



Offshore
Wind Evidence
+ Change
Programme

Delivery Options for Strategic Marine Net Gain

Task and Finish Group Final Report

Foreword

We are in the grip of a marine biodiversity crisis, which makes it essential that we all work collaboratively to restore the habitats and species which are core to the health of the coasts and seas around our island. At the same time, there are huge opportunities and plans for marine developments; many of which will be critical to the work required to address climate change. Importantly, future development will need to be delivered with contributions to Net Gain, in addition to the existing requirements for environmental protection. This is the second report of a Task and Finish (T&F) Group established to look at how a statutory obligation for Net Gain can be best delivered in the coastal and marine environments to ensure that significant contributions can be made to assist nature restoration and recovery. The work was possible through funding and excellent support from the Offshore Wind Evidence and Change programme and the Group is extremely grateful for this. The first phase of work used calls for evidence to develop strategic targets for net gain which, in the views of the many people who supported the outcomes, would ensure that Net Gain obligations on developers and development would deliver meaningful conservation and restoration, addressing areas where we know national conservation targets are currently not being met. The wide support for the strategic targets set out in the first report allowed the Group to make a number of recommendations which could be of help to Defra, who are members of the Group, in undertaking their own work on developing policy and procedures for delivering Net Gain.

This second report examines those strategic targets further and looks at how they could be delivered at a more local level. As before, the work was done by the Group setting out calls for evidence from the many people who are working around the country on marine and coastal restoration and recovery, and their knowledge, experience and views were of immense value in helping us to prepare this report and its recommendations. The report looks at both the mechanics of restoration activities and the lessons learnt from doing them, as well as possible funding approaches. As with the first report, this has allowed us to make further recommendations on the way that Net Gain could be delivered while also identifying some further areas of work which may be useful as Net Gain becomes a statutory obligation.

The work could not have been done without the excellent help of ABPmer who were not only part of the Group, but also did much of the work in undertaking the calls for evidence, assimilating the results and drafting the subsequent reports.

We hope that you find this report useful and thought provoking and we would very much like to hear any views you have about it, or how we can ensure that statutory Net Gain is most effective in helping achieve real recovery of the marine environments. Please contact info@sudg.org.uk to share your thoughts.

Peter Barham, Chair of the Task and Finish Group.



Executive Summary

This report summarises work undertaken by a Task and Finish Group (T&F Group) between October 2022 to October 2023, funded by the Offshore Wind Evidence and Change programme, to explore and make recommendations on options for the strategic delivery of intertidal and Marine Net Gain (MNG), hereafter referred to as Strategic Marine Net Gain (SMNG). The report builds on earlier work undertaken by the T&F Group which identified strategic targets for MNG (The Crown Estate, 2021¹). This second report provides recommendations on delivery of those targets to best achieve SMNG.

The T&F Group comprised conservation NGOs, Coastal, Estuary and Marine Partnerships (CEMPs), industry representatives and statutory bodies, supported by consultants, ABPmer. To support the work of the T&F Group, ABPmer co-ordinated a number of discrete tasks to examine how best to deliver the strategic targets identified within the first T&F Group report, the outputs of each of these tasks are included as appendices to the report:

- Collation of information on existing and planned marine restoration and recovery projects within an excel database;
- Collation of further information on marine restoration and recovery projects through a call for evidence;
- Issuing a second call for evidence on specific aspects of SMNG including on restoration and recovery priorities, approaches to co-ordination of restoration and recovery, information requirements to support delivery of SMNG, how a system of SMNG might support innovation, flexibility in the delivery of SMNG requirements and on the potential of a contributions-based approach as part of SMNG; and
- Development of an initial spatial (regional) model seeking to estimate potential future demand for MNG restoration and recovery actions, based on forecast levels of future development activity and their residual impact.

The review and the call for evidence identified over 700 projects and proposals seeking to reduce pressures upon or to create, enhance or restore marine and intertidal/coastal habitats and species. This showed that the greatest number of initiatives in the marine environment are focused on pressure reduction, either fisheries management measures to protect fish and shellfish stocks (which also provide a benefit to seabed habitats and dependent species) or Marine Protected Area (MPA) management measures. At the coast, there are also many saltmarsh and mudflat habitat creation projects. Increasingly, there are a number of restoration projects focused on seagrass and saltmarsh habitats, as well as projects seeking to reduce pressures on seabird colonies and wading bird populations.

The second call for evidence received 54 online responses, many of which provided a lot of further detail regarding key limitations to current restoration initiatives, ecological or nature recovery priorities in the marine environment and potential measures and mechanisms to contribute to, or support delivery of SMNG targets. The information from this second call for evidence has been invaluable in shaping the recommendations of the T&F Group as to how a strategic approach to MNG implementation might be taken forward. These recommendations help in delivering the strategic targets identified in the first T&F Group report.

¹ The Crown Estate. 2021. Strategic Net Gain Task and Finish Group, Offshore Wind Evidence and Change Programme, Strategic Net Gain Targets for Coastal and Marine Environments. Online. Available here: <https://www.marinedataexchange.co.uk/details/3513/2021-strategic-net-gain-task-and-finish-group-offshore-wind-evidence-and-change-programme-strategic-net-gain-targets-for-coastal-and-marine-environments/summary> [Accessed 17/10/23].



An initial model for estimating future MNG demand carried out as part of the work necessarily required many assumptions to be made concerning the future level of development activity, the residual impact of such development, and how MNG requirements might be calculated. Given these uncertainties, however, the model is considered to indicate an 'order of magnitude' for MNG demand in the period to 2050, which suggested that, overall, the scale of MNG demand for habitat measures over this period may be less than 0.1% of subtidal mud, sand and gravel habitats to achieve MNG in relation to direct loss/change of habitat in English waters and less than 0.5% to achieve MNG in relation to both habitat loss and habitat disturbance. These are relatively small requirements when compared to the areas of English seabed currently under management measures for nature conservation or fisheries management (4.4% subtidal mud, 8.3% subtidal sand, 6.3% subtidal gravel). It has not been possible, within the scope of this work, to quantify residual impacts to species (fish, birds, marine mammals) nor to calculate a potential MNG requirement for species. This is due to the limited quantification of such impacts within Environmental Impact Assessments (EIAs) and the lack of evidence available to estimate residual impacts.

Based on the information received through the calls for evidence from a wide range of stakeholders and the experience and knowledge within the T&F Group, the Group makes the following recommendations:

Recommendation 1 - recognising the need to address the marine biodiversity crisis, a statutory system of MNG should be implemented as soon as possible.

Recommendation 2 - a national/UK online restoration platform of marine restoration and recovery projects should be established and maintained building on the evidence database created in this study.

Recommendation 3 – where restoration and recovery projects are being progressed, the project promoters should ensure that they suitably plan for, collect and disseminate evidence on their effectiveness in achieving desired environmental objectives, in a demonstrable way, with some kind of measurement of success, including submission of outcomes to the national/UK restoration platform.

Recommendation 4 – any system of MNG must recognise that many marine restoration and recovery projects activities are of an innovative nature with significant uncertainties surrounding delivery outcomes. Such delivery risks will need to be managed within any MNG decision-making framework. Consideration should be given to how such risks might be managed to provide developers with sufficient confidence to invest in innovative restoration and recovery projects.

Recommendation 5 - recognising the multiplicity of challenges reported by existing restoration and recovery projects, we recommend that some specific case studies are developed to review the outcomes of projects, to better understand blockers and constraints and how they might be overcome, and to identify enablers that may facilitate future projects. Monitoring data from these projects should be publicly available to further learning for restoration and recovery projects.

Recommendation 6 – planning and implementation of SMNG should be undertaken at the level of regional marine plans, ensuring adequate input from local stakeholders to identify restoration/recovery priorities. A pilot project should be progressed to develop and test options for SMNG implementation, for example East Marine Plan or Celtic Sea. This might usefully help to identify relevant stakeholders, options for identifying priorities, how a regional SMNG programme could contribute to Good Environmental Status (GES) targets and national marine recovery priorities and the T&F Group SMNG targets. The regional impact of MNG should be reviewed and reported on at appropriate intervals.

Recommendation 7 - strategic marine planning should take account of space needs for MNG interventions. This might usefully build on the work of the first T&F Group report on strategic targets as well as initiatives such as Restore Meadows, Marshes and Reefs (ReMeMaRe) and Marine Restoration Potential (MaRePo) and incorporated within Marine Spatial Prioritisation (MSPri) and The Crown Estate's Whole of Seabed programme and adapted over time as MNG requirements and priorities become clearer.

Recommendation 8 – where SMNG targets overlap with activities such as coastal flood risk management, interventions should be co-ordinated to ensure they match SMP requirements so that MNG can incorporate the broader objectives of mitigating the effects of climate change.



Recommendation 9 - the assumptions used in the model for estimating future MNG demand should be refined over time as better evidence emerges. This will provide greater confidence in the overall and regional estimates of future MNG demand. This work could be built upon by The Crown Estate's Whole of Seabed programme.

Recommendation 10 - SMNG should encompass residual impacts beyond simply the footprint of physical development. In particular, SMNG might usefully include indirect impacts to habitats such as permanent and temporary disturbance as well as impacts to species groups (e.g., mortality, permanent and temporary disturbance). However, if these additional elements are to be incorporated within SMNG, the decision-making framework will need to address how the greater levels of uncertainty associated with the assessment of these residual impacts will be taken into account in decision-making.

Recommendation 11 - consideration of approaches to quantifying residual impacts of developments should be based on information contained within project environmental assessments; any requirement for additional assessment evidence should be clear and justifiable, and should not create an onerous new burden on developers. While the development and application of better tools to reliably quantify impacts is to be encouraged, particularly for species impacts, it is recognised that these are only likely to be of assistance in the longer term. For the time being decision-making in relation to SMNG will need to take account of existing available evidence and the inherent uncertainties in estimates of residual impact.

Recommendation 12 - case studies should be commissioned to examine the level of detail in environmental assessments across different marine sectors on direct and indirect impacts and the uncertainties pertaining to that information. This will help increase understanding of the limitations of such information and consideration of how attendant uncertainties might need to be taken into account within a system of SMNG.

Recommendation 13 – due to the variety of different types of industry activities that take place in the marine environment, it might be necessary to consider different SMNG systems for different groups of activities.

Recommendation 14 - any system of SMNG should enable developers to contribute broadly to marine recovery priorities across all relevant ecosystem elements, including both habitats and species. The system of SMNG should seek to avoid creating significant imbalances between what is impacted and what is delivered through SMNG. The T&F Group has emphasised that delivery of strategic targets should be based on an understanding of ecosystem requirements. This could either be managed at project level or at a more strategic level, depending on policy decisions about MNG. Further work is needed to understand the most appropriate measures which SMNG can contribute towards assisting in nature's recovery and to fill in evidence gaps identified during the second call for evidence, particularly surrounding species.

Recommendation 15 - research and development (R&D) should form a component of any system of MNG. This could be funded through developer contributions as part of a strategic approach to MNG. Risks associated with novel interventions should be managed by government within a wider portfolio of SMNG interventions to ensure an overall net gain is achieved from marine development.

Recommendation 16 – a contributions-based approach should form part of any system of SMNG. This will facilitate funding of pressure reduction/removal projects that cannot be delivered by industry, enable pooling of resources to deliver larger scale gains, and enable investment in innovation which is essential to support broader marine recovery.

Recommendation 17 – any contributions-based approach should be sufficiently flexible to enable developers to deliver their own MNG projects, however where possible they should look to contribute to wider delivery of agreed conservation targets.

Recommendation 18 - a contributions-based approach should be transparent so that industry contributions can be identified with specific restoration/recovery projects to enable developers to report on their own biodiversity targets and disclose information as part of sustainability reporting requirements.



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Document Control

Version	Author	Approved	Date	Description of change
1.0	Task and Finish Group	Task and Finish Group (Chair)	20/11/2023	Approved for issue by Task and Finish Group.

This is the independent report produced and approved for issue by the Task and Finish Group.



1. Introduction

There is widespread recognition of the need for greater action to restore our marine environment in the face of a continued decline in marine biodiversity. The need for recovery and restoration also sits alongside the climate crisis and the move towards energy security and Net Zero, which has made a considerable difference in the way that marine industries currently operate and plan for the future. Alongside the extensive growth in offshore wind, many marine industries have already adapted the way they work to reduce their carbon emissions and also to have a positive influence on the natural environment they operate within. Marine industries will continue to make improvements as time passes, and this is reflected in the way that many marine industries are reporting their actions in corporate and social responsibility documents, demonstrating the changing nature of modern companies. Many companies have incorporated their intentions to assist in marine recovery into their long-term strategies and there are already numerous examples of marine recovery actions being done on a voluntary basis, often working in partnership with conservation bodies. The potential value of a net gain obligation is widely supported across marine industry sectors with a linked understanding that this could, and should, deliver very important and significant contributions to nature recovery, which industry could be proud of being associated with.

Net gain has been identified as a potentially important mechanism that can contribute to halting and reversing marine biodiversity loss. Halting the biodiversity crisis, and where possible reversing it, will require action from many organisations, including government and non-governmental organisations (NGOs), but net gain associated with development in the marine environment will be an important and essential component. Recognising this, from January 2024 (just over two years following royal assent of the Environment Act) it will be mandatory for all in-scope developments in the terrestrial and intertidal environment to deliver a biodiversity net gain (BNG) of 10%. Although there is no formal net gain policy yet for the marine environment, Government has also committed to developing such a policy, and has held a first consultation on the principles of marine net gain (MNG) and published a summary of the responses. While the commitment to deliver net gain as part of development will become a statutory obligation, there is still an outstanding requirement for understanding comprehensively how this should be done or what could be achieved through the delivery of net gain.

A consequence of this was that a Task and Finish Group (T&F Group), funded by the Offshore Wind Evidence and Change programme², was established in 2021 to see if it was possible to identify key strategic targets which would have the greatest impact in reversing marine and intertidal biodiversity loss and therefore maximise the impact of the net gain obligation when it becomes statutory. The multi-disciplinary group, comprised:

- Conservation NGOs – The Wildlife Trusts (TWT), Royal Society for the Protection of Birds (RSPB)
- Seabed User Development Group (SUDG) – Executive Officer and Chair
- Industry representation – Energy UK, RenewableUK (RUK), UK Major Ports Group (UKMPG)
- The Crown Estate
- Statutory bodies – Natural England
- Department for Environment Food & Rural Affairs (Defra)

² 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 Energy Security and Net Zero (DSENZ) 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. [Offshore Wind Evidence and Change Programme | The Crown Estate](#)



The Group supported by consultants, ABPmer, completed their first report in October 2021³, which successfully identified strategic targets for marine and intertidal net gain. These targets were developed through extensive calls for evidence and through internal discussion with the T&F Group. The final outcome was a set of strategic targets widely supported by many stakeholders with close interests in the marine environment. An important aspect of the work carried out by the group was that it also identified a number of important assumptions which were central to the discussions about net gain and the targets and, in addition, the group proposed a number of important recommendations which they felt would warrant further consideration in the development of a policy for MNG. All this information was made available to Defra for their work on identifying processes and procedures for delivering net gain and much of this was reflected in their subsequent consultation on MNG principles.

Two important points were identified through the activities of the group which were considered sufficiently important to take forward for potential further work. Firstly, there is considerable experience at a local level on what restoration should entail and how it is already being attempted through local actions by a very wide range of organisations and people. Secondly, the potential benefits of delivering net gain through funding and partnerships could be immense and may catalyse larger and more ambitious projects leading to better and greater outcomes.

These two points were the basis for a successful bid for further funding from the Offshore Wind Evidence and Change programme to build on the first report and examine more closely the value of local actions and the potential for funding opportunities. For this second phase of work, the T&F Group was broadened to include the Coastal Partnerships Network (CPN) and the Joint Nature Conservation Committee (JNCC). Consequently, the aim of this further study has been to identify and agree recommendations for more local delivery of strategic intertidal and Marine Net Gain (MNG), hereafter referred to as Strategic Marine Net Gain (SMNG), targets for the improvement and recovery/restoration of the marine and intertidal environments, and the potential for using industry funding as a mechanism for assisting with local delivery. The objective for the T&F Group was to develop further the strategic net gain targets, and, as for the first report, provide Defra with information which they may consider to be of value in undertaking their own work in developing policy for MNG. With the successful bid for funding from the Offshore Wind Evidence and Change programme, ABPmer was commissioned to support the work of the T&F Group.

One element of considerable importance in examining SMNG targets, which was explored briefly in the first report, was whether net gain obligations on industry could deliver aspects which could only be controlled through regulatory actions, for example some pressure reduction such as reduction in fishing pressure. While it was agreed that this was not an area which industry could necessarily deliver, it raised the potential for asking whether net gain actions would need to be shown to have immediate effect if they were deemed to be compliant with the law. What was clear from the first report and the range of identified strategic targets is that they are not all immediately deliverable and that there are risks associated with some actions for net gain that would take time to deliver successful outcomes. In addition, as we are still in the early stages of discovering how to carry out many aspects of marine restoration and have little evidence of how successful some of these actions may be, there is also still a risk that some actions undertaken for net gain may not deliver successful outcomes. A consequence of this is that, unless all net gain activity is restricted to only those which have been shown to have successful track records, the choice of potential options for net gain action may be severely limited.

In light of the points above, the aim of this work was to build on the first T&F Group report which identified strategic targets for MNG and, using information collected through the calls for evidence, provide recommendations on delivery of said targets to best achieve SMNG. A further aim of this work was also to examine some of the aspects raised above with a view to making recommendations about the wider application of net gain to achieve the best possible results for marine recovery and restoration.

To support the work of the T&F Group, ABPmer co-ordinated a number of discrete tasks to examine how best to deliver the strategic targets identified within the first T&F Group report. The first element of the study was to undertake an analysis of, and call for evidence on, existing recovery and restoration projects and proposals

³ The Crown Estate. 2021. Strategic Net Gain Task and Finish Group, Offshore Wind Evidence and Change Programme, Strategic Net Gain Targets for Coastal and Marine Environments. Online. Available here: <https://www.marinedataexchange.co.uk/details/3513/2021-strategic-net-gain-task-and-finish-group-offshore-wind-evidence-and-change-programme-strategic-net-gain-targets-for-coastal-and-marine-environments/summary> [Accessed 17/10/23].



(including pressure removal/reduction projects) at a national and local level, with consideration of local and regional priorities and drivers. A further call for evidence collated stakeholder views on a range of factors relevant to MNG delivery. The study then considered the link between development, impact and recovery/restoration, looking at potential demands for net gain projects regionally.

Outputs from these activities have been used to inform deliberations within the T&F Group and to support the development of recommendations on the delivery of SMNG.

2. Policy Initiatives Relevant to Marine Net Gain

As part of the scope of the work, the T&F Group sought to summarise existing policy initiatives that are relevant to MNG, recognising that there are a large number of such initiatives both in England and in the devolved administrations. A description of relevant initiatives is provided in Appendix A, and summarised in a schematic in Figure 1.

Within England, Defra lead on the development of MNG policy. A public consultation on MNG principles was held in 2022 and a summary of consultation responses published in March 2023. The Government response to the consultation is expected in due course.

Key elements of the consultation included:

- Whether MNG should include species as well as habitats;
- The extent to which MNG might include wider environmental benefits in addition to biodiversity benefits;
- The treatment of uncertain positive MNG benefits;
- The approach to defining MNG requirements including the option of a contributions-based approach;
- The scope of projects to which MNG applies;
- The extent to which MNG should be mandatory;
- Adopting a strategic approach to MNG delivery; and
- Delivery of MNG in designated sites.

In parallel with the development of MNG policy, Defra is in the process of implementing BNG for terrestrial and intertidal projects considered under the planning system. Experience with the development of BNG policy is informing development of MNG policy to some extent, while recognising the specific distinctiveness and complexity of the marine environment. In the previous report of the T&F Group, it was discussed that a strategic approach to marine and coastal net gain should include net gain interventions in the intertidal zone, however it was acknowledged that current UK legislative jurisdictions do not support this view.

To support Defra's MNG policy development and implementation a number of Natural England projects have been completed or are in progress. These include initial work to explore how irreplaceable habitats might be defined in the marine environment, work through ReMeMaRe and MaRePo to identify potential locations for restoration initiatives for specific habitats and features, and work to explore the benefits of assisted versus natural recovery and an initial exploration of the feasibility of a contributions-based approach to MNG. Natural England is also leading work to explore options for measuring and comparing gains and losses for MNG. Wider work through the British Energy Security Strategy (BESS) around strategic compensation and the establishment of a Marine Recovery Fund is also relevant in the context of MNG.

Alongside the work by government and its agencies, the T&F Group published its first report in 2021 making recommendations on strategic targets for MNG. This report of the Group's second piece of work makes further recommendations on options for MNG delivery.



The offshore wind industry (RenewableUK and Energy UK) has also held a series of workshops to explore approaches to calculate MNG requirements. More widely, there are a number of developer initiatives that seek to achieve a net positive impact for marine biodiversity including Ørsted’s Net Positive Impact policy, SSE’s Positive for the Planet initiative and Shell’s Biodiversity Action Plan programme (these are summarised in Appendix A).

The devolved administrations, particularly Scotland and Wales, are also developing and implementing policy to support the achievement of a net positive impact from development. In Wales, this is being achieved through implementation of its Biodiversity Deep Dive recommendations and implementation of planning reforms, including enhanced requirements linked to the Section 6 of the Environment (Wales) Act duty on maintaining and enhancing biodiversity and the resilience of ecosystems. The Welsh Government also intends to develop marine planning guidance on supporting and encouraging marine ecosystem resilience, restoration and enhancement through Welsh National Marine Plan policy. In Scotland, the draft Scottish Biodiversity Strategy and Delivery Plan will create statutory targets for restoration and provide further support to the Scottish Marine Environmental Enhancement Fund (SMEEF). Research is also being commissioned to explore options for the development of an exchange mechanism that could be used to assess potential marine and coastal enhancement measures applied across marine ecosystem components so that an overall positive outcome for biodiversity is achieved from offshore wind developments. The Scottish Government is also in the process of commissioning a library of restoration, conservation and enhancement measures for a range of marine ecosystem components, including but not limited to; benthic habitats, marine mammals, fish, marine birds and the pelagic environment.

All of these initiatives make a valuable contribution to discussions around how best to implement MNG and have informed deliberations within the T&F Group.

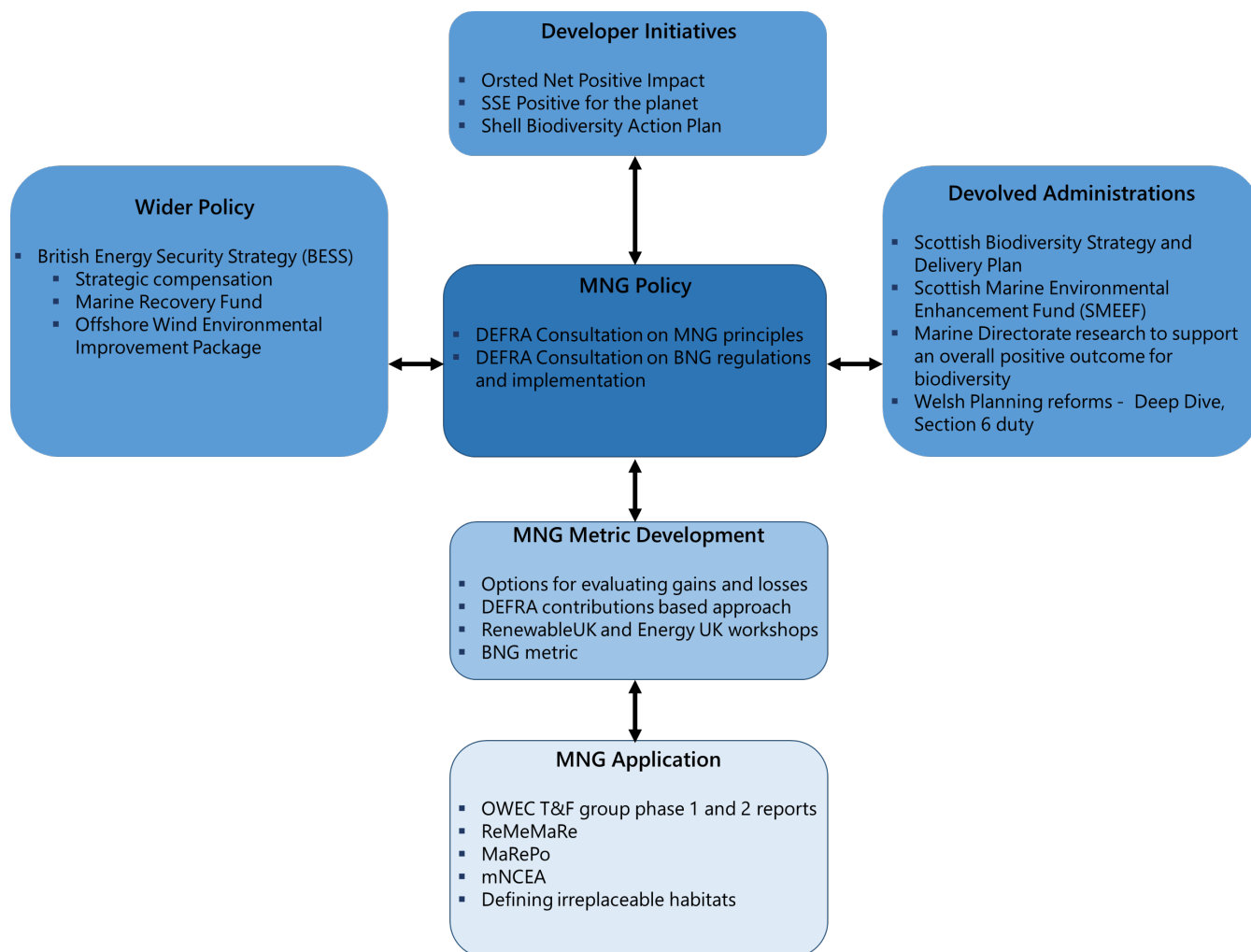


Figure 1. Interrelationship between MNG policy related initiatives

3. Stakeholder Calls for Evidence

3.1 Introduction

To inform its consideration of delivery options for SMNG targets, the T&F Group carried out a review of existing marine restoration and recovery initiatives and issued two calls for evidence.

3.1.1 First call for evidence: Review of existing recovery and restoration projects

The first call for evidence was focused on compiling a database of existing marine restoration and recovery projects and proposals (including pressure removal/reduction projects) across the UK. An initial database was compiled by ABPmer collated in a standardised manner within a searchable Excel database (0). Information recorded for each project/initiative, where available, included:

- Project name;
- Project description;
- Location;
- Site coordinates;
- Site area (ha);
- Project type (Creation; Restoration; Enhancement; Pressure removal);
- Project status (Planned; Underway; Complete);
- Project start date;
- Project end date (if applicable);
- Target marine features;
- Key drivers (Project mitigation/compensation; Management authority actions within MPAs; Management authority actions outside of MPAs; Voluntary initiative; Research; Other (please specify));
- Links to regional/local priorities;
- Lead organisation (overall project lead);
- Delivery organisation(s);
- Funding partner(s);
- Total project cost (or predicted cost);
- Delivery cost;
- Monitoring and maintenance costs;
- Project outcomes (or expected outcomes);
- Monitoring and evaluation;
- Criteria used to measure success;
- Source; and
- Additional information.

The first call for evidence, launched in January 2023 sought to gather additional information on the projects and proposals identified during the review as well as any additional projects and proposals not yet captured. The call for evidence was publicised at Coastal Futures, through CMS news and via LinkedIn, and ran for three weeks. Respondents were invited to provide any additional knowledge to the evidence database and to complete a brief



questionnaire to gain a broader view on potential delivery options for strategic marine and intertidal net gain. The questionnaire contained the following questions:

- Thinking about completed projects that you are familiar with, how successful was the evaluation process and what lessons were learnt as part of the evaluation?
- What were the key challenges for project delivery and how were they overcome?
- Can you suggest additional metrics/indicators not already being used which you consider would be useful to measure the success of intertidal and marine restoration/ recovery projects?
- Strategic targets will need to consider appropriate spatial scales. Do you agree that marine plan level could be an appropriate scale for marine Net Gain?

3.1.2 Second call for evidence: Strategic marine net gain targets potential mechanisms and priorities for delivery

A second call for evidence was launched in August 2023. This was similarly publicised through CMS news and via LinkedIn, and ran for three weeks. The call for evidence was hosted using SurveyMonkey.

Respondents were invited to complete a questionnaire aiming to gain a broader view on potential delivery options for strategic marine and intertidal net gain. A summary of the questions posed are below, with the full questionnaire provided in Appendix B:

1. The findings from the first call for evidence identified four key limitations to current restoration initiatives. How would you rank the four limitations in terms of their significance in delivering ecological needs or priorities?
2. Are there any other limitations to current restoration initiatives you would add to this list, and where would you rank them?
3. What further work do you feel could be required to address these limitations as part of the development of MNG?
4. As part of a strategic approach to MNG, it may be helpful to take account of ecological or nature recovery priorities in the marine environment. In your view, what are the key national restoration or nature recovery needs in the marine environment?
5. During the first call for evidence, stakeholders identified a preference for applying MNG at a marine plan region level. How might the ecological priorities in each marine plan region (or other regional level) be identified?
6. During the first project the Strategic Net Gain Task and Finish Group (T&F Group) identified a number of strategic MNG targets. Which measures do you think industry might be able to contribute to or implement to support delivery of MNG targets, given appropriate policy?
7. The T&F Group has identified several key information requirements which might be needed to inform strategic MNG delivery. Is there anything else you consider would be critical to support successful delivery of strategic MNG?
8. A flexible approach may be required to facilitate the delivery of strategic MNG, Do you agree or disagree that MNG should:
 - Seek specifically to address a project’s residual impacts on the impacted habitat/species features (i.e., like-for-like)
 - Allow some trading between habitats and/or features
 - Allow some trading between species
 - Allow trading across all ecological elements
9. Some interventions may look to use novel approaches to achieve restoration outcomes. However, it is recognised that regulation often requires some level of certainty of anticipated project results. How might a strategic approach be developed to facilitate innovation in restoration and enhancement projects?



10. Would a contributions-based approach or central/regional fund be best to facilitate delivery of strategic MNG targets?
11. How do you think a central fund-based approach would be best used to support strategic MNG delivery?
12. Would your organisation/s like to be involved in providing information for MNG planning? If yes, in what capacity would your organisation/s like to be involved?

The final question focused on identifying the sector of the respondent, to indicate the perceived priority actions and targets across different sectors.

3.2 Evidence review and responses to the first call for evidence

The review and the call for evidence identified over 700 projects and proposals seeking to reduce pressures upon or to create, enhance or restore marine and intertidal/coastal habitats and species. The interventions are distributed across English marine plan regions as well as in devolved administration waters (although projects in the devolved administrations are considered to be under-represented in the database due to the fact that net gain policy, and as such the focus of this work, is in England). This showed that the greatest number of initiatives in the marine environment are focused on pressure reduction, either fisheries management measures to protect fish and shellfish stocks (which also provide a benefit to seabed habitats and dependent species) or Marine Protected Area (MPA) management measures. At the coast, there are also many saltmarsh and mudflat habitat creation projects. Increasingly there are a number of restoration projects focused on seagrass and saltmarsh habitats as well as projects seeking to reduce pressures on seabird colonies and wading bird populations.

Limited information was obtained on the spatial extent of interventions. Further engagement with planned and proposed projects could be undertaken to better understand the scale of current and future interventions. Based on available evidence, pressure reduction initiatives (fisheries management, MPAs) were identified as covering over 15,000 km² of subtidal seabed within English waters. In contrast, identified habitat creation/restoration projects for which information on spatial extent was available encompassed around 4,500 ha (45 km²).

What is clear is that while some types of intervention, such as managed realignment to create mudflat and saltmarsh are relatively well established, many types of intervention are still in their infancy and thus their effectiveness is less well known. For example, while a significant number of projects are trialling restoration of seagrass and native oyster features, it is likely to be many years before their effectiveness is understood such that delivery risks associated with future projects can be effectively managed. Similarly, while extensive pressure reduction measures have been implemented within MPAs there is as yet very limited evidence to demonstrate their effectiveness (although significant benefits are expected based on wider international experience).

The top two challenges for interventions highlighted by respondents to the first call for evidence were obtaining licences (where required) to undertake the interventions and insufficient funding for the duration of the project, including funding to support long-term monitoring and evaluation of success.

It is recognised that these problems are more widespread and go beyond MNG projects and will therefore need potential government intervention to ensure environmental targets can be realised. However, a number of potential options for overcoming these challenges, in the context of potential future MNG projects, were identified including:

- Securing long term funding for restoration projects (either under developer obligations to pay for project level habitat works or through strategic, pooled funding for nature recovery, in order to satisfy statutory net gain requirements);
- Using existing tools, or developing better tools, to overcome licencing issues and to streamline the process; and
- Co-ordination between all organisations involved and appointment of a co-ordination lead role in the early stages of project development.

There was some support from stakeholders for the view that MNG might be best co-ordinated at Marine Plan Region level, while recognising these were primarily administrative boundaries rather than ecological ones, therefore some cross-border approaches may be required. For respondents that agreed, justification was given



that marine plan regions provided a suitable starting point for MNG strategic targets but that such targets should be also governed by, and be relevant to, the ecology of site to which any such gain is being applied. This view is very much in line with the recommendation from the first report that an ecosystem-based approach is the most ecologically appropriate.

3.3 Responses to the second call for evidence

A detailed analysis of the survey results is presented in Appendix B. The survey generated a total of 54 responses across a wide range of industries/ sectors.

3.3.1 Key limitations affecting current restoration initiatives

The four key limitations previously identified by the T&F Group continue to be acknowledged as significant barriers to progressing restoration initiatives:

- Complexity of requirements within marine licensing system (for development and for restoration projects alike)
- Limited availability of funding for restoration/recovery projects, particularly long-term funding
- Limited baseline data against which to measure success of project interventions.
- Competing demands for space, particularly coastal (intertidal and nearshore) space

In addition, a number of other key limitations were identified including a lack of a statutory system of MNG, lack of research/scientific understanding on intervention success criteria, lack of resources/expertise generally and within public bodies, lack of 'shovel-ready' projects to invest in and a lack of co-ordination between intertidal BNG and MNG.

Additionally, a range of research priorities were suggested by respondents including:

- Development of an agreed historic baseline;
- Review of the availability of existing data;
- Assessment of the success of restoration techniques (including novel techniques);
- Research on innovative restoration techniques;
- Identification of pressures and pressure reduction mechanisms;
- Better assessment of species population requirements in terms of both space and resource; and
- Evaluation of restoration benefits.

The benefit of strategic marine planning for potential future intervention areas to ensure space is provided for interventions was also highlighted by respondents.

3.3.2 Ecological or nature recovery priorities in the marine environment

As with the first report, key priorities identified by respondents included contributing to UK Marine Strategy (UKMS) indicators and recovery/enhancement of MPA interest features to favourable conservation status. Specific feature priorities identified included:

- Recovery of declining seabird populations, in particular species at greatest risk from Highly Pathogenic Avian Influenza (HPAI) and pressures associated with offshore energy;
- Restoration and recovery of transitional coastal habitats;
- Active restoration of seagrass and saltmarsh;
- Improving other coastal habitats such as kelp, rocky shores and sediments;



- Protection, restoration and recovery of biogenic reefs (oysters, *serpulid*, *Modiolus*), particularly where they form on sedimentary habitats. Native oyster in particular was noted by multiple respondents;
- Resilience in marine mammal populations;
- Remove pressure on irreplaceable subtidal marine habitats, e.g. sandbanks, Sea Pen habitats;
- Recovery of inshore fish populations, essential fish habitats and forage fish species;
- Restoration and recovery of migratory fish (shad, smelt, sturgeon and salmon (particularly at risk of climate change));
- Removal of invasive species; and
- Improvement of water quality by reducing and eliminating pollution entering the marine environment, either from land-based or sea-based sources – e.g., eliminate outflow of sewage and other upstream sources of pollution.

It was suggested that regional marine plans could be enhanced to account for the current status of each UK marine region and to identify ecological sensitivities which might be addressed by a regional level approach to environmental enhancement.

Additional research actions to identify the most sensitive existing habitats, those habitats at the greatest risk or those with the most severe degradation were also suggested as a method to prioritise potential nature recovery initiatives. Respondents also noted that habitats which are most at risk from climate change, in particular coastal and intertidal habitats, should be a focus and that MNG should account for the broader objectives of mitigating the effects of climate change.

Survey respondents felt that urgent resource should be allocated to identify regional priorities/ ecological needs for MNG and that a regional approach should be delivered from the outset to ensure proportionate gains in all regions.

Survey respondents identified a wide range of mechanisms that could be used to inform regional priorities. Stakeholder engagement (including the public, academics, NGOs and relevant public bodies) was highlighted as a key mechanism, including through existing fora such as Coastal, Estuary and Marine Partnerships (CEMPs) or the marine element of Local Nature Recovery Strategies (LNRS). The use of existing data and assessments (such as from the UKMS, Water Framework Directive (WFD) and MPA condition assessments) to inform priorities was also frequently cited, as well as building on existing processes to identify restoration/recovery opportunities and prioritisation processes (e.g., ReMeMaRe and MaRePo).

Marine planning was identified as a potentially useful mechanism through which regional priorities could be identified and safeguarded through marine plan policies. Some respondents suggested that natural capital approaches could help to prioritise interventions to maximise welfare benefits.

3.3.3 Strategic MNG delivery

Stakeholders considered that industry could contribute to all of the restoration priorities identified by the T&F Group during the first report with a majority of stakeholders supporting each priority:

- Restore and/ or create intertidal/ near coastal habitats, including characterising species (e.g., mudflat/ sandflat, saltmarsh/ reedbed, seagrass, native oyster, kelp)
- Restore offshore habitats (e.g., native oyster reef, *Modiolus*, serpulid reef, subtidal sands, muds and gravels)
- Support and restore fish populations
- Support populations of birds
- Support populations of marine mammals
- Reduce pressure



While it was recognised that nearshore restoration is likely to be easier, respondents felt it was important to ensure that the system of MNG enabled industry to contribute to offshore priorities where required. Respondents also considered that it was important that any system of MNG enabled industry to contribute to species priorities to facilitate marine biodiversity recovery. Mixed views were expressed concerning whether modifications to offshore infrastructure to enhance marine biodiversity should count towards MNG.

Respondents acknowledged that pressure reduction interventions could only be taken forward as part of a strategic approach led by government and might best be progressed through developer contributions to a Marine Recovery Fund.

The T&F Group has previously identified a number of key information requirements to support strategic delivery of MNG interventions:

- Identification of suitable areas for MNG delivery at a regional scale
- Identification of specific projects (location, site area and target habitat feature within the marine plan region)
- Identification of habitat or species needs within the marine plan region
- Creation of a prioritised list of projects to which industry can contribute (at a regional or local scale)
- Creation of a 'shovel ready' list of projects (within a region) to which industry can contribute (this may mean projects which are fully planned and consented)

Where survey respondents commented, they supported these priorities. Respondents also identified a range of wider evidence needs, some of which related to planning and delivering MNG interventions and others which were related to broader aspects of MNG. It was noted that it would be helpful to have clear guidance around MNG interventions (what will and will not count as MNG measures), how collaboration amongst developers might be facilitated, and on monitoring requirements.

It was also highlighted that guidance and consideration of a strategic approach beyond individual marine plan areas and across administrations, and potentially between neighbouring countries, will be needed. This is particularly relevant for offshore industries where developments may cross plan areas and administrations.

To facilitate the strategic delivery of MNG a flexible approach may be required with regards to trading between habitats and species. Most respondents felt that MNG should allow some trading between habitats and/or features and between species, however the majority also agreed that projects should specifically look to address the residual impacts on the impacted habitat/species where such options are possible. However, one respondent did caution the approach and suggested that trading between species and habitats should be informed by an in-depth knowledge of both and where improvements should be focused. A hierarchical process to select the appropriate delivery approach was suggested.

It was noted that there are likely to be some ecological elements that are simply too different/ unique to be traded and that guidance and principles will be required as policy develops to clearly define such instances. In order to determine the appropriateness of such measures it was felt a review of regional policy should be completed during which stakeholder engagement/consultation should be undertaken to ensure appropriate and deliverable measures and metrics are developed.

Survey respondents identified several key mechanisms through which delivery risks associated with novel restoration/recovery interventions might be managed if such interventions were to be incorporated within a system of MNG. Many respondents suggested that research and innovation should be a specific component of any system of MNG. This might be funded by developer contributions within a strategic approach to MNG, with a set proportion of MNG monies directed towards novel restoration/recovery interventions. Adaptive management (or survey, deploy, monitor) was also recognised as a very important mechanism for ensuring that learning could take place notwithstanding uncertainty. It was further suggested that such novel interventions might be trialled at small scale and then built up, and that risky projects should not be progressed within MPAs.



3.3.4 Central fund-based approach to facilitate MNG

Around half of respondents supported a contributions-based approach to facilitate MNG and the remainder were unsure, with only one respondent opposed. Respondents saw particular benefits of a contributions approach as including the opportunity to contribute to pressure reduction measures, to invest in innovation, monitoring and research, and in funding a co-ordinating body.

Those who agreed thought such an approach would allow MNG to be co-ordinated and delivered at a regional level with a national overview, and that such an approach would also provide greater consistency in regard to decision-making on MNG, would encourage collaboration and co-ordination through partnership delivery, and would allow the fastest ecological benefits for the marine environment by facilitating better, more targeted and effective interventions to take place at a larger scale.

Of those unsure about a contributions-based approach, many suggested that their uncertainty was with the lack of definition around such an approach and the potential mechanisms for management and application of such a fund. Several noted that a contribution-based approach should not be ruled out, but that clarity would be needed to decide if it was the most suitable approach for MNG. To assess a fund's suitability, it was suggested that firstly clear government guidance and a definition of strategic versus site-based intervention would be needed, alongside some clear indications of how the centralised funding system would work in practice.

Should a contributions-based approach be taken forward or considered in more detail, the overarching consensus from respondents was that all of the suggested approaches: habitat/species interventions, funding of a co-ordinating body, research, innovation, monitoring and non-statutory management, were necessary in order to promote marine nature recovery and for a MNG system to succeed.

3.3.5 Stakeholder involvement in MNG planning

Virtually all respondents expressed an interest in their organisations being involved in providing information for MNG planning, including government bodies (conservation bodies, environment bodies, local authorities, port & harbour authorities), industry, environmental NGOs and coastal fora.

Respondents identified a wide range of elements they would wish to be involved in ranging from policy development, policy implementation, identification and prioritisation of restoration/recovery priorities through to project delivery.

4. Potential Future Demand for Net Gain Projects

4.1 Introduction

Consideration of effective approaches to the strategic delivery of MNG targets (including both subtidal areas and intertidal areas covered by BNG) significantly depends on the nature and scale of MNG demand into the future. While the policy approach to MNG has yet to be clarified by Defra, the T&F Group sought to explore possible future demand for MNG interventions in English waters (including subtidal and intertidal areas) based on assumptions about the nature, scale and location of potential future development activity, assumptions about the nature and scale of residual impacts to which MNG requirements might apply, and assumptions about the nature and scale of interventions that might be required to achieve MNG. The assumptions used in this study are not intended to imply any particular direction for government policy, but have simply been made in order to facilitate the analysis. Given the many uncertainties surrounding the assumptions, the analysis is considered to indicate an order of magnitude of possible MNG requirements. However, the structured nature of the assessment will allow refinement of these assumptions over time.



4.2 Methods

Estimates of potential future demand for MNG were made for both wholly marine developments and for developments that might affect intertidal locations in English waters (encompassed within BNG). The detailed methodology and assumptions used in the analysis are provided in Appendix C. In essence the analysis was conducted via the following steps:

- **Estimation of scale (number and size of development projects with marine component) and location (marine plan region) of future development projects across all relevant marine sectors in the period to 2050:**
 - these estimates were based on levels of historical development (from MMO's Marine Case Management System, the Planning Inspectorate's Development Consent Order (DCO) Register and local authority planning application portals), existing plans for future development (e.g., offshore wind plans), and projections of potential future marine development from policy documents. The estimates were split into three epochs (2023 – 2030, 2031 – 2040 and 2041 – 2050) to enable a temporal analysis to be carried out;
- **Estimation of residual impacts of potential future development for which subtidal MNG might be required:**
 - It was assumed that MNG might be required for habitat loss/change, permanent and temporary disturbance of habitat, mortality and significant disturbance to fish, birds and marine mammals;
 - For each marine sector, estimates were made of the scale (spatial extent/intensity) of residual impacts where feasible, drawing on information from Environmental Impact Assessments (EIAs) and experience of the contractor team to indicate average levels of residual impact per project type. For species impacts it was not possible to meaningfully quantify residual impacts (due to limitations of available evidence) and the analysis simply sought to quantify the number of development projects in each marine plan region which might give rise to impacts for which an MNG requirement might apply;
 - For habitat impacts (loss/change or permanent/temporary disturbance), the type of habitat affected (mud, sand or gravel) was estimated based on the proportion of mud/sand/gravel within the marine plan area. (More specific criteria were applied for sectors such as marine aggregates which specifically target marine sand and gravel habitats);
- **Estimation of residual impacts of potential future development for which intertidal BNG might be required:**
 - The analysis drew on previous work undertaken by eftec *et al.* (2021⁴) which estimated potential future demand for intertidal sediment and saltmarsh habitat by local authority area to 2050, based on information about the number of developments in coastal areas around England and assumptions on the extent of project footprints affecting intertidal areas.
- **Estimation of potential future MNG requirement:**
 - Based on the estimates of residual impact, assumptions were made on the potential requirement for MNG in order to calculate potential MNG requirements by marine plan region over the time periods 2023 – 2030, 2031 – 2040 and 2041 – 2050. The analysis used a simplifying assumption that MNG requirements would be broadly like-for-like, although it is recognised that some level of trading may form part of MNG policy once determined. It is recognised that assumptions on the scale of interventions that might be required to demonstrate a net gain are particularly uncertain owing to scientific uncertainties concerning the effectiveness of some interventions and the benefits that might accrue. This is, and will remain, a significant limitation of efforts to forecast MNG demand for the foreseeable future.

⁴ eftec, WSP & ABPmer. 2021. Biodiversity Net Gain: Market analysis study, February 2021. Available at: <https://randd.defra.gov.uk/ProjectDetails?ProjectID=20608> [Accessed 23/06/23]



The analysis drew on relevant previous studies that had sought to forecast future activity levels including ABPmer & eftec (2022⁵) which sought to explore a contributions-based approach to MNG and eftec *et al.* (2021⁴) which explored a market-based approach to BNG, including intertidal BNG. Consultation on assumptions was carried out through the T&F Group and adjustments made to reflect comments received.

The analysis was undertaken using a spreadsheet model to generate information on potential future MNG demand by marine sector and for marine development as a whole for the time periods 2023 – 2030, 2031 – 2040 and 2041 – 2050.

4.3 Estimate of future MNG demand

A summary of results from the analysis are presented in the sub-sections below. Results need to be interpreted with consideration of the assumptions used in this study in order to facilitate the analysis, as detailed in Section 4.1. Detailed results are presented in Appendix C.

4.3.1 Subtidal habitat

The analysis indicates that at a national (England) scale, habitat loss/change from future development could be of the order of 25 to 30 km² per decade in the period to 2050 resulting in a potential demand per decade for MNG of 60 to 75 km² based on the assumptions used in the study. While these spatial extents may seem large in themselves, they are small relative to the spatial extents of the respective habitats within each marine plan region. For example, there is a total of around 200,000 km² of subtidal mud, sand and gravel in English waters⁶ – potential MNG demand would therefore represent less than 0.1% of this area over the whole period 2023 to 2050.

There is potential demand for MNG interventions in relation to habitat loss/change in each marine plan region although this varies in relation to region size and forecast levels of future development activity. The greatest forecast levels of demand for MNG in relation to habitat loss/change are for sand and gravel habitats in East and South marine plan regions primarily due to future offshore wind and marine aggregate development in these regions.

Estimates of temporary and permanent habitat disturbance in English waters range from 67 to 85 km² and 70 to 115 km² respectively over the three time periods, again with the main impacts occurring in East and South marine plan regions primarily due to future offshore wind and marine aggregate development.

Given the challenges in re-creating subtidal mud, sand and gravel habitats, MNG for loss/change to subtidal habitats might need to be delivered through pressure reduction initiatives on existing subtidal mud, sand and gravel habitats. Should this be the case, it is estimated that pressure reduction initiatives might be required over an area of the order of 270 to 380 km² per decade to meet potential MNG demand in the period to 2050 across English waters. Over 30% of this demand might be in both East and South marine plan regions reflecting the key activities driving this potential demand.

It should be noted that while the absolute values might appear large, the scale of potential future demand for pressure reduction is relatively small compared to the extent of these habitats in English waters (12513 km² (subtidal mud), 122935 km² (subtidal sand) and 68783 km² (subtidal gravel)). They are also small relative to current pressure reduction measures implemented within MPAs (around 550 km² (subtidal mud), 10,200 km² (subtidal sand) and 4,300 km² (subtidal gravel) (based on 0)). The relative extents of subtidal mud, sand and gravel habitats, the extent of such habitats currently subject to management measures (within MPAs or for fisheries management) and the potential requirements for MNG measures to 2050 are illustrated in Figure 2. On

⁵ ABPmer & eftec. 2022. Marine Net Gain. Sector Analysis. ABPmer Report No. R.3875. A report produced by ABPmer for Defra Offshore Wind Enabling Actions Programme, April 2022. Available here: <https://randd.defra.gov.uk/ProjectDetails?ProjectId=21049> [Accessed 17/10/23].

⁶ Mud, sand and gravel habitats considered in this study account for 88% of the seabed in English waters (total seabed around 230,000 km²). The main exclusions from the study relate to rock habitats, deep sea habitats, littoral habitats and sublittoral mixed sediments.



this basis, further pressure reduction (primarily from bottom-towed fishing gears) might be a potential mechanism for delivering MNG, although such measures could not be delivered by industry.

The analysis has not taken account of possible requirements for compensatory measures under the Habitats Regulations or for measures of equivalent ecological value under the Marine & Coastal Access Act 2009 where the features affected are associated with sites protected for nature conservation. However, given the policy steer to developers to avoid developing within MPAs where at all possible, habitat impacts within MPAs are likely to represent a relatively small proportion of overall habitat impacts.

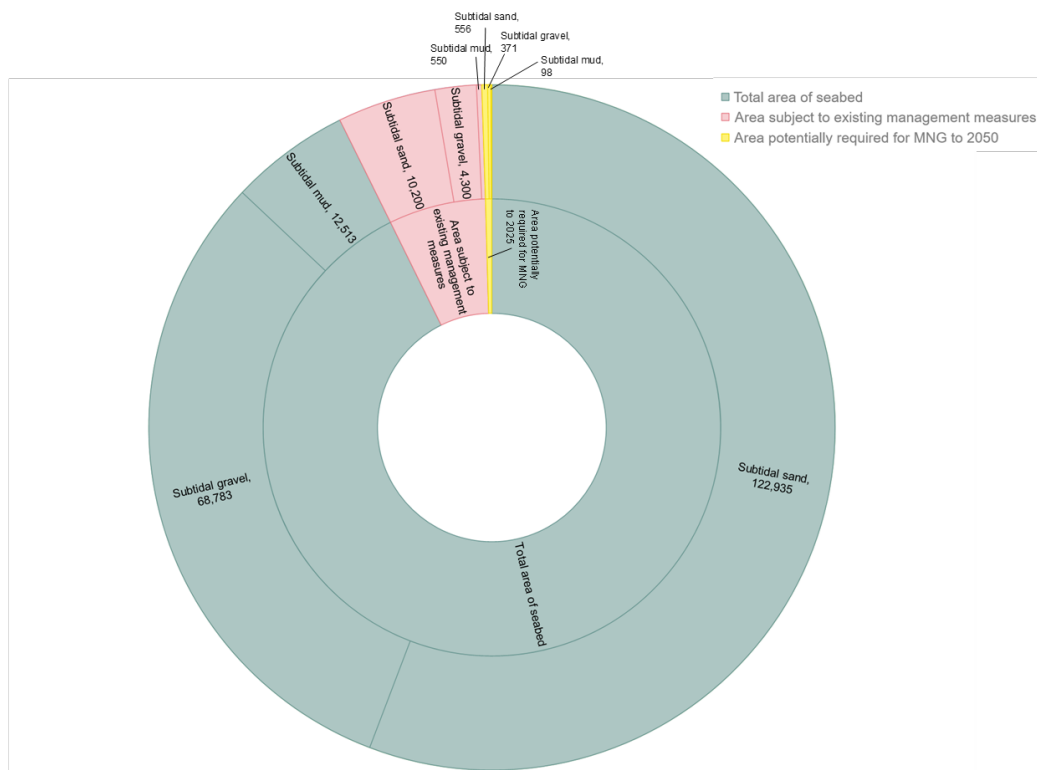


Figure 2. Schematic comparing the extent of subtidal mud, sand and gravel habitats and the extent of such habitats under existing management measures with the potential requirements for MNG to 2050

4.3.2 Intertidal habitat

Owing to limitations of available data, the forecast demand for intertidal BNG was presented as being constant over time. Demand was identified across all marine plan regions. The overall level of potential demand (10 km² saltmarsh and 10 km² mudflat per decade) is considered to be a significant overestimate based on the contractor’s experience of current levels of intertidal habitat loss from development and existing approaches to delivering compensatory measures under the Habitats Regulations.

Marine Management Organisation (MMO, 2019⁷) identifies potential opportunities for intertidal habitat creation and restoration through interventions such as managed realignment, regulated tidal exchange and beneficial use of dredged material around the coast of England. Figure 3 shows potential sites suitable for managed realignment within England based on the MMO (2019) report and identifies sites which have managed realignment as a shoreline management policy (SMP) in Epoch 1, Epoch 2 or both Epoch 1 and 2, and sites where the current SMP policies in Epochs 1 or 2 are different or ‘other’ such as hold the line or no active intervention.

⁷ Marine Management Organisation. 2019. Identifying sites suitable for marine habitat restoration or creation (MMO1135). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/798829/20190430_MMO1135_Identifying_sites_for_habitat_creation_datalayers_Report_a.pdf [Accessed 23/06/23].

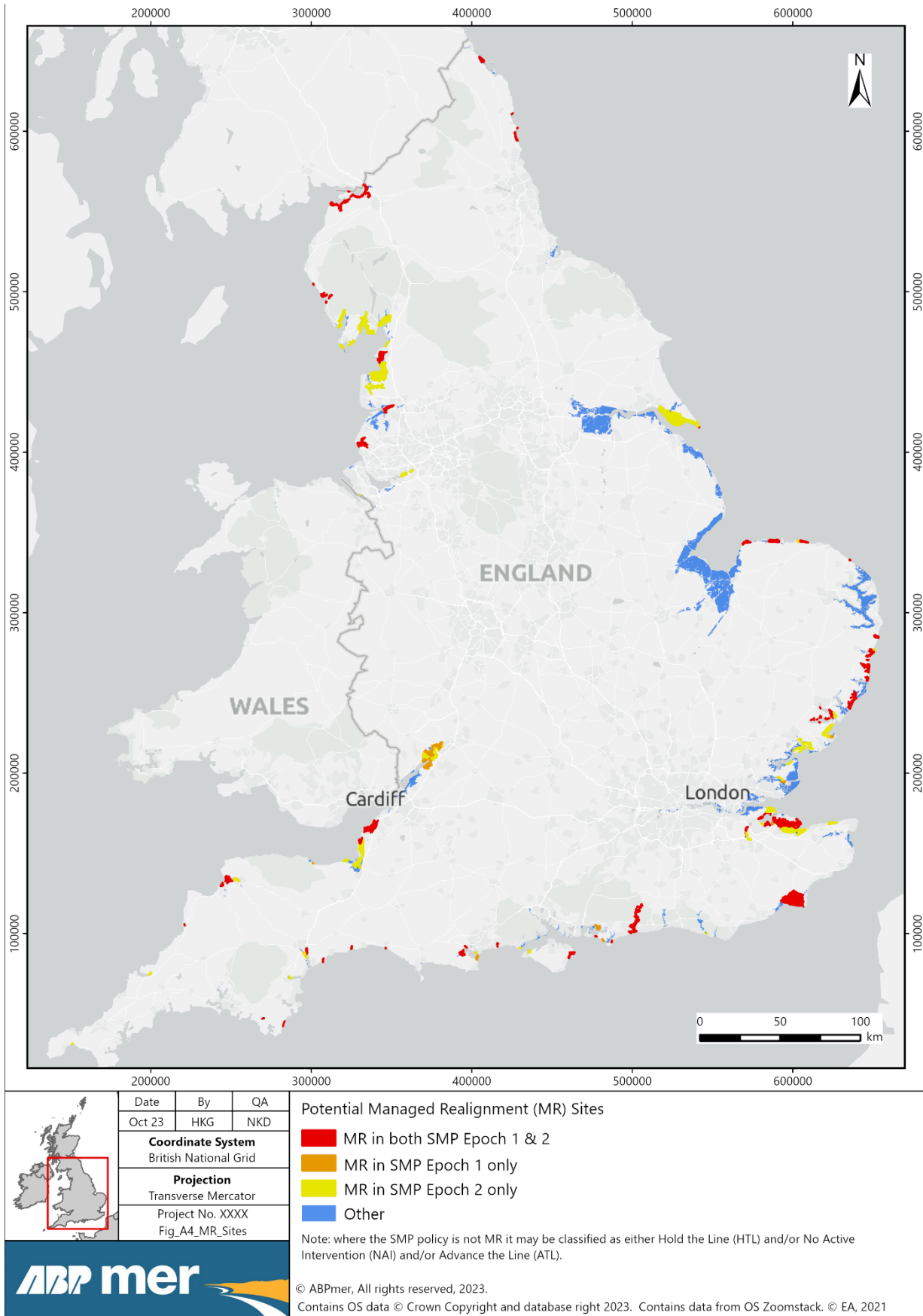


Figure 3. Potential sites suitable for managed realignment within England



This study identified many tens of thousands of hectares (hundreds of km²) of opportunity indicating a large scope for future intertidal interventions and shows the importance of taking a strategic approach to restoration actions. It would appear feasible that the potential supply of intertidal habitat creation/restoration and enhancement projects would be able to meet the likely demand for BNG in intertidal areas, but the T&F Group has emphasised that delivery of strategic targets should be based on an understanding of ecosystem requirements.

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.

4.3.3 Species impacts

It has not been possible to meaningfully quantify the residual impacts of development on species groups within this study. In the absence of quantified impacts for species groups, it has not been possible to define what MNG might require in terms of species measures. Given the complexities and uncertainties, development of a meaningful and robust approach to quantifying residual species impacts and determining MNG requirements is likely to present an ongoing challenge to policy makers.

The assessment indicates that development projects resulting in residual impacts that may require MNG species measures are likely to occur in all marine plan regions across all epochs. Greater levels of intervention may be required in the East and North East marine plan regions due to the greater number of projects in these areas giving rise to residual impacts on mobile species groups.

Key sectors giving rise to potential demand for MNG species measures include offshore wind, oil and gas and port development. Offshore wind potentially affects birds, fish, and mammals while oil and gas development primarily affects fish and mammals (underwater noise). Port development projects may also generate high levels of underwater noise, but given the location of major ports within estuaries, residual impacts are more likely to be confined to fish as marine mammals are typically located in coastal and offshore areas.

As above for habitats, the analysis for species has not taken account of possible requirements for compensatory measures under the Habitats Regulations or for measures of equivalent ecological value under the Marine & Coastal Access Act 2009 where the features affected are associated with sites protected for nature conservation. In relation to birds, it is likely that the Habitats Regulations will be the primary driver of measures to offset residual impacts. The Habitats Regulations may also be the main driver for actions in relation to marine mammals. It will also be the case that some MNG measures taken to address habitat impacts will also benefit mobile features.

Based on information on the number of existing/planned initiatives for fish/birds/marine mammals extracted from the restoration and recovery projects database (0), it appears that initiatives for these species groups are being progressed across most marine plan regions. Due to the limitations of the analysis, it is not possible to identify whether the number and nature of such initiatives might be at a level consistent with the level of activity that might be required to deliver MNG for species. It is recognised that measures to improve the quality of seabed habitats is likely to contribute to supporting mobile species' populations (through increases in prey abundance). Separately, fisheries management measures will also contribute to supporting mobile species populations.

5. Conclusions and Recommendations

5.1 Conclusions

5.1.1 First call for evidence

Based on the evidence review and first call for evidence, the T&F Group recognises and appreciates the wide range of restoration and recovery projects and proposals being progressed around the UK.



The database provides a useful compilation of current and planned restoration and recovery projects. A collaborative project by the Environment Agency and The Crown Estate is aiming to build upon the database to provide a national/UK-wide repository of information which should inform future planning for marine nature recovery. A number of stakeholder workshops are planned to develop an online restoration platform which will form a central resource where stakeholders can provide updates and new project entries to facilitate ongoing collation of restoration and recovery projects. In particular, further work is required to improve information on the spatial extent (and condition) of restoration and recovery projects, and this significant gap should be addressed by the platform (ABPmer, 2023⁸). Furthermore, it is important that restoration and recovery projects suitably plan for, collect and disseminate evidence on their effectiveness in achieving desired environmental objectives as this is a significant gap in understanding for many types of intervention.

While some interventions are relatively well understood, such as managed realignment to create mudflat and saltmarsh habitats, other types of intervention such as restoration of seagrass and native oyster beds are in their infancy. Promotion of such projects within a regulatory framework that demands certainty in achieving a net gain is, and will continue to be, challenging for the foreseeable future. Any system of MNG will therefore need to carefully consider how decision-making manages delivery risk while encouraging innovation to achieve meaningful marine recovery. Simply seeking to place delivery risk on developers would be inappropriate and ineffectual and likely to lead to reliance on a limited range of more certain interventions which would fail to achieve overall marine recovery.

The top two challenges for interventions highlighted by respondents to the first call for evidence were obtaining licences (where required) to undertake the interventions and insufficient funding for the duration of the project, including funding to support long-term monitoring and evaluation of success.

It is recognised that these problems are more widespread and go beyond MNG projects and will therefore need potential government intervention to ensure environmental targets can be realised. However, a number of potential options for overcoming these challenges, in the context of potential future MNG projects, were identified including:

- Securing long term funding for restoration projects (either under developer obligations to pay for project level habitat works or through strategic, pooled funding for nature recovery, in order to satisfy statutory net gain requirements);
- Using existing tools, or developing better tools, to overcome licencing issues and to streamline the process; and
- Co-ordination between all organisations involved and appointment of a co-ordination lead role in the early stages of project development.

There was some support from stakeholders for the view that MNG might be best managed at marine plan region level, while recognising these were primarily administrative boundaries rather than ecological ones, therefore some cross-border approaches may be required. For respondents that agreed, justification was given that marine plan regions provided a suitable starting point for MNG strategic targets but that such targets should be also governed by, and be relevant to, the ecology of site to which any such gain is being applied.

5.1.2 Second call for evidence

The T&F Group notes that the key limitations previously identified by the Group continue to be acknowledged as significant barriers to progressing restoration initiatives:

- Complexity of requirements within marine licensing system (for development and for restoration projects alike)
- Limited availability of funding for restoration/recovery projects, particularly long-term funding

⁸ ABPmer, (2023). Towards a New 'Restoration Project Platform', Advice on developing an online resource to map, audit and manage coastal, estuarine and marine habitat restorations, ABPmer Report No. R.4204. A report produced by ABPmer for Environment Agency, August 2023.



- Limited baseline data against which to measure success of project interventions.
- Competing demands for space, particularly coastal (intertidal and nearshore) space

In addition, a number of other key limitations have been identified through the call for evidence including a lack of a statutory system of MNG, lack of research/scientific understand on intervention success criteria, lack of resources/expertise generally and within public bodies, lack of 'shovel-ready' projects to invest in, and a lack of co-ordination between intertidal BNG and MNG.

The T&F Group acknowledges the current limitations identified, and recognises the benefits of adopting a strategic approach to MNG implementation. This might particularly include:

- Timely implementation of a proportionate, statutory system of MNG recognising the continued decline of the UK's marine biodiversity, and enabling industry to contribute to recovery, whilst maintaining operations;
- Strategic planning for restoration interventions building on the work of the first T&F Group report on strategic targets as well as initiatives such as ReMeMaRe and MaRePo and incorporated within MSPri and The Crown Estate's Whole of Seabed programme;
- Better co-ordination of research, building on existing initiatives with input from government and wider stakeholders to steer research priorities; and
- Better funding for restoration initiatives to ensure adequate long-term monitoring is carried out.

The T&F Group notes the wide range of potential restoration and recovery options identified by respondents to the call for evidence and the linkages to UKMS indicators and condition of MPA features. The T&F Group supports interventions to address impacts wider than the physical footprint of development on the seabed, recognising that marine developments have the potential to disturb habitats and disturb and harm species over wider areas and that these impacts can be of greater significance than the simple physical footprint of a development.

We further note the broad support for ecological recovery priorities to be planned for and delivered at a regional level. Respondents identified a number of different potential mechanisms for progressing regional-scale planning including through marine plans, through existing fora such as CEMPs or the marine element of LNRS. Respondents identified the importance of local stakeholder engagement in determining regional priorities. Some respondents suggested that natural capital approaches could help to prioritise interventions to maximise welfare benefits.

The T&F Group recognises the importance of stakeholder engagement in contributing to the identification of regional priorities. Local stakeholders often have the best knowledge about local opportunities and their likely social acceptance. While marine planning is an obvious mechanism for identifying ecological recovery priorities and establishing policies for their delivery, such processes will also need to facilitate more local input. The role that LNRS and coastal fora might play could usefully be explored.

There is already a reasonable level of information on the state of our marine environment and on current pressures, which can be used to inform regional priorities. Work is also being taken forward through projects such as ReMeMaRe and MaRePo to identify areas of opportunity for restoration of marine and coastal habitats which, with further development, can be used to inform the identification of locations for restoration/recovery projects. In the context of MNG, regional priorities will also need to reflect the forecast demand for MNG interventions based on likely levels of future development. The T&F Group considers there will be value in undertaking a pilot study to explore further how a regional approach might work in practice.

Respondents to the second call for evidence agreed on the wide range of restoration/recovery interventions that industry could contribute to, including inshore and offshore restoration actions and pressure reduction initiatives for both habitats and species. While it was recognised that nearshore restoration is likely to be easier, respondents felt it was important to ensure that the system of MNG enabled industry to contribute to offshore priorities where required. Respondents also considered that it was important that any system of MNG enabled industry to contribute to species priorities to facilitate marine biodiversity recovery. Respondents acknowledged however that pressure reduction interventions could only be taken forward as part of a strategic approach led by government and might best be progressed through developer contributions to a Marine Recovery Fund.



The T&F Group notes that mixed views were expressed concerning whether modifications to offshore infrastructure to enhance marine biodiversity should count towards MNG. The T&F Group has some concerns that such interventions do not typically align with prevailing local ecological systems or processes but recognise that a policy decision will need to be taken to define the scope of interventions that are deemed to contribute to MNG.

The T&F Group agrees that any system of MNG should enable developers to contribute broadly to marine recovery priorities across all relevant ecosystem elements including both habitats and species. The strategic approach to MNG will need to facilitate developer contributions to pressure reduction measures to achieve this.

The T&F Group notes that respondents to the second call for evidence agreed with the suggested key information requirements to support strategic delivery of MNG interventions, including:

- Identification of suitable areas for MNG delivery at a regional scale;
- Identification of specific projects (location, site area and target habitat feature within the marine plan region);
- Identification of habitat or species needs within the marine plan region;
- Creation of a prioritised list of projects to which industry can contribute (at a regional or local scale); and
- Creation of a 'shovel ready' list of projects (within a region) to which industry can contribute (this may mean projects which are fully planned and consented).

Respondents additionally noted that it would be helpful to have clear guidance around MNG interventions (what will and will not count as MNG measures), how collaboration amongst developers might be facilitated, and on monitoring requirements.

Most respondents felt that MNG should allow some trading between habitats and/or features and between species, however the majority also agreed that where possible projects should specifically look to address the residual impacts on the impacted habitat/species where such options are possible. A hierarchical approach to determining suitable interventions at project level was suggested by several respondents.

The T&F Group considers that some level of trading will be inevitable within MNG, not least because re-creation of subtidal habitats lost within development footprints cannot readily be replaced and will therefore require non like-for-like replacement or enhancement of similar habitat through pressure reduction measures. A level of trading will also provide flexibility to support marine recovery priorities to which MNG could make a significant contribution.

The T&F Group agrees that the system of MNG should seek to avoid creating significant imbalances between what is impacted and what is delivered through MNG. This could either be managed at project level or at a more strategic level, depending on policy decisions about MNG. The T&F Group has emphasised that delivery of strategic targets should be based on an understanding of ecosystem requirements, and 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. At a strategic level, decisions on interventions could be based on regional marine recovery priorities (which could incorporate an element of MNG demand). The T&F Group considers that these options could usefully be explored through a regional pilot study.

Survey respondents identified several key mechanisms through which delivery risks (including ecological and financial risks and failure to meet obligations) associated with novel restoration/recovery interventions might be managed if such interventions were to be incorporated within a system of MNG. Many respondents suggested that research and innovation should be a specific component of any system of MNG. This might be funded by developer contributions within a strategic approach to MNG, with a defined proportion of MNG monies directed towards novel restoration/recovery interventions. Adaptive management (or survey, deploy, monitor) was also recognised as a very important mechanism for ensuring that learning could take place notwithstanding uncertainty. It was further suggested that such novel interventions might be trialled at small scale and then built up, and that risky projects should not be progressed within MPAs.



The T&F Group agrees that research and development should necessarily form a component of any system of MNG to facilitate learning and expand the evidence base around potential interventions. This could be funded by a proportion of developer contributions. As part of an overall strategic approach to MNG, the risk of project delivery failure would be held by government but the risk could be balanced across a wider portfolio of more certain MNG interventions to ensure an overall net gain was achieved through marine development. The T&F Group considers that a system of MNG that placed such risks on individual developers would be unworkable and would preclude innovation.

While there was a good level of support for a contributions-based approach to be part of MNG (around half of respondents across all stakeholder groups supported this), other respondents remained uncertain. The T&F Group considers that a contributions-based approach will be a necessary component of an effective system of MNG, not least to facilitate pressure reduction initiatives which industry cannot deliver and to support essential research and development to facilitate innovation. The T&F Group recognises industry concerns about how contributions might be used, and the need to ensure that contributions are focused on delivering environmental benefit and that there is sufficient transparency for developers in terms of the projects that their contributions fund. The T&F Group also recognises that industry wants to see flexibility in how any contributions-based approach is applied so that developers have the option of delivering their own MNG projects alongside any contributions-based approach.

The T&F Group acknowledges and welcomes the strong interest across marine stakeholders to engage in the development and implementation of MNG. In order to develop an effective system of MNG, it will be important that a collaborative approach is taken that involves all interested stakeholders to ensure the system is both practical and delivers a net gain from marine development. Whatever form MNG implementation takes, it will be beneficial for all relevant stakeholders to contribute to processes for prioritising restoration/recovery projects, particularly at a regional/local level.

5.1.3 Modelling potential future MNG demand

The T&F notes the large uncertainties in seeking to model future demand for MNG given uncertainties concerning the scale and location of future development activity, uncertainties in the spatial extent and intensity of residual impacts from development projects and uncertainties concerning MNG policy and how gains and losses might be assessed. Necessarily many assumptions have needed to be made, including assumptions concerning MNG policy, which have not yet been defined by Defra. The estimates provided should therefore be considered as initial estimates which indicate a potential 'order of magnitude' scale of future demand for MNG in the period to 2050. It is hoped that projects such as The Crown Estate's Whole of Seabed programme can build upon the model and assumptions developed in this study.

While the analysis undertaken can only be seen as indicative, it suggests that the possible levels of future MNG demand for subtidal habitat restoration/recovery in the period to 2050 represent less than 0.1% of the current area of subtidal habitat in English waters. The analysis therefore suggests that demand for subtidal MNG habitat measures could be met, particularly given that recovery measures are already being implemented across much of our MPA network which occupies 38% of UK waters⁹.

The T&F Group note that while EIAs, Environmental Statements¹⁰ and wider environmental assessments typically include information that enables the direct loss/change of habitat and impacts to mobile species groups to be assessed, they tend to be qualitative and generally lack quantified information on the spatial extent and intensity of disturbance to habitats or species impacts. Even where tools exist, such as to assess seabird collision risk mortality, there is a lack of scientific consensus on the accuracy of such tools, resulting in high levels of

⁹ <https://incc.gov.uk/our-work/uk-marine-protected-area-network-statistics/>

¹⁰ The EIA process is an assessment of the potential significant environmental effects of a proposal. An Environmental Statement (ES) is the report on the EIA for a defined development project. It identifies the significant environmental effects of the scheme in the aspects set out in the EIA Regulations.



uncertainty about actual impacts (Cook & Masden, 2019¹¹; Searle *et al.*, 2023¹²). Similarly, methods to assess the ecological consequences of disturbance are in their infancy and assessments using such tools are subject to high levels of uncertainty (e.g., Keen *et al.*, 2021¹³). Despite progress in developing such tools, impact estimates from such tools will remain very uncertain for the foreseeable future. Should MNG policy seek to include wider aspects of project residual impacts such as habitat disturbance or species disturbance and mortality, it will be important that the implementation framework recognises the likely limitations of evidence within EIAs/environmental assessments. Such uncertainty will need to be taken into account in the design of MNG decision-making frameworks to ensure that the system is workable.

The T&F Group recognise that there is very limited opportunity to recreate subtidal habitats in the marine environment. Some examples might include placement of hard substrate or structures to create reefs, but such interventions inevitably result in the loss of the pre-existing substrate and may not be desirable from an ecological perspective. While the removal of seabed infrastructure as part of decommissioning projects could facilitate restoration of underlying seabed substrates, the scale of such decommissioning activities on the seabed is and will remain small relative to the potential impacts from new development in the period to 2050.

In order to facilitate SMNG for subtidal habitats, it may be necessary for any MNG regime to provide for pressure reduction measures on subtidal habitat, however, the outcomes should be related to SMNG targets. Such options would appear to be feasible based on indicative potential demand for MNG and the potential supply of interventions, depending on policy decisions by government about the scope for trading across habitats within any MNG regime. However, as there is limited scope for marine industries to reduce disturbance of marine habitats from their own activities, pressure reduction measures involving other marine sectors (such as fisheries) could only be pursued as part of a strategic approach led by government. These should be important considerations for the design of any system of MNG.

The analysis suggests that the calculated potential demand for intertidal habitat (over 1,000 ha intertidal sediment and 1,000 ha saltmarsh nationally per decade) may be a significant overestimate. It is considered that a more realistic estimate of potential demand (less than half of the above estimates, based on the contractor's experience) could be met from the current/future supply of intertidal habitat creation/restoration and enhancement opportunities, particularly given the recent upsurge in interest in coastal restoration projects.

Given the lack of robust quantitative evidence on species impacts, it has not been possible within the constraints of this study to develop quantitative assessments of residual impact on species or potential MNG demand. Rather, the analysis has sought to identify the number of projects within marine plan regions over different time periods that might give rise to an MNG requirement. This analysis indicates that MNG measures for mobile species could be required in all marine plan regions in the period to 2050. Given that many of the mobile features that will be affected are afforded site-based protection due to their association with MPAs, it is likely that some of the residual impacts will be addressed under the Habitats Regulations and Marine and Coastal Access Act 2009, with demand for net gain on top of these other statutory requirements.

5.2 Recommendations from the T&F Group

Based on the information received through the calls for evidence from a wide range of stakeholders and the experience and knowledge within the T&F Group, the Group makes the following recommendations. These recommendations are England-focused, but there will be many opportunities to use the delivery of SMNG targets

¹¹ Cook, A.S.C.P. & Masden, E.A., 2019. Chapter 5: Modelling collision risk and predicting population level consequences. In: Perrow, M.R. (ed) (2019). *Wildlife and Windfarms, Conflicts and Solutions Volume 4 Offshore: Monitoring and Mitigation*. Pelagic Publishing, Exeter, UK.

¹² Searle, K.R., O'Brien, S.H., Jones, E.L., Cook, A.S.C.P., Trinder, M.N., McGregor, R.M., Donovan, C., McCluskie, A., Daunt, F., Butler, A., 2023. A framework for improving treatment of uncertainty in offshore wind assessments for protected marine birds, *ICES Journal of Marine Science*, 2023, fsad025, <https://doi.org/10.1093/icesjms/fsad025>

¹³ Keen, K.A., Beltran, R.S., Pirotta, E., Costa, D.P., 2021 Emerging themes in Population Consequences of Disturbance models. *Proc. R. Soc. B* 288: 20210325. <https://doi.org/10.1098/rspb.2021.0325>



to develop good practice which can be shared with the devolved administrations. Recommendations set out with no order of priority:

Recommendation 1 - recognising the need to address the marine biodiversity crisis, a statutory system of MNG should be implemented as soon as possible.

Recommendation 2 - a national/UK online restoration platform of marine restoration and recovery projects should be established and maintained building on the evidence database created in this study.

Recommendation 3 - where restoration and recovery projects are being progressed, the project promoters should ensure that they suitably plan for, collect and disseminate evidence on their effectiveness in achieving desired environmental objectives, in a demonstrable way, with some kind of measurement of success, including submission of outcomes to the national/UK restoration platform.

Recommendation 4 - any system of MNG must recognise that many marine restoration and recovery projects activities are of an innovative nature with significant uncertainties surrounding delivery outcomes. Such delivery risks will need to be managed within any MNG decision-making framework. Consideration should be given to how such risks might be managed to provide developers with sufficient confidence to invest in innovative restoration and recovery projects.

Recommendation 5 - recognising the multiplicity of challenges reported by existing restoration and recovery projects, we recommend that some specific case studies are developed to review the outcomes of projects, to better understand blockers and constraints and how they might be overcome, and to identify enablers that may facilitate future projects. Monitoring data from these projects should be publicly available to further learning for restoration and recovery projects.

Recommendation 6 - planning and implementation of SMNG should be undertaken at the level of regional marine plans, ensuring adequate input from local stakeholders to identify restoration/recovery priorities. A pilot project should be progressed to develop and test options for SMNG implementation, for example East Marine Plan or Celtic Sea. This might usefully help to identify relevant stakeholders, options for identifying priorities, how a regional SMNG programme could contribute to Good Environmental Status (GES) targets and national marine recovery priorities and the T&F Group SMNG targets. The regional impact of MNG should be reviewed and reported on at appropriate intervals.

Recommendation 7 - strategic marine planning should take account of space needs for MNG interventions. This might usefully build on the work of the first T&F Group report on strategic targets as well as initiatives such as ReMeMaRe and MaRePo and incorporated within MSPri and The Crown Estate's Whole of Seabed programme and adapted over time as MNG requirements and priorities become clearer.

Recommendation 8 - where SMNG targets overlap with activities such as coastal flood risk management, interventions should be co-ordinated to ensure they match SMP requirements so that MNG can incorporate the broader objectives of mitigating effects of climate change.

Recommendation 9 - the assumptions used in the model for estimating future MNG demand should be refined over time as better evidence emerges. This will provide greater confidence in the overall and regional estimates of future MNG demand. This work could be built upon by The Crown Estate's Whole of Seabed programme.

Recommendation 10 - SMNG should encompass residual impacts beyond simply the footprint of physical development. In particular, SMNG might usefully include indirect impacts to habitats such as permanent and temporary disturbance as well as impacts to species groups (e.g., mortality, permanent and temporary disturbance). However, if these additional elements are to be incorporated within SMNG, the decision-making framework will need to address how the greater levels of uncertainty associated with the assessment of these residual impacts will be taken into account in decision-making.

Recommendation 11 - consideration of approaches to quantifying residual impacts of developments should be based on information contained within project environmental assessments; any requirement for additional assessment evidence should be clear and justifiable, and should not create an onerous new burden on developers. While the development and application of better tools to reliably quantify impacts is to be encouraged,



particularly for species impacts, it is recognised that these are only likely to be of assistance in the longer term. For the time being decision-making in relation to SMNG will need to take account of existing available evidence and the inherent uncertainties in estimates of residual impact.

Recommendation 12 - case studies should be commissioned to examine the level of detail in environmental assessments across different marine sectors on direct and indirect impacts and the uncertainties pertaining to that information. This will help increase understanding of the limitations of such information and consideration of how attendant uncertainties might need to be taken into account within a system of SMNG.

Recommendation 13 – due to the variety of different types of industry activities that take place in the marine environment, it might be necessary to consider different SMNG systems for different groups of activities.

Recommendation 14 - any system of SMNG should enable developers to contribute broadly to marine recovery priorities across all relevant ecosystem elements, including both habitats and species. The system of SMNG should seek to avoid creating significant imbalances between what is impacted and what is delivered through SMNG. The T&F Group has emphasised that delivery of strategic targets should be based on an understanding of ecosystem requirements. This could either be managed at project level or at a more strategic level, depending on policy decisions about MNG. Further work is needed to understand the most appropriate measures which SMNG can contribute towards assisting in nature's recovery and to fill in evidence gaps identified during the second call for evidence, particularly surrounding species.

Recommendation 15 - research and development (R&D) should form a component of any system of MNG. This could be funded through developer contributions as part of a strategic approach to MNG. Risks associated with novel interventions should be managed by government within a wider portfolio of SMNG interventions to ensure an overall net gain is achieved and maintained from marine developments.

Recommendation 16 – a contributions-based approach should form part of any system of SMNG. This will facilitate funding of pressure reduction/removal projects that cannot be delivered by industry, enable pooling of resources to deliver larger scale gains, and enable investment in innovation which is essential to support broader marine recovery.

Recommendation 17 – any contributions-based approach should be sufficiently flexible to enable developers to deliver their own MNG projects, however where possible they should look to contribute to wider delivery of agreed conservation targets.

Recommendation 18 - a contributions-based approach should be transparent so that industry contributions can be identified with specific restoration/recovery projects to enable developers to report on their own biodiversity targets and disclose information as part of sustainability reporting requirements.

The recommendations identified above have been based on internal discussion within the T&F Group and from stakeholder views collated during the calls for evidence. They are presented as recommendations to support the further discussions on the topic of MNG, which may help inform Defra in the development of MNG policy and help identify activities for further work from the T&F Group.

A number of suggestions for next steps have been identified by the T&F Group to continue developing the thinking on SMNG. Such next steps reflect the position of continuing development of MNG policy and could include:

- Investigating the information gaps identified in second call for evidence;
- Exploring different pressure reduction pathways that could be used towards delivering MNG;
- Actively supporting and contributing towards ongoing work by T&F Group partners, such as Natural England's evidence building projects on MaRePo+ and exploring MNG assessment frameworks;
- Assessing options for a contributions-based approach to SMNG through a series of case studies or scenario testing;



- Further assessing the tools available to developers and exploring ways of streamlining possible SMNG systems; or
- Identifying any additional key research and development priorities to support development of a MNG policy.

The next steps for the T&F Group are to discuss and agree which of these areas should be taken forward by the Group.

6. Abbreviations/Acronyms

ABPmer	ABP Marine Environmental Research Ltd
BAP	Biodiversity Action Plan
BESS	British Energy Security Strategy
BNG	Biodiversity Net Gain
CEMPs	Coastal, Estuary and Marine Partnerships
CMS	Communications and Management of Sustainability
COP15	15th Conference of the Parties to the UN Convention on Biological Diversity
COWSC	Collaboration on Offshore Wind Strategic Compensation
CPN	Coastal Partnerships Network
Defra	Department of Environment Food and Rural Affairs
DCO	Development Consent Order
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
eNGO	Environmental Non-Governmental Organisation
ES	Environmental Statement
GES	Good Environmental Status
HPAI	Highly Pathogenic Avian Influenza
HRA	Habitat Regulation Assessment
JNCC	Joint Nature Conservation Committee
LinkedIn	Business Social Networking Web Site
LNRS	Local Nature Recovery Strategy
MBA	Marine Biological Association
MaRePo	Marine Restoration Potential
MaRePo+	Marine Restoration Potential Phase 2



MMO	Marine Management Organisation
mNCEA	Marine Natural Capital and Ecosystem Assessment
MNG	Marine Net Gain
MPA	Marine Protected Areas
MRF	Marine Recovery Fund
MSPri	Marine Spatial Prioritisation
NG	Net Gain
NGO	Non-Governmental Organisation
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
ReMEDIES	LIFE Recreation ReMEDIES
ReMeMaRe	Restore Meadows, Marshes and Reefs
RSPB	Royal Society for the Protection of Birds
RUK	RenewableUK
SMEEF	Scottish Marine Environmental Enhancement Fund
SMNG	Strategic Marine NET Gain
SMP	Shoreline Management Policy
SNCBs	Statutory Nature Conservation Bodies
SSE	SSE Energy Plc
SUDG	Seabed User Development Group
T&F	Task and Finish
TWT	The Wildlife Trusts
UK	United Kingdom
UKMPG	UK Major Ports Group
UKMS	United Kingdom Marine Strategy
WFD	Water Framework Directive
WWF	World Wildlife Fund



Appendices

Appendix A. Summary of Policy Initiatives Relevant to Marine Net Gain

A.1 MNG policy development

A.1.1 Consultation on MNG principles, Defra

MNG is an initiative created as part of the Defra 25-year environment plan aiming to achieve a net increase in biodiversity during offshore development projects. It is an approach to development that aims to leave the natural environment in a measurably better state than beforehand.

The MNG consultation set out the principles of net gain policy for the marine environment in England and development within it (Defra, 2022a¹⁴). It sought views from stakeholders at all levels including UK government representatives, marine industries, recreational marine users, NGOs, conservationists, academics and coastal communities. The consultation aimed to use responses from stakeholders to shape policy, legislation, guidance and delivery plans, which will aid in translating net gain aims into a defined approach. This is to ensure net gain initiatives provide maximum environmental and socioeconomic benefit.

Key elements of the consultation included:

- Whether MNG should include species as well as habitats;
- The extent to which MNG might include wider environmental benefits in addition to biodiversity benefits;
- The treatment of uncertain positive MNG benefits;
- The approach to defining MNG requirements including the option of a contributions-based approach;
- The scope of projects to which MNG applies;
- The extent to which MNG should be mandatory;
- Adopting a strategic approach to MNG delivery; and
- Delivery of MNG in designated sites.

A summary of consultation responses was published in March 2023¹⁵.

A.1.2 Consultation on Biodiversity Net Gain (BNG) Regulations and Implementation, Defra

BNG is a UK government initiative which aims to increase biodiversity during terrestrial and intertidal development. It will achieve this by requiring developers to mitigate the impacts of development projects by investing in habitat restoration/protection/realignment.

¹⁴ Defra. (2022a). Consultation on the principles of Marine Net Gain. Policy paper. June 2022. Online. Available at: defra.gov.uk [Accessed 01/02/23]

¹⁵ Defra. (2023a) Consultation outcome: Summary of responses. Updated 21 March 2023. Available here: <https://www.gov.uk/government/consultations/consultation-on-the-principles-of-marine-net-gain/outcome/summary-of-responses>



This initiative has produced assessment tools to quantify ecological value of habitats (Natural England, 2022¹⁶). This quantification of biodiversity provides a clear, universal assessment of potential impacts of habitat development and how reduction/restoration/protection/mitigation strategies could be used to achieve BNG.

A consultation on BNG (Defra, 2022b¹⁷) set out the practical and legal implementation details of the new BNG requirement for development, including the intertidal environment. It sought views from stakeholders at all levels. This was to ensure mandatory BNG delivers positive outcomes for biodiversity, creates better spaces for local communities and creates an easy to implement process for developers. The Government published its response to the consultation in February 2023¹⁸ and BNG is due to be implemented from January 2024.

A.2 MNG assessment frameworks

A.2.1 Exploration of options for evaluating gains and losses for Marine Net Gain, Natural England

Natural England is commissioning work to collaboratively look at mechanisms for measuring and comparing marine biodiversity losses and gains, to underpin MNG policy. Working with partners and stakeholders, the project will assess what factors could form the basis for valuing marine habitats and species and linking to outcomes, to calculate whether gains outweigh impacts.

A.2.2 Marine Net Gain - Sector Analysis

Defra commissioned initial research into a contributions-based approach to MNG (ABPmer & eftec, 2022⁵). This work identified that a contributions-based approach could work across marine industries but recognised that simple financial metrics lacked a clear linkage to residual environmental damage from development projects. The report recommended that any contributions-based approach should incorporate an environmental component which seeks to reflect the relative residual impact of development projects.

A.2.3 Offshore wind Sector Workshops

RenewableUK and Energy UK are convening a series of industry workshops to explore alternatives to a simple financial metric which might better reflect the residual environmental impact of a development.

A.2.4 BNG Metric 4.0

Natural England has published a series of iterations of a BNG metric which includes intertidal areas (Natural England, 2021¹⁹). This remains under consultation with stakeholders.

¹⁶ Natural England. (2022). Biodiversity Metric 3.1: Auditing and accounting for biodiversity calculation tool: short guide. Natural England Joint Publication JP039. April 2022.

¹⁷ Defra. (2022b). Consultation on Biodiversity Net Gain Regulations and Implementation. January 2022. Policy paper. Online. Available at: defra.gov.uk. [Accessed: 01/02/23].

¹⁸ Defra. (2023b) Consultation outcome: Government response and summary of responses. Updated 21 February 2023. Available here: <https://www.gov.uk/government/consultations/consultation-on-biodiversity-net-gain-regulations-and-implementation/outcome/government-response-and-summary-of-responses>

¹⁹ Natural England (2021). The Biodiversity Metric 4.0 (JP039). Available here: <https://publications.naturalengland.org.uk/publication/6049804846366720> [Accessed 12/10/2023].



A.3 Projects supporting MNG application

A.3.1 Offshore Wind Evidence and Change Strategic Net Gain Task and Finish Group

In 2020, marine industries, together with The Wildlife Trusts, RSPB, Natural England, The Crown Estate and Defra, put forward a successful bid to the Offshore Wind Evidence and Change Programme to develop strategic targets for marine and intertidal net gain. The Strategic Net Gain Targets Task and Finish Group (T&F Group) was formed to deliver the work and included:

- Conservation NGOs – The Wildlife Trusts, RSPB
- Seabed User Development Group (SUDG) – Executive Officer and Chair
- Industry representation – Energy UK, RenewableUK (RUK), UK Major Ports Group (UKMPG)
- The Crown Estate
- Statutory bodies – Defra, Natural England

The T&F Group completed its first report in October 2021¹, setting out a number of strategic targets for marine and intertidal net gain. These targets were widely consulted on, and well supported by a range of marine stakeholders. In addition, the T&F Group set out a number of assumptions and recommendations for further consideration in the development of a policy for MNG.

A.3.2 Defining Marine Irreplaceable Habitats, Natural England

The study has sought to define intertidal and marine irreplaceable habitats, from mean high water out to England's Exclusive Economic Zone (EEZ), through a series of literature reviews, reports and interviews with experts. The study considers the criteria which would make marine habitats irreplaceable. Consultation with industry on the criteria took place through a workshop in March 2023. Further work is planned to map marine irreplaceable habitats in English waters.

A.3.3 Restoring Meadows, Marsh and Reef Initiative (ReMeMaRe), Environment Agency

The Environment Agency-led ReMeMaRe has developed opportunity maps for restoration of some intertidal and shallow subtidal habitats, including initial mapping of potential for the creation of new seagrass, saltmarsh and native oyster bed habitats.

A.3.4 Marine Restoration Potential (MaRePo), Natural England and Offshore Wind Evidence and Change Programme

The Offshore Wind Evidence and Change programme funded a study to map the potential for restoration of some of the known threatened and declining marine habitats in English waters as defined by the OSPAR convention. These include kelp beds, maerl beds, horse mussel beds, native oyster beds, sea-pen burrowing mega-fauna habitats and subtidal seagrass beds. The work builds on work undertaken by ReMeMaRe. The phase 1 report was published in September 2023 (Johnson *et al.*, 2023²⁰). Further work is being commissioned through the Offshore Wind Evidence and Change programme to improve and refine the existing models and develop maps of potential restoration areas for a wider range of habitats and species in MaRePo+.

²⁰ Johnson, C.E.L., Axelsson, M., Brown, L., Carrigan, K.H.O., Cordingley, A., Elliot, A.L., Downie, A., Gannon, L., Green, B., Jones, J., Marsh, M.K., McNie, F., Mills, S.R.A., Wallace, M.N. and Woods, H.J. (2023) Marine Restoration Potential (MaRePo). Natural England Research Report JP054.



A.3.5 What are the benefits of assisted versus natural recovery in the marine environment?

Natural England

The Marine Biological Association of the UK (MBA) carried out a project funded by Natural England to provide an overview of the advantages and disadvantages of assisted and natural recovery including a cost and benefit analysis (Tillin *et al.*, 2022²¹). The analysis reviewed resultant time to recovery, genetic diversity, potential introduction of invasive and non-native species, and cost of introduction. It also assessed the feasibility of assisted restoration of marine and coastal habitats and species considered, and summarised the risks, challenges and uncertainties.

A.3.6 Optimising the benefits of artificial hard structures, Natural England

Natural England has commissioned an evidence-based review of existing literature to guide management decisions for MPAs and Natural England's advice on new marine infrastructure. It will collate and assesses existing available evidence where attempts have been made to maximise the ecological benefit of artificial substrates. In addition, this project will highlight evidence gaps, suggest how they can be filled and provide a horizon scan of future infrastructure technologies.

A.3.7 Marine Natural Capital and Ecosystem Assessment (mNCEA) Programme, Defra

The mNCEA is an initiative led by Defra which aims to survey and monitor Defra marine-linked policy areas. This is to quantify and evaluate ecosystem services provided by these habitats in order to create tools for environmental decision-making.

A.3.8 The Crown Estate Whole of Seabed Programme

The Crown Estate has commenced pioneering work ('Whole of Seabed' programme) to digitally map the seabed resource needed to meet future demand, enabling the delivery of multiple priorities including net zero and nature recovery, as well as the enhanced co-ordination of future activities out to 2050.

A.4 Relevant wider marine policy

A.4.1 British Energy Security Strategy (BESS) – Offshore Wind Environmental Improvement Package

Updates to Habitat Regulation Assessments (HRAs) are being implemented by the UK government to increase offshore wind development while employing BNG measures. This will be achieved by giving the Secretary of State powers to tailor HRAs where offshore wind is concerned, enabling strategic measures to compensate for impacts on the marine environment and establishing an industry-funded Marine Recovery Fund (MRF) (UK Government, 2022²²).

If an offshore wind farm has significant negative impacts on protected habitats and species, that cannot be avoided, reduced, or mitigated, developers will be required to take measures to compensate for these impacts. Windfarm developers can organise their own compensation measures or will be able to contribute to a MRF (which aims to be operational by late 2023) to discharge compensation obligations.

²¹ Tillin, H.M., Lubelski, A., Watson, A., Tyler-Walters, H. (2022) What are the benefits of assisted versus natural recovery? NECR0475. Natural England. Available here: <https://publications.naturalengland.org.uk/publication/6475990008856576#:~:text=Assisted%20recovery%20approaches%20have%20clear,services%20and%20goods%20and%20benefits.> [Accessed 20/09/2023]

²² UK Government. (2022). Energy Security Bill factsheet: Offshore wind environmental improvement package. UK government publications. December 2022. Online. Available at: www.gov.uk [Accessed 01/02/23].



A.4.2 Marine Spatial Prioritisation (MSPri)

The spatial squeeze is a key issue for the future of our seas. Our seas are only going to get busier over the coming decades and we need to factor in new activities such as the growth of new types of energy (e.g., hydrogen) and growth within existing industries e.g., aggregates.

That is why for England, Defra have established a cross-government Marine Spatial Prioritisation (MSPri) programme to build our understanding of future demands, optimise use of our seas, maximise colocation between all seas users and balance the needs of industries with restoring and protecting the marine environment.

MSPri will engage with marine industries over the next few months to improve understanding of future demands and identify opportunities for greater colocation and co-existence.

A.4.3 Collaboration on Offshore Wind Strategic Compensation (COWSC)

The COWSC programme is a collaborative governance approach for agreeing strategic compensation measures, bringing together Government, SNCBs, eNGOs, the offshore wind industry and the devolved administrations.

The purpose of the COWSC is to explore, develop and implement strategic compensation solutions to help enable an offshore wind industry that deliver on Government ambitions whilst also balancing the UK's Net Zero ambition with the need to ensure environmental protection.

COWSC's objectives are to:

- Define and agree one or more delivery mechanisms for delivering strategic compensation in the UK;
- Explore, define and agree feasible options for compensation measures that can be suitable applied at a strategic level;
- Develop and undertake UK-wide pilot projects to test compensatory measures in priority areas;
- Monitor, steer and learn from the delivery of the pilot projects; and
- Support the development of a library of ecologically robust and commercially feasible strategic compensatory measures.

There have been several meetings at each tier of the governance and the terms of references and key definitions have been agreed.

A.5 Devolved administrations

A.5.1 Draft Scottish Biodiversity Strategy and Delivery Plan

The Scottish Government consulted on its draft Biodiversity Strategy in December 2022. The draft Strategy sets out a vision, outcomes and 33 priority actions designed to halt and reverse biodiversity loss including in the marine environment. In August 2023, the Scottish Government published for consultation an updated version of the draft Strategy together with a proposed five-year delivery plan²³. The Bute House Agreement includes a commitment to passing a new Natural Environment Bill in the current parliament. A key element of the Bill will be the introduction of legally binding nature restoration targets²⁴.

²³ [Tackling the Nature Emergency - Consultation \(www.gov.scot\)](https://www.gov.scot)

²⁴ <https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2021/09/scottish-government-scottish-green-party-shared-policy-programme/documents/scottish-government-scottish-green-party-shared-policy-programme/scottish-government-scottish-green-party-shared-policy-programme/govscot%3Adocument/scottish-government-scottish-green-party-shared-policy-programme.pdf>



A.5.2 Scottish Marine Environmental Enhancement Fund (SMEEF)

Managed by a Steering Group with representatives from the Scottish Government, Crown Estate Scotland and NatureScot, SMEEF facilitates investment in marine restoration projects in Scotland. The fund is supported by voluntary contributions, largely made by businesses in the marine sector, and grants are allocated on a competitive basis. One of the targets in the draft Delivery Plan is to increase the funding realised by SMEEF.

A.5.3 Marine Directorate Research Studies to Support Nature Recovery in Scotland's Marine Environment

The Marine Directorate of Scottish Government is commissioning research to explore options for the development of an exchange mechanism that could be used to assess potential marine and coastal enhancement measures applied across marine ecosystem components so that an overall positive outcome for biodiversity is achieved from offshore wind developments.

The Marine Directorate is also in the process of commissioning a library of restoration, conservation and enhancement measures for a range of marine ecosystem components, including but not limited to benthic habitats, marine mammals, fish, marine birds and the pelagic environment.

A.5.4 Wales - COP15, Biodiversity Deep Dive, Section 6 Duty and the Planning System

Wales is promoting Net Benefit for biodiversity through amendments to planning policy in the light of COP15, implementation of its Biodiversity Deep Dive recommendations and strengthening of public body duties under Section 6 of the Environment (Wales) Act. A consultation on these proposed amendments was undertaken in 2023²⁵. The consultation included guidance on achieving a net benefit for biodiversity.

A.6 Example of Developer Initiatives

A.6.1 Ørsted Net Positive Impact

Ørsted aims to achieve BNG by 2030. Steps to accomplish this include developing tools for measuring biodiversity impacts offshore, driving international collaboration and investing in projects which protect as well as restore biodiversity (Ørsted, 2023²⁶). Projects currently receiving funding from Ørsted include planting seagrass, saltmarsh as well as introducing native oysters in the Humber estuary, the Essex Native Oyster Restoration Initiative and creation of Kittiwake compensation nesting sites in Suffolk. Ørsted have also partnered with other large funding organisations including the World Wildlife Fund (WWF), ARK Nature and The Wildlife Trusts to implement larger scale projects with larger positive impacts.

A.6.2 SSE Positive for the Planet

SSE renewables aims to achieve BNG from 2025. Steps already taken to achieve the 2025 goal include developing two BNG toolkits to quantify the impact of SSE projects on local biodiversity and development of a 10-point plan for achieving BNG (SSE, 2022²⁷). This program includes:

- Developing toolkits to enable use globally;
- Developing 'habitat banks';

²⁵ <https://www.gov.wales/targeted-policy-changes-planning-policy-wales-net-benefit-biodiversity-and-ecosystems-resilience>

²⁶ Orsted. (2023). Building Renewable Energy in Balance with Biodiversity. Online. Available at: [ored.com](https://www.ored.com) [Accessed: 01/02/23]

²⁷ SSE. (2022). Positive for the planet, Renewable energy with a Biodiversity Net Gain. November 2022. Online. Available at: www.sserenewables.com [Accessed 01/02/22].



- Trailing new approaches for achieving BNG offshore; and
- Engaging with stakeholders by participating in industry forums, contributing to research projects and leading the BNG working group of the Powering Net Zero Pact, a collaboration of global power sector companies.

A.6.3 Shell Biodiversity Action Plan

As part of their Respecting Nature goal, Shell has implemented BNG on all new projects from February 2021²⁸. A process is followed to ensure this is achieved. This begins with screening of potential new projects to determine if they are located in a 'critical habitat'. If the habitat is critical, a biodiversity plan is created which sets out the actions needed following a 'mitigation hierarchy'. This hierarchy has three levels: avoid development in the habitat, reduce impact and where there is impact, take steps to achieve net positive (e.g., managed realignment). Shell has commissioned work to develop an initial draft Biodiversity Action Plan (BAP) for the central North Sea, which has involved engagement with interested stakeholders.

A.6.4 Bp Biodiversity Strategy

As part of their biodiversity strategy, from 2022 onwards, new bp operated projects whose planned activities have the potential for significant direct impacts on biodiversity will be required to develop net positive impact action plans for those activities. This requirement will apply to projects across the bp portfolio from oil and gas to renewables and the action plan will be required to be implemented for as long as the asset is operated by bp. Bp are currently developing a robust methodology to enable significant direct impacts to be assessed and net positive impact on biodiversity to be achieved. Delivery options for strategic marine net gain: Analysis of Existing Recovery and Restoration Projects and Proposals

²⁸ Shell. (2022). Biodiversity. Online. Available at: <https://www.shell.com/sustainability/environment/biodiversity.html> [Accessed: 01/02/23].



Appendix B. Delivery options for strategic marine net gain: Strategic Marine Net Gain targets potential mechanisms and priorities for delivery





Offshore
Wind Evidence
+ Change
Programme

Delivery Options for Strategic Marine Net Gain

Analysis of Existing Recovery and Restoration Projects and Proposals

Executive Summary

The Task and Finish (T&F) Group, funded by the Offshore Wind Evidence and Change Programme, completed its first report in October 2021, setting out a number of strategic targets for marine and intertidal net gain. These targets were widely consulted on, and well supported by a range of marine stakeholders. Building on the outcomes from the first phase of work, the T&F Group is working to develop potential delivery options for strategic MNG, with the aim of identifying and agreeing recommendations for more local delivery of strategic net gain targets.

The first task has been to undertake an analysis of existing recovery and restoration projects and proposals (including pressure removal/reduction projects) at a national and local level, with consideration of local and regional priorities and drivers. The outputs presented within this report provide a comprehensive review of existing initiatives, including innovative or inventive types of initiatives being undertaken which could be applied to MNG.

The review and the call for evidence identified 709 recovery and restoration projects. In total, restoration projects targeting 25 types of habitat and species feature were captured within the call for evidence.

The emphasis of the work was with consideration of MNG policy development in England. This resulted in an underrepresentation of projects within the devolved administrations. This is acknowledged as a limitation within this report, but as such it is recommended that future work build on the existing database and develop a wider understanding of interventions being undertaken within the devolved administrations, to expand on existing knowledge of restoration, creation and enhancement techniques, and identify innovative methods that could also be applied to MNG.

Next steps will involve agreeing a suitable basis for determining potential demands for net gain projects regionally. Alongside this, future work will also need to consider what is needed ecologically within each marine plan region to facilitate a strategic approach to restoration. Linking of current and future restoration interventions against existing initiatives, such as Shoreline Management Plans, River Basin Management Plans and Local Nature Recovery Strategies which have a marine element will be key in order to achieve this.



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Document Control

Version	Author	Approved	Date	Description of change
1.0	Task and Finish Group	Task and Finish Group (Chair)	09/11/2023	Approved for issue by Task and Finish Group.



1. Introduction

There is increasing recognition of the need for greater action to restore our marine environment in the face of a continued decline in marine biodiversity. Net gain has been identified as a potentially important mechanism that can contribute to halting and reversing marine biodiversity loss. From autumn 2023, two years following royal ascent of the Environment Act, it will be mandatory for all in scope developments in the terrestrial and intertidal environment to deliver a minimum biodiversity net gain of 10%. Although there is no formal net gain policy as yet for the marine environment, Government has committed to developing such a policy, and has held a first consultation on the principles of marine net gain (MNG).

The Task and Finish (T&F) Group, funded by the Offshore Wind Evidence and Change Programme, completed its first report in October 2021, setting out a number of strategic targets for marine and intertidal net gain. These targets were widely consulted on, and well supported by a range of marine stakeholders. In addition, the T&F Group set out a number of assumptions and recommendations for further consideration in the development of a policy for MNG (The Crown Estate, 2021¹).

Building on the outcomes from the first phase of work, the T&F Group is now working to develop potential delivery options for strategic MNG. The aim of this project is to identify and agree recommendations for a more local delivery of strategic net gain targets for the improvement and recovery/restoration of marine and intertidal environments, which can be used as a basis for determining net gain targets for marine industry sectors, including offshore wind. ABPmer has been commissioned to support the work of the T&F Group.

The first task has been to undertake an analysis of existing recovery and restoration projects and proposals (including pressure removal/reduction projects) at a national and local level, with consideration of local and regional priorities and drivers. The outputs seek to identify the scale of future development activity at a regional (marine plan area) level and combine information on potential project impacts and future project development to establish a potential level of demand for MNG at regional level.

2. Review of existing recovery and restoration projects

An extensive review of existing recovery and restoration projects and proposals (including pressure removal/reduction projects) was undertaken to capture both national and local level projects. The review encompassed projects being undertaken across the UK, not just within England, to ensure a comprehensive review of existing initiatives which could be applied to MNG, including innovative or inventive types of initiatives being undertaken within devolved administrations, not captured within England, which could be applied to MNG.

Relevant projects identified as part to the review were collated in a standardised manner within a searchable Excel database (Appendix B). As well as specific recovery and restoration projects/proposals the review also collated information on existing policy-led development initiatives. Information recorded for each project/initiative, where available, included:

¹ The Crown Estate. 2021. Strategic Net Gain Task and Finish Group, Offshore Wind Evidence and Change Programme, Strategic Net Gain Targets for Coastal and Marine Environments. Online. Available here: <https://www.marinedataexchange.co.uk/details/3513/2021-strategic-net-gain-task-and-finish-group-offshore-wind-evidence-and-change-programme-strategic-net-gain-targets-for-coastal-and-marine-environments/summary>



- Project name
- Project description
- Location
- Site coordinates
- Site area (ha)
- Project type (Creation; Restoration; Enhancement; Pressure removal)
- Project status (Planned; Underway; Complete)
- Project start date
- Project end date (if applicable)
- Target marine features
- Key drivers (Project mitigation/compensation; Management authority actions within MPAs; Management authority actions outside of MPAs; Voluntary initiative; Research; Other (please specify))
- Links to regional/local priorities
- Lead organisation (overall project lead)
- Delivery organisation(s)
- Funding partner(s)
- Total project cost (or predicted cost)
- Delivery cost
- Monitoring and maintenance costs
- Project outcomes (or expected outcomes)
- Monitoring and evaluation
- Criteria used to measure success
- Source
- Additional information

Sources of information collated on each project were also recorded as well as any supplementary information. The list of projects included in this review is not exhaustive and it is acknowledged that there are likely others in various development stages or planned that potentially were not captured as part of this study.

2.1 Call for evidence

To help supplement the initial review, a call for evidence was launched on 28 February 2023. This was publicised at Coastal Futures, through CMS news and via LinkedIn, and ran for three weeks. The call for evidence was hosted using SurveyMonkey and required respondents to provide the above listed data through a link to the evidence database.

Respondents were also invited to complete a brief questionnaire aiming to gain a broader view on potential delivery options for strategic marine and intertidal net gain. The questionnaire also contained the following five questions:



- Thinking about completed projects that you are familiar with, how successful was the evaluation process and what lessons were learnt as part of the evaluation?;
- What were the key challenges for project delivery and how were they overcome?;
- Can you suggest additional metrics/indicators not already being used which you consider would be useful to measure the success of intertidal and marine restoration/ recovery projects?;
- Strategic targets will need to consider appropriate spatial scales. Do you agree that marine plan level could be an appropriate scale for marine Net Gain?; and
- Would you be happy for the T&F Group to contact you further regarding the information you have provided?

3. Results

3.1 Existing recovery and restoration projects

The initial review and the call for evidence identified 709 restoration projects. Figure 1 shows the number of initiatives for the UK and for each devolved administration.

Of the 709 projects identified, 674 were being, or had been, undertaken within England. The database therefore underrepresents measures outside of England with very few initiatives being recorded from Northern Ireland, Scotland or Wales and only single projects identified from the Channel Islands and the Isle of Man. It is acknowledged that the emphasis of this work is with consideration of MNG, which is an English policy, and has led to underrepresentation within the devolved administrations. As a result, comparative analysis has focused only on projects identified within England and has not been undertaken between countries, and no comparison can be made using the data collected from respondents. However, the importance of cross-boundary projects, especially in areas such as the Severn Estuary, Solway Firth and Dee Estuary is recognised.

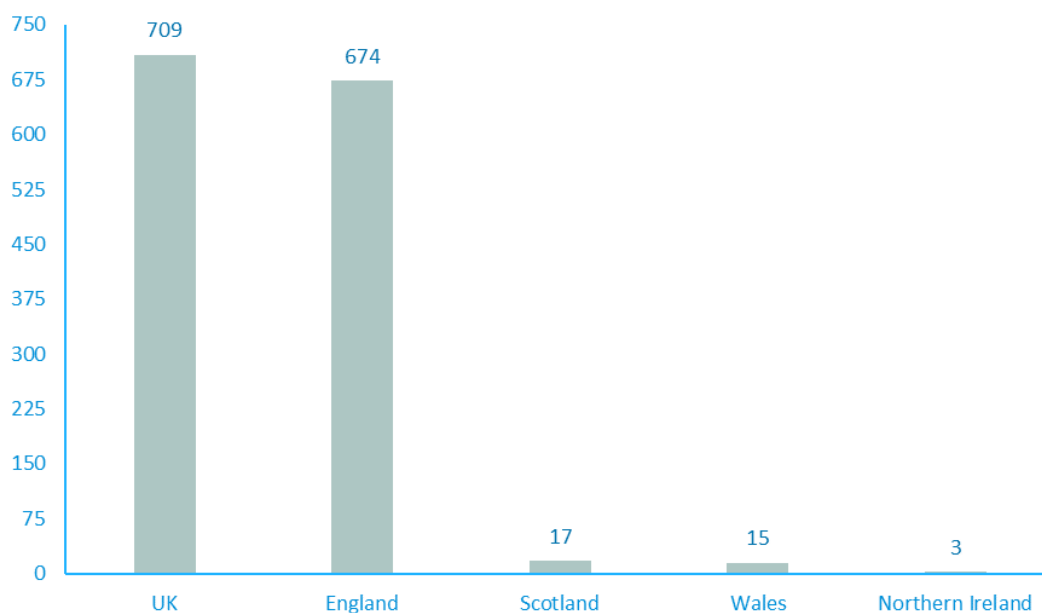


Figure 1. The number of restoration initiatives identified across the UK and devolved administrations



Five main drivers of relevant recovery, restoration and pressure reduction/ removal projects were identified as part of the call to evidence and were predetermined for stakeholders to best assign to their project, namely:

- Actions taken by developers to offset impacts from development projects (including compensatory measures under Birds & Habitats Directives, Measures of Equivalent Environmental Benefit (MEEB) under Marine and Coastal Access Act 2009 (MCAA) or voluntary measures taken by developers to address stakeholder objections or deliver company sustainability commitments);
- Actions determined by management authorities (e.g., Defra, Marine Management Organisation (MMO), Statutory Nature Conservation Bodies (SNCBs), Environment Agency (EA), harbour authorities with conservation remit) to support achievement of conservation objectives within MPAs;
- Actions determined by management authorities to support achievement of conservation goals outside of MPAs (e.g., Sussex Kelp Restoration Project; Restoring Meadow, Marsh and Reef (ReMeMaRe), Unlocking the Severn);
- Voluntary actions by Non-Governmental Organisations (NGOs), industry and local communities to restore and recover the marine environment (e.g., Project Seagrass, Solent Oyster Restoration Project);
- Socio-economic; and
- Research projects (e.g., ReMEDIES, Milford Haven Native Oyster Project, Stronger Shores (Flood and Coastal Resilience Innovation Programme)).

Table 1 shows the number of projects identified for each of the key project drivers listed above. Stakeholders were also given the opportunity to select 'Other' and specify their project driver. In all such cases (12 projects) the driver for the project was given as 'socio-economic' such as enhancing or restoring habitats to support local tourism or fisheries. The predominant driver for relevant interventions were management authority actions associated with MPAs, all of which were related to pressure reduction measures. Voluntary initiatives were the second highest project driver. In most cases these were related to the restoration or creation of saltmarsh, seagrass or native oysters.

Table 1. Number of projects identified for each key project driver

Project driver	Number of projects
Project mitigation/ compensation	21
Management authority action within MPAs	471
Management authority action outside MPAs	46
Voluntary action	61
Research	33
Other - Socio-economic	12
<i>Unspecified</i>	65



In total, restoration projects targeting 25 types of habitat and species feature were captured within the call for evidence. These are listed in Table 2. Figure 2 shows the number of initiatives and the target habitat and species features for England, noting that some projects targeted more than one habitat or species feature. Due to the number of target features identified an 'Other category' was created to facilitate mapping.

This category is formed of:

- Artificial reef
- Artificial pools
- Kelp
- Subtidal mud
- Subtidal rock
- Supralittoral sand
- Reedbed
- Sand dunes
- Submarine structures made by leaking gases
- Transitional grassland
- Vegetated shingle

Subsequently, to assess the spatial distribution of existing restoration initiatives each project was mapped against each marine plan region. Figure 3 shows the spatial distribution of each target marine feature by marine plan region.

Table 2. Types of habitat and species features targeted by restoration initiatives

Habitat and species features		
Artificial pools	Reedbed	Subtidal mud
Artificial reef	Reef	Subtidal rock
Kelp	Saltmarsh	Subtidal sand
Lagoon	Sand dunes	Supralittoral sand
Marine fish	Sea caves	Transitional grassland
Marine mammals	Seabirds	Vegetated shingle
Migratory fish	Seagrass	Submarine structures made by leaking gases
Mudflat	Shellfish	
Native oyster	Subtidal gravel	

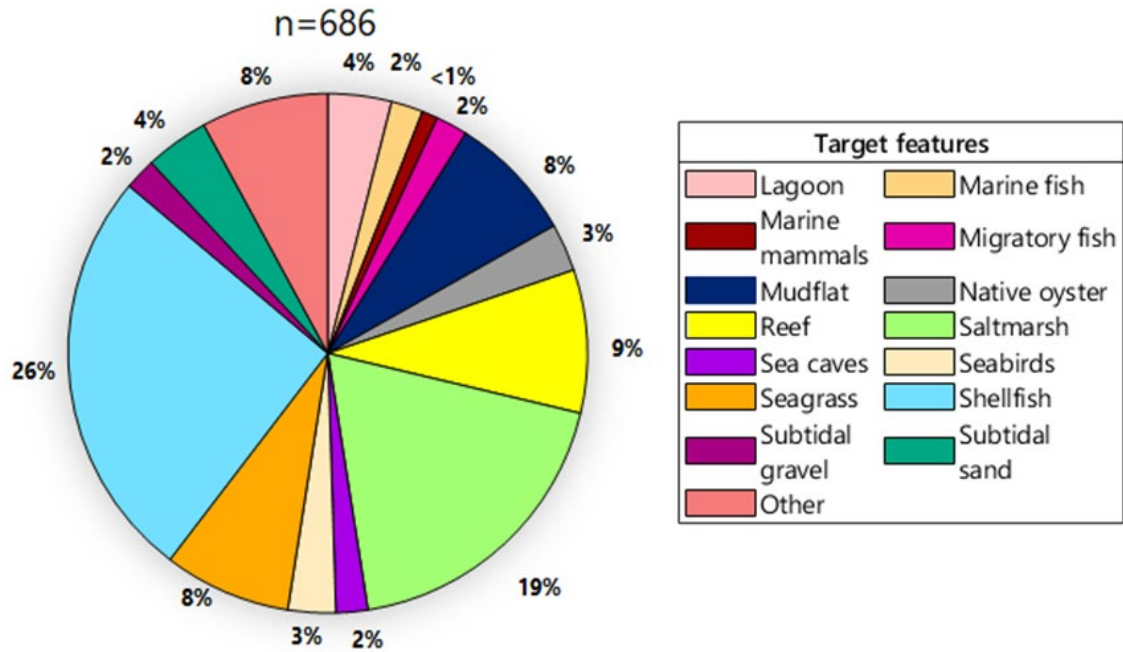


Figure 2. Summary of project target features for English interventions

Overall, measures which targeted shellfish² had the highest number of initiatives across the UK (Figure 2), generally linked to protected areas and pressure reduction measures, in particular in the East and North West marine plan regions (Figure 3.). Saltmarsh was the second highest target feature across the England. Initiatives to restore or enhance saltmarsh occurred within most marine plan regions but most frequently within the South and South East regions.

² Pressure reduction interventions generally related to MPA measures in England or to measures delivered via a statutory mechanism e.g., fisheries byelaws (MMO, Inshore Fisheries Conservation Authority (IFCA)).

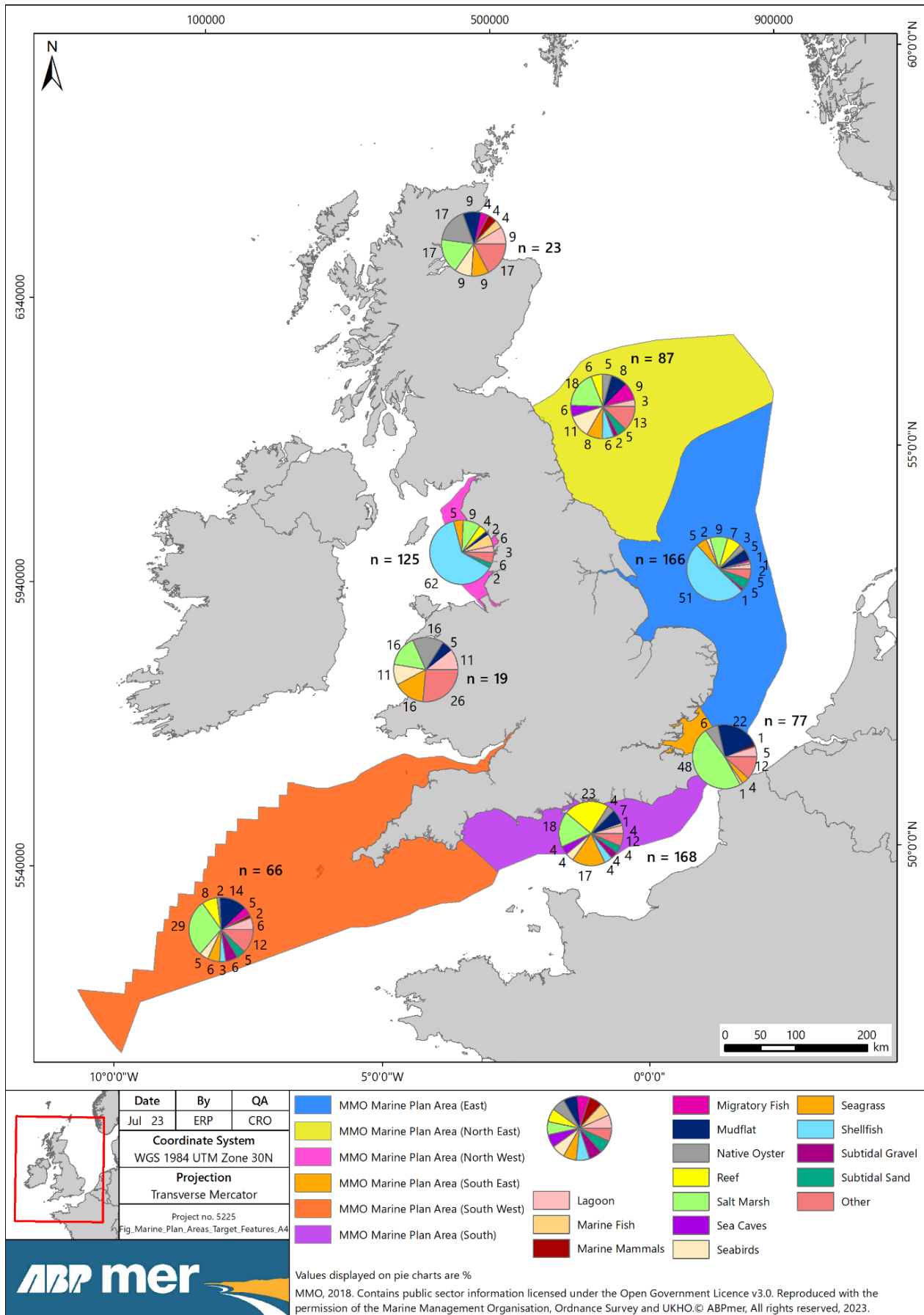


Figure 3. Target habitat or species for restoration and recovery projects by marine plan region



There were few projects identified targeting species such as marine mammals or migratory fish. The majority of projects targeting marine or migratory fish species were management authority actions. However, some voluntary initiatives were identified including the Sturgeon habitat restoration project, the River Trent and the Avon Severn eel pass projects, and the Culter dam fish pass that aims to aid the migration of salmon and sea trout. It is recognised that there are many additional projects and measures for migratory fish in rivers (e.g., installation of fish passes, gravel cleaning etc) but these have not been included in the database as they are beyond the geographical scope of our study.

Of the six projects focused on marine mammals, four were associated with management authority actions within MPAs. However, two research related projects were identified, namely the Greater Thames Seal Working Group and the Scottish Marine Animal Stranding Scheme.

The East marine plan region recorded the highest number of all types of restoration interventions, with the South the second highest (Figure 4). Very few projects were recorded from the Channel Islands, Isle of Man, Northern Ireland, Scotland or Wales for the reasons discussed above.

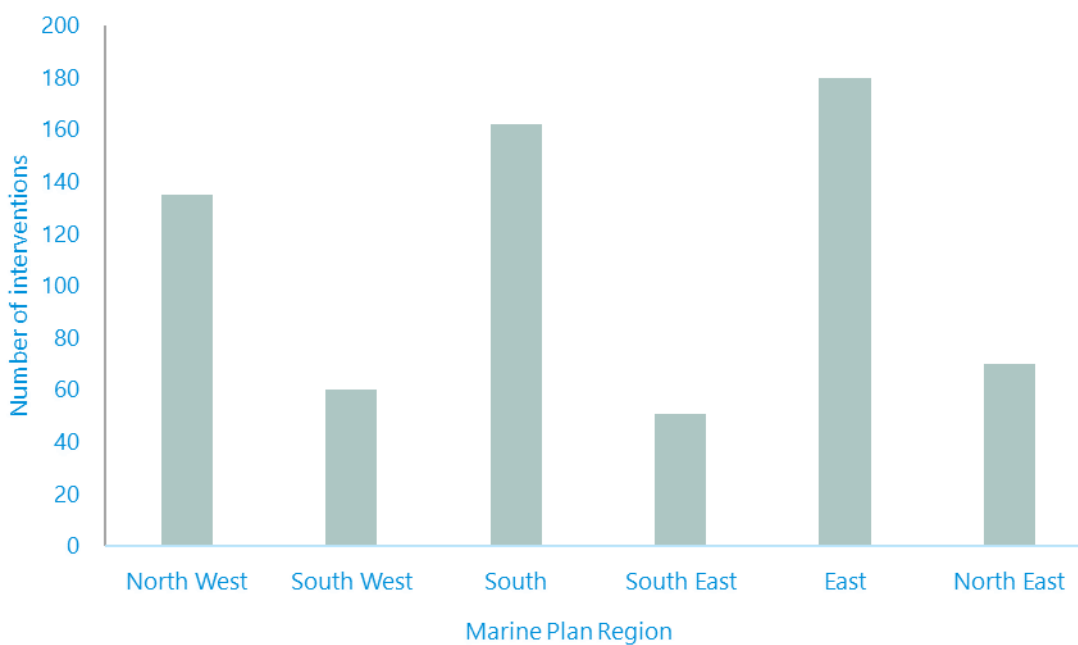


Figure 4. Number of interventions by marine plan region

Four key types of intervention were identified: creation, restoration, enhancement of habitats and/or species, or pressure reduction initiatives. To assess the spatial extent of existing restoration projects the distribution of each type of initiative was mapped against each marine plan region (Figure 5).

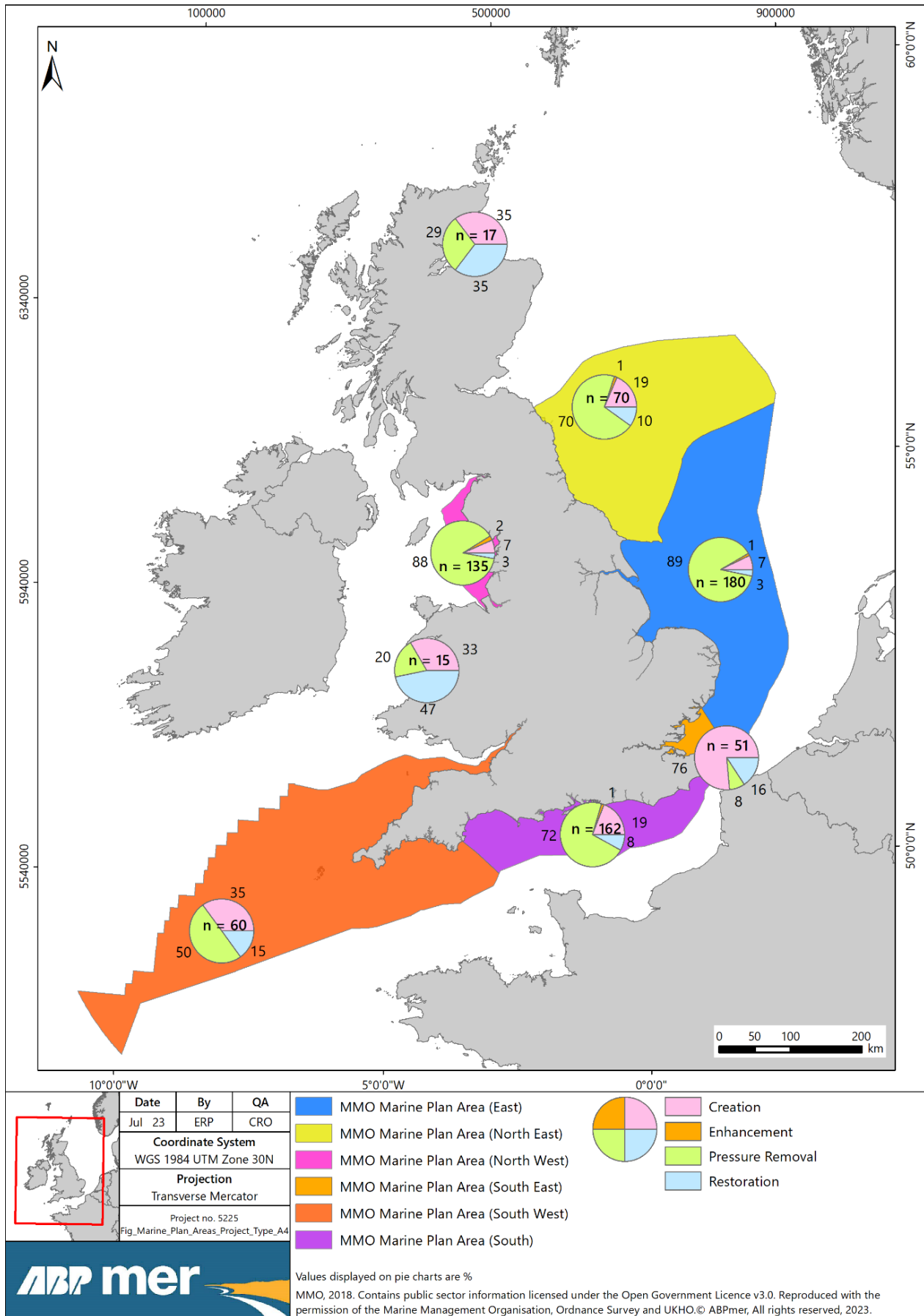


Figure 5. Project type by marine plan region



Seventy percent of all interventions identified were pressure removal projects. These pressure reduction interventions generally related to MPA measures in England or to measures delivered via a statutory mechanism (MMO, IFCAs). Similar data for Wales and Scotland was not captured in the database, due to the English remit of MNG policy.

The majority of pressure removal projects were associated with measures to protect shellfish stocks (i.e., IFCA fishing byelaws). There were few projects specifically targeting pressure reduction interventions on subtidal features, such as subtidal sand, gravel and mud, however it is acknowledged that any pressure reduction measures to protect shellfish stock will by default also provide protection for habitats in associated areas, by reducing bottom pressure. As a result, an assessment was undertaken to overlay areas subject to fisheries or MPA measures with EUNIS level 3 habitat classifications to assess the areas of subtidal mud, subtidal sand and subtidal gravel which receive de facto protection as a result of such pressure reduction measures. In total 15,034 km² of subtidal sediment benefit from pressure reduction as a result of fisheries or MPA measures, 87 % of which is located within the East marine plan region (Table 3). Subtidal sand receives the greatest protection by area across all marine plan regions, with subtidal mud the lowest, equating to 3.7 % of the total area.

Table 3. Area of subtidal mud, sand and gravel (km²) covered by fisheries or MPA measures within each marine plan region

Marine plan region	Subtidal mud (A5.1)	Subtidal sand (A5.2)	Subtidal gravel (A5.1)	Total
South West	99	218	507	825
North West	356	8	0.5	364
North East	10	150	64	224
East	13	9,661	3,401	13,076
South East	52	55	36	143
South	26	112	265	402
Total	557	10,204	4,273	15,034

All MPA and IFCA byelaws to reduce pressure on shellfish are delivered via statutory mechanisms, therefore consideration was also given to identify the number of shellfish measures which were delivered under alternative drivers, for example voluntary measures. However, of the 177 identified shellfish projects only one was not associated with a management authority action, which was the North West Wildlife Trusts Cumbrian Creel Project³, classified as a voluntary action undertaken by an NGO.

Other target features which were the focus of pressure removal activities included kelp, marine fish, marine mammals, migratory fish, mudflat, native oyster, reef, seabirds, seagrass, submarine structures made by leaking gases, subtidal habitats including gravel, mud, rock and sand and saltmarsh. Of those, listed reef features has the second highest number of pressure removal related projects, similarly these were all linked to management authority actions (Figure 6).

³ North West Wildlife Trust Cumbrian Creel Project: <https://www.livingseasnw.org.uk/what-we-do/marine-conservation-projects/creel-project>

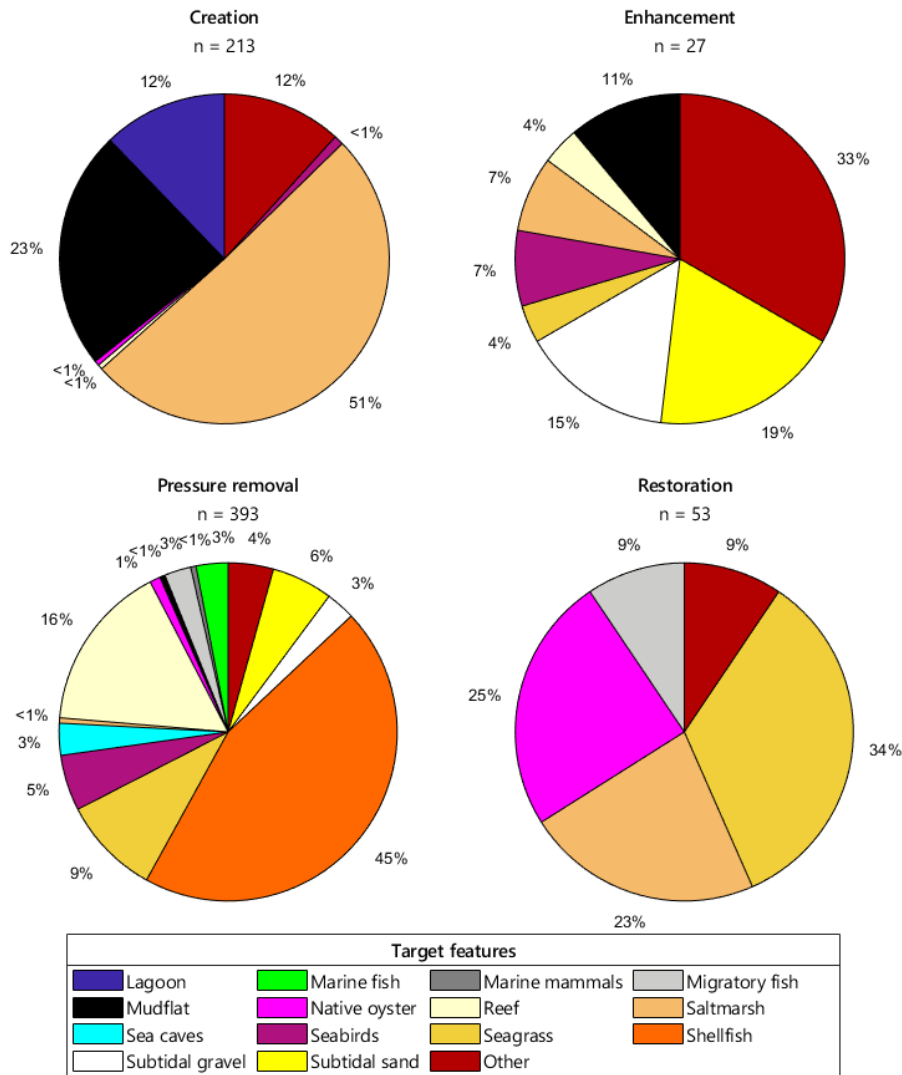


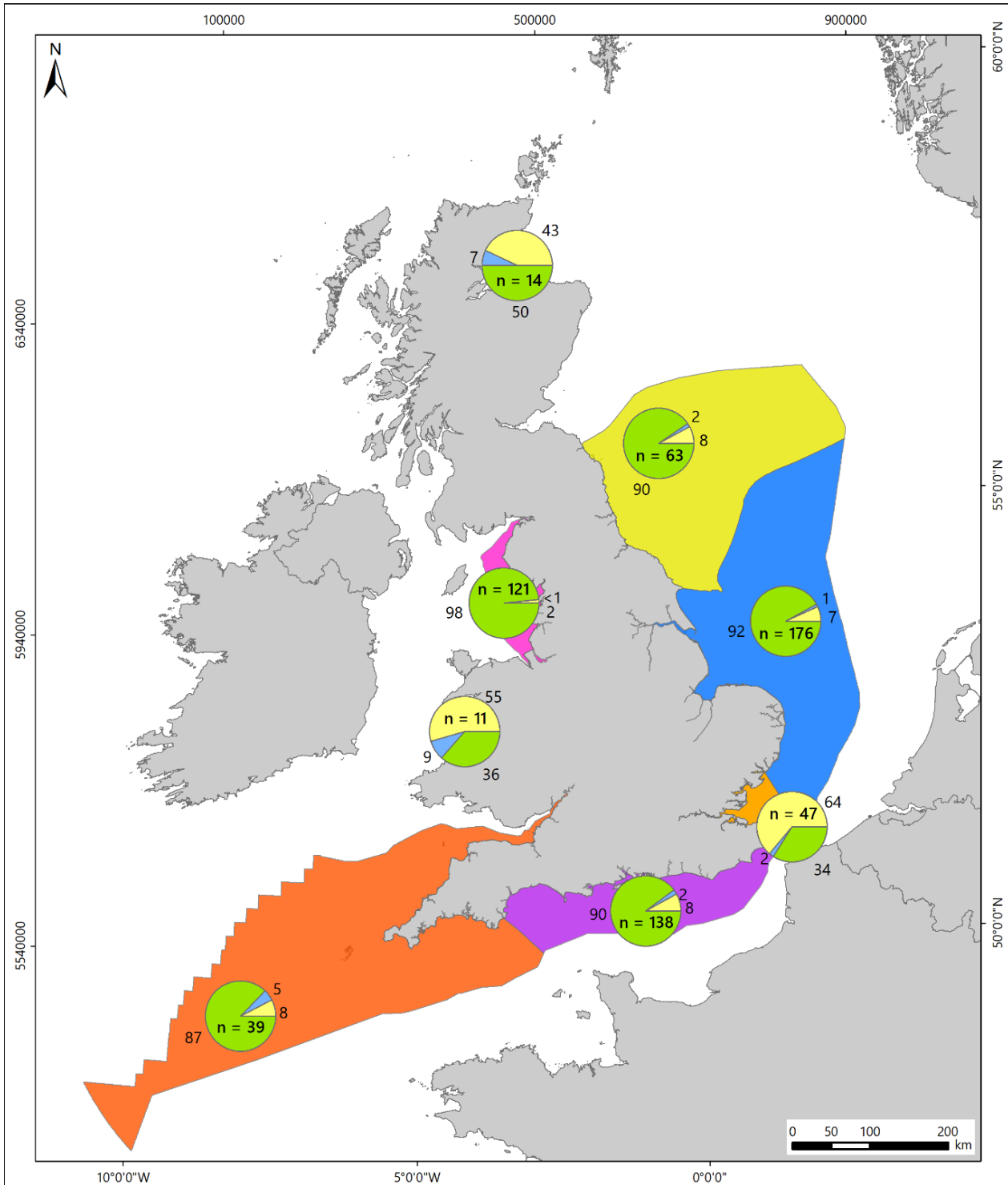
Figure 6. Target habitat or species features by project type

Of the remaining interventions, habitat creation projects accounted for 19 % of those identified, restoration 9 % and enhancement 2 %. The majority of habitat creation projects had been undertaken, or were underway, within the South East and South marine plan regions. Of the habitat creation projects identified, saltmarsh creation accounted for 51 % of interventions.

To assess the number of projects which have been undertaken to date and the potential supply of ongoing/ planned projects, the spatial distribution of restoration interventions by project status (completed, planned, underway) was mapped against each marine plan region (Figure 7).

Seventy-six of the 709 projects (11 %) had been completed at the time of the call for evidence (March 2023), the majority of which had been undertaken within the South East (40 %), East (16 %) and South (14%) marine plan regions. The majority of projects, 544 of the 709 (77 %), are currently underway, the highest number of which were within the North West marine plan region.





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Projection				
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Values displayed on pie charts are %
 MMO, 2018. Contains public sector information licensed under the Open Government Licence v3.0. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UKHO. © ABPmer, All rights reserved, 2023.

Figure 7. Status (completed, underway or planned) of restoration and recovery projects by marine plan region

A large proportion of interventions underway are associated with management authority measures within MPAs (Table 4, Figure 8). Sixty-two projects are currently underway, excluding MPA management measures, for predominantly voluntary or research interventions. Only 13 planned, future, projects were identified during the call for evidence.

Table 4. Status of projects for each project driver

Main project driver	Completed	Underway	Planned	Unspecified
Management authority action within MPAs	1	470	0	0
Management authority action outside MPAs	34	2	4	6
Project mitigation/ compensation	16	2	2	1
Voluntary action	14	35	2	10
Research	5	21	5	2
Other - Socio-economic	6	2	0	4
Unspecified	-	-	-	65

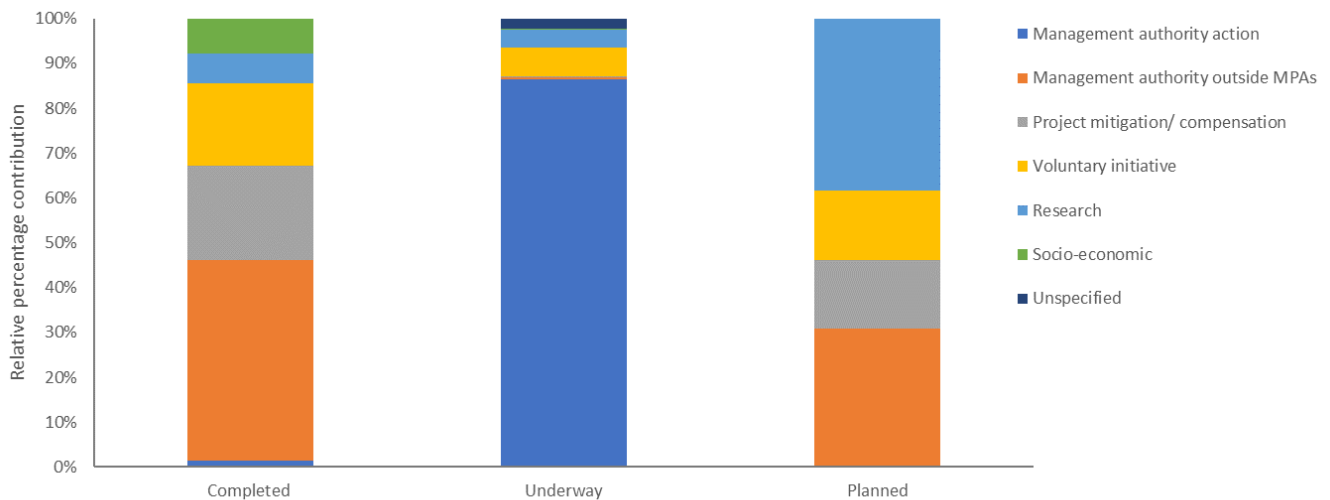


Figure 8. Relative percentage contribution of key project drivers to completed, underway or planned projects.

Table 5 provides a breakdown of the number of projects, completed, underway and planned, for each target habitat and species feature, noting that some projects target multiple features. A separate assessment was also considered which excluded MPA measures to assess the supply of habitat restoration interventions. For projects currently underway, excluding MPA measures, the three predominant target habitats were saltmarsh, seagrass and native oyster, which accounted for 68 % of interventions. Other target features included artificial pools, marine mammals, mudflat, sand dunes and seabirds, among others. Of the planned, future projects which have not yet started, the majority of projects (74 %) aim to target mudflat, saltmarsh and seabirds.



Table 5. Number of projects, completed, planned or underway, for each target feature

Row Labels	Completed	Underway	Underway (excluding MPA measures)	Planned	Unspecified
Artificial pools	3	4	4		
Artificial reef	3	1	1		1
Kelp		2	2	1	
Lagoon	18				12
Marine fish		12	1		1
Marine mammals		6	4		
Migratory fish	3	10		1	2
Mudflat	30	8	3	5	16
Native oyster	2	20	13	1	8
Reedbed	3				1
Reef		65			1
Saltmarsh	52	26	21	5	53
Sand dunes	4	3	3		
Sea caves		12			
Seabirds	1	23	4	4	4
Seagrass	1	54	14	1	8
Shellfish		175			1
Submarine structures made by leaking gases		1			
Subtidal gravel		15			
Subtidal mud		12			
Subtidal rock		7			
Subtidal sand		27			1
Supralittoral sand	3				
Transitional grassland	8	1			6
Vegetated shingle			1	1	
Total	131	484	71	19	115

Data on the spatial extent of habitat interventions is largely missing from the call for evidence data, however, data were provided for 138 projects which were either completed or underway, excluding MPA management projects, which were discussed separately above. A number of projects aimed to restore/ create multiple habitat or species features within the same site, where this was the case, it was assumed that the area of each habitat restored/ created was equal for the purposes of the assessment.



In total, 25,113 ha of habitat restoration/ creation/ pressure reduction were identified, the large majority of which, 20,400 ha, was associated with the Sussex Kelp Recovery Project, a marine rewilding project aiming to restore kelp forests through pressure reduction measures by introducing a new bylaw preventing trawling within 4 km of the coastline to allow natural regeneration (Table 6). The second largest project was the Alkborough managed realignment project, which created a total of 307 ha of saltmarsh, mudflat and reedbed habitat.

In terms of both the number of creation and/ or restoration projects, and the total area restored/ created, saltmarsh, mudflat and lagoon habitats were the highest targeted features. However, in terms of average area restored per project, sand dune and native oyster projects on average restored the largest areas of habitat, 79.7 ha and 74.2 ha respectively. Overall, on average, habitat creation/ restoration projects created/ restored 20.5 ha per project.

As a crude extrapolation, based on the identified planned projects this would equate to approximately 205 ha of habitat restoration/ creation across the 10 future habitat restoration/ creation projects planned to be undertaken within the East (2), North East (1), North West (1), South (3), South East (1), South West (2) marine plan regions. The remaining three planned projects are pressure removal projects that aim to reduce impacts to seabirds at a national level.

Table 6. Area of habitat and species features restored or created by intervention

	Number of projects	Total area (ha)	Average area (ha)
Pressure reduction			
Kelp	1	20,400.0	20,400.0
Marine fish	1	267.0	267.0
Sub-total	2	20,667.0	10,333.5
Creation/ restoration			
Artificial pools	4	3.7	0.9
Artificial reef	1	1.0	1.0
Lagoon	29	422.2	14.6
Mudflat	48	1,198.3	25.0
Native oyster	6	445.0	74.2
Reedbed	4	206.0	51.5
Saltmarsh	100	1,622.2	16.2
Sand dunes	4	318.7	79.7
Seagrass	5	44.5	8.9
Supralittoral sand	1	0.5	0.5
Transitional grassland	15	183.6	12.2
Sub-total	217	4,445.7	20.5
Total	219	25,112.7	114.7

3.2 Potential delivery options for strategic MNG

To help supplement the review, four key questions were posed to respondents aiming to gain a broader view on potential delivery options for strategic marine and intertidal Net Gain. The responses to each question are summarised below.

3.2.1 How successful was the evaluation process, and what lessons were learnt as part of the evaluation?

Respondents provided mixed responses to the question, with several noting that their projects had not had a set evaluation process but had used some arbitrary metrics to measure success, with another also highlighting that the evidence base for evaluation of success of marine restoration and recovery is still in its infancy. Despite this many agreed that an end of project evaluation process was key for future learning; for example, identifying not only successful outcomes but elements or techniques which had been unsuccessful to inform future restoration efforts and identify different monitoring strategies for future projects.

In addition to ecological data, such as change in habitat type/extent/ function, or species survival etc., some projects also considered additional evaluation measures including social and financial indicators.

One project noted that although they had a post-project evaluation process, the success of the evaluation and learnings from the project were limited by the lack of baseline data, i.e., an understanding of the changes resulting from the project. Appropriate baseline data are therefore required prior to project interventions and can also be useful to inform the types of metrics used to evaluate project outcomes.

A similar issue was highlighted by another respondent who suggested that current post-project monitoring does not assess the longer-term outcomes, but that this would be useful to track how the interventions develop over time and to ensure that interventions result in the intended net gain or project goal. They also noted that, where appropriate, comparisons of success across different types of marine restoration intervention would be valuable.

3.2.2 What were the key challenges for project delivery, and how were they overcome?

Marine licensing and insufficient funding were the two main challenges repeatedly noted by respondents, with 60 % of respondents citing challenges with obtaining licencing and 40 % referencing funding as a constraint.

Several respondents noted issues with obtaining the relevant licences to undertake their restoration interventions, largely due to the cost and complexity of the licencing and consent process. In several cases this resulted in project delays, impacts to budgets and in some cases prevented certain planned elements of the projects going ahead, one example of this related to the creation of fish refugia. These issues were particularly highlighted for projects being undertaken in privately owned areas, cross-boundary sites and designated sites. One respondent noted that the issues had been repeatedly raised with the relevant authorities, but no respondents noted how any issues had been resolved.

Funding was another issue noted as a key challenge, which had multiple project impacts. One respondent noted the limitation with longer-term funding to build resources to achieve long-term ambitions. This was similarly reiterated by another that linked the lack of longer-term funding to capacity building to support ongoing restoration interventions. Furthermore, it was highlighted that funding was often linked to the project lifetime, which did not enable longer-term monitoring or evaluation of project success or allow for project outcomes to be shared more widely to support future restoration efforts.

Two additional challenges were also highlighted by respondents:

1. Demonstrating the project benefits/ outcomes due to a gap in robust baseline data; and
2. Building stakeholder interest and support in areas where there are conflicting interests over the use of space.



Few respondents identified how their issues had been overcome to enable project delivery, however one respondent suggested a number of options for overcoming challenges in the context of potential MNG projects in the future:

1. Funding secured under obligation of the developer to pay for habitat works in order to satisfy net gain conditions including monitoring to show the delivery of agreed gains.
2. Large scale developments creating potential for strategic, pooled funding for nature recovery, which could provide more scope for long-term funding security.
3. Using existing tools e.g., the Coastal Concordat to overcome licensing issues and to streamline the process. For example, the Coastal Concordat could help fast track or prioritise permissions to allow conservation work in the coastal and marine space.
4. Coordination between all the organisations involved and appointment of a coordination lead role in the early stages of project development.
5. Adding interim evaluation steps to demonstrate benefits at different stages throughout the project lifecycle, not just at the end, and using proxy indicators of success where necessary.
6. Development of working groups and engagement with other stakeholders at the earliest possible stage of any project to enable stakeholder buy in.

3.2.3 Can you suggest metrics or indicators not already being used which would be useful to measure the success of intertidal and marine restoration or recovery projects?

It was noted that the marine environment is inherently difficult to measure and therefore a novel approach to quantify MNG could be needed.

Multiple respondents noted the potential use of Natural Capital (NC) accounting/ assessment to help measure project success and assess the wider ecosystem service benefits provided by any interventions at a site, or for elements of the NC approach to be incorporated into a more specific MNG metric tool. It was suggested that such a tool could be used to assess the site baseline, undertake an anticipated benefits calculation and then a realised benefits account to measure the project success. However, it is noted that currently a lack of evidence may prevent the robust implementation of such an approach.

Additional suggested approaches to monitoring project success were inclusion of eDNA assessment to consider the wider ecosystem benefits provided by a site e.g., for managed realignment do the interventions at a site increase fish use? Or the use of Good Environmental Status as defined by the Marine Directive, for which there are eleven descriptors that describe what the environment will look like when GES has been achieved.

Several respondents also highlighted the need to utilise established methods and data to inform any MNG approach, e.g., through Environmental Impact Assessments (EIAs) to establish baselines where data is limited, and to consider measurements which acknowledge the interconnectivity of marine and coastal environments, for example, water quality measurements could be useful to explore wider ecosystem improvements created by projects.

One respondent in particular cautioned the application of the BNG metric for use in MNG, suggesting it was already challenging when applied in a coastal context.

Few species-specific approaches were suggested within the responses but one focusing on seal disturbance (including arising from climate change) suggested measures such as bycatch, entanglement, mortality, phenology shifts and noise impacts on hearing could be built into any assessment on impact.

3.2.4 Strategic targets will need to consider appropriate spatial scales. Do you think that marine plan level in England could be an appropriate scale for marine Net Gain?

Respondents were asked to select an option and provide a written justification of their response. Figure 9 shows the responses.



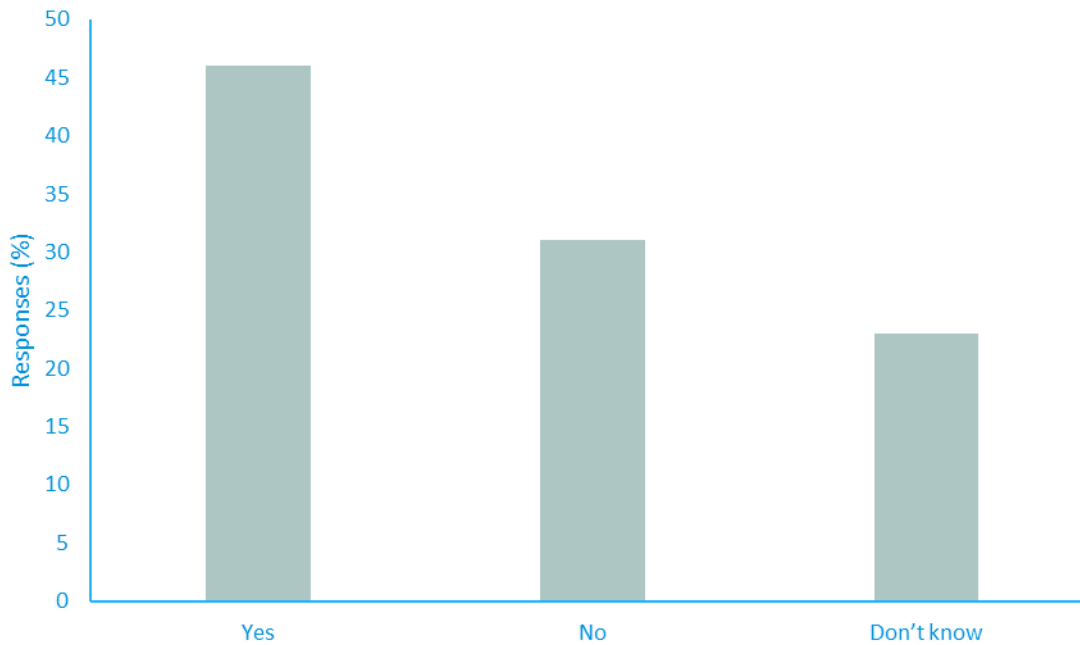


Figure 9. Stakeholder responses to the question: Do you think that marine plan level in England could be an appropriate scale for marine Net Gain?

Forty-six percent of responses agreed that marine plan level in England could be an appropriate scale for MNG; 31 % disagreed and 23 % were unsure.

For respondents that agreed, justification was given that marine plan regions provided a suitable starting point for MNG strategic targets but that such targets should also be governed by, and be relevant to, the ecology of the site to which any such gain is being applied. It was also raised that Offshore Wind Farm (OFW) developments tend to be grouped within marine plan regions e.g., Celtic Sea sites and those proposed for new floating OFW within the South West marine plan region. Strategic goals could therefore be tailored around developments happening within each marine plan region, and ensure MNG is being accounted for across all marine plan regions and across all developments within a region.

However, given the interconnectedness of the marine environment, it was suggested that a degree of flexibility may be required, especially for projects in close proximity to marine plan region boundaries e.g., an initiative just across a boundary may be more appropriate than one hundreds of miles away but still in the same marine plan area. In addition, it was noted that photo ID and satellite tagging demonstrate that highly mobile marine species use multiple marine plan regions, so whilst a marine plan region approach may be a good starting point, it will be necessary to bear in mind that some cross-boundary approaches may be required.

It was also highlighted that whilst proximity to the site of impact may be needed to ensure gains are delivered everywhere and not only in the most obvious locations, in some instances delivering gains for specifically impacted features or species may be more beneficial further afield, but that this should remain an exception.

Several respondents suggested the marine plan regions may be too large, covering huge geographic areas with a wide variety of habitats/species and different priorities for regions within those areas, and that it may be challenging to coordinate partners across the regions. It was suggested that spatial scales should be smaller and should look to collaborate with existing coastal partnerships to identify and fund priority actions. One respondent also suggested IFCA areas as an alternative and potentially more appropriate scale.

In contrast, some respondents suggested that MNG should consider all English regions and that England's marine ecosystems need to recover throughout its waters.

4. Conclusions and recommendations

The initial review and the call for evidence identified 709 projects of which 674 were being, or had been, undertaken within England.

The emphasis of the work was with consideration of MNG policy development in England. This resulted in an underrepresentation of projects within the devolved administrations. This is acknowledged as a limitation within this report, however, was not the focus of the call for evidence, and as a result, comparative analysis focused only on projects identified within England. It is, however, recommended that future work build on the existing database and develop a wider understanding of interventions being undertaken within the devolved administrations, to expand on existing knowledge of restoration, creation and enhancement techniques, and identify innovative methods that could also be applied to MNG.

In total, restoration projects targeting 25 types of habitat and species feature were captured within the call for evidence. Overall, of the projects identified, 70 % were pressure removal projects, linked with management authority actions delivered via statutory mechanisms, which predominantly focused on targeting shellfish, particularly in the East and North West marine plan regions. These measures also protect the associated shellfish habitat. Of the remaining projects, habitat creation interventions accounted for 19 % of those identified, restoration 9 % and enhancement 2 %. Of the habitat creation projects, saltmarsh creation accounted for 51 %. Interventions to create or restore saltmarsh occurred within most marine plan regions but most frequently within the South and South East regions. There were few projects identified targeting species such as marine mammals and migratory fish and of those the majority of projects were management authority actions.

To assess the potential supply of ongoing/ planned projects the spatial distribution of restoration interventions by project status was mapped against each marine plan region. Seventy six of the 709 projects had been completed at the time of the call for evidence (March 2023), with the majority of projects, 544 of the 709, currently underway. However, a large proportion of interventions underway were associated with management authority measures within MPAs. Only 62 currently underway were not associated with MPA management measures and only 13 planned, future, projects were identified during the call for evidence.

For underway projects, excluding MPA measures, the three predominant target habitats were saltmarsh, seagrass and native oyster, which accounted for 68 % of interventions. Other target features included artificial pools, marine mammals, mudflat, sand dunes and seabirds. Of the planned, future projects which have not yet commenced, the majority of projects (74 %) aimed to target mudflat, saltmarsh and seabirds.

One limitation of the current data was that the spatial extent of habitat interventions was largely missing from the call for evidence data, as a result the analysis has focused on the number of projects identified per marine plan region. Future work to more accurately map the location and spatial extent of habitat interventions will be key in order to link ongoing and future restoration with areas of identified potential (such as those identified through ReMeMaRe) to provide a linkage to the benefits or infer where multiple benefits might occur.

For the 138 projects within the call for evidence where spatial extent data had been provided a total of 25,113 ha of habitat restoration/ creation/ pressure reduction had been undertaken. The large majority, 20,400 ha, was associated with the Sussex Kelp Recovery Project, aiming to restore kelp forests through pressure reduction measures. There were few projects specifically targeting pressure reduction interventions on subtidal features, however it is acknowledged that any pressure reduction measures, as a result of fisheries or MPA measures, will by default also provide protection for habitats in associated areas. In total 15,034 km² of subtidal sediment is subject to pressure reduction as a result of fisheries or MPA measures. Subtidal sand receives the greatest protection by area across all marine plan regions, with subtidal mud the lowest.

In terms of both the number of creation and/ or restoration projects, and the total area restored/ created, saltmarsh, mudflat and lagoon habitats were the highest targeted features. Overall, on average, habitat creation/ restoration projects created/ restored 20.5 ha per project. As a crude extrapolation, based on the identified



planned projects and the average per-project creation/ restoration footprint, currently there are approximately 205 ha of planned habitat restoration/ creation projects, to be undertaken within English waters.

Next steps will involve agreeing a suitable basis for determining potential demands for net gain projects regionally. Alongside this, future work will also need to consider what is needed ecologically within each marine plan region to facilitate a strategic approach to restoration. This was outside of the scope of the current work but could be an important focus for future work through the Offshore Wind Evidence and Change Programme, as this understanding will be needed to achieve nature recovery and as such is considered as an important next step. Within this process, the issue of additionality will need to be considered, identifying the demand and needs that link with current government initiatives and obligations. Marrying this anticipated demand with potential future supply will also need to be a key consideration. Linking of current and future restoration interventions against existing initiatives, such as Shoreline Management Plans, River Basin Management Plans and Local Nature Recovery Strategies which have a marine element will be key in order to achieve this.

The top two challenges to restoration interventions highlighted by respondents were obtaining licences to undertake their restoration interventions and insufficient funding for the duration of the projects, including funding to support long-term monitoring and evaluation of success.

It is recognised that these problems are more widespread and go beyond MNG projects and will therefore need potential government intervention to ensure environmental targets can be realised. However, a number of potential options for overcoming these challenges. in the context of potential future MNG projects, were identified including:

- Securing funding either under obligation of the developer to pay for habitat works in order to satisfy net gain conditions or through creation of a potential for strategic, pooled funding for nature recovery;
- Using existing tools e.g., the Coastal Concordat to overcome licencing issues and to streamline the process; and
- Coordination between all organisations involved and appointment of a coordination lead role in the early stages of project development.

Further work to review such options and to develop approaches to facilitate restoration interventions within the remit of MNG will be required.

Alongside all future work, more specific consideration will be needed to consider how, and to what extent, industry could feasibly contribute towards any identified targets through BNG and MNG.



5. Abbreviations/Acronyms

BNG	Biodiversity Net Gain
CMS	Communications and Management of Sustainability
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
eDNA	environmental Deoxyribonucleic Acid
EIA	Environmental Impact Assessment
EUNIS	European University Information Systems
GDPR	General Data Protection Regulation
GES	Good Environmental Status
ID	Identity
IFCA	Inshore Fisheries and Conservation Authorities
LinkedIn	Business Social Networking Web Site
MCAA	Marine and Coastal Access Act 2009
MEEB	Measures of Equivalent Environmental Benefit
MMO	Marine Management Organisation
MNG	Marine Net Gain
MPA	Marine Protected Areas
NC	Natural Capital
NGO	Non-Governmental Organisation
OFW	Offshore Wind Farm
ReMEDIES	LIFE Recreation ReMEDIES
ReMeMaRe	REstore MEadows, MARshes and REefs
RSPB	Royal Society for the Protection of Birds
SNCBs	Statutory Nature Conservation Bodies
SUDG	Seabed User and Developer Group
T&F	Task and Finish
UK	United Kingdom



Appendices

Appendix A. Delivery options for strategic marine net gain: Call for evidence

Preface

Background

A Task and Finish Group has identified a number of strategic targets for marine Net Gain (MNG), that could be delivered by marine and coastal industries as part of the development process.

The Group comprises SUDG members, The Wildlife Trusts, RSPB, Natural England, The Crown Estate, Defra, supported by consultants ABPmer. It is made possible through funds provided by The Crown Estate via the Offshore Wind Evidence and Change Programme, a unique initiative that enables the gathering of data and evidence to support the sustainable development of offshore wind in the UK.

The primary aim of the work completed by the Group was to establish how net gain, and therefore funding from industry, could be targeted towards achieving meaningful and lasting benefits to conservation that would aid recovery and restoration of marine and coastal environments. The potential for this related to the scale of potential development by marine industries means that MNG could have a significant role to play in restoration. Strategic planning to maximise the impact of MNG delivery would be extremely valuable.

Work on identifying strategic targets involved collating evidence on the state of marine and coastal environments, through formal reporting mechanisms (e.g., the UK Marine Strategy) and consultation with knowledgeable and experienced stakeholders.

This work was invaluable in identifying where actions are needed, and the results have been used to identify potential strategic targets which the Group agreed will be of significant value to conservation. It also established which of these would be achievable within the limits of what industry can deliver, as some aspects, considered important for creating recovery, can only be delivered through legislation so are beyond the reach of industry. These potential strategic targets were used as the basis for further consultation to assess the level of agreement amongst stakeholders that these targets would be beneficial and achievable.

The output of this consultation was a widespread endorsement of the targets. The resulting work is fully reported [here](#)⁴. An important output of the work is its use by Defra to support the development of marine Net Gain (MNG) policy.

Request for evidence

The Task and Finish Group is now seeking a better understanding of how best to deliver the identified targets. While there is considerable experience and understanding on how projects to deliver restoration and recovery are being planned and delivered locally, it is not yet fully utilised to inform strategic net gain delivery. It was therefore agreed that gathering this information could be of enormous value in providing recommendations on the delivery of the strategic targets, further ensuring MNG would be of real significance.

Additionally, examination of potential approaches and funding mechanisms already being used will allow for exploration of possible delivery approaches for MNG by industry, including partnerships and funding.

⁴ <https://www.marinedataexchange.co.uk/details/3513/2021-strategic-net-gain-task-and-finish-group-offshore-wind-evidence-and-change-programme-strategic-net-gain-targets-for-coastal-and-marine-environments/summary>



On this basis, the Offshore Wind Evidence and Change Programme has approved funding for further work to examine existing approaches and gain stakeholders' views on delivery options for strategic net gain targets. The outputs of this additional work will formulate recommendations for the delivery of the strategic targets that could be used by industry to deliver MNG, and by Defra to support their work developing policy and procedures for marine MNG.

We would therefore be very grateful for your involvement and responses to this call for evidence to ensure we have the widest understanding possible of what is going on and, in some ways more importantly, how this is being done and how industry could support these initiatives through their own commitment to delivering MNG.

Peter Barham, Chair, Strategic Targets Task and Finish Group

Review of existing restoration initiatives

The Task and Finish Group has collected evidence to support their understanding of current interventions relevant to marine and intertidal Net Gain within the UK. This includes existing projects seeking to directly restore or re-establish habitat and species features, as well as projects that seek to reduce pressures on such features. The evidence has been collated within a database, linked below.

We would appreciate if you could review and update the data on known projects within the database, and/or add details on projects not yet captured, to support our knowledge of existing MNG projects and feed into our wider work aiming to analyse existing recovery and restoration projects and proposals.

Please click the following link to review and update the evidence database⁵:

>> Go to evidence database <<

Once you have finished, *please return to this survey* to answer some additional, broader questions on potential delivery options for marine net gain. In particular, the call for evidence seeks further information on the success of completed projects, any key challenges and how they were overcome, and any thoughts around indicators that might be used to assess the success of future projects. There is also a question concerning the geographic scales over which marine net gain should be addressed.

These additional questions should take approximately five minutes to complete.

⁵ Call for evidence closed May 2023 - Database no longer available.



Call for evidence database template

Project Name	Project description	Location	Site coordinates	Site area (ha)	Project type	Project status	Project start date
The name of the project	Brief description of the project	Project location	Coordinates for central point within the project boundary	Total site extent. Please convert to Ha where possible or specify units	Creation/ restoration/ enhancement/ pressure removal* Please select one from the drop-down list. *e.g., removal of; fishing pressures, recreational disturbance etc.	Planned/underway/ complete. Please select one from the drop-down list	Project start date or anticipated start date if not yet underway
Free text	Free text	Free text	Free text	Free text	Drop-down list Creation Restoration Enhancement Pressure removal	Drop-down list Planned Underway Complete	Free text



Project end date (if applicable)	Target marine features	Key drivers	Links to regional/local priorities	Lead organisation	Delivery organisation(s)	Funding partner(s)
Project end date or anticipated end date if not yet completed	Types of habitats/species that the project aims to create/restore/enhance	Key reason for the project being undertaken. Please select one from the drop-down list.	Are there local/ regional drivers that have informed your project. If so, what? E.g., Local nature recovery strategy; local economic plans; industrial strategy	The overall lead project organisation	Organisations involved in project delivery in addition to the lead organisation	Organisations providing finance for the project/ funding mechanisms
Free text	Free text	Drop-down list Project mitigation/compensation Management authority actions within MPAs Management authority actions outside of MPAs Voluntary initiative Research Other (please specify)	Free text	Free text	Free text	Free text

Total project cost	Delivery cost	Monitoring and maintenance costs	Project outcomes (or expected outcomes)	Monitoring and evaluation	Criteria used to measure success	Source	Additional information
Total project cost or predicted cost if not yet started	Costs to deliver the project	Costs to monitor and maintain the works	What did the project achieve, or does it hope to achieve?	Types of monitoring/ evaluation undertaken to evaluate the project success – post project appraisal	The metrics/indicators used to measure the success of the project	Please provide a hyperlink to the project page	Please provide any additional relevant information
Free text	Free text	Free text	Free text	Free text	Free text	Free text	Free text



The following questions look to gain a broader view on potential delivery options for strategic marine and intertidal Net Gain.

Thinking about completed projects you are familiar with:

Q – How successful was the evaluation process, and what lessons were learnt as part of the evaluation?

Free text response

Q – What were the key challenges for project delivery, and how were they overcome?

Free text response

Q – Can you suggest metrics or indicators not already being used which would be useful to measure the success of intertidal and marine restoration or recovery projects?

Free text response

Q – Strategic targets will need to consider appropriate spatial scales. Do you think that marine plan level in England could be an appropriate scale for marine Net Gain?

- Yes
- No
- Please explain your reasoning - free text

Q – Would you be happy for the T&F Group to contact you further regarding the information you have provided*?

** Contact details will not be shared to any 3rd parties and will be managed in line with strict GDPR policies. Information will only be used by T&F Group members to contact you to discuss, in further detail, your listed project to inform the groups understanding of delivery mechanisms for existing restoration and recovery projects.*

- Yes
- No
- If yes, please provide the Project Name and Your contact details below.



Appendix B. Existing recovery and restoration projects database

Clicking the link below will open the 'attachment', allowing the embedded data sheet to be opened (requires Adobe Acrobat Reader v.008 or above).

Financial information has been removed from the data sheet for data protection purposes.

Click here for embedded data sheet:

- [StrategicMNG_Evidencebase_November2023.xlsx](#)



Appendix C. Delivery options for strategic marine net gain: Second call for evidence summary of responses: potential mechanisms and priorities for strategic MNG delivery





Offshore
Wind Evidence
+ Change
Programme

Delivery Options for Strategic Marine Net Gain

Second call for evidence summary of responses:
potential mechanisms and priorities for strategic MNG delivery

Executive Summary

The Task and Finish (T&F) Group, funded by the Offshore Wind Evidence and Change Programme, completed its first report in October 2021, setting out a number of strategic targets for marine and intertidal net gain. These targets were widely consulted on, and well supported by a range of marine stakeholders. Building on the outcomes from the first phase of work, the T&F Group is working to develop potential delivery options for strategic Marine Net Gain (MNG), with the aim of identifying and agreeing recommendations for more local delivery of strategic net gain targets.

This report summarises the results of a second call for evidence, which aimed to gain a broader view from a range of stakeholders on potential delivery options for strategic marine and intertidal net gain. This follows on from the first call for evidence conducted by the T&F Group in February 2023, which sought information to undertake an analysis of existing recovery and restoration projects and proposals (including pressure removal/reduction projects) at a national and local level. The review and the first call for evidence identified 709 recovery and restoration projects. In total, restoration projects targeting 25 types of habitat and species feature were captured within the call for evidence.

The outputs presented within this report provide a summary of stakeholder views on more local delivery of strategic net gain targets for the improvement and recovery/restoration of marine and intertidal environment, aiming to agree a suitable basis for determining potential demands for net gain projects regionally.

This second call for evidence generated responses from a wide range of sectors including academia, Government agencies and departments, local authorities, NGOs/ charities, consultancies and industry. Analysis of responses from stakeholders has resulted in the identification of a number of key priorities for potential MNG restoration/recovery options. It has also identified several key limitations to current restoration initiatives, established potential ecological or nature recovery priorities within the marine environment to inform MNG prioritisation, and has considered potential approaches to best facilitate the delivery of strategic MNG.



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Document Control

Version	Author	Approved	Date	Description of change
1.0	Task and Finish Group	Task and Finish Group (Chair)	02/11/2023	Approved for issue by Task and Finish Group.



1. Introduction

There is increasing recognition of the need for greater action to restore our marine environment in the face of a continued decline in marine biodiversity. Net gain has been identified as a potentially important mechanism that can contribute to halting and reversing marine biodiversity loss. From January 2024, just over two years following royal assent of the Environment Act, it will be mandatory for all in scope developments in the terrestrial and intertidal environment to deliver a minimum biodiversity net gain of 10%. Although there is no formal net gain policy as yet for the marine environment, Government has committed to developing such a policy, and has held a first consultation on the principles of marine net gain (MNG).

The Task and Finish (T&F) Group, funded by the Offshore Wind Evidence and Change Programme, completed its first report in October 2021, setting out strategic targets for marine and intertidal net gain. These targets were widely consulted on, and well supported by a range of marine stakeholders. In addition, the T&F Group set out their assumptions and recommendations for further consideration in the development of a policy for MNG (The Crown Estate, 2021¹).

Building on the outcomes from the first phase of work, the T&F Group is now working to develop potential delivery options to inform delivery of strategic MNG. The aim of this project is to identify and provide recommendations on possible options for delivery of strategic net gain targets, including more local mechanisms, which can be used by offshore wind and other marine industry sectors to help prepare for any future MNG requirements. ABPmer has been commissioned to support the work of the T&F Group.

This report summarises the results of a second call for evidence, which aimed to gain a broader view from a range of stakeholders on potential delivery options for strategic marine and intertidal net gain. This follows on from the first call for evidence conducted by the T&F Group in February 2023, which sought information to undertake an analysis of existing recovery and restoration projects and proposals (including pressure removal/reduction projects) at a national and local level.

2. Call for evidence

The second call for evidence was launched on 16 August 2023 and ran for three weeks. It was hosted on SurveyMonkey and publicised through CMS news, and via LinkedIn and T&F Group member networks.

Respondents were invited to complete a questionnaire aiming to gain a view on more local delivery of strategic net gain targets for the improvement and recovery/restoration of marine and intertidal environments. A summary of the questions contained within the questionnaire are below, with the full questionnaire provided in Appendix A:

1. The findings from the first call for evidence identified four key limitations to current restoration initiatives. How would you rank the four limitations in terms of their significance in delivering ecological needs or priorities?
2. Are there any other limitations to current restoration initiatives you would add to this list, and where would you rank them?

¹ The Crown Estate. 2021. Strategic Net Gain Task and Finish Group, Offshore Wind Evidence and Change Programme, Strategic Net Gain Targets for Coastal and Marine Environments. Online. Available here: <https://www.marinedataexchange.co.uk/details/3513/2021-strategic-net-gain-task-and-finish-group-offshore-wind-evidence-and-change-programme-strategic-net-gain-targets-for-coastal-and-marine-environments/summary>



3. What further work do you feel could be required to address these limitations as part of the development of MNG?
4. As part of a strategic approach to MNG, it may be helpful to take account of ecological or nature recovery priorities in the marine environment. In your view, what are the key national restoration or nature recovery needs in the marine environment?
5. During the first call for evidence, stakeholders identified a preference for applying MNG at a marine plan region level. How might the ecological priorities in each marine plan region (or other regional level) be identified?
6. During the first project the Strategic Net Gain Task and Finish Group (T&F Group) identified a number of strategic MNG targets. Which measures do you think industry might be able to contribute to or implement to support delivery of MNG targets, given appropriate policy?
7. The T&F Group has identified several key information requirements which might be needed to inform strategic MNG delivery. Is there anything else you consider would be critical to support successful delivery of strategic MNG?
8. A flexible approach may be required to facilitate the delivery of strategic MNG, do you agree or disagree that MNG should:
 - Seek specifically to address a project’s residual impacts on the impacted habitat/species features (i.e., like-for-like)
 - Allow some trading between habitats and/or features
 - Allow some trading between species
 - Allow trading across all ecological elements.
9. Some interventions may look to use novel approaches to achieve restoration outcomes. However, it is recognised that regulation often requires some level of certainty of anticipated project results. How might a strategic approach be developed to facilitate innovation in restoration and enhancement projects?
10. Would a contributions-based approach or central/regional fund be best to facilitate delivery of strategic MNG targets?
11. How do you think a central fund-based approach would be best used to support strategic MNG delivery?
12. Would your organisation/s like to be involved in providing information for MNG planning? If yes, in what capacity would your organisation/s like to be involved?

The final question aimed to identify what sector the respondent works in, to facilitate the comparison of perceived priority actions and targets across different sectors. Respondents could select one option from the following drop-down list of sectors:

- 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)



3. Results

The survey generated a total of 54 responses across a wide range of industries/ sectors, a breakdown of which is shown in Figure 1.

Four responses came from ‘Other’ sectors, these represented the defence sector, a dredging and offshore renewables company, and nature and coastal partnerships.

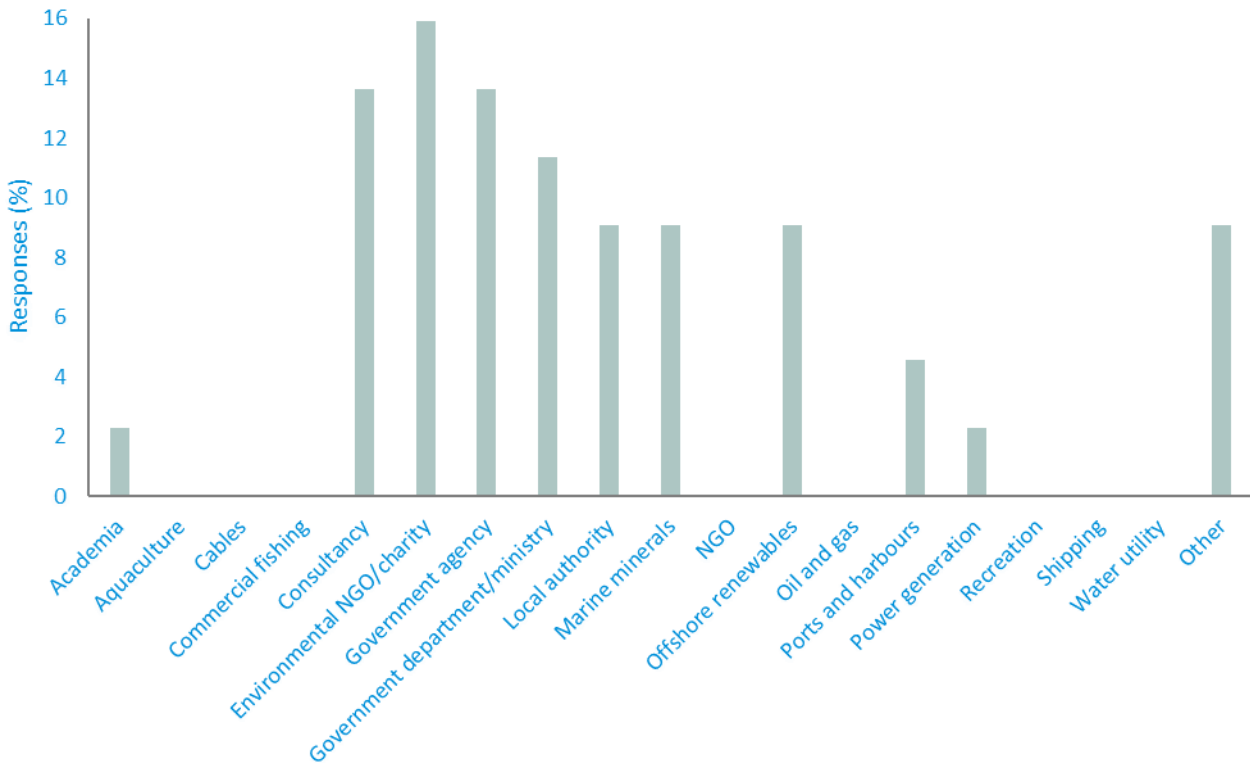


Figure 1. Percentage of responses from each sector

3.1 Key limitations to current restoration initiatives

The findings from the first call for evidence identified four key limitations to current restoration initiatives:

- Complexity of requirements within the marine licensing system;
- Limited availability of funding for restoration/recovery projects (particularly long-term funding);
- Limited baseline data against which to measure success of project interventions; and
- Competing demands for space (particularly coastal space).

In the second call for evidence, respondents were asked to rank these limitations, with respect to their significance in delivering ecological priorities. Figure 2 provides a summary of responses.



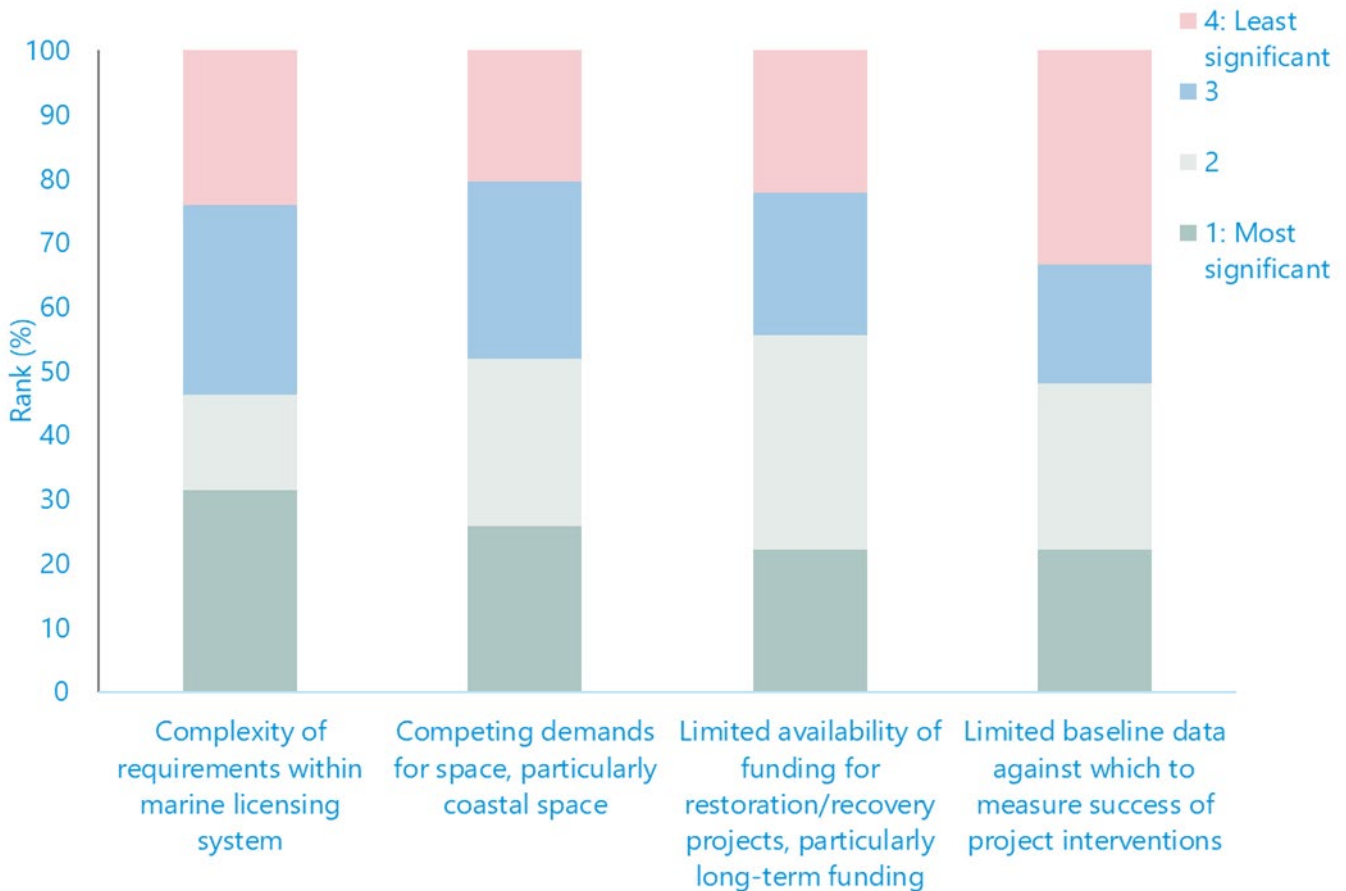


Figure 2. Rank of the four key limitations identified in terms of their significance in delivering ecological priorities

Complexity of requirements within the marine licensing system was most commonly ranked as the most significant limitation to current restoration initiatives, closely followed by competing demands for space particularly at the coast. Limited baseline data against which to measure success of project interventions was generally considered the least significant issue. However, the results do not show a statistically significant outcome and so it should be noted that all appear to be recognised as limiting factors.

Respondents also identified several other factors they considered might be potentially limiting to future net gain initiatives. The most common of these was a lack of strategic coordination between Biodiversity Net Gain (BNG) in the intertidal and MNG, and the need for a prioritised list of 'shovel-ready' projects, both 31% of responses respectively. Twenty-nine percent of respondents also identified the lack of MNG strategy, guidance or qualification process as a key limitation, and indicated the need for the implementation of a clear legal framework and political prioritisation to support MNG.

Other commonly occurring responses included; barriers to/the lack of research especially with respect to novel approaches and assessing the effectiveness of restoration actions (24%), resource constraints within Statutory Nature Conservation Bodies (SNCBs) and government to provide expertise, guidance and support engagement (21%), lack of and/or difficulties with stakeholder buy-in and establishment of partnerships to support BNG/MNG delivery (12%), and application of pressure removal actions within the marine environment including, pre-existing pressures preventing recovery, a lack of understanding of key pressures, linking removal of pressures to recovery and a lack of policy drivers for pressure removal (12%).

To address these limitations, 50% of respondents highlighted the need for further research and monitoring, in particular to define current environmental conditions, but also to:



- Develop an agreed historic baseline;
- Review the availability of existing data;
- Assess the success of restoration techniques;
- Research innovative restoration techniques;
- Identify pressures and pressure reduction mechanisms;
- Better assess species population requirements in terms of both space and resource; and
- Evaluate restoration benefits.

It was also felt that a more simplified/ streamlined licensing process or increased flexibility of consenting for restoration initiatives would support implementation. In addition, the development of a statutory MNG system, including the development of government guidance, definition of 'gain' for MNG, details on restoration priorities and linkages between BNG and MNG, to support the earlier limitations identified by respondents, were suggested.

Spatial planning to support more strategic application and equitable allocation of restoration space was also highlighted as a way to address some limitations.

Funding to enable longer-term monitoring or to support existing projects (e.g., Restoring Meadow, Marsh and Reef (ReMeMaRe)) and other mechanisms including coastal partnerships, was suggested to support and co-ordinate initiatives and also funding to provide greater staff resource to government departments and SNCBs to facilitate the implementation of MNG and production of the guidance indicated above.

3.2 Ecological or nature recovery priorities in the marine environment

Existing initiatives which respondents cited as being useful mechanisms to define targets and help to provide a prioritisation for nature recovery in the UK included Good Environmental Status (GES) reporting targets, using UK Marine Strategy (UKMS) indicators to demonstrate linkages to failing status indicators, and reviewing and refreshing regional marine plans in order to account for the current status of each UK marine region and to identify ecological sensitivities which might be addressed by a regional level approach to environmental enhancement.

Recovery/enhancement of Marine Protected Area (MPA) interest features to favourable conservation status was also identified by multiple respondents. Correct management of existing MPAs was suggested as a high priority, ensuring that existing MPAs are in favourable condition and are appropriately managed and monitored, in addition to the designation of more MPAs/ Highly Protected Marine Areas (HPMAs).

Additional research actions to identify the most sensitive existing habitats, (habitats at the greatest risk or those with the most severe degradation) were also suggested as actions which could help develop methods of prioritising certain nature recovery initiatives. Respondents also noted that habitats which are most at risk from climate change, in particular coastal and intertidal habitats, should be a focus and that MNG should account for the broader objectives of mitigating the effects of climate change.

Priorities identified by respondents included:

- Recovery of declining seabird populations, in particular species at greatest risk from Highly Pathogenic Avian Influenza (HPAI) and pressures associated with offshore energy;
- Restoration and recovery of transitional coastal habitats;
- Active restoration of seagrass and saltmarsh;
- Improving other coastal habitats such as kelp, rocky shores and sediments;
- Protection, restoration and recovery of biogenic reefs (oysters, serpulid, *Modiolus*), particularly where they form on sedimentary habitats. Native oyster in particular was noted by multiple respondents;



- Resilience in marine mammal populations;
- Remove pressure on irreplaceable subtidal marine habitats, e.g., sandbanks, Sea Pen habitats;
- Recovery of inshore fish populations, essential fish habitats and forage fish species;
- Restoration and recovery of migratory fish (shad, smelt, sturgeon and salmon (particularly at risk of climate change));
- Removal of invasive species;
- Reduce and eliminate marine pollution - eliminate outflow of sewage and other pollution; and
- Improvement of water quality.

During the first call for evidence, stakeholders identified a preference for applying MNG at a marine plan region level. As a result, during the current survey respondents were asked how ecological priorities might be identified for each marine plan region.

Survey respondents felt that urgent resource should be allocated to identifying regional priorities/ ecological needs for MNG and that a regional approach should be delivered from the outset to ensure proportionate gains in all regions.

Respondents identified a wide range of mechanisms that could be used to inform regional priorities. Stakeholder engagement (including the public, academics, NGOs and relevant public bodies) was highlighted as a key mechanism, including through existing forums such as coastal partnerships or through the marine element of Local Nature Recovery Strategies (LNRS). To achieve a regional approach there was general consensus that local partners and delivery groups, not just government bodies, should be included within the engagement process to establish potential sites and priorities. It was also suggested that Inshore Fisheries and Conservation Authorities (IFCAs) should be involved within the process, to help integrate fishing into assessments to consider wider incidental environmental impacts, including displacement and cumulative effects.

The use of existing data and assessments (such as from the UKMS, Water Framework Directive (WFD) and MPA condition assessments) to inform priorities was also frequently cited, as well as building on existing programmes to identify restoration/recovery opportunities and prioritisation processes (e.g., ReMeMaRe and Marine Restoration Potential (MaRePo)). It was also felt that as part of the review process the cost and technical feasibility, related to any suggested longlist of opportunities, should be considered to further refine and prioritise regional opportunities, and that guidance on suitable consenting processes and methodologies should be defined for those prioritised options.

Marine planning was also identified as a potentially useful mechanism through which regional priorities could be identified and safeguarded through marine plan policies, with multiple respondents indicating the need for clear and coherent zonation of the seabed for all users. Some respondents suggested that natural capital approaches could help to prioritise interventions to maximise welfare benefits. In addition, it was suggested that climate-related pressures should also be considered to ensure long-term suitability of prioritised options.

One respondent suggested that the T&F Group could be well placed to begin the initial identification/prioritisation work, due to the wide-ranging stakeholder membership which includes industry, government, SNCBs and eNGOs. Another suggested that Regional Stakeholder Groups (RSGs), as developed to gather the evidence underpinning Marine Conservation Zone (MCZ) designations, should be re-engaged. They felt that RSGs had been particularly effective at representing all key stakeholder interests, were responsible for making the MCZ recommendations, working through the associated issues, and communicating with the local groups upon which the recommendations were developed.

3.3 Strategic MNG delivery

During the first project the Strategic Net Gain T&F Group identified a number of strategic MNG targets, including measures to:



- Restore and/ or create intertidal/ near coastal habitats, including characterising species (e.g., mudflat/ sandflat, saltmarsh/ reedbed, seagrass, native oyster, kelp);
- Restore offshore habitats (e.g., native oyster reef, Modiolus, serpulid reef, subtidal sands, muds and gravels);
- Support and restore fish populations;
- Support populations of birds;
- Support populations of marine mammals; and
- Reduce pressures.

Respondents were asked to identify which measures they felt industry might be able to contribute to, or implement, to support delivery of MNG targets, given appropriate policy.

Measures to restore intertidal or near coastal habitats were considered most likely for industry to contribute to or implement to support delivery of MNG targets, closely followed by measures to restore offshore habitats. Support of marine mammals and bird populations were considered least likely (Figure 3).

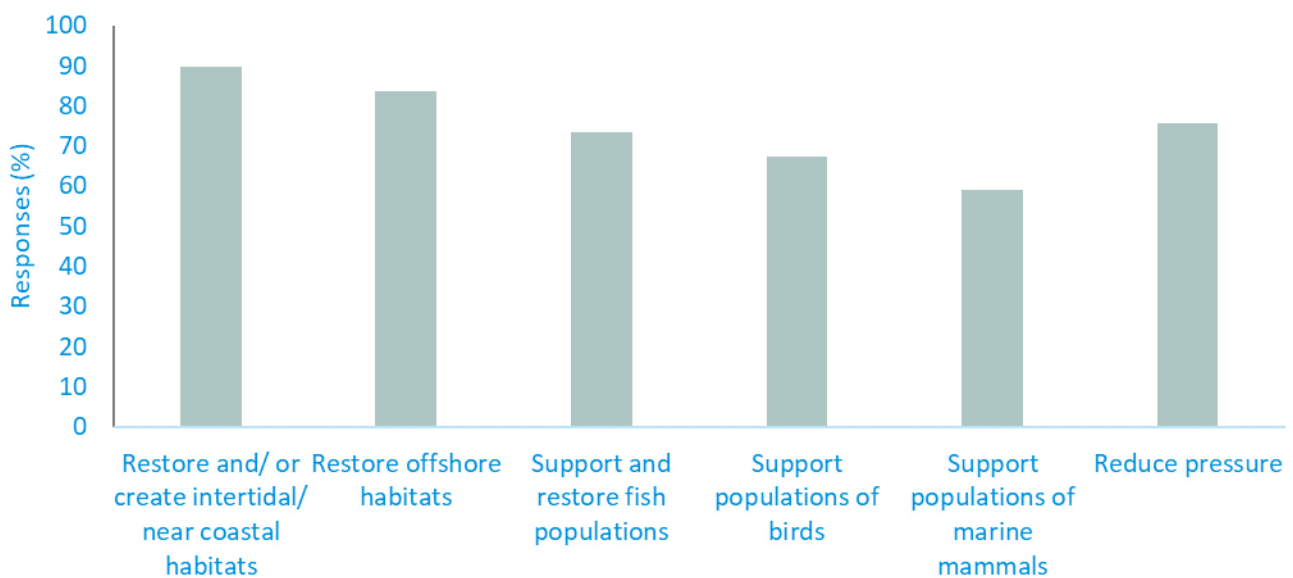


Figure 3. Measures respondents felt industry might be able to contribute to, or implement, to support delivery of MNG targets

In general, respondents agreed that nearshore habitat restoration is the easiest and most obvious contribution for industry to implement as part of a MNG system, due to existing knowledge of known restoration techniques. However, most agreed that it is critical to not exclude other options to support wider marine recovery. To achieve this, it was felt that a specific MNG system would need to be developed, as replicating the existing terrestrial/ intertidal BNG system would not sufficiently deliver resilience in our seas. Primarily, respondents felt that embedding species recovery within the system instead of focusing solely on habitat restoration would be key to deliver meaningful benefits.

To support the delivery of nearshore habitat creation/ restoration respondents suggested that restoration and biodiversity enhancement efforts at project sites could be implemented by industry. In addition, industry could also support existing initiatives such as ReMeMaRe or support academic institutes and citizen science groups to develop new areas of habitat e.g., placing cultch or planting seagrass. It was also suggested that linking oyster reef or kelp restoration with for example, nutrient neutrality policy or MNG policy in a regulatory manner could unlock large-scale funding from industry.



However, one respondent commented that intertidal interventions should not be a feature of MNG as they are already captured under BNG and as such would detract from marine recovery.

Respondents who work for offshore industries acknowledged that active creation/ restoration of habitats may be more limited, especially for those habitats which are characterised by low species biodiversity and density, such as sandbanks. However, some suggested initiatives included experimenting with the re-establishment of offshore oyster reefs and contributing to research for the implementation of horse mussel restoration. Pilot projects such as suspended habitats including seaweed and aquaculture habitats, artificial reefs and infrastructure design which encourages native species colonisation were also suggested.

The installation of offshore infrastructure such as scour protection around turbines, armouring for cables was also considered to provide an alternative solution for offshore restoration e.g., through the creation of artificial reef. However, wider discussions on artificial reef as an MNG option have been mixed due to the implications when removing structures at the end of a project lifecycle, and it is acknowledged that OSPAR requires removal of manmade structures. Despite this it was suggested that research should be completed to clearly show whether the leaving of in situ lower structures can provide benefits, or even leave new habitats undisturbed.

Active methods to support fish populations largely focused on the active creation/ restoration of spawning grounds and nursery habitat (seagrass, biogenic reef) or inclusion of measures as part of the development infrastructure e.g., artificial reef, cod 'hotels'. It was also suggested that industry could work with local groups and business to support grass-root projects, such as lobster hatcheries.

Additional options included supporting and funding research initiatives such as bycatch reduction, sustainable fisheries methods and diversification of the fisheries sector.

Similar research considerations were also proposed for marine mammal interventions; for example, improving the understanding of fisheries bycatch rates and causes, and in funding more ecologically suitable monitoring protocols and gear types (smart trawl etc.). In addition, research to better understand how and when marine mammals use different marine areas within their individual ranges and research into reducing underwater noise. In addition, restoration or creation of habitats that offer protection for marine mammals, including supporting fish population restoration as a prey species were suggested.

Possible options proposed for seabird interventions included directly incorporating measures for birds (and also fish, e.g., cod pipes, nesting platforms) as part of development infrastructure. Predator control/eradication campaigns, the creation of new breeding or foraging habitat, enhancing the availability of seabird prey i.e., supporting fish populations and also reducing pressures from invasive non-native species at seabird colonies, were also suggested. Suggested research options included improving knowledge on seabird bycatch and seabird use of artificial nesting sites.

Many of the pressure reduction options suggested by respondents were linked to reducing fishing pressure and promoting fishery exclusion zones, but also included suggestions such as paying fishermen a fee to patrol MPAs or buying fishing quota for the purpose of not extracting it. However, as was highlighted in the first T&F Group report (The Crown Estate, 2021²), and by a number of respondents, it will not be within industries' power to implement initiatives which require influence over other sectors or look to reduce ongoing pressures caused by other industries. Therefore, pressure reduction will not be in the power of industry alone to deliver but will require strong Government leadership and coordination across sectors. To address this a number of respondents suggested that appropriate marine spatial planning of restoration (and its subsequent protection/management) would be needed.

² The Crown Estate. 2021. Strategic Net Gain Task and Finish Group, Offshore Wind Evidence and Change Programme, Strategic Net Gain Targets for Coastal and Marine Environments. Online. Available here: <https://www.marinedataexchange.co.uk/details/3513/2021-strategic-net-gain-task-and-finish-group-offshore-wind-evidence-and-change-programme-strategic-net-gain-targets-for-coastal-and-marine-environments/summary>



In relation to marine aggregate extraction in particular, a number of suggestions were presented including, limiting the dredge footprint through use of active dredge zones, promoting natural restoration by relinquishing non-productive and/ or worked-out seabed areas after aggregate extraction, or offering pressure reduction projects when relinquishing aggregate leases if mechanisms were available to limit fishing pressure.

It was also noted that in relation to offshore wind development, windfarm arrays reduce pressure from mobile fisheries with noted change in activity for mobile gear. It was suggested that the offshore wind industry could provide access/collaborate on opportunities to better understand (and potentially quantify) these changes over time.

A significant proportion of respondents (38%) suggested that a strategic fund would be the best way for industry to be able to facilitate MNG interventions and contribute towards strategic marine restoration. It was suggested that such a fund would be coordinated by government and could then support things like countryside stewardship practices or establish and support a marine equivalent, fund local organisations delivering existing net gain projects, contribute to government or NGO-identified and led projects, or be used to purchase areas of marine reserves.

If such a method was developed, then financial contributions to the fund would need to be proportionate to the residual impact of a development or sectoral activity but could be used to fund all types of measures. It was also suggested that a portion of the contributed funds should be used for survey, research and proof-of-concept projects to expand restoration and recovery capabilities.

The T&F Group has previously identified several key information requirements to support strategic delivery of MNG interventions:

- Identification of suitable areas for MNG delivery at a regional scale;
- Identification of specific projects (location, site area and target habitat feature within the marine plan region);
- Identification of habitat or species needs within the marine plan region;
- Creation of a prioritised list of projects to which industry can contribute (at a regional or local scale); and
- Creation of a 'shovel ready' list of projects (within a region) to which industry can contribute (this may mean projects which are fully planned and consented)

Where survey respondents commented, they supported these priorities. Respondents also identified a range of wider information needs which they considered would be critical to support successful delivery of strategic MNG. Responses related to planning and delivering MNG interventions, as well as broader aspects of MNG.

The identification of the role of government and government bodies in supporting MNG was identified as particularly important, as was clarification on the statutory basis for MNG and how this will generate funds to deliver MNG. Alongside clarification on the statutory basis for MNG, the development of a metric or tool to calculate MNG was indicated to allow transparent assessment of MNG delivery. However, respondents indicated that such a tool needs to be user-friendly but also adaptable to provide implementation options suited to different scenarios.

It was noted that it would be helpful to have clear guidance around MNG, including on interventions (what will and will not count as MNG measures, trading rules, and implications for MNG at the end of life for marine infrastructure/ decommissioning), how collaboration amongst developers might be facilitated, what the key barriers to delivery might be and how these might be overcome, monitoring requirements, and the issue of additionality in the context of the UK MPA network. The identification of potential delivery partners to facilitate collaboration for MNG delivery was also raised.

It was also highlighted that guidance and consideration of a strategic approach beyond individual marine plan areas and across administrations, and potentially between neighbouring countries, will be needed. This is particularly relevant for offshore industries where developments may extend across these boundaries. It was



suggested by one respondent that MNG guidance may need to align with OSPAR requirements/drivers so that there are common, cross-border objectives.

Additional research needs were again highlighted as an evidence gap required to support MNG, especially with regards to offshore delivery options. Research into novel techniques e.g., green gravel kelp restoration and the production of more restoration handbooks, including one for offshore developments, was suggested.

To facilitate the strategic delivery of MNG a flexible approach may be required with regards to trading between habitats and species; respondents were asked to assess to what level trading between habitats or species should be considered (Figure 4).

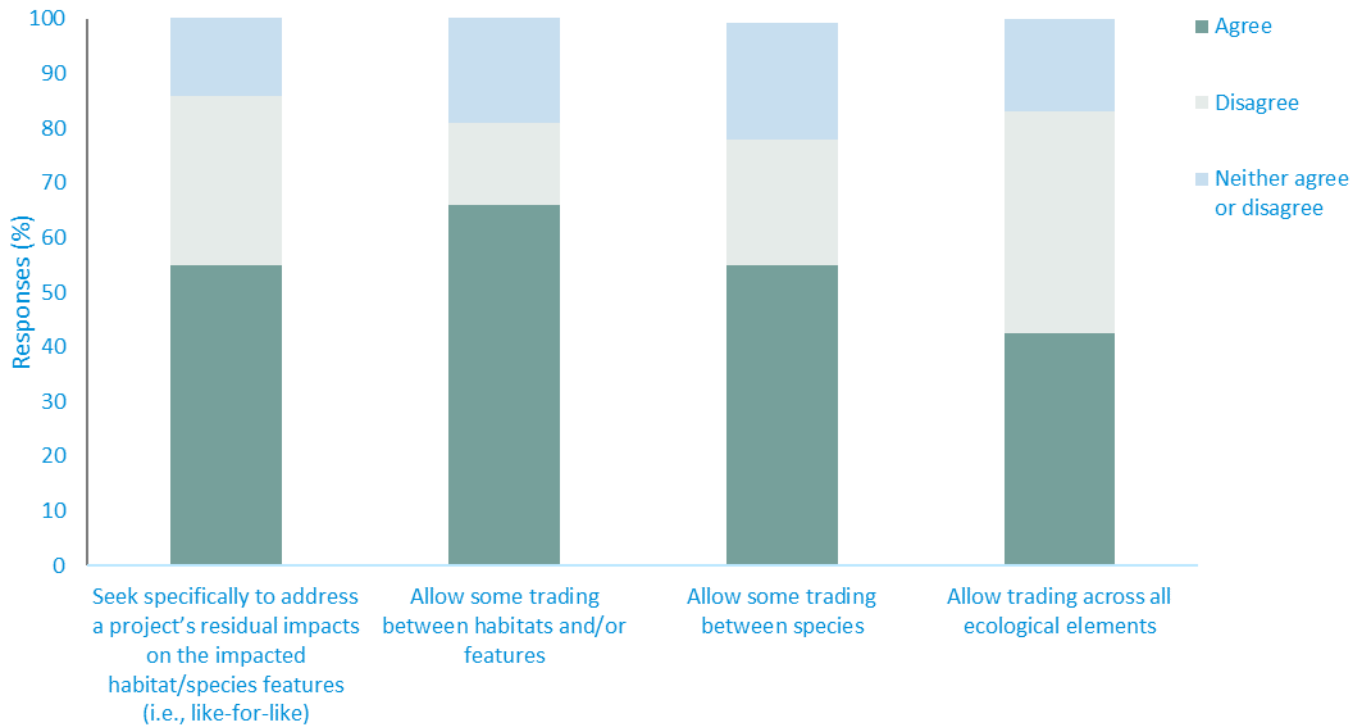


Figure 4. Respondents views on the level trading that should be considered between habitats or species in relation to MNG

Most respondents felt that MNG should allow some trading between habitats and/or features and between species, however the majority also agreed that projects should specifically look to address the residual impacts on the impacted habitat/ species where such options are possible. However, one respondent did caution the approach and suggested that trading between species and habitats should be informed by an in-depth knowledge of both and where improvements should be focused. A hierarchical process to select the appropriate delivery approach was suggested.

One respondent raised that residual project impacts should have already been addressed through compensation and as such net gain should not be subject to the same restrictions. This would therefore provide greater flexibility around potential MNG options and would allow for developers to use innovative approaches and not be constrained by the marine licencing process, or by a lack of evidence that the proposed measure would work.

There was disagreement between respondents as to whether trading across all ecological elements should be allowed, with approximately 40% agreeing, 42% disagreeing and 18% neither agreeing nor disagreeing. One respondent elaborated further suggesting that MNG should only be applied across ecosystems within the same environment, i.e., impacts from marine developments should only be delivered in marine ecosystems, and intertidal/coastal developments should only be delivered in coastal ecosystems.

It was noted, by more than one respondent, that there are likely to be some ecological elements that are simply too different/ unique to be traded and that guidance and principles will be required as policy develops to clearly



define such instances. In addition, in order to determine the appropriateness of such measures a review of regional policy should be completed during which stakeholder engagement/ consultation should be undertaken to ensure appropriate and deliverable measures and metrics are developed.

Finally, two additional approaches were suggested by respondents including the use of pressure reduction measures as an option to facilitate MNG and the allocation of protected areas.

The T&F Group acknowledge that some interventions may look to use novel approaches to achieve restoration outcomes. However, it is recognised that regulation often requires some level of certainty of anticipated project results. Respondents were therefore asked to consider how an approach might be developed to facilitate innovation in restoration and enhancement projects, if such interventions were to be incorporated within a system of MNG.

Respondents identified several key mechanisms through which delivery risks associated with novel restoration/recovery interventions might be managed. Many respondents suggested that research and innovation should be a specific component of any system of MNG. This might be funded by developer contributions within a strategic approach to MNG, with a set proportion of MNG monies directed towards novel restoration/recovery interventions, i.e., projects which are not 'shovel ready' but more 'proof of concept', with the remaining proportion being used to support more established approaches. One respondent suggested that 40% of financial contributions should be proportioned for innovation and research, whilst another suggested a limit of 25% so that there is certainty for some MNG being delivered.

Some respondents suggested that risk could be factored into MNG calculations to allow some capacity for a project being unsuccessful. However, if innovative approaches are successful (proven over sufficient temporal and spatial scale), a process could be established for some form of MNG banking/future offset. In contrast, others suggested that initially there should be an acceptance of risk, with no large penalties, which might act as a deterrent for practitioners. This would enable learning and encourage innovative techniques which might not otherwise be considered. It was suggested that specific marine locations/ areas could be set aside to provide opportunities to develop thinking and new approaches.

Adaptive management (or survey, deploy, monitor) was also recognised as a very important mechanism for ensuring that learning could take place notwithstanding uncertainty. It was further suggested that such novel interventions might be trialled at small scale and then built up, and that risky projects should not be progressed within MPAs. One respondent suggested that there should only be limited application of MNG within MPAs and in particular no bioengineering projects. Only pressure reduction measures should be undertaken within MPAs (offshore) and only providing assessments are undertaken and confirm that measures taken forward will have no unintended consequences e.g., fisheries displacement.

It was felt that a more explicit framework might need to be established in relation to innovative approaches, in order to log and monitor specific outcomes, including potentially specific monitoring and reporting requirements, primarily so that learnings from such initiatives, both positive and negative, are evidenced and shared between practitioners. Thus, though there will be a requirement for a range of pilots and trials, these will need to be strictly regulated and safeguards put in place to ensure lessons learnt are being recorded, best practices shared, and that these feed into any statutory MNG system.

3.4 Central fund-based approach to facilitate MNG

Respondents were asked their opinion on whether a contributions-based approach or a central/ regional fund would be better to facilitate the delivery of strategic MNG targets. 50% of respondents agreed that a contributions-based approach would be best, whereas only 2% disagreed with the approach. However, 48% were unsure (Figure 5). A breakdown of responses by sector is shown in Figure 6.



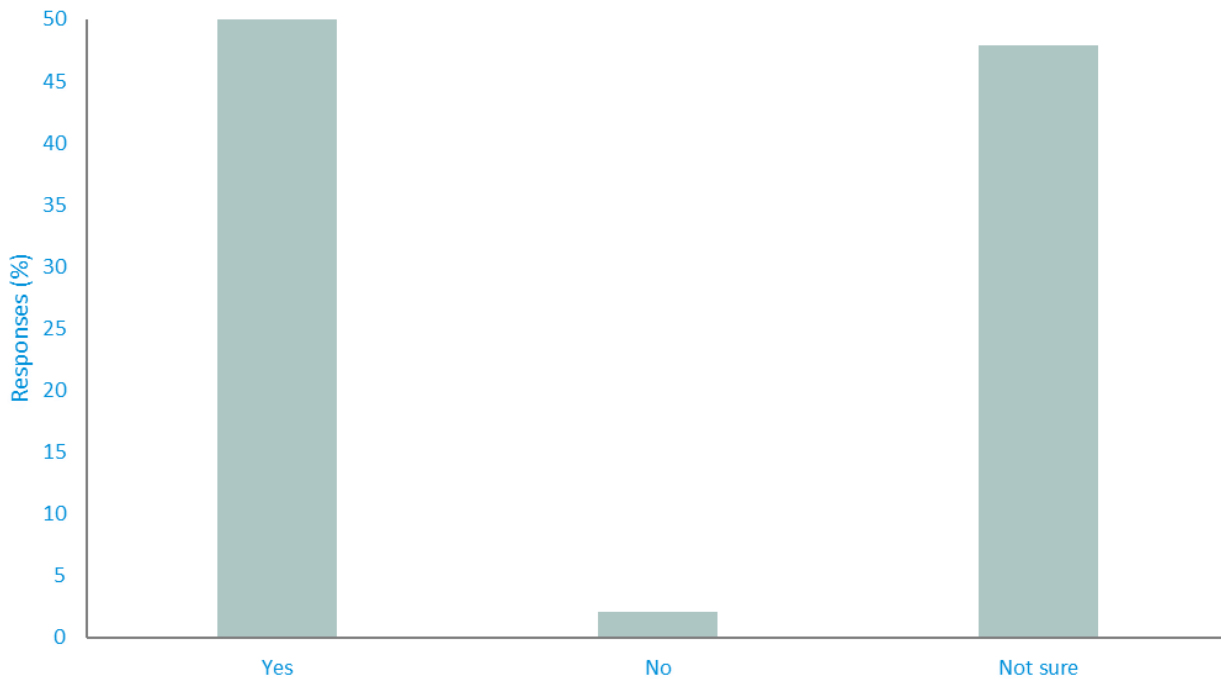


Figure 5. Stakeholder views on whether a contributions-based approach would be better to facilitate the delivery of strategic MNG targets

Only one respondent, from the offshore renewables sector, disagreed with the idea that a contributions-based approach would be best to facilitate the delivery of strategic MNG. They suggested that although a contributions-style approach would be a faster and simpler way to implement MNG, there could be some consequences including the lack of a link between the development and the level of impact due to a one-size fits all approach. They also felt the approach, if used as an interim solution, could risk delaying the development of a metric. Additionally, they felt it could lead to efforts being concentrated in certain areas with relatively simple restoration/enhancement requirements, leaving more challenging areas/habitats to continue to decline.

The respondents who agreed with a contributions-based approach were from a wide range of sectors including academia, consultancies, eNGOs/charities, government agencies/ departments, local authorities, coastal partnerships and industry, including marine minerals, offshore renewables, oil and gas, ports and harbours, power generation and defence.

Those who agreed thought such an approach would allow MNG to be coordinated and delivered at a regional level with a national overview. Several noted that due to the high connectivity and complexity of the marine environment, delivery of small, unlinked projects on a local scale would not provide large-scale ecological improvements. As such, a central fund approach would allow application of a strategic approach, ensure national/ regional prioritisation of projects but also enable successes and failures to be appropriately monitored to allow progression towards more innovative approaches. It would also provide greater consistency in regard to decision-making on MNG, would encourage collaboration and coordination through partnership delivery, and would allow the fastest ecological benefits for the marine environment by facilitating better, more targeted and effective interventions to take place at a larger scale.

Many agreed (21%) that the best outcome would be a regional fund, reflecting national priorities, with prioritisation of projects undertaken at the regional level. Where possible it was also suggested that the source of funding should be identifiable so that developers can link contributions to tangible benefits/ restoration projects.

Several did note however that any contribution-style approach should be proportionate to development impacts and therefore linked in some way to the size of the development and/ or its environmental impact.



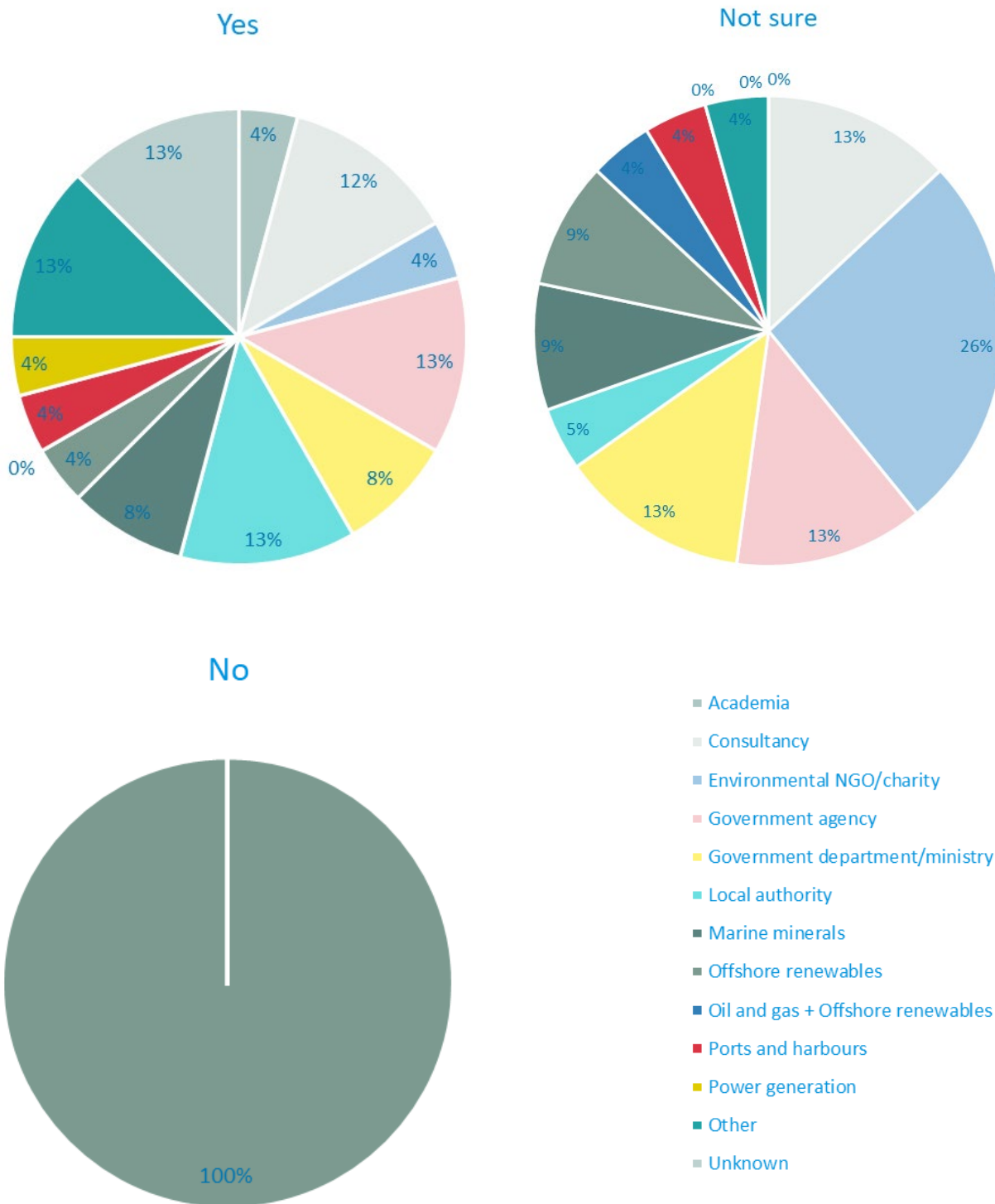


Figure 6. Breakdown of responses by sector on the suitability of a contributions-based approach to facilitate strategic MNG delivery

Environmental NGOs/ charities were the largest proportion of respondents unsure if such an approach should be developed. Other sectors that were also unsure included consultancies, government agencies/ departments, local authorities and some industries, including marine minerals, offshore renewables, oil and gas, and ports and harbours.

Many suggested that their uncertainty was with the lack of definition around such an approach and the potential mechanisms for management and application of such a fund. Several noted that a contribution-based approach should not be ruled out, but that clarity would be needed to decide if it was the most suitable approach for MNG. Additionally, any fund would need to be managed in a suitable way to not use a disproportionate amount of the fund for administrative activities or policy paper development.



To assess a fund’s suitability, it was suggested that firstly a clear definition of strategic versus site-based intervention would be needed, alongside some clear indications of how the centralised funding system would work in practice. Additionally, an MNG system will need to deliver measurable gains associated with development impacts, therefore even under a contribution-based approach, monitoring and traceability will be critical. Further, a contributions-based approach will require strong Government leadership and guidance on application, which is currently lacking.

Another possible difficulty highlighted with a contributions-based approach was the potential problem of linking up a MNG system with its terrestrial and intertidal BNG counterpart, which will need to be addressed particularly where there may be overlaps.

Several respondents also noted that developers would need assurance that contributions were being directed effectively, efficiently and being transparently managed and accounted for. One also noted that businesses will be required to report on their own biodiversity ambitions and targets to adhere with European legislation and/or their own sustainability reporting requirements. They questioned whether such a fund-based approach would be able to support these requirements and/ or enable them to demonstrate that their contributions are helping them to directly achieve their own ambitions and objectives.

Should a contributions-based approach be taken forward or considered in more detail, respondents were asked how they felt the fund would be best used to support strategic MNG delivery, based on a number of key themes: habitat/species interventions, funding of a coordinating body, research, innovation, monitoring and non-statutory management (Figure 7).

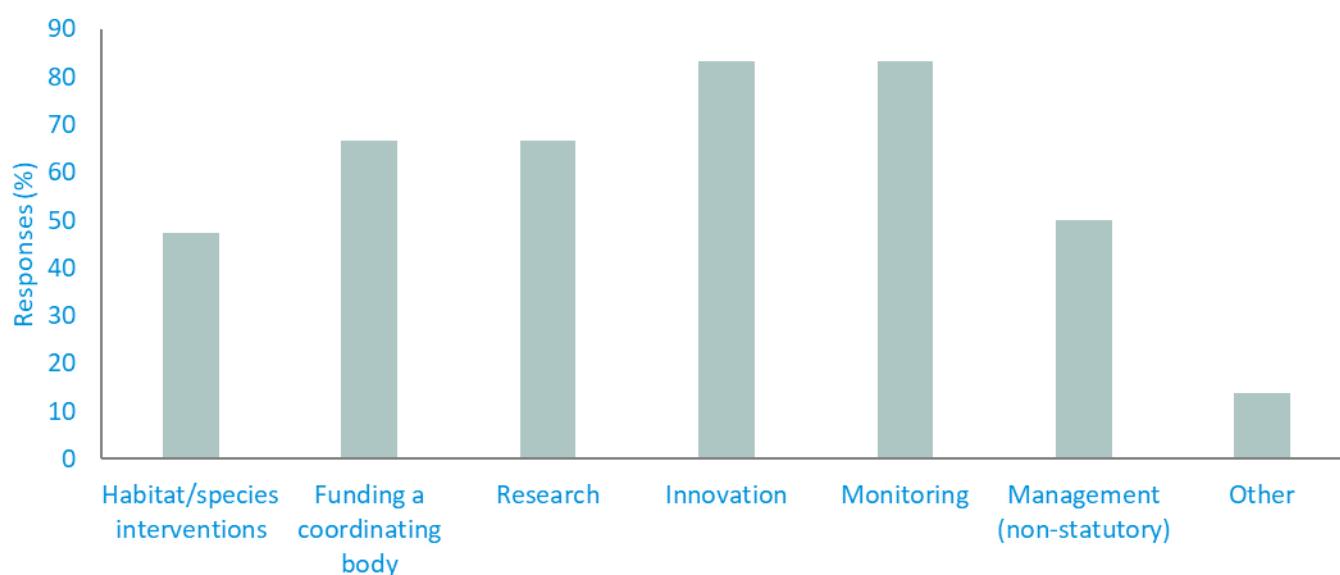


Figure 7. Stakeholder views on how a central/ regional fund would be best used to support strategic MNG delivery

Innovation and monitoring were suggested by respondents as the two key areas for how a fund could be used to best support strategic MNG. In particular, respondents suggested that contributions should help drive the development of a metric and facilitate collaboration on projects between industries operating in the marine environment. In addition, respondents noted the need for research to develop innovative approaches to marine restoration over time, and to identify the most suitable locations for MNG outcomes, following which there will need to be monitoring and enforcement to ensure that MNG is delivering the anticipated outcomes. Innovation around funding pressure reduction was also suggested as an immediate priority, in the absence of existing methods for active seabed habitat restoration.

It was noted that the allocation of funding may need to evolve over time and that at this current stage, research, innovation, monitoring and testing are key to establish more tried and tested restoration methods. However, in future, there may be a move away from research and innovation to a greater proportion of practical intervention



when methods (and what success looks like) are better understood. Funding for monitoring of implemented practical interventions over a sufficient time period will also be key, so that success can be better defined.

However, others expressed a preference for funds to go directly to restoration activities and to support 'on the ground' actions not management, research or monitoring, which they felt should be the responsibility of other organisations. It was noted that such actions should include not just habitats/species interventions, but also consider wider actions such as improving the condition of the physical environment (e.g., contaminant removal).

Although several respondents suggested funding should be used to fund a coordinating body others disagreed, saying a number of coordinating bodies already existed and that instead streamlining the current process (i.e., removing the need for consultation with multiple bodies such as Marine Management Organisation (MMO) and Local Planning Authorities (LPAs)) was more important. Another suggested that the MMO should be the coordinating body due to the linkage with marine licencing.

Despite divergent stakeholder views on the funding of a coordinating body, there was general agreement that, whatever the process, there should be a single, coordinating body to approve, consent, monitor and enforce MNG, to ensure consistency in the approach, to provide the best outcomes for marine recovery and to minimise wasted administrative funds. In addition, the remit of the body should be to manage and implement strategic MNG, to define and prioritise restoration actions and to ensure 'ready-to-go' enhancement projects (already fully consented) were in place that industry could then aid to deliver.

It was highlighted in several responses that MNG can work alongside existing statutory regimes and responsibilities but should not be a vehicle to deliver regulatory outcomes or interventions. An MNG contributions-based approach should therefore not be used to fund actions and activities that should be funded by Government for the regulation and management of the marine environment e.g., enforcement of existing protected sites.

Despite specific suggestions by respondents for each of the listed themes, the overarching consensus from respondents was that all of the suggested approaches: habitat/species interventions, funding of a coordinating body, research, innovation, monitoring and non-statutory management, were necessary to promote marine nature recovery and for a MNG system to succeed.

3.5 Stakeholder involvement in MNG planning

As a final question, respondents were asked if they would like to be involved in providing information for MNG planning, and if so in what capacity.

Virtually all respondents expressed an interest in their organisations being involved in providing information for MNG planning, including government bodies (conservation bodies, environmental bodies, LPAs, port and harbour authorities), industry, eNGOs and coastal fora.

Respondents identified a wide range of elements they would wish to be involved in, ranging from policy development, policy implementation, identification and prioritisation of restoration/recovery priorities through to project delivery.

In general, industry representatives including from offshore renewables, power generation, oil and gas and marine minerals predominantly just wanted to be engaged throughout the process to incorporate their view into how MNG is defined and to ensure it is developed in a deliverable and proportionate way. They were happy to provide feedback on existing projects, advice on how project development conditions can support marine recovery, feedback on the use of metrics, monitoring approaches, innovation and design thinking, and marine spatial planning.

Respondents from local authorities, eNGOs/charities and coastal partnerships were largely happy to support through data sharing, where possible, providing case studies to demonstrate how intertidal habitat creation can deliver biodiversity and species recovery, providing information on coastal (intertidal and near-shore) MNG delivery and enabling the development of any pilot projects or beyond. Some were also happy to hold an advisory role within relevant forums or share experience of past restoration projects.



The majority of respondents from Government agencies/ departments expressed how they were already involved in the development of net gain and would continue to work on policy development, implementation and guidance to support MNG. One response from the devolved administrations suggested that although net gain policy was not yet applicable, learning from an English perspective could be key to inform development of their own policy at which point they would expect to be a key contributor (as a statutory adviser) to MNG planning and indeed for cross-border issues under the English process.

4. Conclusions

The call for evidence generated responses from a wide range of industries/ sectors. Virtually all respondents expressed an interest in their organisation's being involved in providing information for MNG planning, and identified a wide range of elements they would wish to be involved in, ranging from policy development, policy implementation, identification and prioritisation of restoration/recovery priorities through to project delivery.

The four key limitations previously identified continue to be acknowledged as significant barriers to progressing restoration initiatives. In addition, a number of other key limitations were identified including a lack of a statutory system of MNG, lack of research/scientific understanding on intervention success criteria, lack of resources/expertise generally and within public bodies, lack of shovel-ready projects to invest in and a lack of co-ordination between intertidal BNG and MNG.

A range of research priorities were suggested by respondents including:

- Developing an agreed historic baseline;
- Reviewing the availability of existing data;
- Assessing the success of restoration techniques (including novel techniques);
- Researching innovative restoration techniques;
- Identifying pressures and pressure reduction mechanisms;
- Better assessment of species population requirements in terms of both space and resource; and
- Evaluation of restoration benefits.

With regards to the research priority identified to develop an agreed historic baseline, it is noted that, rightly or wrongly, a baseline of 2020 is currently being used by forums such as Nature Positive and the Science Based Targets Network (SBTN). Many organisations will also be disclosing their interactions with nature under the Corporate Sustainability Reporting Directive (CSRD) and Taskforce on Nature-related Financial Disclosures (TNFD), so consideration of these frameworks may also be helpful to inform MNG.

In addition, it is acknowledged that there is a need to identify pressures and pressure reduction mechanisms to inform MNG but that work undertaken in this area for compensation requirements might be a useful resource to draw upon.

Existing initiatives which respondents cited as being useful mechanisms to define, and provide prioritisation for, nature recovery targets included GES reporting targets, using UKMS indicators, and reviewing and refreshing regional marine plans.

Key priorities identified by respondents included recovery/enhancement of MPA interest features to favourable conservation status, in addition to the designation of more MPAs/ HPMAs. Specific feature priorities identified included:



- Recovery of declining seabird populations, in particular species at greatest risk from HPAI and pressures associated with offshore energy;
- Restoration and recovery of transitional coastal habitats;
- Active restoration of seagrass and saltmarsh;
- Improving other coastal habitats such as kelp, rocky shores and sediments;
- Protection, restoration and recovery of biogenic reefs (oysters, serpulid, modiolus), particularly where they form on sedimentary habitats;
- Resilience in marine mammal populations;
- Remove pressure on irreplaceable subtidal marine habitats, e.g., sandbanks, Sea Pen habitats;
- Recovery of inshore fish populations, essential fish habitats and forage fish species;
- Restoration and recovery of migratory fish (shad, smelt, sturgeon and salmon (particularly at risk of climate change));
- Removal of invasive species;
- Reduce and eliminate marine pollution - eliminate outflow of sewage and other pollution; and
- Improvement of water quality.

Additional research actions to identify the most sensitive existing habitats, those habitats at the greatest risk or those with the most severe degradation were also suggested as a method to prioritise potential nature recovery initiatives. Natural England's marine irreplaceable habitats work, including mapping, may be a useful resource to address this suggested action.

Stakeholder engagement (including the public, academics, NGOs and relevant public bodies) was also highlighted as a key mechanism, including through existing fora such as coastal partnerships or the marine element of LNRS. The use of existing data and assessments (such as from the UKMS, WFD and MPA condition assessments) to inform priorities was also frequently cited, as well as building on existing processes to identify restoration/recovery opportunities and prioritisation processes (e.g., ReMeMaRe and MaRePo). Some respondents suggested that natural capital approaches could help to prioritise interventions to maximise welfare benefits.

While it was recognised that nearshore restoration is likely to be easier, respondents felt it was important to ensure that the MNG system enabled industry to contribute to offshore priorities where required. Respondents also considered that it was important that any system of MNG enabled industry to contribute to species priorities to facilitate marine biodiversity recovery.

Mixed views were expressed concerning whether modifications to offshore infrastructure to enhance marine biodiversity should count towards MNG. The installation of offshore infrastructure was considered to provide an alternative solution for offshore restoration e.g., through the creation of artificial reef, but wider discussions are ongoing on the implications when removing structures at the end of a project lifecycle. Despite this it was suggested that research should be completed to clearly show whether the leaving of in situ lower structures can provide benefits, or even leave new habitats undisturbed. Recommendations from the Influence of man-made structures in the ecosystem (INSITE) report (INSITE, 2023³) highlighted that it could be beneficial to consider options such as partial removal or leaving structures intact, as these structures can support biodiversity and

³ INSITE (2023) Environmental Restoration & Net Gain: Understanding the influence of man-made structures in the marine environment. [Online]. Available here: https://s3-eu-west-1.amazonaws.com/statial.insitenorthsea.org/20230829_INSITE-North-Sea_Policy-2_Environmental-Restoration-and-Net-Gain.pdf



restore ecosystems in a manner similar to natural complex ecosystems. However, the report doesn't address the alternative picture on the need for pressure reduction and valuing sediment habitats.

Respondents acknowledged that pressure reduction interventions could only be taken forward as part of a strategic approach led by government and through appropriate marine spatial planning for restoration actions (and their subsequent protection/ management). A significant proportion of respondents (38%) suggested that this might best be progressed through developer contributions to a marine recovery fund.

Respondents identified a range of information needs including the need to have clear guidance around MNG interventions (e.g., what will and will not count as MNG measures), how collaboration amongst developers might be facilitated, and on monitoring requirements. Additional research needs were again highlighted as an evidence gap required to support MNG, especially with regards to offshore delivery options.

To facilitate the strategic delivery of MNG a flexible approach may be required with regards to trading between habitats and species; most respondents felt that MNG should allow some trading between habitats and/or features and between species, however the majority also agreed that projects should specifically look to address the residual impacts on the impacted habitat/ species where such options are possible. However, one respondent did caution the approach and suggested that trading between species and habitats should be informed by an in-depth knowledge of both and where improvements should be focused. A hierarchical process to select the appropriate delivery approach was suggested. In addition, in order to determine the appropriateness of such measures a review of regional policy should be completed during which stakeholder engagement/ consultation should be undertaken to ensure appropriate and deliverable measures and metrics are developed.

It is recognised that regulation often requires some level of certainty of anticipated project results however, to facilitate MNG some interventions may look to use novel approaches to achieve restoration outcomes. Many respondents suggested that research and innovation should be a specific component of any system of MNG. This might be funded by developer contributions within a strategic approach to MNG, with a set proportion of MNG monies directed towards novel restoration/recovery interventions. Adaptive management (or survey, deploy, monitor) was also recognised as a very important mechanism for ensuring that learning could take place notwithstanding uncertainty. It was further suggested that such novel interventions might be trialled at small scale and then built up and that risky projects should not be progressed within MPAs.

Half of respondents supported a contributions-based approach, and the remainder were unsure with only one respondent opposed. Respondents saw particular benefits of a contributions-based approach as including the opportunity to contribute to pressure reduction measures, to invest in innovation, monitoring and research and in funding a co-ordinating body. Those who agreed thought such an approach would allow MNG to be coordinated and delivered at a regional level with a national overview, and that such an approach would also provide greater consistency in regard to decision-making on MNG.

Of those unsure on a contributions-based approach, many suggested that their uncertainty was with the lack of definition around such an approach and the potential mechanisms for management and application of such a fund. To assess a fund's suitability, it was suggested that firstly clear government guidance and a definition of strategic versus site-based intervention would be needed, alongside some clear indications of how the centralised funding system would work in practice. It was also noted that one of the challenges of a contributions-based approach is the ability for developers to report on their own Net Positive Impact (NPI) targets and disclose information as part of sustainability reporting.

Should a contributions-based approach be taken forward or considered in more detail, respondents were asked how they felt the fund would be best used to support strategic MNG delivery. Despite specific suggestions by respondents for each of the listed themes, the overarching consensus from respondents was that all of the suggested approaches: habitat/species interventions, funding of a coordinating body, research, innovation, monitoring and non-statutory management, were necessary in order to promote marine nature recovery and for a MNG system to succeed.



Despite divergent stakeholder views on the funding of a coordinating body, there was general agreement that, whatever the process, there should be a single, coordinating body to approve, consent, monitor and enforce MNG, to ensure consistency in the approach, to provide the best outcomes for marine recovery and to minimise wasted administrative funds. In addition, the remit of the body should be to manage and implement strategic MNG, to define and prioritise restoration actions and to ensure 'ready-to -go' enhancement projects (already fully consented) were in place that industry could then aid to deliver.

Ultimately, in order to develop an effective system of MNG, it will be important that a collaborative approach is taken involving all interested stakeholders to ensure the system is both practical and delivers a net gain from marine development. Whatever form MNG implementation takes, it will be beneficial for all relevant stakeholders to contribute to the processes for prioritising restoration/recovery projects, particularly at a regional/local level. The approach will need to enable developers to contribute broadly to marine recovery priorities across all relevant ecosystem elements including both habitats and species and to facilitate developer contributions to pressure reduction measures to achieve this.

5. Abbreviations/Acronyms

ABPmer	ABP Marine Environmental Research Ltd
BNG	Biodiversity Net Gain
CMS	Communications and Management of Sustainability
CSRD	Corporate Sustainability Reporting Directive
eNGO	Environmental Non-Governmental Organisation
GES	Good Environmental Status
HPAI	Highly Pathogenic Avian Influenza
HPMAs	Highly Protected Marine Areas
IFCA	Inshore Fisheries and Conservation Authorities
INSITE	Influence of man-made structures in the ecosystem
LinkedIn	Business Social Networking Web Site
LNRS	Local Nature Recovery Strategy
MCZ	Marine Conservation Zone
MaRePo	Marine Restoration Potential
MMO	Marine Management Organisation
MNG	Marine Net Gain
MPA	Marine Protected Areas
NGO	Non-Governmental Organisation
NPI	Net Positive Impact



OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
ReMeMaRe	Restore Meadows, Marshes and Reefs
RSG	Regional Stakeholder Groups
SBTN	Science Based Targets Network
SNCBs	Statutory Nature Conservation Bodies
T&F	Task and Finish
TNFD	Taskforce on Nature-related Financial Disclosures
UK	United Kingdom
UKMS	UK Marine Strategy
WFD	Water Framework Directive



Appendices

Appendix A. Call for evidence: Strategic Marine Net Gain targets potential mechanisms and priorities for delivery

Background

In 2021, the Offshore Wind Evidence and Change Programme Task and Finish Group identified a number of widely agreed strategic targets for marine and coastal net gain (a full description of the work and outcomes is available in the final project report). In this second phase, we are looking at potential options for how these strategic targets could be delivered by industry, to support industry commitments to deliver net gain for development projects and wider corporate policies on nature recovery.

In early 2023, a first call for evidence provided considerable insight into the impressive amount of work already in progress or planned for nature restoration, alongside identifying some of the principal barriers to delivery of these initiatives.

How you can help

To assist with our work to assess possible mechanisms for delivery of strategic targets, we invite you to respond to this further call for evidence, which asks more detail on delivery of strategic net gain.

Your input will be invaluable in helping us prepare recommendations for the delivery of net gain through strategic targets and ensure that net gain delivers real and significant contributions to nature recovery in the marine environment.

The survey should take around 15 minutes, depending how much detail you choose to provide.

'Marine Net Gain'

Throughout this call for evidence, reference is made to Marine Net Gain (MNG), which is used as an all-encompassing term to include restoration and recovery actions in relation to development that might be taken in the offshore marine environment, coastal and intertidal areas.

Questions

1. The findings from the first call for evidence identified four key limitations to current restoration initiatives. How would you rank the four limitations in terms of their significance in delivering ecological needs or priorities?
 - a) Complexity of requirements within marine licensing system
 - b) Limited availability of funding for restoration/recovery projects, particularly long-term funding
 - c) Limited baseline data against which to measure success of project interventions
 - d) Competing demands for space, particularly coastal space
2. Are there any other limitations to current restoration initiatives you would add to this list, and where would you rank them?



3. What further work do you feel could be required to address these limitations as part of the development of MNG?
4. As part of a strategic approach to MNG, it may be helpful to take account of ecological or nature recovery priorities in the marine environment. In your view, what are the key national restoration or nature recovery needs in the marine environment?
5. During the first call for evidence, stakeholders identified a preference for applying MNG at a marine plan region level. How might the ecological priorities in each marine plan region (or other regional level) be identified?
6. During the first project the Strategic Net Gain Task and Finish Group (T&F Group) identified a number of strategic MNG targets. Which of the following measures do you think industry might be able to contribute to or implement to support delivery of MNG targets, given appropriate policy??

Please tick all that apply:

- I. Actions to restore and/ or create intertidal/ near coastal habitats, including characterising species (e.g., mudflat/ sandflat, saltmarsh/ reedbed, seagrass, native oyster, kelp);
- II. Actions to restore offshore habitats (e.g., native oyster reef, Modiolus, serpulid reef, subtidal sands, muds and gravels);
- III. Actions to support and restore fish;
- IV. Action to support populations of birds;
- V. Actions to support populations of marine mammals; and
- VI. Pressure reduction actions.

Please provide an indication of how industry could contribute to each measure.

7. The T&F Group has identified several key information requirements which might be needed to inform strategic MNG delivery:
 - Identification of suitable areas for MNG delivery at a regional scale.
 - Identification of specific projects (location, site area and target habitat feature within the marine plan region).
 - Identification of habitat or species needs within the marine plan region.
 - Creation of a prioritised list of projects to which industry can contribute (at a regional or local scale).
 - Creation of a 'shovel ready' list of projects (within a region) to which industry can contribute (this may mean projects which are fully planned and consented).

Is there anything else you consider would be critical to support successful delivery of strategic MNG?



8. A flexible approach may be required to facilitate the delivery of strategic MNG, which could include any/all of the following approaches.

Do you agree or disagree that MNG should... (please place a cross on the box which applies)

	Agree	Disagree	Neither agree nor disagree
Seek specifically to address a project's residual impacts on the impacted habitat/species features (i.e., like-for-like)			
Allow some trading between habitats and/or features			
Allow some trading between species			
Allow trading across all ecological elements			
Other please specify:			

What do you feel are the positives or negatives of the above approaches, or any other potential approaches?

9. Some interventions may look to use novel approaches to achieve restoration outcomes. However, it is recognised that regulation often requires some level of certainty of anticipated project results. How might a strategic approach be developed to facilitate innovation in restoration and enhancement projects?
10. Would a contributions-based approach or central/regional fund be best to facilitate delivery of strategic MNG targets?
- Yes
 - No
 - Not sure

Please explain your answer

11. If yes, how do you think a central fund-based approach would be best used to support strategic MNG delivery?

Please tick all that apply.

- Habitat/species interventions only
- Funding a coordinating body
- Research
- Innovation e.g., habitat and species or in relation to pressure reduction
- Monitoring
- Management (non-statutory)
- Other please specify:



12. Would your organisation/s like to be involved in providing information for MNG planning?

- Yes
- No

If yes, in what capacity would your organisation/s like to be involved?

Please select the sector you work in:

- 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)



Appendix D. Delivery options for strategic marine net gain: Assessing Potential Future 'Demand' for Marine Net Gain





Offshore
Wind Evidence
+ Change
Programme

Delivery Options for Strategic Marine Net Gain

Assessing Potential Future 'Demand' for Marine Net Gain

Executive Summary

To support the work of the T&F Group, ABPmer were tasked with estimating the potential future demand for MNG interventions at marine plan region level based on estimates of future development activity. This report presents the estimates of forecast potential future 'demand' for marine net gain (MNG) interventions at national and regional (marine plan) level in the period to 2050 based on assumptions. It seeks to identify the scale of future development activity and combine information on potential project impacts and future project development to establish a potential level of demand for MNG. The analysis is limited to English waters.

The analysis highlights the challenges of forecasting the scale, location, and timing of future development activity particularly over decadal time scales. Given that environmental impacts tend to be site specific, any assessment of residual impacts from marine development activity will come with a large uncertainty. In addition, ahead of policy development for Marine Net Gain (MNG), there is currently a high level of uncertainty concerning how any MNG requirements might be determined and therefore many assumptions have been required in translating estimates of residual impact into a potential MNG demand. Consequently, the analysis should be seen as providing an order of magnitude indicative potential MNG requirement at this stage.

The analysis indicates that future marine development will potentially result in the combined loss of/change to subtidal mud, sand, and gravel habitats of the order of 25 to 30 km² per epoch in the period to 2050, although this value is uncertain and dependent on assumptions about levels of future development activity and their spatial footprint on the seabed. The main sectors contributing to subtidal habitat loss/change are predicted to be offshore wind and marine aggregates sectors which account for up to 90 % of the habitat loss/change based on the assumptions used in the analysis. Potential loss calculated by the analysis for intertidal habitat (over 1,000 ha intertidal sediment and 1,000 ha saltmarsh nationally per decade) was considered to be a significant overestimate. A more realistic estimate of potential demand was thought to be less than half of the above estimate, the requirements for which could be met from the supply of intertidal habitat creation/restoration and enhancement opportunities, particularly given the recent upsurge in interest in coastal restoration projects.

There are significant challenges in seeking to quantify the spatial extent and intensity of permanent and temporary disturbance and residual impacts to mobile species groups. Such information is not typically available within statutory assessments and where quantified assessments are provided these are subject to high levels of uncertainty. Incorporating species impacts within MNG is likely to be especially challenging and require the collection of significant additional information and development of new assessment tools within EIA processes. However, the analysis identifies that future development will also lead to permanent (project lifetime) and temporary disturbance of subtidal habitats. This is estimated to be around 70 to 115 km² per epoch (permanent disturbance) and 65 to 85 km² per epoch (temporary disturbance).

It was not possible within the constraints of this study to develop quantitative assessments for species impacts, however the study sought to identify the number of projects within marine plan regions over different time periods which might give rise to an MNG requirement. This analysis indicates that MNG measures for mobile species could be required in all marine plan regions in the period to 2050.

The overall scale of past and current restoration/enhancement and recovery interventions would appear to be at a level that, if continued, could help to deliver MNG, depending on the form that MNG takes. However, it should be recognised that in subtidal environments, it will be difficult to recreate significant areas of replacement habitat. MNG may therefore need to focus on creation or enhancement of intertidal or coastal habitats or alternatively look to improve the condition of subtidal habitats (through pressure removal), noting that this latter option could only be delivered as part of a strategic approach led by government.



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Document Control

Version	Author	Checked	Approved	Date	Description of change



1. Introduction

There is increasing recognition of the need for greater action to restore our marine environment in the face of a continued decline in marine biodiversity. Net gain¹ has been identified as a potentially important mechanism that can contribute to halting and reversing marine biodiversity loss. From autumn 2023, two years following royal ascent of the Environment Act, it will be mandatory for all in scope developments in the terrestrial and intertidal environment to deliver a biodiversity net gain of 10 %. Although there is no formal net gain policy as yet for the marine environment, Government has committed to developing such a policy, and has held a first consultation on the principles of marine net gain (MNG) (Defra, 2022²).

The Strategic Net Gain Targets Task and Finish Group (T&F Group), funded by the Offshore Wind Evidence and Change Programme, completed its first report in October 2021, setting out a number of strategic targets for marine and intertidal net gain (Offshore Wind Evidence and Change Programme, 2021³). These targets were widely consulted on, and well supported by a range of marine stakeholders. In addition, the T&F Group set out a number of assumptions and recommendations for further consideration in the development of a policy for MNG.

Building on its first report, the T&F Group is now working to develop delivery options for strategic net gain. The aim of this projects is to identify and agree recommendations for a more local delivery of strategic net gain targets for the improvement and recovery/restoration of the marine and intertidal environments, which can be used as a basis for determining net gain targets for marine industry sectors, including offshore wind. ABPmer has been commissioned to support the work of the T & F Group.

To support the work of the T&F Group, ABPmer were tasked with developing a database of existing and planned marine restoration/enhancement and recovery projects to identify what interventions were already being undertaken, and then to estimate potential future demand for MNG interventions for England at a marine plan region level, based on estimates of future development activity.

This report presents the outputs from this latter task. It seeks to identify the scale of future development activity on a regional scale (marine plan region) and combine information on potential project impacts and future project development to establish a potential level of demand for MNG at regional level.

2. Approach to estimating future demand

Two elements have been included in the analysis:

- An assessment of potential residual impacts to subtidal habitats (mud, sand, gravel), intertidal habitats (saltmarsh, intertidal sediment) and species groups from future development activity in the period to 2050; and
- Translation of these residual impacts into an indicative demand for MNG.

¹ Net gain is an approach to development that aims to leave the natural environment in a measurably better state than beforehand. This means protecting, restoring, or creating environmental features that are of greater ecological value to wildlife, habitats, and people than any losses associated with the original project.

² Defra. 2022. Consultation on the Principles of Marine Net Gain. Available at: <https://consult.defra.gov.uk/defra-net-gain-consultation-team/consultation-on-the-principles-of-marine-net-gain/> [Accessed 23/06/23].

³ Offshore Wind Evidence and Change Programme. 2021. Strategic Net Gain Targets for Coastal and Marine Environments - Task and Finish Group Final Report, October 2021. Available at: <https://www.marinedataexchange.co.uk/details/3513/2021-strategic-net-gain-task-and-finish-group-offshore-wind-evidence-and-change-programme-strategic-net-gain-targets-for-coastal-and-marine-environments/summary> [Accessed 23/06/23].



2.1 Approach to estimating residual impacts to habitats and species

The assessment has sought to make best use of existing studies. ABPmer & eftec (2022⁴) undertook an analysis of the scale of future marine development activity for a wide range of marine sectors. Separately eftec et al. (2021⁵) completed an analysis of potential development affecting intertidal habitat (by local authority area) as part of a study exploring the potential market for biodiversity net gain credits. Both studies have informed the approach to the assessment in this study.

Residual impacts to habitats and species have been assessed as follows:

- Subtidal habitats:
 - Forecasts of future development activity⁶ have been based on ABPmer & eftec (2022⁴) and updated following advice from the T&F Group;
 - Annual forecasts of levels of development activity have been made for the period 2023 to 2050 with assumptions made regarding the distribution of levels of activity across marine plan regions (combining inshore and offshore marine plan areas where relevant);
 - Residual impacts have been calculated based on assumptions for each sector (see Appendix A) for:
 - Area of direct habitat loss/change;
 - Area of permanently disturbed habitat (habitat considered to be regularly disturbed over the lifetime of the development); and
 - Area of temporarily disturbed habitat (habitat considered to be disturbed only during construction or irregularly during operation).
- Residual impacts have been assigned to marine plan regions and distributed across broad habitat types (EUNIS level 3: Sublittoral coarse sediment A5.1 (gravel), Sublittoral sands/muddy sands A5.2 (sand) and Sublittoral cohesive mud and sandy mud A5.3 (mud)) based on assumptions. For most offshore development, in the absence of information on the specific location of developments, it has been assumed that mud, sand and gravel habitats will be affected pro rata to their spatial extent in each marine plan region. For marine aggregates, it has been assumed that only sand and gravel habitats will be affected pro rata to their spatial extent in each marine plan region as these are the resources targeted by marine aggregate producers; and
 - Areas of affected habitat (mud, sand, and gravel) subject to loss/change, permanent disturbance, or temporary disturbance, have then been calculated using a simple spreadsheet model (available from the authors on request) for each marine plan region for the epochs; 2023-2030, 2031-2040 and 2041 - 2050.

⁴ ABPmer & eftec. 2022. Marine Net Gain. Sector Analysis. ABPmer Report No. R.3875. A report produced by ABPmer for Defra Offshore Wind Enabling Actions Programme, April 2022. Available at: <https://randd.defra.gov.uk/ProjectDetails?ProjectId=21049> [Accessed 23/06/23].

⁵ eftec, WSP & ABPmer. 2021. Biodiversity Net Gain: Market analysis study, February 2021. Available at: <https://randd.defra.gov.uk/ProjectDetails?ProjectId=20608> [Accessed 23/06/23].

⁶ Aggregates, aquaculture (shellfish), aquaculture (seaweed), carbon capture usage and storage, coastal development (regeneration - subtidal infrastructure), offshore wind farms, oil and gas, ports, power interconnectors and transmission lines, power stations, recreational boating (subtidal infrastructure development), telecommunication cables, tidal range energy, tidal stream energy, wastewater treatment outfalls and wave power.



- Intertidal habitats:
 - Estimates of annual intertidal habitat loss (intertidal sediment and saltmarsh) by local authority area (from eftec et al., 2021⁵) were used to estimate annual intertidal habitat loss by marine plan region, including locations within MPAs.
- Species (for subtidal projects only):
 - Assumptions have been made on the relative significance of residual impacts to species groups (fish, birds, and marine mammals) including mortality and disturbance during construction or operation (see Appendix A); and
 - Forecast future development activity levels (see subtidal habitats above) have been used to identify the number of projects that may require species measures to offset residual impact. In making these estimates no account has been taken of possible requirements to implement compensatory measures or measures of equivalent ecological value in relation to features protected by European or national site designations.

For subtidal (and intertidal) habitats, information on the spatial extent and degree of residual impact is generally available from Environmental Statements. While these assessments tend to be quite conservative in line with relevant guidance, they do provide a meaningful basis from which to assess a project's residual impacts.

For species impacts, while Environmental Statements include assessments of impacts to mobile species groups, such impacts are generally not quantified, or where they are quantified, estimates are subject to high levels of uncertainty (for example, estimates of seabird collision mortality from offshore wind farm development). If species impacts are to be incorporated within MNG, depending on the approach taken, this could require additional information to be collected and analysed by developers as part of their development applications.

2.2 Indicative potential future demand for MNG

Information on the potential scale and nature of residual impact from future development activity has been used to inform an indicative potential requirement for MNG.

Ahead of policy development by Defra, there is no clear basis for translating residual development impacts into an MNG demand. To estimate a possible level of future demand that can be compared to possible future supply of restoration/enhancement or recovery initiatives, tailored assumptions, based on available scientific evidence, have been applied. The assumptions used should not be taken to infer any policy preference, nor any agreed position on the assumptions used.

For the purposes of modelling potential future demand for MNG, the following assumptions were made:

- **Habitat loss/change** - a factor of 2.2 has been used to identify the MNG requirement in relation to habitat loss/change for both intertidal and subtidal impacts. This is based on the factor of 2 that has been applied for compensation of intertidal habitat loss in European sites (Morris et al, 2016⁷) with an uplift of 10 % to achieve net gain.
- **Permanent habitat disturbance** - a factor of 1.1 has been applied to permanent habitat disturbance for subtidal projects. In effect this assumes a 50 % loss of function from the disturbed habitat.

⁷ Morris, R., Harley, M., Cottle, R., Banks, B., Doody, J., Brown, A., Weston, A., Hart, R., Prince, S. 2016. Review of the Effectiveness of Natura 2000 Sites Compensation Measures in England. Contract Reference: WC1076. Available at: <http://www.humburnature.co.uk/admin/resources/13694wc1076finalreport-1.pdf>



- **Temporary habitat disturbance** - a factor of 0.05 has been applied to temporary habitat disturbance in subtidal mud and sand habitats and a factor of 0.25 applied to subtidal gravel habitats, as gravel habitats typically take longer to recover compared to mud and sand habitats (MarESA⁸).
- **Species features** - where the scale of residual impact from a subtidal project is assessed as 'moderate' or 'high' for either construction or operation, it has been assumed to trigger a requirement for mobile species measures (fish, birds, or mammals) but it has not been possible within this study to quantify that requirement.

The assessment of potential future demand has been made at the same level of granularity as the assessment of potential residual impact (i.e., subtidal mud, sand, and gravel habitat; intertidal sediment and saltmarsh habitat). In presenting the analysis in this way, ahead of MNG policy development, it does not seek to presume that MNG would require like-for-like replacement of residual impacts. Rather, it allows closer comparison with the information on potential supply of MNG interventions.

2.3 Recognising uncertainties

There are many uncertainties in seeking to project the scale, timing and location of future development activity, the residual impact of such development and the requirements to achieve MNG. It is not feasible to assign estimates of uncertainty to many of these elements and therefore not appropriate to undertake any kind of formal uncertainty analysis. The key elements contributing to uncertainty include:

- Future scale, location, and timing of development activity - these can be projected based on past and current trends. For established sectors it is probably accurate within a factor of 3 ($\pm 300\%$), but for emerging sectors it may be accurate within an order of magnitude;
- Residual impacts:
 - Habitat spatial scale - information has been drawn from EIAs, sector reviews and experience of the contractor. While the scale of impact depends to some extent on site specific factors, at regional/national level the estimates are considered to be accurate within a factor of 3;
 - Habitat type - given that the specific location of future development is generally unknown, habitat type has typically been inferred based on the relative distribution of mud, sand, and gravel habitats within a marine plan region. At regional level the estimates may be accurate within a factor of 3;
 - Species - the significance of residual impacts to species from different development types has been based on the judgement of the contractor. The number of projects giving rise to species impacts has the same levels of uncertainty pertaining to future development;
- MNG demand:
 - The multiplier used to estimate habitat demand is based on limited evidence. It is noted that a Biodiversity Net Gain (BNG) style metric might result in higher levels of demand based on currently available case studies. Depending on the development of MNG policy the requirement could be higher or lower than calculated in this study by an unknown amount;
 - Potential demand has been split across broad habitat types (subtidal mud, sand, and gravel) and intertidal sediment and saltmarsh. It is currently uncertain to what extent, if at all, MNG might demand or encourage a like-for-like policy and thus each of these potential demands is uncertain to an unknown degree.

⁸ MarESA database https://www.marlin.ac.uk/sensitivity/sensitivity_rationale



The estimates of residual impact within this study are considered quite conservative based on extensive existing experience of EIA outcomes for marine developments across a wide range of sectors. The estimated scale of future activity is also considered to be an overestimate, particularly for emerging sectors such as shellfish and seaweed aquaculture where expansion tends to occur more slowly than anticipated in strategy documents. The translation of residual impacts to estimates of future demand is based on best judgement from the available evidence and considering the precautionary principle. Greater certainty will only become available once MNG policy has been clarified.

Given the above uncertainties, at this time the analysis provides only an order of magnitude estimate of what might be required to deliver MNG.

It is noted that The Crown Estate is initiating a project to digitally map the seabed resource needed to meet future demand as well as the enhanced co-ordination of future activities to 2050 (TCE⁹). The outcome of The Crown Estate project could help to clarify some of the assumptions about the location, scale and timing of future development and reduce some of the uncertainties.

3. Model results

Due to the many assumptions that have needed to be made in order to perform the analysis, all the analysis presented below should be treated as indicative and preliminary.

3.1 Subtidal habitats

A summary of the key results from the assessment are provided in Table 1 (subtidal habitats affected by marine plan region, impact type and epoch) and Table 2 (indicative demand for MNG by marine plan region, impact type and epoch).

Table 1. Estimated subtidal habitat area impacts (km²) by marine plan region, impact type and epoch

Marine plan region	Habitat impact	Habitat	2023-2030	2031-2040	2041-2050
South West	Loss/change	Mud	0.20	0.54	0.52
		Sand	0.66	2.40	2.31
		Gravel	0.45	2.30	2.21
	Permanent disturbance	Mud	1.81	2.79	2.71
		Sand	3.59	7.05	6.62
		Gravel	2.12	5.48	5.00
	Temporary disturbance	Mud	0.11	1.75	1.75
		Sand	0.60	9.58	9.58
		Gravel	0.63	10.58	10.58
North West	Loss/change	Mud	0.81	1.36	1.35
		Sand	1.45	2.27	2.26
		Gravel	0.37	0.58	0.58

⁹ <https://www.thecrownestate.co.uk/en-gb/media-and-insights/news/2023-the-crown-estate-to-digitally-map-scenarios-to-inform-co-ordinated-approach-to-future-seabed-use/>



Marine plan region	Habitat impact	Habitat	2023-2030	2031-2040	2041-2050
North East	Permanent disturbance	Mud	1.87	3.67	3.67
		Sand	3.36	6.02	6.02
		Gravel	0.69	1.34	1.34
	Temporary disturbance	Mud	3.39	0.44	0.43
		Sand	4.63	0.60	0.59
		Gravel	1.21	0.15	0.15
	Loss/change	Mud	0.07	0.47	0.47
		Sand	0.23	5.67	5.65
		Gravel	0.01	0.49	0.49
East	Permanent disturbance	Mud	0.69	1.16	1.16
		Sand	2.40	7.20	7.20
		Gravel	0.16	0.57	0.57
	Temporary disturbance	Mud	0.08	2.40	2.37
		Sand	1.15	33.67	33.24
		Gravel	0.10	2.97	2.93
	Loss/change	Mud	0.20	0.19	0.19
		Sand	12.09	8.43	8.41
		Gravel	5.00	3.44	3.44
South East	Permanent disturbance	Mud	1.28	1.62	1.62
		Sand	16.85	24.47	24.47
		Gravel	6.52	9.58	9.58
	Temporary disturbance	Mud	0.32	0.13	0.12
		Sand	35.46	14.23	13.88
		Gravel	14.88	5.96	5.81
	Loss/change	Mud	0.08	0.11	0.12
		Sand	0.20	0.31	0.45
		Gravel	0.04	0.08	0.15
South	Permanent disturbance	Mud	0.76	1.23	1.29
		Sand	2.00	5.52	6.14
		Gravel	0.69	2.43	2.75
	Temporary disturbance	Mud	0.05	0.07	0.07
		Sand	0.59	0.74	0.75
		Gravel	0.29	0.36	0.37
	Loss/change	Mud	0.42	0.50	0.50
		Sand	1.70	2.03	2.03



Marine plan region	Habitat impact	Habitat	2023-2030	2031-2040	2041-2050
National	Permanent disturbance	Gravel	4.86	5.69	5.69
		Mud	3.43	4.53	4.53
		Sand	7.09	9.72	9.72
	Temporary disturbance	Gravel	14.77	22.17	22.17
		Mud	0.17	0.06	0.06
		Sand	0.65	0.25	0.25
	Loss/change	Gravel	2.51	0.86	0.86
		Mud	1.78	3.16	3.15
		Sand	16.32	21.12	21.12
	Permanent disturbance	Gravel	10.72	12.59	12.55
		Mud	9.84	15.01	14.98
		Sand	35.30	59.98	60.16
	Temporary disturbance	Gravel	24.95	41.57	41.41
		Mud	4.12	4.86	4.82
		Sand	43.08	59.07	58.29
		Gravel	19.62	20.87	20.69

Table 2. Indicative potential subtidal habitat demand (km²) by marine plan region, impact type and epoch

Marine plan region	Habitat impact	Habitat	2023-2030	2031-2040	2041-2050
South West	Loss/change	Mud	0.44	1.19	1.15
		Sand	1.45	5.28	5.09
		Gravel	0.98	5.07	4.86
	Permanent disturbance	Mud	1.99	3.07	2.98
		Sand	3.95	7.76	7.28
		Gravel	2.33	6.03	5.50
	Temporary disturbance	Mud	0.01	0.09	0.09
		Sand	0.03	0.48	0.48
		Gravel	0.16	2.64	2.64
North West	Loss/change	Mud	1.79	2.99	2.97
		Sand	3.19	5.00	4.98
		Gravel	0.80	1.27	1.27
	Permanent disturbance	Mud	2.06	4.03	4.03
		Sand	3.70	6.62	6.62
		Gravel	0.76	1.48	1.48



Marine plan region	Habitat impact	Habitat	2023-2030	2031-2040	2041-2050
North East	Temporary disturbance	Mud	0.17	0.02	0.02
		Sand	0.23	0.03	0.03
		Gravel	0.30	0.04	0.04
	Loss/change	Mud	0.16	1.04	1.04
		Sand	0.50	12.48	12.43
		Gravel	0.02	1.07	1.07
	Permanent disturbance	Mud	0.76	1.28	1.28
		Sand	2.64	7.92	7.92
		Gravel	0.17	0.63	0.63
East	Temporary disturbance	Mud	0.00	0.12	0.12
		Sand	0.06	1.68	1.66
		Gravel	0.02	0.74	0.73
	Loss/change	Mud	0.44	0.42	0.42
		Sand	26.61	18.55	18.51
		Gravel	11.00	7.58	7.56
	Permanent disturbance	Mud	1.40	1.79	1.79
		Sand	18.54	26.92	26.92
		Gravel	7.17	10.54	10.54
South East	Temporary disturbance	Mud	0.02	0.01	0.01
		Sand	1.77	0.71	0.69
		Gravel	3.72	1.49	1.45
	Loss/change	Mud	0.17	0.23	0.26
		Sand	0.43	0.69	0.99
		Gravel	0.08	0.18	0.34
	Permanent disturbance	Mud	0.83	1.35	1.41
		Sand	2.20	6.07	6.75
		Gravel	0.76	2.67	3.02
South	Temporary disturbance	Mud	0.00	0.00	0.00
		Sand	0.03	0.04	0.04
		Gravel	0.07	0.09	0.09
	Loss/change	Mud	0.92	1.09	1.09
		Sand	3.74	4.46	4.46
		Gravel	10.69	12.52	12.52
	Permanent disturbance	Mud	3.77	4.98	4.98
		Sand	7.80	10.69	10.69



Marine plan region	Habitat impact	Habitat	2023-2030	2031-2040	2041-2050	
National	Temporary disturbance	Gravel	16.25	24.39	24.39	
		Mud	0.01	0.00	0.00	
		Sand	0.03	0.01	0.01	
	Loss/change	Gravel	0.63	0.21	0.21	
		Mud	3.92	6.96	6.93	
		Sand	35.91	46.45	46.46	
	Permanent disturbance	Gravel	23.59	27.69	27.61	
		Mud	10.82	16.51	16.48	
		Sand	38.82	65.98	66.18	
	Temporary disturbance	Gravel	27.44	45.73	45.55	
		Mud	0.21	0.24	0.24	
		Sand	2.15	2.95	2.91	
			Gravel	4.90	5.22	5.17

Table 1 indicates that at a national (England) scale, habitat loss/change from future development could be of the order of 25 to 30 km² per decade in the period to 2050 resulting in a potential demand for MNG of 60 to 75 km² (Table 2). While these spatial extents may seem large in themselves, they are small relative to the spatial extents of the respective habitats within each marine plan region (Table 3), there is a total of around 200,000 km² of subtidal mud, sand, and gravel in English waters.

Table 3. Areas of subtidal mud, sand, and gravel (km²) within each marine plan region

Marine Plan Region	Mud	Sand	Gravel
South West	5,857	32,009	35,461
North West	2,160	2953	777
North East	3,220	45,107	3,977
East	341	38,077	15,995
South East	176	1,893	981
South	759	2,897	11,592
Total	12,513	122,935	68,783

Potential demand varies by region, habitat type and epoch, reflecting differences in estimated levels of future development activity.

Figure 1 provides a summary of potential MNG demand in relation to habitat loss/change by marine plan region in the period 2023 - 2050. The greatest levels of potential demand for sand and gravel habitats may be in East and South marine plan regions. The main drivers of this demand are offshore wind development and marine aggregates.



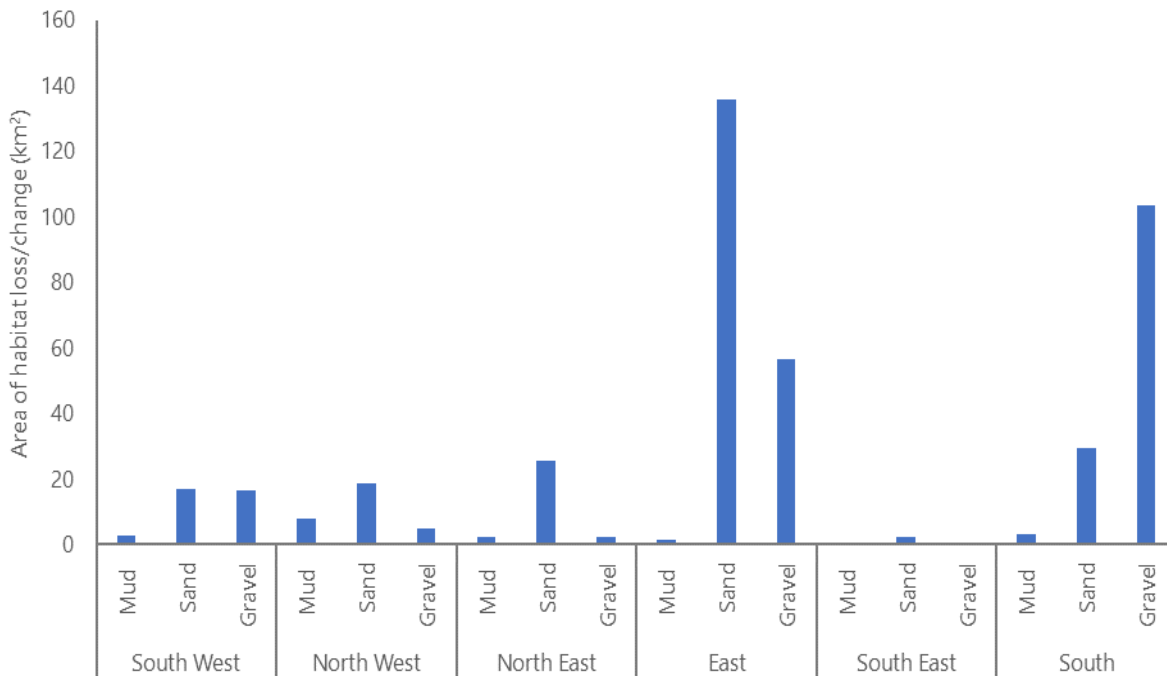


Figure 1. Potential MNG demand (km²) in relation to habitat loss/change by habitat type by marine plan region in the period 2023 - 2050

The estimated residual impact of marine aggregate extraction accounts for around 30 to 40 % of potential demand in relation to subtidal sand and gravel habitat loss/change and around 40-60 % of subtidal sand and gravel demand in relation to permanent habitat disturbance based on the assumptions used in the assessment. Marine aggregate extraction is primarily focused in the East and South marine plan regions and thus accounts for the potentially much greater MNG demand for subtidal sand and gravel habitats in these regions. While new marine aggregate development may be a significant driver of MNG demand in relation to subtidal sand and gravel habitats, where marine aggregate producers relinquish existing licences, as a result of resources become depleted over time, it may be that these relinquished areas could contribute to MNG targets. Relinquished areas are left with a suitable covering of underlying substrate and once recovered from any direct or indirect impacts of marine aggregate extraction would be expected to have ecological structure and function comparable to natural habitats.

The estimated residual impact of offshore wind development accounts for around 50-60 % of potential demand in relation to subtidal mud, sand, and gravel habitat loss/change and around 80–90 % of subtidal mud, sand, and gravel demand in relation to temporary habitat disturbance based on the assumptions used in the assessment.

All other sectors make relatively small contributions to residual impact and potential MNG demand.

Given the challenges of successfully creating new subtidal mud, sand, or gravel habitat, it may be necessary to provide flexibility in MNG solutions, for example by allowing pressure reduction measures to be applied as MNG in place of creation of new areas. Table 4 presents an indicative estimate (by marine plan region and epoch) of what MNG demand might comprise if habitat loss/change, habitat permanent disturbance and habitat temporary disturbance were conflated to a single metric. For simplicity this has been achieved by summing the areas of permanent and temporary habitat disturbance and adding the habitat loss/change values multiplied by a factor of 3 (to recognise that a larger area of habitat would need to be protected from disturbance to offset functional impacts from habitat loss/change).



Table 4 (and Figure 2) indicate that in East and South marine plan regions, significant pressure reduction initiatives might be required to meet potential MNG demand in the period to 2050 of the order of 270 to 380 km² per decade across English waters. Over 30% of this demand might be in both East and South marine plan regions reflecting the key activities driving this potential demand (offshore wind and marine aggregates).

It should be noted that while the absolute values might appear larger, the scale of potential future demand for pressure reduction is relatively small compared to current pressure reduction measures implemented within MPAs. These equate to pressure reduction measures of around 550 km² (subtidal mud), 10,200 km² (subtidal sand) and 4,300 km² (subtidal gravel) (based on ABPmer (2023¹⁰)). On this basis, further pressure reduction (primarily from bottom-towed fishing gears) might be a potential mechanism for delivering MNG, although such measures could not be delivered by industry.

Table 4. Indicative potential subtidal habitat demand (km²) by epoch (commuted to habitat disturbance)

Marine plan region	Habitat type	2023-2030	2031 - 2040	2041-2050
South West	Mud	3.33	6.73	6.53
	Sand	8.34	24.08	23.02
	Gravel	5.44	23.88	22.71
North West	Mud	7.60	13.02	12.96
	Sand	13.49	21.66	21.58
	Gravel	3.48	5.34	5.32
North East	Mud	1.24	4.53	4.52
	Sand	4.18	47.04	46.87
	Gravel	0.26	4.58	4.56
East	Mud	2.74	3.05	3.05
	Sand	100.13	83.28	83.15
	Gravel	43.90	34.76	34.67
South East	Mud	1.36	2.05	2.20
	Sand	3.52	8.17	9.77
	Gravel	1.08	3.30	4.14
South	Mud	6.53	8.25	8.25
	Sand	19.04	24.07	24.07
	Gravel	48.96	62.16	62.16
<i>National</i>	<i>Mud</i>	<i>22.80</i>	<i>37.63</i>	<i>37.51</i>
	<i>Sand</i>	<i>148.70</i>	<i>208.29</i>	<i>208.46</i>
	<i>Gravel</i>	<i>103.13</i>	<i>134.03</i>	<i>133.56</i>

¹⁰ ABPmer. 2023. Delivery Options for Strategic Marine Net Gain, Analysis of existing recovery and restoration projects and proposals, ABPmer Report No. R.4275. A report produced by ABPmer for OWEC: Strategic MNG Delivery Task and Finish Group, May 2023.



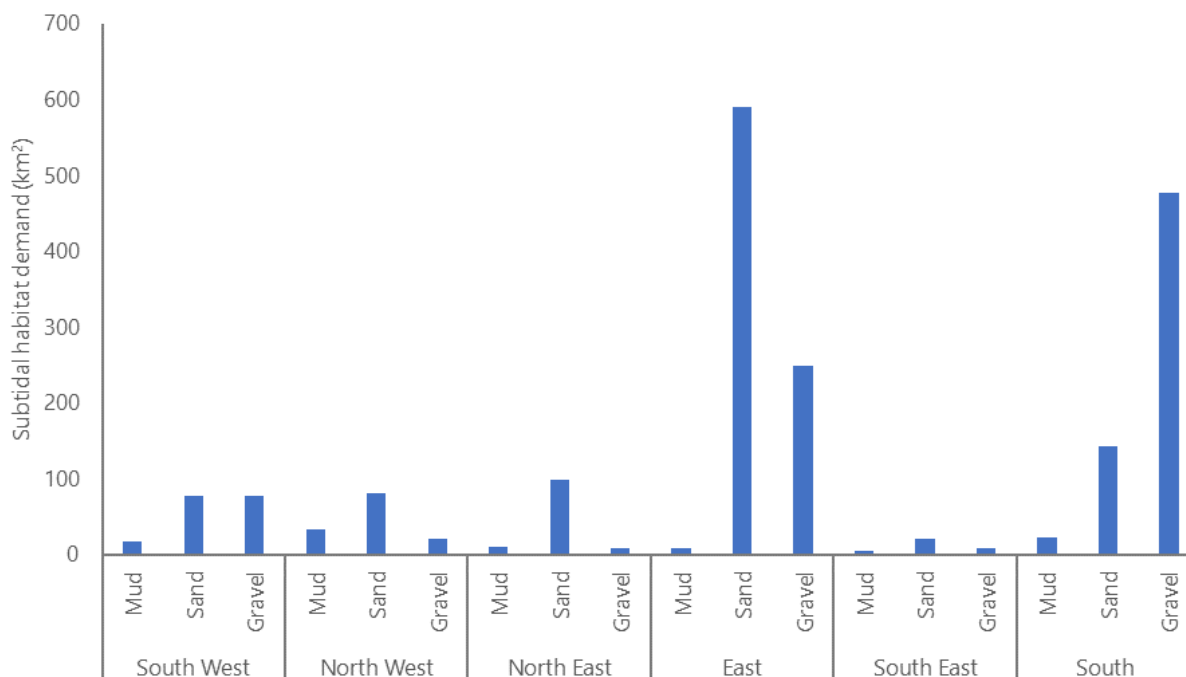


Figure 2. Potential MNG demand (km²) in relation to subtidal habitat (commuted to disturbance impacts) by habitat type by marine plan region in the period 2023 -2050

3.2 Intertidal habitats

Table 5 presents a summary of indicative intertidal demand for MNG by marine plan region and epoch in relation to loss of intertidal sediment and saltmarsh, also summarised in Figure 3. Based on the method applied, estimates of losses for intertidal sediment and saltmarsh are assumed to be equal.

The indicative levels of intertidal MNG demand in relation to habitat loss (Table 5) are comparable in scale with the estimates for subtidal habitat demand (Table 2) based on the method used. However, the estimates are considered to be highly conservative based on the report authors' experience of relevant projects around the English coast. For example, in the South marine plan region alone, the estimates suggest a demand for 40 ha of intertidal sediment and 40 ha saltmarsh p.a., which does not accord with current experiences of rates of intertidal habitat loss from development projects, which are an order of magnitude lower.

The analysis has not taken account of possible requirements for compensatory measures under the Habitats Regulations or for measures of equivalent ecological value under the Marine & Coastal Access Act 2009 where the features affected are associated with sites protected for nature conservation. It is noted that at least 80 % of estuarine and 50 % of coastal areas are subject to site-based habitat protection under the Habitats Regulations and Marine & Coastal Access Act. These are likely to be the primary drivers for intertidal habitat interventions as a result of development project impacts, with the demand for net gain on top of these other statutory requirements.

It is noted that the database of interventions developed through the first call for evidence has identified a total of 48 initiatives that have created mudflat habitat (1,198 ha) and 100 initiatives that have created saltmarsh habitat (1,622 ha) over the past 20 years or so. It is recognised that these interventions have been undertaken in response to a range of drivers including as compensatory measures for development impacts, mitigation for sea level rise and for conservation purposes.

Table 5. Indicative potential intertidal habitat demand (km²) by habitat type, epoch, and marine plan region

Marine plan region	Habitat type	2023-2030	2031 - 2040	2041-2050
South West	Intertidal sediment	1.8	2.3	2.3
	Saltmarsh	1.8	2.3	2.3
North West	Intertidal sediment	0.8	1.0	1.0
	Saltmarsh	0.8	1.0	1.0
North East	Intertidal sediment	0.8	1.0	1.0
	Saltmarsh	0.8	1.0	1.0
East	Intertidal sediment	0.9	1.2	1.2
	Saltmarsh	0.9	1.2	1.2
South East	Intertidal sediment	1.8	2.3	2.3
	Saltmarsh	1.8	2.3	2.3
South	Intertidal sediment	3.1	3.9	3.9
	Saltmarsh	3.1	3.9	3.9
<i>Total (National)</i>	<i>Intertidal sediment</i>	<i>9.3</i>	<i>11.6</i>	<i>11.6</i>
	<i>Saltmarsh</i>	<i>9.3</i>	<i>11.6</i>	<i>11.6</i>

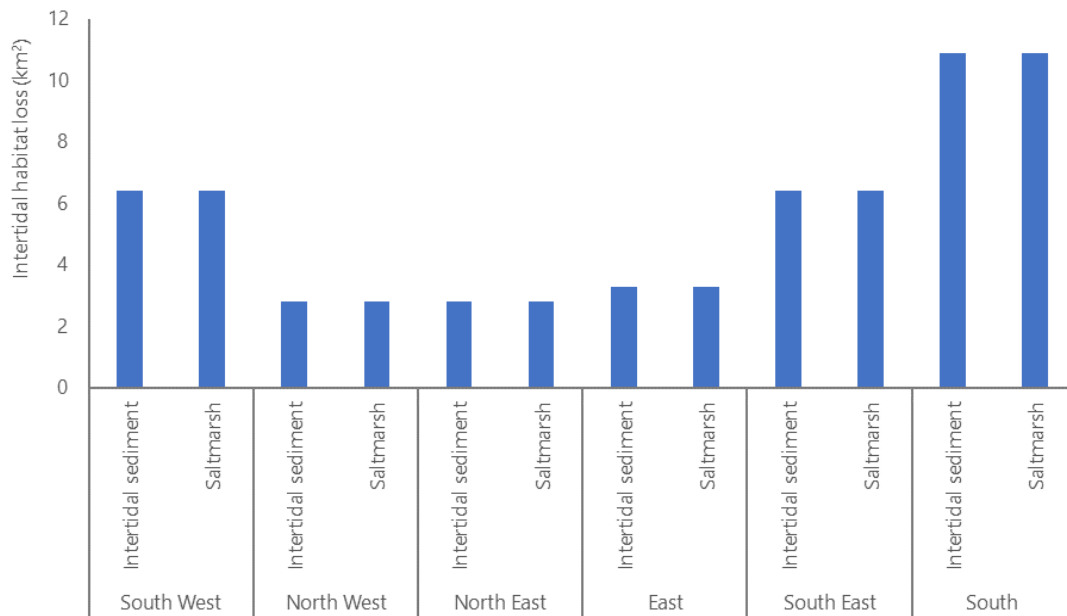


Figure 3. Potential MNG demand (km²) in relation to intertidal habitat loss by habitat type by marine plan region in the period 2023 - 2050



Marine Management Organisation (MMO, 2019¹¹) identifies potential opportunities for intertidal habitat creation and restoration through interventions such as managed realignment, regulated tidal exchange and beneficial use of dredged material around the coast of England. This study identified many tens of thousands of hectares (hundreds of km²) of opportunity indicating a large scope for future intertidal interventions. It is likely that the possible supply of intertidal habitat creation/restoration and enhancement projects can readily meet the likely demand for MNG.

3.3 Species impacts (subtidal)

Table 6 and Figure 4 present a summary of the number of projects potentially requiring MNG measures for species, by marine plan region and epoch.

Table 6. Number of development projects per epoch that may require MNG species measures for mobile feature groups (birds, fish, marine mammals)

Mobile feature impact	South West	North West	North East	East	South East	South	National
2023-2030							
Bird mortality	1	2	1	6	0	2	12
Bird disturbance	1	3	1	6	0	2	13
Fish mortality	1	2	0	0	1	1	5
Fish disturbance	7	8	7	21	4	6	53
Marine mammal mortality	0	0	0	0	0	0	0
Marine mammal disturbance	1	2	1	13	0	2	19
2031-2040							
Bird mortality	6	6	12	6	0	0	30
Bird disturbance	7	6	12	6	0	0	31
Fish mortality	2	2	0	0	1	1	6
Fish disturbance	6	7	9	26	4	12	64
Marine mammal mortality	0	0	0	0	0	0	0
Marine mammal disturbance	6	6	12	16	0	0	40
2041-2050							
Bird mortality	6	6	12	6	0	0	30
Bird disturbance	6	6	12	6	1	0	31
Fish mortality	1	1	0	0	3	1	6
Fish disturbance	5	7	9	26	5	12	64
Marine mammal mortality	0	0	0	0	0	0	0
Marine mammal disturbance	6	6	12	16	0	0	40

¹¹ Marine Management Organisation. 2019. Identifying sites suitable for marine habitat restoration or creation (MMO1135). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/798829/20190430_MMO1135_Identifying_sites_for_habitat_creation_datalayers_Report_a.pdf [Accessed 23/06/23].



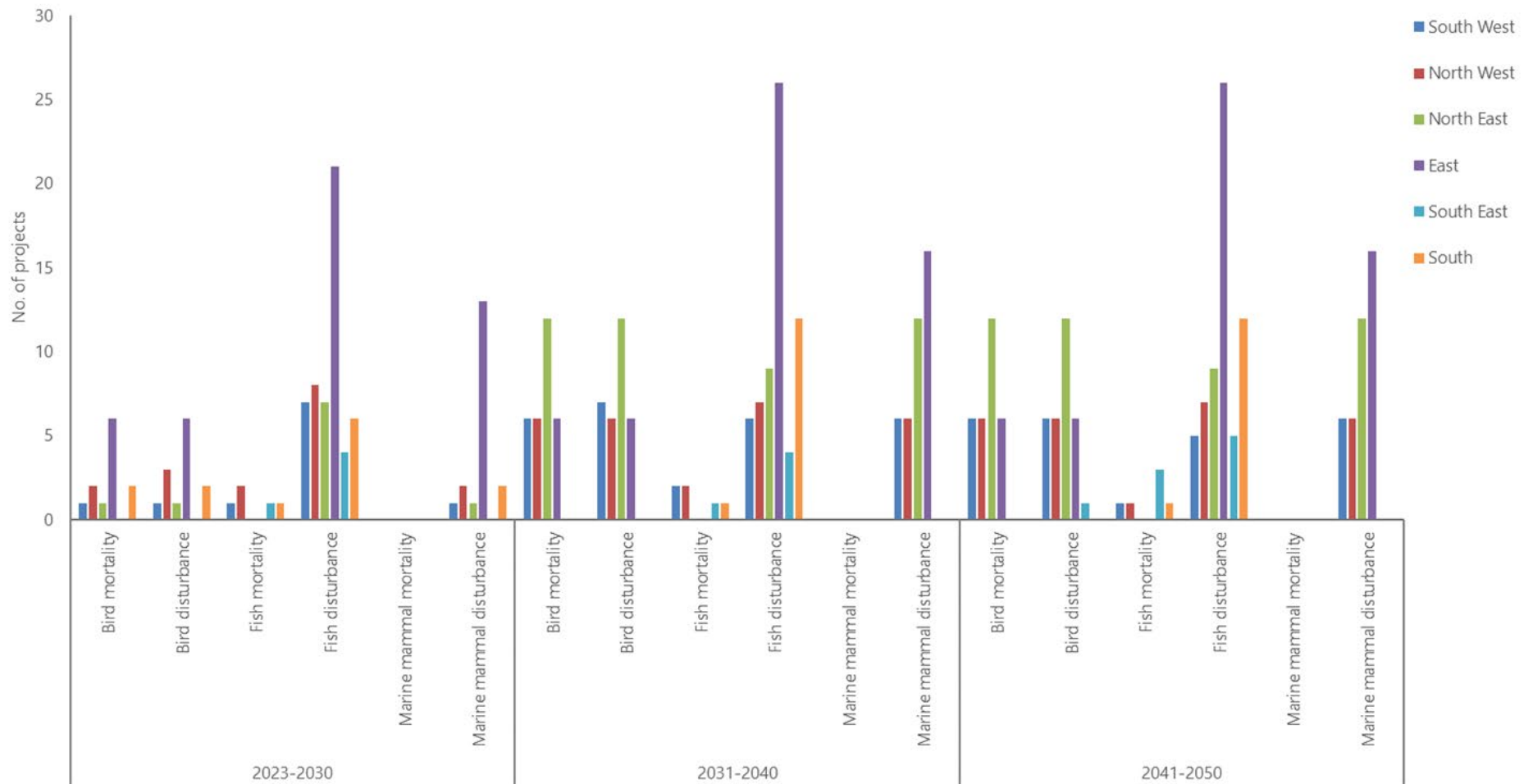


Figure 4. Potential MNG demand (number of projects) in relation to species impacts by pressure, marine plan region and epoch



As noted above, it has not been possible to meaningfully quantify the residual impacts of development on species groups within this study. In the absence of quantified impacts for species groups, it has not been possible, to refine the scale of species impacts, nor define what MNG might require in terms of species measures. Given the complexities and uncertainties, development of a meaningful and robust approach to quantifying residual species impacts and determining MNG requirements is likely to present an ongoing challenge to policy makers.

The assessment indicates that development projects resulting in residual impacts that may require MNG species measures are likely to occur in all marine plan regions across all epochs. Greater levels of intervention may be required in the East and North East marine plan regions due to the greater number of projects in these areas giving rise to residual impacts on mobile species groups.

Key sectors giving rise to potential demand for MNG species measures include offshore wind, oil and gas and port development. Offshore wind potentially affects birds, fish, and mammals while oil and gas development primarily affects fish and mammals (underwater noise). Port development projects may also generate high levels of underwater noise, but given the location of major ports within estuaries, residual impacts are more likely to be confined to fish as marine mammals are typically located in coastal and offshore areas.

The analysis has not taken account of possible requirements for compensatory measures under the Habitats Regulations or for measures of equivalent ecological value under the Marine & Coastal Access Act 2009 where the features affected are associated with sites protected for nature conservation. In relation to birds, it is likely that the Habitats Regulations will be the primary driver of measures to offset residual impacts. The Habitats Regulations may also be the main driver for actions in relation to marine mammals. It will also be the case that some MNG measures taken to address habitat impacts will also benefit mobile features.

Information on the number of existing/planned initiatives for fish/birds/marine mammals has been extracted from the restoration and recovery projects database (ABPmer, 2023¹⁰) and is shown in Table 7. This evidence indicates that initiatives for fish, birds and marine mammals are being progressed across most marine plan regions. Due to the limitations of the analysis, it is not possible to identify whether the number and nature of such initiatives might be at a level consistent with the level of activity that might be required to deliver MNG for species. It is recognised that measures to improve the quality of seabed habitats is likely to contribute to supporting mobile species' populations (through increases in prey abundance). Separately, fisheries management measures will also contribute to supporting mobile species populations.

Table 7. Indicative numbers of existing/planned initiatives for fish, birds, and marine mammals by marine plan region

Existing/ planned mobile feature initiatives	South West	North West	North East	East	South East	South
Fish (inc. migratory fish)	-	8	-	2	-	2
Birds (seabirds, waterbirds)	3	-	10	3	1	6
Marine mammals	3	1	1	1	2	1



4. Discussion

The analysis highlights the challenges in seeking to project the scale, location, and timing of future development activity. Environmental impacts are often very site specific. Thus, the spatial location of future development is important in understanding specific impacts/residual impacts and strategically linking development to the optimal locations to deliver MNG.

Ahead of policy development for MNG, there is currently a high level of uncertainty concerning how any requirement for MNG might be determined and thus many assumptions have been required in translating estimates of residual impact into a potential MNG demand. Consequently, the analysis should be seen as providing an order of magnitude indicative potential MNG requirement at this stage. Greater clarity will come once MNG policy has been determined. The Crown Estate's work to digitally map the seabed resource needed to meet future demand as well as the enhanced co-ordination of future activities out to 2050 could also help to reduce uncertainties surrounding future marine development and its spatial impacts.

It is noted that the policy approach to MNG has not yet been determined. While the analysis presents information relating to subtidal habitat loss/change, permanent disturbance and temporary disturbance, intertidal habitat loss, and subtidal species impacts, the actual scope of MNG may differ. While EIAs and wider environmental assessments typically include information that enables the direct loss/change of habitat to be assessed, they generally include less quantified information on the spatial extent and intensity of disturbance or species impacts. Should MNG policy seek to include wider aspects of project residual impacts, this could require developers to undertake more detailed assessment of disturbance and species impacts, and to provide additional information as part of their consent applications. Given the limitations of current scientific assessment tools, this will be challenging and potentially contentious.

4.1 Subtidal habitat

The analysis indicates that future marine development will potentially result in the combined loss of/change to subtidal mud, sand, and gravel habitats of the order of 25 to 30 km² per decade in the period to 2050. Given the uncertainties surrounding the location of future development, it is difficult to be more precise about the specific habitats and biotopes that will be affected. The main sectors contributing to subtidal habitat loss/change are predicted to be offshore wind and marine aggregates which account for up to 90 % of the habitat loss/change based on the assumptions used in the analysis.

The analysis identifies that future development will also lead to permanent (project lifetime) and temporary disturbance of subtidal habitats. This is estimated to be around 70 to 115 km² per epoch (permanent disturbance) and 65 to 85 km² per epoch (temporary disturbance). Based on the assumptions used in the study, marine aggregates are likely to be the primary sector contributing to permanent disturbance and offshore wind the primary sector contributing to temporary disturbance.

It is recognised that there is limited opportunity to recreate subtidal habitats in the marine environment as the scale of decommissioning activities on the seabed is and will remain small relative to the potential impacts from new development in the period to 2050. In order to facilitate MNG for subtidal habitats, it is likely to be necessary for any MNG regime to provide for subtidal impacts to be offset in a non like-for-like manner either through pressure reduction measures on subtidal habitat or creation of intertidal habitat. Both options would appear to be feasible based on indicative potential demand for MNG and the potential supply of interventions, depending on policy decisions by government. However, as there is limited scope for marine industries to reduce disturbance of marine habitats from their own activities, pressure reduction measures involving other marine sectors (such as fisheries) could only be pursued as part of a strategic approach led by government.

Any approach to estimate MNG demand will need to carefully consider how to include the marine aggregates sector. The absolute impact of the sector is a function of its total footprint in the marine environment, a combination of the spatial extent of Active Dredge Zones (ADZ - within which aggregate is extracted) and Secondary Impact Zones



(SIZ - the area within which the effects of sediment deposition on the seabed from dredging activities are experienced). Most licences issued are for renewal of existing (15 year) licences. These renewals do not necessarily lead to an increase in the footprint of existing dredging activity. Where new licences are sought these may result in one or more existing licences being relinquished, again potentially resulting in no increase to combined ADZ or SIZ. Conversely, it might be argued that MNG is a new policy and that it should apply to all new or renewal licences even if the overall footprint of marine aggregate dredging does not change.

4.2 Intertidal habitat

The analysis suggests that the calculated potential demand for intertidal habitat (over 1,000 ha intertidal sediment and 1,000 ha saltmarsh nationally per decade) may be a significant overestimate. It is considered that a more realistic estimate of potential demand (less than half of the above estimates) could be met from the supply of intertidal habitat creation/restoration and enhancement opportunities, particularly given the recent upsurge in interest in coastal restoration projects.

4.3 Species groups

There are significant challenges in seeking to quantify residual impacts to species groups and how species impacts might be incorporated into MNG. While Environmental Statements assess impacts to mobile species groups, such assessments generally tend to be qualitative and there is a lack of robust quantitative information. It has therefore not been possible within the constraints of this study to develop quantitative assessments of residual impact or potential MNG demand. Rather, the analysis has sought to identify the number of projects within marine plan regions over different time periods that might give rise to an MNG requirement. This analysis indicates that MNG measures for mobile species could be required in all marine plan regions in the period to 2050. Given that many of the mobile features that will be affected are afforded site-based protection due to their association with MPAs, it is likely that some of the residual impacts will be addressed under the Habitats Regulations and Marine and Coastal Access Act, with demand for net gain on top of these other statutory requirements.

5. Conclusions

Forecasting the scale, location and timing of future development activity is inherently challenging particularly over decadal time scales. Given that environmental impacts tend to be site-specific, any assessment of residual impacts from marine development activity will come with a large uncertainty. Similarly, given that MNG policy is in its infancy, it is also currently uncertain how residual impacts might be translated into a demand for MNG interventions. Nevertheless, it is helpful to start considering these issues now, as recognised by the recent announcement by The Crown Estate concerning its future spatial scenarios project which, inter alia, will enable identification of areas for restoration/recovery interventions within a wider marine spatial planning process. Greater clarity concerning MNG requirements will come as MNG policy becomes better defined.

It is likely to be feasible to assess residual impacts to subtidal and intertidal habitats based on information contained within Environmental Statements or wider environmental assessments, particularly measures of habitat loss/change. Such information could be used to calculate an MNG demand (within a metric) or to refine a financial contributions-based approach.

There are significant challenges in seeking to quantify the spatial extent and intensity of permanent and temporary disturbance, and residual impacts to mobile species groups. Such information is not typically available within statutory assessments and where quantified assessments are provided these are subject to high levels of uncertainty. Incorporating species impacts within MNG is likely to be especially challenging and require the collection of significant additional information and development of new assessment tools within EIA processes.



In simple terms, the overall scale of past and current restoration/enhancement and recovery interventions would appear to be at a level that, if continued, could help to deliver MNG, depending on the form that MNG takes. However, it should be recognised that in subtidal environments, it will be difficult to recreate significant areas of replacement habitat. MNG may therefore need to or alternatively look to improve the condition of subtidal habitats (through pressure removal, primarily bottom-trawling fishing pressure). This latter option could only be delivered as part of a strategic approach led by government.

6. Abbreviations/Acronyms

ADZ	Active Dredge Zone
BMAPA	British Marine Aggregate Producers Association
BNG	Biodiversity Net Gain
EIA	Environmental Impact Assessment
EUNIS	European Nature Information System
GW	Gigawatt
HVDV	High Voltage Direct Current
LPA	Local Planning Authority
LSO	Long Sea Outfall
MarESA	Marine Evidence based Sensitivity Assessment
MLW	Mean Low Water
MMO	Marine Management Organisation
MNG	Marine Net Gain
MPA	Maine Protected Area
MW	Megawatt
OWEC	Offshore Wind Evidence and Change Programme
PIZ	Primary Impact Zone
SIZ	Secondary Impact Zone
T&F Group	Strategic Net Gain Task and Finish Group
TCE	The Crown Estate



Appendices

Appendix A. Assumptions for estimating future demand

Aggregates

- Assume indicative 3 new licence applications p.a. across marine plan regions pro rata to existing number of licences in each marine region (The Crown Estate and BMAPA, 2021¹²)¹³;
- Assume average Active Dredge Zone (ADZ) size for each new site as indicative of permanent habitat change for 15 years of licence (plus 5 years recovery) (The Crown Estate and BMAPA, 2021¹²)¹⁴;
- Assume average Secondary Impact Zone (SIZ) size (for combined sediment plume and bedform effects) as 3 x ADZ for each new site as indicative of habitat disturbance for 15 years of licence¹⁵;
- Habitat affected assumed to comprise subtidal sands and gravels; and
- Assume mortality and disturbance of mobile species as negligible (N) or low (L) for all development locations.

Aquaculture (shellfish)

- Assume footprint of mussel farms increases linearly to meet 2030 and 2040 aquaculture strategy goals;
- Assume 1,000 tonnes of shellfish (mussels) every two-year growing cycle (i.e., 500 tonnes p.a.) occupies an area 5.46–7.26 km² (average 6.36 km²);
- Assume even distribution of new development across marine plan areas;
- Assume development occurs proportionally over mud, sand, and gravel habitats;
- Assume 0.1% of footprint subject to permanent habitat change over lifetime of development (anchors);
- Assume 6.6% (Wilding, T.A. & Nickell, T.D. 2013¹⁶, and ABPmer & Maritek, 2021¹⁷)¹⁸ area of footprint subject to permanent habitat change over lifetime of development (to 2050);

¹² The Crown Estate and BMAPA. 2021. Marine Aggregate Extraction 2021. The area involved – 24th annual report. Available at: <https://www.thecrownestate.co.uk/media/4242/the-area-involved-24th-annual-report.pdf> (Accessed 23/06/23).

¹³ Based on TCE and BMAPA, (2021¹²) there are 29 licences in East marine plan areas, 24 in South marine plan areas, three in South West marine plan areas and two in North West marine plan areas.

¹⁴ Based on TCE and BMAPA (2021¹²), there are 64 existing licences (includes 6 in Welsh waters) with a total licensed area of 1068 km² and an ADZ of 106 km². On this basis an average ADZ per licensed site is approximately 1.66 km².

¹⁵ Based on visual review of PIZ and SIZ in various marine aggregate EIAs.

¹⁶ Wilding, T.A. & Nickell, T.D. 2013. Changes in Benthos Associated with Mussel (*Mytilus edulis* L.) Farms on the West-Coast of Scotland. PLoS ONE 8(7): e68313. Available at: <https://doi.org/10.1371/journal.pone.0068313> [Accessed 23/06/23].

¹⁷ ABPmer & Maritek. 2021. Prospects and Opportunities for Large-scale Restorative Aquaculture in Scotland. Report to Crown Estate Scotland, December 2021. Available at: <https://www.crownstatescotland.com/resources/documents/prospects-and-opportunities-for-large-scale-restorative-aquaculture-in-scotland-low-res> [Accessed 23/06/23].

¹⁸ Wilding, T.A. & Nickell, T.D. 2013¹⁶ indicate habitat impacts limited to roughly 5 m either side of mussel lines; ABPmer & Maritek (2021¹⁷) indicate layout of mussel farm would entail 6 km of headlines in area of 0.91 km². Together these studies indicate that main habitat impacts would occur on 6.6 % of farm footprint.



- Assume negligible habitat disturbance outside of development footprint; and
- Assume mortality and disturbance of mobile species during operation as negligible (N) or low (L) for all development locations.

Aquaculture (seaweed)

- Assume footprint of seaweed farms increases linearly to meet 2030 and 2040 aquaculture strategy goals;
- Assume footprint of seaweed farms requires 1.05 km² for annual production of 40 tonnes kelp (based on ABPmer & Maritek, 2021¹⁷);
- Assume even distribution of new development across marine plan areas;
- Assume development occurs proportionally over mud, sand, and gravel habitats;
- Assume 0.1% of footprint subject to permanent habitat change over lifetime of development (anchors);
- Assume 1% of footprint subject to regular habitat disturbance over lifetime of development (mooring chains); and
- Assume mortality and disturbance of mobile species during construction and operation is negligible (N) (fish and birds) or low (L) (marine mammals - entanglement risk) for all development locations.

Carbon capture usage and storage

- Assume two projects progress in mid 2020s (East Coast Cluster (Teesside), HyNet (North West)) and two further projects progress in mid 2030s (Zero Carbon Humber and Bacton);
- Assume each pipeline has 100 km length:
 - Assume 5% of this length leads to direct habitat change (rock armouring, cable crossings) with width of 5 m;
 - Assume temporary habitat disturbance during installation along length of pipeline and width of 5 m;
- Assume development occurs proportionally over mud, sand, and gravel habitats; and
- Assume mortality and disturbance of mobile species during construction and operation is negligible (N) or low (L).

Coastal development (regeneration) (subtidal elements)

- Includes works to existing river and coastal walls, and works to bridges and public piers;
- Assume indicative 5 new licence applications p.a. entailing subtidal works split across marine plan regions pro rata;
- Assume development occurs proportionally over mud and sand habitats;
- Assume subtidal footprint of marine works is 1 ha;
- Assume 50% of footprint subject to permanent habitat change over lifetime of development;
- Assume 50% of footprint subject to habitat disturbance during construction; and
- Assume mortality of mobile species during construction and operation is negligible (N) and disturbance of mobile species during construction and operation is low (fish and birds) or negligible (N) (marine mammals) for all development locations.



Offshore wind farms

- Assume 2 GW installed capacity consented p.a. in English waters to 2030;
- Assume 2 GW installed capacity consented p.a. in English waters from 2031 to 2050;
- Assume projects to 2030 are located in planned development locations (pro rata to estimated capacity) Based on ABPmer & eftec (2022⁴);
- Assume projects from 2030 are located in North East marine plan areas (40%), East marine plan areas (20%), South West marine plan area (20%) North West marine plan area (20%);
- Development area is 150 km² per GW;
- Assume development occurs proportionally over mud, sand, and gravel habitats;
- Assume impacts of fixed and potential future floating offshore wind are similar;
- Assume 0.5% of development footprint subject to permanent habitat change over lifetime of development (foundation/scour protection with 40 m radius);
- Assume 1.5% of array footprint subject to habitat disturbance during construction (assume 300 km of intra-array cabling per 1 GW development with disturbance width of 5 m);
- Assume 5% of this intra-array cable area is subject to direct habitat change (rock armouring, mattresses);
- Assume 300 km of export cable (two HVDV cables @150km per 1 GW development) with disturbance width of 5 m during construction);
- Assume 5%¹⁹ of this export cable area is subject to direct habitat change (rock armouring, mattresses);
- Assume entire export cable area subject to temporary disturbance during construction;
- Assume mortality of mobile species during construction is negligible (N) (birds and mammals) or low (L) (fish). Assume mortality of bird species during operation is moderate and mortality of fish and mammals during operation is negligible (N);
- Assume disturbance of mobile species during construction is moderate (fish, birds, and mammals); and
- Assume disturbance of mobile species during operation is moderate (birds) or low (fish, mammals).

Oil and gas

- Assume one exploration (seismic survey) licence p.a. in English waters (East marine plan areas);
- Assume 1 exploration (drilling) licence p.a. in English waters (East marine plan areas);
- Assume 1 decommissioning projects p.a. in English waters (East marine plan areas) with no residual footprint (and thus ignored for purposes of the assessment);
- Assume footprint of marine works for exploration (drilling) projects is 0.5 ha;
- Assume development occurs proportionally over mud, sand, and gravel habitats;
- Assume 50% of footprint subject to permanent habitat change over lifetime of development (wellhead);
- Assume 50% of footprint subject to habitat disturbance during construction;

¹⁹ It is recognised that amount of rock armouring required can be very variable depending on location e.g., much higher percentage of rock armouring required for some Irish Sea windfarm export cables.



- Assume mortality and disturbance of mobile species during drilling is low (L) or negligible (N);
- Assume mortality of mobile species is low (L) or negligible (N) during seismic surveys; and
- Assume disturbance of mobile species is low (birds) or moderate (fish and mammals) during seismic surveys.

Ports

- Assume level of applications remains constant over time (10 x small, 5 x medium, 4 x large p.a.) spread across marine plan regions pro rata to existing number of ports²⁰;
- Assume footprints of works below MLW are 0.1 ha (small projects); 1 ha (medium projects) and 100 ha (large projects - to account for dredging requirements);
- Assume development occurs equally over mud and sand habitats;
- For small and medium projects:
 - Assume 50% of footprint subject to permanent habitat change over lifetime of development (reclamation/structures);
 - Assume 50% of footprint subject to habitat disturbance over the lifetime of the development (maintenance dredging);
 - Assume mortality and disturbance of mobile species during construction and operation is low (fish and birds, marine mammals) for all development locations;
- For large projects:
 - Assume 5% of footprint subject to permanent habitat change (reclamation/structures);
 - Assume 50% footprint subject to habitat disturbance over the lifetime of the development (maintenance dredging);
 - Assume mortality of mobile species during construction and operation is low (L) (fish, birds, marine mammals) for all development locations;
 - Assume disturbance of mobile species during construction is moderate (M) (fish) or low (L) (birds, mammals); and
 - Assume disturbance of mobile species during operation is low (L).

Power interconnectors and transmission lines

- Assume 1 x licence application p.a. for 100 km length of cable in English waters below MLW;
- Assume evenly distributed across marine plan areas;
- Assume development occurs proportionally over mud, sand, and gravel habitats;

²⁰ MMO (2017). Analysis for the North East, North West, South East and South West marine plan areas. Project MMO 1127. <https://www.gov.uk/government/publications/futures-analysis-for-the-north-east-north-west-south-east-and-south-west-marine-plan-areas-mmo-1127> [Accessed 23/6/23]. Report indicates the following numbers of major/minor ports - NE = 8; NW = 10; SE = 9; SW = 23. Department for Transport. 2018. Port and domestic waterborne freight statistics: data tables (PORT). <https://www.gov.uk/government/statistical-data-sets/port-and-domestic-waterborne-freight-statistics-port#all-port-traffic-totals-major-and-minor> [Accessed 23/06/23], indicates the following numbers of major/minor ports - S = 47; E = 18.



- Assume footprint of cable is 5 m width over length of cable (100 km) = 0.5 km² (50 ha);
- Assume 5% of this cable area is subject to direct habitat change (rock armouring, mattresses);
- Assume footprint of cable subject to temporary habitat disturbance during construction; and
- Assume mortality of mobile species during construction and operation is negligible (N) and disturbance of mobile species during construction and operation is low (fish and birds) or negligible (N) (marine mammals) for all development locations.

Power stations

- Assume one new large coastal power station built per decade in North West (mid 2030s) and South East (2040s) marine plan areas;
- Assume subtidal footprint of each development is 5 ha;
- Assume development occurs equally over mud, sand, and gravel habitats;
- Assume 50% of footprint subject to permanent habitat change over lifetime of development (reclamation/structures);
- Assume 50% of footprint subject to temporary habitat disturbance over the lifetime of the development (construction dredging);
- Assume mortality and disturbance of mobile species during construction is low (fish and birds, marine mammals) for all development locations;
- Assume mortality during operation is high (H) (fish) or low (birds, marine mammals); and
- Assume disturbance of mobile species during operation is low.

Recreational boating (subtidal elements)

- Assume 20 small projects p.a. in English waters with below MLW of 0.05 ha;
- Assume 10 medium projects in English waters with footprint below MLW of 0.5 ha;
- Assume 1 large project in English waters with footprint below MLW of 2 ha;
- Assume projects pro rata to number of ports across marine plan areas;
- Assume development occurs equally over mud and sand habitats;
- Assume 50% of footprint subject to permanent habitat change over lifetime of development (reclamation/structures);
- Assume 50% of footprint subject to habitat disturbance over the lifetime of the development (maintenance dredging); and
- Assume mortality of mobile species during construction and operation is negligible (N) and disturbance of mobile species during construction and operation is low (fish and birds) or negligible (N) (marine mammals) for all development locations.

Telecommunication cables

- Assume 1 x marine licence application p.a. for 100 km length of cable in English waters below MLW;
- Assume evenly distributed across marine plan areas;



- Assume development occurs proportionally over mud, sand, and gravel habitats;
- Assume footprint of cable is 1 m width over length of cable (100 km) = 0.1 km² (10 ha);
- Assume 5% of this cable area is subject to direct habitat change over width of 5 m (rock armouring, mattresses);
- Assume footprint of cable subject to temporary habitat disturbance during construction; and
- Assume mortality and disturbance of mobile species during construction and operation is negligible (N).

Tidal range energy

- Assume one development every ten years sequentially in NW, SW, and SE marine plan areas;
- Assume 20 ha of subtidal habitat subject to direct change (lagoon wall);
- Assume 100 ha of subtidal habitat subject to habitat disturbance during operation (maintenance dredging inside lagoon);
- Assume development occurs proportionally over mud, sand, and gravel habitats;
- Assume mortality of mobile species during construction is low (L) (fish, birds, marine mammals) for all development locations;
- Assume mortality of mobile species during operation is High (fish) or low (birds, mammals (assuming mitigation measures implemented));
- Assume disturbance of mobile species during construction is moderate (M) (fish, birds) or low (L) (mammals); and
- Assume disturbance of mobile species during operation is low (L).

Tidal stream energy

- Assume 1 MW p.a. installed in English waters pro rata across NW, SW, S and SE marine plan areas to 2050;
- Assume development occurs proportionally over mud, sand, and gravel habitats;
- Assume 0.5 ha of footprint per MW subject to permanent habitat change over lifetime of development (foundations);
- Assume 2.5 ha of footprint per MW subject to regular habitat disturbance over lifetime of development (mooring chains, scour);
- Assume 10 km of export cable with disturbance width of 5 m during construction (0.05 km²);
- Assume 5% of this export cable area is subject to direct habitat change (rock armouring, mattresses);
- Assume entire export cable area subject to temporary disturbance during construction;
- Assume mortality of mobile species during construction is low (L) (fish, birds, marine mammals) for all development locations;
- Assume mortality of mobile species during operation is Moderate (M) (fish) or low (L) (birds, marine mammals (assuming mitigation implemented)); and
- Assume disturbance of mobile species during construction and operation is low (L).



Wastewater treatment outfalls

- Assume three new LSOs are constructed p.a. pro rata across marine plan areas;
- Assume the maximum footprint of each LSO during construction is 1 ha (2 km x 5 m width);
- Assume 5% of footprint subject to permanent habitat change over lifetime of development outfall diffuser head);
- Assume 50% of footprint subject to habitat disturbance during operation (organic enrichment based on deposition model);
- Assume development occurs equally over mud and sand habitats;
- Assume mortality of mobile species during construction and operation is low (L); and
- Assume disturbance of mobile species during construction and operation is low (L).

Wave power

- Assume 1 MW p.a. installed in SW marine plan area to 2030 rising to 4 MW p.a. from 2031 to 2050;
- Assume development occurs proportionally over mud, sand, and gravel habitats;
- Assume 0.5 ha of footprint per MW subject to permanent habitat change over lifetime of development (foundations);
- Assume 2.5 ha of footprint per MW subject to regular habitat disturbance over lifetime of development (mooring chains, scour);
- Assume 10 km of export cable with disturbance width of 5 m during construction (0.05 km²);
- Assume 5% of this export cable area is subject to direct habitat change (rock armouring, mattressing);
- Assume entire export cable area subject to temporary disturbance during construction; and
- Assume mortality and disturbance of mobile species during construction and operation is low (L) (fish, birds, marine mammals) for all development locations.

Intertidal habitat

The eftc BNG market analysis study estimated direct loss of intertidal sediment and saltmarsh habitat based on the number of coastal planning applications in each LPA area and standard assumptions about the average scale of habitat loss. The estimates were made for the 10-year period 2011 to 2020.

- Assume losses of intertidal sediment and saltmarsh as a result of development activity continue at these levels in the period to 2050 with the same geographic distribution;
- Assume there is no temporary disturbance of intertidal habitat; and
- Assume mortality of mobile species as negligible (N); assume disturbance of mobile species is low (L) (fish and birds) and negligible (mammals) for all development locations.

