

COWRIE MCZFISH 2010

**Benefits and disadvantages of
co-locating windfarms and marine
conservation zones, with a focus on
commercial fishing**

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Acronyms

BSSG:	Balanced Sea Stakeholder Group
COWRIE:	Collaborative Offshore Wind Research Into the Environment
DECC:	Department for Energy and Climate Change
Defra:	Department for the Environment, Food and Rural Affairs
EIA:	Environmental Impact Assessment
EIS:	Environmental Impact Statement
EMS:	European Marine Site
ENG:	MCZ Ecological Network Guidance (NE & JNCC, 2010d)
FEPA:	Food and Environmental Protection Act
FLOWW:	Fishing Liaison with Offshore Wind and Wet Renewables group
FSIWG:	Finding Sanctuary Inshore Working Group
FSOWG:	Finding Sanctuary Offshore Working Group
FSSG:	Finding Sanctuary Stakeholder Group
IPC:	Infrastructure Planning Commission
ISMCZ:	Irish Sea Marine Conservation Zones
JNCC:	Joint Nature Conservation Committee
MCZ:	Marine Conservation Zone
MMO:	Marne Management Organisation
MPA:	Marine Protected Area
MPASAP:	Marine Protected Area Science Advisory Panel
NE:	Natural England
NFFO:	National Federation of Fishermen's Organisations
SAC:	Special Area of Conservation
SAP:	Marine Protected Areas Science Advisory Panel
SFC:	Sea Fisheries Committee
SPA:	Special Protection Area
ZAP:	Zone appraisal and planning

Executive Summary

Government has committed to the UK producing 30% of its electricity from renewable sources by the year 2020. In response, the UK offshore renewable energy industry has grown considerably since the first, small offshore demonstration site was commissioned in 2000. Installed offshore capacity is now estimated to be 1,342 MW, with a further 2,238 MW in construction. These developments constitute a significant boost to the UK economy, and further major investment will be required in order to meet the agreed targets. In support of offshore renewable energy development, The Crown Estate has recently offered areas of the UK shelf seas for renewable development under its Round 2, Round 2 Extension and Round 3 offshore windfarm development phases.

Government has also committed to marine conservation targets, and networks of marine conservation zones (MCZs) are to be introduced in English inshore and English and Welsh offshore waters by the end of 2012. The MCZ networks will be a significant tool for delivering Government's vision for clean, healthy, safe, productive and biologically diverse oceans and seas. The identification of MCZs, together with the development of management recommendations, is being carried out in a bottom-up manner by stakeholder groups supported by four regional MCZ Projects based around the English coast; this process is ongoing.

The commercial fishing industry is an important stakeholder in marine management matters. Historically, fishermen were able to move freely from place to place in order to pursue target species, but fishing has become more geographically constrained through time by other industries and activities at sea, including oil and gas, cables, shipping, ports and aggregate dredging. The introduction of windfarms and MCZs at sea has the potential to place additional constraints on where and how fishing can be undertaken.

In summer 2010, Ichthys Marine produced a report for Collaborative Offshore Wind Research Into the Environment (COWRIE) that identified options and opportunities to mitigate any adverse impacts on fishing activities that resulted from constructing and operating windfarms. One of the possible mitigation options identified was to co-locate windfarms with MCZs, so that MCZs are designated in the same areas as, or overlap with, windfarms. This mitigation option was predicated on the idea that when MCZs are designated, conservation objectives may require that some or all fishing activities are stopped inside those sites, while fishing activities may also be constrained by or excluded from offshore windfarms. Hence, if fishing was to be affected by both windfarms and MCZs, co-locating windfarms with MCZs might reduce their combined impact on the fishing industry.

The approach of attempting to minimise any adverse socio-economic impacts of MCZs through co-location has received attention in various Governmental policy documents. However, the implications of co-location for the fishing industry, as well as for stakeholders including windfarm developers, nature conservation agencies, the regional MCZ projects and fisheries managers, have yet to be assessed formally. Because the regional MCZ Project stakeholder groups are working quickly to identify MCZs and to recommend management objectives for the sites, producing a review document that briefly explored the potential benefits and disadvantages of co-location was considered worthwhile in an effort to inform stakeholders in the MCZ designation process.

Through a small number of interviews, a literature review, stakeholder consultation on an issues document and subsequent stakeholder review of a draft report, six potential benefits of co-location were identified. No attempt was made to rank these issues in order of importance or significance:

1. Co-location may minimise social and economic impacts on the fishing industry
2. Co-location discussions may support windfarm developers' efforts to engage with local fishing communities

3. Co-location may provide opportunities for windfarm developers to demonstrate their environmental performance
4. Restrictions on fishing activities within windfarms may support MCZ conservation objectives
5. Routine operations in co-located windfarms may support MCZ management efforts
6. Co-location may support the attainment of MCZ habitat protection targets

Six potential disadvantages of co-location were also identified: Again, no attempt was made to rank these issues in order of importance or significance

1. Turbines and windfarm infrastructure may prevent the attainment of MCZ conservation objectives
2. Co-location may increase responsibilities and costs for windfarm developers
3. Co-location may make gaining consent for developments more difficult, putting investment potential at risk
4. Co-location may limit access to fishing grounds inside windfarms that would otherwise be targeted
5. Co-location may require a compromise on where MCZs are located resulting in sub-optimal performance of the network
6. Concern that fishermen will not receive compensation for lost fishing opportunities if co-location occurs

Although some potential benefits were identified, in the course of completing this report it became clear that there is considerable concern over co-locating windfarms with MCZs. Essentially, stakeholders are uncertain about the implications of co-location because the MCZ monitoring and management guidance is being developed at the same time as the process for identifying the sites is moving quickly forward. Unknown risk factors including future environmental conditions, refinements of marine conservation objectives and approaches to renewable energy generation, or changes in the viability and participation levels of fishing and other activities, exacerbate the uncertainty.

For windfarm developers, uncertainties over potential additional responsibilities, costs and difficulties of gaining consent for developments because of co-location are considered to be putting the investment potential of the offshore renewable industry at risk. This is then thought to be jeopardising the attainment of UK renewable energy and emissions reductions targets, as well as risking a loss of investment to the UK economy.

For nature conservation interests, there is concern over whether conservation objectives can be met in co-located sites because of the presence of the windfarm infrastructure. There is also the question of what would happen if a co-located MCZ was shown to be failing to meet conservation objectives because of a windfarm, in particular there would be any additional costs for developers in mitigating adverse impacts.

Finally, and of key relevance to this report, analyses undertaken suggest that benefits will not necessarily accrue to fishermen from co-location. The effects of co-location on the fishing industry are likely to depend on the mix of active fisheries found in and around the windfarm and MCZ areas, the fisheries management regimes in those areas, willingness to fish inside windfarms, and other factors. This complexity means that the implications of co-location will have to be considered on a site-by-site basis.

In summary, more detailed information on conservation objectives for MCZs and on the management and monitoring regimes that will be imposed to meet those objectives is urgently needed in order for stakeholders to take informed decisions on co-location.

The findings of this report are solely those of the author, after reviewing relevant literature and having been informed by stakeholder consultation.

1. Introduction

1.1. Project background

The first offshore windfarm constructed in UK waters was in 2000 at Blyth, where two turbines totalling 4 MW capacity were installed (RenewableUK, 2010a). The offshore industry has grown considerably since that time, such that installed offshore capacity is now estimated to be 1,342 MW, with a further 2,238 MW in construction (RenewableUK, 2011).

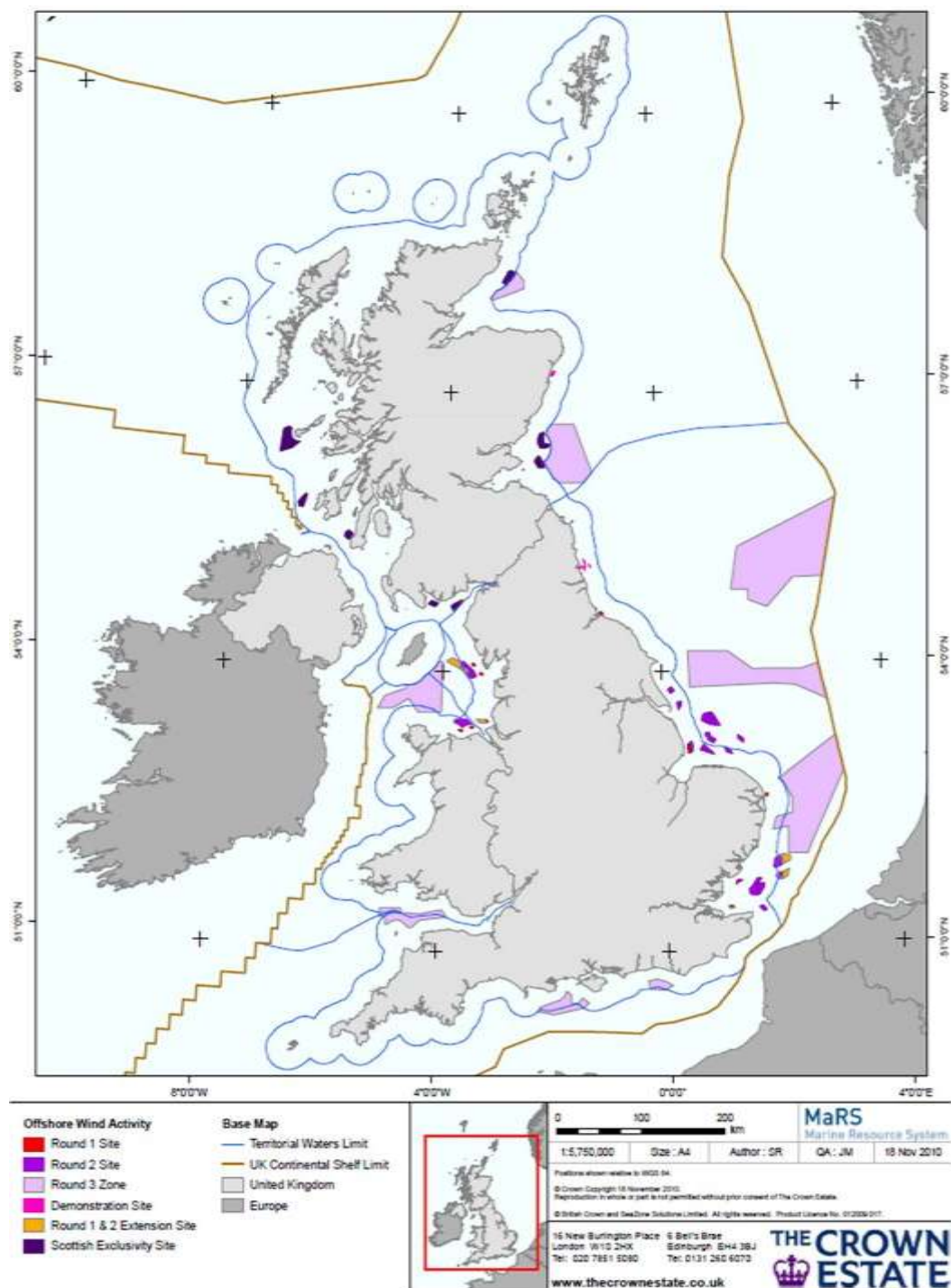
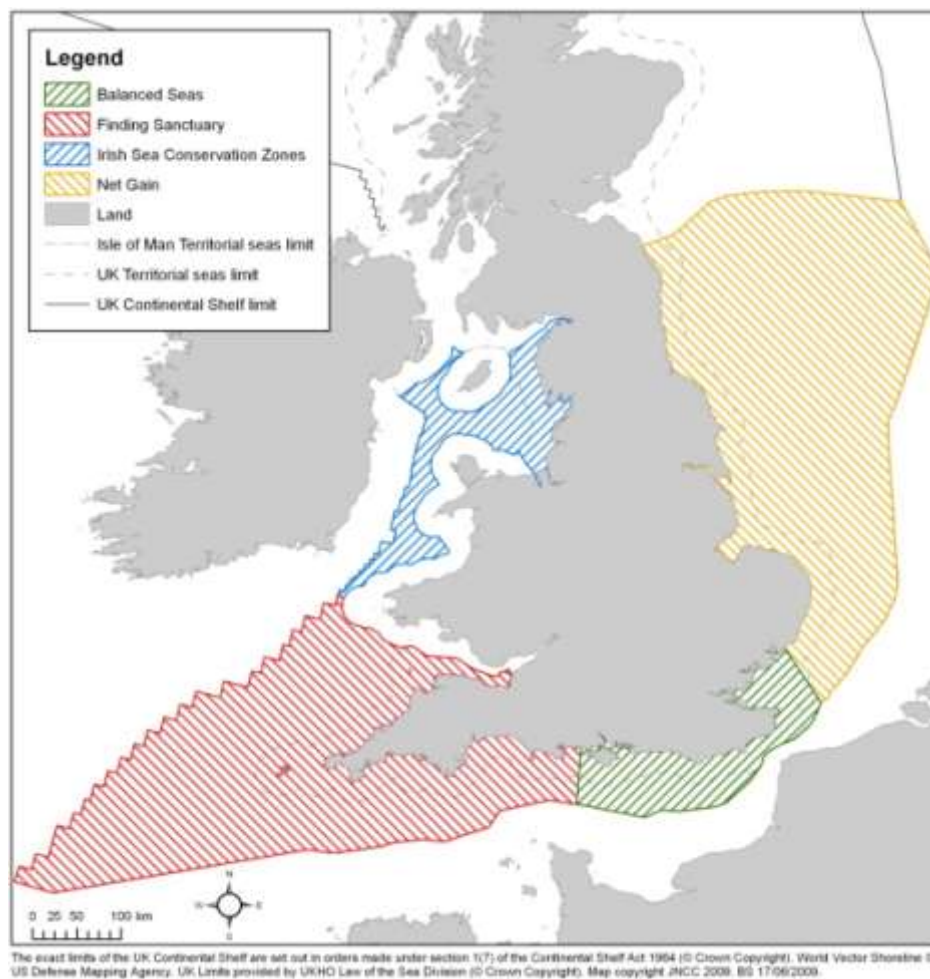


Figure 1: UK windfarm locations and development areas.

In part, the growth of the windfarm industry is because Government has committed to the UK generating 30% of its electricity from renewable sources by the year 2020, a figure derived from UK targets under the EU Renewable Energy Directive. The Committee on Climate Change noted that decarbonisation of the power sector by 2030 is key to achieving UK greenhouse gas emissions reductions targets, and that renewable generation, mainly from wind power, could make a significant contribution (CCC, 2008). The Crown Estate has recently offered areas of the UK shelf seas for development under its Round 2, Round 2 Extension and Round 3 offshore windfarm development phases (Figure 1).

In the late 1980s, the first large marine protected areas (MPAs) were designated around the UK coastline. Special Areas of Conservation (SACs) were established to protect specific habitats and species, while Special Protection Areas (SPAs) were established to protect rare, vulnerable or migratory birds and their habitats. Following Royal Assent of the Marine and Coastal Access Act in 2009, networks of new MPAs called marine conservation zones (MCZs) are now scheduled to be introduced around the English coast and in UK offshore waters off Wales in 2012. The MCZ networks will be of a greater scale than any other MPAs previously designated, and encompass a wider range of habitats. Importantly, the process of identifying sites and recommending management measures will be carried out by stakeholders. This requires stakeholders to be actively involved in discussions, and so four regional MCZ projects have been formed to promote and manage stakeholder input. The areas covered by the projects (but not by the MPAs themselves, which will cover only part of each project area) are shown in Figure 2.



Map reproduced from Natural England website (NE, 2009)

Figure 2: Map showing the spatial extent of the four regional UK MCZ projects.

Historically, commercial fishermen have been able to move freely from place to place in order to pursue target species. This relatively unrestricted movement by fisherman is important because fish, crustaceans and other mobile marine species may be found in different locations from season to season and year to year. On a shorter timescale, tides and time of day can affect the catchability or distribution of target species, while bad weather can limit the accessibility of some areas to fishing.

Commercial fishing may be geographically constrained to some extent by other industries and activities at sea. Oil and gas, cables, shipping, ports and aggregate dredging activities, together with Ministry of Defence sites and training activities, have been features of the marine environment for many decades, and fishing is commonly restricted in close proximity to these industries and installations. Now, the construction of offshore windfarms and the designation of MCZs may also impact the ability of some commercial fishermen to pursue fishing opportunities.

The development of an offshore windfarm may cause disruption to commercial fishing activities within the site, through the loss of access to fishing grounds while the windfarm is being constructed, as well as potentially for the operational life of the windfarm. This could occur through obstructing fishing grounds with cable routes, turbines and statutory 50 m turbine safety zones, or through regulatory exclusion. Voluntary exclusion by fishermen may also occur due to safety concerns, in particular in bad weather or strong tides when manoeuvring fishing gear and vessels can be difficult, and when the consequences of snagging anything on the seabed could be severe.

In June 2010, Ichthys Marine produced a report for COWRIE that considered the options and opportunities to mitigate any impacts that may occur to the fishing industry as a result of the construction of offshore windfarms (Blyth-Skyrme, 2010). The report aimed to provide fishermen, developers and other interested parties with a menu of possible mitigation options which would be of use in discussions related to current and future developments.

A range of different potential mitigation options were identified in the Ichthys Marine report. One of those identified was to co-locate windfarms with MCZs, so that MCZs are designated in the same areas as, or overlap with, windfarms. This was proposed because when MCZs are designated, conservation objectives may require that some or all fishing activities are stopped inside those sites, while fishing activities may also be excluded from windfarms. Hence, where fishing would be affected by both windfarms and MCZs, co-locating windfarms with MCZs might reduce their combined impact on the fishing industry. This report considers that mitigation option in more detail, and considers the potential benefits and disadvantages of that approach for windfarm developers, the fishing industry, nature conservation agencies, the regional MCZ projects and fisheries managers.

1.2. Fishing gears and their operation

For the purposes of this report, towed gears are defined as demersal fishing gears that must be actively moved along the seabed; these include otter trawls, beam trawls, scallop dredges, mussel dredges and oyster dredges. In turn, static gears are defined as stationary fishing techniques that rely on the target species moving to the gear; these include crustacean and whelk pots, anchored gill or tangle nets, and long-lines.

Towed demersal fishing techniques require contact to be maintained between the gear and the seabed, and some gears work by digging in to the surface sediments in order to catch target species sheltering there. This contact impacts seabed habitats and communities, although the effects vary between different towed gears, and different habitats and communities can be more or less resilient based on their structural complexity and the levels of natural perturbation experienced. The studied effects of these gears include high levels of bycatch (Hall and Mainprize, 2005), reduced benthic

community biomass and productivity (Hiddink *et al.*, 2006), reduced benthic species richness (Collie *et al.*, 2000) and direct impacts on habitats (Kaiser *et al.*, 2002).

The impacts of static gears on benthic systems are relatively little studied, but are generally considered to be less than towed gears. In the main, this is because of the smaller footprint of static gears and because they are also designed to rest on the seabed, rather than to penetrate the substrate. Studies have generally concluded that the use of pots and anchored nets can result in quantities of bycatch (Cook, 2003), ghost fishing of lost gear, sometimes for extended periods (Kaiser *et al.*, 1996; Bullimore *et al.*, 2001), and that some damage can result to attached benthic species (Johnson, 2002).

Other fishing techniques are quite specialised and are not considered in detail in this report. In particular, demersal drift netting and Scottish seining require large areas of open ground, clear of any obstructions, and so both are likely to be impacted significantly by windfarm construction and cable laying activities. In contrast, commercial angling seems unlikely to be constrained by the presence of turbines or by rough seabed characteristics, although it is possible that anchoring would be a concern inside windfarms or on sensitive habitats. Overall, fisheries managers should consider these three techniques to have relatively low collateral environmental impact on habitats and communities, but are not considered further in this report.

Pelagic trawling and pelagic drift netting are also specialised techniques that may be of interest to MCZ managers because of the potential for seabird and/or marine mammal bycatch in certain circumstances. However, while these techniques are likely to be impacted significantly by windfarm developments, considering these fisheries is beyond the scope of this report.

1.3. Offshore windfarms and commercial fishing

An issue of primary concern and interest to the fishing industry is the type of fisheries management regime that will be imposed within both windfarms and MCZs; essentially, the question is 'which, if any, fishing activities will be permitted inside these sites?'

Towed gears are likely to be of greatest concern to windfarm developers, because of their mode of operation; the risk is that the gear could snag on exposed or shallowly buried cables. However, compensation is required to be paid to fishermen where they sacrifice gear to avoid damaging windfarm infrastructure (BERR, 2008), so fishermen have little incentive to keep pulling and damage a cable when a snag occurs. It is also worth noting that while mussel and oyster dredges are towed gears, they tend to be physically very narrow, and are typically used over short tows and discrete beds of the target species. As such, it may be possible to use these gears inside windfarms without them being a threat to infrastructure, although both parties may benefit from fishermen discussing their intentions with the relevant windfarm developer before proceeding.

Hauling static gears and anchors may pose problems in terms of snagging cables and causing damage to windfarm infrastructure. However, depending on the nature of the seabed and the alignment of the turbines, it should be possible to set static gear away from known cable routes or installations. It is, though, still possible for the gear to move in strong tides or in bad weather and possibly to tangle with turbines or scour-protection material. This would be particularly the case where fleets of pots or nets and long-lines extend further than the inter-turbine spacing. In such circumstances, gear modifications may be necessary to allow safe operation. Cables may also move to some extent, or become exposed, requiring care to be taken if fishing.

For this project, publicly available environmental impact assessments or other official documents for 16 UK offshore windfarms were examined. These indicated that at eight (50%) of the sites no attempt will be made to seek specific restriction on fishing activities. At another four (25%) of the sites, the intention was reported to be to seek

500 m exclusions around turbines for towed gears only through application to the Secretary of State (BERR, 2007b), while documents for the last four (25%) of the sites did not clearly state the approach that would be taken towards fishing activities.

Even where fishing is permitted, it is unclear if fishermen will be prepared to work inside windfarms. While there is no indication that insurance premiums would be higher for vessels to fish inside (Blyth-Skyrme, 2010), manoeuvring vessels and gear around and between turbines is perceived to be difficult or dangerous, particularly in inclement weather or strong tides (Dr. Stephen Lockwood, MCZ Coalition, pers. comm.). It is noted that there are anecdotal reports of both towed and static fishing gears being used inside some windfarms, but no data or verified information were available to confirm this.

1.4. MCZs and permitted activities or industries

The MCZ networks will include two general types of sites. Reference-area MCZs will be introduced where *"all extraction, deposition or human-derived disturbance is removed or prevented"* (NE and JNCC, 2010d). While these sites will have strict criteria for protection, available guidance suggests that such reference-area MCZs will make up the minority of MCZs, as only one example (at least) of each broad habitat type and feature of conservation interest needs to be protected within each regional project (NE and JNCC, 2010d).

In contrast, the majority of the MCZs within the network will have protection levels *"which ensure the favourable condition of the MCZ features and no further degradation"* (NE and JNCC, 2010d). It is thought that Good Environmental Status will act as the minimum acceptable level for MCZ conservation objectives (Defra, 2010a).

An important consideration regarding MCZs is that there is no specific management advice yet available to define what activities will be permitted inside MCZs. This makes it difficult to determine what impact MCZs will have on fishing and other activities.

In terms of achieving conservation objectives for MCZs, towed demersal fishing gears are likely to be considered a particular risk because of their mode of operation and potential impact on seabed species, communities and habitats. This is likely to be the same for other extractive activities, such as aggregate dredging and elements of port development and maintenance, although these industries are not considered further in this report. The construction and operation of windfarms will also be considered in detail through a statutory consents process, as is the case now, because of the scale of the developments and because they introduce structures to the marine environment.

In order to undertake different activities inside MCZs, Clause 126 of the Marine and Coastal Access Act details that there will be a requirement for relevant authorities to be satisfied that the activities pose no significant risk to hindering the achievement of MCZ conservation objectives (UK Government, 2009b). Additionally, a precautionary approach to the protection of features may be necessary where there is not sufficient data or understanding (Defra, 2009a), while monitoring will be used to help evaluate effects and support adaptive management (NE and JNCC, pers. comm.).

In discussions with Natural England (NE) and JNCC staff (5th October 2010), it was made clear that there are no pre-conceptions regarding what activities will be permitted inside MCZs. Instead, it seems likely that the habitat types and conservation objectives, as well as the existing level of an activity, will be fundamental in determining what measures will be imposed. There is also the potential for mitigation to be designed or developed that allows different activities or industries to gain or maintain access to MCZs when proposed.

1.5. Guidance on the potential for co-locating windfarms and MCZs

Co-location is the result of siting windfarms and designating MCZs in the same or overlapping areas. In terms of order, the windfarm may come before the MCZ designation, or vice versa. Legislation and a variety of policy documents exist which provide statutory guidance on the approach to co-location to be taken in the MCZ network designation process. These do not necessarily provide a significant level of detail on co-location, but they do indicate that social and economic factors will be relevant, and that there are sometimes competing interests in meeting the need for an ecologically coherent network. Relevant documents include:

- a) The Marine and Coastal Access Act (UK Government, 2009b):

The Marine and Coastal Access Act, which received Royal assent in 2009, is the legislation that requires a network of MPAs to be established in UK waters, excluding the Scottish and Northern Irish inshore regions, by the end of 2012.

"Clause 117 (7). In considering whether it is desirable to designate an area as an MCZ, the appropriate authority may have regard to any economic or social consequences of doing so."

- b) Explanatory notes for the Marine and Coastal Access Act (UK Government, 2009a):

These notes accompany the Marine and Coastal Access Act.

"Note 335. Subsection (7) allows Ministers to take account of the economic or social consequences of designation. This ensures MCZs may be designated in such a way as to conserve biodiversity and ecosystems whilst minimising any economic and social impacts. Where an area contains features that are rare, threatened or declining, or forms a biodiversity hotspot, greater weight is likely to be attached to ecological considerations. Where there is a choice of alternative areas which are equally suitable on ecological grounds, socio-economic factors could be more significant in deciding which areas may be designated as an MCZ".

- c) Guidance on selection and designation of MCZs (note 1) (Defra, 2010b):

This document is addressed in particular to NE, the JNCC, and to the project teams and stakeholder groups of the MCZ projects. It provides guidance on the factors that the Government considers important for those involved in identifying potential MCZs to bear in mind when carrying out their selection work.

- *"Page 11: MCZs should exploit synergies where objectives are compatible (or multiple use of sites) because that is essential to allow the sustainable use of our seas. If an area has a degree of protection for other purposes, for example, it is already designated as a European marine site and is already subjected to restriction on other activities e.g. fisheries closures or military training areas, then we should consider whether it is suitable for protection of other features within the existing site boundary where compatibility can be achieved.*

We want to achieve the maximum ecological benefit for the minimum socio-economic cost. Therefore where sustainable socio-economic exploitation of our marine resources would also support ecological conservation objectives, we should take advantage of that. For example an area can provide conservation benefits through excluding activities for reasons of safety (e.g. exclusion zones around offshore wind turbines) or danger areas."

- *"Page 12: The existence of socio-economic interests will not prevent the consideration of an area for designation as an MCZ, nor compromise the achievement of an ecologically coherent MPA network, but will be considered as part of the process outlined here. In some cases the presence of socio-economic interests may actually afford protection of features of conservation interest and co-location*

may be mutually beneficial (e.g. wind farm sites, shipping lanes) where objectives could be compatible."

- *"Page 13: Providing it does not conflict with achieving an ecologically coherent network, it will be desirable to avoid designating MCZs that would be detrimental to ongoing, licensed or planned socio-economic activities."*

d) Offshore energy strategic environmental assessment (DECC, 2009).

This document reviewed and assessed the environmental implications of the draft plan/programme for licensing for offshore oil and gas, including gas storage, and leasing for offshore wind. It was designed to inform UK Government, and to provide routes for public and stakeholder participation in the process.

"Recommendation 14: Efforts are (or will be) underway to identify offshore MCZs/MPAs e.g. under the Marine Strategy Framework Directive, OSPAR and the Marine and Coastal Access Bill. Where the objectives of the conservation sites and renewable energy development are coincident, preference should be given to locating wind farms in such areas to reduce the potential spatial conflict with other users."

f) The Government's strategy for contributing to the delivery of a UK network of MPAs (Defra, 2010a).

This document described the UK Government's approach to delivering an ecologically coherent network of well-managed MPAs as part of the provisions of the Marine and Coastal Access Act 2009. It noted that in order to ensure it remains relevant, the document is subject to review because of the changing physical environment, scientific understanding and legal situation.

"Section 50. So while stakeholders can be involved in the process of providing scientific information on boundaries and assessment of the impact of the [European marine] sites, the socioeconomic effects of the sites on stakeholders cannot be taken into account under these directives."

Section 51. On the other hand, where we can consider a broader range of criteria in selecting other sorts of sites, as is the case with MCZs, which will make up a significant proportion of new MPAs in the foreseeable future, we have the opportunity for a much more inclusive approach to designating new sites and are committed to doing so."

g) MCZ project delivery guidance (NE and JNCC, 2010b):

This document comprises guidance and advice given to the MCZ projects by NE and the JNCC. It describes the process for the selection and recommendation of MCZs to Government, and is informed by existing and draft Government policy.

"Natural England, JNCC and Defra recognise the importance and advantages of taking economic and social consequences into consideration as fully as is compatible with the primary objective of creating an ecologically coherent network of Marine Protected Areas.... Taking account of socio-economic factors when trying to meet ecological criteria is a complex process and there is likely to be a range of possible permutations of sites within a regional MCZ project area that may meet the Ecological Network Guidance. It is important that stakeholders understand that, whilst meeting the Guidance is the ultimate aim, there are many ways in which this can be achieved, including minimising some of the potentially adverse social and economic impacts."

h) MCZ project; additional guidance for regional MCZ projects (NE and JNCC, 2010c):

This document provides some clarification to the regional MCZ projects and other stakeholders of a number of issues concerning the approach to socio-economic activities while meeting the guidance on what will constitute an ecologically coherent network of MCZs. It states:

"There are significant socio-economic benefits in integrating MCZs with existing activities; wherever possible regional stakeholder groups are encouraged to identify these synergies to provide for 'win win' situations. Regional stakeholder groups should ensure that consideration is also given to socio-economic activities that are licensed ... and being planned for, thus providing a level of 'future proofing' in the co-location decision making process.

If existing (and/or planned) activities in an area together exert a level of pressure deemed compatible with the conservation objectives, the area should be considered as an ideal area for recommendation as long as the favourable condition target can be achieved. This will require close liaison with the stakeholders with an active interest in the site. Where it is both feasible and consistent with the ENG, co-location of this sort will help to reduce conflicts of use elsewhere."

- i) MPAs Science Advisory Panel response to Finding Sanctuary; assessment of performance against principles (MPASAP, 2010):

This document is the response of the MPAs Science Advisory Panel (SAP) to the first Finding Sanctuary report on progress towards meeting the MCZ Ecological Network Guidance principles. The SAP provides scientific oversight and reviews the work of all four regional MCZ projects:

"2.2.3. [Windfarms] can act as stepping stones for invasive species (e.g. Crassostrea). There [are] some claims that subtidal cables can influence the electro-sensing ability of elasmobranchs. There is also evidence that man-made reefs concentrate existing fish, rather than resulting in increased stocks. Decommissioning wind farms could have negative impacts, but it is likely that future reliance on wind farms for energy supply will result in upgrading, not decommissioning. Existing foundations could be left in place as local reefs. These are all manageable/acceptable impacts when viewed against the potential gain from large MCZs. Avoiding existing or planned wind farms in the MCZ planning process could also put severe constraints on opportunities to protect certain marine habitats."

1.6. Project aims

This report aims to inform stakeholders in the windfarm development and MCZ designation processes by examining the potential benefits and disadvantages for commercial fishing and other interests of co-locating windfarms and MCZs. Windfarm developers, the fishing industry, nature conservation organisations, the regional MCZ projects that are designing the MCZ networks, and fisheries managers were consulted in the course of drafting this report.

It should be noted that this report has addressed the implications of co-locating windfarms with MCZs as are understood at the present time. The implications of future changes to marine conservation objectives or changes to requirements for decommissioning or upgrading turbines at the end of their operational life, as well as changes to fisheries interests and other activities, cannot be predicted. These issues constitute unknown but potentially significant risks to all stakeholders in taking any particular course of action with respect to co-location.

It should also be noted that the report has not attempted to address the implications for climate change targets, UK job creation and coastal economies, or other issues associated with not proceeding with windfarm developments. These issues are relevant to the wider discussion on renewable energy, but are not considered in scope for this report as they are dependent on additional factors that are not within the direct remit or control of the MCZ designation process. For the same reason, wider socio-economic implications for coastal communities of losing fishing opportunities, or any environmental and socio-economic implications for the UK of failing to achieve marine conservation objectives, have not been considered.

2. Methodology

2.1. Project approach

The long-term value of this report will depend on ensuring that the range of concerns and opportunities that different stakeholder groups associate with co-location are recognised and appropriately considered. As such, engagement with stakeholder groups involved with the MCZ designation process was considered vital.

In order to start the project, a small number of preparatory discussions were undertaken to identify key guidance documents and to briefly assess the current situation with regards to co-location. These were with NE, JNCC, Finding Sanctuary, the National Federation of Fishermen's Organisations (NFFO) MCZ Coalition and The Crown Estate.

Key legislation and associated guidance documents related to MCZs and the MCZ designation process were then reviewed to ensure that co-location of windfarms and MCZs was technically possible. Also, in order to gain greater insight to the detailed MCZ process, all existing regional and local stakeholder group reports from the four MCZ projects were examined.

The literature review and key comments or information items were subsequently used to create an 'issues' document, comprising lists of the potential benefits, disadvantages or concerns associated with co-locating windfarms and MCZs for key stakeholders.

2.2. Review and results of consulting on the 'issues' document

Following its creation, the 'issues' document was sent to RenewableUK (the trade and professional body for the UK wind and marine renewables industries), six offshore windfarm developers, The Crown Estate, DECC, Defra, the MMO, NE, the JNCC, four Sea Fisheries Committees (SFCs), the four regional MCZ projects, the NFFO, the New Under Ten Fishermens' Association, the Shellfish Association of Great Britain and the Sea Fish Industry Authority. The aim was to gather feedback on the identified issues, and to ensure that the report detailed the concerns and positions held on co-location as accurately as possible prior to consultation of the draft report.

Responses to the issues document were received from RenewableUK, one windfarm developer, The Crown Estate, the NFFO, two individual fishermen, Natural England and the JNCC, two of the regional MCZ projects and three SFCs. Defra also provided information regarding the updated and final version of Guidance Note 1 (Defra, 2010b).

In general, the issues document appeared to be well or moderately well received by the stakeholders that responded. Concerns were, however, expressed consistently over the lack of specific information regarding MCZ conservation objectives and what any resulting management regime would be. Concerns were also expressed over the additional costs that may result from MCZ designation for developers.

Importantly, RenewableUK provided a copy of their position statement on co-location. It concluded that although co-location offers potential for MCZs and for the offshore wind industry, there is too little information available currently (on management, responsibilities and costs) for co-location to be supported (RenewableUK, 2010b).

As a result of the comments received from all stakeholders, the lists of benefits and disadvantages were modified prior to producing the draft report for consultation. The draft report was then sent to the same stakeholders as the issues document. Responses were received from RenewableUK, one windfarm developer, The Crown Estate, an individual fishermen, the JNCC, three of the regional MCZ projects and three SFCs. Factual corrections or minor changes to text were made as a result of the consultation. Critical comments are also summarised, together with responses, in Appendix 1.

3. Co-location: Potential benefits

The following is a list of potential and perceived benefits of co-location that might accrue to sectors or industries as stakeholders in windfarms and/or MCZs. The order does not necessarily provide an indication of their relative significance, and each may be more or less relevant at any co-located site.

3.1. Co-location may minimise social and economic impacts on the fishing industry

There appears to be some expectation that co-location would result in the loss to fishing of just one sea area, whereas a separate windfarm and MCZ would result in the loss of access to two areas. In such cases, it might be expected that co-location would minimise the socio-economic impacts incurred by fishermen in comparison to establishing separate windfarms and MCZs. For example, notes from the regional MCZ project stakeholder group meetings include:

- *"There was a debate whether the group should be considering co-location as possible or not possible in case the easy option (no co-location) is chosen which would take more ground away from commercial fishing."* (FSIWG, 2010c);
- *"It was agreed that where wind farms can be co-located with MCZs (i.e. the ecological features are adequately protected), this will be highly beneficial to all concerned, and the project should make sure such opportunities are sought."* (BSSG, 2010);

However, while benefits may accrue to the fishing industry from co-location, this is not necessarily the case. In fact, fishermen who wanted and were able to access grounds inside windfarms may not be able to fish for conservation reasons if the area was also designated as an MCZ. Further, because towed gear fisheries appear more likely to be excluded from MCZs than static gear fisheries, static gear fishermen could benefit from separate windfarms and MCZs where gear conflict had been an issue in those areas. Gear conflict between static and towed gears can be a considerable issue for fishermen, and a number of fisheries management agreements have been established around the UK in order to limit or prevent its occurrence (Blyth *et al.*, 2002).

In the absence of clear fisheries management guidance for MCZs, it is difficult to determine where gains and/or losses may be made within the static and towed fishing gear sectors from co-location. However, in an attempt to increase understanding, three simple scenarios were conceptualised, with different combinations of fishing activity permitted inside a windfarm. In the first scenario, all fishing activities would be allowed to continue inside; in the second, static gears would be allowed inside the windfarm but towed gears would not; in the third, no fishing activities would be allowed inside the windfarm. In each of the three scenarios, two options were provided; one with co-location, and one with separate windfarms and MCZs.

In order to complete the interaction matrix, three combinations of MCZ management were also conceptualised. In the first, all fishing activities would be allowed to continue inside the MCZ; in the second, static gears would be allowed inside the MCZ but towed gears would not; in the third, no fishing activities would be allowed inside the MCZ.

The potential impact of the different management scenarios is described qualitatively in Tables 1 - 3 on the following pages. To assist in understanding the potential impact of each of the scenarios, a nominal 'score' was then attributed to the towed and static gear sectors on the basis of the likely effect of the management regimes adopted. Half a point was awarded or deducted for spatial gains or losses to the towed and static gear sectors fishing in one area. Hence, if access for all fishermen was lost to a co-located windfarm,

the score would be -1, comprising -0.5 for the static gear sector and -0.5 for the towed gear sector. If fishing was excluded from separate windfarms and MCZs, then the score would be -2, as both sectors would lose both areas. A score of 0.25 was awarded to static gears in situations where there was potential for those fishermen to gain somewhat from the avoidance of gear conflict in areas available to fishing.

In undertaking these analyses, it is assumed that fishing will occur inside windfarms where permitted. However, this may not be the case in reality, and even where there is assumed to be no impact on fishing activities and a score of 0 is given (e.g. in scenario 3, column 3), it should be noted that the presence of the turbines would still limit when and how fishermen would be able to access a windfarm site, and the turbines and safety zones would at the very least slightly decrease the area available for fishing.

Finally, taking account of any changes in the level of catches that may result from windfarm developments, or situations where a degree of overlap rather than complete co-location existed between the MCZ and windfarm, could not be included in this analysis. Also, effort displacement and knock-on effects are possible impacts resulting from any redistribution of fishing activity; these effects are difficult to predict and are site specific, such that generalisations cannot be made. As such, no attempt has been made to incorporate displacement into these analyses; it may, nevertheless, occur in situations where fishing effort is required to be redistributed (e.g. Dinmore *et al.*, 2003).

Table 1: Scenario 1, showing results where no fishing is allowed inside windfarms.

N.B. The total indicative 'score' assigned to the effect of each management combination on fishing activities is marked in bold text.

Interaction Matrix	MCZ: No fishing allowed	MCZ: Static gears allowed; No towed gears	MCZ: All fishing allowed
Co-locate Windfarm No fishing allowed	All fishermen lose windfarm-MCZ (-1) (-1)	All fishermen lose windfarm-MCZ (-1) (-1)	All fishermen lose windfarm-MCZ (-1) (-1)
Separate Windfarm No fishing allowed	All fishermen lose windfarm and MCZ (-2) (-2)	All fishermen lose windfarm (-1); Towed gears lose MCZ (-0.5); Static gears gain potential safe haven inside MCZ (+0.25) (-1.25)	No change in MCZ (0) All fishermen lose windfarm (-1) (-1)

The first column under Scenario 1 (Table 1), where no fishing is permitted in either windfarms or MCZs, appears to describe the situation that is imagined by many stakeholders concerning the management regimes applied to windfarms and MCZs. It would result in the greatest loss of ground for the fishing industry where separate sites were established, and the greatest benefits from co-location (calculated as the difference between the total score for separate windfarms and MCZs [-2] compared to the total score for co-located windfarms and MCZs [-1]). Under the scenario shown in the second

column, where no fishing is permitted in a separate windfarm and only static gears are permitted in the separate MCZ, the static gear sectors may benefit slightly in the MCZ from the avoidance of gear conflict. The actual benefit would depend on the specific grounds and on the mix of towed and static gears in use.

Table 2: Scenario 2, showing results where static gears are allowed inside windfarms, but towed gears are not.

N.B. The total indicative 'score' assigned to the effect of each management combination on fishing activities is marked in bold text

Interaction Matrix	MCZ: No fishing allowed	MCZ: Static gears allowed; No towed gears	MCZ: All fishing allowed
Co-locate Windfarm Static gears allowed; No towed gears	All fishermen lose windfarm-MCZ (-1) (-1)	Towed gears lose windfarm-MCZ (-0.5); Static gears gain potential safe haven inside windfarm-MCZ, but may still be affected by windfarm infrastructure (0.25) (-0.25)	Towed gears lose windfarm-MCZ (-0.5); Static gears gain potential safe haven inside windfarm-MCZ, but may still be affected by windfarm infrastructure(0.25) (-0.25)
Separate Windfarm Static gears allowed; No towed gears	All fishermen lose MCZ area (-1); Towed gears lose windfarm(-0.5); Static gears gain potential safe haven inside windfarm, but fishing may still be affected (0.25) (-1.25)	Towed gears lose windfarm and MCZ (-1); Static gears gain potential safe havens inside windfarm and MCZ, but may still be affected by windfarm infrastructure (2 x 0.25 = 0.5) (-0.5)	No change in MCZ (0) Towed gears lose windfarm (-0.5); Static gears gain potential safe haven inside windfarm, but may still be affected by windfarm infrastructure (0.25) (-0.25)

Under Scenario 2 (Table 2), as for Scenario 1, the greatest impact would come under the first column where fishing is not permitted inside the MCZ. In all other situations, the impacts were scored as being less than under Scenario 1, because of the potential for static gears to be used inside the sites, and for the static gear sectors to benefit by gaining exclusive use of the co-located or separate sites and thereby avoid gear conflict.

As in almost all other situations under the different scenarios, the benefits or losses will depend on the specific mix of fishing industry sectoral interests at the local level, and on the management measures applied to the fisheries in each site. Under Scenario 2, there is, though, the potential for the static gear sectors to benefit by avoiding gear conflict in both MCZs and windfarms where co-location does not occur.

The predicted impact and scores given under Scenario 3 (Table 3, below), are less than under the other two Scenarios. As with those Scenarios, the overall effect on fishing activities of co-location under Scenario 3 will depend on whether or not fishermen are

willing to fish inside windfarms, even if legally permitted. Although there is some anecdotal evidence of towed and static gear fisheries occurring in windfarms, there is still considerable uncertainty about how common or accepted fishing within windfarms will be amongst the wider community of fishermen.

Table 3: Scenario 3, showing results if all fishing activities are allowed inside windfarms.
N.B. The total indicative 'score' assigned to the effect of each management combination on fishing activities is marked in bold text

Interaction Matrix	MCZ:	MCZ:	MCZ:
	No fishing allowed	Static gears allowed; No towed gears	All fishing allowed
Co-locate Windfarm All fishing allowed	All fishermen lose windfarm-MCZ (-1) (-1)	Towed gears lose windfarm-MCZ (-0.5); Static gears potentially gain safe haven inside windfarm-MCZ, but fishing may still be affected by windfarm infrastructure (0.25) (-0.25)	Impacts minimised but fishing may still be affected by windfarm infrastructure (0) (0)
Separate Windfarm All fishing allowed	All fishermen lose MCZ (-1); All fishing allowed inside windfarm, but may still be affected by infrastructure (0) (-1)	Towed gears lose MCZ (-0.5); Static gears potentially gain safe haven inside MCZ (+0.25); All fishing allowed inside windfarm, but may still be affected by infrastructure (0) (-0.25)	No change in MCZ (0) Impacts minimised but fishing may still be affected by windfarm infrastructure (0) (0)

In summary, the analyses are highly simplified, but they suggest that benefits would not automatically accrue to all commercial fishing sectors from co-location. Where fishing activities are prohibited or only static gears are allowed inside MCZs, some fishermen may benefit from co-location. In contrast, co-location appears to provide no benefits to the fishing industry if fishing is allowed to continue at the existing level within MCZs.

It is clear that local knowledge of fishing grounds and fishing activities will be needed in order to understand the social and economic impacts of co-locating windfarms with MCZs. Information on the value of fishing activities by different sectors in different areas, as well as a clearer understanding of the management regimes that will be applied in windfarms and MCZs, will help in determining whether co-location would be less impacting than establishing a separate windfarm and MCZ in any particular case.

3.2. Co-location discussions may support windfarm developers' efforts to engage with local fishing communities

Engaging local stakeholders in order to generate productive input to developments can be a difficult task. Although co-location would not automatically provide benefits to all fishermen, discussing and working through the options for co-location in an effort to minimise social and economic impacts may provide a useful focus for discussions between the fishing industry and developers, and lead to improved working relationships. Of course, discussions may result in coming to the conclusion that co-location is not desired by the fishing community, but that is also a valid result.

The level of importance of engaging the fishing community to a windfarm developer is likely to be dependent on the level of fishing activity present in the development site. Essentially, improving or building effective relations may be of relatively minor importance, or it may provide significant benefits to windfarm developers in their efforts to work with fishing communities.

It is relevant to note that the demonstration of early, structured and ongoing stakeholder engagement is a requirement for Infrastructure Planning Commission (IPC) applications (TheCrownEstate, 2010).

3.3. Co-location may provide opportunities for windfarm developers to demonstrate their environmental performance

Windfarm developments are commercial enterprises, and developers are working to promote environmental sustainability. Co-locating windfarms with MCZs may therefore provide developers with marketing or public relations opportunities linked to the wider environmental sustainability of offshore windfarms.

Government's objectives for the MCZ projects are centred around the aim of promoting marine environmental protection and sustainability. Defra has stated:

- *"We rely on our oceans and seas for jobs, food, resources including renewable sources (e.g. wind and tidal power, oil and gas), and recreation. They also mitigate climate change. It is easy to see, therefore, how our health and the health of our planet depends in no small part on the condition of our oceans and seas. We need to act to protect our marine environment from the threats facing it."* (Defra, 2010c).

These aims are consistent with those of the renewable energy sector. For example:

- *"Wind is the world's fastest growing renewable energy source, and this trend is expected to continue with falling costs of wind energy and the urgent international need to tackle CO₂ emissions to prevent climate change."* (RenewableUK, 2010c).

Co-locating a windfarm with an MCZ would confirm that the impact of the windfarm on the marine species, communities and habitats found in the site was sufficiently low that favourable condition of the site could be achieved. The SAP commented:

- *"The guiding principle in considering existing zoning should be that if the area contains ecologically important habitats or species, then it should be considered for the establishment of a MCZ. Given the pressure on the marine environment, the aim should be to collocate compatible activities whenever possible."* (MPASAP, 2010).

Some windfarms have been co-located already with SACs and SPAs, and it is impossible at the level of detail of this report to determine the value of marketing or public relations opportunities that could be derived from co-location with MCZs. However, it seems likely that this could be used to add to the message regarding the wider environmental sustainability of windfarm developments.

3.4. Restrictions on fishing activities within windfarms may support MCZ conservation objectives

The Government's vision is for clean, healthy, safe, productive and biologically diverse oceans and seas, while fishing is one of the activities that has been identified as impacting the marine environment (Defra, 2008). The UK Secretary of State has the power to prohibit certain activities, including fishing, within designated safety zones for up to 500 m around turbines located within the UK Renewable Energy Zone (BERR, 2007a). If fishing activities were excluded from windfarms, the result may therefore support conservation objectives in co-located MCZs.

At present, there is no specific guidance available on the fisheries management regime that will be imposed in MCZs. Reference area MCZs will, though, comprise areas where *"all extraction, deposition or human-derived disturbance is removed or prevented"* (NE and JNCC, 2010d). It therefore appears highly unlikely that any fishing activities (or windfarm developments) will be permitted in reference area MCZs.

In contrast, some fishing activities may be allowed to continue in the other sites in the MCZ networks (NE & JNCC pers. comm.). While MCZ objectives should in any case be met through excluding potentially damaging activities, it is possible that MCZ objectives would be met more easily or more quickly where more fishing activities were excluded from sites because of being co-located with windfarms.

The idea that environmental benefits may be derived through excluding activities from co-located sites has support from the SAP, which stated:

- *"Wind farms, for example, may be suitable for MCZs (although not for Reference Zones). They are good in the sense of excluding some disruptive human activities."* (MPASAP, 2010).

It should be noted that displacing fishing effort may result in increased environmental impacts in areas which were otherwise relatively unimpacted (Dinmore *et al.*, 2003), or in fishermen being pushed into more marginal areas, which may have negative environmental implications through requiring increased fishing effort and / or higher bycatch in order to produce the same catches. Nevertheless, excluding even the lowest impact fishing activities from co-located sites may support the achievement or maintenance of favourable condition of MCZs.

3.5. Routine operations in co-located windfarms may support MCZ management efforts

A stated objective of the Marine and Coastal Access Act 2009 is *"to recover and protect the richness of our marine environment and wildlife through the development of a strong, ecologically coherent and well managed network of marine protected areas, that is well understood and supported by all sea users, by 2012"* (Defra, 2009b). Maintaining effective management control over potentially damaging activities undertaken within MCZs will be challenging, but will also be key to ensuring that the networks deliver environmental benefits.

The regular monitoring and maintenance activity that is undertaken around windfarms may act to deter the undertaking of any activities within co-located MCZs in violation of a management regime. Although there is no suggestion that windfarm developers should take on any enforcement responsibilities, information collected as part of routine windfarm operations may be useful to enforcement agencies. Such information provision appears likely to have relatively minor cost implications. RenewableUK stated:

- *"In addition, definitions on the enhancements and positive impacts of co-location need to be stated for different industry/socio-economic activities. For example: Enforcement and Security- increased surveillance of site"* (RenewableUK, 2010b).

3.6. Co-location may support the attainment of MCZ habitat protection targets

The Ecological Network Guidance provides a summary of the proportions of different habitats that should be protected inside MCZs within each of the regional MCZ project areas in order for the MCZ network to be considered ecologically coherent (NE and JNCC, 2010d). Table 5 in that document provides the figures for protection, and these range from 11 - 25 % of high energy circalittoral rock and 15 - 30 % of subtidal sand, to 25 - 42 % of a number of intertidal, soft-sediment habitats. These targets represent considerable areas of seabed, but the document also provides guidance on identifying sites: It states:

- *"Impacts and feature vulnerability: Sites which best contribute to achieving the network design principles and further ecological considerations should be identified as MCZs, regardless of current degradation."* (NE and JNCC, 2010d).

Although MCZ habitat protection targets may be met through different MCZ network designs, if it is assumed that there is a chance that windfarms may be constructed in what are assessed as being sites that best contribute to achieving the network design principles, then it appears that there is some potential for the targets to be missed if co-location with windfarms is not considered. In this regard, the SAP noted:

- *"Avoiding existing or planned wind farms in the MCZ planning process could also put severe constraints on opportunities to protect certain marine habitats."* (MPASAP, 2010).

At the time of writing, it is understood that Natural England and JNCC are undertaking a gap analysis of the habitats specified in the Ecological Network Guidance (NE and JNCC, 2010d). Draft or preliminary findings may already be available to the Regional MCZ projects. The aim of this work is to identify where protection needs to be achieved in order to meet the criteria for ecological coherence. Existing sites that protect relevant habitats, for example the SACs designated for sandbanks, count towards the site protection targets.

The information that is derived from the NE and JNCC gap analysis will help the regional MCZ project teams to identify the MCZ networks, including helping to determine the need or otherwise for co-location to occur.

4. Co-location: Potential disadvantages

The following is a list of potential and perceived disadvantages of co-location that might accrue to sectors or industries as stakeholders in windfarms and/or MCZs. The order does not necessarily provide an indication of their relative significance, and each may be more or less relevant at any co-located site.

4.1. Turbines and windfarm infrastructure may prevent the attainment of MCZ conservation objectives

A question of fundamental importance concerning co-location is whether the physical presence of the turbines and cables, together with any associated scouring, would prevent an MCZ feature from reaching or maintaining favourable condition. The use of large quantities of scour protection material could further limit the potential for a site feature to be considered sufficiently natural that it would meet conservation objectives (NE and JNCC, 2010a). These issues would need to be answered at the EIA stage of site development.

While approaches to mitigate adverse impacts may be identified, comments from MCZ stakeholder groups suggest that there is at least some doubt about the compatibility of windfarms with MCZs in soft sediment areas. It was noted:

- *"Habitat type 8 (subtidal mud): Replacement of habitat of subtidal mud with hard structures. Soft sediment species loss and disturbance = Not compatible"*. (ISM CZ, 2010).

In contrast, an indication of the potential ecological acceptability of co-location was provided by the SAP, in relation to the Atlantic Array windfarm site:

- *"The issue of whether such co-location was desirable/feasible was discussed by the SAP and, although there were advantages and disadvantages, such co-location was considered acceptable and potentially beneficial from a scientific point-of-view."* (MPASAP, 2010).

As well as habitat modification, questions remain over the effects on marine species of electro-magnetic fields (EMF) from buried power cables. Elasmobranch species (e.g. sharks and rays), eels and, possibly, cod and flounder have been shown to react to the presence of cables, although the impact is thought likely to be small overall (Wilhelmsson *et al.*, 2010). The SAP has also commented on EMF:

- *"There [are] some claims that subtidal cables can influence the electrosensing ability of elasmobranchs."* (MPASAP, 2010).

Wilhelmsson *et al.* (2010) also considered the issue of disturbance to fish from noise generated by operational windfarms. That report concluded that although there were limitations in survey design and scale of the studies thus far conducted, there was no evidence of fish avoiding operational windfarms and that, based on current knowledge, impacts should be very local to the turbines (i.e. in the order of a few m). Noise during construction (e.g. from piling), may still be an issue over long periods, however.

Overall, the potential for a windfarm to prevent the attainment of MCZ conservation objectives will need to be considered on a site by site basis. Key considerations may be the footprint of the site in comparison to the area of conservation interest, and the likely ecological role of any hard substrata in that system. Further work to understand the effects of EMF may also be needed (RenewableUK, 2010b). Existing understanding does, though, suggest that turbines, cables and other infrastructure would not necessarily prevent MCZs from attaining conservation objectives through the EIA process.

4.2. Co-location may increase responsibilities and costs for windfarm developers

Windfarm developers are required to take account of the financial viability of, and costs associated with, their developments. Developers may therefore be unwilling to commit to co-location with MCZs without an assurance that associated monitoring, mitigation or maintenance costs would not greatly increase. At present, there appears to be insufficient information on monitoring requirements, which has led to concerns.

The Marine and Coastal Access Act asserts that the responsibility for costs associated with monitoring MCZs lie with the Statutory Nature Conservation Agencies. It states:

- *"Clause 124 (3). For the purposes of complying with its duty under this section, the appropriate authority for any area may direct the appropriate statutory conservation body for that area to carry out such monitoring of MCZs in that area as is specified in the direction."* (UKParliament, 2009).

Irrespective of whether windfarm developments are located inside or outside MCZs, standard Food and Environmental Protection Act licence conditions require developers to monitor potential environmental impacts of those developments for three years (Weiss *et al.*, 2009). The concern, though, is that the amount of information needed for monitoring, and hence the associated costs, will increase inside MCZs. No figures for the monitoring costs associated with windfarms sited inside or outside MCZs were available to this project, but experience of monitoring developments located in EMSs prompted RenewableUK to produce a co-location position paper, which noted:

- *"Increased baseline survey data collection (whether carried out by developer, JNCC or by Natural England- this has knock-on costs of delay to project). An example is London Array which had to be split into two phases to allow three years of operational bird data to be gathered before being allowed to construct phase 2. This has very significant cost implications."* (RenewableUK, 2010b).
- *"Table 1: Potential scenarios on the renewable industry from MCZ co-location:*

Scenario	Impact of MCZ
Best	No impact
	No requirement beyond normal monitoring
	No requirement beyond SAC
	Additional cost beyond SAC
	Prohibitively high cost
Worst	Banned

The industry would be happy with the top 2 scenarios and could possibly accommodate the third scenario, on some MCZ sites, if there was clear scientific data and evidence for doing so. However anything above this would not be acceptable to the industry and co-location is extremely unlikely to be possible." (RenewableUK, 2010b).

Although there is no justification for monitoring requirements in MCZs in excess of those required in EMSs (NE, pers. comm), and so the 'worst' three scenarios detailed in RenewableUK's position paper appear unfounded, RenewableUK's position paper on co-location detailed a number of other situations where costs for developers could increase if MCZs are designated with windfarms; these included where restrictions on timing of construction or operational activities were imposed and where a requirement to micro-site turbines would result in additional cabling complexity. Restrictions on construction may occur in any case due to existing nature conservation or fisheries constraints, but

where turbine installation vessels can cost £100,000+ per day, and cabling may cost £300,000- £400,00 per km (Renewable UK, pers. comm.), any delays or complications have potentially large financial implications. Time and effort spent in collaborating with the nature conservation agencies over operational activities undertaken within co-located windfarms will also have additional cost implications in MCZs in comparison to developments located outside of designated nature conservation sites.

4.3. Co-location may make gaining consent for developments more difficult, putting investment potential at risk

Gaining consent for windfarm developments inside MCZs may pose additional challenges in comparison to gaining consent for sites outside MCZs, in terms of potentially needing to prevent or minimise adverse environmental impacts through mitigation. While additional cost may be an issue for developers (discussed in Section 4.2), there is also a risk that consent may not be gained, posing a risk to the investment potential of offshore windfarms.

On consenting, notes from the regional MCZ projects suggest that there is a lack of clarity on the potential for additional costs and risks to consenting to be incurred by developers seeking to construct windfarms that may be co-located with MCZs:

- *"The renewables industry is hardening its view against co-location of wind farms and MCZs since it could damage the consents process and lead to extra costs. They are not getting more definitive compatibility guidance..." (FSOWG, 2010a).*
- *"Even with a Government policy decision that co-location was OK, there would still be costs borne by the industry. These costs include not only marginal increases to construction/operating costs but also the perceived risk to investment and obtaining planning consent, both of which may limit the ability of developers to access the necessary investment finance to take projects forward." (FSIWG, 2010b)*

In order to support the MCZ designation process, the Finding Sanctuary Project produced an interim 'compatibility matrix' (FSOWG, 2010b). This provided an initial assessment of the likelihood that a range of activities are compatible with maintaining the ecological features of nine seafloor habitat types and eight water column features. The assessment determined that the compatibility of operational marine renewable energy generation facilities was not known.

In the absence of clear guidance, developers are faced with the issue of trying to address unknown levels of risk associated with gaining consent for co-located sites. Although at least one developer is reportedly engaging with NE to reduce uncertainties around co-location (NE, pers. comm), developers have expressed a high level of concern that this unknown risk from co-location could affect the multi-billion investment potential of offshore windfarms, and hence the potential for the offshore renewable energy sector to support the achievement of UK emissions reduction targets (RenewableUK, pers. comm.). A regional MCZ project stakeholder group member also stated:

- *"It is irresponsible of Finding Sanctuary to nominate MCZ in areas earmarked for renewables on the basis of stimulating discussion because in the current financial market this could scare off investors." (FSSG, 2010).*

4.4. Co-location may limit access to fishing grounds inside windfarms that would otherwise be targeted

It is possible that the fishing industry could incur greater social and economic impacts through co-location than if separate windfarms and MCZs were established. If a windfarm was constructed on a favoured fishing ground and fishermen were willing and able to continue fishing, then co-location with an MCZ that prohibited fishing would

result in those fishermen instead being displaced, potentially onto less productive grounds. In such circumstances, designating a separate MCZ could be less impacting to fishermen.

Fishermen may also incur negative social and economic impacts if co-location displaced fishing activity onto similar grounds that were further away from port, requiring more time and fuel to be spent transiting to the fishing grounds. Concerns over longer transit times between fishing grounds and port in bad weather could reduce the number of days that fishermen would be able to fish, further reducing profitability.

Displacement is a complex issue, and the effects are difficult to predict. Where fishermen are displaced, knock-on impacts may result to other fishermen, through increased competition for space, gear conflict and local resource depletion. As noted in Section 3.4, displacement may also result in more sensitive or less fished and less impacted areas being fished, or could result in more marginal areas, for example with higher levels of bycatch, being fished harder in order for fishermen to catch the same amount.

Tables 1 - 3 describe the potential impacts on the towed and static gear sectors under different windfarm and MCZ management regimes. The picture is complicated, and local knowledge of fishing grounds and fishing activities will be needed in order to fully understand the issues and to determine if establishing separate windfarms and MCZs would, in fact, be less impacting on fishing activities than co-location.

4.5. Co-location may require a compromise on where MCZs are located resulting in sub-optimal performance of the network

Where a windfarm is located away from what is determined to be the best example of a habitat for marine conservation, then co-locating an MCZ with that windfarm could result in sub-optimal performance of the MCZ network overall.

The Marine and Coastal Access Act is relatively clear on the factors which may be considered in selecting sites. It states:

- *"Where there is a choice of alternative areas which are equally suitable on ecological grounds, socio-economic factors could be more significant in deciding which areas may be designated as an MCZ."* (UK Government, 2009b).

This guidance makes it clear that socio-economic issues may be deciding factors, but that they only become significant at the point at which a choice needs to be made between sites of equal ecological value. The Ecological Network Guidance provides the detailed basis for what constitutes an ecological coherent network of MPAs, but it also confirms that sites must be selected for designation on the basis of their ecological value first and foremost (NE and JNCC, 2010d).

Seeking opportunities to avoid adverse socio-economic impacts on any interest group may result in the regional MCZ projects recommending ecologically sub-standard sites for designation. This has been noted by the SAP, which commented in their response to the first reports provided to them by the regional MCZ projects. The SAP said:

- *"All of the Regional Projects have so far taken an approach of mapping fishing effort and then designing MCZs around areas of high fisheries use or value. The stated aim is to minimise socio-economic impacts on fishermen. However, such an approach carries several risks: (1) that sites will be chosen for MCZs that are currently second rate from an ecological perspective; (2) that avoidance of such areas could undermine connectivity of MCZs; or (3) other stakeholders may feel that unfair advantages are being given to fisheries in the planning process."* (MPASAP, 2010).

An aspect of the network designation that may provide some room for manoeuvre in terms of co-location and taking account of social and economic factors is that the quality of data on seabed habitats may not be sufficiently high in many instances for detailed

comparisons of ecological value to be undertaken. Essentially, it may be difficult to focus purely on the ecological value of different areas when attempting to make objective site selection assessments. The SAP commented on the quality of seabed data:

- *"Accuracy of information of seabed types is obviously an issue: The UKSeaMap data layer is the result of substantial work by DEFRA contractors and has been through a process of audit. It should therefore be treated as the "best available evidence" unless specific, reliable data to the contrary are available. Whilst UKSeaMap does give an indication of the sort of seabed types and their distribution, it is clear that some areas that might be selected to represent a particular broadscale habitat may turn-out to be a different broadscale habitat. Where large areas are being considered for MCZ (e.g. offshore) the SAP do not view this as a big problem, as 'on average' the EUNIS L3 [broadscale habitat] designation will be correct. UKSeaMap is known to be incorrect at particular locations and if it is being used to identify a small, specific region, then that designation should where possible be supported by evidence from other data layers or additional information."* (MPASAP, 2010).

4.6. Concern that fishermen will not receive compensation for lost fishing opportunities if co-location occurs

The payment of compensation by developers for lost fishing opportunities is a contentious issue and may not always be appropriate. The Fishing Liaison with Offshore Wind and Wet Renewables (FLOWW) group has provided guidance on settling on and distributing any compensation with the fishing industry (BERR, 2008). To date, it is understood that, in some cases, financial assistance has been provided to fishermen by windfarm developers where fishing opportunities were considered to be lost.

At the time of writing this report, it is not clear if financial assistance will be offered to businesses adversely affected by MCZ designations, although Government will review the economic impact assessments that are currently being undertaken when making the final decision on the MCZ networks (NE, pers. comm). A lack of financial assistance resulting from MCZ designation could cause concern within the fishing industry if it eliminated the possibility of receiving recompense for fishing opportunities lost within co-located windfarms and MCZs. It was commented:

- *"The fishing representatives were concerned that if an MCZ is co-located within a wind farm area, then it could mean that developers would not be liable to pay compensation and they were keen to point out how valuable the North Devon area is to their industry and to reinforce that these fishermen are not able to diversify."* (FSOWG, 2010a)
- *"There has been a shift in North Devon fishermen's view on co-location as displacement compensation may not be paid to them by wind farm developers if co-location goes ahead."* (FSIWG, 2010a).

Although payment of compensation for lost fishing opportunities is contentious, and mitigation may be preferred instead, situations may occur where the presence of a windfarm restricts or eliminates fishing opportunities such that compensation might be considered appropriate according to the FLOWW guidelines.

As was noted in the first Ichthys Marine report for COWRIE (Blyth-Skyrme, 2010), identifying options to mitigate any adverse impacts from windfarms in order to 'keep fishermen fishing' rather than receiving compensation to permanently vacate a site was preferred by all the stakeholders who attended that project's expert advisory group workshops. Essentially, the advisory group agreed that compensation associated with excluding fishing from windfarms did not provide a long-term option for the fishing industry. Instead, displacement and increased pressure on remaining grounds would likely result, potentially reducing the financial viability of some fishing activities.

5. Discussion

In the course of completing this report it became clear that there are significant concerns over co-locating windfarms with MCZs. In particular, stakeholders are uncertain about the implications of co-location because the MCZ monitoring and management guidance is being developed at the same time as the process for identifying sites is moving forward quickly. Unknown factors including future environmental conditions, refinements to marine conservation objectives and approaches to renewable energy generation, or changes in the viability and participation levels of fishing and other activities, exacerbate the risks for stakeholders considering co-location options.

Insufficient information on the environmental monitoring or mitigation requirements for co-located windfarms, and the potential for windfarm developers to be required to bear costs as a result of conditions imposed on co-located windfarms, are issues of primary concern to developers. Existing guidance suggests that all English waters and offshore waters around England and Wales must be considered to be 'in-scope' for the MCZ designation process, but Government has also committed to achieving significant growth in the offshore renewable energy industry. A reduction in the investment potential of the offshore renewable energy industry would therefore be significant for the attainment of UK renewable energy and emissions reductions targets, as well as being potentially important for the UK economy. Guidance and assurance for developers over the responsibilities and costs associated with co-location is urgently needed in order to manage and allay concerns. RenewableUK stated:

- *"RenewableUK acknowledges the potential that co-location holds for MCZs and offshore wind but notes that currently there is too little information for us to support the proposition."* (RenewableUK, 2010b)

The biggest concern for nature conservation stakeholders appears to be whether MCZ conservation objectives can be met in co-located sites. The presence of the turbines, scour pits and/or scour protection material, as well as cables and EMF, may be considered too significant for conservation objectives to be attained. These issues will be assessed during the EIA process. It is unclear at the present time what steps would need to be taken to address any failure to meet objectives, which is a significant concern for windfarm developers and renewable energy investors when measures to mitigate adverse environmental impacts could be expensive. Again, clear guidance is needed in order to be confident of the conditions, if any, under which windfarms would be compatible with MCZs, and the implications for stakeholders of proceeding with a particular course of action with respect to co-location.

In attempting to understand the effect that co-location will have on minimising the combined socio-economic impacts of MCZs and windfarms on fishing, an important question is whether or not fishermen are both willing and legislatively able to fish inside windfarms. 500 m exclusion zones for vessel traffic have been introduced during windfarm construction phases, but this will normally reduce to 50 m during the operational phase (BERR, 2007b). It is then the decision of individual developers to seek an extension to the operational exclusion zone from the Secretary of State if they wish. The evidence from windfarm documentation is that most developers will not seek extensions. However, the physical presence of the turbines and other infrastructure may in any case impact fishing activities by obstructing particular tows or drifts, and by limiting the types of gear that may be worked successfully. For example, in water of just 25 m depth, assuming tows are undertaken with a warp to water depth ratio of 3:1, a fishing boat and otter trawl can quickly assume a footprint similar in size to a football field, which presents manoeuvring challenges. The manoeuvring ability of vessels hauling static gears is also greatly restricted, and snagging fishing gear on the seabed would be a serious concern when working in relatively close proximity to turbines. Any

concerns will be magnified in the dark and in strong tides and poor weather, such that in poor conditions windfarms may effectively become no-go areas. However, these considerations are likely to be the same as for any higher risk fishing situation, such as working near to shore, and it is relevant to note that insurance underwriters reported that they were not intending to increase the premiums of fishermen who wanted to fish inside windfarms (Blyth-Skyrme, 2010).

It is also important to note that modern fishing techniques, gears and equipment are very sophisticated, and that a high level of fishing accuracy is now possible. In a letter to Natural England concerning the boundaries and buffer zones of MPAs, the Sea Fish Industry Authority noted:

- *"Even a cursory examination of fishermen's track plotter data can also reveal with extraordinary accuracy the reality of where fishermen are working, particularly with the towed gears that are deemed to present high levels of future risk to the conservation features of the sites, and the precision with which they can deploy these gears. Recent demonstrations of these data ... show that ... towed gears are deployed with an accuracy of just a very few meters – typically +/- 3m."* (SFIA, 2010).

It is this high level of accuracy that allows fishermen to work successfully around wrecks, reefs, banks and other existing seabed features. It therefore seems plausible that, in appropriate conditions, many fisheries could be routinely conducted within offshore windfarms when the inter-turbine spacing of the more recent designs usually exceeds 500 m, and may extend to 1000 m. It is noticeable, though, that evidence of fishing actually occurring within windfarms is scant. Fisheries monitoring at Barrow Windfarm is undertaken with commercial trawl gear (RSKEnvironment, 2007), but verifiable data on routine commercial fishing activities occurring within windfarms do not appear to exist. Anecdotally, trawling takes place at the Kentish Flats windfarm, and potting occurs in at the Barrow windfarm, but this has not been confirmed for this report.

At the same time that the effect of windfarms on fishing is a key issue, the fisheries management regimes that will be implemented in MCZs will be important in terms of understanding the potential benefits or disadvantages to fishermen of co-location. At the time of writing, there is no firm guidance on the activities that will be excluded from or will require management in MCZs in order to support the attainment of conservation objectives. The process by which measures may be introduced has been described, however (NE *et al.*, 2010).

Finding Sanctuary's interim 'compatibility matrix' assessment determined that towed demersal fishing gears are not compatible with the protection of any of the identified seafloor habitats (FSOWG, 2010b). However, that document is not binding, and in discussion with NE and JNCC it was made clear that towed gears will not necessarily be excluded from MCZs, and that the impact at the existing level of activity may be important. This last point may be important, as benthic habitats and communities in shallow, high energy environments are well adapted to regular natural perturbation, and fishing effects may be only short-term in duration. In such situations, the overall impacts of even towed gears may not be considered significant.

5.1. Conclusion

There is considerable and wide-spread support from across a range of stakeholder groups for marine conservation objectives and for MCZs. The policy guidance, document review and the stakeholder responses to questions that have been considered as part of this work also showed that while there is also some interest in investigating the potential for co-locating offshore windfarms with MCZs, many questions and uncertainties remain.

The analyses undertaken for this report suggest that co-locating windfarms with MCZs will not necessarily result in benefits being conferred to stakeholders. While co-location

may be helpful in some cases in order to attain marine habitat protection targets as defined in the ecological network guidance (NE and JNCC, 2010d), it offers few benefits and a number of significant disadvantages for windfarm developers. In particular, there are concerns that the cost and consenting risks may impact the investment potential of the windfarm industry and, ultimately, the ability of the UK to meet emissions reductions and renewable energy targets.

The potential for co-location to positively or negatively impact fishing activities is site specific and will depend on the mix of active fisheries found in and around the windfarm and MCZ areas, the fisheries management regimes in those areas, willingness of fishermen to fish inside windfarms, and the space available for displacement into other suitable grounds. This complexity means that understanding the implications for fishing activities of co-locating any particular sites will inevitably rely on local knowledge of each system.

Importantly, taking an informed decision on co-location will require more information to be available on conservation objectives for habitats and species, and much greater knowledge of the management regimes that are therefore likely to be introduced in MCZs, than is currently available to stakeholders.

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Appendix 1: Consultation comments and responses

The table below provides a summary of the main comments received from stakeholders during the consultation on the draft final report, conducted in November-December 2010, together with a note on how those responses were addressed in this final report.

Other changes were also made to the document to address factual errors and minor comments, while positive comments have not been documented here.

GENERAL COMMENTS		
#	Summary of Comment	Response
1	<p>The report is unbalanced:</p> <p>The document suffers from a lack of balance with it being too focused on fishing interests and not properly accounting for the concerns and benefits of the renewables sector. This may in part be explained by the small number of representatives who were consulted.</p>	<p>As described in the report in Section 2, potential benefits and disadvantages of co-location were identified through a small number of initial discussions, review of MCZ Project and other documentation, and through external consultation of an 'issues' document sent to RenewableUK, six windfarm developers, The Crown Estate, NE and JNCC, the four regional MCZ Projects, four SFCs, DECC, Defra, the MMO, the NFFO, NUTFA, SAGB and SFIA. Consultees were offered the opportunity to comment on the list such that additional issues were added while other issues were removed as a result of the responses.</p> <p>As is noted in the main report, responses to the issues document were received from RenewableUK, one windfarm developer, The Crown Estate, the NFFO, two individual fishermen, Natural England and the JNCC, two of the regional MCZ projects and three SFCs. Defra also provided information regarding the updated and final version of Guidance Note 1.</p> <p>Of the six potential benefits identified through this project process, one is a potential benefit to the fishing industry, two are potential benefits for windfarm developers, and three are potential benefits for nature conservation and management. Of the six potential disadvantages, two would be incurred by the fishing industry, two by the windfarm industry, and two are specific to nature conservation objectives.</p>
2	<p>The report's title should be changed to be specific to fishing:</p> <p>The title "Benefits and disadvantages of co-locating windfarms and marine conservation zones" implies that the report addresses issues of MCZs in relation to the windfarm industry, whereas the focus is on the fishing industry. This should be expressed more clearly.</p>	<p>The report has attempted to investigate the benefits and disadvantages of co-location from a broad range of perspectives. The stakeholder consultation undertaken in the course of the project has resulted in a focus being placed on the implications of co-location for the fishing industry. In order to inform readers of the nature of the report, the title has been modified to:</p> <p>"Benefits and disadvantages of co-locating windfarms and marine conservation zones, with a focus on commercial fishing".</p>
3	<p>The report lacks a clear hypothesis and is unfocused:</p>	<p>In the absence of clear, statutory guidance, this report was conceived as a means to explore the issues</p>

	<p>Due to the lack of a clear hypothesis the report is unfocused and relationships cannot be tested, therefore conclusions are solely the opinion of the author and not representative of wider views on the key issues.</p>	<p>surrounding co-location of windfarms and MCZs and, with a focus on the fishing industry, to inform stakeholders of the potential benefits and disadvantages of co-location. The report was not conceived to consider the implications of co-locating MCZs with any other industries or activities, and no hypothesis was being tested.</p> <p>Section 1.6 has been revised and states the purpose of the report:</p> <p><i>"This report aims to inform the windfarm development and MCZ designation processes by examining the potential benefits and disadvantages for commercial fishing and other interests of co-locating windfarms and MCZs."</i></p> <p>It is intended that readers understand the report expresses the opinion of the independent author, but that it was informed by consultation with representatives from a broad range of interest groups. A comment to that effect has been added to the executive summary.</p>
4	<p>The number of benefits and disadvantages is unbalanced and the ranking order is incorrect:</p> <p>There are six benefits but only five disadvantages of co-location, which gives the impression that the benefits are greater than the disadvantages. This should be addressed. The ranking is also wrong.</p>	<p>No attempt is made to rank or weight the importance of any of the benefits or disadvantages listed. As such, the number of benefits or disadvantages of co-location, or their order is of no significance. The weight given to a benefit or disadvantage will need to be evaluated at the site-level. This point has been made in the executive summary, and at the start of the benefits and disadvantages sections.</p> <p>As a result of changes made in the final drafting, six benefits and six disadvantages now appear; this is a coincidental result.</p>
5	<p>It is too early to take any decisions on co-location:</p> <p>The MCZ process and stakeholder conversations are still in the early stages and the majority of stakeholders are currently exploring the options at present. There are too many unknowns in the MCZ process to make any decisions on this topic at present.</p>	<p>The report attempts to explore the issues surrounding co-location in an objective and balanced manner. The report does not recommend or advise against co-location in general, and the need to consider the benefits and disadvantages of co-location on a site-by-site basis is stressed at numerous points throughout the document.</p>
6	<p>The question of environmental compatibility / incompatibility needs to be answered first:</p> <p>Whether a wind farm is able to co-locate with an MCZ is discussed in section 4.3. This question must be answered before turning to any potential benefits or disadvantages.</p>	<p>The section dealing with the potential for windfarms to prevent the attainment of MCZ conservation objectives has been moved to section 4.1 in order to discuss this issue at the start of the disadvantages section. The section concludes:</p> <p><i>"Overall, the potential for a windfarm to prevent the attainment of MCZ conservation objectives will need to be considered on a site by site basis ... Existing understanding does, though, suggest that turbines, cables and other infrastructure would not necessarily prevent MCZs from attaining conservation objectives."</i></p> <p>As such, it is the author's opinion that the discussion on potential benefits and disadvantages of co-location is valid.</p>

7	<p>Factors other than profitability also drive windfarm developments:</p> <p>There is a lack of discussion on the wider benefits offered by offshore wind in terms of jobs, investment and climate change mitigation. The report instead suggests in Section 4.3 that monetary gain is the only reason for developers to build windfarms. Much more emphasis should be given to wider benefits.</p>	<p>Although issues of climate change mitigation, job creation and the economy are relevant to the wider discussion on renewable energy development, they are dependent on additional factors that are not within the remit or control of the MCZ designation process, and are beyond the analytical scope of this report.</p> <p>The reference to profitability made in Section 4.3 was intended to highlight that increasing costs may put proceeding with windfarm developments at risk. The text has been revised to more clearly explain the focus of the point.</p>
8	<p>Future, unknown factors constitute co-location risks to stakeholders:</p> <p>The report says the implications for co-location of future changes to objectives of marine conversation, decommissioning or re-powering of turbines, etc. cannot be predicted and are therefore not considered. But, because they cannot be predicted they should be included in this report as a consideration and an unknown risk.</p>	<p>Future changes in approaches to marine conservation, renewable energy generation, fishing and other activities present difficulties and risks to all stakeholders in accepting or rejecting co-location options. However, the level of risk to individual stakeholders or interest groups of these unknowns is impossible to determine.</p> <p>This has now been reflected in the text of Section 1.6, and the issue has been explored in the discussion in more detail.</p>
9	<p>Quotes from MCZ project group discussions may be taken out of context:</p> <p>Quotes from the Regional MCZ Projects' stakeholder advisory groups have been used, but these may be taken out of context, or infer general group agreement on an issue when in fact it may represent an opinion expressed by just one individual. The report should make this clear.</p>	<p>Incorrect interpretation of group discussions reported in note form is always a possibility. However, this report has illustrated points with direct quotes taken from the MCZ stakeholder group reports, and it is assumed that stakeholders are given an opportunity to correct inaccurate statements when reviewing draft versions of the reports prior to final publication.</p> <p>An attempt has been made throughout this report to be thoroughly objective and fair, by using quotes that appear to be representative of group thinking, for example by using those that include statements such as '<i>It was agreed...</i>'. However, individual comments have also been used where these appear to illustrate particular thinking or a particular industry position.</p>
10	<p>If fishing is allowed inside windfarms, there is no need for co-location:</p> <p>A statistic is given about 'no attempt' being made to restrict fishing activities in 50% of wind farm sites, followed by another 25% only restricting for towed gear. This should therefore be followed with the point that co-location may be unnecessary if restrictions continue in this trend going forward.</p>	<p>Legislation is clear that a 50 m safety zone will 'normally apply' around each turbine in operational windfarms (http://webarchive.nationalarchives.gov.uk/+http://www.berr.gov.uk/files/file40651.pdf). The Secretary of State may then be approached to extend the exclusion zones to up to 500 m around individual turbines. However, even if fishing is permitted, the presence of turbines and, in some cases, cables reduces the area available to fishing, and will impact where and how fishing can be undertaken, or where it is perceived that it may be undertaken, particularly in poor weather. Although the issues will need to be considered on a site-by-site basis, co-location which did reduce the area in which fishing was restricted therefore has the potential to benefit the fishing industry even if fishing is permitted inside windfarms.</p>

11	<p>MCZ identification process not described clearly:</p> <p>The process for identifying MCZs does not come across clearly in the document, particularly the fact that the recommendations will come from the stakeholders themselves (including both fisheries and renewable energy sectors). Industry is required to be proactive in informing that process.</p>	<p>The report does not intend to provide a detailed guide to the MCZ project process. However, that stakeholders have the role of recommending management measures is certainly relevant to discussions on co-location. The introductory section of the report has been modified to read:</p> <p><i>"The MCZ networks will be of a greater scale than any other MPAs previously designated. Importantly, the process of identifying sites and recommending management measures will be carried out by stakeholders. This requires stakeholders to be actively involved in discussions, and so four regional MCZ projects have been formed to promote and manage stakeholder input."</i></p>
12	<p>MCZ management is developing:</p> <p>The comment on P.4 that <i>"there is no specific management advice yet available to confirm what fishing activities will be permitted inside MCZs"</i> shows a lack of appreciation of the evolving/iterative nature of the MCZ Project process. Management measures cannot be determined before MCZs are identified.</p>	<p>The evolving/iterative nature of the MCZ project process may be an important strength of the stakeholder-led process, but the concurrent development of management measures also introduces some level of uncertainty for stakeholders. The point was being made in the report that there is currently little advice or guidance available on what activities are likely or unlikely to be compatible with MCZ conservation features.</p> <p>In order to better reflect the issue, the text has been modified to read:</p> <p><i>"An important consideration regarding MCZs is that there is no specific management advice yet available to define what activities will be permitted inside MCZs. This makes it difficult to determine what impact MCZs will have on fishing and other activities."</i></p>
13	<p>Adverse impacts of windfarms on the marine environment may be greater than thought:</p> <p>The impacts of windfarms on the marine environment are poorly understood. Data collection and monitoring is unlikely to be sufficiently extensive to detect changes in species abundance. Until impacts are understood better, the question of co-location implies there are benefits to balance when there may only be harms to avoid.</p>	<p>The UK offshore windfarm industry is relatively new, and is developing rapidly. It is, however, beyond the scope of this document to comment on the suitability or quality of data collection and monitoring efforts within the industry, other than to say that it is assumed that developers undertake monitoring and reporting as required under the terms of their consents.</p> <p>The potential for adverse environmental impacts to result from windfarm developments and therefore for co-location not to be feasible has been considered specifically in the report at Section 4.1.</p>
14	<p>Other MPA designation processes are occurring in UK waters.</p> <p>There is an inconsistent mention of the Scottish MPA process - in some areas of the report it is included, while information is omitted in other places.</p>	<p>This report covers the MCZ processes as being undertaken within the four regional MCZ Projects in English waters and UK offshore waters around England and Wales. Any references to the MPA identification and designation processes that are being undertaken in other UK offshore waters, or in Scottish, Welsh and Northern Irish waters within the 12 nm UK territorial limit, have been removed to improve the clarity of the report. The findings may, though, help to inform other MPA processes, where discussions are held on the potential for co-location to occur.</p>

ISSUE SPECIFIC COMMENTS		
#	Summary of Criticism	Comment
1	<p>Need to provide evidence of displacement impacts on fishing activities:</p> <p>It is stated in Section 3.1 that "... effort displacement and knock-on effects ... may, nevertheless, occur at any development or MCZ where fishing effort is redistributed":</p> <p>Evidence should be provided to support this comment.</p>	<p>Section 3.1 notes that: "... effort displacement and knock-on effects are possible impacts resulting from any redistribution of fishing activity; these effects are difficult to predict and are site specific, such that generalisations cannot be made."</p> <p>Effort displacement is a potentially significant but complex factor in marine fisheries management. An example reference providing details of a measured effect and impact is now provided.</p>
2	<p>The reasoning for the scoring used in the Section 3.1 scenarios is unclear:</p> <p>In the scenarios described in section 3.1 (May minimise social and economic impacts on the fishing industry), why was a positive score of 0.25 used for 'Static gears potentially gain safe haven inside MCZ' – should this not be +0.50 as a direct opposite to the negative score?</p>	<p>The scoring used across the scenarios provides an indication of the direction and magnitude of the potential effects on fishing activities of different management approaches inside MCZs and windfarms. The actual effects of different management approaches will depend on wide range of site-specific factors.</p> <p>Section 3.1 states that a score of + 0.25 was provided for situations where "<i>there was potential for static gear fishermen to gain from the avoidance of gear conflict in areas available to fishing</i>". Essentially, the score reflects that there may be a small measure of benefit (0.25) for static gear fishermen who may have been working in that location in any case. Without any benefit from gear conflict avoidance, the effect would be neutral and the score would be 0.</p>
3	<p>The section 3.1 scenarios hugely oversimplify the issues:</p> <p>The analysis undertaken in Section 3.1 does not take into account the size and scale of any development and the density of turbines, or the possible source population and emigration of fish to neighbouring sites from within OWFs, or the long term trend in annual catch landings for some species.</p>	<p>As is noted in the report, the scenarios presented in Section 3.1 are simplified in order to help increase understanding of fishing and co-location issues in the absence of clear guidance. Simplification was considered essential and appropriate in order to consider the complex interactions between two fishing sectors, three different windfarm and MCZ management approaches, and co-location or no co-location as a final level of interaction.</p> <p>As was noted, taking account of any changes in the level of catches, or situations where a degree of overlap rather than complete co-location existed between the MCZ and windfarm, or displacement, could not be made. It is likely that the other factors mentioned are beyond the scope of any generic analysis, and would have to be assessed on a case by case basis.</p>
4	<p>Developers cannot exclude fishing from sites outside the UK 12 nm limit:</p> <p>Section 3.4: Developers cannot extinguish rights to navigation outside of 12nm so stating "The exclusion of fishing activities from windfarms may therefore support conservation objectives" may be incorrect as fishermen cannot be excluded from many sites.</p>	<p>Statutory Instrument 2007 No. 1948 (The Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007) provides the Secretary of State, when requested by developers, to exclude certain activities from safety zones established for up to 500 m around renewable energy installations. Such safety zones may be established around any installation within the UK Renewable Energy Zone (REZ). The UK REZ includes UK offshore waters out to the median line or the 200 nm territorial limit.</p>

5	<p>Excluding fishing from co-located sites will not provide additional MCZ benefits:</p> <p>Section 3.4 suggests that MCZ objectives could be exceeded or met more quickly when located with windfarms from which fishing was excluded. But if the feature being protected is sensitive to fishing then that activity will be restricted regardless of whether it is located within a windfarm or not. Therefore, MCZ objectives would be met irrespective.</p>	<p>Management guidance has yet to be provided, and what activities will or won't be permitted inside MCZs designated for different species and habitats is an issue of interest and on-going importance to all participants in the discussion on MCZ designation.</p> <p>The guidance for reference area MCZs is that "<i>all extraction, deposition or human-derived disturbance is removed or prevented</i>" within these sites, which would almost certainly preclude fishing activities. However, it appears likely that some fishing activities will be allowed to continue inside other MCZs where these activities are considered to have low impacts. No fishing activities are completely benign, however, and so excluding even the lowest impact fishing activities from co-located sites may support the achievement or maintenance of favourable condition of MCZs.</p>
6	<p>Monitoring fishing activity is undertaken:</p> <p>Section 3.5 infers that 88% of UK vessels don't have VMS and therefore aren't being monitored. The role of SFC/IFCAs should be mentioned here, as well as byelaws and that most <15m are active in near shore areas.</p>	<p>The text of this section has been modified to better reflect that management of any and all activities (i.e. not just some fishing activities) that violate an MCZ management regime may be supported by the monitoring of activity and the routine operational activity that is likely to be occur at windfarm sites.</p>
7	<p>Report presents options of only co-location or no co-location, but some overlap may also occur:</p> <p>Section 3.6 appears to present co-location or no-co-location as being the only options, when some overlap may also occur. This other result should be explained.</p>	<p>The report defines co-location in Section 1.1, and 1.5: "Co-location is the result of constructing windfarms and designating MCZs in the same or overlapping areas".</p> <p>Section 3.6 has been modified slightly to include the specific potential for overlap to support MCZ designation targets.</p>
8	<p>Impacts from windfarm noise aren't considered fully:</p> <p>Concerns have been raised by scientists about the effect of the noise created during different stages of windfarm development on certain fish stocks. This should also be taken into consideration, as this is likely to interact with and possibly exacerbate any impacts suffered by the fishing industry.</p>	<p>This report has been written on the basis that the impact of noise on commercially targeted marine fish species has been studied and that construction phase impacts can be significant, but that the noise and EMF produced by operational phase windfarms does not appear to cause significant impacts in the longer term. A comprehensive review by Wilhelmsson et al. (2010) has been referenced.</p> <p>However, in time it may be important to review and update thinking if necessary, and this would be enabled through collecting and analysing monitoring data and through scientific study. This would allow the identification and management of any impacts that did occur.</p>
9	<p>Need to separate out 'additional costs' and 'risks to consent for developers' as different disadvantages:</p> <p>Section 4.2 refers to potential additional costs for developers associated with co-location, and risks to consent that may come from co-location. These should be separated out as different issues.</p>	<p>The draft report considered costs, risks to consent and risks to investment potential as elements of the same issue for developers. In light of comments received, the potential for costs to increase has been separated out in this final report from the risks to consent and to investment potential as a separate disadvantage of co-location.</p> <p>The potential for costs to increase is now covered in Section 4.2, while the risk to consents and investment potential has been covered in Section 4.3.</p>

10	<p>Windfarms can increase steaming times and decrease fishing viability:</p> <p>Not enough emphasis is placed on the impact that extended steaming times resulting from having to travel around or through windfarms may have on fishing activities and viability.</p>	<p>Steaming times, additional costs and risks from being further offshore in bad weather are certainly factors of potential relevance and importance to the fishing industry. They are addressed specifically in the report at Section 4.4: "<i>May limit access to fishing grounds inside windfarms that would otherwise be targeted.</i>"</p>
11	<p>Co-location won't compromise MCZ identification:</p> <p>Section 4.5 suggests that MCZ objectives may be compromised if windfarms in sub-optimal areas are co-located with MCZs. But opportunities for co-location will only be sought where a feature which is within a proposed windfarm needs to be protected to meet network targets.</p>	<p>The guidance from UK Government is that socio-economics (of all stakeholders and interested parties) will be taken into account where potential MCZ sites are equally suitable on ecological grounds, but that the sites should be selected first on the basis of their ecological value first. As such, co-location for the sake of co-location could result in sub-optimal performance of the network. The text in Section 4.5 has been changed to more clearly explain the situation.</p>