals, eutrophication) offshore environments (habitats, invertebrates, fish, birds and marine mammals):
    - Scale of opportunity
    - Technical feasibility
    - Overall prioritisation for MNG
    - Scope for industry vs government-led delivery
    - Opportunity for further comment

Most survey questions were based on a Likert scale (Strongly agree / Somewhat agree / Neither agree nor disagree / Somewhat disagree / Strongly disagree) or Yes / No format for ease of analysis with opportunity to provide reasoning for answers in accompanying text boxes.

2.2 Analysis of responses

Once the survey closed, responses were collated into an Excel database to facilitate analysis. In the first instance, questions with select answers (Yes/ No, or Strongly agree/ Somewhat agree/ Neither agree nor disagree/ Somewhat disagree/ Strongly disagree) were graphed to determine the degree of consensus for the suggested actions.

Throughout the report, when presenting statistics on the extent of agreement or disagreement with a question the categories Strongly agree/ Somewhat agree or Somewhat disagree/ Strongly disagree have been combined to indicate the level of agreement or disagreement.

Answers to open-response questions were then explored in depth to provide context to the observed results and highlight any strong stakeholder opinions to the proposed priorities for coastal and Marine Net Gain.

Analysis results are presented in Section 3 below.

3 Results

The survey generated a total of 37 unique responses, with representation from 9 of the 17 listed industries/ sectors.

Consultancies and offshore renewables provided the two highest sector responses. No responses were received from academia, aquaculture, cables, commercial fishing, government department/ministry, ports and harbours, shipping or water utilities. Seven responses came from 'Other' sectors including the Seabed User Development Group (SUDG), hydrographic surveyors and a Coastal Partnership. A breakdown of the percentage of responses by sector is shown in Figure 1.

It was noted that many of the responses received to this second consultation were organisational responses rather than from individuals, which accounts to some extent for the reduced number of responses compared to the first survey. One respondent also provided feedback on the assumptions document.

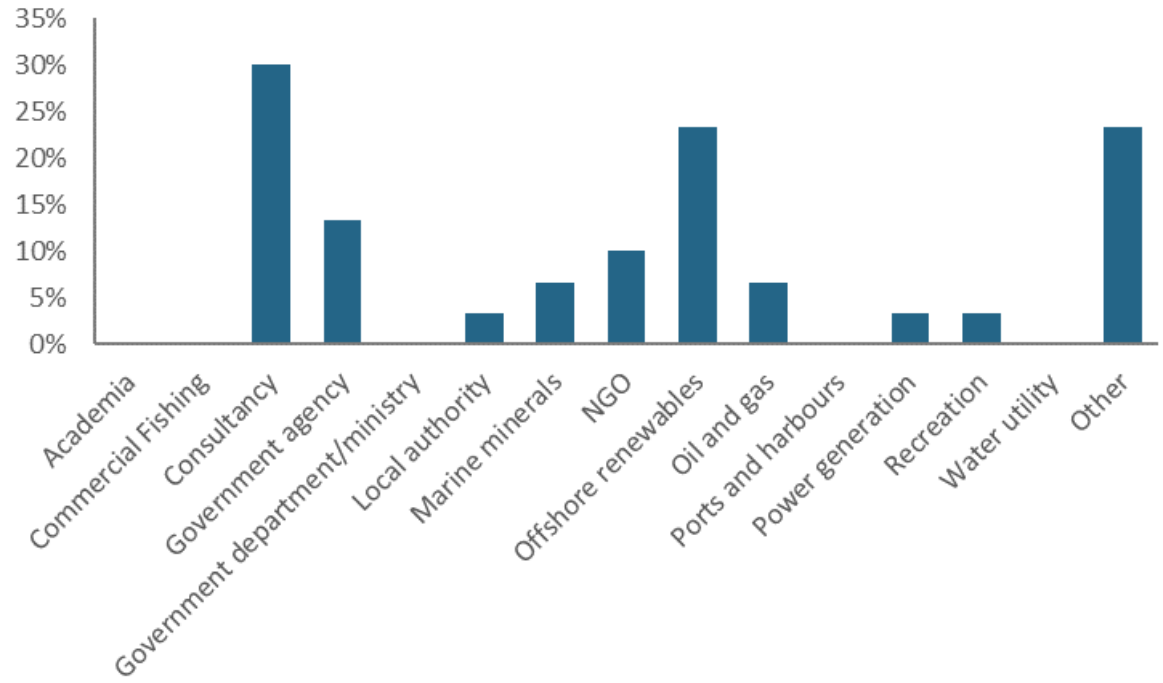

Figure 1. Percentage of responses from each sector

3.1 Section 1 responses

The T&F Group has focused on the identification of strategic targets for BNG, as opposed to ENG. Respondents were asked to identify their level of agreement with this approach and to explain their answer. The results are presented in Figure 2.

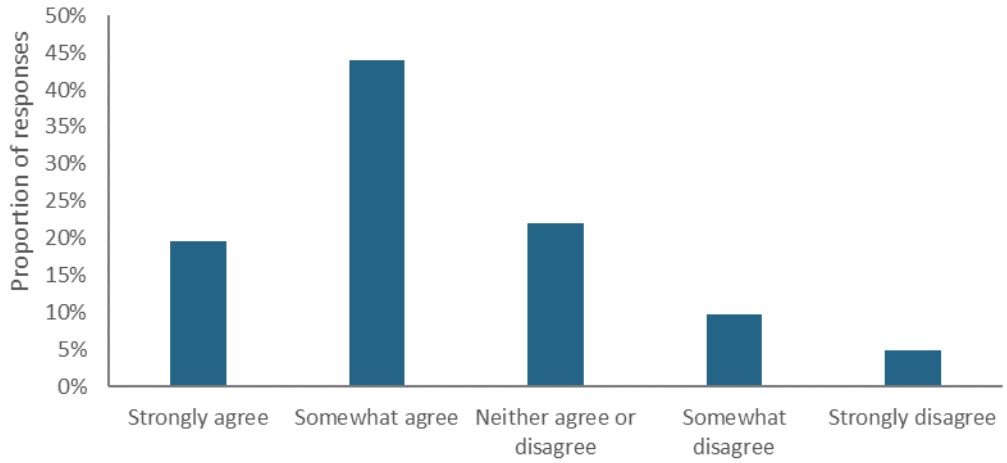

Figure 2. Respondents view on the application of BNG as opposed to ENG

The majority (64%) of respondents agreed with the approach to focus on BNG as opposed to ENG and explained that it would be consistent with terrestrial Net Gain and that BNG should be the priority to effectively tackle biodiversity loss.

There was general agreement (61%) with the approach to delivering Net Gain separately between intertidal/near coastal and offshore environments (Figure 3). However, respondents often acknowledged that it is important to consider the high level of connectivity in the marine environment, especially where developments span multiple marine environments.

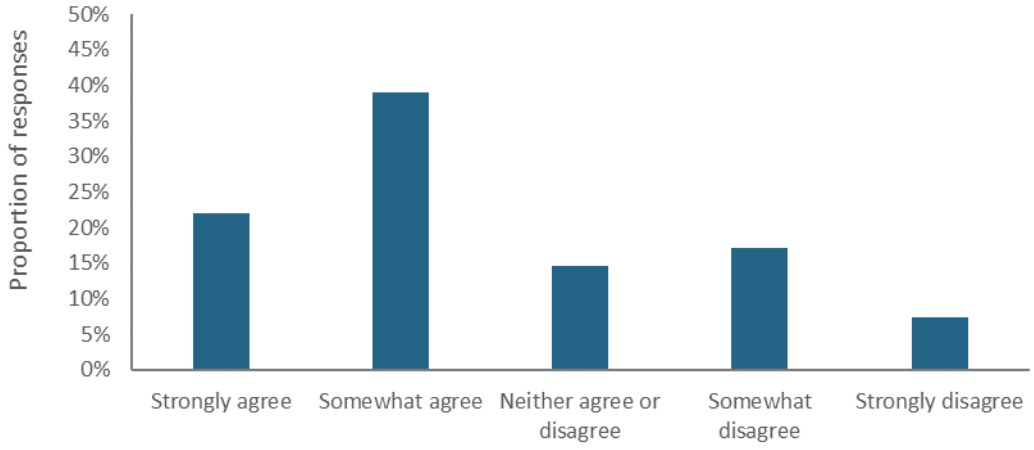

Figure 3. Respondents views on separating intertidal/ near coastal and offshore Net Gain priorities

Similarly, it was identified that Net Gain in one environment could deliver benefits to other marine environments, for example, intertidal ecosystems can be important fish nurseries that benefit fish stocks offshore. Implementing Net Gain targets in the offshore environment was acknowledged to be difficult but it was deemed important to target Net Gain in relevant areas affected by development projects. One respondent noted that the intertidal and offshore environments differ greatly in terms of biodiversity and it is important to differentiate the two environments when developing BNG targets.

A total of 9 respondents disagreed with the approach of separating intertidal and offshore targets. There was a consensus between these respondents that projects can often overlap both offshore and intertidal environments, for example offshore wind farms, and that Net Gain targets should cover both environments. It was also acknowledged that delivering Net Gain offshore may prove more difficult than in the intertidal area and delivery in the intertidal could provide an appropriate alternative.

In response to the question on how 'natural' intervention needs to be to count as BNG, several respondents noted that although natural interventions are preferable, the use of artificial structures and 'greening the grey' should be considered for BNG if the mechanisms used encourage the colonisation of target species and promoted BNG. However, it was recognised that more research into the design of infrastructure for promoting BNG would be required. One respondent from the offshore renewables sector also noted that the longevity of a project needs to be considered where artificial interventions are made as potential decommissioning or removal of structures may reverse any gains made.

The use of aquaculture as a mechanism for implementing BNG targets received mixed reactions. Whilst some respondents agreed that the use of aquaculture contributed to either BNG or ENG, aquaculture itself was generally not recognised as a mechanism for BNG unless the aim was to restore natural shellfish or seaweed beds, for example. One respondent from industry commented that the use of aquaculture or artificial structures is likely to have an economic benefit, however this should not be the primary driver behind the use of artificial interventions.

The majority of respondents agreed that species should be included in Marine Net Gain targets (77%; Figure 4). Respondents explained that the focus should be on species of particular concern and that measures to benefit one species should not be detrimental to another. Respondents who recommended that species should not be included in the BNG targets indicated that the focus should be on habitats and that their recovery and restoration would fundamentally lead to the increase in biodiversity of target species. However, respondents who agreed with the inclusion of species also indicated that both species and habitats should be included in BNG as opposed to one or the other.

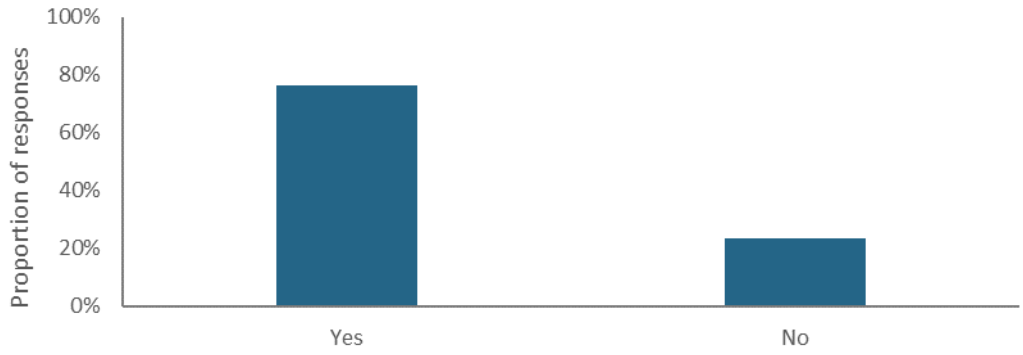

Figure 4. Respondents views on species inclusion in Marine Net Gain strategic targets

A number of options for the most appropriate method of application for MNG were provided to respondents. The majority (50%) agreed that an industry levy to support a strategic fund would be beneficial. This approach was described as allowing investment into strategic or large-scale projects and avoiding the complications of a metric approach. Given the desire for MNG to encompass species and human activity pressures as well as habitat loss, it is noted that development of a metric encompassing all of these factors would be extremely challenging. It was suggested that developers would potentially prefer the use of a levy over a metric due to the ease of making payments and overall clarity. However, one industry respondent noted that such a levy may reduce the willingness of offshore companies 'to go above and beyond' by reducing the credit given to industry, especially where they are already moving towards net positive models. Other options presented for comment included; a metric similar to that created for terrestrial/intertidal Net Gain, a new metric designed for the offshore (subtidal) marine environment or other options for the respondent to specify.

Three respondents from industry and government, indicated a preference for a metric similar to that created for terrestrial/intertidal Net Gain. They explained that the use of a comparable metric would make the implementation easier and quicker and allow for assessment to be made between approaches used. There was also a suggestion that a metric could be used to ensure everyone is applying the same rules to support strategic Net Gain delivery. In contrast, several respondents were in agreement that a new metric designed for the offshore (subtidal) would be effective but could use existing approaches as a starting point, however one respondent from an NGO believed that any application of a metric would make marine BNG targets complex and difficult to deliver. The linking of intertidal and offshore BNG approaches was also suggested.

Of the respondents who selected 'other', most explained that a mixed approach could be most effective and allow flexibility to industry, particularly in terms of combining metric and levy approaches.

3.2 Section 2 responses

Section two questions were focused on specific aspects captured within the table of draft strategic priorities. Opinions were sought on each of the suggested targets, priorities, and scale of suggested opportunity for each marine feature category. To assist respondents, the associated rows from the priorities table were provided for each question (see copy of the questionnaire in Appendix C for context).

3.2.1 Pressure reduction actions

Respondents were asked whether they agreed that measures within the pressure reduction categories 'contaminants', 'marine litter' and 'underwater noise' were of a lower priority for strategic MNG targets.

The majority of respondents (62 %) agreed with the low priority rating awarded to these pressure reduction categories (Figure 5). Respondents who agreed with these measures being of lower priority mostly considered that issues surrounding water quality or marine litter cover ENG as opposed to BNG. There was also a general consensus that measures to reduce such pressures should be the responsibility of the accountable developer/industry. In response to underwater noise it was highlighted that this is already closely regulated in line with the National Planning Policy Framework and the Habitats Regulations.

In contrast, respondents who disagreed explained that these pressure categories can have an important impact on biodiversity and thus should be considered within strategic MNG targets.

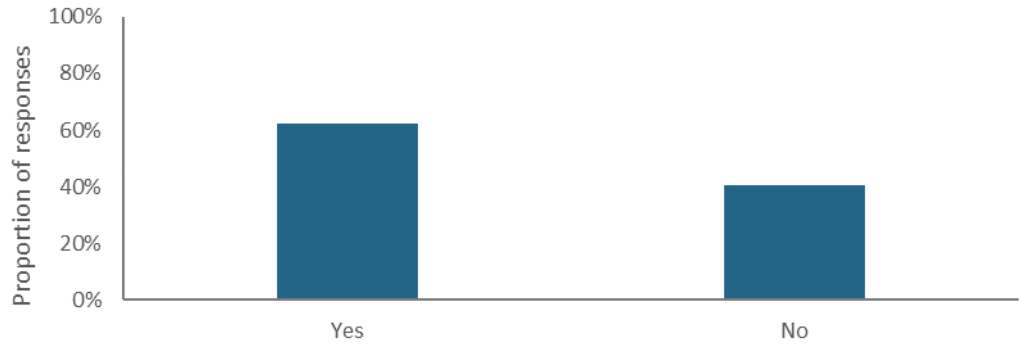

Figure 5. **Respondents views on whether the pressure reduction categories contamination/ water quality, marine litter and underwater noise are lower priorities for strategic Marine Net Gain targets**

3.2.2 Intertidal/near coastal habitats

In response to questions on strategic Net Gain opportunities to restore and/ or create intertidal/near coastal habitats (including characterising species), 77% of respondents agreed with the suggested high scale of opportunity for mudflat/sandflat, saltmarsh/reedbed, seagrass, native oyster reef, maerl and medium scale of opportunity for kelp. Eighty-two percent of respondents agreed with the suggested technical feasibility, and no respondents disagreed (somewhat or strongly). Seventy percent of respondents agreed with the overall prioritisation for Net Gain actions for intertidal/ near coastal habitats (high priority).

Respondents generally considered that government would be best placed to lead the delivery of BNG targets of intertidal habitats. This was due to government being able to provide policy/laws to ensure the adoption of BNG targets and facilitate strategic approaches on national and regional levels. However, many also agreed that industry could provide financial support and also be directly involved with government to deliver BNG targets. Industry-led BNG targets was highlighted as a possibility at local scales, such as the ecological enhancement of current infrastructure. There were two suggestions concerning the involvement of NGOs such as nature conservation organisations or agencies for the delivery of BNG.

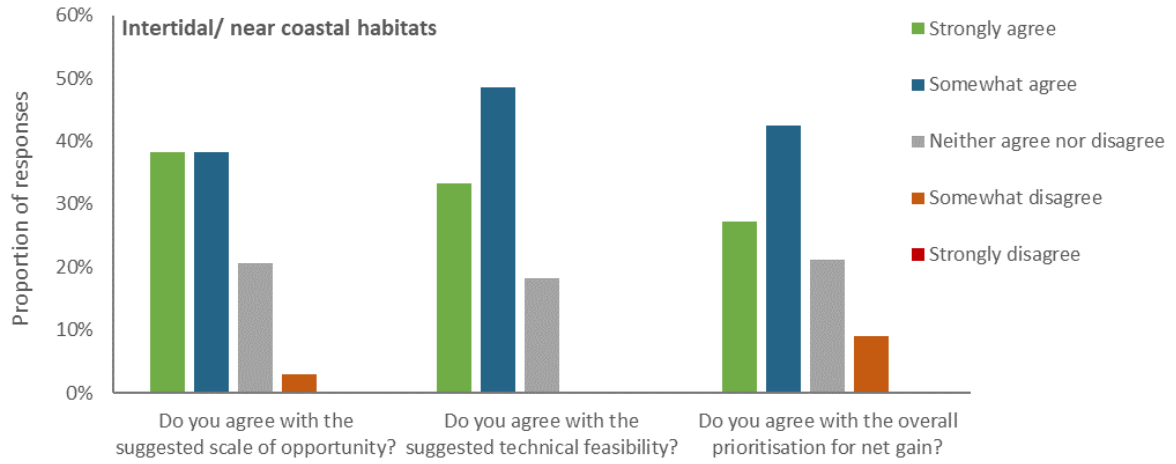

Figure 6. **Respondents views on the scale of opportunity, technical feasibility and overall prioritisation for Net Gain actions to restore and/ or create intertidal/near coastal habitats**

One respondent from the consultancy sector noted that all interventions on a habitat level were likely to support broader ecosystem functioning. Two respondents also mentioned that more research into BNG interventions is needed, as there is uncertainty around the effectiveness of each approach mentioned in the priorities table (Appendix A). Ultimately, the links between biodiversity pressures and actions are needed to develop appropriate BNG actions. It was further suggested that a BNG levy could be used to support the enforcement of byelaws to enhance habitats.

3.2.3 Intertidal/near coastal invertebrates

In response to questions on strategic Net Gain opportunities to restore and/ or increase populations of intertidal/near coastal invertebrates, 72% of respondents either strongly or somewhat agreed with the suggested high scale of opportunity to restore native oyster, *Modiolus*, edible crab, European lobster, spiny lobster and scallop. Eighty-one percent of respondents also agreed with the suggested technical feasibility, with no respondents disagreeing (Figure 7).

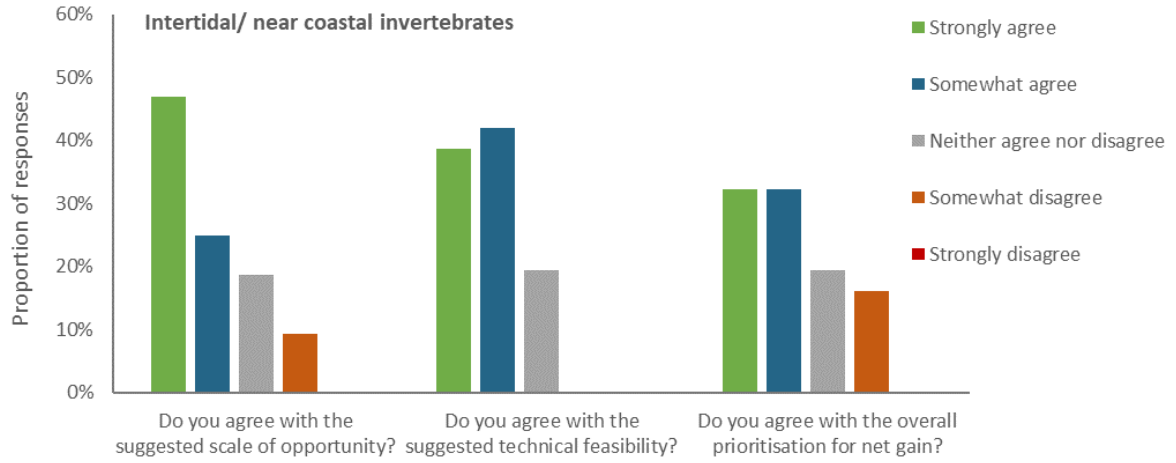

Figure 7. Respondents views on the scale of opportunity, technical feasibility and overall prioritisation for Net Gain actions to restore and enhance intertidal/near coastal invertebrates

Sixty-five percent of respondents agreed with the overall prioritisation (medium priority) for Net Gain actions for intertidal/ near coastal invertebrates. Of respondents who disagreed there was concern that the current opportunity for restoration is currently limited as fisheries management is a government obligation without much scope for industry delivery at this time. Additionally, some felt that further consideration is needed over the priority of intertidal invertebrates as these species are of economic value but may not be appropriate for increasing biodiversity.

There was a general consensus that delivery of actions which fall within fisheries management would need to be government-led to ensure adoption of BNG targets, particularly on national and regional levels. It was also described that the management of fisheries and fishing pressures by other industry sectors would be inappropriate.

However, many respondents agreed that overall delivery of measures to restore intertidal/ near coastal invertebrates could be delivered through a combination of industry and government approaches. Respondents suggested it would be appropriate for industry to lead on the implementation of some measures, such as re-stocking.

Respondents further commented that more research is needed to understand how effective interventions are, highlighting that there is an opportunity to fund research or trial projects into the restoration of invertebrate species and their habitats (such as mussels and oyster beds).

Finally, the importance of liaising with local communities as well as industry was mentioned when looking to implement intertidal invertebrate interventions.

3.2.4 Intertidal/near coastal fish

Similar to the responses regarding intertidal invertebrates, there was consensus that the management of fisheries would need to be government-led. However, it was acknowledged that the combination of both industry and government would potentially maximise the opportunities to achieve Net Gain. Some respondents indicated that it would not be appropriate to expect other industries to be responsible for delivering the reduction of fishing pressures.

Eighty-one percent of respondents either strongly or somewhat agreed with the suggested high scale of opportunity to support and restore intertidal/near coastal fish. However, one respondent highlighted that the scale of opportunity focused on migratory fish but that non-migratory fish should be included as they make up a large proportion of inshore fish.

Seventy-three percent of respondents agreed with the suggested technical feasibility and sixty-seven percent of respondents agreed with the overall prioritisation for Net Gain actions for intertidal/ near coastal fish (high priority; Figure 8).

Further, suggestions on the implementation of BNG targets included the restoration and expansion of nursery ground areas, and the need to consider the impacts of terrestrial farming on aquaculture, the effect of long-term climate change, and fishing gear.

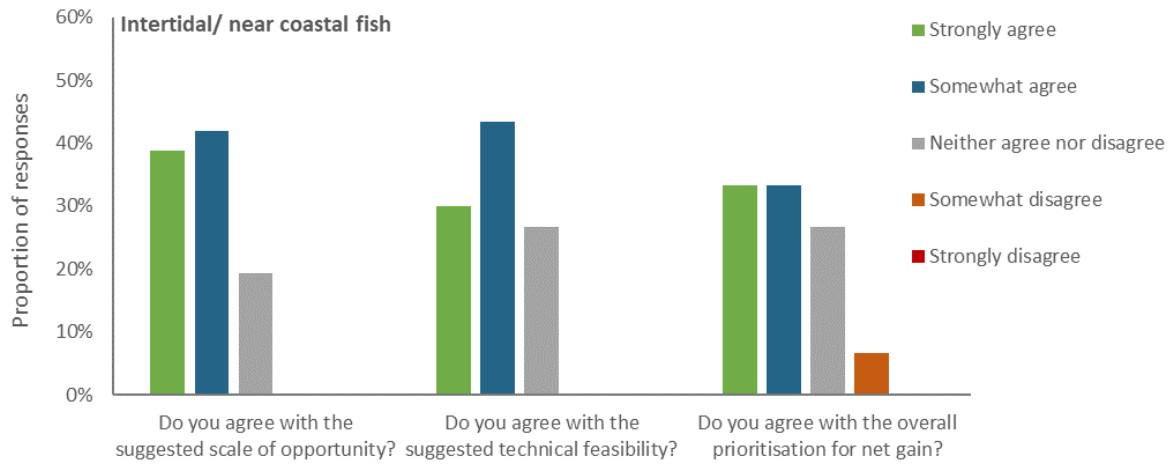

Figure 8. **Respondents views on the scale of opportunity, technical feasibility and overall prioritisation for Net Gain actions to support and restore intertidal/near coastal fish**

3.2.5 Intertidal birds

Seventy-two percent of respondents either strongly or somewhat agreed with the suggested scale of opportunity for Net Gain actions to support populations of intertidal birds. However, one industry respondent strongly disagreed, suggesting that long-term declines in population numbers are due to climate change and as such restoring habitat for birds that may no longer find the climate suitable could be a waste of time. They suggested that the cause of the decline needs to be clearly identified to ensure the correct action is taken.

Seventy-one percent of respondents agreed with the suggested technical feasibility, and 77% agreed with the overall prioritisation for Net Gain actions for intertidal/ near coastal birds (high priority; Figure 9).

Government was considered most appropriate to lead actions to restore intertidal/ near coastal birds for the delivery of BNG, however several respondents believed that the implementation of targets should be led by industry. It was acknowledged that government-led BNG would likely allow for opportunities to be implemented on national and regional scales, but industry led project-level BNG would likely lead to 'quick wins'. One respondent from the offshore renewables sector mentioned that habitat restoration could be led by industry but in line with government guidance. However, management of general disturbance would need to be government-led.

Several respondents considered that bird species should not necessarily be the focus of BNG and that focussing on a habitat/prey level and the pressures which impact birds would be potentially more beneficial for BNG in the marine environment. Two respondents suggested that climate change and pollutants should also be recognised as pressures on intertidal birds and considered in BNG targets.

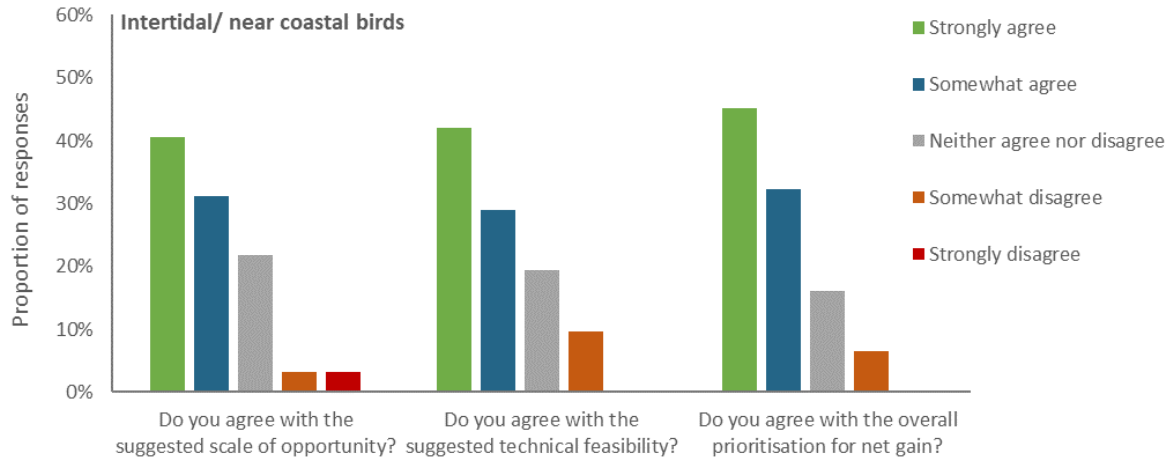

Figure 9. Respondents views on the scale of opportunity, technical feasibility and overall prioritisation for Net Gain actions to support populations of intertidal birds

3.2.6 Intertidal marine mammals

Respondents generally agreed with the suggestions made for Net Gain actions to support populations of intertidal/near coastal marine mammals. Fifty-six percent agreed with the suggested scale of opportunity, 55% with the suggested technical feasibility and 55% with the overall prioritisation for Net Gain (low priority; Figure 10).

The majority of respondents mentioned that collaboration between government and industry is likely to be required, with government leading through the implementation of legislation, and industry implementing measures and undertaking monitoring. There was concern that although otters are sensitive to terrestrial impacts, intertidal impacts would likely also impact otters. However, one consultancy respondent stated that otters are generally more of a terrestrial and freshwater issue. Equally, other species were also highlighted by respondents to be impacted by intertidal pressures, such as seals, and should have been considered within the scope of actions for intertidal areas, as well as offshore. Respondents clarified that more work is needed to identify the priorities for marine mammals.

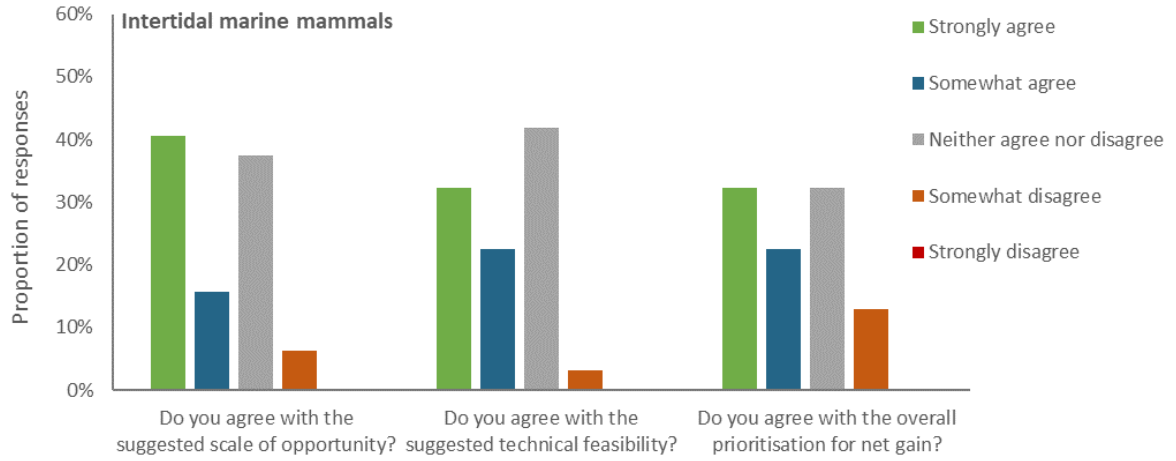

Figure 10. **Respondents views on the scale of opportunity, technical feasibility and overall prioritisation for Net Gain actions to support populations of intertidal/near coastal marine mammals**

3.2.7 Eutrophication

In response to questions on strategic Net Gain opportunities to address eutrophication 78% of respondents either strongly or somewhat agreed with the suggested medium scale of opportunity. Seventy-seven percent of respondents also agreed (strongly or somewhat) with the suggested technical feasibility, with no respondents strongly disagreeing (Figure 11).

Sixty-eight percent of respondents also strongly, or somewhat agreed with the overall prioritisation for Net Gain (medium priority), however, 16% somewhat or strongly disagreed. Of respondents who disagreed there was concern that there were limited opportunities for offshore infrastructure developers to address eutrophication through BNG targets. Additionally, it was felt that marine industries are not contributing to eutrophication, which is more of a concern for the agricultural sector as a result of land-based run-off and should therefore be addressed directly by government and associated industries rather than through BNG targets for marine industries.

It was considered that tackling eutrophication should be government-led, particularly due to the government commitments through the MSFD, which was in agreement with the method of implementation suggested within the draft prioritisation of Net Gain opportunities (Appendix A). However, it was recognised that industry can implement BNG targets or other schemes which could improve water quality as a secondary benefit (such as habitat restoration). Government leadership and the implement of legislation was seen as a requirement to reduce the pressure of diffuse pollution by respondents, with some identifying the need for a collaborative approach with industry.

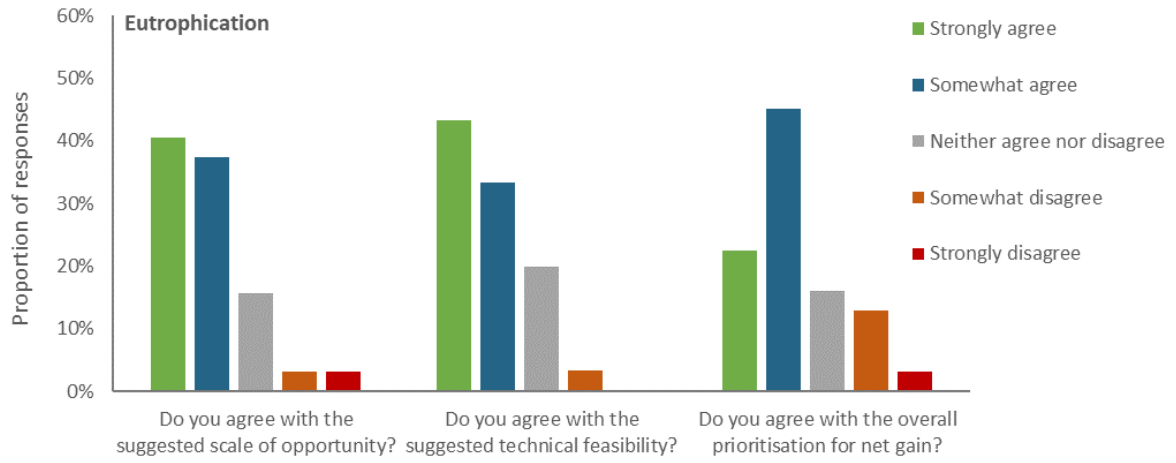

Figure 11. Respondents views on the scale of opportunity, technical feasibility and overall prioritisation for Net Gain actions to address eutrophication

3.2.8 Offshore habitats

There was a general consensus that government would need to lead on the delivery of pressure reduction in offshore habitats. This was particularly the case where respondents mentioned fisheries management. However, it was also explained that a mixture of government and industry-led interventions for BNG would likely be effective.

Overall, 79% of respondents either strongly or somewhat agreed with the suggested scale of opportunity and 77% with the suggested technical feasibility. Seventy-two percent of respondents agreed with the overall prioritisation for Net Gain in offshore habitats being high (Figure 12). However, there was some disagreement with the overall prioritisation, with 24% somewhat disagreeing, on the basis that removal of pressures is required to facilitate offshore habitat restoration, which is outside industry scope to deliver. Further, it was felt that Net Gain should be based on proven direct intervention; even in the case of habitat restoration such as oyster beds it is largely experimental at this time and cannot yet be considered as Net Gain.

Several respondents agreed that fisheries were the most likely industry leading to pressures on offshore habitats and that other industries should not be responsible for interventions relating to fisheries pressures. It was also highlighted that care is needed to link fishing pressure management to BNG and that funding should not be used for compensation or subsidies. The loss of habitat due to infrastructure was also seen as impacting a relatively small area of the seabed compared to fishing and thus should not be seen as a priority.

One respondent from the consultancy sector commented that industry could implement targets to ecologically enhance offshore infrastructure, with guidance from government on what types of habitats needs promoting. However, another respondent from an NGO described that the scope for industry to contribute to offshore habitat restoration as limited.

Several stakeholders disagreed that the decommissioning of infrastructure would always result in BNG as structures may have been colonised by native species. It was acknowledged that any decommissioning should factor in the financial cost of the removal against potential BNG and also recognise that the process of removal may be damaging to biodiversity.

Lastly, it was also noted that further research and monitoring is required offshore in order to set long-term targets.

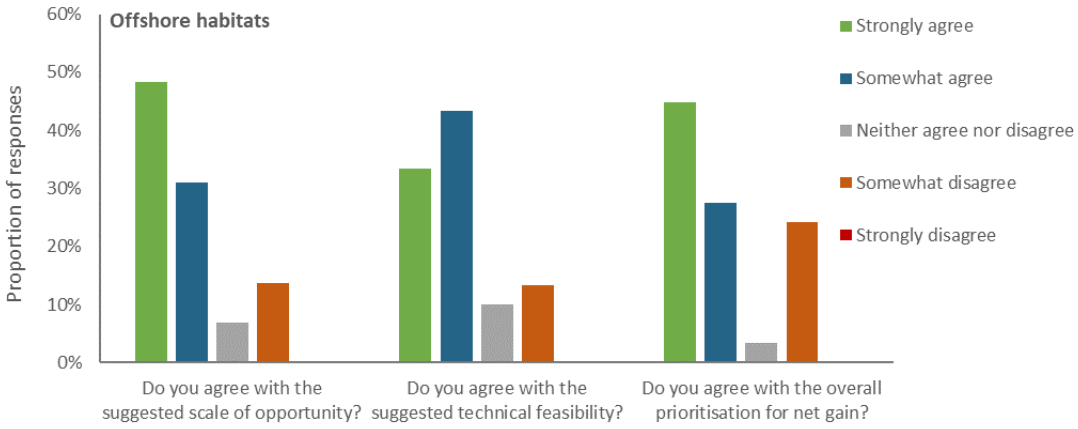

Figure 12. **Respondents views on the scale of opportunity, technical feasibility and overall prioritisation for Net Gain actions to restore offshore habitats**

3.2.9 Offshore invertebrates

Similar to the responses for offshore habitats, respondents were in agreement that BNG targeting offshore invertebrates should be government-led to reduce fishing pressure through fisheries management measures. However, some BNG targets could be implemented by industry. It was noted by one respondent from the offshore renewables sector that any BNG should have a scientific underpinning to ensure increases in biodiversity are relevant to the baseline of the area (for example, restoring native oyster beds in areas where they used to exist). Further, it was highlighted that research into the recovery of deep-water habitats is needed to assess successful outcomes.

Overall, 70% of respondents agreed with the suggested scale of opportunity and 66% with the suggested technical feasibility. Sixty percent of respondents agreed with the overall prioritisation for Net Gain for offshore invertebrates being high for oysters and medium for edible crab, European lobster, spiny lobster, *Modiolus* and other invertebrates (Figure 13).

However, there was some disagreement with the overall prioritisation, with 30% either strongly or somewhat disagreeing, on the basis that BNG funds should not be used to enhance the stock status of commercial species unless the enhancement delivers biodiversity increases. In addition, they noted that restoration of lobsters and crabs is seen as a low priority as it would likely just lead to economic gain.

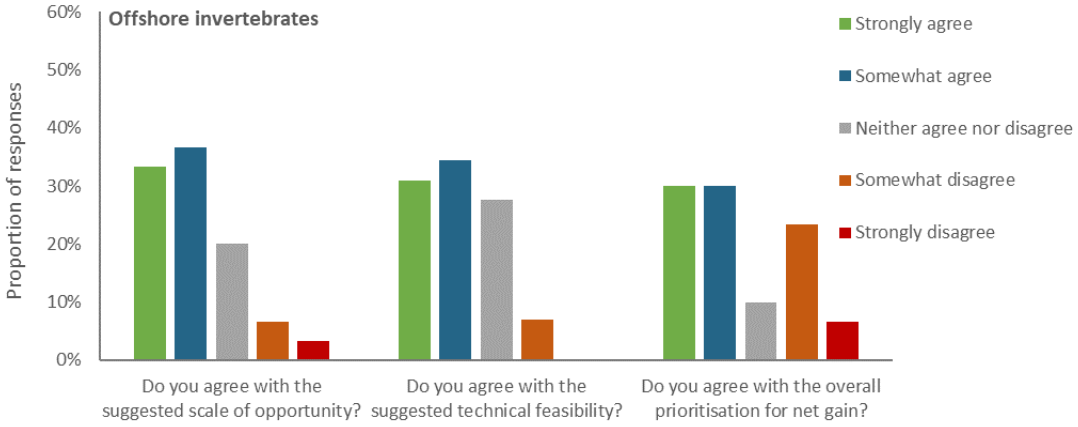

Figure 13. **Respondents views on the scale of opportunity, technical feasibility and overall prioritisation for Net Gain actions to restore and enhance offshore invertebrates**

3.2.10 Offshore fish

In response to questions on strategic Net Gain opportunities to support populations of offshore fish, 83% of respondents either strongly or somewhat agreed with the suggested high scale of opportunity. Seventy-nine percent of respondents also agreed with the suggested technical feasibility, with no respondents disagreeing (Figure 14).

However, only 57% of respondents agreed with the overall prioritisation for Net Gain (medium to high priority), with 33% somewhat or strongly disagreeing. Some respondents suggested this was because overall prioritisation should be high, especially for key prey species, and that there was no mention of the wider ecosystem benefits for birds and marine mammals through increasing prey availability.

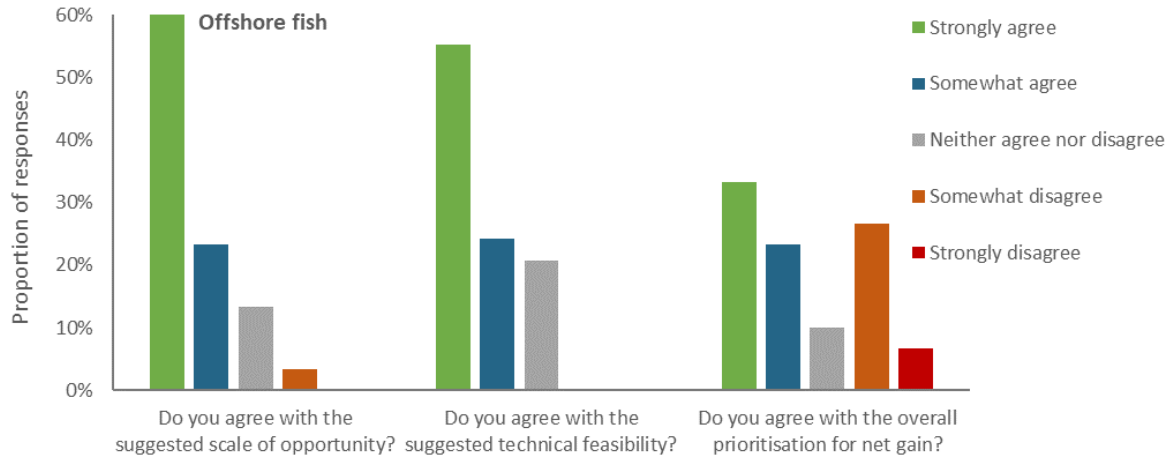

Figure 14. Respondents views on the scale of opportunity, technical feasibility and overall prioritisation for Net Gain actions to support populations of offshore fish

There was strong agreement among respondents that BNG initiatives should be government-led, due to the requirement for commercial fisheries management, and implemented by the fishing industry. One industry respondent mentioned that collaboration between the government, industry and fisheries is likely the most effective approach to reduce the pressures on offshore fish. Three respondents expressed that BNG should not be funded or contributed to by infrastructure industries if the main pressures are from fisheries. Similarly, respondents mentioned that BNG funding should not be used to enhance the stock status of commercial species unless they can deliver additional benefits (for example, increasing prey availability for marine birds or mammals).

Further suggestions were made regarding the use of Maximum Sustainable Yields (MSY) to further manage fish stocks and the use of offshore developments acting as no take zones, which would benefit BNG. The impacts of climate change were also mentioned as necessary to account for with BNG.

3.2.11 Offshore birds

Eighty-three percent of respondents either strongly or somewhat agreed with the suggested scale of opportunity to support populations of offshore birds. Eighty percent agreed with the suggested technical feasibility and 69% agreed with the overall prioritisation for Net Gain for offshore bird populations being high (Figure 15).

Respondents generally agreed that successful implementation of BNG for offshore birds would require both government and industry intervention. It was recognised that developers could support site-specific initiatives such as colony-based management. However, government would be required to lead larger-scale initiatives such as fisheries management, which would most likely benefit seabird colonies. Consideration was also highlighted for the delivery of BNG in terms of how this may impact compensatory measures under the Habitats Regulations for impacts to Special Protection Area (SPA) features. The majority of respondents highlighted that fisheries management is critical and the effectiveness of BNG would be dependent on government initiatives. A respondent also noted that all maritime industries should be scoped into BNG targets, not just fisheries or infrastructure.

It was highlighted that acknowledgement is needed regarding how climate change may affect offshore birds and the implementation of BNG targets. Long-term action is likely needed by governments and on an international level.

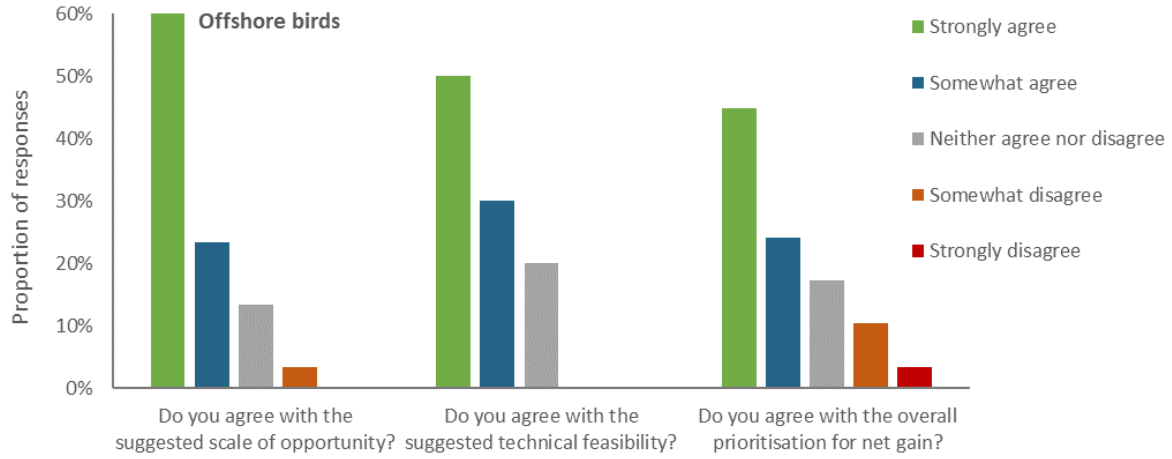

Figure 15. Respondents views on the scale of opportunity, technical feasibility and overall prioritisation for Net Gain actions to support populations of offshore birds

3.2.12 Offshore marine mammals

Overall, there was a general consensus that fisheries management was needed to reduce the pressures of bycatch and prey availability on marine mammals. Respondents agreed that government legislation should lead by setting appropriate standards, particularly in terms of fisheries management, and industry should support the monitoring and implementation of BNG targets. It was identified that industry could also support research into better fishing methods to reduce pressures such as bycatch.

Seventy-nine percent of respondents agreed with the suggested scale of opportunity to support marine mammal populations offshore. Eighty-two percent agreed with the suggested technical feasibility, however only 55% agreed with the overall prioritisation for Net Gain for offshore marine mammal populations (low to medium priority; Figure 16). Several respondents suggested that BNG for marine mammals should be either 'high' or 'medium' priority, as opposed to 'low to medium', and that seals should be split out from cetaceans as they are impacted by different pressures and have different ecological needs.

In addition, it was highlighted by respondents that more research is needed to better understand the impacts of noise on marine mammals, and the location of important feeding grounds in order to better manage prey resources when implementing BNG targets.

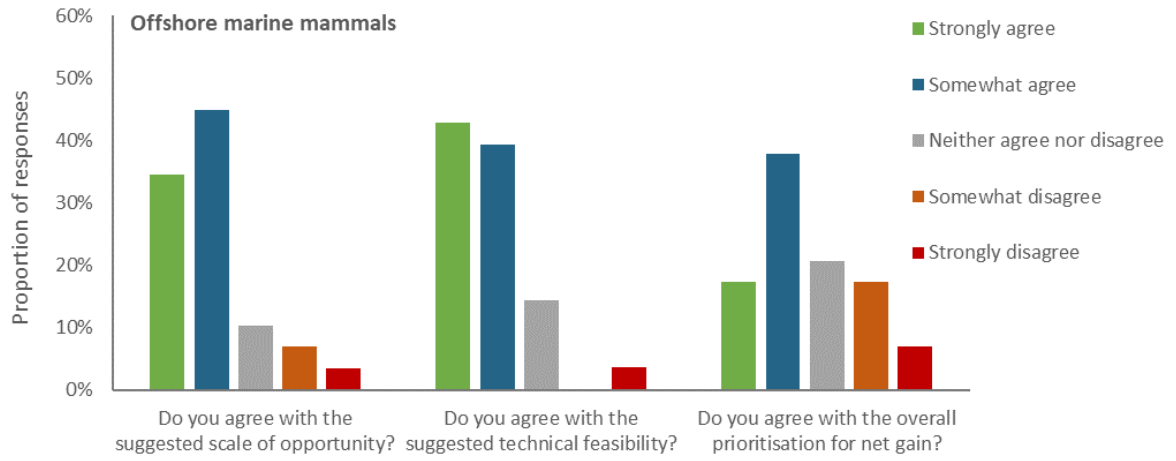

Figure 16. **Respondents views on the scale of opportunity, technical feasibility and overall prioritisation for Net Gain actions to support populations of offshore marine mammals**

4 Discussion

Survey feedback has provided broad majority support for all of the draft priorities for MNG identified by the T&F Group. Respondents generally agreed that priorities within the pressure categories 'contaminants', 'marine litter' and 'underwater noise' were of a lower priority for strategic MNG targets. There was a general consensus that measures to reduce such pressures should be the responsibility of the accountable developer/industry.

Across all other feature categories there was broad consensus on the suggested overall prioritisation for Net Gain across the marine feature categories, though see exceptions highlighted below. This was also true for the suggested scale of opportunity and the technical feasibility of delivery of measures.

Across the different marine feature categories there was general agreement with the suggested scope for industry and government-led delivery of Net Gain. However, some respondents argued that the implementation of MNG should be in addition to the delivery of existing government commitments. Industry funding should be focused on active interventions, delivered alongside the strategic management of pressures affecting marine biodiversity by government, and that there are opportunities for government-led and industry partnership projects, depending on the scale and circumstances.

There were also some areas where there was a degree of contention including:

- Marine pressures to which the T&F Group had assigned a low priority for Marine Net Gain:
    - Water quality: some respondents highlighted nutrient issues as being relevant (although these were covered separately under eutrophication); other respondents highlighted the links between elevated concentrations of contaminants and ecological health;
    - Marine litter and debris: some respondents made the point that it is feasible to remove substantial amounts of litter which prevents ghost fishing and other wildlife entrapment (initiatives such as 'Fishing for Litter') and argued for inclusion of marine litter as a Net Gain action. The T&F Group recognises that there may be circumstances in which removal of litter and debris can contribute to localised ecological enhancement on a site-specific basis but remains of the view that such interventions are generally of lower value than other potential measures;
    - Underwater noise: stakeholders generally agreed that this was a mitigation issue and that there was little that could be done in the context of MNG.
- Fish in offshore environments: several respondents argued that this should be assigned a high priority similar to intertidal/near coastal fish rather than a medium-high priority;
- Marine mammals in offshore environments: several respondents felt that this should be high priority rather than low to medium priority, and that the issue of improving prey availability was particularly important in supporting population recovery.

The stakeholder feedback received during this second survey, has been used to refine the initial draft priorities for MNG developed by the T&F Group, to inform the final recommended priorities for MNG.

5 References

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6 Abbreviations/Acronyms

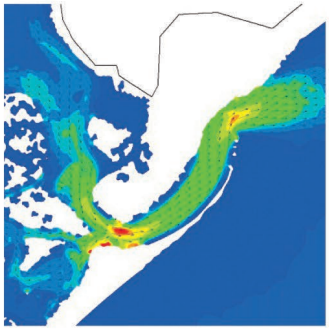
BNG	Biodiversity Net Gain
CMS	Communications and Management for Sustainability
ELM	Environmental Land Management
ENG	Environmental Net Gain
eNGO	Environmental Non-government Organisation
EQS	Environmental Quality Standard
GES	Good Environmental Status
LNRS	Local Nature Recovery Strategies
MNG	Marine Net Gain
MPA	Marine Protected Area
MSFD	Marine Strategy Framework Directive (now Marine Strategy)
MSY	Maximum Sustainable Yield
NBN	National Biodiversity Network
NGO	Non-Governmental Organisation
OWEAP	Offshore Wind Enabling Actions Programme
ReMeMaRe	REstoring MEadows, MArshes and REef
RSPB	Royal Society for the Protection of Birds
SMEEF	Scottish Marine Environmental Enhancement Fund
SMRU	Sea Mammal Research Unit
SPA	Special Protection Area
SUDG	Seabed User Development Group
T&F Group	Strategic Net Gain Task and Finish Group
UK	United Kingdom
UKMMAS	United Kingdom Marine Monitoring and Assessment Strategy

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

Appendices




Innovative Thinking - Sustainable Solutions

ABP mer

A Prioritisation of Strategic Net Gain Opportunities

A.1 Prioritisation of Strategic Net Gain Opportunities

This document identifies strategic Net Gain opportunities and suggestions for how these might be delivered. The opportunities have been identified based on an understanding of stakeholder views, historic losses, feasibility of measures and consideration of the extent to which marine industry might feasibly contribute to such targets. The opportunities have been split into three categories, based on the assumption that offshore development will be required to deliver Net Gain offshore and that coastal projects will need to deliver Net Gain in intertidal/nearshore areas. We have therefore sought to differentiate targets that might be relevant to offshore areas and those relevant to intertidal/nearshore area.

The prioritisation is focused on delivery of Biodiversity Net Gain (BNG) as a core component of overall Marine Net Gain. It has not considered measures that would constitute Environmental Net Gain (ENG) but wouldn't directly deliver BNG (e.g. greenhouse gas emissions reductions, air quality improvements, flood risk reduction).

The prioritisation of opportunities is also, partly dependent on the wider approach to Marine Net Gain and the funding mechanism. If the approach places responsibility for delivery of Net Gain measures on developers, then the focus of Marine Net Gain measures will need to be on measures within developers' powers to deliver. If the approach is more focused on developers providing funding for Net Gain actions which are then delivered by government, the scope of measures could be much broader and reflect the broader priorities for restoration/enhancement in the marine environment.

The prioritisation does not take account of potential issues of additionality

Table A1. Pressure reduction opportunities which are seen as low priority

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
Action to reduce contaminants	Water quality – **medium**; Sediment quality - **medium**	Water quality: Technically feasible to deliver improvements in water quality, potential for government to work with farmers; Sediment quality: disproportionately costly to undertake large scale remediation of contaminated sediments.	**Government-led**	**Low**	Relatively few failures of Water Framework Directive Environmental Quality Standard (EQS) in transitional and coastal waters. Offshore waters considered to be at Good Environmental Status (GES). In line with polluter pays principle significant point source discharges should be responsible for limiting their emissions.
Action to reduce and clean up marine litter and debris	**Medium**	Other than removal of intertidal litter for aesthetic reasons, it is not technically feasible to remove meaningful amounts of litter from the marine environment.	**Direct implementation by industry and government-led**	**Low/ infeasible**	Scope to contribute funding to litter removal initiatives but this would primarily deliver ENG not BNG.
Action to reduce underwater noise	The significance of current levels of ambient anthropogenic underwater noise is uncertain.	Technically feasible to reduce anthropogenic underwater noise at source but this would be considered a mitigation measure when implemented by industry on its own projects.	**Direct implementation by industry**	**Low**	Measure to reduce industries own ambient underwater noise would be considered as mitigation.

Table A2. Intertidal/near coastal opportunities

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain [1]	Additional Comments
Action to restore and/ or create intertidal/near coastal habitats (including characterising species)	**High** – major historic losses of mudflat/sandflat, saltmarsh/reedbed, seagrass, native oyster reef, maerl **Medium** – kelp Uncertain – intertidal under-boulder communities, other bivalve beds (blue mussel, cockles, clams)	Feasibility of direct mudflat/sandflat and saltmarsh/reedbed creation well established; seagrass and blue mussel restoration likely to be feasible given suitable conditions; direct native oyster reef restoration remains challenging and experimental; kelp uncertain but potential to seed gravel to allow restoration; cockle/clam restoration best managed through control of fishing pressure. Maerl restoration only possible through pressure reduction.	**Direct implementation by industry and government-led**	**High** (mudflat/sandflat, saltmarsh/reedbed, seagrass, native oyster **Medium** (kelp, other bivalves, maerl) **Low/ N/A** (intertidal under-boulder communities)	Scope for habitat restoration and enhancement in intertidal and near coastal areas in particular for intertidal mudflat and sandflat, saltmarsh/ reedbed, seagrass and native oyster. Some scope for restoration and enhancement of other features. Interventions could be led by industry or government (with industry funding). Opportunities for kelp restoration may be limited and likely to be site specific and to require management of fishing gear abrasion pressures. Measures entailing management of commercial fishing pressure would need to be government-led.

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain [1]	Additional Comments
Action to restore and enhance intertidal/near coastal invertebrates	**High** – native oyster, *Modiolus*, edible crab, European lobster, spiny lobster, scallop	Direct restoration of species remains challenging, but potential to restore edible crab, European lobster, spiny lobster populations through fishing pressure reduction and targeted restocking (e.g. lobster hatcheries). Other invertebrate species can be enhanced as a result of pressure reduction (primarily fisheries abrasion and penetration pressure).	**Direct implementation by industry and government led** (primarily Government led as most interventions likely to require management of (fishing) pressures)	**Medium** (edible crab, European lobster, spiny lobster, *Modiolus*, other invertebrates)	Some scope for restoration and enhancement of intertidal/ nearshore invertebrates, mostly requiring reduction in (fishing) pressures which would need to be government-led.
Action to support and restore intertidal/near coastal fish	**High** – Atlantic salmon, sea trout, allis and twaite shad, smelt, eel, river and sea lamprey, sturgeon	Some success in restoration of salmon but more challenging in southern rivers due to climate change; some experience with allis and twaite shad (Unlocking the Severn – removal of migratory barriers; water quality improvements); restoration of eel populations dependent on pressure reduction (reduction in fishing pressure (glass eel/elver); recovery of lamprey dependent on populations of other migratory fish.	**Direct implementation by industry and government-led**	**High**	Scope to contribute to direct restocking, removal of migratory barriers, or management of spawning and, nursery habitats.

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain [1]	Additional Comments
Action to support populations of intertidal birds	**High** - a number of intertidal birds have a long-term declining trend, in part due to climate change	Intertidal birds can be supported through habitat creation/ enhancement and through reduction in disturbance pressures.	**Direct implementation by industry and government-led**	**High**	Scope for restoration/ enhancement of intertidal habitats and funding of initiatives to reduce disturbance.
Action to support populations of intertidal/near coastal marine mammals	**Low -** Scope to enhance coastal otter populations	Measures to improve otter habitat on land.	**Direct implementation by industry and government-led**	**Low**	Generally seen as more of a terrestrial than coastal issue and unlikely to be many issues arising for coastal developers .
Action to address eutrophication	**Medium** - a significant proportion of transitional and coastal water bodies have elevated concentrations of dissolved inorganic nitrogen. A smaller number of water bodies show evidence of eutrophication. The UK has largely achieved its aim of GES for eutrophication in offshore waters (D5).	Technically feasible to deliver improvements in water quality.	**Government-led**	**Medium**	In line with the 'polluter pays' principle significant sources should be responsible for limiting their own emissions. However, significant scope remains to contribute to wider projects tackling diffuse pollution the results in eutrophication. Other (direct) habitat interventions may also contribute to nutrient cycling (e.g. saltmarsh creation).

[1] An advisory group mechanism may be required to assess if projects are appropriate at a regional or national scale in meeting the objective of recovery. It is important that spatial considerations are taken into account e.g. are the projects in the appropriate locations and how will they affect the existing habitats and species.

Table A3. Offshore opportunities

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for NET gain	Additional Comments
Action to restore offshore habitats	**High** - major historic losses of offshore structuring features (native oyster reef, *Modiolus*, serpulid reef and other biogenic reef) particularly as a result of bottom-towed fishing gears (seabed abrasion and penetration, removal of organisms)	Direct native oyster restoration remains challenging and experimental – may be more feasible offshore away from *Bonamia* infected areas; removal of abrasion pressures from fishing gears may lead to long-term recovery of biogenic reefs (serpulid reef, pink sea fan etc).	**Direct implementation by industry** (for direct restoration) but **government-led** for pressure reduction	**High**	Recognised that there are limited opportunities to restore habitat offshore directly. Pressure removal (particularly fisheries pressure removal) likely to be important to support long-term habitat recovery and ecological benefits e.g. sandeel recovery. Achieving this at scale likely to require government intervention and leadership.
	Medium – historic losses of offshore habitats within development footprints (for a relatively small area of seabed)	Removal of development infrastructure as part of decommissioning to restore offshore habitats. Decommissioning programmes already seek to remove most significant infrastructure. Additional removals may be disproportionately expensive or too risky.	**Direct implementation by industry** (for removal of own infrastructure) **government-led** (for removal of third-party infrastructure)	**High**	Developers may have limited opportunity to decommission their own existing structures (most decommissioning activity relates to oil and gas, but most new development relates to offshore wind). Enhanced removal of infrastructure may be disproportionately expensive or pose unacceptable health and safety risks.

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for NET gain	Additional Comments
					Potential for Net Gain could incentivise more decommissioning and drive innovation of a) decommissioning techniques which are less damaging and b) encourage projects at build phase to create infrastructure which is easier to install and remove.
Action to restore and enhance offshore invertebrates	**High** – native oyster, *Modiolus*, edible crab, European lobster, spiny lobster, scallop	See comments under offshore habitats above. Direct restoration of species such as native oyster remains challenging. Also, potential to restore edible crab, European lobster, spiny lobster populations through fishing pressure reduction and targeted restocking (e.g. lobster hatcheries). Other invertebrate species can be enhanced as a result of pressure reduction (primarily fisheries abrasion and penetration pressure).	**Direct implementation by industry and government-led** (mostly government-led as most interventions likely to require management of (fishing) pressures)	**High** (native oyster) **Medium** (edible crab, European lobster, spiny lobster, *Modiolus*, other invertebrates)	Some scope for restoration and enhancement of offshore invertebrates, mostly requiring reduction in (fishing) pressures which would need to be government led.

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for NET gain	Additional Comments
Action to support populations of offshore fish	**High** – many commercial fish species below Maximum Sustainable Yield (MSY). Populations of key food chain species such as sandeel, herring and sprat significantly depleted compared to historic levels	Populations can be enhanced through fisheries management measures (including management of direct fishing pressures and seabed abrasion/ penetration).	**Government-led** (measures to reduce pressure on fish stocks/limit abrasion damage would likely need to be government-led)	**Medium to High** (depending on funding mechanism for Net Gain)	Scope for industry to contribute to funding of fisheries measures for key food chain species such as sandeel, herring and sprat.
Action to support populations of offshore birds	**High** – a number of seabird species are in long-term decline due to reductions in prey availability (from overfishing and climate change) and pressures at nesting colonies (predation, disturbance)	Seabird species can be supported through measures to reduce pressures at breeding colonies (predator removal, disturbance reduction, provision of nesting sites) and through enhancement of prey abundance (fisheries measures).	**Direct implementation by industry and government-led** (measures at colonies can be directly funded, but measures to reduce fishing pressures would likely need to be government led)	**High**	Scope to directly support seabirds at breeding colonies and potential to improve prey availability through fisheries management measures offshore.
Action to support populations of offshore marine mammals	**Medium** - Cetacean populations are depleted compared to historical levels. Harbour seal populations depleted in some UK regions (e.g. East coast)	Scope to reduce fisheries by-catch mortality. Populations could also be enhanced through reductions in commercial fishing pressure on prey resources.	**Government-led**	**Low to Medium** (depending on funding mechanism for Net Gain)	Opportunity for industry to contribute funding to fisheries management measures.

B Strategic Net Gain Targets for Coastal and Marine Environments: Assumptions of the Task and Finish Group

The Task and Finish Group (T&F Group) that was established to determine strategic targets for Marine Net Gain have met on a number of occasions. In discussion the group have identified a number of factors and assumptions which were considered important to be taken into account when determining targets. It is important to stress that additional factors were identified through the survey undertaken to collect stakeholder views on strategic targets. The assumptions are central to the group's determination of targets whilst also providing information on their application and deliverability by industry to meet Net Gain obligations. The T&F Group includes representation from industry, government and environmental NGOs. These assumptions represent the collective thinking of the T&F Group, however, any final Net Gain assumptions prepared by government bodies will be subject to Defra Policy steer, ministerial approval and public consultation.

It is also important to stress that all of these discussions were based in the foundation that the mitigation hierarchy will still apply to development. This is not to limit the opportunities for Net Gain, but instead create opportunities for additional improvements, i.e. compensation plus.

Although we are still awaiting the final outcome of the Environment Bill, and the associated implications for developing a Marine Net Gain approach, the current indication from government is that Net Gain should be delivered as Biodiversity Net Gain in the intertidal zone and terrestrial environments. The T&F Group recognise the overlap between the delivery of intertidal biodiversity Net Gain and the developing Net Gain policy for marine environments and the importance of establishing integrated and seamless approaches that provide clarity for coastal areas.

Each of the assumptions are discussed in more detail below and are considered important or essential aspects of the final recommendations for strategic targets and their delivery.

1. As a basic premise, strategic targets should be based on our understanding of where we are already failing intertidal and marine environments, and the need to halt and reverse marine biodiversity loss. This is well documented by existing monitoring of statutory as well as non-statutory obligation, including statutory reporting such as the failure to meet Good Environmental Status (GES) as part of the Marine Strategy Framework Directive (MSFD) requirements and the failure of designated MPAs to meet favourable conservation status. In addition, there are also many accounts of loss prepared by eNGOs and others highlighting the continuing depletion of species and habitats. For example, only 4 out of 15 indicators for meeting GES have been achieved so far[1] and the State of Nature estimated that only approximately half of fisheries in the UK are assessed as being fished sustainably[2]. The UK Breeding Seabird Indicator showed a 22% decline in average abundance for 13 species between 1985 and 2015[1]. Recent seal counts from 2019 show that harbour seal populations on the east coast of England have declined by approximately 27.6% compared to the previous year[3].

1 UKMMAS (2018) Summary of progress towards Good Environmental Status: Marine Online Assessment Tool
2 NBN (2019) State of Nature Report 2019
3 SMRU (2020) Scientific Advice on Matters Related to the Management of Seal Populations: 2020

2. The primary goal of intertidal and marine biodiversity Net Gain at a national scale should be:

   to place marine and intertidal ecosystems into recovery

   Multi-purpose projects providing secondary benefits that contribute to the following targets should also be prioritised, but these benefits should be delivered in addition to the primary goal of achieving ecosystem recovery:

   a. *to reduce disaster risk from the continuing loss of natural coastal defences such as salt marsh (e.g. flood risk / coastal erosion); and*
   b. *to combat climate change, through mitigation and adaptation.*

   Both primary and secondary goals should be planned with an ultimate overall aim of generating lasting improvements in the marine and coastal environments.

3. The group fully recognised the importance of the opportunity to pool funding from industry and other partners to undertake projects that would have a significant and positive impact on the marine environment which will be important in avoiding piecemeal and possibly inappropriate and unsustainable actions. It may be that this would be critical to the success of more ambitious projects such as those outlined in 5, 8 and 9 below.

4. Targets should be presented without reference to specific timescales (unless these are evidenced). The delivery of biodiversity Net Gain will be inherently linked to biodiversity recovery priorities, the timeframes for action, and the timescale and scale of development in the marine environment, but any argument to identify targets for immediate delivery needs some consideration. Although timing of delivery will be an important principle in determining how biodiversity Net Gain should be delivered by developers (and will need to be addressed in statutory aspects developed by Defra) it will be important to avoid solely focusing on quick wins which do not necessarily contribute to strategic targets (see point 5 below). It is accepted that where possible, biodiversity Net Gain should be secured 'in perpetuity', however, the definition of 'in perpetuity' may alter depending upon the type of intervention in question (i.e. pressure reduction verses habitat creation), as well as the mechanism for delivery (e.g. if Net Gain is delivered at a project level, 'in perpetuity' would be limited to the lifetime of the project (e.g. tern rafts)).

5. By definition, strategic targets for biodiversity Net Gain may be large and ambitious, reflecting the scale and opportunities for restoring and improving the marine and coastal environments. Consequently, biodiversity Net Gain targets for individual developments should be made on the basis that rather than stand alone, they could contribute to wider delivery of agreed conservation targets and that they are just one of the mechanisms that will be helping to restore biodiversity by partnerships working.

   a. For intertidal goals, a good example of this is that the Environment Agency are preparing targets based on their own understanding of the current status of salt marsh, sea grass and other habitats and these could be important opportunities where industry could assist in delivering biodiversity Net Gain as part of the EA's own actions in managing flood and coastal defences. Such an approach also lends itself to even wider partnership working, such as that carried out at Wallasey Island by RSPB and others and in the delivery of more ambitious campaigns for restoration. For example, Essex Wildlife Trust and the Environment Agency worked in partnership on a coastal re-alignment project in the Blackwater Estuary, where land was purchased, and the old sea wall was allowed to be

breached[4]. This has created valuable salt-marsh habitat that now supports internationally important bird populations and acts as a fish nursery for bass, herring and 14 other fish species, all while providing a natural defence against rising sea levels.

b. No similar examples exist for achieving marine goals and it is recognised that restoring and improving the marine environment is extremely challenging. Therefore, delivering these marine targets will require novel and innovative approaches, outside of traditional habitat restoration, in order to succeed.

6. Intertidal and marine environments are not constrained by boundaries and are very dynamic in nature. To further complicate the issue, not all marine activities result in permanent loss (i.e. they create a temporary disturbance). This needs to be recognised in strategic targets and means that biodiversity Net Gain should be within these dynamic systems. A general principle, therefore, is that activities and possible loss of biodiversity in the intertidal zone should deliver biodiversity Net Gain in the intertidal area and, equally, loss in the marine zone should deliver biodiversity Net Gain in the marine environment. By extension, this should mean that Net Gain for marine and intertidal activities should not be delivered in the terrestrial environment. However, it should be recognised that there are potential exceptions to this, where opportunities may be identified to deliver ambitious strategic Net Gain projects, for example one that might address the upstream root cause of a failing habitat in the marine environment (e.g. water quality management to enable seagrass restoration).

7. Although the current expectation is that Biodiversity Net Gain will be the preferred way forward by government, this does not mean that there won't be opportunities for Environmental Net Gain and these should be considered by developers as part of the development and planning of projects. What is becoming clear and more frequently stated by government and others is that the sea is going to become an increasingly busy place. Activities which create a pressure on the environment may need to be addressed, such as some forms of fishing. While this may create opportunities for biodiversity Net Gain it will be important to recognise that the responsibility to assess the removal of pressures as a means of delivering biodiversity Net Gain must be with government, as the removal of such pressures will often also require statutory intervention.

8. An important principle of successful biodiversity Net Gain is that the causes of loss may need to be addressed if the outcomes of Net Gain activities are to be successful and sustained. Consequently, targets need to acknowledge the complexity of the environment and examine and treat causes of loss as well as direct action to restore. For example; simply planting sea grass, or laying native oysters or mussels, without considering the reasons, such as nutrient enrichment, that have caused loss in the first place may not only be unsuccessful, but would place a liability on the developer to maintain features which the current ecosystem is incapable of sustaining.

9. There is some potential that research and data gathering could be considered as biodiversity Net Gain (for example a research project to support better biodiversity Net Gain delivery in the future), but only if it is delivered as part of a broader strategic approach, and as a supporting action to delivering Net Gain. It would not be appropriate, for example, for piecemeal research to be carried out as Net Gain to determine how to deliver biodiversity Net Gain for a specific development.

[4] Essex Wildlife Trust - Coastal Defence and Realignment at Abbotts Hall Farm: https://www.essexwt.org.uk/nature-reserves/abbotts-hall-farm/coastal-realignment

In addition to the points made above about the nature of strategic biodiversity Net Gain, the group discussions identified a number of assumptions and areas of agreement which are made as recommendations to assist delivery of biodiversity Net Gain, the design of the principles of biodiversity Net Gain and how biodiversity Net Gain should be administered through regulation.

1. The delivery of biodiversity Net Gain could be coordinated by advisory groups for large areas of sea with the aim of delivering strategic targets at a regional level through better understanding of local requirements. These groups should work under a set of clear principles to identify strategic mitigation, compensation and monitoring, in addition to biodiversity Net Gain. This approach will also ensure that all bases are being covered i.e. maintaining the coherency of the network and avoiding overprovision for selected marine features. These could also link in with other initiatives such as Environmental Land Management (ELM) and Local Nature Recovery Strategies (LNRS).

2. Ambitious restoration projects will require greater funding and therefore a strategic / collaborative approach. The Aggregates Levy provides an example for how a funding mechanism might work. A strategic approach is also potentially better for smaller developments where pooling of such projects would lead to larger gains. However, funding doesn't need to be one or the other, there could be a strategic fund as well as a developer led approach to suit project / industry needs. ReMeMaRe are preparing a series of bids to try and highlight Net Gain issues/ requirements. A strategic fund could be used to support these more ambitious projects.

3. It may be that to safeguard the permanence of biodiversity Net Gain projects, legal protection, or safeguarding through tenure rights, would be required. While this needs examination, there are questions about custodianship and who will have responsibility to maintain sites. At the same time there is a need to monitor the effectiveness and success of sites and responsibility for this also needs examination. This becomes especially important where biodiversity Net Gain is delivered through partnership working where there is more than one key player.

4. The group put the issue of additionality aside for discussions as this is being addressed by government currently. It was agreed by the group, however, that the issue of additionality would not restrict the group's thinking on where and how biodiversity Net Gain could be applied strategically, and this would be reflected in the targets.

5. The strategic targets developed will be England focussed, but there will be many opportunities to use the delivery of biodiversity Net Gain to develop good practice which can be shared with the other devolved administrations. This should also be reciprocated as others develop their own approaches. For example, the development of the partnership funding approach, Scottish Marine Environmental Enhancement Fund (SMEEF) may prove to be of real value in developing practical application of funds for strategic target delivery.

6. It is important to stress that the work of this T&F Group considered parallel projects (e.g. work under Offshore Wind Evidence and Change Programme and OWEAP) so as not to be self-siloed. There is a need for alignment between the different working groups considering Net Gain and the group will draft a communication on links between OWEAP, Offshore Wind Evidence and Change Programme and this project and outputs.

7. The group makes some high-level recommendations on the delivery of biodiversity Net Gain in the intertidal and marine environment; however, the primary role of the group is to decide on the priorities for strategic Net Gain based on the agreed assumptions. It is ultimately up to government to define what they consider acceptable as Net Gain and how these might be delivered.

C Strategic Net Gain Targets for Coastal and Marine Environments: Second Stakeholder Questionnaire

Strategic Targets for Net Gain: what are the priorities, opportunities and how might they be delivered?

1) First, a bit about you. Please select which sector you work in from the list below?

SECTION 1: Thoughts on the delivery of Marine Net Gain

A number of questions have been identified by the Task & Finish Group to further explore the delivery of Net Gain in the marine environment. We would very much appreciate your comments on the following points.

2) The Task and Finish Group have focussed on the identification of strategic targets for Biodiversity Net Gain, as opposed to Environmental Net Gain (see draft assumptions paper) for further details).

   Do you agree with this assumption?
   - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Please explain your answer

3) It is anticipated that offshore development (subtidal) will be required to deliver Net Gain offshore and that coastal projects (intertidal) will need to deliver Net Gain in intertidal/nearshore areas. Therefore, targets have been identified with specific reference to each of these environmental compartments.

   Do you agree with this approach?
   - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Please explain your answer

4) How 'natural' does an intervention need to be to count as BNG? For example, should enhancement of hard coastal infrastructure 'greening the grey' count as BNG, or could forms of shellfish or seaweed aquaculture count as BNG measures?

5) Do you think species should be included within Marine Net Gain strategic targets?
   - Yes/No
   - If yes, which groups do you think should be included (invertebrates, birds, fish, marine mammals)?

6) Which approach do you think would be the most appropriate for the application of Marine Net Gain:
   - A metric similar to that created for terrestrial Net Gain;
   - A new metric designed for the offshore marine environment;
   - An industry levy to support a strategic fund, with Net Gain delivered either regionally or nationally;
   - Other

   Please explain your answer:

SECTION 2: Strategic priorities for Marine Net Gain

The table of strategic priorities forms the basis of this section and opinions are sought on each of the suggested targets, priorities, and scale of suggested opportunity.

The Task & Finish Group has prepared a document setting out the assumptions that have been made by the group, when discussing the development of strategic targets for Marine Net Gain. This assumptions document has been provided to support your thinking, when considering the questions that follow.

Prioritisation of Strategic Net Gain Opportunities

The following questions identify strategic Net Gain opportunities and suggestions for how these might be delivered. The opportunities have been identified based on an understanding of stakeholder views, historic losses, feasibility of measures and consideration of the extent to which marine industry might feasibly contribute to such targets. The opportunities have been split into three categories, based on the assumption that offshore development will be required to deliver Net Gain offshore and that coastal projects will need to deliver Net Gain in intertidal/nearshore areas. We have therefore sought to differentiate targets that might be relevant to offshore areas and those relevant to intertidal/nearshore area.

The prioritisation is focused on delivery of Biodiversity Net Gain (BNG) as a core component of overall Marine Net Gain. It has not considered measures that would constitute Environmental Net Gain (ENG) but wouldn't directly deliver BNG (e.g. greenhouse gas emissions reductions, air quality improvements, flood risk reduction).

The prioritisation of opportunities is also, partly dependent on the wider approach to Marine Net Gain and the funding mechanism. If the approach places responsibility for delivery of Net Gain measures on developers, then the focus of Marine Net Gain measures will need to be on measures within developers' powers to deliver. If the approach is more focused on developers providing funding for Net Gain actions which are then delivered by government, the scope of measures could be much broader and reflect the broader priorities for restoration/enhancement in the marine environment.

The prioritisation does not take account of potential issues of additionality.

Pressure reduction opportunities

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
Action to reduce contaminants	Water quality – **medium**; Sediment quality - **medium**	Water quality: Technically feasible to deliver improvements in water quality, potential for government to work with farmers; Sediment quality: disproportionately costly to undertake large scale remediation of contaminated sediments.	**Government-led**	**Low**	Relatively few failures of Water Framework Directive Environmental Quality Standard (EQS) in transitional and coastal waters. Offshore waters considered to be at Good Environmental Status (GES). In line with polluter pays principle significant point source discharges should be responsible for limiting their emissions.
Action to reduce and clean up marine litter and debris	**Medium**	Other than removal of intertidal litter for aesthetic reasons, it is not technically feasible to remove meaningful amounts of litter from the marine environment.	**Direct implementation by industry and government-led**	**Low/ infeasible**	Scope to contribute funding to litter removal initiatives but this would primarily deliver ENG not BNG.
Action to reduce underwater noise	The significance of current levels of ambient anthropogenic underwater noise is uncertain.	Technically feasible to reduce anthropogenic underwater noise at source but this would be considered a mitigation measure when implemented by industry on its own projects.	**Direct implementation by industry**	**Low**	Measure to reduce industries own ambient underwater noise would be considered as mitigation.

1) Do you agree that measures within pressure categories water quality, marine litter and underwater noise are lower priorities for strategic Marine Net Gain targets?
    - Yes/ No
    - Please explain why

Intertidal/ near coastal opportunities

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain (1)	Additional Comments
Action to restore and/ or create intertidal/near coastal habitats (including characterising species)	**High** – major historic losses of mudflat/sandflat, saltmarsh/reedbed, seagrass, native oyster reef, maerl **Medium** – kelp Uncertain – intertidal under-boulder communities, other bivalve beds (blue mussel, cockles, clams)	Feasibility of direct mudflat/sandflat and saltmarsh/reedbed creation well established; seagrass and blue mussel restoration likely to be feasible given suitable conditions; direct native oyster reef restoration remains challenging and experimental; kelp uncertain but potential to seed gravel to allow restoration; cockle/clam restoration best managed through control of fishing pressure. Maerl restoration only possible through pressure reduction.	**Direct implementation by industry and government-led**	**High** (mudflat/sandflat, saltmarsh/reedbed, seagrass, native oyster **Medium** (kelp, other bivalves, maerl) **Low/ N/A** (intertidal under-boulder communities)	Scope for habitat restoration and enhancement in intertidal and near coastal areas in particular for intertidal mudflat and sandflat, saltmarsh/ reedbed, seagrass and native oyster. Some scope for restoration and enhancement of other features. Interventions could be led by industry or government (with industry funding). Opportunities for kelp restoration may be limited and likely to be site specific and to require management of fishing gear abrasion pressures. Measures entailing management of commercial fishing pressure would need to be government-led.

2) Intertidal/near coastal habitats
   - Do you agree with the suggested scale of opportunity?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the suggested technical feasibility?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the overall prioritisation for Net Gain?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - What do you consider the scope for industry vs government-led delivery? Do you agree with the suggested method of implementation?
   - Do you have any further comments on any of the above, are there any other targets/ actions you feel should be included?

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain (1)	Additional Comments
Action to restore and enhance intertidal/near coastal invertebrates	**High** – native oyster, *Modiolus*, edible crab, European lobster, spiny lobster, scallop	Direct restoration of species remains challenging, but potential to restore edible crab, European lobster, spiny lobster populations through fishing pressure reduction and targeted restocking (e.g. lobster hatcheries). Other invertebrate species can be enhanced as a result of pressure reduction (primarily fisheries abrasion and penetration pressure).	**Direct implementation by industry and government-led** (primarily government-led as most interventions likely to require management of (fishing) pressures)	**Medium** (edible crab, European lobster, spiny lobster, *Modiolus*, other invertebrates)	Some scope for restoration and enhancement of intertidal/ nearshore invertebrates, mostly requiring reduction in (fishing) pressures which would need to be government-led.

3) Intertidal/near coastal invertebrates
   - Do you agree with the suggested scale of opportunity?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the suggested technical feasibility?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the overall prioritisation for Net Gain?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - What do you consider the scope for industry vs government-led delivery? Do you agree with the suggested method of implementation?
   - Do you have any further comments on any of the above, are there any other targets/ actions you feel should be included?

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain (1)	Additional Comments
Action to support and restore intertidal/near coastal fish	**High** – Atlantic salmon, sea trout, allis and twaite shad, smelt, eel, river and sea lamprey, sturgeon	Some success in restoration of salmon but more challenging in southern rivers due to climate change; some experience with allis and twaite shad (Unlocking the Severn – removal of migratory barriers; water quality improvements); restoration of eel populations dependent on pressure reduction (reduction in fishing pressure (glass eel/elver); recovery of lamprey dependent on populations of other migratory fish.	**Direct implementation by industry and government-led**	**High**	Scope to contribute to direct restocking, removal of migratory barriers, or management of spawning and, nursery habitats.

4) Intertidal/near coastal fish
   - Do you agree with the suggested scale of opportunity?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the suggested technical feasibility?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the overall prioritisation for Net Gain?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - What do you consider the scope for industry vs government-led delivery? Do you agree with the suggested method of implementation?
   - Do you have any further comments on any of the above, are there any other targets/ actions you feel should be included?

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain (1)	Additional Comments
Action to support populations of intertidal birds	**High** - a number of intertidal birds have a long-term declining trend, in part due to climate change	Intertidal birds can be supported through habitat creation/ enhancement and through reduction in disturbance pressures.	**Direct implementation by industry and government-led**	**High**	Scope for restoration/ enhancement of intertidal habitats and funding of initiatives to reduce disturbance.

5) Intertidal birds
   - Do you agree with the suggested scale of opportunity?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the suggested technical feasibility?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the overall prioritisation for Net Gain?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - What do you consider the scope for industry vs government-led delivery? Do you agree with the suggested method of implementation?
   - Do you have any further comments on any of the above, are there any other targets/ actions you feel should be included?

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain (1)	Additional Comments
Action to support populations of intertidal/near coastal marine mammals	**Low -** Scope to enhance coastal otter populations	Measures to improve otter habitat on land.	**Direct implementation by industry and government-led**	**Low**	Generally seen as more of a terrestrial than coastal issue and unlikely to be many issues arising for coastal developers .

6) Intertidal mammals
   - Do you agree with the suggested scale of opportunity?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the suggested technical feasibility?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the overall prioritisation for Net Gain?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - What do you consider the scope for industry vs government-led delivery? Do you agree with the suggested method of implementation?
   - Do you have any further comments on any of the above, are there any other targets/ actions you feel should be included?

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain (1)	Additional Comments
Action to address eutrophication	**Medium** - a significant proportion of transitional and coastal water bodies have elevated concentrations of dissolved inorganic nitrogen. A smaller number of water bodies show evidence of eutrophication. The UK has largely achieved its aim of GES for eutrophication in offshore waters (D5).	Technically feasible to deliver improvements in water quality.	**Government-led**	**Medium**	In line with the 'polluter pays' principle significant sources should be responsible for limiting their own emissions. However, significant scope remains to contribute to wider projects tackling diffuse pollution the results in eutrophication. Other (direct) habitat interventions may also contribute to nutrient cycling (e.g. saltmarsh creation).

7) Eutrophication
   - Do you agree with the suggested scale of opportunity?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the suggested technical feasibility?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the overall prioritisation for Net Gain?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - What do you consider the scope for industry vs government-led delivery? Do you agree with the suggested method of implementation?
   - Do you have any further comments on any of the above, are there any other targets/ actions you feel should be included?

Offshore opportunities

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
Action to restore offshore habitats	**High** - major historic losses of offshore structuring features (native oyster reef, *Modiolus*, serpulid reef and other biogenic reef) particularly as a result of bottom-towed fishing gears (seabed abrasion and penetration, removal of organisms)	Direct native oyster restoration remains challenging and experimental – may be more feasible offshore away from *Bonamia* infected areas; removal of abrasion pressures from fishing gears may lead to long-term recovery of biogenic reefs (serpulid reef, pink sea fan etc).	**Direct implementation by industry** (for direct restoration) but **government-led** for pressure reduction	**High**	Recognised that there are limited opportunities to restore habitat offshore directly. Pressure removal (particularly fisheries pressure removal) likely to be important to support long-term habitat recovery and ecological benefits e.g. sandeel recovery. Achieving this at scale likely to require government intervention and leadership.
	Medium – historic losses of offshore habitats within development footprints (for a relatively small area of seabed)	Removal of development infrastructure as part of decommissioning to restore offshore habitats. Decommissioning programmes already seek to remove most significant infrastructure. Additional removals may be disproportionately expensive or too risky.	**Direct implementation by industry** (for removal of own infrastructure) **government-led** (for removal of third-party infrastructure)	**High**	Developers may have limited opportunity to decommission their own existing structures (most decommissioning activity relates to oil and gas, but most new development relates to offshore wind). Enhanced removal of infrastructure may be disproportionately expensive or pose unacceptable health and safety risks. Potential for Net Gain could incentivise more decommissioning and drive innovation of a) decommissioning techniques which are less damaging and b) encourage projects at build phase to create infrastructure which is easier to install and remove.

8) Offshore habitats
   - Do you agree with the suggested scale of opportunity?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the suggested technical feasibility?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the overall prioritisation for Net Gain?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - What do you consider the scope for industry vs government-led delivery? Do you agree with the suggested method of implementation?
   - Do you have any further comments on any of the above, are there any other targets/ actions you feel should be included?

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
Action to restore and enhance offshore invertebrates	**High** – native oyster, *Modiolus*, edible crab, European lobster, spiny lobster, scallop	See comments under offshore habitats above. Direct restoration of species such as native oyster remains challenging. Also, potential to restore edible crab, European lobster, spiny lobster populations through fishing pressure reduction and targeted restocking (e.g. lobster hatcheries). Other invertebrate species can be enhanced as a result of pressure reduction (primarily fisheries abrasion and penetration pressure).	**Direct implementation by industry and government-led** (mostly government-led as most interventions likely to require management of (fishing) pressures)	**High** (native oyster) **Medium** (edible crab, European lobster, spiny lobster, *Modiolus*, other invertebrates)	Some scope for restoration and enhancement of offshore invertebrates, mostly requiring reduction in (fishing) pressures which would need to be government-led.

9) Offshore invertebrates
   - Do you agree with the suggested scale of opportunity?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the suggested technical feasibility?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the overall prioritisation for Net Gain?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - What do you consider the scope for industry vs government-led delivery? Do you agree with the suggested method of implementation?
   - Do you have any further comments on any of the above, are there any other targets/ actions you feel should be included?

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
Action to support populations of offshore fish	**High** – many commercial fish species below Maximum Sustainable Yield (MSY). Populations of key food chain species such as sandeel, herring and sprat significantly depleted compared to historic levels	Populations can be enhanced through fisheries management measures (including management of direct fishing pressures and seabed abrasion/ penetration).	**Government-led** (measures to reduce pressure on fish stocks/limit abrasion damage would likely need to be government-led)	**Medium to High** (depending on funding mechanism for Net Gain)	Scope for industry to contribute to funding of fisheries measures for key food chain species such as sandeel, herring and sprat.

10) Offshore fish
    - Do you agree with the suggested scale of opportunity?
        - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
    - Do you agree with the suggested technical feasibility?
        - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
    - Do you agree with the overall prioritisation for Net Gain?
        - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
    - What do you consider the scope for industry vs government-led delivery? Do you agree with the suggested method of implementation?
    - Do you have any further comments on any of the above, are there any other targets/ actions you feel should be included?

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
Action to support populations of offshore birds	**High** – a number of seabird species are in long-term decline due to reductions in prey availability (from overfishing and climate change) and pressures at nesting colonies (predation, disturbance)	Seabird species can be supported through measures to reduce pressures at breeding colonies (predator removal, disturbance reduction, provision of nesting sites) and through enhancement of prey abundance (fisheries measures).	**Direct implementation by industry and government-led** (measures at colonies can be directly funded, but measures to reduce fishing pressures would likely need to be government led)	**High**	Scope to directly support seabirds at breeding colonies and potential to improve prey availability through fisheries management measures offshore.

11) Offshore birds
   - Do you agree with the suggested scale of opportunity?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the suggested technical feasibility?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the overall prioritisation for Net Gain?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - What do you consider the scope for industry vs government-led delivery? Do you agree with the suggested method of implementation?
   - Do you have any further comments on any of the above, are there any other targets/ actions you feel should be included?

Strategic Net Gain Opportunity	Potential Scale of Opportunity	Technical Feasibility	Method of Implementation	Overall Prioritisation for Net Gain	Additional Comments
Action to support populations of offshore marine mammals	**Medium** - Cetacean populations are depleted compared to historical levels. Harbour seal populations depleted in some UK regions (e.g. East coast)	Scope to reduce fisheries by-catch mortality. Populations could also be enhanced through reductions in commercial fishing pressure on prey resources.	**Government-led**	**Low to Medium** (depending on funding mechanism for Net Gain)	Opportunity for industry to contribute funding to fisheries management measures.

12) Offshore marine mammals
   - Do you agree with the suggested scale of opportunity?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the suggested technical feasibility?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - Do you agree with the overall prioritisation for Net Gain?
     - Strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree
   - What do you consider the scope for industry vs government-led delivery? Do you agree with the suggested method of implementation?
   - Do you have any further comments on any of the above, are there any other targets/ actions you feel should be included?

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