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1 Introduction

1.1 Purpose of the Impact Assessment

1.1.1 A Marine Conservation Zone (MCZ) is a new type of Marine Protected Area (MPA) created by the Marine and Coastal Access Act 2009 (HM Government, 2009), which can be designated to conserve marine flora, fauna, habitats and features of geological or geomorphological interest.

This material for the draft consultation Impact Assessment (IA) supports the regional MCZ projects' final proposals for recommended Marine Conservation Zones (rMCZs) in parts of the UK's seas¹ that are referred to here as the MCZ Project area. The regional MCZ projects were established by the Joint Nature Conservation Committee (JNCC) and Natural England² to facilitate stakeholder development of rMCZ recommendations, which were made by the regional stakeholder groups (RSGs).³ The projects cover the English North Sea ('Net Gain'), Irish Sea ('Irish Sea Conservation Zones'), South-East ('Balanced Seas') and South-West ('Finding Sanctuary').

1.1.2 The IA assesses the potential economic, environmental and social impacts that designation of the rMCZs could have on the UK (Better Regulation Executive, 2010; HM Treasury, 2003). Significant impacts on non-UK commercial fishing fleets are also assessed where information is available.⁴ It is anticipated that the IA will inform the Government's decisions on the designation of rMCZs, because the Marine and Coastal Access Act 2009 specifies that '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' (Section 117(7)).⁵

1.2 Problem under consideration and the rationale for government intervention

1.2.1 A biologically diverse marine environment is of high value to society through the services that it provides and as a basis for human health and livelihoods (OSPAR, 2010). In the marine environment, the main traded ecosystem services are fish landings and aquaculture, while non-traded services include education, flood control, recreation and research. Aside from its value to society, the natural environment has intrinsic or 'non-use' value.⁶

1.2.2 Human activities threaten the extent and condition of many diverse habitats ranging from sediment, rock and reef to maerl beds and some endangered habitats such as deep sea cold water corals (OSPAR, 2010). Fishing affects large areas of the sea bed (UKMMAS, 2010) and has large impacts on marine ecosystems (OSPAR, 2010). Pressures exerted by other activities including aggregate extraction, coastal defence, shipping and wind farms are increasing. OSPAR (2010) noted that 'a reduction in the decline in biodiversity is still a long way off', but that combined pressures from human activities are not fully understood and need to be carefully managed to avoid undesirable impacts. Declines in the extent of the most threatened habitats in the UK (as

¹ These are the marine areas around England extending from mean high water to the edge of the UK's Continental Shelf or its median line with other countries where this is closer. It excludes inshore waters around Wales and Northern Ireland (between mean high water and 12nm (nautical miles)), and inshore and offshore waters around Scotland and the Crown Dependencies (Channel Islands, Isle of Man).

² Natural England is the adviser to the Government on nature conservation in England (out to 12 nm) and JNCC advises the Government on UK and international nature conservation (beyond 12nm).

³ There was one RSG for each regional MCZ project. Further details are provided in Annex M.

⁴ At the request of the Department for Environment, Food and Rural Affairs (Defra).

⁵ Further information on this is provided in the Explanatory Notes on the Act and the Ministerial Statement on the Creation of a Network of Marine Protected Areas made on 11 March 2010 (JNCC and Natural England, 2010b).

⁶ There are two forms of intrinsic value: anthropocentric and non-anthropocentric. Anthropocentric value is the intrinsic value assigned by humans to nature, which has practical implications for policy. Non-anthropocentric value is the value that nature has 'in itself'. As explained in Defra (2007), 'While it is recognised that the natural environment has intrinsic value i.e. is valuable in its own right, such non-anthropocentric value is, by definition, beyond any human knowledge'.

identified in the UK Biodiversity Action Plan (UK BAP)) are occurring only in marine and coastal areas, and it is proving more difficult to maintain or increase the extent of priority habitats in coastal and marine areas in the UK than in the terrestrial environment (JNCC, 2010). The reduction in extent and condition of marine habitats and communities arises due to market failures, public good characteristics and policy failures (described below).

1.2.3 Focussing first on market failure, because no monetary price is attached to many goods and services provided by the marine environment there is no market mechanism that could ensure that individuals take the full costs of their actions into account. Hence, inefficiently high levels of resource depletion and environmental degradation can arise, including biodiversity loss and pollution. For the goods that are traded (such as wild fish), market failure occurs if market prices do not reflect the costs that individuals' actions may be imposing on others and on society through negative impacts on the environment. As a result other individuals and society bear the costs that arise from the individual's actions⁷.

1.2.4 Some marine environmental goods and services are essentially 'public goods', in that no one can be excluded from benefiting from them. For example, if people derive value from the existence of a species, it is impossible to exclude them from this benefit. As a result everyone has an incentive to let someone else ensure continued existence of the species. Individuals do not have an economic incentive to voluntarily contribute effort or money to ensure the continued existence of species that equals the benefit they receive. Hence, the provision of such environmental goods and services is inefficiently low (HM Government, 2011).

1.2.5 Negative impacts on the environment can also arise inadvertently as a result of government policy (known as policy failure). Government intervention is required to address the environmental degradation and resource loss that is occurring as a result of market failure, public good characteristics and policy failure.

1.3 Policy objective and intended effects

1.3.1 The UK Government and Devolved Administrations' vision for the marine environment is for 'clean, healthy, safe, productive and biologically diverse oceans and seas' (HM Government, 2011b). This vision recognises the economic, social and intrinsic value of a healthy marine environment and demonstrates a commitment to halting the loss of biodiversity and restoring it as far as is feasible (HM Government, 2011b).

1.3.2 The UK government has made a number of international commitments to establish an ecologically coherent MPA network.⁸ The network is also required by the Marine Strategy Framework Directive (MSFD, Official Journal of the European Union, 2008) and will make an important contribution to achieving Good Environmental Status (GES). The UK MPA network will

⁷ This is an example of an externality: a cost or benefit that is not transmitted through prices and is incurred by a party who did not agree to the action causing the cost or benefit.

⁸ Under the OSPAR Convention (1992), the Convention on Biological Diversity (1993) and the World Summit on Sustainable Development (2002).

comprise Sites of Special Scientific Interest (SSSIs),⁹ Special Areas of Conservation (SACs),¹⁰ Special Protection Areas (SPAs),¹¹ Ramsar sites¹² and MCZs, (along with similar designations in Scotland, Wales and Northern Ireland). Designation of MCZs will help to ensure that conservation of habitats and species is given greater priority in the regulation and management of human activities, by ensuring that features are protected and conservation objectives are achieved. Management requirements for MCZs will depend on the features within the site and their conservation objectives. Many MCZs will be multi-use zones; however, the Ecological Network Guidance (ENG) requires that each broad-scale habitat and Feature Of Conservation Importance (FOCI) should have at least one viable MCZ Reference Area within each of the four regional MCZ project areas where all extraction, deposition or human-derived disturbance is removed or prevented. MPAs, together with coherent planning outside sites, will help to promote a healthy and resilient marine environment (Defra, 2010) and thereby help to maintain its value to society.

1.3.3 A fundamental principle of the government's approach is that nature conservation is integrated with productive and sustainable use of the seas (HM Government, 2010). This is reflected in the government's aim to develop a 'well-managed network of Marine Protected Areas (MPAs) that is well understood and supported by sea-users and other stakeholders' (Defra, 2010a). The process for identifying rMCZs was designed to facilitate stakeholder involvement, with the RSGs shaping the location, conservation objectives and management of rMCZs (Defra, 2010a). This was informed by statutory advice that JNCC and Natural England provided to the regional MCZ projects (JNCC and Natural England, 2010a) on species and habitats that should be protected by MCZs in order to meet the requirements of the Marine and Coastal Access Act 2009 and Defra policy. Defra will consult with stakeholders on the proposed sites. The provisions made in the Act that enable MCZs to provide protection are summarised in Annex G

1.4 Overview of the IA and the policy option

1.4.1 The structure and method used for this IA are based on government guidance (Better Regulation Executive, 2010; HM Treasury, 2003). The IA assesses the impacts of the suite of rMCZs recommended by all of the regional MCZ projects (Policy Option 1, which is the only option) relative to the baseline.

1.4.2 In developing the recommended suite of sites, numerous options for MCZs were considered by the RSGs during the iterative planning process in terms of their ecological contribution to the network of MPAs and their economic and social consequences¹³. Only one policy option is recommended as this represents the consensus of the RSGs on the suite of sites¹⁴ that best meets the regional MCZ projects' aims, of meeting the requirements of the ENG while seeking to minimise impacts on sea users. The planning process was based on a number of assumptions,

⁹ Designated under the Wildlife and Countryside Act 1981 (as amended).

¹⁰ Required by the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna).

¹¹ Required by the Wild Birds Directive (Council Directive 2009/147/EC on the conservation of wild birds).

¹² Sites designated as Wetlands of International Importance under the Ramsar Convention (1971).

¹³ The planning process is documented in the iterative progress reports of each regional MCZ project.

¹⁴ Charts of the recommended suite of sites is provided in Annex H7.

which may be subject to change following designation. Therefore although the suite of sites represents the best network in terms of representing a consensus between stakeholders, if these assumptions turn out to be incorrect then this may undermine the basis upon which consensus was achieved. For one site, rMCZ 29 in the Balanced Seas project area, there are two options (rMCZs 29 and 29.2); both options are used to estimate the impacts of the site in the IA.

1.4.3 Sections 2 and 3 present the following for the environment and for each sector of human activity:

- The baseline situation (the 'do nothing' option in which MCZs are not designated) against which the impact of MCZs is assessed.
- The potential costs and benefits of Policy Option 1, the suite of rMCZs recommended by all of the regional MCZ projects, relative to the baseline.

1.4.4 The following key assumptions have been made in assessing the costs and benefits. Further details are provided in Annex H1, which describes the general approach and assumptions made in the IA. Sector specific assumptions and the resultant limitations are also provided in Annex H.

- Where rMCZ Reference Areas are located within a larger rMCZ, the impacts of the former are assessed separately from the latter.
- Implementation of management measures (and impacts) will start when rMCZs are designated which is assumed to occur at the beginning of 2013 (although in reality designation may occur later in 2013 and it may take time for the appropriate management to be put in place). For many rMCZs site verification will be necessary to confirm the presence and extent of features within the site. Where this is the case, verification will take place in advance of any management measures being implemented (they will not occur simultaneously) and, as such, the costs for these sites are overestimates.
- Management scenarios are used to describe the additional management of activities that may be needed to achieve the conservation objectives of the features protected by each rMCZ. Where there is uncertainty, more than one scenario has been used to reflect the potential range of impacts. The scenarios used in the IA do not pre-judge the management that will be required in practice. The management required will be determined following designation, and therefore the scenarios employed in the IA may result in overestimates or underestimates of the true impact.
- Management will be fully enforced and effective.
- The boundaries of rMCZs, the locations of features and their conservation objectives are as specified in the regional MCZ projects' site recommendations (submitted in September 2011). The total impact of the suite of rMCZs has been adjusted to account for overlaps in rMCZs and rMCZ Reference Areas.

- Mitigation of impacts of licensed activities will be provided through the existing marine licensing framework. Existing consents that could impact on MCZ features will not be reviewed following designation of MCZs.
- Costs that operators incur voluntarily and costs that are incurred prior to designation of MCZs are discussed in the narrative but not included in costs presented in the IA summary (this is standard practice for IAs).
- The cost to the commercial fishing sector is equivalent to the value of landings and GVA affected attributed to the area of rMCZs. This is likely to be an overestimate of the true value of landings affected as a proportion of effort currently expended within rMCZs is likely to be redistributed (or displaced) to areas outside rMCZs as fishers seek to offset the impacts of rMCZ-related fisheries management.
- In the absence of MCZs (in the baseline) it is assumed that existing government policies and commitments related to the marine environment are fully implemented and achieve their desired goals. Particularly significant are commitments to implementation of the Environmental Impact Assessment Directive and the Water Framework Directive. In light of this, the IA assumes that no mitigation of impacts of water abstraction, discharge or diffuse pollutions is required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process¹⁵.

1.4.5 Section 4 provides a summary of the potential costs and benefits. Further detail and supporting information are provided in annexes, including the assumptions and the approaches used for estimating the benefits and costs.

1.4.6 The degree of analysis undertaken in each section of the IA and for each sector is proportionate to the magnitude of the anticipated social or economic impact of MCZs. Impacts are assessed over a 20-year period. All values are presented as real values in 2010 prices unless otherwise stated and projected values are given in constant prices. The present value of the costs and benefits has been calculated using a discount rate of 3.5%.

2 Baseline and summary of benefits of Policy Option 1, the suite of rMCZs

2.1 About this section

2.1.1 This section presents

- The baseline for the environment in which MCZs are not designated, against which the potential benefits of Policy Option 1 (the suite of rMCZs) are assessed over the IA's 20-year

¹⁵ Natural England has advised that this is a reasonable assumption to make for the purposes of the IA (Natural England, pers. comm., 2010).

timeframe. A general summary is also provided of changes in the environment in the MCZ Project area over the next 20 years that are expected to occur, for example as a result of climate change and human activities.

- The potential benefits of the suite of rMCZs recommended by all of the regional MCZ projects, assessed relative to the baseline. Section 2.2 presents the beneficial impacts of rMCZs on the environment, including rMCZ features and section 2.3 provides an assessment of the beneficial impacts of rMCZs on ecosystem services.

2.2 Environment

Baseline

2.2.1 This section provides a general summary of the environment in the MCZ Project area and the pressures that it will be subject to in the absence of MCZs

Summary of the environment in the MCZ Project area

2.2.2 UK waters encompass the transition zone between the north-eastern, cold-water communities and south-western, temperate-water communities found in western European marine waters. As such, the UK has an exceptional variety of biological communities associated with the sea bed and high levels of marine biodiversity (UKMMAS, 2010) relative to the rest of Europe.

2.2.3 The MCZ project area encompasses the Celtic Seas and the North Sea. In the Celtic Seas (Western Channel and Irish Sea) the environment ranges from being fully oceanic through to brackish estuarine systems with diverse biological communities that include many commercially important species (OSPAR, 2010). The main marine habitats are sands and gravels with rocky outcrops and mud in some areas. The coast is mostly rocky though there are intertidal sediments in estuaries, bays and inlets (UKMMAS, 2010). In the North Sea (including the Eastern Channel), the main marine habitats are mud, sand, coarser sediments and gravels (UKMMAS, 2010) that support large stocks of commercially important fish and substantial populations of prey (such as sand eels) for many sea birds (OSPAR, 2010). The coastline is varied and includes rock, shelving beaches and soft cliffs (UKMMAS, 2010). The extensive estuaries with mudflats and salt marshes are internationally important for migrating birds (OSPAR, 2010).

2.2.4 The final recommended suite of sites consists of 127 rMCZs, including 65 areas of high protection known as rMCZ Reference Areas and one Potential Co-Location Zone¹⁶. The rMCZs cover the full range of estuarine, inshore and offshore benthic¹⁷ habitats in the MCZ Project area (extent and occurrence of the habitats and species recommended for protection by rMCZs is summarised in Annex B). The current ecological condition of features within individual rMCZs varies depending on the localised conditions and the exposure to different types of human and

¹⁶ The PCLZ is a site identified by the RSG to have the potential to become an MCZ. However, it is not currently part of the final suite of recommended rMCZs, because the RSG agreed that the decision to recommend the site to the Government would be subject to further discussions between Natural England, JNCC and the renewable energy developers who have interests in the site. The site is included in the IA at the request of the RSG, so that the assessment may inform the ongoing discussions.

¹⁷ A description for animals, plants and habitats associated with the seabed.

environmental pressures (UKMMAS, 2010). The current likely condition of features in rMCZs has been determined via a desk-based vulnerability assessment exercise¹⁸ and the results of this are set out in Annex I. However, it is more difficult to predict the feature-specific trends in baseline conditions. The baseline extent of the FOCI is illustrated by their status on lists of national and multi-lateral environmental agreements, which identifies them as being rare, threatened, at risk or in decline.¹⁹ While features on these lists have statutory protection, none of the MCZ features currently have conservation objectives under these listings²⁰.

Summary of pressures affecting the environment in the MCZ Project area

2.2.5 Major threats to marine ecosystems anticipated as a result of climate change include rising sea temperatures, rising sea levels²¹, greater frequency of storms, increases in the occurrence of severe storm surges, and changes in the timing of planktonic production, composition and distribution (which have been linked to changes in distribution of many fish species, reorganisation of predator–prey relationships and the spread of non-indigenous species) (OSPAR, 2010). Acidification of sea water²² is expected to affect many species with critical ecological roles in benthic and pelagic²³ communities, impacting on ecosystems within the next 50 to 100 years (OSPAR, 2010). To help to stabilise greenhouse gas concentrations in the atmosphere there are likely to be more carbon capture and storage (CCS) projects²⁴ in the future, and more applications for development of wind, wave and tidal stream energy are also expected (OSPAR, 2010).

2.2.6 Levels of hazardous substances in sediment, fish and shellfish have fallen, but are at unacceptable levels in historically contaminated or industrialised estuaries and some very coastal areas (UKMMAS, 2010). Though water quality issues such as eutrophication are being addressed by the EU Water Framework Directive (2000), which aims to achieve good environmental quality in freshwater and estuarine and coastal waters within 1 nm of low water, this will take time.

2.2.7 Fishing activity is widespread in the MCZ project area. Recent efforts in fisheries management are reducing exploitation rates and thereby enabling stocks to increase. However, a number of fish stocks remain outside precautionary assessments of safe biological limits and so are at risk of stock collapse (OSPAR, 2010). Reductions in the capacity of the fishing fleet have tended to be offset by advances in technology that improve fishing efficiency (OSPAR, 2010). Commercial fishing causes the death of target and non-target species, can change community

¹⁸ If designated survey and monitoring work will be carried out to establish the true condition of MCZ features.

¹⁹ All FOCI are subject to one or more of the following national and multi-lateral agreements: OSPAR List of Threatened and/or Declining Species (features that are considered to be under threat or in decline, and may be rare or particularly sensitive); UK BAP Priority Habitats and Species (features of international importance, at high risk or in rapid decline, as well as habitats that are important for key species); Wildlife and Countryside Act, Schedule 5 (species likely to become extinct from the UK unless conservation measures are taken, and species subject to an international obligation for protection).

²⁰ Any species and habitats already protected by SPAs or SACs that overlap with an rMCZ are not proposed for MCZ designation.

²¹ Due to thermal expansion.

²² As a result of increased concentrations of atmospheric carbon dioxide dissolving in the sea.

²³ Communities in the water column.

²⁴ These capture carbon dioxide emissions from combustion (for example, from power stations), and transport and store it in sub-seabed geological reservoirs (such as depleted oil and gas fields).

structures and food webs (which may increase the vulnerability of ecosystems) and disturbs and damages the sea bed (OSPAR, 2010). The area of affected habitat will expand if closures displace fishers to sensitive areas that are currently lightly fished²⁵ or to biodiverse areas excluded from the suite of rMCZs for socioeconomic reasons. The reform of the CFP, planned for 2012, may address some of these issues.

2.2.8 Unlicensed activities such as recreation can have localised impacts, including direct damage to features through trampling and anchoring as well as the creation of litter. *Charting Progress 2* identifies litter and underwater noise as developing issues that may impact on marine life (UKMMAS, 2010).

2.2.9 Pressures on habitats and species arising from activities that are subject to a marine licence (including aggregate extraction, navigational dredging and disposal sites, oil and gas-related activities, port and harbour developments, and renewable energy developments) are likely to continue to increase (OSPAR, 2010). When considering a licence application, the regulator can specify any required mitigation (and monitoring) in the licence conditions. Through this regulatory process, the environmental impacts of licensed activities are managed at acceptable levels in the absence of MCZs.²⁶

Benefits

2.2.10 Designation of MCZs under the Marine and Coastal Access Act 2009 (alongside existing and proposed legislation covering Scotland, Wales and Northern Ireland) will help to conserve the range of biodiversity in UK waters. It will complement (not duplicate) other types of designation and provide an essential contribution to the UK's network of MPAs. In the absence of MCZs, there would be large areas of the UK's marine environment and a high number of British species and habitats, particularly away from the coast, that would not receive protection.

2.2.11 The beneficial impacts of MCZs on the environment are described below in terms of the anticipated benefits of a network of MPAs, the impacts of MCZs on the condition of the features that they protect and the contribution that MCZs will make to an ecologically coherent network of MPAs.

Anticipated benefits of an MPA network

2.2.12 In making commitments to establish a network of MPAs, previous UK governments anticipated that MPAs would (Moffat, 2012):

- enable protection and management of representative examples of marine ecosystems to ensure their long-term viability and maintenance of genetic diversity,
- enable protection of rare, threatened and/or endangered species and populations and conservation of habitats critical to the survival of such species,

- provide benefits to commercial species as a result of conservation of biodiversity,
- facilitate interpretation of the marine environment for the purposes of conservation, education and tourism,
- provide a range of management (including highly protected areas) so that human activities compatible with the conservation objectives of sites could continue,
- provide a focus for research and increase understanding of the functioning of the marine environment and the effects of human activities upon it.

2.2.13 As the number of MPAs increases worldwide, there is a large and increasing, evidence base (including Commonwealth of Australia, 2003; Gubbay, 2006; PISCO, 2011) that demonstrates that MPAs are delivering these benefits (Moffat, 2012). The benefits, which encompass all three strands of sustainable development (environmental, economic and social), mirror the well-established track record of impacts of protected areas on land. However, it is clear from the available evidence that MPAs as a tool cannot be successful if they are used in isolation and that they need to be one of a number of management mechanisms that address the functioning and management of the entire marine area (Moffat, 2012).

Anticipated benefits of MCZs on the condition of the features that they protect

2.2.14 Assuming designation, appropriate management of MCZs will reduce the risk that the extent, population, structure, natural environmental quality and processes of features protected by MCZs will diminish over time. The risk that the features will be adversely affected by human activities is greater if they are not protected by an MCZ (JNCC and Natural England, 2011a, b and c).

2.2.15 For unlicensed activities, MCZ management regimes will influence the pressures created by activities in order to allow the conservation objectives of site features to be met. For licensed activities, the regulator can already specify any required mitigation (and monitoring) in the licence conditions when considering a licence application. Once MCZs are designated it is anticipated that licence applicants will need to specifically identify whether the MCZ features and conservation objectives might be affected by the proposed plan or project. This should make it easier for effective mitigation to be introduced where required.

2.2.16 In the IA, the impact of MCZs on the condition of features is assessed based on the conservation objective (in the absence of further information), as described below. The assumptions are made for the purposes of the IA and may not apply in reality:

- Features with a conservation objective of 'recover to reference condition' are assumed to not currently be in reference condition but, with MCZ designation and appropriate management they will recover to reference condition over time. Reference condition is the state where there are no, or only very minor, changes to the values of the hydromorphological, physio-chemical

and biological quality elements which would be found in the absence of anthropogenic²⁷ disturbance (Natural England and JNCC, 2011).

- Features with a conservation objective of 'recover to favourable condition' are assumed to be currently in unfavourable condition but, with MCZ designation and appropriate management they will recover to favourable condition over time. A feature attains favourable condition when its extent or population is stable or increasing, it has the structure and functions (or habitat) that are necessary for its long-term maintenance, and the quality and occurrence of habitats and the composition and abundance of species are in line with prevailing natural conditions (Natural England and JNCC, 2011).
- Features with a conservation objective of 'maintain in favourable condition' are assumed to be currently in favourable condition. MCZ designation and continued appropriate management will protect the features against the risk of degradation from pressures from human activities in the future (which are not currently known). Though it is assumed that in most cases mitigation of the impacts of human activities is not currently required, mitigation would, if necessary, be introduced (with the associated costs and benefits).

2.2.17 Across the rMCZs, 1,016 draft conservation objectives²⁸ are proposed for habitats, species, and geological and geomorphological features (this figure increases to almost 1,100 if the Isles of Scilly Sites rMCZs are broken down into its individual component sites). These include:

- 290 'recover to reference condition' conservation objectives,
- 200 'recover to favourable condition' conservation objectives,
- 526 'maintain at favourable condition' conservation objectives.

2.2.18 The broad-scale habitats included in the suite of rMCZs cover the full range of those found in the MCZ Project area. These broad-scale habitats act as surrogates for biodiversity at finer scales, allowing the suite of rMCZs to capture the coarse biological and physical diversity of the UK sea bed, thereby affording protection to the associated species and biotopes²⁹. Their inclusion incorporates a precautionary principle approach, allowing for conservation of features for which there is limited information, (JNCC and Natural England 2010a). The suite of rMCZs also protects habitats and species of conservation importance that are known to be rare, threatened or declining in our marine area across the extent of their range in the MCZ project area, as well as geological and geomorphological features and other features of ecological interest, such as sea birds. A summary of the area or number of occurrences of features recommended for protection by MCZs in each regional MCZ project area is provided in Annex B

²⁷ Caused by humans or human activities.

²⁸ There is one conservation objectives still to be confirmed in the Balanced Seas project area which are not included in this total.

²⁹ A biotope is the physical habitat with its associated distinctive biological communities.

MCZs' contribution to an ecologically coherent network of MPAs

2.2.19 Designation of the rMCZs will, alongside other MPAs, provide an ecologically coherent network of sites, contributing to the protection of living, non-living, cultural, and/or historic marine resources. As part of the MPA network, rMCZs will contribute to the UK government's vision for 'clean, healthy, safe, productive and biologically diverse oceans and seas' (Defra 2002) and will play an important role in conserving biodiversity, ecological processes and sustaining wider ecosystem health (JNCC and Natural England, 2010a).

2.2.20 In the ecologically coherent network, protection of each habitat and species is replicated in other protected areas, enabling adjacent populations to interact and be mutually sustaining. The component sites are self-sustaining and geographically dispersed to ensure that species and habitats persist through natural cycles of variation. The connectivity between sites should ensure protection of species at different stages of their life cycle. Overall the ecologically coherent network is of adequate size to afford the protection needed for it to deliver its ecological objectives (JNCC and Natural England, 2010a).

2.2.21 The network will only be considered to be ecologically coherent if the design principles set out in ENG are satisfactorily met. Scientific advice on the ecological coherence of the MPA network that includes rMCZs and on the contribution of individual rMCZs (to the extent that this is possible) is being provided by JNCC, Natural England and the Science Advisory Panel (SAP).³⁰ Their advice was not available at the time of writing this document. Statistics and illustrations that indicate the degree to which each regional suite of rMCZs meets the ENG network design principles can be found in the regional MCZ projects' recommendation reports (Balanced Seas, 2011; Lieberknecht and others, 2011; Net Gain, 2011; ISCZ, 2011) and are not repeated here.

2.3 Ecosystem services

Baseline

2.3.1 Ecosystem services are defined as services provided by the natural environment that benefit people (Defra, 2007).³¹ The ecosystem services that may be provided by MCZ features include those set out in Table 1.

Table 1 Ecosystem services that may be provided by MCZ features.

General ecosystem service categorisation	Ecosystem services used in the IA	Type of service
Provisioning	Provision of fish and shellfish for human consumption	Final ecosystem service
Cultural	Recreation	Goods
	Research and education	Final Ecosystem Service
	Non-use	Goods

³⁰ The SAP is a panel of leading academics set up specifically to provide scientific advice to the MCZ Project – further details can be found at: www.naturalengland.org.uk/ourwork/marine/protectandmanage/mpa/mcz/default.aspx

³¹ Definitions of each ecosystem service can be found in Annex H.

Regulating	Natural hazard protection	Final ecosystem service
	Environmental resilience	Intermediate ecosystem service
	Gas and climate regulation	Final ecosystem service
	Regulation of pollution	Final ecosystem service

2.3.2 The value of the ecosystem services provided by these features in the baseline (in the absence of MCZs) is dependent on the local, regional and global environmental conditions, the impacts of human activities and the contribution that the service makes to human well-being (which may arise from their use or non-use of the service). This is because the value of the service is a product of the quantity and quality of the service and its contribution to welfare. The services provided by the UK marine environment benefit people both within the UK and abroad.

2.3.3 *Provisioning services:* The provision of fish and shellfish for human consumption, accessed via commercial fisheries, has been in decline in the UK (in volume terms). The decline has occurred principally through reduced landings of demersal and pelagic finfish, partly as a result of declining fish stocks (Austen and others, 2011). Landings of shellfish have been increasing. Marine aquaculture production has increased significantly in the UK over the last decade. A summary of commercial fishing and aquaculture activities in rMCZs can be found in section 3.2; Annex D provides a summary of the scale and value of fisheries in the UK.

2.3.4 *Cultural services:* Much of the value of the recreation services provided by the marine environment is associated with activities in the coastal terrestrial fringes. A baseline description of the recreation taking place in MCZs is provided in section 3.2 and Annex D provides a summary of the value of recreation in the UK. The marine environment provides a number of opportunities for research and education activities. For example, the Marine Conservation Society (MCS), through its Cool Seas programme, has visited more than 400 schools in the UK, reaching over 120,000 school children since 2006 (Austen and others, 2011). In addition people place value on simply knowing that marine habitats and species exist, even if they never utilise or experience them. People also place value on ensuring the availability of marine habitats and species and associated ecosystem services for others and for future generations (Beaumont and others, 2006).

2.3.5 *Regulating services:* In terms of regulation of pollution, improved treatment of sewage has reduced the need to rely on marine ecosystems to degrade sewage waste, although localised pollution issues remain (Austen and others, 2011). Similarly, chemical discharges from industry are now tightly regulated, although a legacy of chemicals remains in the marine environment (Austen and others, 2011). The global warming effects of greenhouse gas emissions have increased the importance of marine habitats and organisms for carbon sequestration. Certain marine habitats and species directly and indirectly contribute to natural sea defences. Rising sea levels as a result of global warming and increased risk of flooding highlight the importance of this service (Austen and others, 2011). Activities that disturb the sea bed can interfere with these regulating services.

2.3.6 Following a growing awareness of the important role of marine ecosystem services, a number of studies, such as Beaumont and others (2006), have attempted to estimate the total value of ecosystem services. These studies indicate the importance of marine ecosystem services to human wellbeing but do not assess impacts of changes in marine habitat and species quality.

Benefits

2.3.7 The IA assumes that rMCZ features with 'maintain' conservation objectives are likely to prevent deterioration in ecosystem services, while 'recover' conservation objectives are likely to increase the potential benefits of ecosystem services. Recommended MCZs will conserve and enhance both the stock and flow of marine ecosystem services but the necessary data are not available for these changes to be quantified. Recommendations have been made for 108 rMCZs, and a further 65 rMCZ Reference Areas. Taking into account the overlaps between some of these sites, the total number of sites recommended for designation is 127 (an rMCZ Reference Area that is located within an rMCZ is part of the rMCZ and not a separate designation). The sites will protect over 1,000 instances of particular habitats and species. Knowledge of many of these habitats and species and their contributions to ecosystem services is limited, dispersed and in disparate forms, as indicated by Fletcher and others (2012).

2.3.8 The following descriptions of potential benefits to ecosystem services are based on material presented in Annex L.

Fish and shellfish for human consumption

2.3.9 The IA assumes that benefits to provision of fish and shellfish for human consumption are most likely to arise where:

- the designation (and subsequent management) is assumed to improve the condition of the habitats and species within it (as indicated by the conservation objectives) (as discussed in the section 2.3.6);
- and the designation will lead to a reduction in fishing mortality and subsequent improvement in the characteristics of fish stocks.

2.3.10 The suite of rMCZs considered in this IA will cover a combined area of 37,760km², the management of which will affect a potentially significant level of commercial fishing activity (see section 3.2). As the rMCZs will form part of an ecologically coherent network of MPAs, the combined effect of the suite of rMCZs (and other MPAs) in terms of habitat improvement and reduced mortality of fish, is expected to be greater than the total effect of individual rMCZs when considered in isolation from each other.

2.3.11 Evidence that rMCZs could result in potential improvements in populations of less mobile species such as shellfish (including crustaceans) is relatively strong. Management for MCZs may specifically reduce fishing effort that targets some commercial species listed as MCZ FOCI, such as crawfish. The extent to which the value of benefits will be realised will depend on the degree to

which fishing is still permitted within each rMCZ, and the extent to which spillover benefits occur (allowing fishers not fishing within the rMCZ to benefit from improved fish populations).

2.3.12 On-site benefits of improved fish and shellfish populations will only be realised where fishing is still permitted within an MCZ (possibly at a reduced level compared with the baseline). Off-site benefits from the spill-over of fish and shellfish from MCZs may benefit fishers outside the MCZ, regardless of whether fishing is permitted within it. For less mobile species, benefits are likely to be concentrated in localised areas around MCZs. Off-site benefits may occur for species such as scallops as a result of increased larval export, improving the health of surrounding scallop beds.

2.3.13 It has not been possible to establish the likely net effect on fishing effort and fishing mortality that may result following the displacement and redistribution of fishing effort arising from the management for MCZs. However, the concerns raised by fishing organisations during the MCZ planning process and draft IA consultation indicate that for most gear types there is a significant chance of reduced landings. This implies that there is a significant likelihood of reduced fishing mortality for a number of species, including mobile finfish species. In turn, it may therefore be assumed that a general reduction in fishing mortality will enable an improvement in fish stocks. Any such benefits to fish stocks are likely to be highly species dependent.

2.3.14 Fish stock benefits may be greatest for those species that are overexploited, landings of which are typically governed by CFP quota policies. Given current quota policies, many fishers interviewed for this IA thought it unlikely that MCZs would result in any decline in catch rates to below quota levels (Various vessel skippers and owners, pers. comms., 2011). As such it is unclear whether any significant changes in the stocks of quota species could occur as a result of MCZs.

2.3.15 The value of impact on supplies of fish and shellfish for human consumption derived from any increase in fish stocks will depend on the species that are positively affected, markets for these species and the scope for fishers to catch them (given MCZ management of fishing activity). It is unclear whether the price of fish or shellfish caught from within MCZs will increase as a result of MCZs, for example through creation of a premium product.

2.3.16 The potential benefits described above are considered independently from the potential costs of MCZs arising from the additional management of fisheries for MCZs and potential impacts on fish and shellfish populations by effort displaced from MCZs. These costs are assessed in section 3.2³².

2.3.17 Potential benefits to static gear fishers within MCZs may occur in specific sites if MCZ management involves cessation or reduction in mobile gear fishing effort. This may open new ground for static gear fishers and/or reduce gear conflict and the associated costs of lost fishing gear.

³² In order for MCZs to generate a net benefit, the gross benefits will need to be greater than the costs of additional restrictions on fisheries and displacement effects

Recreation

2.3.18 The recreational activities that are most likely to benefit from MCZs are those most directly related to the marine environment, including recreational angling, diving and wildlife watching. Benefits to recreation from MCZs are expected to stem both from changes to the ecological condition of the marine environment and from the designation label (regardless of any ecological changes). They are likely to be greatest for coastal and estuarine MCZs, which are more accessible than those further from shore.

2.3.19 Improvements in the condition of marine habitats and species may enhance the recreational experience for participants, which will thereby increase the value of the ecosystem service. This is most likely to arise from rMCZs with features that have conservation objectives that seek to recover their condition (to favourable or reference condition). Improvements in the condition of benthic habitats may benefit species not specifically included in MCZ designation orders as well as those that are. For example, bird populations may benefit from the protection of benthic habitats that contribute to the provision of good foraging grounds. Bird watchers may benefit from resultant improvements in bird watching experiences. Many of the rMCZs are in or adjacent to locations that are important sea bird foraging grounds, and thus could be of potential benefit to people who watch seabirds in the UK.

2.3.20 There is evidence that sea anglers (shore-based and from boats) benefit from increases in the size and diversity of fish that they catch: Drew Associates (2004) found that anglers were willing to pay more for larger fish and a greater diversity in the catch, and that shore-based anglers were willing to pay more for an increase in the number of fish that they caught. Anglers may therefore benefit if such improvements arise as a result of the management of MCZs. However, extractive and depositional activities, including recreational angling, will not be permitted in MCZ Reference Areas. In such cases any benefits will be limited to any spill-over effects that may occur.

2.3.21 Where MCZs only include conservation objectives to maintain feature condition, MCZs may insure the recreation service against the risk of future degradation. This will ensure that their current recreational benefits to people will be maintained. Even where material improvements in the quality of the ecosystem service do not occur, participants of recreation activities may visit an MCZ that they had not previously visited or visit an MCZ more frequently as a result of the designation alone. This may result in an increase in the overall number of visitors to a specific site, which may have beneficial impacts on local economies. Such increases may represent a redistribution of location preferences of recreation participants, rather than an overall increase in the level of participation in the UK.

2.3.22 MCZs may act as a focal point for recreation activities less directly related to the quality of MCZ features such as walking along the coastal path. MCZs may also generate additional public interest and be used in marketing campaigns for coastal areas. They may help site managers to access funding, enabling improvements in the provision of marine environment information and interpretation, which may increase the quality of the experience for visitors.

Research and education

2.3.23 The UK National Ecosystem Assessment highlights the need for more research on the marine environment. noting that an improvement in knowledge would support more effective marine planning and licensing of activity in UK waters for the sustainable use of marine habitats and the maintenance of clean, healthy, productive and biologically diverse seas.' (Austen and others, 2011). There are specific research gaps in the effectiveness of MPAs in temperate areas and the role of biodiversity in ensuring the resilience of ecosystem service provision.

2.3.24 The designation of MCZs in UK waters will generate significant investment³³ in research activities, including mapping of the sea bed, feature condition assessments and ongoing monitoring of MCZs. MCZ-related research will help to improve the evidence base and contribute to our understanding of marine ecosystems, anthropogenic impacts upon the marine environment and the effects of management interventions, which may in turn lead to the more efficient use and management of the marine environment in future. MCZ Reference Areas will provide an opportunity to demonstrate the state of a broad range of marine features, in the context of prevailing environmental conditions, and the absence of many anthropogenic pressures will provide control areas as part of long-term monitoring and assessment (JNCC and Natural England, 2010c).

2.3.25 MCZs, including the research and monitoring activities occurring within them, may act as a focal point around which to develop education events and facilities, either as new ventures or as extensions to existing programmes. Ease of access means that MCZs that enable visitors to benefit from shore-side interpretation are likely to benefit the greatest number of people. Any educational benefits for visitors to MCZs or the coast nearby will depend significantly on the quality of public education and interpretation material that is provided. MCZ designation may aid site managers in accessing funding with which to develop such material (European Marine Site managers, pers. comms., 2011). Interpretation activities or education programmes in marine areas typically involve talks (by tour guides, interpreters and rangers on board boats or on shorelines), visitor centres, displays, signs and brochures. Education resources could be developed for delivery to the wider public through television programmes, articles in magazines and newspapers, and educational resources developed for use in schools. This would enable education benefits to be captured by non-visitors.

Regulating services

2.3.26 The environmental resilience of ecosystems is highly linked to levels of marine biodiversity and protecting a wide range of species and habitats, many of which will respond differently to natural or human pressures, can increase resilience to natural and human pressures (Hughes and others, 2005; Tilman, Reich and Knops, 2006; in Beaumont and others, 2006). By protecting a range of habitats and species, MCZs will help to ensure that natural and human pressures are absorbed by the marine environment, protecting against degradation, irreversible damage and potential reductions in all (final) marine ecosystem services.

³³ An estimate of the direct investment on MCZ assessment and monitoring by JNCC and Natural England is set out under the 'Costs of managing MCZs' in Section 3.3.

2.3.27 Benthic biomass production is linked to rates of carbon sequestration (Austen and others, 2009; Cooper and others, 2010). Management of MCZs may reduce levels of human activities, such as bottom trawling, that reduce levels of benthic biomass. Where this occurs, there may be a resultant net increase (compared with the baseline) in the rate of carbon sequestration. Some MCZ features, including intertidal mud, coastal salt marshes and saline reed beds, the deep-sea bed and seagrass, are particularly efficient sequesters of carbon (Fletcher and others, 2012). To the extent that MCZs will contribute to healthier and more diverse ecosystems, they are anticipated to aid the environment's capacity to process waste (Beaumont and others, 2006) and protect the regulating capacity of the marine environment. Salt marshes and seagrass beds are thought to be particularly good regulators of pollution and subtidal sediment habitats can act as pollution sinks, aided by the fauna resident within them.

2.3.28 Management for MCZs is expected to result in increased biomass and biodiversity and a reduction in sea bed disturbance (compared with the baseline), which are expected to improve the marine environment's capacity to provide regulating services.

Non-use values

2.3.29 Many people will gain satisfaction from knowing that rare, threatened and representative marine species, habitats and features of geological or geomorphological interest are being conserved by MCZs (non-use value). These benefits include the benefit to themselves (existence value), as well as the benefit that they gain from knowing that the features are being conserved for others in the current generation (altruistic value) or future generations (bequest value).

2.3.30 A significant proportion of the total value derived from MCZs may be non-use value.³⁴ McVittie & Moran (2008) found that households in the UK were willing to pay a total of between £487m/yr and £1,171m/yr for a UK network of MCZs³⁵. These estimates include both non-use and use values; although McVittie and Moran (2008) estimate that a high proportion will be non-use value. These estimates cannot be directly transferred to the suite of rMCZs being considered in this IA, as the estimates were based on a hypothetical network covering all UK territorial and offshore waters, which differs from that under assessment here. However, they give an indication of the potential scale of non-use benefits that could accrue from the suite of rMCZs.

2.3.31 Other evidence that the UK population values the marine environment comes from a number of recent surveys: 80% of the adult population in England stated that a healthy marine environment was important (ICM Research, 2012; TNS, 2009), 68% of the UK population were in favour of governments designating parts of the ocean as protected areas, and 32% of the UK population were concerned about ocean health in general (Potts and others, 2011).³⁶

³⁴ A study on the value of Natura 2000 sites in Scotland found that 99% of the overall value of such sites was non-use (Jacobs, 2004, cited in Defra, 2007).

³⁵ These estimates cannot be directly transferred to the suite of rMCZs being considered in this IA as the estimates were based on a hypothetical network covering all UK territorial and offshore waters, which differs from that under assessment here. However, they give an indication of the potential scale of non-use benefits that could accrue from the suite of rMCZs.

³⁶ These opinions may include both use and non-use sentiments.

2.3.32 The Your Seas Your Voice campaign³⁷ (Ranger and others, 2012) identified the reasons why people would like specific areas of the marine environment conserved, many of which reflect non-use sentiment including conservation for future generations; aesthetic values; personal significance; emotional attachment; the wide range of plants and animals; and a social responsibility to look after the sites. Research by Pike and others (2010) based on interviews with 24 marine and coastal protected area (MCPA) practitioners identified that the natural environment was the primary reason why the public visited MPAs and that MPAs provided feelings of spirituality, peace and tranquillity, natural beauty, inspiration for creativity, and areas for reflection and solitude.

3 Baseline and summary of the costs of Policy Option 1, the suite of rMCZs

3.1 About this section

3.1.1 This section describes the following:

- A summary of human activities that are expected to occur over the 20-year period of analysis within, or near to the suite of rMCZs (the baseline), that are likely to be affected by rMCZs. The baseline does not seek to describe all human activities within the MCZ Project area. For commercial fisheries, the baseline describes all activity within the footprint of the suite of rMCZs, regardless of whether that activity will be impacted on by MCZ management³⁸.
- Section 3.2 presents a summary of the anticipated impacts on human activities resulting from the designation and management of rMCZs³⁹, assessed relative to the baseline. This primarily describes costs however where benefits are expected to arise, these are also described.
- Section 3.3 presents costs of surveys, management measures and consultation with stakeholders.

3.1.2. Where possible, the IA has considered known likely future plans and projects in rMCZs, unless there is significant uncertainty about whether they will take place. In the absence of data on trends, current levels of activities are used in the baseline (and impacts are assessed relative to these). Where known, anticipated future trends in activities are described.

3.1.3 The IA mostly assesses impacts on UK economic welfare in terms of the impact on gross value added (GVA),⁴⁰ as insufficient data were available to calculate impacts via changes to

³⁷ Participants were able to vote for specific areas identified by MCS or to nominate and vote for new areas in addition to those already identified by MCS.

³⁸ This differs from information presented in Annex I, in which baseline information is provided only for those gear types that may be affected by each rMCZ.

³⁹ Annex C provides a quick guide to the activities that take place in each rMCZ and whether they are likely to be impacted on by the rMCZ. Annex F provides a regional summary of baseline and impacts for each sector (where appropriate). Annex I presents the baseline and impacts for each rMCZ. Further information on impacts that cannot be attributed to individual sites is provided in Annex J. Impacts that are assessed only for the national suite of sites (and not individual rMCZs) are described only in this document. The scale of each of the sectors in the UK is described in Annex D.

⁴⁰ GVA measures the contribution to the economy of each sector.

consumer and producer surplus (the measures used in conventional economic cost-benefit analysis). Though the focus of the IA is on the impact on UK economic welfare and society at a national scale, significant regional and/or local impacts have been highlighted where these arise. Cumulative impacts that arise over and above the sum of the impacts of the sites are identified where possible in the assessment of impacts for each sector. The assessments of impacts are subject to considerable uncertainty as it is difficult to know how additional management for MCZs will impact on operators, how operators will respond, the economic costs of the impacts and what the wider effects will be.

3.1.4 To meet Regulatory Policy Committee requirements and at the request of Defra, the IA indicates the management measures that might be employed to deliver management of activities in MCZs. Management measure is used in the IA to refer to the instrument through which management will be provided, such as a statutory instrument (e.g. a byelaw) or voluntary agreement.

3.1.5 The best estimate of impacts is based on the advice of JNCC and Natural England, and the Department of Energy and Climate Change (DECC) where appropriate. Additional concerns about the impacts of rMCZs raised by operators and their representatives are provided in the narrative but are not included in the costs presented in the IA summary. While these are important to consider, they are not the best estimate of impact as they include unlikely eventualities.

3.2 Anticipated costs to human activities that will be impacted on by MCZ management

Aggregate extraction

Baseline

3.2.1 There are 70 existing marine aggregate extraction production licence areas within the MCZ Project area (British Marine Aggregate Producers Association (BMAPA) pers. comm., 2011), concentrated in the Net Gain and Balanced Seas project areas. In the Balanced Seas project area, 13 production licences and 3 applications for new licensed areas are within 1km of an rMCZ (rMCZs 16, 17, 22, 28, 29, and 29.2 and rMCZ Reference Area 13. In the Net Gain project area, 4 production licence areas are within 1km of an rMCZ (rMCZs NG 4, NG 16). Neither the Finding Sanctuary nor the Irish Sea Conservation Zones project areas have any production, application or option areas within 1km of any rMCZs.

3.2.2 A total of 15 rMCZs overlap with or are in close proximity to strategic resource areas. These are areas that are not currently licensed where evidence of geological features and deposition processes suggests there is potential for sand and gravel deposits to be found (The Crown Estate, feedback on draft IA material, 2011). The distribution of these rMCZs is as follows: Balanced Seas: 8; Net Gain: 4; Irish Seas Conservation Zones: 2; Finding Sanctuary: 1.

Costs

3.2.3 Two management scenarios are employed in the IA, which provide high and low cost estimates that illustrate the potential range of impacts upon the marine aggregate extraction sector. Further details of each management scenario are available in Annex H2. Additional one-off

costs are anticipated in both scenarios in the assessment of environmental impact which is undertaken in support of each future licence application. A range of additional mitigation requirements are also anticipated.

3.2.1 The low cost scenario assumes that future licence applications for aggregate extraction (for production, application) within 1km of an rMCZ will need to assess the potential impact of the activity upon the MCZ features' conservation objectives. It is estimated that the additional cost will be incurred for a total of 25 applications for 20 licensed areas over the 20 years covered by the IA. It is assumed that the additional one-off average cost of £0.027m per licence application (based on information provided by BMAPA, pers. comm., 2011). BMAPA will also incur a cost of £0.010m/yr to provide information that all operators can use for these assessments.

3.2.2 The operators of licence number 395 are assumed to incur additional costs (of £0.010m/yr; BMAPA, pers. comm., 2011) to monitor the impact of aggregate extraction upon features in rMCZ Reference Area 13 (North Utopia) in the Balanced Seas project area. It is assumed that no costs are incurred as a result of the three month closure to aggregate extraction offered by operators to mitigate impacts on features of rMCZ 16 (Kingmere) in the same project area. Overall, the total cost to the aggregate sector of the low cost management scenario for all rMCZs is estimated to be £0.043m/yr and the present value is estimated to be £0.595m over the 20-year period of the IA. The low cost scenario provides the best estimate of the impacts of MCZs on the aggregate extraction sector; BMAPA is content with this (pers. comm., 2012).

3.2.3 The high cost scenario assumes that an additional cost to assess impacts on MCZ features will be incurred for future licence applications for all existing production licences in the MCZ Project area. It is estimated that this will apply to a total of 140 applications for 70 licensed areas over the 20 years covered by the IA (BMAPA, pers. comm., 2011). As for the low cost scenario, it is assumed that BMAPA will incur a cost of £0.010m/yr to provide information that operators will use for their assessments. The scenario also assumes that additional costs will be incurred for future licence applications for strategic resource areas. It is estimated that a total of 17 applications (The Crown Estate, feedback on draft IA material, 2011) will be submitted in 2028. It is assumed that capacity of existing resources will be sufficient at least until this time (based on advice of Natural England, pers. comm., 2011). As for the low cost scenario, it is assumed that the additional one-off cost per licence application is £0.027m.

3.2.4 The high cost scenario also assumes that costs arise from mitigation of impacts on features at two sites. In both cases, the additional costs are estimated in terms of replacing the shortfall with aggregate sourced from a licensed area 40km away. This does not include increased routine maintenance costs that may arise and greenhouse gas emissions may increase as a result of transporting aggregates over greater distances. It is assumed that the three month closure offered by operators of adjacent licensed areas (453 and 448) to mitigate impacts on Balanced Seas rMCZ 16 (Kingmere) results in a reduction in aggregate extraction, incurring additional costs of £0.415m/yr for each of the 2 operators.

3.2.5 It is also assumed that closure to extraction at licence area 395 is necessary to mitigate impacts on features in Balanced Seas rMCZ Reference Area 13 (North Utopia), which results in additional costs of £1.662m/yr. BMAPA has indicated that for the two companies that operate the licence this scenario would result in loss of sunk investment, loss of value of the aggregate asset in the site and it could also result in loss of potential value added and impacts on local businesses and employment (pers. comm., 2012). The consequences for the operators of impacts arising from constraints on the licence could be significant (BMAPA pers. comm., 2012). The licence area is also expected to have an increasingly significant role in the supply of aggregates for use in construction and coastal defence in southern England in the long term (BMAPA feedback on draft IA material, 2012).

3.2.6 It is not known whether licence applications for prospecting or production in strategic resource areas will be submitted during the 20-year period of the IA, where they will be located and what activities will be proposed. Therefore, it is not possible for the IA to identify whether additional mitigation of impacts on MCZs will be required and therefore whether operators will incur additional costs as a result. In the Balanced Seas project area, The Crown Estate is particularly concerned about the potential impacts of rMCZ 8 (Goodwin Sands) and rMCZ Reference Area 8 (Goodwin Knoll) on a block of important strategic aggregate resource which has been dredged in the past. The Crown Estate has indicated that closure of this block to aggregate extraction would have significant economic impacts on aggregate industry and potential knock on effects on construction, beach recharge and coastal protection operations (feedback on draft IA material, 2011).

3.2.7 The estimated average annual cost of the high cost management scenario is £2.715m/yr and the present value is £38.760m over the 20-year period of the IA plus the unknown costs described above.

Aquaculture

Baseline

3.2.8 Eight aquaculture businesses cultivate Pacific oysters in or near to Finding Sanctuary rMCZs. They produced a total of over 120 tonnes of Pacific oysters in 2010 (Shellfish cultivators and Devon and Severn Inland Fisheries and Conservation Authority (IFCA), pers. comms., 2011), which was sold for an estimated £0.506m. At least two of these businesses are solely reliant on Pacific oyster cultivation (Shellfish cultivators, pers. comms., 2011).

Costs

3.2.9 Two management scenarios have been considered which reflect the uncertainty about the need for Pacific oyster cultivators to use triploid rather than diploid stock^{41,42}. Under the low cost

⁴¹ With the exception of Pacific oyster cultivation, no other aspects of aquaculture operations were identified as causing significant pressures on MCZ feature condition and therefore no management of these activities is expected.

⁴² Use of triploid seed stock rather than diploid seed stock may reduce the risk of wild settlement of Pacific oysters, which are considered to be an invasive non-native species in south-west England.

management scenario, no additional management is anticipated and as such there are no anticipated costs. These apply only to 3 rMCZs in the Finding Sanctuary project area.

3.2.10 The high cost management scenario assumes use of triploid stock is required to reduce the risk of wild settlement of Pacific oysters in the rMCZs. This would impact on the eight businesses that cultivate oysters within or in close proximity to rMCZs The Dart, Devon Avon and The Camel Estuary. Due to a shortage in supply, it is unlikely that these businesses could source sufficient triploid stock and they would therefore cease production of Pacific oysters. This would result in a decline in output of over 120 tonnes of oysters/yr (9% of UK Pacific oyster output), with a value of £0.506m/yr. It is estimated that this would result in a reduction in UK GVA of approximately £0.279/yr (based on 2010 data), equivalent to approximately 9% of UK Pacific oyster cultivation GVA and 2% of UK shellfish cultivation GVA. Over the IA's 20-year timeframe the high cost scenario costs are estimated to have a present value of £3.959m; the cost of the low cost scenario is zero. It is unclear which scenario is most likely to arise. The best estimate of the cost is assumed to be the mid-point of the low and high cost scenarios, which results in a present value of costs over 20 years of £1.979m.

Archaeological heritage

Baseline

3.2.11 There is evidence of archaeological features in or adjacent to 120 rMCZs of which 36 are rMCZ Reference Areas (Balanced Seas: 19; Finding Sanctuary: 8; Irish Seas Conservation Zones: 3; Net Gain: 6). The archaeological features include designated historic shipwreck sites, scheduled monuments, listed buildings, battlefields, World Heritage Sites, historic features and non-designated shipwrecks. Further details are provided in Annex I.

Costs

3.2.12 It is anticipated that archaeological surface recovery of artefacts and full site excavations will be prohibited in:

- 65 rMCZ Reference Areas (archaeological features are currently known to exist in 36 of these);
- 2 rMCZs (which are not rMCZ Reference Areas) with exposed peat and clay beds that have a conservation objective of 'recover to favourable condition'.

It is assumed that diver trails, visitors and non-intrusive surveys will be allowed to continue in rMCZs (see Annex H).

3.2.13 Further impacts upon archaeological activity in MCZs that are not MCZ Reference Areas could arise if, for example, vessels can no longer anchor over sensitive features such as seagrass beds (except in emergency) (Natural England, pers. comm., 2011). It has not been possible to quantify this impact as it is not known where archaeological activity may be proposed.

3.2.14 The prohibition of archaeological activities in the above sites could result in a reduction of archaeological evidence recorded in the sites. The loss of recorded archaeological evidence would

impact upon the benefits that society derives from archaeology, including historical and environmental data, interpretation and associated social values. It has not been possible to quantify this cost. If archaeologists respond to the prohibition by seeking alternative sites for archaeological excavation elsewhere, this could result in additional costs to the sector (for example, if they have to travel further). Again, it has not been possible to quantify this impact as it is not known where archaeological activity may be proposed.

3.2.15 For all rMCZs where (for the purposes of the IA) it is assumed that bottom trawling and dredging is restricted, the IA assumes that there will be additional benefits to archaeology. It is assumed that where such potentially damaging activities are restricted or prohibited, this will result in greater protection to exposed or shallow-buried archaeology. Again, it has not been possible to quantify this impact.

3.2.16 All archaeological activity proposed within or near to any rMCZ that is subject to a licence is expected to incur an additional cost of up to £0.010m for licence application, in order to assess the impact of the proposed activity upon the conservation objectives of the MCZ features (English Heritage, pers. comm., 2012). This cost is likely to be an overestimate as it is the entire cost of collecting environmental data to support the licence application, some of which would be required in the absence of rMCZs.

3.2.17 Evidence of archaeological heritage currently only exists in 103 rMCZs (see Annex I). It is assumed that licence applications are more likely to come forward for the 103 rMCZs where archaeological heritage is known to exist than for other rMCZs where there are no known archaeological features. As the number of future licence applications is not known, the costs cannot be estimated.

Cables (interconnectors and telecom cables)

Baseline

3.2.18 There are numerous existing power and telecommunication cables passing through rMCZs. However, there are no known existing operational cables and no known planned cable installations within any rMCZ Reference Areas. The greatest concentration of existing cables is in the Finding Sanctuary project area (the landing point of most transatlantic cables). The IA assumes that only the costs of future cable licence applications could be impacted upon by rMCZs, and that eight to 24 licence applications will be submitted over the 20-year period of the IA, spread equally across the four regional MCZ project areas.

Costs

3.2.19 One scenario of impact upon the cable sector is employed in the IA that is based on advice provided by JNCC and Natural England (JNCC & Natural England, 2011a, c).

3.2.20 It is anticipated that existing or operational cables will not be impacted upon by rMCZs. It is assumed that licence decisions regarding currently submitted applications for proposed cables will be made before rMCZs are designated and so will not incur any additional cost. The IA

assumes that cable operators would incur an additional cost for future licence applications for cables as a result of rMCZs, but only for installations partly or wholly located within 12nm of the English coastline. The sector has indicated that it would voluntarily incur such additional costs for proposals beyond 12nm (UK Cable Protection Committee, pers. comm., 2011).

3.2.21 No additional costs are expected to mitigate the impact of cables upon MCZ features. This is because cable operators are allowed to lay their cables anywhere outside of the 12nm limit unhindered. Under the United Nations Convention on the Law of the Sea, power and telecom cables laid on the continental shelf can be installed and maintained as required. Under Section 81 of the Marine and Coastal Access Act 2009 'Exemptions', telecom and power cables laid on the continental shelf outside territorial sea (outside 12nm) are exempt from licensing. Within 12nm, although cables must be licensed, additional mitigation is not anticipated compared to the baseline (see Annex H6 for explanation). However, there are potential significant unknown costs if cables passing within 12nm of the English coastline are required to install alternative types of cable protection at an additional cost, in order to protect MCZ features. However, Natural England (pers. comm., 2012) has said that such costs are very unlikely (see Annex H14 for explanation).

3.2.22 It is not yet known where and how many future cables will be proposed hence, the IA assumes that between eight to 24 licence applications will be submitted over the 20-year period of the IA, spread equally across the four regional MCZ project areas. It is known that power cables are proposed between Denmark and England, France and England, and Iceland and England; all of which could occur within the 20-year period of the IA (JNCC, pers. comm., 2012). However, the possible routes of these cables are not known and so this possible impact has not been assessed in the IA.

3.2.23 It is assumed that each cable proposal will be required to consider its impact upon MCZ features. The cost of this is estimated to be £0.010m per licence application. Depending on the number of licence applications submitted, this is equivalent to a £0.004m/yr to £0.012m/yr cost to the sector. The present value of the cost to the sector is estimated to be £0.053m to £0.159m over the 20-year period of the IA. The best estimate is the mid-point of the lowest and highest cost. It estimates that 16 licence applications will come forward for proposed cable routes in the MCZ project area, at an additional cost of £0.106m (present value) over the 20-year period of the IA.

3.2.24 JNCC and Natural England (2011a, c) have advised that in rMCZs that are not rMCZ Reference Areas no additional mitigation of impacts of repair or installation of cables is likely to be required. In the event that a cable route was sought through an rMCZ Reference Area, the operator may incur a cost if it has to forgo its preferred cable route. Due to the location of rMCZ Reference Areas, this is considered to be unlikely (Natural England and JNCC, pers. comms., 2012). The UK Cable Protection Committee is content with these assumptions.

Coastal development (excluding port and harbour developments)

Baseline

3.2.25 In the Balanced Seas project area, there are three known major proposed coastal developments within 1km of two rMCZs, the Thames Airport and the Lower Thames Crossing (rMCZ 5) and Bradwell Nuclear Power Station (rMCZ 3). In the Irish Sea Conservation Zones project area, a marine landing facility is planned at the new nuclear power station development at Sellafield in rMCZ 11. Sellafield also conducts monitoring for radioactive materials in rMCZs 11, Reference Area I and Reference Area J. There are no other known coastal developments planned in the vicinity of any other rMCZ (with the exception of port and harbour developments).

Costs

3.2.26 For the three developments in the Balanced Seas project area, it is likely that the developers will incur additional costs for future licence applications as a result of MCZs or will need to mitigate impacts upon the features of rMCZs 3 or 5. However, this is subject to uncertainty as proposals are at very early stages and the nature and scale of potential impacts are unknown. It is anticipated that Irish Sea Conservation Zones rMCZs 11, Reference Area I and Reference Area J will not impact on Sellafield's operations. No other rMCZs are anticipated to impact upon coastal developments (port developments are covered under the ports, harbour, shipping and disposal sites sector).

Commercial fisheries

3.2.27 A summary of the baseline and impacts are provided firstly for all commercial fisheries and then in further detail for each broad category of gear type.

Summary of the baseline for all UK commercial fisheries

3.2.28 Commercial fishing takes place to varying degrees in most of the rMCZs, covering a wide range of fisheries and fishing conditions. The IA considers the following broad categories of gear types: dredges, bottom trawls, mid-water trawls, pots and traps, nets, hooks and lines, and collection by hand. The baseline and assessment of impacts is provided for each separately below. The baseline describes fishing activity currently occurring within the suite of rMCZs, regardless of whether that activity will be impacted on by MCZ management. The combined value of landings from the suite of rMCZs is estimated to be £25.147m/yr with the highest contribution arising from bottom trawling, followed by pots and traps (Table 2). Of this total, 32% is contributed from rMCZs in the Balanced Seas project area, 31% from Net Gain, and 22% and 15% from Irish Seas Conservation Zones and Finding Sanctuary project areas respectively. Summaries for each gear type are provided below in Table 2, using information and statistics provided by stakeholders and the MCZ Fisheries Model (details provided in Annex H).

3.2.29 Existing management of commercial fisheries in the MCZ Project area includes quota allocations, effort restrictions (on days at sea), size of catch and gear restrictions, labour restrictions, seasonal restrictions and real-time closures. Some of this management applies to the entire MCZ Project area (including the minimum European standard provided under the CFP) and

some applies only to specific areas, such as the restrictions provided by byelaws (further details are provided in Annex E). Reform of the CFP may result in changes to fisheries management during the 20-year period covered by the IA.

Summary of the costs for all UK commercial fisheries

3.2.30 Uncertainty about whether additional management of fisheries will be needed means that up to five management scenarios have been used in the IA for each rMCZ, including 'recommended' or 'preferred' management scenarios identified by the RSGs for some rMCZs. Details of the scenarios are provided in Annex I. The summary of impacts presents the lowest (including no additional management) and highest cost management scenarios to give an estimated range of potential costs to the UK economy (based on impacts on the UK fleet only). The best estimate of the value of landings and GVA affected is also provided, calculated using assumptions on the probability of the low cost and high cost scenarios occurring, which in turn is dependent on assessments of draft conservation objectives and current fishing pressures. The best estimate is derived from a combination of the following:

- mid-point (50%) values between the lowest and highest cost scenarios for gear types that were the primary reason for setting the conservation objectives of the features to 'recover',
- quartile (25%) values between the lowest and highest cost scenarios for gear types that were not the primary reason for setting the conservation objectives of the features to 'recover'.

3.2.31 Details of the key assumptions and limitations of the analysis are presented in Annex H7, along with an explanation of how the best estimate for each gear type in each rMCZ was identified.

3.2.32 The value of landings affected by management for MCZs is estimated to range from £2.353m/yr to £15.753m/yr, depending on the stringency of the restrictions implemented in each site. This is estimated to result in a loss of GVA of between £1.038m/yr and £6.962m/yr (Table 2). Depending on the restrictions implemented in each site, between 45 and 103 rMCZs are expected to have an impact greater than £0.001m/yr on landings for an individual category of gear type. Under the highest cost scenario, there are four rMCZs that are anticipated to affect a total value of landings which is greater than £1.000m/yr: Net Gain rMCZ NG 9 (£2.770m/yr); Balanced Seas rMCZ 14 (£1.228m/yr); and Irish Seas Conservation Zones rMCZs 1 (£1.091m/yr) and 6 (£1.049m/yr). No Finding Sanctuary rMCZs have impacts over £1.000m/yr. The best estimate is that rMCZs will affect £7.952m/yr of UK vessel landings and £3.471m/yr of UK GVA (1.09% of total UK vessel GVA in 2010⁴³). Over the 20-year timeframe of the IA, the best estimate of present value for value of landings and GVA affected is £112.912m and £49.279m respectively.

⁴³ UK GVA data is provided in Annex D.

Table 2 Estimated baseline UK vessel fishing activity occurring within the suite of rMCZs and the estimated impacts anticipated under the lowest and highest cost management scenarios and the best estimate.

Gear type	Baseline		Lowest cost management scenario			Highest cost management scenario			Best estimate of costs		
	Estimated total value of landings (£m/yr)	Estimated GVA (£m/yr)	No. of rMCZs affecting £0.001m/yr or more of landings	Estimated total value of landings affected (£m/yr)	UK GVA affected (£m/yr)	No. of rMCZs affecting £0.001m/yr or more of landings	Estimated total value of landings affected (£m/yr)	UK GVA affected (£m/yr)	No. of rMCZs affecting £0.001m/yr or more of landings	Best estimate value of landings affected (£m/yr)	Best estimate UK GVA affected (£m/yr)
Dredge	4.119	1.946	18	0.568	0.270	43	2.054	0.967	33	1.342	0.633
Bottom trawl	8.785	3.517	29	1.387	0.573	77	7.469	3.017	75	4.435	1.798
Mid-water trawl	1.221	0.683	2	0.046	0.026	4	0.063	0.035	4	0.055	0.031
Pots & traps	8.206	3.974	17	0.210	0.102	52	4.169	2.019	50	1.355	0.656
Nets	2.188	0.969	9	0.062	0.027	46	1.563	0.693	42	0.595	0.264
Hooks & lines	0.435	0.256	3	0.031	0.018	27	0.243	0.143	23	0.085	0.050
Hand collection	0.192	0.089	6	0.050	0.023	9	0.192	0.089	8	0.084	0.039
Total	25.147	11.434	54	2.353	1.038	103	15.753	6.962	102	7.952	3.471

Source: Estimates made using the MCZ Fisheries Model and stakeholder data. The MCZ Fisheries Model employs MMO data on value of landings for 2007 to 2010, data on distribution of effort for under 15 metre vessels for 2004 to 2010 which was collected by the regional MCZ projects from fishers through FisherMap, and processed vessel monitoring system data on distribution of effort for over 15 metre vessels for 2007 to 2010 provided by the MMO (further details provided in Annex H). Note that the above estimates have been adjusted to account for overlaps between rMCZs. Totals may not sum due to rounding. Further details are provided in Annexes I and N. The Balanced Seas RSG developed two network options, which provide two configurations of one particular site (rMCZ 29 and rMCZ 29.2). Option 1 includes rMCZ 29.2 which includes only the easternmost half of rMCZ 29 where the value of landings from dredging is lower. Option 2 includes the larger site, rMCZ 29. The baseline values contributed from Balanced Seas rMCZs are derived from network option 2, which includes the higher estimated value of landings derived from rMCZ 29 (rather than rMCZ 29.2). The lowest cost scenario includes Balanced Seas option 1 (including rMCZ 29.2); the highest cost scenario includes Balanced Seas option 2 (including rMCZ 29), and the best estimate includes figures for Balanced Seas averaged across the two options. For more details on the Balanced Seas network options 1 and 2 please refer to the Annex F regional summary.

Bottom trawling

Baseline

3.2.33 Bottom trawling occurs in most rMCZs with the greatest activity in rMCZs that are outside 6nm. There are some small-scale operations in intertidal and estuarine sites. Target species include white fish, flatfish, shrimp, nephrops, skate and ray. The Irish Sea Conservation Zones project area contributes 47% of the total value of landings for bottom trawling (estimated at £4.164m/yr) from the suite of rMCZs. This is mostly attributed to six of the Irish Sea Conservation Zones rMCZs located in the mud basins to the east and west of the Isle of Man, which coincide with nephrops fishing grounds. The nephrops fishery has been the most important fishery for Northern Irish ports since the mid-1980s.

Costs

3.2.34 The total value of landings affected is greatest for vessels that bottom trawl, which would also experience the greatest number and area of rMCZs closed to fishing of all gear types. Under the low cost management scenario, the largest value of landings affected arises within the Balanced Seas project area estimated at £0.946m/yr (of the total £1.387m/yr value of landings affected for all four regional MCZ project areas). This is largely due to the anticipated impacts of rMCZ 14, Offshore Brighton. For all other regional MCZ project areas, only rMCZ Reference Areas affect a value of landings greater than £0.001m/yr.

3.2.35 The highest cost management scenario is expected to have widespread impacts on bottom trawl fleets. The value of landings affected is more than £0.001m/yr for 75 rMCZs (Finding Sanctuary: 28 rMCZs; Balanced Seas: 24; Irish Sea Conservation Zones: 14; Net Gain: 9). Two sites in the Irish Sea Conservation Zones project area (rMCZs 1 and 6) are expected to affect a value of landings for bottom trawlers of greater than £1.000m/yr each. Under this scenario, £4.042m/yr (about 54% of the estimated £7.469m/yr total value of landings from bottom trawling) affected by the entire suite of sites arises from Irish Sea Conservation Zones rMCZs. Representatives of the Northern Irish fisheries estimate that up to 20% of the fleet's annual landings into Northern Irish and Cumbrian ports could be lost if all rMCZs are designated (once displacement of effort by fishing vessels is factored in qualitatively). Local economies that are dependent on fisheries and processing, such as Kilkeel, Ardglass and Portavogie, could be considerably impacted (Northern Ireland Fish Producers' Association and Anglo-North Irish Fish Producers' Association pers. comm., 2011).

3.2.36 The best estimate is that £4.435m/yr of UK vessel landings and £1.798m/yr of UK vessel GVA will be affected by the suite of rMCZs, with present values over the 20-year IA timeframe of £63.030m and £25.552m respectively.

Pots and traps

Baseline

3.2.37 Pots and traps are typically worked by relatively small vessels (usually under 15 metres in length, and mostly under 10 metres), targeting crabs, lobsters, periwinkles and whelks. These

vessels have relatively small ranges and tend to work areas close to their home port; therefore activity is greater in rMCZs within 6nm. At £4.747m/yr, the Net Gain rMCZs contribute 58% of the total value of landings for pots and traps from the entire suite of rMCZs. Of this, an estimated £2.586m/yr can be attributed to Net Gain rMCZ 9, where there is an internationally important shellfishery. Finding Sanctuary rMCZs have the second highest value of landings from pots and traps. Five rMCZs account for approximately 85% of all pot and trap landings arising from rMCZs within the Finding Sanctuary project area.

Costs

3.2.38 Under the low cost scenario, 17 rMCZs, all of which are rMCZ Reference Areas, are anticipated to each affect a total value of landings greater than £0.001m/yr. The estimated total value of landings affected is £0.210m/yr, with the largest contributions from rMCZs in the Irish Sea Conservation Zones (38%) and Finding Sanctuary (32%) project areas.

3.2.39 The high cost scenario is expected to have widespread impacts on fleets that deploy pots and traps across the MCZ Project area. Out of all of the categories of gear type, the value of landings affected is the second highest for pots and traps (estimated at £4.169m/yr). The value of landings affected is estimated to be more than £0.001m/yr for 52 rMCZs (Balanced Seas: 24; Finding Sanctuary: 13; Net Gain: 8; Irish Sea Conservation Zones: 7). Net Gain rMCZs account for 68% of the total value of landings affected, with £2.586m/yr arising from rMCZ NG 9 alone. It is anticipated that this site will impact on businesses based in Bridlington (Britain's most important shellfish port, and Europe's most important lobster port in terms of landings), and will have significant impact on fleets from other East and North Yorkshire ports (interview with National Federation of Fishermen's Organisation (NFFO), 2011). The management scenario may affect the viability of affected individual vessels that concentrate their effort within individual rMCZs.

3.2.40 In establishing the draft conservation objectives, the features in sites (including rMCZ NG9) were assessed as having low vulnerability to fishing with pots and traps at current levels and, as such, this activity was not the primary reason for assigning the 'recover' conservation objectives. It is anticipated that, if additional management is required for pots and traps, it may be towards the lower end of the range and is likely to be less restrictive than that required for other gears.

3.2.41 The best estimate is that £1.355m/yr of UK vessel landings and £0.656m/yr of UK vessel GVA will be affected by the suite of rMCZs, with present values over the 20-year IA timeframe of £19.258m and £9.325m respectively.

Dredges

Baseline

3.2.42 The main target species for vessels using dredges in the rMCZs are scallops, oysters, cockles and mussels. The Balanced Seas project area (option 2 configuration of sites⁴⁴)

⁴⁴ The Balanced Seas RSG developed two network options, which provide two configurations of one particular site (rMCZ 29 and rMCZ 29.2). Option 1 includes rMCZ 29.2, which is a smaller site including only the easternmost half of rMCZ 29.2 where the

contributes 86% of the total value of landings for this gear type across the suite of rMCZs (estimated at £3.538m/yr of the £4.119m/yr total). The rMCZ with the greatest value of landings from dredging is rMCZ 3 Blackwater, Crouch, Roach and Colne Estuaries (£1.703m/yr), which is the location of the most important oyster fishery (for native and Pacific oysters) in the Balanced Seas project area. Landing values for rMCZ 29 are also high as scallops, which are very abundant currently in the Eastern English Channel, are targeted here (Defra, 2011). As this abundance and the associated value subsides, increased effort may be expected in rMCZs within the Finding Sanctuary project area that were historically fished by the same fleet.

Costs

3.2.43 Under the low cost scenario, 17 rMCZs (including seven rMCZ Reference Areas) affect an estimated value of landings from dredging greater than £0.001m/yr. This figure rises to 43 rMCZs under the high cost scenario (Balanced Seas: 18 rMCZs; Finding Sanctuary: 12; Irish Sea Conservation Zones: 11; Net Gain: 2). Impacts are concentrated in the Balanced Seas project area; here, rMCZs contribute 93% of the £0.567m/yr and 81% of the £2.055m/yr estimated total value of landings affected by the suite of rMCZs under the low and high cost management scenarios respectively. The most significant impact from an individual site is from rMCZ 29 East Meridian at £0.602m/yr loss of landings from scallop dredging under the high cost scenario. For this reason, the Balanced Seas RSG recommended an alternative option for this site, rMCZ 29.2, which includes only the easternmost half of rMCZ 29, where the value of landings from dredging is lower.

3.2.44 The best estimate is that £1.342m/yr of UK vessel landings and £0.633m/yr of UK vessel GVA will be affected by the suite of rMCZs, with present values over the 20-year IA timeframe of £19.077m and £9.001m respectively.

Nets

Baseline

3.2.45 Netters are active in both inshore and offshore rMCZs. The target species vary widely according to the type of netting and location. The Balanced Seas project area contributes 59% of the £2.188m/yr total estimated value of landings from netting in the suite of rMCZs and rMCZ 13.1 Beachy Head East (£0.499m/yr) has the highest estimated value of landings from nets within this project area.

Costs

3.2.46 Within the Balanced Seas and Finding Sanctuary project areas the effects of rMCZs on netting are widespread. Under the low cost scenario, 9 rMCZ Reference Areas within these project areas affect more than £0.001m/yr value of landings from netting. This figure rises to 27 (Balanced Seas project area) and 17 (Finding Sanctuary project area) rMCZs under the high cost scenario, and a further two rMCZs in the Net Gain project area. Under the high cost scenario, approximately

estimated value of landings from dredging is lower. Option 2 includes the larger site, rMCZ 29. For more details on the Balanced Seas network options 1 and 2 please refer to the Annex F regional summary.

72% of the estimated £1.504m/yr value of landings from netting affected arises from Balanced Seas rMCZs. The most significant impact from an individual site is from rMCZ 13.1, which affects landings of £0.499m/yr.

3.2.47 The best estimate is that £0.595m/yr of UK vessel landings and £0.264m/yr of UK vessel GVA will be affected by the suite of rMCZs, with present values over the 20-year IA timeframe of £8.459m and £3.749m respectively.

Hooks and lines

Baseline

3.2.48 Limited fishing with hooks and lines occurs in rMCZs within 12nm, targeting species that include bass, cod, ling, pout, whiting, skates, rays, spurdog, smooth hound and tope. The Finding Sanctuary rMCZs contribute 55% of the £0.435m/yr estimated total value of landings from the suite of rMCZs from this gear type. Five rMCZs account for approximately 95% of the value of all hook and line landings arising from rMCZs within the Finding Sanctuary project area.

Costs

3.2.49 Compared with the other gear types, impacts on hooks and lines are relatively low in terms of value of landings affected. The best estimate is that £0.085m/yr of UK vessel landings and £0.050m/yr of UK vessel GVA will be affected by the suite of rMCZs, with present values over the 20-year IA timeframe of £1.215m and £0.714m respectively.

Collection by hand

Baseline

3.2.50 This type of fishing is only reported to occur at a significant level in rMCZs in the Irish Sea Conservation Zones project area where at least 30 intertidal fishers (estimated to be a third of regular intertidal fishers in the north-west of England) work in the coastal and estuarine rMCZs (ISCZ FisherMap project, 2010). The number of fishers will be much greater in years when cockle and mussel beds arise in rMCZs and are opened for harvesting. The estimated total value of landings is £0.192m/yr. Intertidal fishers in the ISCZ project area use a variety of hand gear that includes different types of nets, dredges, hooks and lines and hand rakes. Target species include cockles, mussels, winkles, shrimps, razor clams and a variety of fish.

Costs

3.2.51 Compared with the other gear types, impacts of rMCZs on collection by hand are relatively low in terms of value of landings affected. The best estimate is that £0.084m/yr of UK landings and £0.039m/yr of UK GVA will be affected by the suite of rMCZs, with present values over the 20-year IA timeframe of £1.193m and £0.551m respectively. However, it is not possible to accurately estimate the value of intertidal fisheries affected by ISCZ rMCZs because the harvest value is rarely recorded and is often gathered for personal consumption. Also, cockle and mussel beds arise sporadically in different locations, making it very difficult to determine their value and how they may be affected by rMCZs. In the north-west of England waters, trends indicate that usually

one large bed is opened once every 4 or 5 years, obtaining values in the region of £5m to £10m.⁴⁵ However, rMCZs in the ISCZ project area do not overlap with the main cockle and mussel areas in Morecambe Bay and the Ribble Estuary.

Mid-water trawls

Baseline

3.2.52 There is a low level of mid-water trawling by UK vessels in rMCZs, with the greatest value of landings taken from rMCZs outside 12nm. Target species include herring, bass and spurdog. The highest contribution (45% of an estimated £1.211m/yr total value of landings for this gear type from the suite of rMCZs) comes from within Net Gain rMCZs.

Costs

3.2.53 Compared with the other gear types, impacts of rMCZs on mid-water trawls are relatively low in terms of value of landings affected. The best estimate is that £0.055m/yr of UK vessel landings and £0.031m/yr of UK vessel GVA will be affected by the suite of rMCZs, with present values over the 20-year IA timeframe of £0.779m and £0.436m respectively.

Non-UK fleets

Baseline

3.2.54 Non-UK fleets also have historic rights to fish in UK waters between 6nm and 12nm, and therefore any rMCZs which fall within that area may be fished by non-UK fleets. Although historic fishing rights exist between 6nm and 12nm for the whole of the MCZ Project area, each non-UK fleet only has historic rights to fish certain parts. In the Net Gain and Balanced Seas project areas, French, Belgian, Dutch, Danish and German fleets have historic rights to fish for a range of species in grounds between 6nm and 12nm. Non-UK vessels over 15 metres in length are active in many rMCZs beyond 12nm. The Net Gain and Balanced Seas project areas are the most important for the Dutch cutter fleet (Productschap, pers. comm., 2011). Within the Irish Sea Conservation Zones project area, non-UK fleet activity (French, Belgian, Irish and to a lesser extent, Spanish) is concentrated in the offshore rMCZs (beyond 12nm) and associated rMCZ Reference Areas. French, Irish and Belgian trawlers and Spanish longliners are active in the majority of Finding Sanctuary rMCZs outside 6nm. The main gears used by non-UK vessels throughout all project areas are bottom trawls and dredges, with Belgian vessels principally using a modified beam trawl ('sumwing'). Target species include scallops, nephrops, herring, hake, monkfish, squid, cuttlefish, whitefish and flatfish.

3.2.55 Values of landings for non-UK fleets arising from within the suite of rMCZs were provided to the regional MCZ projects only for French fleets⁴⁶, and these data are separated into two categories only, mobile and static gears. The estimated average value of landings between 2008

⁴⁵ Noted from online press articles.

⁴⁶ Value of landings data have been provided by the Dutch and Belgian fleets, however where provided, the data refers to the whole of the regional MCZ project area and not just the suite of rMCZs. Therefore it has not been possible to provide a quantitative estimate of the baseline and costs for non-UK fleets other than the French fleet.

and 2009 for French vessels from the suite of rMCZs is £10.176m/yr⁴⁷; of this £9.529m/yr is from mobile gear (dredges and bottom trawls) and £0.646m/yr is from static gear (pots and traps, nets, and hooks and lines) (based on data provided by Direction des Pêches Maritimes et de l'Aquaculture, pers. comm., 2012).

Costs

3.2.56 Across the MCZ Project area, the greatest impacts of rMCZs on non-UK fleets are anticipated to be impacts on French and Belgian fleets that operate in rMCZs and rMCZ Reference Areas beyond 12nm, and in those rMCZs between 6nm and 12 nm (in areas where these fleets have historical rights), under management scenarios where bottom trawling and dredging are prohibited. Should management prohibit the use of bottom trawling, the Dutch fleet has indicated that rMCZs in the Net Gain and Balanced Seas project areas will affect the whole fleet as all Dutch and UK-flag vessels use some form of benthic gear. It is anticipated that the southern Dutch fleet (Goedereede, Stellendam, Breskens), which is more active in the southern North Sea, will be most affected by proposed management (Productschap, pers. comm., 2011). The Belgian fleet fishing the Irish Sea has indicated that the proposed management (under all scenarios) could result in eight vessels leaving the fleet, increased competition with UK vessels in the Bristol Channel and impact on fishing quotas (Belgian Fisheries Representative (2011) *MCZ Impact Assessment Questionnaire* 2011). The Belgian fleet is also extremely concerned about the impact of the Balanced Seas rMCZs on their activities. Spanish longliners and bottom trawlers will be affected by Finding Sanctuary rMCZs The Canyons, South-West Deep (East) and South-West Deep (West). Should this group of sites be closed to Spanish longliners and bottom trawlers, the value of landings affected is estimated to be £3.8m/yr⁴⁸ (JNCC interviews with non-UK fleets, 2011).

3.2.57 Due to the nature of the data provided, it has only been possible to cost impacts on the French fleet across the entire MCZ Project area. Under the low cost management scenario it is estimated that £0.241m/yr value of landings will be affected. This value rises to £9.878m/yr under the high cost scenario⁴⁹, with the greatest impact arising in rMCZs in the Finding Sanctuary and Balanced Sea project areas (75% and 24% respectively). The best estimate is that £5.081m/yr values of landings will be affected (based on data provided by Direction des Pêches Maritimes et de l'Aquaculture, pers. comm., 2012). It should be noted that this is an estimate of landings affected and therefore the GVA affected will be less than this.

3.2.58 Recommended MCZ 29 accounts for 75% of the best estimate of the value of French landings impacted by the Balanced Seas suite of rMCZs; this was a major contributing factor in the RSG's recommendation of a second option, rMCZ 29.2, which covers the eastern half only of the site and accounts for only 23% of the value of French landings impacted. Balanced Seas rMCZ 17 is also anticipated to have a major impact on French vessels landings, accounting for 27% of the

⁴⁷ The baseline value of landings from Balanced Seas rMCZs are derived from network option 2, which includes the higher estimated value of landings derived from rMCZ 29. The contributions from mobile and static gear do not sum the total value of landings due to rounding.

⁴⁸ Based on value of landings in 2010.

⁴⁹ The cost scenarios include the mid-point between Balanced Seas options 1 and 2.

value of landings impacted by Balanced Seas rMCZs. A group of five Finding Sanctuary rMCZs (Cape Bank, South Dorset, South of the Isles of Scilly, South of Falmouth, South-East of Falmouth) would result in an estimated £0.588m/yr value of landings affected under management scenarios where bottom trawling is prohibited⁵⁰.

3.2.59 It has not been possible to make a quantitative estimate of the impact of rMCZs on other non-UK fleets as was the case for the UK fishing industry. Where fisheries management is sought for sites through the CFP, there is a requirement to ensure that the process is non-discriminatory. Thus, where costed values derived from impacts to UK fleets only are used to inform Government's decision making we recommend that due consideration is also given to the impacts on non-UK fleets.

Other impacts of closure of rMCZs to commercial fisheries

3.2.60 This section summarises other potential impacts on fisheries and associated businesses that may arise from management scenarios that involve closure of rMCZs to specific fisheries.⁵¹ Information was gathered through interviews with fleet representatives and from RSG members and Named Consultative Stakeholders during the iterative recommendation process.

3.2.61 Under the high cost management scenario, impacts on the landings from several gear types may arise within the same site, adding to the overall impact on fishing activity. For example, The Cape Bank rMCZ (including the rMCZ Reference Area) accounts for approximately two thirds of the total pot and trap, hook and line and netting landings affected by Finding Sanctuary rMCZs, and could therefore affect the viability of fishers active there. Specific multiple site designations are likely to increase the impacts on certain fleets. For example, should Net Gain rMCZs 6, 9 and 12 all be designated, the proposed fisheries management could have particularly significant effects on the Bridlington fleet and other Yorkshire fleets.

3.2.62 Although the quantified costs in the IA assume no redistribution of effort, in reality displacement is a more likely impact for many rMCZs. Displacement of fishing effort is likely to occur in response to the management of MCZs and may result in increased landings from outside MCZs. If catch rates do not match those attained inside rMCZs, fishing efficiency may be reduced. In response, fishers may increase the number of days spent at sea and/or increase their use of fishing gear. Both these responses would increase fuel consumption and may have negative environmental impacts, including greater pressures on stocks, other species and the sea bed outside MCZs, and increased greenhouse gas emissions. Social impacts may include an increased risk to the safety of fishers and their vessels and additional time spent away from families.

3.2.63 Conflict between mobile and static fishing gears may increase in certain fishing grounds as a result of displacement of effort from MCZs. This could result in social tensions within fishing communities as well as increased operational costs as a result of lost or damaged gear. Equally,

⁵⁰ Based on the value of landings from the group of rMCZs by French bottom trawlers averaged between 2008 and 2009 from data provided by Direction des Pêches Maritimes et de l'Aquaculture, pers. comm., 2012.

⁵¹ Further detail is provided in Annex J.

gear conflict could decrease in MCZs where certain gears are restricted or prohibited. Gear conflict is unlikely to increase significantly as a result of affected fishers using alternative gears as this is not a viable option for many vessels due to cost, unsuitability of the vessel (for using other gears) and EU licensing restrictions. However, if fishers respond to the management by using different gear within an MCZ, this may increase pressures on stocks, other species and habitats within the MCZ.

3.2.64 While fishers are most likely to respond to management of MCZs by displacing their effort, fishers have explained that in some areas there is a lack of suitable alternative fishing grounds due to existing MPAs, shipping and future wind farm developments. For example, in areas around Flamborough and the north Norfolk coast and in the Eastern English Channel, closure of rMCZs to certain gears could force vessels to leave the fleet. Management scenarios that involve closures to specific fisheries could impact on employment, businesses that service fishing vessels, processors, and businesses in the wholesale and retail trades. Commercial fisheries within 6nm make a substantial contribution to year-round employment for port fleets, providing work over the winter months and in adverse weather conditions.

Flood and coastal erosion risk management (coastal defence)

Baseline

3.2.65 The frequency at which floods and coastal erosion take place is predicted to increase over the next 20 years, as climate change brings about a rise in sea levels, stormier seas and more frequent rainfall in the UK (UKMMAS, 2010). Shoreline Management Plans (SMPs) have been prepared for the entire extent of the English coastline to manage the future impact of floods and coastal erosion upon property, infrastructure and human welfare. The SMPs propose one of four options: 'no active intervention', which is to allow the coastline to evolve naturally without intervention; 'managed realignment', which is to allow natural processes to continue with minimal intervention (such as moving pathways and car parks etc.); 'hold the line', which is to maintain the current line of defence with intervention (for example, maintenance of defence walls or construction of new defences); and 'advance the line', which is to build new defences seaward of existing defences.

Costs

3.2.66 It is assumed that additional costs will be incurred in future licence applications to assess the impact of flood and coastal erosion risk management activities upon MCZ features. This is estimated to involve an additional 0.5 to 1 day of work per licence application, in at least 356 licence applications by 2018/9 and at least 1,267 licence applications over the 20-year period of the IA. It is anticipated that most of these licence applications will be submitted for works in Essex, Norfolk and Suffolk. These estimates are indicative only and are subject to the site-specific nature of the work. It has not been possible to estimate the costs (Environment Agency, pers. comm., 2012).

3.2.67 There is a possibility that FCERM activities may impact on the features of 4 rMCZs and that it would not be possible to mitigate the impacts and deliver the SMP policy. This is the case

for 3 Net Gain rMCZs (NG 10, Reference Area 3 and Reference Area 6) and Balanced Seas rMCZ Reference Area 3. This situation does not apply to any rMCZs (including rMCZ Reference Areas) in the Finding Sanctuary and ISCZ project areas. The IA assumes for all 4 rMCZs that the SMP policy is delivered, because in each case the policy provides significant protection to life, property and/or important assets, and impacts on MCZ features are not mitigated (Natural England and Environment Agency, pers. comm., 2011; further details are provided in Annex I).

3.2.68 There is considerable uncertainty about whether FCERM activities will impact on features protected by these 4 sites. To reflect this, the low cost scenario assumes that no impacts, and therefore no costs, arise. The high cost scenario assumes that impacts arise. The costs are assessed in terms of the costs to the operator of providing benefit that is equivalent to the impact that maintenance of the existing FCERM scheme would have on the MCZ features (As specified in Section 126(7) of the Marine and Coastal Access Act 2009). In the absence of information about what undertaking, or make arrangements for the undertaking of, measures of equivalent environmental benefit would entail, how it would be determined, and whether it will be necessary, this impact has not been quantified in the IA. This could be a significant unknown cost.

3.2.69 The impacts have been assessed in this way because the assessment is of the impacts of the regional MCZ projects' site recommendations that were submitted in September 2011. The Minister's decision about designating this site will be also informed by Natural England's and JNCC's statutory advice on MCZs that was published on 18 July 2012. Where it is feasible, it is anticipated that the advice will suggest that the site recommendation is adjusted to increase the likelihood that the MCZ features' conservation objectives can be achieved. Such adjustment is not included in the IA because the IA is an assessment of the regional MCZ projects' recommendations.

3.2.70 It is anticipated that all other rMCZs are compatible with SMP policy (Natural England and Environment Agency, pers. comm., 2011). In the high cost scenario, it is anticipated that additional monitoring will be required to identify whether off-site shingle recharge is impacting on the features of 2 rMCZs (13.1 and 13.2, Beachy Head East and West) in the Balanced Seas project area. Based on information provided by the Environment Agency (pers. comm., 2011), this one-off cost is estimated to have a present value of £0.010m.

3.2.71 The best estimates of impacts on FCERM activities are based on the site-specific probability of the scenarios that are used in the analysis arising. Details are provided in Annex I.

National defence

Baseline

3.2.72 National defence activities are known to take place within 71 rMCZs, of which 18 are rMCZ Reference Areas. The types of activity are numerous, ranging from live firing, submarine exercises, explosions and sea bed sampling to surface target towing, smoke release and acoustic trials. A summary of the activities that take place in each rMCZ is provided in Annex I. Detailed information is not available.

Costs

3.2.73 Designation of rMCZs is unlikely to have any direct impact upon the current level and type of Ministry of Defence (MOD) activity nationally (MOD, pers. comm., 2011). However, should the future level of MOD activity increase, there is a possibility that some MCZs could impact upon future military activity. It is not possible to estimate what this future level of activity may be, or the impact that may arise from MCZs.

3.2.74 It is assumed that MOD will mitigate the impact of military activity upon MCZ features through additional planning consideration during operations and training, based on information provided by MOD (pers. comm., 2011). The IA assumes the costs of this applies to the suite of rMCZs as this is how the costs have been presented by the MOD (not at a site-level). The costs comprise a one-off cost for adjustment of electronic tools and charts (£0.025m in the year of MCZ designation), and annual costs to ensure that the electronic tools and charts are up to date and that MCZs are factored into all operations. Annual costs are estimated to be £0.015m/yr in the first four years of MCZ designation, reducing to £0.010m/yr in the years thereafter. The present value of the cost to MOD is estimated to be £0.183m over the 20-year period of the IA analysis. This is the best estimate of impact.

Oil and gas exploration and production, gas interconnectors and gas storage (including carbon capture and storage)

Baseline

3.2.75 The IA assumes that only the costs of future oil and gas (including CCS) licence applications could be impacted upon by MCZs. Therefore, currently consented developments of oil and gas production are not described in the baseline.

3.2.76 In the 26th Seaward Licensing Round,⁵² operators were invited to apply to DECC to extract oil and gas from 442 licensed blocks on the UK Continental Shelf that are located within the MCZ project area. Of these, 131 blocks were later awarded to operators for commercial extraction. Most are located in the Net Gain project area. In the 27th Seaward Licensing Round,⁵³ many of the blocks in the 26th Seaward Licensing Round were offered again. However, a further 123 blocks representing new potential areas for oil and gas extraction compared with the 26th Round were made available. The IA assumes that, during the 20-year period of the IA, one licence application is submitted for each of the 442 blocks offered in the 26th Round and for each of the 123 blocks that represent new areas offered in the 27th Round. DECC and Oil & Gas UK are content with this assumption.

3.2.77 None of the rMCZ Reference Areas overlap with existing or planned oil and gas developments, or blocks in the 26th Round with 'significant discoveries' or 'fallow blocks with discoveries' (see Annex H11). However, 32 rMCZ Reference Areas overlap with 38 blocks on offer in the 27th Round. None of these blocks yet have discoveries and it is not known if any will be of commercial interest. DECC has stated that it is unlikely that any rMCZ Reference Areas will

⁵² Announced in October 2010 and December 2011.

⁵³ Announced in February 2012.

overlap with future oil and gas (including CCS) infrastructure due to the location and size of rMCZ Reference Areas (DECC, pers. comm., 2012).

3.2.78 There is considerable uncertainty regarding the number and location of CCS applications that are likely to be submitted over the IA 20-year period. This is because UK policy concerning the sector is yet to be defined and demonstration projects and investment programmes are yet to be determined. It is assumed that 20 CCS applications will be submitted over the IA 20-year period (split between the Net Gain and Irish Sea Conservation Zones project areas) (CCSA, pers. comm., 2011). This is likely to be an overestimate as it is based on the CCS capacity that is estimated to be required to decarbonise the electricity sector by 2030 rather than what may be feasible (DECC, pers. comm., 2011).

Costs

3.2.79 Oil and gas and CCS operators are anticipated to incur additional costs in future licence applications in order to assess the impact of proposed activities upon the conservation objectives of MCZ features. No additional costs to mitigate impact upon MCZ features are anticipated (see Annex H11). In rMCZs that are not rMCZ Reference Areas, based on the advice of DECC, JNCC and Natural England, it is assumed that no additional costs will be incurred to operators to mitigate impacts upon features. Although the IA assumes that construction of infrastructure and drilling would be prohibited in rMCZ Reference Areas, DECC (pers. comm., 2012) has advised that it is unlikely that any future oil and gas (including CCS) activity would take place in rMCZ Reference Areas (based on their size and locations).

3.2.80 The present value of the impact of rMCZs on oil and gas and CCS operators is estimated to range from £3.661m (low cost estimate) to £7.131m (high cost estimate) over the 20-year period of the IA. The impacts are predominantly associated with rMCZs in the Net Gain and Irish Sea Conservation Zones project areas. The best estimate of impact is the mid-point of the low and high cost, which is £5.396m (present value). A breakdown of estimated costs by region is provided in Annex N10.

Concerns raised by Oil & Gas UK and Carbon Capture Storage Association (CCSA)

3.2.81 Oil & Gas UK and the Carbon Capture and Storage Association (CCSA) are concerned that additional costs could be incurred by operators to mitigate the impact of their activities upon MCZ features. They suggest that additional costs could be incurred if: pipelines need to be re-routed around rMCZs (only for rMCZ Reference Areas for the oil and gas sector, and for all rMCZs for the CCS sector); horizontal drilling to resources underneath rMCZ Reference Areas is not allowed; additional mitigation of spills and leakages is required; and if requirements for ongoing monitoring of impact upon MCZ features as a licence condition incur additional costs. CCSA is concerned about the knock-on impacts that such mitigation, if it was required, could have on the economic viability of developments and on meeting the UK climate change targets. Oil & Gas UK and CCSA could not quantify all of these possible impacts but estimate that the potential additional impact on operators could be in the region of £96.400m (present value) over the 20-year period of

the IA⁵⁴. Oil & Gas UK also estimates that oil and gas operators will incur an additional cost of £0.346m before rMCZs are designated, due to the requirement to consider the potential impact of activities upon MCZ features in currently submitted licence applications.

3.2.82 These concerns are not included in the IA Summary. This is because DECC, Natural England and JNCC have indicated that the additional costs outlined by Oil and Gas UK and CCSA are unlikely to be incurred as a consequence of MCZs (DECC, pers. comm., 2012; JNCC and Natural England, 2011c).

Ports, harbours, shipping and disposal sites

Baseline

3.2.83 There are over 230 ports and harbours on the English coast within the MCZ Project area ranging from major international gateways to small harbours (see Annex D). 133 ports and harbours are located within 5km of an rMCZ. The following port-related activities take place in and within the vicinity of rMCZs and as such may be impacted upon by the designation of rMCZs:

- dredging of navigation channels,
- disposal at sea of dredged material,
- maintenance and laying of berths, moorings, anchorages, lights and buoys,
- maintenance works to port and harbour infrastructure,
- new development, in particular as part of port master plans,
- anchoring of commercial vessels,
- activities to regulate the movement of vessels.

Costs

3.2.84 Two management scenarios are presented in the IA to estimate the most likely impact of rMCZs upon ports, harbours, shipping and disposal sites. Scenario 1 (the low cost scenario), assumes that future licence applications will incur additional costs to consider the potential impact of the proposed activity on the MCZ features' conservation objectives. This is assumed to apply to navigational dredging and disposal at sea activities which take place within 1km of an rMCZ and known port developments proposed within 1km of an rMCZ. To avoid under-estimating the costs, this scenario makes the unrealistic assumption that no ports have Maintenance Dredge Protocols (MDPs). No additional costs to mitigate any impact of port operations are anticipated with the exception of the disposal of dredged material in Padstow Bay and Surrounds rMCZ (Finding Sanctuary) and Beachy Head East rMCZ (Balanced Seas).

3.2.85 Under Scenario 2 (the high cost scenario) it is assumed that additional costs are incurred for future licence applications for navigational dredging, disposal at sea activities and port developments proposed within 5km of an rMCZ. This scenario includes the costs of incorporating MCZ features into existing and planned MDPs. To reflect uncertainty about how many ports will

⁵⁴ See Annex N10 for a breakdown

collaborate and implement joint MDPs (for example, within an estuary) in future, two estimates (a low cost estimate and a high cost estimate) are provided for Scenario 2 (to provide sensitivity analysis; see Annex H11 for an explanation).

3.2.86 The mitigation of impact costs are the same in both scenarios, except Scenario 2 also includes a high cost for the mitigation of the impacts of planned navigational dredging and the resultant relocation of the Cross Roads buoy from The Fal rMCZ Reference Area (Finding Sanctuary). Both scenarios only include mitigation costs for site-specific plans and proposals where they are known. Insufficient detail is available for all future plans and proposals. Therefore, some rMCZs could incur a significant unknown cost for mitigation of impact for some future plans and proposals on MCZ features. However, Natural England has stated this is unlikely (see Annex H11 for an explanation).

3.2.87 Three rMCZ Reference Areas in the Balanced Seas project area (rMCZ Reference Area 3 (Holehaven Creek), rMCZ Reference Area 22 (North Mistley), rMCZ Reference Area 24 (Harwich Haven)) overlap with existing maintenance navigational dredges. These are incompatible with the management requirements for Reference Areas which prohibits extraction. Also rMCZ 22 (Bembridge) overlaps with a designated anchoring area for commercial shipping which it is assumed impacts on the MCZ's features. Because mitigation would not allow the activities to continue (at the necessary level in the case of rMCZ 22) the IA assumes that these activities will continue because of their economic importance (further detail is provided in Annex I) and impacts will not be mitigated.

3.2.88 For these activities in the 4 rMCZs, the impacts in both the high and low cost scenarios are assessed in terms of the costs to the operator of providing benefit that is equivalent to the impact that continuation of the activity would have on the MCZ's features (as specified in Section 126(7) of the Marine and Coastal Access Act 2000). In the absence of information about what undertaking, or make arrangements for the undertaking of, measures of equivalent environmental benefit would entail, how it would be determined, and whether it will be necessary, this impact has not been quantified in the IA. This could be a significant unknown cost.

3.2.89 The impacts have been assessed in this way because the assessment is of the impacts of the regional MCZ projects' site recommendations that were submitted in September 2011. The Minister's decision about designating this site will be also informed by Natural England's and JNCC's statutory advice on MCZs that was published on 18 July 2012. Where it is feasible, it is anticipated that the advice will suggest that the site recommendation is adjusted to increase the likelihood that the MCZ features' conservation objectives can be achieved. Such adjustment is not included in the IA because the IA is an assessment of the regional MCZ projects' recommendations.

3.2.90 Under both Scenarios 1 and 2 it is anticipated that ship owners and mariners will incur one-off costs in purchasing updated charts and Sailing Directions to obtain information on the locations of MCZs and the management required for them. The cost of this cannot be estimated

as it is subject to a number of uncertainties. It is anticipated that significantly less than an estimated cost of £3.5m would be attributable to MCZs (MCA pers. comm., 11 July 2012).

3.2.91 A total of 34 to 87 rMCZs are anticipated to impact upon port, harbour, shipping and disposal site activities (under Scenarios 1 and 2 respectively). Estimated one-off costs range from £5.738m to £38.386m, with anticipated annual costs of £0.040m/yr to £0.092m/yr. This gives a present value over the 20-year period of the IA of £4.663m to £34.531m. The latter figure is largely made up of a one-off cost (£24m) to mitigate the anticipated impact of navigational dredging in The Fal rMCZ Reference Area (Finding Sanctuary) (Table 3).

Table 3 Summary of the costs associated with low and high cost management scenarios, and the industry assessment of costs

	Number of rMCZs affected	Estimated one-off costs (£m)	Estimated average annual costs (£m/yr)	Estimated present value of costs (£m)
Scenario 1	34	5.738	0.040	4.663
Scenario 2 - low	87	38.078	0.075	34.356
Scenario 2 - high	87	38.386	0.075	34.531
Best estimate	87	25.422	0.092	22.521
Industry's assessment of costs	–	0.032–1.740	0.468–14.941	6.827–210.034

3.2.92 The best estimate of impact is the mid-point of Scenario 2 (low cost) and Scenario 2 (high cost) with one exception. The exception is the cost of mitigation for The Fal rMCZ Reference Area, for which the best estimate is the mid-point of the cost for Scenarios 1 and 2. For the entire suite of rMCZs, the best estimate is additional annual costs of £0.092m/yr and one-off costs of £25.422m. The present value over the 20-year period of the IA is £22.521m, which is largely made up of a one-off cost to mitigate the anticipated impact of navigational dredging in The Fal rMCZ Reference Area (Finding Sanctuary).

3.2.93 It should be noted that five ports in the Balanced Seas project area are known to have development planned during the 20-year period of the IA. However, the lack of detail about these plans means that it is not possible to estimate any port-specific costs due to rMCZs at this time under the low and high cost scenarios. This applies to any future port development within 5km of an rMCZ that could impact on the features protected by an rMCZ. This could be a significant unknown cost in the IA.

Concerns raised by eight ports and harbour operators

3.2.94 Representatives of the ports, harbours and shipping sector are concerned that MCZ management could incur greater costs than those represented by the scenarios. They are concerned that as a result of rMCZs, operators could also be required to undertake additional

environmental surveys, monitoring of environmental impact and mitigation measures, in particular with regard to management of sediment dispersal.

3.2.95 The costs have been assessed based on information provided by eight port operators on additional sediment management schemes and/or modifications to disposal practices that they anticipate will be required by MCZ management (further details are provided in Annexes H11, J1d and N10). The assessment estimates additional annual costs of £0.468m/yr to £14.941m/yr to this sector and one-off costs of £0.032m/yr to £1.740m/yr. This represents a present value over the 20-year period of the IA of £6.827m to £210.034m.

3.2.96 These concerns are not included in the IA Summary. This is because Natural England has indicated that the additional costs outlined by the eight ports and harbour operators are unlikely to be incurred as a consequence of MCZs (JNCC and Natural England, 2011c).

Recreation

Baseline

3.2.97 Recreational activities take place in many of the rMCZs, with the heaviest concentration in coastal and estuarine sites, although some offshore sites in the south-east are important for charter boats. Also, common rights exist for extraction of resources from rMCZ Reference Areas along the North Norfolk coast, for example for cockling, samphire collection and bait digging. As boating is particularly important within the Finding Sanctuary and Balanced Seas project areas, a description of boating activities likely to be impacted by rMCZs is provided below.

3.2.98 Anchoring of recreational vessels (except in emergency circumstances) is the main aspect of boating impacted by the management scenarios for four rMCZs and four rMCZ Reference Areas within the Balanced Seas and Finding Sanctuary project areas. Sites that are particularly important for anchoring and laying of race marks are:

- The Fal rMCZ Reference Area – an important area for race events due to its overlap with Carrick Roads;
- Studland Bay rMCZ – at peak times between 105 and 210 boats anchor in the bay (Boat Owners Response Group (BORG), pers. comm., 2011; Dorset Wildlife Trust, pers. comm., 2009)
- Three rMCZs around the north coast of the Isle of Wight, particularly Norris to Ryde rMCZ where up to 200 boats may anchor at a time, particularly during Cowes Week.
- rMCZ Reference Area 3 Holehaven Creek, in the Thames Estuary, where large numbers of recreational vessels anchor.

3.2.99 Charter boat operators are very active in the Balanced Seas project area, with approximately 190 vessels offering a range of recreational activities, particularly sea angling.

Costs

3.2.100 The management scenarios for many of the rMCZs have a negligible impact on recreation, because for example levels of the activity are low, alternative locations are available, the mitigation can be (or is already) provided through adoption of good practice (which should be adopted anyway, in the absence of MCZs) and existing codes of conduct.

3.2.101 A single management scenario is applied to each rMCZ Reference Area, which is closure to all extractive and depositional recreational activities. Management scenarios for some rMCZ Reference Areas also include mitigation of potentially damaging and disturbing activities, including dog fouling and wash and scour caused by motorised boats. It has not been possible to estimate costs of these.

3.2.102 Mitigation may be required for rMCZs with features that are sensitive to the impacts of anchoring of recreational vessels. For those sites where little anchoring occurs, one management scenario is employed: closure of the site to anchoring of recreational vessels (except in emergency) and racing marks. For those sites with sensitive features where there are significant levels of anchoring, a second scenario is also employed: closure of the site to anchoring of recreational vessels (except in emergency) and racing marks and installation of permanent eco-moorings (if there is an appropriate site for the moorings in the vicinity). The two scenarios are employed in the analysis to reflect uncertainty about how the mitigation might be provided.

3.2.103 In total, 55 rMCZs are anticipated to impact on the recreational sector, of which 44 are rMCZ Reference Areas. Significant impacts are discussed below.

3.2.104 **Anchoring of recreational vessels:** Within the Balanced Seas and Finding Sanctuary project areas, the management scenarios for nine rMCZs, of which five are rMCZ Reference Areas, include restrictions on anchoring by recreational vessels (except in emergency circumstances). The direct impacts of restrictions on anchoring cannot be quantified. They may increase greenhouse gas emissions (as a result of boaters travelling to alternative moorings), could impact on the safety of boaters and their vessels, and may result in loss of revenue for local businesses. The scenario that includes installation of eco-moorings, is estimated to result in combined capital costs of £2.986m and estimated annual mooring charges of £0.768m/yr, for Balanced Seas rMCZs Norris to Ryde, Yarmouth to Cowes and Bembridge, and rMCZ Reference Areas Holehaven Creek and Harwich Haven, and Finding Sanctuary rMCZ Studland Bay. The impacts of Irish Sea Conservation Zones and Net Gain rMCZs on boating are likely to be negligible.

3.2.105 **Racing:** This will also be impacted on by some sites, due to restrictions on the laying of racing marks. The restrictions that are assumed in the only management scenario for the Fal rMCZ Reference Area (Finding Sanctuary) are estimated to result in a loss of 7,000 to 12,000 race participant days per year. It is estimated that gross direct local expenditure associated with Falmouth racing could reduce by £0.572m/yr, which may have significant local economic impacts. Net of the effects of affected participants substituting expenditure to other locations and other activities, the effect on UK GVA is estimated to be £0.067m/yr. The rMCZ is also likely to affect the

level of watersports training that takes place, which may impact on the overall provision of watersports training due to the importance of the eastern shore of the Carrick Roads for safe activities in easterly winds. Balanced Seas rMCZs around the coast of the Isle of Wight may impact on racing activities.

3.2.106 **Sea angling:** In general MCZ management will close only small areas to sea angling and in many cases alternative locations are available within close proximity. Where there is a lack of alternative locations, angling activities may be significantly impacted. For example in the Balanced Seas project area, two rMCZ Reference Areas Holehaven Creek and St Catherine's Point West could impact on 60 individuals and over 25 charter boat operators respectively. Where angling activities are displaced to alternative locations further afield, displacement may decrease fishing time, and increase fuel costs and greenhouse gas emissions. For example, closure of Irish Sea Conservation Zones rMCZ Reference Area H could impact on an estimated five angling boats and 40 individuals, with angling displaced northwards to the Cumbrian coast. This could increase the environmental pressure at other sites (as there would be an increase in bait collection in those sites, causing greater erosion to sand dunes and coastal paths). An angler has reported that this would increase his vessel fuel costs by 15% and decrease fishing time by 15% (angler, pers. comm., 2011). The impacts of rMCZs on sea angling in the Finding Sanctuary and Net Gain project areas are likely to be negligible.

3.2.107 **Charter boat operators:** In the Balanced Seas project area, charter boat operators would be affected by closure of eight rMCZ Reference Areas (to angling and anchoring except in emergency), impacting on revenues of UK, Belgian and French recreational angling charter boat operators. Costs have been quantified for six of these sites, with an estimated £1.401m/yr value of earnings affected (£0.658m/yr UK GVA)⁵⁵. The impacts of rMCZs in the Irish Sea Conservation Zones, Finding Sanctuary and Net Gain project areas on charter boat operators are likely to be negligible.

3.2.108 Over the 20-year timeframe of the IA, the best estimate of the present value of costs of rMCZs arising from the mitigation of impacts of anchoring by recreational vessels and impacts on the revenue charter boat operators is £19.223m (86% from Balanced Seas and 14% from Finding Sanctuary). These costs are the costs to users and of relevant infrastructure.

3.2.109 **Other recreational activities:** Six rMCZ Reference Areas are expected to impact on wildfowling. Where the rMCZ Reference Area covers a prime location, closures are anticipated to diminish the quality of the activity and may impact on commercial revenues. Three rMCZ Reference Areas are expected to impact on education and research (Net Gain rMCZ Reference Areas 7 and 9), and fossil collecting (Lyme Bay rMCZ Reference Area). The scale of impact has not been quantified but costs could be incurred through additional travel and increased greenhouse gas emissions. The management scenarios are not expected to impact significantly

⁵⁵ Based on data provided by representatives of Balanced Seas RSG, Solent/ Isle of Wight/Hampshire Local Group and StakMap. Losses associated with non-UK vessels and those operating from other parts of the UK have not been quantified.

on other activities. Where evidence of impact was not available from users of the rMCZs, at present the impacts are assumed to be negligible.

Renewable energy

Baseline

3.2.110 **Wind energy:** There are existing or planned wind farms⁵⁶ wholly or partly within the following rMCZs: the Potential Co-location Zone and rMCZ 3 (Irish Sea Conservation Zones project area); NG 4 and NG 7 (Net Gain project area); and North of Lundy rMCZ (Finding Sanctuary project area) (Table 4). None of these are rMCZ Reference Areas. There are no existing or planned wind farms overlapping with rMCZs in the Balanced Seas project area, however the Round 3 Gunfleet Sands Demonstration Site lies within 1km of rMCZ 3 Blackwater, Crouch, Roach and Colne Estuaries.

Table 4 Wind farms wholly or partly within rMCZs

Regional MCZ project area	Wind farm name	Status	Output capacity potential (MW)
Irish Seas Conservation Zones	Walney Extension	In pre-planning and not yet consented	740
	West of Duddon Sands	Consented and under construction	389
	Walney Phase 1	Operational	184
	Walney Phase 2	Operational	184
	Ormonde	Operational	150
	Irish Sea Zone Round 3	In pre-planning	4,200
Net Gain	Sheringham Shoal	Under construction	317
	Race Bank	Licence application submitted	535
	Dudgeon	Licence application submitted	560
	Hornsea Zone 4, Round 3	In pre-planning	4,000
Finding Sanctuary	Atlantic Array Zone 8, Round 3	In pre-planning and not yet consented	1,500

3.2.111 Three of the windfarms (in Table 4) are not yet consented and so could incur additional costs to mitigate impact of cable protection upon MCZ features. These are Atlantic Array in rMCZ North of Lundy (Finding Sanctuary), Walney Extension wind farm in the Potential Co-location Zone (Irish Sea) and the Round 3 Hornsea Zone 4 wind farm in rMCZ NG 7 (Net Gain). JNCC and

⁵⁶ Only wind farms that are not yet consented could be impacted by rMCZs. Existing and consented wind farms are described in the baseline to aid the reader's understanding of human activity in the rMCZs.

Natural England (pers. comm., 2012) have advised that it is highly unlikely that this mitigation will be required. However, it is important to highlight that this could be a significant unknown cost in the IA.

3.2.112 Planned or proposed (but not yet consented) wind farm export power cable routes pass through 26 rMCZs including six rMCZs that are Reference Areas⁵⁷. These cable routes are associated with 12 planned or proposed wind farms:

- Net Gain: Galloper Extension, Triton Knoll, Race Bank, Blyth Offshore Demonstration Site and Round 3 (Dogger Bank – Zone 3, Hornsea – Zone 4, and East Anglia – Zone 5) and national grid offshore transmission cables.
- Irish Sea: Walney Extension and Round 3 (Irish Sea – Zone 9).
- Balanced Seas: Gunfleet Sands Demonstration Site, London Array and Thanet.

3.2.113 18 of these rMCZs are located in the Net Gain project area (rMCZs Reference Areas 2a&2b, 3, 4, 5 and 8; rMCZs 1b, 1c, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13). Five are in the Irish Sea project area (Potential Co-location Zone, rMCZs 2, 3, 16 and Reference Area S) and three are in the Balanced Seas project area (rMCZs 3, 8 and 10).

3.2.114 **Wave energy:** There are currently no operational or proposed wave energy devices in any rMCZs. Four areas of long-term potential development for wave energy (DECC, pers. comm., 2011) overlap or are within 1km of seven rMCZs. These are all located in the Finding Sanctuary project area: rMCZs Hartland Point to Tintagel, Newquay and The Gannel, Padstow and Surrounds, Cape Bank, Isles of Scilly, South of the Isles of Scilly and Land's End. For the purposes of the IA it is estimated that four licence applications will be submitted over the period to 2030 for wave energy developments overlapping with, or in the vicinity of, these rMCZs (DECC, pers. comm., 2011). The possible developments have a combined potential electricity generating capacity of 1,220MW (PMSS, 2010).

3.2.115 **Tidal energy:** Seven areas of long-term potential development for tidal energy DECC, pers. comm., 2012) overlap or are within 1km of 13 rMCZs: rMCZs Bideford to Foreland Point, Hartland Point to Tintagel, Lundy Reference Area, Cape Bank, South Dorset, South-East of Portland Bill Reference Area (Finding Sanctuary); and rMCZs 17, 20, 22, 23, 25.2, 28, and Reference Areas 13 and 18 (Balanced Seas). For the purposes of the IA it is estimated that nine licence applications will be submitted over the period to 2030 for developments overlapping with, or in the vicinity of, these rMCZs (DECC, pers. comm., 2011). The possible developments have a combined potential electricity generating capacity of 1,291MW (PMSS, 2010).

⁵⁷ Operational and consented cables routes are not described in the baseline as it is assumed that they will not be impacted by rMCZs.

Costs

3.2.116 Two scenarios of impact upon the renewable energy sector are presented in the IA, based on advice provided by JNCC and Natural England (JNCC & Natural England, 2011a).

3.2.117 The low cost scenario assumes that an additional cost will be incurred in future licence applications (in the assessment of environmental impact). Unknown potentially significant costs are assumed to arise as a result of three rMCZ Reference Areas that overlap with areas for long-term potential development for tidal energy (Reference Area 13 and 18 (Balanced Seas) and South-East of Portland Bill Reference Area (Finding Sanctuary)). This is because renewable energy developments and installation of cables will not be permitted within rMCZ Reference Areas. It is assumed that no additional mitigation of impact will be required due to other rMCZs. The high cost scenario includes the low cost scenario costs but also includes additional costs that may be incurred to re-route yet-to-be consented cables around rMCZ Reference Areas, and to install alternative cable protection on yet-to-be consented export cables in rMCZs that are not rMCZ Reference Areas.

3.2.118 A summary of the estimated costs to the renewable energy sector in both scenarios is provided in Table 5.

Table 5 Estimated impact of rMCZs on the renewable energy sector in the Natural England, JNCC and MMO scenario

Renewable energy source	Estimated additional cost and years in which it is incurred			rMCZs contributing to this cost
	Scenario 1	Scenario 2	Best estimate of impact	
Wind energy	£0.180m one-off cost spread across 2013 to 2016, and 2022	£469.717m one-off cost spread across 2013 to 2017 and 2022	£70.615m one-off cost spread across 2013 to 2017 and 2022	<p><i>Irish Sea Conservation Zones:</i> Potential Co-location Zone, rMCZ 2, rMCZ 3, rMCZ Reference Area S, and rMCZ 16</p> <p><i>Net Gain:</i> rMCZs Reference Areas 2a&2b, 3, 4, 5 and 8; rMCZs 1b, 1c, 2, 4, 5, 6, 7, 8, 9, 10, 11, and 13.</p> <p><i>Finding Sanctuary:</i> North of Lundy and Morte Platform rMCZs</p> <p><i>Balanced Seas:</i> Blackwater, Crouch, Roach and Colne Estuaries rMCZ, Swale Estuary rMCZ and Goodwin Sands rMCZ.</p>
Wave and tidal energy	£0.190m one-off cost	£0.190m one-off cost spread	£0.190m one-off cost	<i>Finding Sanctuary:</i> Bideford to Foreland Point rMCZ, Hartland Point to Tintagel rMCZ, Lundy

Renewable energy source	Estimated additional cost and years in which it is incurred			rMCZs contributing to this cost
	Scenario 1	Scenario 2	Best estimate of impact	
	spread across 2013, 2015, 2020 and 2030	across 2013, 2015, 2020 and 2030	spread across 2013, 2015, 2020 and 2030	rMCZ Reference Area, Cape Bank rMCZ, South Dorset rMCZ, South Dorset rMCZ Reference Area and South-East of Portland Bill rMCZ Reference Area, Newquay & the Gannel rMCZ, Padstow & Surrounds rMCZ, Isles of Scilly Sites rMCZ, South of the Isles of Scilly rMCZ, Land's End rMCZ. <i>Balanced Seas:</i> rMCZs 17, 20, 22, 23, 28, 25.2 and Reference Areas 13 and 18
Total renewable energy sector	£0.313m present value over the 20-year period of the IA	£396.602m present value over the 20-year period of the IA	£59.759m present value over the 20-year period of the IA	All of the above

3.2.119 Estimated one-off costs for this sector (wind, wave and tidal energy) range from £0.370m to £469.908m (under Scenarios 1 and 2 respectively); there are no anticipated annual costs. This represents a present value over the 20-year period of the IA of £0.313m to £396.602m. The best estimate is 15% of the additional installation costs in Scenario 2, plus 100% of the additional assessment of environmental impact costs in Scenario 2 (see Annex H14 for an explanation), which is one-off costs of £70.615m, which has a present value over the 20-year period of the IA of £59.759m.

3.2.120 Scenario 2 assumes that there could be additional cable protection costs for inter-array cabling in rMCZ North of Lundy (Finding Sanctuary), rMCZ 7 (Net Gain) and the Potential Co-location Zone (Irish Sea). However, it was not possible to quantify this cost. This could be a significant unknown cost. However, JNCC and Natural England (pers. comm., 2012) have stated that there is a very low likelihood of this cost occurring and so it is not the best estimate of impact.

Concerns of seven renewable energy developers

3.2.121 Representatives of the renewable energy sector are concerned that MCZs could incur greater costs for the sector than those shown in the scenarios. To reflect this uncertainty, the sector has made its own assumptions about how it could be impacted upon by MCZs. The sector anticipates that further costs could be incurred as a result of conditions placed on future licences,

including the requirement to undertake additional environmental surveys, additional monitoring of environmental impact and additional mitigation measures, and delays to project delivery. More detail is provided in Annexes H14 and N13.

3.2.122 The assessment is based on information provided by seven wind farm developers. Wave and tidal energy developers did not inform this assessment. The assessment estimates additional annual costs of £2,909m/yr for this sector and one-off costs of £4,519m. This gives a present value of £41,809m over the 20-year period of the IA. These costs are associated with rMCZ 2, rMCZ 3, rMCZ 4, rMCZ 5, the Proposed Co-location Zone and rMCZ Reference Area S (Irish Sea Conservation Zones); North of Lundy and Morte Platform rMCZs (Finding Sanctuary); and rMCZs NG 1b, NG 4, NG 5, NG 6, NG 7, NG 8, NG 9, NG 10, NG 11 and NG 13 (Net Gain).

3.2.123 These concerns are not included in the IA Summary. This is because Natural England and JNCC have indicated that the additional costs outlined by the seven renewable energy developers are unlikely to be incurred as a consequence of MCZs (JNCC and Natural England, 2011c).

3.2.124 Tidal energy developers and the Isle of Wight Council are concerned that the Solent rMCZs could significantly impact on tidal energy development. This possible impact is not quantified in the IA as Natural England and JNCC consider the impact to be unlikely (JNCC and Natural England, 2011c).

3.3 Costs of managing rMCZs

Costs of management measures implementation and enforcement and/or surveillance in rMCZs

3.3.1 The present value of the costs of MCZ management measures implementation, enforcement and/or surveillance over the 20-year period of the IA is estimated to be £103.492m to £119.582m. This can be broken down into a one-off implementation cost of £0.986m to £2.662m, followed by annual costs of £7.215m/yr to £8.233m/yr (Table 6). The best estimate of cost is the mid-point, which gives a present value of £111.537m, composed of a one-off cost of £1.824m and an annual cost of £7.724m/yr.

Table 6 Estimated costs of MCZ management measure implementation, enforcement and/or surveillance for the entire MCZ Project area

Body that will incur the cost	One-off cost, £m	Annual cost, £m/yr
Local authorities/private landowners	0.044	0.004
IFCAs	0.500–1.836	1.383–1.810
MMO	0.418–0.758	5.828–6.420
Defra	0.024	0.000
Total	0.986–2.662	7.215–8.233

Note: Duplication of costs for rMCZs Reference Areas located within other rMCZs has not been removed because the management of activities for rMCZ Reference Areas is likely to involve prohibition of more activities.

3.3.2 The costs are provided for the following mixture of non-regulatory management measures (such as voluntary agreements, codes of conduct and education programmes) and regulatory measures (such as byelaws and prohibition orders). The lowest cost estimate is for non-regulatory measures for rMCZs where it is reasonable to assume that they could be effective. All other rMCZs are assumed to have regulatory management measures only (e.g. for offshore rMCZs). The highest cost estimate is for regulatory management measures for all rMCZs. For rMCZs where it is assumed that 'no additional management' is necessary, the management cost is assumed to be zero.

3.3.3 The costs are for 160 to 165 management measures (the above mixture of non-regulatory and regulatory measures) assuming one measure per rMCZ (irrespective of the number of different activities that require management).

3.3.4 Only the cost of enforcement/surveillance of rMCZ management measures is included in the headline figures in the IA Summary. This is because Defra (pers. comm., 2012) has advised that costs to implement rMCZ management measures (including MMO and IFCA costs to implement byelaws and to help set up voluntary agreements, landowner costs to install signs and bins, and Defra costs to get agreement for management outside of 12nm through the Common Fisheries Policy) are the normal responsibilities of the relevant regulators and fall under policy development.

Costs of MCZ verification, baseline setting and monitoring surveys

3.3.5 Estimated costs for MCZ verification, baseline setting and monitoring surveys have been provided by JNCC and Natural England (Table 7). JNCC will have responsibility for monitoring offshore sites (outside 12nm) and Natural England will have responsibility for monitoring inshore sites (inside 12nm). Sites that cross the 12nm boundary will be monitored jointly by the two organisations.. All cost estimates are based on previous experience of similar surveys.

3.3.6 An initial site verification process will aim to build on the evidence base and improve the level of confidence in the identification of features and inform the development of conservation objectives in MCZs. It will be completed by 2014/5. This will involve relatively limited sampling. At present it is assumed that verification surveys will only be required for those sites not assessed as having high scientific confidence associated with their underpinning evidence base for the presence and extent of MCZ features. Subsequently, more detailed baseline-setting surveys, involving a range of broad-scale and direct survey techniques will be completed to map the extent of features more fully. Thereafter condition monitoring surveys will be completed allowing changes in condition to be identified and assessed against the baseline. For the purpose of the IA it is estimated that for each site condition monitoring surveys will take place once during each six-year reporting cycle, commencing over 2019 to 2024.

Table 7 Total and average one-off and annual costs for site verification, baseline setting and monitoring surveys

	Site verification and baseline setting	Monitoring	Total
Average costs (£m/yr)	8.050 One-off costs arising over the period 2013 to 2018	6.142 Annual costs arising over the period 2019 to 2032	6.714 Average costs arising over the 20 year period of the IA
Total costs over the 20 year period of the IA (£m)	48.301	85.938	134.285

3.3.7 The present value of the costs of MCZ verification, baseline setting and monitoring surveys over the 20-year period of the IA is estimated to be £97.593m. This can be broken down into a one-off cost of £48.301m incurred over the period 2013 and 2018, followed by annual costs of £4.299m/yr incurred from 2019 onwards. This is the best estimate of the cost.

Costs of stakeholder groups that are consulted on management of rMCZs

3.3.8 It is not yet known whether stakeholder groups will be established to be consulted on the management of rMCZs. If groups are established, stakeholder representatives will incur costs through the time they spend undertaking work for the group and travel and subsistence. These costs have not been included in the IA.

Other costs to the public sector

3.3.9 The following costs to the public sector (which cannot be quantified) will also be incurred as a result of the suite of rMCZs:

- Informing users of the marine environment about the rMCZs and additional management that is required, by updating nautical charts and Shipping Directions and for example, providing information through the Notice to Mariners.
- Public authorities will need to consider impacts on achieving the conservation objectives of MCZ features when licensing activities. For authorities that consider impacts of many licence applications on MCZ features this may involve significant work.
- Natural England and JNCC will advise public authorities on the impacts that proposed licensed activities could have on features' conservation objectives. This will involve significant work for the suite of rMCZs.

4 Summary of all costs and benefits

4.1.1 It has not been possible to monetise the benefits of designating the sites, as benefits cannot be readily quantified or valued (as the majority of benefits are not traded). Non-monetised benefits of rMCZs that have been identified in the IA include the conservation of marine species and habitats for current and future generations, maintenance or improvement in condition of the features and the value of their non-extractive ecosystem services, benefits to nature-based recreational activities, research and education, and an improved understanding of the long-term impacts of human activities on marine ecosystems.

4.1.2 McVittie & Moran (2008) found that households in the UK were willing to pay a total of between £487m/yr and £1,171m/yr for a UK network of MCZs. Whilst these results are not directly transferable and will be an overestimate of willingness to pay for the suite of rMCZs under consideration, the study is however useful in enabling us to indicate the significant potential scale of the benefits, which could be many times greater than the best estimate of costs.

4.1.3 The total estimated quantified economic costs of all rMCZs ranges from £16.5m/yr to £52.4m/yr, with a best estimate of £24.6m/yr. This gives a present value of between £237.5m and £817.9m and a best estimate of £365.7m over the 20-year timeframe of the IA. The best estimated annual cost to business is £10.19m/yr, with the remaining annual costs attributed to ecological survey work (£6.71m/yr) and public sector management (£7.215m/yr). In addition there are a range of non-monetised costs, including social impacts on fisheries, unquantified costs of mitigation and additional costs for licence applications incurred by operators and public authorities. There may be potentially significant unquantified impacts on some businesses and local economies, particularly under the high cost management scenarios.

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