

| | | | | |
|---|---|--|-------------------------|--|
| Title: Designation of Marine Conservation Zones in English Inshore waters and English and Welsh Offshore waters IA No: Defra 1475 Lead department or agency: Defra Other departments or agencies: | Impact Assessment (IA) | | | |
| | Date: 13/12/2012 | | | |
| | Stage: Consultation | | | |
| | Source of intervention: Domestic | | | |
| | Type of measure: Other | | | |
| Contact for enquiries: Mansi Konar (mansi.konar@defra.gsi.gov.uk) 0207 238 1046 | | | | |
| Summary: Intervention and Options | | | RPC Opinion: RED | |

| Cost of Preferred (or more likely) Option | | | | |
|---|----------------------------|--|------------------------------|----------------------|
| Total Net Present Value | Business Net Present Value | Net cost to business per year (EANCB on 2010 prices) | In scope of One-In, One-Out? | Measure qualifies as |
| N/A | N/A | £0.5m | No | NA |

What is the problem under consideration? Why is government intervention necessary?
 A biologically diverse marine environment is of high value to society. Human activities affect many seabed habitats, and although many human activities are regulated, management does not necessarily aim to conserve habitats and species. People may not be aware of the full negative environmental impacts that their activities have, and there's no existing mechanism to ensure that the full costs of activities are taken into account. The resulting depletion of marine habitats and species negatively affects society as a whole. Government intervention is required to address these market failures. By protecting marine habitats and species, the value of the marine environment to society can be maintained.

What are the policy objectives and the intended effects?
 The Government aims to have 'clean, healthy, safe, productive and biologically diverse oceans and seas'. An ecologically coherent network of Marine Protected Areas (MPAs) is an essential part of this strategy. The network of MPAs will contribute to meeting the UK's commitments to international agreements, obligations and the requirements of the Marine Strategy Framework Directive. Marine Conservation Zones (MCZs - a type of MPA) are an essential component of this and Government has a duty to designate MCZs under the Marine and Coastal Access Act 2009. The procedure to identify MCZs will help to deliver the Government's aim of a well-managed network of MPAs that is understood and supported by stakeholders.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)
 Two options available: 1) designating all MCZs in 2013 as recommended by 4 stakeholder led Regional Projects; 2) designating in 2013 a first tranche of 31 MCZs (preferred option) where designation decisions are made on robust evidence. The MCZs not included are considered to be unsuitable for immediate designation due to:
 i) Lack of certainty on presence, extent and conservation objective of features in MCZs'.
 ii) Uncertainty of economic impacts – making it difficult to assess whether the ecological advantages outweigh the socio-economic costs.
 iii) Lower ecological benefits compared to higher costs
 iv) Statutory Nature Conservation Body (SNCB) advice concluded that there are strong grounds for reconsidering reference area implementation and undertaking further evaluation.

| | | | | | |
|--|---------------------|-----------------------|-----------------------|---------------------------|---------------------|
| Will the policy be reviewed? It will/will not be reviewed. If applicable, set review date: Month/Year | | | | | |
| Does implementation go beyond minimum EU requirements? | | | No | | |
| Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base. | Micro Yes | < 20 Yes | Small Yes | Medium Yes | Large Yes |
| What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent) | | | Traded: N/A | Non-traded: N/A | |

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible SELECT SIGNATORY: _____ Date: _____

Summary: Analysis & Evidence

Policy Option 1

Description:

FULL ECONOMIC ASSESSMENT

| Price Base Year 2010 | PV Base Year 2012 | Time Period Years 20 | Net Benefit (Present Value (PV)) (£m) | | |
|-------------------------|----------------------|-------------------------|---------------------------------------|--------------------|-----------------------------|
| | | | Low: Unquantified | High: Unquantified | Best Estimate: Unquantified |

| COSTS (£m) | Total Transition (Constant Price) Years | Average Annual (excl. Transition) (Constant Price) | Total Cost (Present Value) |
|---------------|--|---|-------------------------------|
| Low | £61.5m | £12.7m | £227.4m |
| High | £539.2m | £25.6m | £820.5m |
| Best Estimate | £154.1m | £14.5m | £331.2m |

Description and scale of key monetised costs by 'main affected groups'

Best estimate average annual (including transition costs):

>£1m/yr: public sector management (£7.8m/yr) and ecological surveys (£6.7m/yr); ports, harbours and commercial shipping (£1.4m/yr); renewable energy (3.5m/yr), recreation (£1.3m/yr)

>£0.1m/yr - £0.99m/yr: commercial fisheries (£0.9m/yr); aquaculture (£0.1m/yr); oil and gas (£0.4m/yr)

<£0.1m/yr: cables; flood and coastal erosion; national defence; aggregate extraction

Other key non-monetised costs by 'main affected groups'

Where some costs are highly uncertain or as yet unknown costs have not been quantified. This occurs in archaeology; oil and gas; ports, harbours and shipping; laying of inter-array cable protection. There is low certainty that these costs could arise

| BENEFITS (£m) | Total Transition (Constant Price) Years | Average Annual (excl. Transition) (Constant Price) | Total Benefit (Present Value) |
|---------------|--|---|----------------------------------|
| Low | Optional | Optional | Optional |
| High | Optional | Optional | Optional |
| Best Estimate | Unquantified | Unquantified | Unquantified |

Description and scale of key monetised benefits by 'main affected groups'

Benefits of designating the sites have not been monetised. This is because the benefits cannot be readily quantified and the majority of benefits are not traded, so cannot be easily valued.

Other key non-monetised benefits by 'main affected groups'

A combined area of 37,760km will be protected by designation of MCZs and over 1000 features (habitats, species and geological and geomorphologic features) will be conserved. This is likely to result in increase in final ecosystem services (benefits) such as increase in provisioning, regulating and cultural (and recreational) services. Many people will gain satisfaction (non use value) that rare representative marine features are being protected for current and future generations.

Key assumptions/sensitivities/risks

Discount rate (%)

3.5

Illustrative 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.. There are significant limitations in our knowledge of features: many of the sites under option 1 have low confidence on presence and extent of features. There is currently no definitive assessment method to test the completion of an ecologically coherent network.

BUSINESS ASSESSMENT (Option 1)

| | | | | |
|---|---------------|----------|-------------------|----------------------|
| Direct impact on business (Equivalent Annual) £m: | | | In scope of OIOO? | Measure qualifies as |
| Costs: £8.3m | Benefits: N/A | Net: N/A | No | NA |

Summary: Analysis & Evidence

Policy Option 2

Description:

FULL ECONOMIC ASSESSMENT

| Price Base Year 2010 | PV Base Year 2012 | Time Period Years 20 | Net Benefit (Present Value (PV)) (£m) | | |
|-------------------------|----------------------|-------------------------|---------------------------------------|--------------------|-----------------------------|
| | | | Low: Unquantified | High: Unquantified | Best Estimate: Unquantified |

| COSTS (£m) | Total Transition (Constant Price) Years | Average Annual (excl. Transition) (Constant Price) | Total Cost (Present Value) |
|---------------|--|---|-------------------------------|
| Low | £14.0m | £1.9m | £37.2m |
| High | £29.1m | £5m | £92.3m |
| Best Estimate | £18.3m | £2.1m | £43.6m |

Description and scale of key monetised costs by 'main affected groups'

Costs are less than option 1, as smaller designation of sites covered. Best estimate average annual costs (including transition): >£0.5m: public sector management (£0.8m/yr) and ecological surveys (£1.6m/yr); >£0.1m - £0.5m: ports, harbours and commercial shipping (£0.18m/yr); commercial fisheries (£0.2m/yr) <£0.1m: aggregate extraction; cables; flood & coastal erosion; national defence; oil and gas; renewable energy

Other key non-monetised costs by 'main affected groups'

As fewer sites are designated under Option 2 the unquantified costs are lower. A number of costs will not arise under Option 2. In particular, costs relating to mitigating impacts of inter-array cable protection on MCZ features from yet to be consented wind farms, costs for licence application for aggregate extraction in strategic resource areas, costs relating to flood and coastal risk management and existing maintenance dredging areas of economic importance.

| BENEFITS (£m) | Total Transition (Constant Price) Years | Average Annual (excl. Transition) (Constant Price) | Total Benefit (Present Value) |
|---------------|--|---|----------------------------------|
| Low | Optional | Optional | Optional |
| High | Optional | Optional | Optional |
| Best Estimate | Unquantified | Unquantified | Unquantified |

Description and scale of key monetised benefits by 'main affected groups'

Benefits of designating the sites have not been monetised. This is because the benefits cannot be readily quantified and the majority of benefits are not traded, so cannot be easily valued.

Other key non-monetised benefits by 'main affected groups'

Lower number of features are being designated under option 2 implying the final ecosystem service benefits are likely to be lower than option 1. A combined area of 10,409km² will be protected by designation of MCZs and 261 features (habitats, species and geological and geomorphologic features) will be conserved. However, as only sites with certainty regarding presence and extent of features are designated under option 2 there is a higher probability of achieving these benefits

Key assumptions/sensitivities/risks

Discount rate (%) 3.5

All assumptions made under option 1 apply. Additionally option 2 makes specific assumptions to scale down costs that are regional and not site specific (see evidence base). Designating in tranches may mean that vulnerable MCZ features may continue to incur damage (although this is partly mitigated by undertaking a risk based approach to designation). Assessing the final MPA network and any achievement of an ecologically coherent network may not be possible until all MCZs are designated.

BUSINESS ASSESSMENT (Option 2)

| | | | | |
|---|---------------|----------|-------------------|----------------------|
| Direct impact on business (Equivalent Annual) £m: | | | In scope of OIOO? | Measure qualifies as |
| Costs: £0.5m | Benefits: N/A | Net: N/A | No | NA |

Evidence Base (for summary sheets)

Contents

| | |
|---|----|
| Executive Summary..... | 5 |
| 1 Introduction..... | 11 |
| 1.1 Background..... | 11 |
| 1.2 Purpose of the Impact Assessment..... | 11 |
| 1.3 Problem under consideration and the rationale for government intervention..... | 12 |
| 1.4 Policy objective and intended effects..... | 12 |
| 1.5 Overview of the IA and the policy options..... | 13 |
| 2 Baseline and summary of benefits of Policy Option 1, (the suite of recommended MCZs by the regional projects) and Policy Option 2 (the proposed sites for designation in 2013)..... | 19 |
| 2.1 About this section..... | 19 |
| 2.2 Environment..... | 19 |
| 2.3 Benefits of MCZ designation..... | 21 |
| 3 Baseline and summary of the costs of Policy Option 1, the suite of rMCZs and Policy Option 2 (the proposed sites for designation in 2013)..... | 33 |
| 3.1 About this section..... | 33 |
| 3.2 Anticipated costs to human activities that will be impacted on by MCZ management..... | 34 |
| 3.3 Costs of managing rMCZs..... | 68 |
| 3.4 Process and general principles used to inform sector costs in the Impact Assessment..... | 71 |
| 4 Summary of all costs and benefits..... | 75 |
| References..... | 76 |

E.1 A biologically diverse marine environment is of high value to society. Human activities affect many sea bed habitats and communities, and although many are regulated, management does not necessarily aim to conserve habitats and species. People may not be aware of the full negative environmental impacts that their activities have, and there is no existing mechanism to ensure that the full costs of activities are taken into account. The resulting depletion of marine habitats and species negatively affects society as a whole. Government intervention is required to address these market failures. By protecting marine habitats and species, the value of the marine environment to society can be maintained.

E.2 The Government aims to have 'clean, healthy, safe, productive and biologically diverse oceans and seas'. An ecologically coherent network of Marine Protected Areas (MPAs) is an essential part of this strategy and by enhancing biodiversity will help marine ecosystems adapt to climate change. The network of MPAs will contribute to meeting the UK's commitments to international agreements and obligations and the Marine Strategy Framework Directive. Government has a duty to designate Marine Conservation Zones (MCZs - a type of MPA) under the Marine and Coastal Access Act 2009. The procedure to identify MCZs will help to deliver the Government's aim of a well-managed network of MPAs that is understood and supported by stakeholders.

E3. MCZ designation does not require specific management actions to be taken but under the Marine and Coastal Access Act there is a duty on public authorities to use the enabling powers within the Act to manage MCZs. Those authorities, primarily the Marine Management Organisation and Inshore Fisheries and Conservation Authorities, are empowered to make appropriate management decisions on MCZs to ensure their protection. These may include voluntary arrangements, codes of practice, extra licence conditions or introduction of byelaws. Any byelaw would be accompanied by an impact assessment and subject to public consultation. As MCZ designation does not require specific actions to be taken by appropriate public authorities, we consider that the One In One Out (OIOO) policy does not apply.

E.4 Two options were considered in this Impact Assessment:

- 1) Designating all MCZs in 2013 as recommended by the 4 stakeholder led Regional Projects established to provide recommendations for locations of MCZs;
- 2) Designating in 2013 a first tranche of 31 MCZs where there is certainty over data, economic impacts and ecological benefits and designating further tranches at a later date (preferred option).

E.5 Option 2 is preferred as it bases designation decisions on robust evidence. The MCZs not included are considered to be unsuitable for immediate designation due to:

- i)* Lack of certainty on presence, extent and conservation objectives in MCZs - meaning features could be under or over protected.
- ii)* Uncertainty of economic impacts – some costs are difficult to quantify and/or highly uncertain making it difficult to assess whether ecological advantages outweigh socio-economic costs.
- iii)* Lower ecological benefits compared to higher costs - some MCZs have significantly higher costs in comparison to the ecological benefits identified.

iv) Statutory Nature Conservation Body (SNCB) advice concluded the Regional Project process did not meet the requirements of the Ecological Network Guidance on reference areas so these should be re-evaluated.

Benefits of MCZ designation

E.6 Under Option 1 a combined area of 37,760km and over 1000 features (habitats, species and geological and geomorphologic features) will be protected by designation of MCZs. 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 for current and future generations (non use value).

E.7 The protection is likely to increase final ecosystem services (benefits) such as increase in provisioning services, regulating services and cultural services. Fish populations and the condition of marine habitats and species generally will benefit from greater protection and reductions in sea bed disturbance. Nature-based recreation activities (diving, angling, bird watching) can benefit from enhanced user experiences. Protection of marine resources will benefit research and education and improve understanding of the long-term impacts of human activities on marine ecosystems. Some of the features in the site contribute to key regulating services such as bioremediation of waste, sequestration of carbon and to resilience and continued regeneration of marine ecosystems.

E.8 A lower number of features are being designated under Option 2 implying that the final ecosystem service benefits (described above) are likely to be lower than Option 1. A combined area of 10,409km and 379 features will be protected by designation of MCZs. However, as only sites with certainty regarding presence and extent of features are designated under Option 2 there is a higher probability of achieving individual site benefits under Option 2.

E.9 Benefits of designating the sites have not been monetised and have been described qualitatively in terms of ecosystem services. This is because the benefits cannot be readily quantified and the majority are not traded, so cannot be easily valued. Further work on assessing ecosystem benefits will be carried over during the consultation period and over the longer term.

Costs of MCZ designation

E.10 The total estimated quantified economic costs (including transaction costs¹) of all rMCZs (Option 1) ranges from £15.8m/yr to £52.6m/yr, with a best estimate of £22.2m/yr. This gives a present value of between £227.4m and £820.6m and a best estimate of £331.2m over the 20-year timeframe of the IA.

E.11 Option 2 looks at the designation of a smaller tranche of sites so the quantified costs are lower than Option 1. The total estimated quantified economic costs (including transition costs) of the sites proposed for designation in 2013 (Option 2) ranges from £2.6m/yr to £6.4m/yr, with a best estimate of £3m/yr. This gives a present value of between £37.2 and £92.3m and a best estimate of £43.6m over the 20-year timeframe of the IA.

E.12 The monetised costs of Option 1 and 2 costs across the various sectors are summarised below:

¹ Note the average costs presented in the summary sheets of the IA excludes transition costs and so will be lower than these figures.

| Sector | Quantified costs of option 1 High - low (best estimate); expressed in £m/yr including transitional costs | Quantified costs of option 2 High - low (best estimate); expressed in £m/yr including transitional costs |
|--|---|---|
| Aggregate Extraction | 0.04– 2.7 (0.04) | 0.01 -1.03 (0.01) |
| Aquaculture | 0–0.3 (0.1) | No additional costs |
| Cables | 0.004–0.01 (0.008) | 0.001–0.003 (0.002) |
| Commercial fisheries | 0.3–7 (0.9) | 0.005–2.04 (0.2) |
| Flood and coastal erosion risk management | 0.001 | 0.001 |
| National Defence | 0.01 | 0.008 |
| Oil and Gas | 0.2–0.5 (0.4) | 0.04–0.06 (0.05) |
| Ports, Harbours, Commercial shipping and disposal sites | 0.3–2 (1.4) | 0.07–0.18 (0.18) |
| Recreation | 0.9–1.6 (1.3) | No additional costs |
| Renewable Energy | 0.02–23.5 (3.5) | 0.003–0.6 (0.09) |
| Costs to public sector of managing MCZs | 7.3–8.4 (7.8) | 0.8–0.9 (0.8) |
| Ecological surveys | 6.7 | 1.6 |

E.13 The best estimated annual cost to business is approximately £0.5m/yr for option 2 (compared with costs of approximately £8m/yr for Option 1). The consultation process will be used to gather more information to refine the sector estimates and the annual costs to business.

E.14 Non-monetised costs are summarised as:

- For Options 1 and 2 where future projects were highly uncertain (e.g. in in archaeology, oil and gas, ports, harbours, shipping and disposal sites, and laying of inter-array cable protection for three wind farms that are yet to be consented) or as yet unknown costs have not always been quantified. There is low probability that these costs will arise.
- In both the high and low cost scenarios, impacts of rMCZs on navigational dredges and on a designated shipping anchorage are assessed in terms of the cost of compensation for the effect on the sites' features as appropriate mitigation is not feasible and the activities are deemed to be of economic or national importance.
- One-off costs to vessels to purchase updated charts and Sailing Directions with MCZ locations and management requirements
- Social and economic impacts on local communities from effects on fisheries have not been quantified. There may be potentially significant impacts on some businesses and local economies through restrictions on certain fishing and recreational activities

- There will be costs to the public sector to inform users of the marine environment about rMCZs. Also there will be costs to Natural England and JNCC to advise public authorities on impacts of proposed licensed activities to MCZs, and costs to the public authorities in considering the impacts to MCZs when licensing activities
- Cost of education programmes (e.g. interpretation boards or education materials) that may accompany the designation of MCZs.
- The consultation process will be used to gather more information on the non monetised costs.

E.15 The costs are based on the following key assumptions:

- The cost to the commercial fishing sector is reported as the value of landings and Gross Value Added² lost as a result of MCZ management. It has been assumed that following designation 75% of the affected fishing effort (hence value of landings and GVA) in a site is displaced and 25% is lost. This assumption is based on low overlap of the sites with core fishing grounds indicating that fishers are likely to recover most part of their earnings from other areas. This assumption will be tested during consultation.
- For most licensing activities and MCZs that are not Reference Areas the IA assumes:
 - The cost of assessing and mitigating impacts on habitats and species that are already on the OSPAR List (of Threatened and/or Declining Species and Habitats), the UK List of Priority Species and Habitats (UK BAP) and in Schedule 5 of the Wildlife and Countryside Act cannot be attributed to MCZs. This is because assessment and mitigation of impacts on these habitats and species is already required under existing legislation and hence the cost of these will arise in the absence of MCZs .
 - As a result of MCZs, when operators conduct Environmental Impact Assessments (EIA) there will be additional requirements for them to assess the impacts of proposed plans and projects on MCZ features that are not already protected by existing legislation. This arises only for broadscale habitats protected by MCZs .
 - Mitigation of impacts of proposed plans and projects on broad scale habitats protected by MCZs, and the associated costs is likely to be required only in some instances. JNCC and Natural England advised that in most cases these impacts are negligible and will not require additional mitigation. This is because the foot print of many developments such as oil and gas rigs, pipelines, and wind turbine bases is likely to be quite small compared to the overall area of the protected broad scale habitat.

For MCZs that are Reference Areas, JNCC and Natural England have advised that these will be closed to activities that are considered to be extractive or depositional though potentially damaging or disturbing activities may proceed if the necessary mitigation of impacts can be provided. Defra has decided to review the whole approach to Reference Areas, and so Reference Areas have not been proposed for designation under option 2 (first tranche sites) which is Defra's preferred option.

² GVA is used as a measure because sufficient data are not available to calculate impacts on consumer and producer surplus, which is the measure used in conventional cost-benefit analysis.

- For enforcement costs the lowest cost estimate looks at both non-regulatory measures and regulatory management measures only (e.g. for offshore rMCZs). The highest cost estimate is for regulatory management measures for all rMCZs. The estimates are broad and don't take account of possible cost savings of introducing one management measure that covers multiple rMCZs or risk based prioritisation of monitoring³.
- For Option 2 the IA made specific assumptions to scale down regional costs for some sectors that are not site specific (as option 2 designates fewer sites than option 1 and hence the costs are lower). For certain other sectors costs were assumed to remain the same for both Option 1 and 2⁴.

Process and general principles used to inform sector costs in the Impact Assessment

E.16 The IA includes details of concerns raised by industry (renewable energy, oil & gas and CCS, ports & harbours only) that industry costs are higher than the costs presented in the summary IA impacts. This para summarises the key points that explains how the estimates used in the IA were derived:

- The summary impacts in the MCZ IA are based on costs provided by industry. Assumptions about MCZ management used in the IA drive the differences in the costs between some concerns raised by some industry representatives and summary estimates used in the IA. For example, industry concerns have sometimes assumed a far greater restriction on activity than JNCC and Natural England have assessed as likely.
- Importantly, costs to industry must be 'additional' to costs that would have been incurred anyway in the absence of MCZs (i.e. baseline). Industry concerns included costs that were not additional (i.e. not due to MCZ designation, for example, environmental obligations stemming from other regulations) and therefore these costs have appropriately not been included as an impact of MCZ designation.
- IA costs were revised throughout the MCZ designation process to take account of concerns from industry that these were likely to be underestimated. An extensive process was set up to test assumptions with JNCC, Natural England and regulators which led to refining the assumptions further. Please see 'process' (below) for more information. For further information please see section 3.4 of the Impact Assessment.
- The costs provided in the summary IA are not net of the anticipated benefits, which were not possible to monetise. If they could be monetised, it is anticipated that the designation of MCZs would be likely to incur net economic benefits in the long term.

E.16 We will use the consultation as another opportunity for industry to present information (and provide evidence) whether there may be the requirement for mitigation measures not covered in the cost estimates, which be directly attributable to MCZs as opposed to costs stemming from existing regulatory requirements.

Risks and uncertainty

³ E.g. where there is already good quality survey information because of an overlap with Regional Environmental Characterisation surveys or existing SAC monitoring data.

⁴ The IA assumed that the high scenario regional costs of Aggregate extraction of assessing impacts on features protected by rMCZs for 70 known future production areas will be unchanged even if the number of rMCZs is smaller in Option 2. This is because the rMCZs in Option 2 are spread across all four project areas and BMAPA anticipates that these costs will arise even for licence renewals for areas that are some distance from an MCZ (BMAPA, pers. comm., 2012).

E.18 The key risk for Option 1 is that many of the sites have low confidence in presence and extent of features. Designating MCZs with low certainty for conservation features could result in an incomplete or insufficiently protected network of conservation sites whilst unnecessarily restricting the activities of sea-users. Designating in tranches under Option 2 may mean that vulnerable rMCZ features may continue to incur damage, particularly for those at higher risk, prior to eventual designation. This is in part mitigated by a risk based approach to designation (where some high risk sites are proposed for designation under Option 2) and the risk of damage remains while these data certainty issues are resolved.

Ongoing and future work to address evidence gaps

E.19 The Impact assessment has highlighted a number of evidence gaps. Defra is currently in the process of commissioning two projects that look at ecosystem benefits from the marine environment:

- A review of existing evidence on the impacts of MPAs on recreation and tourism to consider how best to apply this evidence to assess the impact of UK Marine Conservation Zones on recreation and tourism. The outcome of the research will be used to inform the final IA.
- Examination of benefits from increase in ecosystem services from marginal changes in state of benthic habitats. The research is long term (over a year) and outcome will inform the evidence base for future tranches.

E.20 Defra will also be reviewing evidence submitted during consultation⁵. In addition, during consultation Defra will be looking to collect more information on qualitative impacts and any further information that can better inform the cost estimates and assumptions used in the IA.

E.21 The [Written Ministerial Statement](#) of November 2011 outlined that Defra would commission significant additional work to support MCZ designation. Additional funding was made available to the Defra MCZ project in November 2011 and £3.9m was used to survey a selection of sites from each of the four regional projects. Additional surveys and further development of detailed habitat maps have been planned and Defra has identified this work as a priority and will be providing funding of c£2m per year for the next three years.

⁵ Defra is aware of ongoing research undertaken by The Wildlife Trust that looks at benefits from MCZs and of project being carried out by Blue Marine Foundation in the Lyme Bay SAC. Defra will be considering whether such research and researches for the purposes of the final IA.

1 Introduction

1.1 Background

1.1.1 The Marine and Coastal Access Act (MCAA) 2009, places a duty on Government to establish a network of conservation sites which contributes to the conservation or improvement of the marine environment in the UK marine area, is representative of the range of features present in the UK marine area and reflects the fact that conservation of a feature may require the designation of more than one site. The network will include Marine Protected Areas (MPAs) designated under European legislation such as Special Areas of Conservation (SAC)⁶ and Special Protection Areas (SPA)⁷; marine components of RAMSAR sites⁸, Sites of Special Scientific Interests (SSSIs)⁹ and Marine Conservation Zones (MCZs) created under the Act in England and Wales and powers in a similar Act in Scotland and one being finalised in Northern Ireland.

1.1.2 In England Defra invited the Statutory Nature Conservation Bodies (SNCBs), Natural England and the Joint Nature Conservation Committee (JNCC), to make recommendations for locations for MCZs which had stakeholder support. To do this SNCBs established four regional projects (each of which chose its own name) covering the English North Sea ('Net Gain'), Irish Sea ('Irish Sea Conservation Zones'), South-East ('Balanced Seas') and South-West ('Finding Sanctuary'). This approach to open policy making not only allowed a diverse range of stakeholders to shape marine conservation; it also enabled socio-economic considerations to be taken in to account when sites were selected as recommended MCZs.

1.1.3 The SNCBs provided the regional projects with guidance on the criteria for selecting a network of MCZs, based on the OSPAR network design principles¹⁰ in their regions (the Ecological Network Guidance (ENG)) and project delivery guidance setting out the process that should be followed to select site locations and complete an Impact Assessment (IA) accompanying the site recommendations. Defra also established an independent expert Science Advisory Panel (SAP) to support the regional project process.

1.1.4 The regional projects made their recommendation for 173 MCZs in 127 locations (108 MCZs, 46 reference areas¹¹ within MCZs and 19 stand alone reference areas) in September 2011. These were reviewed by the Science Advisory Panel which, while recognising that the recommendations had come from a stakeholder-led process, raised significant concerns about the state of the evidence base supporting the recommendations. As a result of these concerns, Environment Minister Richard Benyon made a Written Ministerial Statement in November 2011 announcing that MCZ designations would be made in tranches with the best-evidenced sites designated first, revising the timetable for designation and announcing additional funding to support further evidence gathering. Formal advice to Ministers on site designation was also provided by SNCBs. This was presented to Defra in July 2012 alongside the impact assessment from the regional projects.

1.2 Purpose of the Impact Assessment

1.2.1 The purpose of the IA is to assess the potential economic, environmental and social impacts that designation of the recommended MCZs (rMCZs) could have on the UK. Two policy options are available to government: designating now all the MCZs recommended by the regional projects; or adopting a staged approach by designating now the 31 sites for which there is both a good cost-benefit case and a robust evidence base for designation. This Impact Assessment covers these two options. The "do nothing option" is not a viable policy option in this instance because section 123 of the MCAA places a legal obligation on Government to create a network of marine protected areas.

⁶ Required by the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna).

⁷ Required by the Wild Birds Directive (Council Directive 2009/147/EC on the conservation of wild birds).

⁸ Sites designated as Wetlands of International Importance under the Ramsar Convention (1971).

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

¹⁰ Oslo and Paris Commission (Ospar) Guidance on Developing an Ecologically Coherent Network of Ospar Marine Protected Areas, (Reference number 2006-3)

¹¹ Highly protected MCZs where all extraction, deposition or human-derived disturbance is removed or prevented to enable features to achieve reference condition (a state where there are no, or only very minor, changes to the values of environmental elements which would be found in the absence of anthropogenic disturbance)

1.2.2 The IA assesses the impacts for all 173 separate MCZ recommendations spread over 127 locations (Policy Option 1); and also a second option (Policy Option 2) which reflects the impacts of designating the 31 rMCZs being proposed for designation by Defra in 2013. Option 2 is our preferred option. MCZs recommended by the Regional Projects which are not proposed for designation initially will be subject to further evidence collection work and clarification of costs with a view to designation at a later point in time subject to the results of this further work.

1.3 Problem under consideration and the rationale for government intervention

1.3.1 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 economic value to society, the natural environment has intrinsic or 'non-use' value¹².

1.3.2 Human activities are having a detrimental effect on the extent and condition of many diverse habitats and their ecosystems, 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. OSPAR¹³ (2010) noted that 'a reduction in the decline in biodiversity is still a long way off', and that combined pressures from human activities are not fully understood and need to be carefully managed to avoid undesirable impacts. The most threatened marine and coastal habitats in the UK (as identified in the UK Biodiversity Action Plan (UK BAP)) are continuing to decline, and maintaining or increasing the extent and condition of priority habitats is more difficult in coastal and marine areas than in the terrestrial environment (JNCC, 2010). The reduction in extent and condition of marine habitats and ecosystems is due to market failures and public good characteristics, hence the need for government intervention to protect valuable features of the marine environment.

1.3.3 Market failure occurs because no monetary price is attached to many goods and services provided by the marine environment so market mechanisms cannot ensure that actions are fully paid for. This has led to resource depletion and environmental degradation, including biodiversity loss and pollution. Even for those goods that are traded (such as wild fish), market prices often do not reflect the true cost, which end up being borne by the environment, other individuals and society.

1.3.4 Because some marine environmental goods and services are 'public goods' (in that no one can be excluded from benefiting from them) individuals do not have an economic incentive to voluntarily contribute effort or money to ensure the continued existence of these goods (HM Government, 2011).

1.3.5 Hence, government intervention is required to address the environmental degradation and resource loss that is occurring as a result of market failure and public good characteristics.

1.4 Policy objective and intended effects

1.4.1 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).

¹² 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'.

¹³ The OSPAR Convention is the current legal instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic. Work under the Convention is managed by the OSPAR Commission, made up of representatives of the Governments of 15 Contracting Parties and the European Commission, representing the European Union

1.4.2 The UK administrations have committed¹⁴ to completing an ecologically coherent UK network of MPAs as part of a broad based approach to nature conservation. However, neither English waters nor the UK waters are a single ecological entity within a biogeographic context. Our aim is for the UK MPA network to contribute to an ecologically coherent network on a biogeographic basis and as a UK contribution to the wider OSPAR network. The UK is contributing to the development of methodologies through OSPAR and will continue to work with the administrations to agree on an approach across the UK.

1.4.3 This network will be a key tool in contributing to achieving Good Environmental Status as required by the Marine Strategy Framework Directive (MSFD) and particularly in ensuring biodiversity and seafloor ecosystems are protected, conserved and where appropriate recovered. The UK has also made a number of international commitments including delivering a contribution to the ecologically coherent network of MPAs under OSPAR, and to 'establish a representative network of MPAs' as set out in the World Summit on Sustainable Development (2002); and the Convention of Biological Diversity.

1.4.4 The network provided for in the Marine and Coastal Access Act (MCAA) and the MCZs in 'English'¹⁵ waters will contribute to meeting these national and international commitments. Designation of MPAs will help to ensure that conservation of habitats and species is given greater priority in the regulation and management of human activities, enabling protection of features and conservation objectives to be achieved.

1.4.5 Management measures for MCZs will be set by the regulatory authorities after designation and be determined by what is required to meet a site's conservation objectives. Since these measures are not known in advance, this impact assessment contains illustrative examples – including the best estimate – of likely management scenarios, bearing in mind that there are likely to be a range of management measures across and within MCZs, delivering differing levels of protection depending upon the conservation objective.

1.5 Overview of the IA and the policy options

1.5.1 The IA assesses the potential costs and benefits of two policy options for rMCZs relative to the 'do nothing' baseline. These are:

- Policy Option 1, the suite of all rMCZs recommended by the regional MCZ projects
- Policy Option 2, the suite of 31 sites of rMCZs being proposed for designation in 2013. This is the preferred option in the IA

1.5.2 Sections 2 and 3 present the impacts for the environment and for each sector of human activity from the policy options.

1.5.3 Government has fully considered both policy options Option 1 and 2, taking in to account the evidence supplied by the Regional Projects in their site recommendations¹⁶ and impact assessment¹⁷, Science Advisory Panel (SAP)¹⁸, the formal advice from the Statutory Nature Conservation Bodies (SNCBs) and Indepth Review¹⁹. Option 2 has been selected as the preferred option. This option would see the designation of 31 of the 108 rMCZs in 2013, alongside further additional work on the evidence base for the remaining 77 MCZs in keeping with the Ministerial announcement of November 2011. The 65 reference areas have been excluded from policy option 2 because of the inadequacies described by the SNCBs in their formal advice.

¹⁴ UK Marine Policy Statement

¹⁵ English inshore and English and Welsh offshore waters

¹⁶ Regional Project recommendations from Finding Sanctuary, Balanced Seas, Irish Seas Conservation Zones and Net Gain (September 2011).

¹⁷ Regional MCZ project Impact Assessment materials. July 2012.

<http://publications.naturalengland.org.uk/publication/2071071?category=1730361>

¹⁸ Science Advisory Panel Assessment of the Marine Conservation Zone Regional Projects Final Recommendations (Nov 2011)

¹⁹ Insert full reference once published

1.5.4 The sites being proposed for designation in 2013 (Option 2) are:

| Finding Sanctuary | Balanced Seas |
|--------------------------------------|--|
| The Canyons 3.1 | Stour & Orwell Estuaries rMCZ 2 |
| Southwest Deepes (West) 3.2 | Blackwater, Crouch, Roach and Colne Estuaries rMCZ 3 |
| East of Haig Fras 3.7 | Medway Estuary rMCZ 6 |
| Poole Rocks 3.14 | Thanet Coast rMCZ 7 |
| South Dorset 3.16 | Folkestone Pomerania rMCZ 11.4 |
| Chesil Beach and Stennis Ledges 3.19 | Beachy Head West rMCZ 13.2 |
| Torbay 3.22 | Kingmere rMCZ 16 |
| Skerries Bank and Surrounds 3.24 | Pagham Harbour rMCZ 25.1 |
| Tamar Estuary Sites 3.27 | Hythe Bay rMCZ 26 |
| Whitsand and Looe Bay 3.28 | |
| Upper Fowey and Pont Pill 3.29 | |
| The Mancles 3.32 | |
| Isles of Scilly 3.35 | |
| Padstow Bay and Surrounds 3.38 | |
| Lundy 3.41 | |
| Irish Seas Conservation Zones | Net Gain |
| North of Celtic Deep rMCZ 5 | Aln Estuary NG 13a |
| Fylde Offshore rMCZ 8 | Rock Unique NG 15 |
| Cumbria Coast rMCZ 11 | Swallow Sand NG 16 |
| Hilbre Island Group rMCZ 14 | |

1.5.5 There are four main reasons for this preferred option of Policy Option 2:

- Lack of certainty on presence, extent and condition of features – Much of the UK seabed remains unmapped and the characteristics and biodiversity of a large proportion of UK subtidal marine habitats are unknown. There are significant gaps in our knowledge of features in terms of their presence, extent and the appropriateness of proposed conservation objectives. Designating MCZs with low certainty in the evidence base for conservation features could result in us protecting areas that do not contain the feature we intended to protect. This would be a no-win situation. It could result in an incomplete or insufficiently protected network of conservation sites whilst also unnecessarily

restricting the activities of sea-users Defra has a strong commitment to evidence based policy and the Written Ministerial Statement of November 2011 outlined Government's position on the need to have a robust evidence base when designating MCZs. Option 2 only includes the sites that meet the data certainty requirements on presence, extent and appropriateness of conservation objectives (more detail is provided in paras 1.5.12 to 1.5.14)

- Uncertainty of economic impacts – The MCAA permits Government to “have regard to any economic or social consequences” in making decisions on MCZ designation. In some instances costs are difficult to quantify or have a high degree of uncertainty. For sites where there is a strong indication of the potential for high unquantified costs there is an increased risk that the ecological advantages will be outweighed by the socio-economic costs. Option 2 excludes such sites for further work on refining cost estimates before they can be considered for designation.
- Lower ecological benefits compared to higher costs – In some instances certain sites were identified to have significantly higher costs (e.g. Goodwin Sands rMCZ recommended by Balanced Seas has a cost of £1.7m per annum) in comparison to the ecological benefits. Such sites have been excluded under option 2 and further work will be required to assess if their ecological contribution is needed to complete a network of sites once the make-up of this network is known.
- Scientific advice on reference areas - Policy Option 2 does not include the 65 reference areas proposed by the Regional Projects. The SNCB advice concluded that although there is good scientific evidence to support the ecological benefits of highly protected marine areas; the Regional Project process did not meet the requirements of the ENG on reference areas. The SAP in their final report to Government also stated that there was not a complete set of viable reference areas noting that Defra and the SNCBs would need to revisit reference areas in the context of the ENG. Defra Ministers have concluded that there are strong grounds for reconsidering the implementation of reference areas and will be undertaking an evaluation so these have not been included in the preferred Option 2.

1.5.6 With all reference areas excluded, the remaining 108 rMCZs were assessed against a set of criteria based on the above principles for inclusion in Option 2.

1.5.7 To be deemed suitable for designation a site needed to show a positive balance between the strength of the conservation advantages it offers and the socio-economic impact of its likely management measures. Where a site's conservation advantages were considered to outweigh the socio-economic costs then the MCZ was considered appropriate for designation at some point. The decision as to whether to include an MCZ in Option 2 was then taken based on the levels of confidence in the evidence supporting the site designation. For some sites where the strength of the conservation advantages appeared weaker, further work will be required to assess whether their ecological contribution will be needed to complete the network of conservation sites in the future.

Weighing up conservation advantages against socio-economic costs

1.5.8 Weighing up conservation advantages against socio-economic costs was challenging because some of the economic impacts are expressed in monetary terms while the ecological benefits are expressed largely in qualitative terms.

1.5.9 MCZs were assessed in terms of their contribution to a network of marine protected areas. The broad requirements for this is that the network should contribute to conservation or improvement of the marine environment, represent the range of species and habitats, and that the conservation of a feature may require the designation of more than one site. The SNCBs identified detailed ecological targets²⁰ to represent these broad requirements which also took account of the OSPAR network design principles. The SNCB advice includes a detailed assessment of how each MCZ recommended by the Regional Projects contributes to these targets.

1.5.10 A greater ecological contribution was required for sites with higher socio-economic costs. MCZs in the top quartile were considered suitable for inclusion in the network only if:

- they provided an opportunity to protect a feature where there are limited opportunities to protect it nationally, or it is the best example of the feature nationally, or,

²⁰ The Ecological Network Guidance: http://jncc.defra.gov.uk/pdf/100608_ENG_v10.pdf

- included multiple features where there are limited opportunities to protect them regionally, and/or they are the best examples of the features regionally.

1.5.11 Where there was a strong indication of the potential for high unquantified costs, an MCZ was deemed to require further consideration ahead of possible designation in a later tranche pending clarifications of likely costs. This judgement also applied where quantified cost predictions for a site spanned a very wide range and needed further work to assess likely costs more precisely. Sites in either of these categories were excluded from Option 2.

Assessing confidence in presence, extent and condition of features

1.5.12 Our knowledge of seabed characteristics is currently limited. This can create uncertainty around whether the species or habitats are present at the site in question, their geographic extent (important for setting the MCZ boundaries) and their current condition (which influences how their conservation objectives should be framed). MCZs are proposed for a range of features and the data confidence of individual features can vary substantially across a single site. Where there were significant data quality issues (less than 50% of the features in an MCZ being ready for designation in 2013,) the MCZs were deemed to require further consideration prior to designation in a later tranche, pending clarifications in the evidence. Data uncertainty issues affect only whether or not a MCZ is ready for designation in 2013 (that is, inclusion in Option 2), and do not preclude an MCZ (or its component features) from inclusion in the network eventually.

1.5.13 The data confidence threshold (below which a site will not be included in Option 2) has been set at a lower level for specific features in sites identified by the SNCBs as being at high risk. In these circumstances we are proposing designation of the relevant features even if the data quality would not otherwise be considered sufficient (in accordance with the Precautionary Principle²¹). However, where data quality is poor for all features in a site, or where there are high unquantified socio-economic costs that need clarifying, these issues will need to be further investigated ahead of designation in a future tranche. This means that although a site has been deemed at high risk, it may not be included in Option 2.

1.5.14 There is ongoing work to improve the evidence base. Given the need to make decisions on which sites to propose for 2013 designation in the consultation we have reached the cut off point for new data and analyses to inform these decisions in early September. New data and analysis will be factored into consideration following this consultation, which will also be an opportunity for stakeholders to present any new evidence that was not previously available. The consultation also offers an opportunity for all stakeholders to challenge what is proposed for each MCZ. Final recommendations on which sites to designate in 2013 will be made following analysis of the responses to the consultation. New data and evidence will be considered for the sites recommended by the regional projects, rather than considering new sites.

One In One Out

1.5.15 MCZ designation does not require specific management actions to be taken but under the Marine and Coastal Access Act there is a duty on public authorities to use the enabling powers within the Act to manage MCZs. Those authorities, primarily the Marine Management Organisation and Inshore Fisheries and Conservation Authorities, are empowered to make appropriate management decisions on MCZs to ensure their protection. These may include voluntary arrangements, codes of practice, extra licence conditions or introduction of byelaws. Any byelaw would be accompanied by an impact assessment and subject to public consultation. As MCZ designation does not require specific actions to be taken by appropriate public authorities, we consider that the One In One Out (OIOO) policy does not apply.

Approach taken to assess costs and benefits

1.5.16 Costs have been assessed in terms of economic impacts on marine sectors (relative to the business as usual scenario). The sectors assessed are:

- Aggregate extraction
- Aquaculture

²¹ The precautionary principle is that where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

- Archaeology
- Cables (interconnectors and telecom cables)
- Coastal development (excluding port and harbour development)
- Commercial Fishing
- Flood and coastal erosion risk management (coastal defence)
- National defence
- Oil and gas exploration and production, gas interconnectors and gas storage (including carbon capture and storage)
- Ports, harbours, shipping and disposal sites
- Recreation
- Renewable energy

1.5.17 Significant impacts on non-UK commercial fishing fleets are also assessed where information is available.

1.5.18 The costs of managing the sites have also been estimated. Much of the site specific information is necessarily highly detailed and as such the IA provides a broad summary of the material with illustrative examples. Further details are provided in methodology papers 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 H²².

1.5.19 The benefits are assessed in terms of contribution to an ecologically coherent network (in this case the network described by the Ecological Network Guidance) and positive changes in ecosystem services. In an ecologically coherent network, protection within individual sites provides protection for habitats and species across the network enabling populations to interact and move between individual protected areas. The component sites need to have a measure of local self-sustainability and be geographically dispersed to ensure that species and habitats persist through natural cycles of variation. Connectivity between sites is important to the movements of species, nutrients and energy between similar habitats and MPAs and will improve the ecological coherence of the network.

1.5.20 Ecosystem services are defined as services provided by the natural environment that benefit people (Defra, 2007)²³. The Millennium Ecosystem Assessment set out a typology of ecosystem services under four broad headings: provisioning (e.g. fish for consumption), regulating (e.g. carbon sequestration), cultural (sea angling and other recreational activities) and supporting services (primary production which is indirectly analysed to avoid double counting²⁴).

1.5.21 For purposes of the impact assessment the benefits of MCZs were assessed qualitatively by looking at the change in final ecosystem services (relative to the 'do nothing' baseline) and how that impacts human welfare. Further information on the methodology used is provided in annex H and section 2.3 of the evidence base.

1.5.22 The regional project impact assessment has been used to inform the decision making process of the sites. A number of assumptions have been made in assessing the costs and benefits. A summary of the assumptions has been provided below:

- Where recommended 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. This was assumed to occur at the beginning of 2013 by the Regional Projects. In reality designation will occur later in 2013 and it may take time for the appropriate management to be put in place.

²² These methodologies have been prepared consulting statutory nature conservation bodies (Nature England and Joint Nature Conservation Committee), other government departments, Defra agencies (Marine Management Organisation and Environment Agency) and various other industry stakeholders. The methodology papers have been independently peer reviewed.

²³ Definitions of each ecosystem service can be found in Annex H.

²⁴ Supporting services are those that are necessary for the production of all other ecosystem services and include habitat provision and nutrient cycling. The important point to emphasise is that they differ from provisioning, regulating, and cultural services in that their impacts on people are indirect and will therefore not be valued directly but by taking account of the impact on these other ecosystem services that are directly 'consumed'.

- Management scenarios are used to describe the additional management of activities that may be needed to achieve the conservation objectives for each MCZ. Where there is uncertainty, more than one scenario has been used to reflect the potential range of impacts. Defra is aware of project being carried out by Blue Marine Foundation in the Lyme Bay SAC and will be considering whether such an approach is feasible and cost-effective in other marine protected areas. 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.
- The cost to the commercial fishing sector is equivalent to the value of landings and Gross Value Added²⁵ affected attributed to the area of rMCZs. It has been assumed that following MCZ designation 75% of the fishing effort is displaced and 25% of the effort from each site is lost. This assumption is based on low overlap of the sites with core fishing grounds indicating that fishermen are likely to recover most part of their earnings from other areas of the sea and was based on modelling of core fishing grounds undertaken by Cefas. However, it is very difficult to predict fishing behaviour and therefore this is an assumption. More information will be collected during consultation to refine this assumption.
- Mitigation of impacts on licensed activities will be provided through the existing marine licensing framework. It is assumed that existing consents that could impact on MCZ features will not be reviewed following designation of MCZs.
- Overlap between sectors (resulting in one sector impacting the other) is likely to be an issue for a very small number of sites only. For example, the Atlantic Array wind farm overlaps an rMCZ in the south west. There is currently fishing activity in this area. The wind farm may result in the exclusion of some or all types of fishing gears from the area of the turbines. Where such a situation has the potential to occur it has been discussed at site-level, but no adjustment has been made in the actual cost data due to the uncertainty over how the situation would actually pan out under baseline conditions.
- The analysis does not take account of proposed SACs that overlap rMCZs. These SACs may result in some management of fisheries, however at this stage there is uncertainty regarding what this management may be. This has been further explained in the fisheries methodology paper (para H7.20).
- 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.
- 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 process²⁶.

1.5.23 Section 4 provides a summary of the potential 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.

1.5.24 The 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, which is consistent with analysis carried out for Natura sites and other marine protected areas. While the MCZ designations can reasonably be expected to generate costs and substantial benefits beyond 20 years uncertainty beyond this point makes further analysis challenging. 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% as per Treasury Green Book guidance²⁷.

²⁵ GVA is used as a measure because sufficient data are not available to calculate impacts on consumer and producer surplus, which is the measure used in conventional cost-benefit analysis.

²⁶ Natural England has advised that this is a reasonable assumption to make for the purposes of the IA (Natural England, pers. comm., 2010).

²⁷ Where effects are very long term (in excess of 50 years) and involve substantial and irreversible wealth transfer between generations a declining discount rate can be used.

1.5.25 Further Impact Assessments will be developed to look at cost benefit analysis on designation of future tranches of sites (beyond 2013).

1.5.26 While it has been possible to quantify part of the costs under both the options, benefits have been assessed qualitatively using the ecosystem services approach. Defra is in the process of commissioning further research to quantify these benefits (see Section 2). The consultation process will be used to test current estimates and gather more information on both costs and benefits.

2 Baseline and summary of benefits of Policy Option 1, (the suite of recommended MCZs by the regional projects) and Policy Option 2 (the proposed sites for designation in 2013)

2.1 About this section

2.1.1 This section presents:

- The baseline for the environment in which MCZs are not designated and a general summary of expected changes in the environment in the MCZ Project area over the next 20 years.
- The potential benefits of the suite of MCZs recommended by the regional MCZ projects (Policy Option 1), and Policy Option 2 (the proposed sites for designation 2013), both assessed relative to the baseline. Section 2.2 presents the beneficial impacts of MCZs on the environment, including MCZ features and section 2.3 provides an assessment of the beneficial impacts of MCZs 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 current ecological condition of features within individual rMCZs varies depending on the localised conditions and the exposure to different types of human and environmental pressures (UKMMAS, 2010). The current likely condition of features in rMCZs has been determined via a desk-based vulnerability assessment exercise²⁸ 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 Feature of Conservation Interest (FOCI) is illustrated by their status on lists of national and multi-lateral

²⁸ If designated survey and monitoring work will be carried out to establish the true condition of MCZ features.

environmental agreements, which identifies them as being rare, threatened, at risk or in decline²⁹. While features on these lists have statutory protection, none of the MCZ features currently have conservation objectives under these listings³⁰.

Summary of pressures affecting the environment in the MCZ Project area

2.2.5 Fishing activity is widespread in the MCZ project area. Recent efforts in fisheries management are reducing exploitation rates and some stocks are recovering. However, a number of fish stocks remain outside precautionary assessments of safe biological limits and so are at risk of stock collapse (OSPAR, 2010). Commercial fishing causes the death of target and non-target species, can change community 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 fished or to biodiverse areas excluded from the suite of rMCZs for environmental and socioeconomic reasons. The reform of the CFP, currently underway, may address some of these issues.

2.2.6 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). These are also proposed descriptors of Good Environment Status under the Marine Strategy Framework Directive.

2.2.7 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.

2.2.8 Major threats to marine ecosystems anticipated as a result of climate change include rising sea temperatures, rising sea levels³¹, greater frequency of storms, increases in the occurrence of severe storm surges, and changes in the timing of plankton 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 water³² is expected to affect many species with critical ecological roles in benthic and pelagic³³ 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) projects³⁴ in the future, and more applications for development of wind, wave and tidal stream energy are also expected (OSPAR, 2010).

2.2.9 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.

²⁹ 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).

³⁰ Any species and habitats already protected by SPAs or SACs that overlap with an rMCZ are not proposed for MCZ designation.

³¹ Due to thermal expansion.

³² As a result of increased concentrations of atmospheric carbon dioxide dissolving in the sea.

³³ Communities in the water column.

³⁴ 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).

2.3 Benefits of MCZ designation

2.3.1 Designation of MCZs 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 establishing an ecologically coherent network of MPAs. In the absence of MCZs, there would be areas of the UK's marine environment and a high number of British species and habitats, particularly away from the coast, that would continue to be unprotected.

2.3.2 There are three broad types of benefits of MCZs: the contribution to the benefits of an ecologically coherent network of MPAs, and the beneficial impact of MCZs on the condition of the features that they have been designated to protect, and the provision of ecosystem services.

Anticipated benefits of an ecologically coherent MPA network

2.3.3 As part of the MPA network, MCZs 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).

2.3.4 As the number of MPAs increases worldwide, there is an increasing empirical evidence base (including Commonwealth of Australia, 2003; Gubbay, 2006; PISCO, 2011) that demonstrates that MPAs are delivering these ecosystem benefits (Moffat, 2012). The 2003 report from the Commonwealth of Australia (Commonwealth of Australia 2003) set out the role of MPAs and their benefits, including their broader benefits and discussed some of the principles which have been incorporated into the Ecological Network Guidance (Natural England and the Joint Nature Conservation Committee 2010) including viability, connectivity and protection as well as including a number of case studies demonstrating the benefits of MPAs from around the world.

2.3.5 Commonwealth of Australia report (2003) provides a number of case studies that show the positive benefits from marine protected areas to commercial and recreational fishers. Merritt Island National Wildlife Refuge at Cape Canaveral, Florida, USA – is an area which was originally closed (from fishing activity) for security reasons in 1962, and has subsequently resulted in record fish sizes (measured by recreational fishers trophy fish catch) in the surrounding fisheries area (Commonwealth of Australia, 2003). Commonwealth of Australia report (2003) also states that these types of spillover benefits are backed up by fish tagging studies. Another example is a network of 4 reserves that were created in St Lucia (in 1995) to cover 35% of the fisheries to improve fish stocks. Evidence indicates that the reserves increased the adjacent local fishery catches by 46% for large fish traps and 90% for small fish traps in five years, and an overall increase in yield of the fishery. Similar examples from Egypt (i.e Nabq Natural resource area) and in the US (i.e. Georges Bank) also show the benefits to catch in surrounding areas from a marine protected area.

2.3.6 Commonwealth of Australia report (2003) also provide case studies that show the positive benefits to tourism (e.g. great barrier reef marine park in Australia and Bonaire main park off the coast of Venezuela).

2.3.7 The expected benefits of MPAs mirror the well-established track record of beneficial impacts of protected areas on land and encompass all three strands of sustainable development (environmental, economic and social). However, it is also clear from the available evidence that MPAs cannot be successful if they are used in isolation and that they need to be one of a number of management mechanisms beyond spatial protection measures that address the functioning and management of the entire marine area (Moffat, 2012)

2.3.8 Option 2 only looks at the costs and benefits of designating 31 sites so the assessment of benefits of an ecologically coherent network cannot be made for Option 2. However, at individual site level the benefits of how these sites contribute to meeting network design principles has been undertaken. As we develop our understanding of what an ecologically coherent network looks like it will become clearer what further designations are needed to complete the network. Although a delay in designation relative to Option 1 will imply a delay in realising the benefits of a network; it does not mean the end goal of an ecologically coherent network will not be realised. And since, unlike option 1, option 2 is based on a robust conservation evidence base, there is a higher likelihood of this approach achieving the full network benefits in the longer term.

2.3.9 There is a risk of not achieving an ecologically coherent network if some features are damaged beyond repair in the longer time taken to designate sites. Thus choosing Option 2 could lead to a

situation where future benefits of an ecologically coherent network are less if further sites cannot be identified and designated to protect these features. As this risk has been mitigated in part by the use in the selection process of the precautionary principle for sites deemed “at risk”.

2.3.10 An assessment of how a site contributes to an ecologically coherent network has been undertaken for each rMCZ (Annex I). An illustrative example, rMCZ 7 East of Haig Fras (Finding Sanctuary project area), shows how the site contributes to specific network design principles:

- Having an adequate sea-area of a broad scale habitat protected is important for the strength of the network. Within Finding Sanctuary, the adequacy targets for subtidal coarse sediment and moderate energy circalittoral rock have only just been achieved, and East of Haig Fras makes an important contribution to these targets.
- Connectivity is another important network design principle, East of Haig Fras is important for contributing to this for circalittoral rock and sublittoral sediment as well as between the inshore and offshore area.
- Representativity is a key principle to ensure that the MPA network protects the full range of marine biodiversity across our sea. East of Haig Fras contributes to this by protecting three broad scale habitats.
- Replication of features within the MPA network is required to spread the risk, and safeguard against any damaging events or unexpected population losses. It also ensures natural variation within features is captured, by protecting broad scale habitats that are also protected within other MCZs, East of Haig Fras contributes to this network design principle.
- An individual site needs to be viable to maintain the integrity of its features and be self-sustaining throughout natural cycles of variation. The features of East of Haig Fras are considered to be viable, which ensures its effective contribution to the network.

The beneficial impacts of MCZs on the condition of the features that they protect

2.3.11 On 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 decrease or degrade over time. The risk that the features will be adversely affected by human activities is greater if not protected by an MCZ (JNCC and Natural England, 2011a, b and c).

2.3.12 For unlicensed activities, MCZ management regimes will manage 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 will make it easier for effective mitigation to be introduced where required.

2.3.13 For assessment in the IA, the impact of MCZs on the condition of features is assessed based on the conservation objectives, as described below:

- 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). Sites with such conservation objectives are present in option 1 and option 2.
- 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 future, currently unplanned, human activities. 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). Sites with such conservation objectives are present in option 1 and option 2.
- Within reference areas features will have a conservation objective of ‘recover to reference condition’. These are assumed to not currently be in reference condition but, with MCZ designation and

³⁵ disturbance (Natural England and JNCC, 2011). Sites with such conservation objectives are present in option 1 and not option 2 (as reference areas are not being designated under option 2).

2.3.14 Across the full suite of rMCZs proposed under Option 1 by the Regional Projects, 1,016 draft conservation objectives are proposed for habitats, species, and geological and geomorphological features. Across policy option 2, the proposed sites for designation, 379 features are proposed for designation. Broken down these include:

| Conservation Objective | Policy Option 1 ³⁶ | Policy Option 2 ³⁷ |
|----------------------------------|-------------------------------|-------------------------------|
| Recover to reference condition | 290 | 0 |
| Recover to favourable condition | 200 | 73 |
| Maintain to favourable condition | 526 | 306 |
| Total | 1,016 | 379 |

2.3.15 The broad-scale habitats included in the suite of rMCZs (Policy Option 1) cover a representative 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 biotopes³⁸. Their inclusion incorporates a precautionary principle approach, allowing for conservation of high ecological value features for which there is limited information, (JNCC and Natural England 2010a). The suite of recommended MCZs (Policy Option 1) 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.

2.3.16 The smaller suite of MCZs in Policy Option 2 have a range of broad scale habitats and features of Conservation Importance but these have not yet been evaluated to ascertain the extent they contribute to a representative network. The extent of the coverage of these features will increase in the future as the network is built. 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. These ecological benefits (under option 1 and 2) are assessed in economic terms using the ecosystem services framework.

Ecosystem Services

Baseline

2.3.17 Ecosystem services are defined as services provided by the natural environment that benefit people (Defra, 2007)³⁹. The ecosystem services that may be provided by MCZ features have been assessed under the headers set out in Table 1.

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

| General ecosystem service categorisation | Final ecosystem services used in the IA |
|--|---|
|--|---|

³⁵ Caused by humans or human activities.

³⁶ Based on the conservation objectives proposed by the regional projects

³⁷ Features contained within sites being proposed for designation in 2013 and for those features being proposed to be designated at a later date. This includes where SNCBs have recommended changes to conservation objectives.

³⁸ A biotope is the physical habitat with its associated distinctive biological communities.

³⁹ Definitions of each ecosystem service can be found in Annex H.

| | |
|--------------|---|
| Provisioning | Provision of fish and shellfish for human consumption |
| Cultural | Recreation |
| | Research and education |
| | Non-use |
| Regulating | Natural hazard protection |
| | Environmental resilience |
| | Gas and climate regulation |
| | Regulation of pollution |

2.3.18 The value of the ecosystem services provided by these features in the baseline 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 (arising from use or non-use of the service). The services provided by the UK marine environment benefit people both within the UK and abroad.

2.3.19 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 recommended MCZs can be found in section 3.2; Annex D provides a summary of the scale and value of fisheries in the UK.

2.3.20 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).

2.3.21 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.

2.3.22 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 which is what is relevant for this IA⁴⁰.

Benefits

2.3.23 Recommended MCZs will conserve and enhance both the stock and flow of marine ecosystem services. As discussed above the IA assumes that rMCZ features with 'maintain' conservation objectives

⁴⁰ The National Ecosystem Assessment says that is unlikely that the status of impacted benthic habitats will improve without further directed management measures to protect the seabed, particularly where they support long-lived, fragile and/or functionally important species. However it is not yet known whether measures such as conservations, protected areas and fisheries management will lead to significant reductions in the levels of physical disturbance, to seabed habitats.

are likely to prevent deterioration in ecosystem services, while 'recover' conservation objectives are likely to increase the potential benefits of ecosystem services. However, the necessary scientific data are not available to quantify these changes because knowledge of many of these habitats and species and their contributions to ecosystem services is limited and dispersed, as indicated by Fletcher and others (2012).

2.3.24 The following evidence of potential benefits to ecosystem services are based on a summary of key literature presented in Annex L. Over the consultation period further research on benefits will be undertaken that looks value of recreational benefits from Marine Protected Areas. Defra is also in the process of commissioning long term research that looks at ecosystem service benefits (provisioning, regulation and cultures services) from marginal changes in state of benthic habitats⁴¹.

Fish and shellfish for human consumption

2.3.25 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 (see Section 2.3.4); and the designation will lead to a reduction in fishing mortality and subsequent improvement in the characteristics of fish stocks.

2.3.26 The suite of MCZs considered in Policy Option 1 will cover a combined area of 37,760km², and 10,409km² in Policy Option 2. The management of these will affect a potentially significant level of commercial fishing activity (see section 3.2). As the MCZs will form part of an ecologically coherent network of MPAs, the combined effect of the suite of recommended MCZs (and other MPAs) in terms of habitat improvement and reduced mortality of fish, is expected to be greater than the total effect of individual MCZs when considered in isolation from each other. This will be also be the case for policy option 2, but to a lesser extent than for option 1 (see para 2.3.59 to 2.3.61 for comparison of benefits between option 1 and 2).

2.3.27 Evidence that MCZs could result in potential improvements in populations of less mobile species such as shellfish (including crustaceans) is relatively strong⁴². Management for MCZs may specifically reduce fishing effort that targets some commercial species listed as MCZ FOCL, 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 MCZ, and the extent to which spillover benefits occur. For less mobile species, benefits are likely to be concentrated in localised areas around MCZs. However, off-site benefits may occur for species such as scallops as a result of increased larval export, improving the health of surrounding scallop beds.

2.3.28 It is difficult 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. It has been assumed that following MCZ designation 75% of the fishing effort is displaced and 25% of the effort from each site is lost. However, there were concerns raised by fishing organisations during the MCZ planning process and draft IA consultation that indicated that for most gear types there is a chance of reduced landings. This implies that there is a 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, although this would be highly species dependent.

2.3.29 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.

2.3.30 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 3.2⁴³.

⁴¹ The research is estimated (based on the need for collecting primary data) to require 18 months and will not be able to inform the final IA but will inform the decision to designate future sites.

⁴² Annex H5

⁴³ 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

2.3.31 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.

2.3.32 Table 2 below provides an example of how the impact of an individual rMCZ on fish and shellfish for human consumption has been assessed. This site in the example has been proposed for designation under option 1 and 2.

| Table 2. Fish and shellfish for human consumption | | rMCZ Chesil Beach and Stennis Ledges |
|---|--|---|
| Baseline | Beneficial impact | |
| <p>Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone contribute to the delivery of fish and shellfish services. The baseline quantity and quality of service provided is assumed to be commensurate with that provided by the features of the site when in favourable and unfavourable condition (see Table 1b).</p> <p>A description of on-site fishing activity and the value derived from it is set out in Table 2b.</p> | <p>If the conservation objectives of the features are achieved, some of the features will be recovered to favourable condition. Others will be maintained in favourable condition. New management of fishing activities is expected (above the baseline situation), the costs of which are set out in Table 2b.</p> <p>Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption. Management of fishing activity within the MCZ may reduce the on-site fishing mortality of species, which may benefit commercial stocks.</p> <p>As the MCZ is small and some fishing activity may still be permitted in the MCZ, it is unclear whether it would have any impact on stocks of mobile commercial finfish species. Stocks of low mobility and site-attached species, such as lobster and crab, may improve as a result of improved habitat condition and reduced fishing pressure. If some fishing for such species is permitted within the MCZ, then catches may improve. Localised beneficial spill-over effects may occur around the MCZ.</p> <p>A reduction in scalloping within the MCZ as a result of new management may result in improved on-site scallop populations. If some scalloping is still permitted within the MCZ, then fishers may benefit from improved catches within the site. If no scalloping is permitted within the MCZ, then no on-site benefits will be derived. A healthier scallop population may result in spill-over benefits to scallop beds outside the MCZ as a result of possible increased on-site spat production, improving catches at those scalloping grounds.</p> <p>If MCZ management involves reduced mobile gear effort, but no reductions in static gear fishing, this may reduce gear conflict between mobile and static gear fishers. Reduced gear conflict may reduce the cost of fishing in the MCZ for static gear fishers.</p> <p>The potential benefits described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision or the off-site impacts of displaced effort.</p> | |

Recreation

2.3.33 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.

2.3.34 Improvements in the condition of marine habitats and species are likely to enhance the recreational experience for participants, and increase the value of the recreational 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.

2.3.35 There is evidence that sea anglers (shore-based and from boats) value 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 also 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. In MCZ Reference Areas (in policy option 1) it is assumed that extractive and depositional activities, including recreational angling, will not be permitted. In such cases any benefits from increased or more diverse stocks will be limited to any spill-over effects that may occur.

2.3.36 Where MCZs only include conservation objectives to maintain feature condition, MCZs will maintain current recreational benefits and insure these against the risk of future degradation. Even if 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. For example, the Lundy Marine Conservation Zone⁴⁴ is a popular destination amongst eco-tourists and in 2008 received 20,000 visitors (South West Tourism). The North-East Kent European Marine site has also used its designation in the green marketing of products and services from the MPA. Examples include promoting the area for up-market eco-tourism. (UNEP) Such increases may however represent a redistribution of location preferences of recreation participants, rather than an overall increase in the level of participation in the UK.

2.3.37 MCZs may act as a focal point for recreation activities less directly related to the quality of MCZ features, such as walking along coastal paths. 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.

2.3.38 Table 3 below demonstrates an example of how sites at an individual level have been assessed to contribute to benefits for recreation. This site has been proposed for designation under option 1 and 2.

| Table 3 Recreation | | rMCZ Isles of Scilly Sites |
|---|--|-----------------------------------|
| Baseline | Beneficial impact | |
| <p>Angling: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone contribute to the delivery of fish and shellfish services. The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable and unfavourable condition (see Table 1b).</p> <p>There are several companies that provide boats which can be chartered for angling, which take visitors out on the reefs, or for sharking. Species caught include pollack, wrasse, mackerel,</p> | <p>If the conservation objectives of the features are achieved, some of the features will be recovered to favourable condition. Others will be maintained in favourable condition.</p> <p>As no additional management of angling is expected, fishers will be able to benefit from any on-site and off-site beneficial effects. If the MCZ results in an increase in the size and diversity of species caught, then this is expected to increase</p> | |

⁴⁴ Lundy was also England's first statutory Marine Nature Reserve in 1986 and in 2003 became the UK's first No Take Zone

| Table 3 Recreation | rMCZ Isles of Scilly Sites |
|--|--|
| <p>bull huss and conger. It has not been possible to estimate the value of angling at the site.</p> | <p>the value derived by anglers.</p> <p>The designation may lead to an increase in angling visits to the site, which may benefit the local economy. This increase may represent a redistribution of location preferences, rather than an overall increase in UK angling.</p> |
| <p>Diving: Fletcher and others (2012) identify that some of the features to be protected by the MCZ can contribute to the delivery of recreation and tourism services. The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable and unfavourable condition (see Table 1b).</p> <p>The Isles of Scilly are known as one of the best places for diving around the British Isles due to the excellent underwater visibility and nutrient-rich sea water. There are several diving companies that provide beginner and advanced courses. Divers can experience large underwater rock formations, reef walls and shipwrecks, and have the opportunity to swim among grey seals. It has not been possible to estimate the value of diving in the rMCZ.</p> | <p>If the conservation objectives of the features are achieved, some of the features will be recovered to favourable condition. Others will be maintained in favourable condition.</p> <p>An improvement in the condition of site features and any associated increase in abundance and diversity of species, which may include recovery of fragile and slow-growing species, may improve the quality of diving at the site and therefore the value of the ecosystem service.</p> <p>The designation may lead to an increase in dive visits to the site, which may benefit the local economy. This increase may represent a redistribution of location preferences, rather than an overall increase in UK diving.</p> |
| <p>Wildlife watching: Fletcher and others (2012) identify that the features to be protected by the MCZ can contribute to the delivery of recreation and tourism services. The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable and unfavourable condition (see Table 1b).</p> <p>The Isles of Scilly are famous for being Europe's top location for seeing rare and migrant birds. Bird watchers can see wryneck, bluethroat, pectoral sandpiper, common rosefinch, ortolan, snow and Lapland bunting, jack snipe, rose-coloured starling and spotted crake. Grey seals also draw wildlife watchers. There are small companies that offer specialised bird watching and wildlife watching tours and accommodation is available on all of the inhabited islands. Wildlife watching boat trips leave from St Mary's to visit Annet – an uninhabited island that is a bird sanctuary and is famous for its breeding puffins – and other popular breeding and feeding grounds for sea birds. It has not been possible to estimate the value of wildlife watching in the MCZ.</p> | <p>If the conservation objectives of the features are achieved, some of the features will be recovered to favourable condition. Others will be maintained in favourable condition.</p> <p>An improvement in the condition of site features and any associated increase in abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service.</p> <p>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK wildlife watching visits and/or a redistribution of location preferences.</p> |

2.3.39 To improve Government's understanding of the benefits of MPAs on recreation further work has been commissioned (Value of the impact of marine protected areas on recreation and tourism services ERG 1204)

Research and education

2.3.40 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.

2.3.41 The designation of MCZs in English waters will generate significant investment⁴⁵ in research activities, including mapping of the sea bed, feature condition assessments, ongoing monitoring of MCZs and academic research to understand better marine habitats and ecosystems. MCZ-related research is already and will continue to contribute to our understanding of marine ecosystems, anthropogenic impacts upon the marine environment and the effects of management interventions, which should in turn lead to the more efficient use and management of the marine environment in future. MCZ Reference Areas (Option 1 only) would provide an opportunity to benchmark the state of a broad range of marine features, in the absence of many anthropogenic pressures and would provide control areas as part of long-term monitoring and assessment (JNCC and Natural England, 2010c).

2.3.42 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. Shore-accessible MCZs 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 use in schools and for delivery to the wider public through television programmes, articles in magazines and newspapers. This would enable education benefits to be accessed by non-visitors. These benefits are likely to occur both under option 1 and 2, though probably to a lesser extent under option 2 as fewer sites are proposed for designation. However, it could be argued that some of these educational benefits may be more dependent on diversity of features than the number of MCZ designated it is difficult to assess the relative values of the two options

2.3.43 Table 5 below demonstrates an example of how sites at an individual level have been assessed to contribute to benefits for research and education. This site has been proposed for designation under option 1 and 2.

| Table 5. Research and education | | rMCZ NG 13a, Aln Estuary |
|---|---|--|
| Baseline | Beneficial impact | |
| <p>Research: Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone can contribute to the delivery of research services.</p> <p>The site overlaps with the Alnmouth Saltmarsh and Dunes Site of Special Scientific Interest (SSSI) and the Northumberland Shore SSSI (Net Gain Final Recommendations, 2011). and, as such, ecological monitoring activities are ongoing. It has not been possible to estimate the value derived from research activities associated with the MCZ.</p> | <p>Monitoring of the MCZ will help to inform understanding of how the marine environment is changing and is impacted on by anthropogenic pressures and management interventions. Other research benefits are unknown.</p> | <p>Anticipated direction of change:</p> <p style="text-align: center;">↑</p> <p>Confidence: High</p> |

⁴⁵ 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.

| Table 5. Research and education | | rMCZ NG 13a, AIn Estuary |
|---|---|--|
| <p>Education: Fletcher and others (2011) identify that the features to be protected by the MCZ can contribute to the delivery of education services.</p> <p>The extent of current educational activity carried out in the site is unknown. It has not been possible to estimate the value derived from education activities associated with the MCZ.</p> | <p>Designation may aid additional local (to the MCZ) provision of education (e.g. events and interpretation boards), from which visitors would derive benefit.</p> <p>Non-visitors may benefit if the MCZ contributes to wider provision of education (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools).</p> | <p>Anticipated direction of change:</p> <p style="text-align: center;"></p> <p>Confidence: Moderate</p> |

Regulating services

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

2.3.45 Benthic biomass production is linked to rates of carbon sequestration (Austen and others, 2009; Cooper and others, 2010). Management of MCZs is likely to involve reducing human activities, such as bottom trawling, that reduce levels of benthic biomass. This may lead to a resultant net increase in the rate of carbon sequestration (relative to the baseline). 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).

2.3.46 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 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 (Beaumont and others, 2006; Fletcher and others, 2012; Austen and others, 2011.)

2.3.47 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.

2.3.48 These benefits are likely to be higher under option 1 compared to option 2 at this stage as more sites are proposed for designation (see paras 2.3.59 to 2.3.61 for further comparison on benefits between the options).

2.3.49 Table 6 below demonstrates an example of how sites at an individual level have been assessed to contribute to benefits for regulating services. This site has been proposed for designation under option 1 and 2.

| Table 6. Regulating services | | rMCZ 26, Hythe Bay |
|---|--|--------------------|
| Baseline | Beneficial impact | |
| <p>Regulation of pollution: The features of the site contribute to the bioremediation of waste (subtidal sediments and mud habitats in deep water) and sequestration of carbon (subtidal sediments) (Fletcher and others, 2011).</p> | <p>If the conservation objectives of the features are achieved, all of the features (subtidal mud, mud habitats in deep water and seapens and burrowing megafauna) will be recovered to favourable</p> | |

| | |
|--|---|
| <p>Environmental resilience: The features of the site are not known to contribute to resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).</p> <p>Natural hazard protection: The features of the site are not known to contribute to local flood and storm protection (Fletcher and others, 2011).</p> <p>It has not been possible to estimate the value derived from regulating services associated with the MCZ.</p> | <p>condition.</p> <p>Recovery of all the features and a potential reduction in the use of bottom towed fishing gear may increase the site's benthic biodiversity and biomass, improving the regulating capacity its habitats.</p> <p>Designating the MCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities.</p> |
|--|---|

Non-use values

2.3.50 Many people 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).

2.3.51 A significant proportion of the total value derived from MCZs may be non-use value⁴⁶. 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 MCZs⁴⁷. These estimates include both non-use and use values; although McVittie and Moran (2008) estimate that a high proportion will be non-use value.

2.3.52 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)⁴⁸.

2.3.53 The Your Seas Your Voice campaign⁴⁹ (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.

2.3.54 All the benefits described above will be realised under both options, however the extent of benefits are likely to be lower under option 2 since it will not deliver a full network. Look at paras 2.3.59 to 2.3.61 for further discussion on difference in benefits between option 1 and 2.

2.3.55 Table 7 below demonstrates an example of how sites at an individual level have been assessed to contribute to benefits for non-use and option values. This site has been proposed for designation under option 1 and 2.

| Table 7. Non-use and option values | | rMCZ The Canyons |
|------------------------------------|-------------------|------------------|
| Baseline | Beneficial impact | |

⁴⁶ 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).

⁴⁷ 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.

⁴⁸ These opinions may include both use and non-use sentiments.

⁴⁹ 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.

| Table 7. Non-use and option values | | rMCZ The Canyons |
|--|--|--|
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the recommended Marine Conservation Zone and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the MCZ. | The MCZ will benefit the proportion of the UK population that values conservation of the MCZ features and its contribution to an ecologically coherent network of Marine Protected Areas. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The MCZ will recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and the risk of future degradation. | Anticipated direction of change:  Confidence: Moderate |

2.3.56 To strengthen our long term approach to valuing benefits from the marine environment further research work has been commissioned - Valuing ecosystem services in the context of the marine environment.

2.3.57 The sites proposed for designation in 2013 will provide benefits to the range of ecosystem services listed above, and will provide a portion of the benefits of the complete recommended network.

2.3.58 Although Policy Option 1 would realise network benefits more quickly, the uncertainty around the presence, extent and condition of some features within some sites could result in a worse long term outcome: through unnecessary designation of sites where the designated feature turns out to be absent or through failure to extend protection to an intended feature. Undertaking Policy Option 2 – designating sites where confidence in the feature exists - will in the long term facilitate a more efficient and effective realisation of the full benefits described, and be consistent with the core principle of evidence-based policy making.

Comparison of benefits between the options

2.3.59 As indicated in the sections above, within any accurately designated site both options will provide similar benefits in terms of provisioning, regulating and recreational services. There are a number of factors that will influence the level of benefits under the two options:

- Scale of protection – The scale and extent of protection under option 1 is greater than option 2 (just over three times in terms of area). Option 1 has 200 conservation objectives of recover, 127 more than option 2, which has a total of 73. This implies that the level of additional benefits (ecosystem services) will be higher under option 1 compared to option 2.
- Certainty of features – Under option 1 there is low certainty on the presence, extent and appropriateness of conservation objectives for a majority of sites. On balance, some low confidence features may not actually be present so some of the benefits described above may not be achieved at a site level. Option 2 only includes sites that have moderate to high certainty that the features exists, except in certain circumstances for features at high risk of damage or deterioration. This means that for individual sites there is higher certainty of achieving the benefits under option 2 compared to option 1.

2.3.60 Option 1 is likely to secure benefits of a network along with other MPAs by meeting criteria of the network design principles to achieve an ecologically coherent network, e.g. connectivity, adequacy and representativity etc. Such benefits will not be realised in full with 31 sites being designated under option 2 as the network is not complete. These network benefits will not be achieved until further sites are designated in future tranches. The risk that some features may be lost or seriously damaged by a delay in designating is being mitigated in some instances by using the precautionary principle for data-poor sites that are is deemed “high risk”.

2.3.61 To summarise, option 1 is likely to give higher immediate benefits compared to option 2. However, there is less certainty of achieving individual site benefits under option 1 and it is also likely to lead to lower benefits than Option 2 together with further tranches of well-evidenced sites. It has not been possible to quantify the benefits but these benefits are potentially high for recreational, regulating and cultural services⁵⁰. Defra is in the process of commissioning research that will look to understand the extent of non use benefits, regulating services benefits and recreational benefits from designating these sites⁵¹. As more relevant evidence becomes available revisions will be made to the benefits presented in the Final Impact Assessment.

3 Baseline and summary of the costs of Policy Option 1, the suite of rMCZs and Policy Option 2 (the proposed sites for designation in 2013)

3.1 About this section

3.1.1 This section describes the following:

3.1.2 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 management⁵².

3.1.3 Section 3.2 presents a summary of the anticipated impacts on human activities resulting from the designation and management of rMCZs under both policy options⁵³, assessed relative to the baseline. This primarily describes costs however where benefits are expected to arise, these are also described.

3.1.4 Section 3.3 presents costs of surveys, management measures and consultation with stakeholders.

3.1.5 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. Where known anticipated future trends in activities are described. In the absence of data on trends, current levels of activities are used in the baseline (and impacts are assessed relative to these).

3.1.6 The IA mostly assesses impacts on UK economic welfare in terms of the impact on gross value added (GVA)⁵⁴, as insufficient data were available to calculate impacts via changes to 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 what additional management will be implemented, 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.

3.1.7 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.

⁵⁰Beaumont et al (2008) and Clarkson (2002) identifies the economic value to of regulating services to UK £420m to £8.5bn. Though this value is for all of UK seas rather than the features that the MCZs protects, it indicates that these benefits from designating MCZs are likely to be high.

⁵¹ <http://www.defra.gov.uk/evidence/funding/competitions/>

⁵² 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.

⁵³ 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.

⁵⁴ GVA measures the contribution to the economy of each sector.

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 extraction⁵⁵ 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.

3.2.2 For option 1 In the Balanced Seas project area, 13 production licences and three applications for new licensed areas are within 1km of recommended MCZs (rMCZs 16, 17, 22, 28, 29, and 29.2 and rMCZ Reference Area 13). In the Net Gain project area, four 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. 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.

3.2.3 For Option 2 in the Balanced Seas project area, three production licences and two applications for new licensed areas are within 1km of recommended MCZ 16 Kingmere. Neither the Finding Sanctuary, the Net Gain nor the Irish Sea Conservation Zones project areas have any production, application or option areas within 1km of any rMCZs. No rMCZs in Option 2 overlap with or are in close proximity to any strategic resource areas.

Key Assumptions underpinning costs

3.2.4 For each option, 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.

3.2.5 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. This is the best estimate of impact. This is because Natural England has advised that these are the additional costs that are most likely to be incurred (Natural England, pers. comm. 2011). Also BMAPA is content for the low cost estimate to be used as the best estimate (BMAPA, pers. comm., 2012).

3.2.6 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 70 production areas in the MCZ Project area. 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 for strategic resource areas (The Crown Estate, feedback on draft IA material, 2011) will be submitted in 2028. It is assumed that the capacity of existing resources will be sufficient at least until this time (based on advice of Natural England, pers. comm., 2011). The high cost scenario also assumes that costs will arise from mitigation of impacts on features in two rMCZs in Balanced Seas. These are rMCZ 28 Reference Area 13 (North Utopia) and rMCZ 16 (Kingmere). Both of these sites are in Option 1, but only rMCZ 16 (Kingmere) is in Option 2.

3.2.7 Both scenarios also assume an additional one-off average cost of £0.027m in each future licence application (based on information provided by BMAPA, pers. comm., 2011). It is assumed that BMAPA will also incur a cost of £0.010m/yr to provide information that all operators can use for these assessments.

3.2.8 The impacts for both policy options over the 20 years covered by the IA are set out in Table 8.

⁵⁵ Aggregates are mixtures of sand, gravel, crushed rock or other bulk minerals used in construction, principally as a component of concrete, and in civil engineering. Today, approximately 20 per cent of the sand and gravel used in England and Wales is supplied by the marine aggregates industry. Definition taken from: <http://www.thecrownestate.co.uk/marine/aggregates/>

Table 8: Assumptions and costs for the aggregates sector

| | Policy Option 1 | | Policy Option 2 | |
|---|--|--|--|--|
| | Low cost and Best Estimate (Scenario 1)* | High cost (Scenario 2) | Low cost and Best Estimate (Scenario 1)* | High cost (Scenario 2) |
| Number of future licence applications over 20-year period of the IA | 32 within 1km of rMCZ | 157 ^a | 5 within 1km of rMCZ | 140 ^b |
| Number of existing production, application and prospecting licensed areas; and strategic resource areas | 25* within 1km of rMCZ | 70 in entire MCZ project area and 14 strategic resource areas in close proximity to rMCZs. | 5* within 1km of rMCZ 16 (Kingmere) | 70 in entire MCZ project area . No strategic resource areas in close proximity to rMCZs. |
| Total costs (annual per year £m/yr) | 0.04 | 2.7 | 0.01 | 1.03 |
| Total costs (present value in £m) | 0.6 | 38.8 | 0.17 | 14.9 |

* These are number of applications within 1km of MCZs

^a Two for each of the 70 existing production licence areas in the MCZ project area irrespective of distance from an rMCZ) and 17 (related to strategic resource areas in close proximity to rMCZs).

^b Two for each of the 70 existing production licence areas in the MCZ project area irrespective of distance from an rMCZ)No strategic resource areas in close proximity to rMCZs.

Limitations

- The additional mitigation of impacts of aggregate extraction on features protected by MCZs is not yet known as it will be determined in future licensing decisions. The 'best estimate' may under estimate or over estimate the costs of the mitigation of impacts that will be required.
- It is not known whether mitigation of impacts will be needed for future aggregate extraction from strategic resource areas or what form this mitigation would take. The costs of this could be potentially significant.
- The additional cost of assessing impacts on MCZ features for future licence applications may differ depending on the nature of the aggregate extraction activity and the MCZ in question. Consequently, the 'best estimate' may under or over estimate average cost per licence (for example for a proposal that needs to consider impacts on more than one MCZ).
- In the high cost scenario the costs of sourcing aggregate supplies from an

| |
|---|
| alternative source do not include the full costs to the operator. |
|---|

Option 1

3.2.9 In addition to increased costs in future licence applications, 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.

3.2.10 A three-month closure of marine aggregate extraction during the period that black bream *Spondyliosoma cantharus* nest in the rMCZ has been offered as a potential mitigation plan offered by operators to mitigate impacts on features of rMCZ 16 (Kingmere) in the Balanced Seas project area (BMAPA, pers. comm., 2011). The IA assumes that the three-month closure would be applied to the full 15-year term and for subsequent years if the licence is renewed. The low cost scenario assumes that no costs are incurred as a result of the three month closure to aggregate extraction 16 in the same project area. The low cost scenario is assumed to be the most likely and is therefore taken as the best estimate of the impacts of MCZs on the aggregate extraction sector; BMAPA is content with this (pers. comm., 2012). Over the IA's 20-year timeframe the low cost scenario costs are estimated to have a present value of £0.6m (which is also the best estimate).

3.2.11 The high cost scenario assumes that the three month closure offered by operators of adjacent licensed areas (453 and 448) to mitigate impacts on Balanced Seas rMCZ 16 (Kingmere) does result in additional costs, assuming that there are no nearby suitable substitute resources. It also assumes that additional costs are incurred to close licence area 395 to extraction in order to mitigate impacts on features in Balanced Seas rMCZ Reference Area 13 (North Utopia). More details on these costs can be found in the individual site summaries in Annex I and in Annex H2. Over the IA's 20-year timeframe the high cost scenario costs are estimated to have a present value of £38.8m.

Option 2

3.2.12 The low cost scenario for Option 2 assumes that additional costs are incurred to three existing production licences and two new application licences to assess impacts on features in rMCZ 16 Kingmere in Balanced Seas. No other rMCZs in Option 2 are anticipated to incur costs to the aggregate extraction sector in the low cost scenario. The high cost scenario assumes that additional costs will be incurred due to the three month closure offered by operators of adjacent licensed areas (453 and 448) to mitigate impacts on Balanced Seas rMCZ 16 (Kingmere). Over the IA's 20-year timeframe the low cost scenario costs are estimated to have a present value of £0.17m (which is also the best estimate).

3.2.13 The high cost scenario for Option 2 assumes that all 70 existing future production areas will incur additional costs to assess impacts on features protected by rMCZs. This is the same assumption as for Option 1, even though Option 2 comprises a lower number of rMCZs. This is because the rMCZs in Option 2 are spread across all four project areas and BMAPA anticipates that these costs will arise even for licence renewals for areas that are some distance from an MCZ (BMAPA, pers. comm., 2012). However, there are no strategic resource areas within 1km of the rMCZs in Option 2 and hence it is assumed that no additional costs will be incurred to future licence applications for these areas. Over the IA's 20-year timeframe the high cost scenario costs are estimated to have a present value of £14.9m.

Aquaculture

Baseline

3.2.14 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

3.2.15 Costs and assumptions are summarised in the table 9 below

Table 9: Costs and assumptions for the aquaculture sector

| | Option 1 | | | Option 2 |
|------------------------------------|--|---------------|---------------------------|--|
| | Low scenario | High Scenario | Best estimate (mid point) | No costs under this option as none of the rMCZs proposed for designation in 2013 have aquaculture businesses |
| Assumptions on Management scenario | No additional management measure required under the low cost scenario High costs management scenario assumes use of Triploid stock The best estimate is the mid point of the two scenarios. | | | |
| Total costs (annual costs £m/yr) | No additional costs | 0.3 | 0.14 | |
| Total costs (present value £m) | No additional costs | 3.96 | 1.98 | |
| Limitations | <ul style="list-style-type: none"> • Uncertainty over the likely management scenarios results in significantly different magnitudes of impacts. The 'best estimate' may under or overstate the true impact. • The conversion of affected revenue to GVA based on information for the whole UK shellfish and finfish marine aquaculture sector is crude and does not take into account regional variation, or differing relative economic contribution of cultivators of different species and business sizes. As such, the estimates of impact on GVA may underestimate or overestimate the true value. • Insufficient information was obtained to be able to assess any potential reduction in the impacts that may result from operators switching to other species in response to the impacts of MCZs. As such, the costs calculated are likely to be overestimated. | | | |

Option 1

3.2.16 Two management scenarios (i.e. no additional management and compulsory use of triploid stock for Pacific Oyster cultivation) have been considered which reflect the uncertainty about the need for Pacific oyster cultivators to use triploid rather than diploid stock^{56,57}. Under the low cost management scenario, no additional management is anticipated and as such there are no anticipated costs. There are only costs associated with 3 rMCZs in the Finding Sanctuary project area⁵⁸.

3.2.17 The high cost management scenario assumes use of triploid seed stock rather than diploid seed stock is required to reduce the risk of wild settlement of Pacific oysters in the rMCZs, as these are invasive non-native species in south-west England. 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 £0.5m/yr. It is estimated that

⁵⁶ 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.

⁵⁷ 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.

⁵⁸ The Pacific oyster was introduced to the Balanced Seas Project Area through aquaculture and now occurs in many locations as stand-alone, wild, viable populations (Balanced Seas vulnerability assessment, 2011). The widespread distribution of the Pacific oyster, and the fact that it is now prolific and well established, means methods other than the compulsory use of triploid stock have been more appropriate in this region, and it has not, therefore, been considered as a potential mitigation measure (Balanced Seas vulnerability assessment, 2011). As such, no management scenarios have been adopted for Pacific oyster cultivators in the south-east. In the other regional project areas – Irish Sea Conservation Zone and Net Gain – Pacific oyster cultivation does not take place in the vicinity of rMCZs.

this would result in a reduction in UK GVA of approximately £0.28/yr (based on 2010 data), equivalent to approximately 9% of UK Pacific oyster cultivation GVA and 2% of UK shellfish cultivation GVA.

3.2.18 Over the IA's 20-year timeframe the high cost scenario costs are estimated to have a present value of £4m; 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 £2m.

Option 2

3.2.19 None of the 3 rMCZs which may require mitigation are proposed for designation in 2013 as part of Option 2, so no costs to aquaculture are expected as part of this option.

Archaeological heritage

Baseline

3.2.20 In option 1 there is evidence of archaeological features in or adjacent to 109 rMCZs in of which 38 are rMCZ Reference Areas (Balanced Seas: 41; Finding Sanctuary: 31; Irish Seas Conservation Zones: 22; Net Gain: 15). This corrects an error in the MCZ Impact Assessment (published 18th July 2012) and is updated with regard to new evidence of archaeology in rMCZs 3, 4 and 5 in the Irish Sea Conservation Zones project area provided by CADW (2012). 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.

3.2.21 In option 2 there is evidence of archaeological features in or adjacent to 24 rMCZs (none are Reference Areas). The number of rMCZs in each project area is broken down as follows: Balanced Seas: 9; Finding Sanctuary: 10; Irish Seas Conservation Zones: 4; Net Gain: 1.

Costs

Option 1

3.2.22 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 38 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'.

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

3.2.24 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.

3.2.25 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. 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).

3.2.26 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.

3.2.27 Evidence of archaeological heritage currently only exists in 109 rMCZs (see Annex I). It is assumed that licence applications are more likely to come forward for the 109 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.

Option 2

3.2.28 For Option 2, evidence of archaeological heritage currently only exists in 23 of rMCZs. However no Reference Areas are included in this option. Therefore, no costs are anticipated to be borne to archaeological heritage in Option 2. However, 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.

Cables (interconnectors and telecom cables)

Baseline

3.2.29 There are numerous existing power and telecommunication cables passing through rMCZs. The greatest concentration of existing cables is in the Finding Sanctuary project area (the landing point of most transatlantic cables). However, there are no known existing operational cables and no known planned cable installations within any rMCZ Reference Areas. 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 (see Annex H6 for more information). As it is not known where future power and telecommunication cables will be proposed, it is not possible to provide site-specific baselines in Annex I and indeed to know, to what degree the same costs would be incurred by rMCZs in Option 2. However, as costs are anticipated to be lower in Option 2, as there are fewer sites, the costs (and applications) are scaled down using the same proportion, as the number of inshore rMCZs in Option 2 compared to Option 1.

Costs

3.2.30 The costs and assumption for the two options are summarised in the table 10 below

Table 10: Costs and assumptions for the cables sector

| | Option 1 | | | Option 2 | | |
|------------------------------------|--|---------------|---|--------------|---------------|---|
| | Low scenario | High scenario | Best estimate (mid-point of high and low) | Low scenario | High scenario | Best estimate (mid-point of high and low) |
| Assumptions | <ul style="list-style-type: none"> Existing or operational cables will not be impacted upon by rMCZs. Licence decisions regarding currently submitted applications will not incur any additional cost. Cable operators will incur an additional cost for future licence applications for cables Costs of each cable proposal to consider its impact upon MCZ features is estimated to be £0.010m per licence. For option 2 it has been assumed that there is a proportionate reduction in the likelihood that a cable will be proposed in the Option 2 area over the 20-year period of the IA | | | | | |
| Total costs (annual costs in m/yr) | 0.004 | 0.01m | 0.008 | 0.001 | 0.003 | 0.002 |

| | | | | | | |
|-----------------------------------|---|--------|--------|--------|--------|--------|
| Total costs (present value in £m) | £0.05m | £0.16m | £0.11m | £0.01m | £0.04m | £0.03m |
| Limitations | <ul style="list-style-type: none"> In the absence of information about future proposals for cable installation over the next 20 years, the assumptions may wrongly represent the actual number of future proposals for cable installation and the mitigation of impacts that will be required to protect the MCZ features. While it is assumed that cables outside 12nm are not required to mitigate impact on MCZ features (due to the United Nations Convention on the Law of the Sea), if a regulator consented to a cable within 12nm that then also impacted on MCZ features outside 12nm, the regulator may be in breach of its duties under the Marine and Coastal Access Act 2009. Due to this uncertainty it has not been possible to quantify this possible impact in the IA. | | | | | |

Option 1

3.2.31 The annual cost to the sector is £0.004m/yr to £0.012m/yr. The present value of the cost to the sector for Option 1 is estimated to be £0.05m to £0.16m over the 20-year period of the IA. The low cost and high cost estimate assumes 8 and 24 licence applications will come forward for proposed cable routes in the MCZ project area respectively. 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 £0.11m (present value) over the 20-year period of the IA.

3.2.32 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.

Option 2

3.2.33 Given the lower number of MCZs in Option 2, the IA assumes that there is a proportionate reduction in the likelihood that a cable will be proposed in the Option 2 area over the 20-year period of the IA. Of the 99 inshore MCZs considered in Option 1 26 inshore sites are proposed to be designated as part of Option 2. Under Option 2 the cost to the sector is estimates to be between £0.001/yr and £0.003m/yr. The present value of the cost to the sector is estimated at £0.01m to £0.04m over the 20-year period, with a best estimate of £0.03m.

Coastal development (excluding port and harbour development)

Baseline

3.2.34 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 (Thames Estuary rMCZ 5) and Bradwell Nuclear Power Station (Blackwater, Crouch, Roach and Colne 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

Option 1

3.2.35 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).

Option 2

3.2.36 Balanced Seas rMCZ 3 is proposed for designation in 2013 as part of Option 2 and the possible future costs for that site apply equally to both options. However Balanced Seas rMCZ 5 is not proposed for designation in 2013.

Commercial fisheries

3.2.37 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

3.2.38 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).

3.2.39 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

Key Assumptions

3.2.40 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 costs to fisheries are measured using Gross Value Added (GVA)⁵⁹, though the impact in terms of landings is also presented. The best estimate of the value of landings and GVA affected is 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',

⁵⁹ In the absence of data to calculate producer and consumer surplus affected (measures used for cost benefit analysis), we look at GVA as the best measure available to estimate costs to industry.

- 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'.

3.2.41 When fishing activity is restricted within a site, the value of that activity to the economy will not always be lost as fishers may be able to fish elsewhere, so that the activity is displaced to another fishing site. It is difficult to predict how behaviour will change in response to a closure and therefore to estimate displacement (for more information see Annex H7)

3.2.42 To assess the likelihood that activity in MCZs is displaced rather than lost, we have analysed the level of overlap between MCZs and core fishing grounds. Fishing grounds are often comprised of intensively fished core areas that account for the majority of fishing effort or value and the less frequently fished margins. If MCZs fall within core grounds, it is less likely that displacement will be possible and this activity is more likely to be lost.

3.2.43 Table 11: Percentage of overlap between MCZs and core fishing grounds

| Gear type | Overlap between inshore MCZs and core grounds (%) | Gear type | Overlap between offshore MCZs and core grounds (%) |
|------------------|---|------------------|--|
| Beam trawls | 1.1 | Trawls | 9.1 |
| Dredges | 1.5 | Dredges | 10.2 |
| Gill nets | 4.2 | Nets | 13.7 |
| Otter trawls | 0.7 | Pots | 19.6 |
| Pots | 5.0 | Lines | 4.8 |
| Seine nets | 1.6 | | |
| Non UK | 7.6 | | |

3.2.44 This analysis suggests that many of the landings are likely to be displaced rather than lost as the overlaps are relatively low. Although this means that the value is not lost, it may cause other costs. For example, 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.

3.2.45 Because it is not possible to model displacement in more detail, the best estimate of the cost uses a generic assumption that 75% of value from fishing will be displaced (and hence recovered from fishing elsewhere), with 25% landings lost (implying costs to industry). For both option 1 and 2⁶⁰ the low and best estimate costs take account of the displacement assumption. However, for both options the high cost estimate illustrates the costs to fishing if there is no displacement. Where a rMCZ is less likely to allow for displacement than on average, this is indicated qualitatively in Annex I.

Key Limitations

- The range of management scenarios used for any particular rMCZ and gear type is large. It has not been possible to obtain advice on the most likely management scenario. In many instances, the upper or lower cost estimates for the range of management may significantly overestimate or underestimate the true cost after designation.
- The assumptions of displacement is generic for all sites while in reality this is likely to differ across sites. These assumptions will be tested during consultation.
- Towards the end of the process, SNCB recommended change in conservative objectives for some sites⁶¹. However, due to time lag in providing the advice the impacts on costs could not be updated to reflect this change in the regional project's impact assessment and hence not been reflected under option 1. Under option 2, these costs have been updated for sites to reflect the recent change in advice. If a site in Option 1 is proposed for designation in the future it will be subject to a new Impact Assessment and this change in conservation objective would be undertaken at that point.

⁶⁰ Due to displacement assumption the costs presented under option 1 differ from the estimates in the regional project Impact Assessment.

⁶¹ Section 4.2 of SNCB advice. <http://publications.naturalengland.org.uk/publication/2030218?category=1723382>

- In some sites in Option 2 not all features are being proposed for immediate designation in 2013. However, the individual site impact assessments still present the impacts from all the features proposed by the Regional Projects because these features will be designated once further evidence collection work is completed to improve the certainty around presence, extent and confidence in conservation objective.

3.2.46 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.

Option 1

3.2.47 The value of landings affected by management for MCZs is estimated to range from £0.6m/yr to £15.7m/yr, depending on the stringency of the restrictions implemented in each site. This is estimated to result in a loss of GVA of between £0.26m/yr and £7m/yr (Table 12). Depending on the restrictions implemented in each site, between 54 and 103 rMCZs are expected to have an impact of £0.001m/yr or more 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 £1m/yr: Net Gain rMCZ NG 9 (£2.8m/yr); Balanced Seas rMCZ 14 (£1m/yr); and Irish Seas Conservation Zones rMCZs 1 (£1.1m/yr) and 6 (£1.05m/yr). No Finding Sanctuary rMCZs have impacts over £1m/yr. The best estimate is that rMCZs will affect £2m/yr of UK vessel landings and £0.9m/yr of UK GVA (1.09% of total UK vessel GVA in 2010⁶²). Over the 20-year timeframe of the IA, the best estimate of present value for value of landings and GVA affected is £28.2m and £12.3m respectively.

Option 2

3.2.48 The value of landings affected by management for MCZs is estimated to range from £0.01m/yr to £4.4m/yr, depending on the stringency of the restrictions implemented in each site. This is estimated to result in a loss of GVA of between 0.01m/yr to 2.04m/yr (Table 13). Depending on the restrictions implemented in each site, between 4 and 25 rMCZs are expected to have an impact of £0.001m/yr or more on landings for an individual category of gear type. Under the highest cost scenario, there are two rMCZs that are anticipated to affect a total value of landings which is greater than £1m/yr – rMCZ 3 Blackwater, Crouch, Roach & Colne and Skerries Bank and Surrounds. The best estimate is that rMCZs will affect £0.45 m/yr of UK vessel landings and £0.21m/yr of UK GVA (0.07% of total UK vessels GVA in 2010). Over the 20-year timeframe of the IA, the best estimate of present value for value of landings and GVA affected is £6.4m and £3m respectively.

⁶² UK GVA data is provided in Annex D.

Table 12 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 for Option 1.

| 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 | 4.12 | 1.95 | 18 | 0.14 | 0.07 | 43 | 2.05 | 0.97 | 43 | 0.34 | 0.16 |
| Bottom trawl | 8.79 | 3.51 | 29 | 0.35 | 0.14 | 77 | 7.47 | 3.02 | 75 | 1.11 | 0.45 |
| Mid-water trawl | 1.22 | 0.68 | 2 | 0.01 | 0.007 | 4 | 0.06 | 0.04 | 4 | 0.01 | 0.01 |
| Pots & traps | 8.21 | 3.97 | 17 | 0.05 | 0.03 | 52 | 4.17 | 2.02 | 50 | 0.34 | 0.16 |
| Nets | 2.19 | 0.97 | 9 | 0.02 | 0.01 | 46 | 1.56 | 0.69 | 43 | 0.15 | 0.07 |
| Hooks & lines | 0.43 | 0.26 | 3 | 0.01 | 0.01 | 29 | 0.24 | 0.14 | 20 | 0.02 | 0.01 |
| Hand collection | 0.19 | 0.09 | 6 | 0.01 | 0.01 | 9 | 0.19 | 0.09 | 8 | 0.02 | 0.01 |
| Total | 25 | 11 | 54 | 0.6 | 0.260 | 103 | 15.7 | 7 | 102 | 2 | 0.9 |

Table 13 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 for Option 2.

| 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 | 2.10 | 0.94 | 2 | 0.00 | 0.00 | 13 | 1.91 | 0.91 | 13 | 0.24 | 0.11 |
| Bottom trawl | 1.18 | 0.32 | 4 | 0.01 | 0.00 | 23 | 0.65 | 0.26 | 21 | 0.08 | 0.03 |
| Mid-water trawl | 0.21 | 0.24 | 0 | 0.00 | 0.00 | 1 | 0.00 | 0.00 | 1 | 0.00 | 0.00 |
| Pots & traps | 2.80 | 1.10 | 0 | 0.00 | 0.00 | 11 | 1.23 | 0.60 | 11 | 0.09 | 0.04 |
| Nets | 0.55 | 0.24 | 0 | 0.00 | 0.00 | 13 | 0.42 | 0.19 | 11 | 0.04 | 0.02 |
| Hooks & lines | 0.12 | 0.07 | 0 | 0.00 | 0.00 | 8 | 0.10 | 0.06 | 5 | 0.01 | 0.00 |
| Hand collection | 0.07 | 0.03 | 0 | 0.00 | 0.00 | 2 | 0.06 | 0.03 | 1 | 0.00 | 0.00 |
| Total | 7.04 | 2.94 | 4 | 0.01 | 0.005 | 25 | 4.4 | 2.04 | 24 | 0.45 | 0.21 |

Notes to table 12 and 13 - 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 so the total number of sites may be less than summing the total by gear type. Totals may not sum due to rounding. Number of sites is equal to or greater than a rounded figure of £0.001m. Further details are provided in Annexes I and N. The Balanced Seas RSG developed two alternative shapes for rMCZ 29 - presented as rMCZ 29 and rMCZ 29.2. rMCZ 29.2 includes only the easternmost half of rMCZ 29. The baseline and high cost scenario values are those for the larger rMCZ 29. The lowest cost scenario includes the values from the smaller rMCZ 29.2. The best estimate is an average of the values for the two alternative rMCZ shapes. For more details on the Balanced Seas network and rMCZs 29 and 29.2 please refer to the Annex F regional summary. Differences in total values in the tables are due to rounding.

Table 14: Comparisons gear types across regions

| Gear Types | Balance Seas | | Fishing Sanctuary | | Irish Seas | | Net Gain | | Total | |
|-----------------|---------------------------|----------|--------------------------|--------------------|--------------------------|----------|--------------------------|----------|----------|----------|
| | Best estimate (GVA, m/yr) | | Best estimate (GVA,m/yr) | | Best estimate (GVA,m/yr) | | Best estimate (GVA,m/yr) | | | |
| | Option 1 | Option 2 | Option 1 | Option 2 | Option 1 | Option 2 | Option 1 | Option 2 | Option 1 | Option 2 |
| Dredge | 0.13 | 0.11 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.16 | 0.11 |
| Bottom Trawl | 0.15 | 0.01 | 0.04 | 0.01 | 0.22 | 0.00 | 0.04 | 0.01 | 0.45 | 0.03 |
| Mid-water Trawl | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| Pots & Traps | 0.04 | 0.01 | 0.02 | 0.03 ⁶³ | 0.01 | 0.00 | 0.09 | 0.00 | 0.16 | 0.04 |
| Nets | 0.05 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.02 |
| Hooks & Lines | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| Coll. by Hand | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |

⁶³ In this instance the costs for the fewer sites in option 2 are higher than for the greater number of sites in option 1. This is because there has been a change in conservation objective for one site under Option 2 which increases the costs. These changes were not reflected in option 1 (as changes were only made to option 2 sites) (please see 3rd bullet under key limitations in commercial fisheries section)

3.2.49 Table 14 provides a summary comparison of all the costs across various gear types.

3.2.50 For Option 1 the main impacts are on bottom trawling (0.45m/yr) and dredging (0.16m/yr). Dredges and bottom trawling costs are mainly concentrated in the Balanced Seas and Irish Sea region. 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). Under high costs scenario, a value of landings for bottom trawlers of greater than £1m/yr is affected for two sites in the Irish Sea Conservation Zones project area (rMCZs 1 and 6). For Option 2 the greatest cost impacts are expected to be for dredges. Over half of this cost is attributed to the Balance Seas project area, in particular region and most costs are accrued to one site: rMCZ3 Blackwater, Crouch, Roach and Colne.

3.2.51 Pots and traps are also seen to have high impacts compared to other gear types (0.16m/yr in Option 1 and 0.04m/yr in option 2). For option 1 the impacts on pots and traps are highest in the Net Gain region. Under the high cost scenario, Net Gain rMCZs account for 67% of the total value of pots and traps landings affected under this scenario, with £2.802m/yr arising from rMCZ NG 9 alone. If this management scenario was in place it would impact on businesses based in Bridlington (Britain's most important shellfish port, and Europe's most important lobster port in terms of landings), and would 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 could affect the viability of affected individual vessels that concentrate their effort within individual rMCZs. Under option 2, impacts on pots and traps are low with the the most impacted site being rMCZ Kingmere, with landings affected of up to £0.133m/yr under the high scenario.

3.2.52 As shown in table 14 the impacts on the rest of the gears are significantly lower. Under the high scenario costs for option 1, the most significant impact from an individual site is from rMCZ 13.1 Beachy Head East which is not being proposed for designation in 2013 in option 2 which affects pots and traps landings of £0.206m/yr. For pots and traps Kingmere is the highest impacted site (best estimate GVA affected is 0.008m/yr). Impacts on hooks and lines are significantly low for both options.

3.2.53 Compared with the other gear types, impacts of rMCZs on collection by hand are relatively low in terms of value of landings affected. 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. However, rMCZs in the ISCZ project area do not overlap with the main cockle and mussel areas in Morecambe Bay and the Ribble Estuary. When taking account of displacement the best estimate of GVA affected under Option 2 is negligible.

3.2.54 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. Impacts under both option 1 and 2 are negligible.

Non-UK fleets

Baseline

3.2.55 The headline figures in the IA only consider impacts on UK fleets. However, Non-UK fleets fish in offshore waters (outside 12nm) and 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.

3.2.56 Values of landings for non-UK fleets arising from within the suite of rMCZs were provided to the regional MCZ projects only for French fleets, and these data are separated into two categories only, mobile and static gears. The estimated average value of landings between 2008 and 2009 for French vessels from the suite of rMCZs is £10.2m/yr; of this £9.5m/yr is from mobile gear (dredges and bottom trawls) and £0.6m/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

Option 1

3.2.57 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. More information on the impacts on foreign fleets can be found in Annex I.

3.2.58 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.

3.2.59 The value of landing affected is provided in the table below (based on data provided by Direction des Pêches Maritimes et de l'Aquaculture, pers. comm., 2012):

| | High (landings affected £m/yr) | Low (landings affected £ m/yr) | Best estimate (landings affected £ m/yr) |
|------------|--------------------------------|--------------------------------|--|
| Option 1** | 9.9* | 0.06 | 1.3 |
| Option 2 | 0.9 | 0 | 0.11 |

* The greatest impact arising in rMCZs in the Finding Sanctuary and Balanced Sea project areas (75% and 24% respectively)

** 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

3.2.60 The impact of Option 2 on foreign fishing will be greatly reduced from the impact of Option 1 as due consideration has been given to the estimated impacts on foreign fleets, using available quantitative and qualitative information. These estimates use the same assumptions about displacement as the analysis of impacts on UK commercial fishing. However, it should be noted that this is an estimate of

landings affected and therefore the GVA affected will be less than this. More information is provided in Annex I.

3.2.61 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, while costed values derived from impacts to UK fleets only are used to inform Government's decision making, due consideration has also been given to the impacts on non-UK fleets.

Other impacts of closure of rMCZs to commercial fisheries

3.2.62 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. Information was gathered through interviews with fleet representatives and from RSG members and Named Consultative Stakeholders during the iterative recommendation process.

3.2.63 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 cumulative impacts of proposed fisheries management could have particularly significant effects on the Bridlington fleet and other Yorkshire fleets.

3.2.64 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, 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 switching to 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.

3.2.65 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

3.2.66 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 aims to create sustainable defences by creating new defences further inland and allowing the existing defence line to breach resulting in inter-tidal habitat creation; '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

Option 1

3.2.67 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.

3.2.68 There is a possibility that flood and coastal erosion risk management (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 will be 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).

3.2.69 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 do arise. The costs are assumed to be 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 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.

3.2.70 It is anticipated that all other rMCZs are currently 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.

Option 2

3.2.72 The smaller tranche proposed for 2013 means that additional costs for future licence applications will be lower. None of the 4 sites where it might not be possible to mitigate impacts on features because of the need to deliver the SMP policy are proposed for designation in 2013, so the significant unknown cost will not occur under Option 2. For future designation of MCZs such qualitative costs will be kept in mind to inform the decision making.

3.2.73 Beachy Head West is proposed to be designated in 2013, therefore it is assumed that the one-off cost for additional monitoring described above will also occur in Option 2 (although Beachy Head East is not part of Option 2). Please see the method paper for more detail.

National defence

Baseline

3.2.74 National defence activities are known to take place within 71 rMCZs, of which 18 are rMCZ Reference Areas within the MCZ project area (consisting of 127 sites). 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. Option 2 looks as designation of 31 of 127 sites proposed under option 1 (and impacts are assessed in terms of a proportionate reduction in costs as discussed below). A summary of the activities that take place in each rMCZ is provided in Annex I.

Costs

The costs and the assumptions are summarised in the table below:

| | Option 1 | Option 2 |
|---|---|----------|
| | Low, high and best estimate | |
| Assumptions | <ul style="list-style-type: none"> • MOD will mitigate the impact of military activity upon MCZ features through additional planning consideration during operations and training • The costs comprise a one-off cost for adjustment of electronic tools and charts and annual costs to ensure that the electronic tools and charts are up to date and that MCZs are factored into all operations. • For the smaller tranche of 33 sites in Option 2, it is assumed that the one-off cost of adjusting electronic tools and charts, and the annual cost of maintaining them and keeping them up-to-date, would remain unchanged. However, it is assumed that the annual cost of additional planning consideration of potential impacts on MCZ sites would be reduced in proportion to the difference in size of Options 1 and 2. | |
| Total annual (including transition) costs | £0.012m | £0.008m |
| Total PV costs (20 years) | £0.18m | £0.12m |
| Limitations | <ul style="list-style-type: none"> • The estimated additional costs anticipated over the next 20 years are generic and may differ depending on the scale and nature of the military activities in each rMCZ. • The IA does not estimate the cumulative costs to MOD of impacts, on activities occurring in more than one MCZ, or activities being impacted on by more than one MCZ, due to lack of information. | |

Option 1

3.2.75 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.

3.2.76 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 £0.18m over the 20-year period of the IA analysis. This is the best estimate of impact.

Option 2

3.2.77 For the smaller tranche of 31 sites in Option 2, it is assumed that the one-off cost of adjusting electronic tools and charts, and the annual cost of maintaining them and keeping them up-to-date, would remain unchanged. However, it is assumed that the annual cost of additional planning consideration of potential impacts on MCZ sites would be reduced in proportion to the difference in size of Options 1 and 2. The present value of the cost to MOD is estimated to be £0.12m over the 20-year period of the IA analysis.

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

Baseline

3.2.78 The IA assumes that only costs associated with making of future oil and gas (including CCS) licence applications could be impacted upon by MCZs. This includes any permits or plans such as Petroleum Operation Notices and Oil Pollution Emergency Plans that require environmental assessment. Currently consented developments of oil and gas production are not described in the baseline as they are not anticipated to incur any additional costs as they are already consented.

3.2.79 In the 26th Seaward Licensing Round¹, (here on in referred to as 26th Round) 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.

3.2.80 In the 27th Seaward Licensing Round², many of the blocks in the 26th Seaward Licensing Round were offered again. An additional 123 blocks representing new potential areas for oil and gas extraction were also made available.

3.2.81 The IA assumes that, during the 20-year period of the IA, one licence application is submitted for each of the blocks offered in the 26th and 27th Round. DECC and Oil & Gas UK are content with this assumption.

3.2.82 None of the rMCZ Reference Areas overlaps with existing or currently 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 overlap with future oil and gas (including CCS) infrastructure due to the location and size of rMCZ Reference Areas (DECC, pers. comm., 2012).

3.2.83 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) (Carbon Capture and Storage Association (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).

3.2.84 The area of designation under Option 2 (31 sites) is smaller compared to Option 1 (127 sites). The additional costs of a smaller tranche is discussed below.

Costs

3.2.85 The costs are based on the following assumptions which are the same as the assumptions used for Option 1. Costs for the options are summarised in table 15 below.

- Additional costs will be incurred in future licence applications in the assessment of environmental impact, in order to assess the impact of future oil and gas (including CCS) developments upon MCZ broad-scale habitats (as outlined in the method paper)
- In rMCZs that are not rMCZ Reference Areas, it is assumed that no additional mitigation of impacts upon MCZ features will be required for oil and gas (including CCS) activity. This is because 1) habitats and species on the OSPAR and BAP lists are already mitigated for outside of MCZs and 2) the footprint of oil and gas (including CCS) developments are unlikely to significantly impact upon the area of broad-scale habitat (please refer to method paper for reasons) protected within a MCZ. However, DECC is concerned that additional mitigation costs could be incurred for future oil and gas installations if, for example, the footprint of the broad-scale habitat is small or if additional importance is given to BAP or OSPAR listed features within a MCZ compared to those outside of an MCZ. These

¹ Announced in October 2010 and December 2011.

² Announced in February 2012.

costs are not quantified in the IA due to the uncertainty about whether they could arise, and if so, where and to what degree. The JNCC and Natural England advise that in their view, it is unlikely that they will advise DECC that additional mitigation is required to protect MCZ features (compared to what it done already outside of MCZs). However, it's not possible for the SNCBs to state definitively that mitigation will never be required.

- It is assumed over the 20 years covered by the IA that one application will be made for a development proposal in each oil and gas block that was offered in the 26th Round and within the MCZ area (DECC, pers comm., 2011). The same is assumed for oil and gas blocks in the 27th Round that represent additional acreage to the blocks in the 26th Round. It is assumed that the additional costs in the assessment of environmental impact, for future licence applications in blocks in the 26th round that have been awarded to an operator, are incurred in 2013 (DECC, pers comm., 2012). For remaining blocks in the absence of information on when these will be incurred it is assumed they will be incurred in 2022. The IA does not assume additional costs for projects for which consent is currently being sought.
- For all future licence applications in 26th Round blocks that have significant discoveries or are fallow blocks with discoveries³, it is assumed that these developments will complete their exploration and appraisal phases during the 20-year period of the IA. It is assumed that 50% of these applications will go on to reach full development, operation and maintenance phases during the 20-year period of the IA. It is assumed that production will start within the 20-year period of the IA but will not finish.
- For all future licence applications in 26th Round blocks that do not have significant discoveries, fallow blocks with discoveries, it is assumed that only surveys, evaluation, appraisal and exploratory drilling will be completed within the 20-year period of the IA. It is assumed that additional costs for assessing environmental impacts are incurred as a result of MCZs only for these phases.
- It is assumed that 50% of the 175 oil and gas fields that are currently in production within the MCZ project area will start the decommissioning process within the 20-year period of the IA.
- All these costs and assumptions are applicable to both Options 1 and 2. However, the costs in Option 2 have been scaled down by the proportion of rMCZs that are the nearest environmentally sensitive area to the blocks 'potentially awarded' in the 26th Round and on 'offer' in the 27th Round (that represent additional acreage to blocks in the 26th Round only to avoid duplication of costs). The scale down factors are 12% and 21% respectively.

Further detail on assumption and best, low and high estimate is provided in the method paper (Annex H11).

Table 15: Anticipated costs to oil and gas sector

| Type of cost | Anticipated costs to oil and gas sector (incl. CCS) (£m) | | | | | |
|---|--|------|------|----------|------|------|
| | Option 1 | | | Option 2 | | |
| | High | Low | Best | High | Low | Best |
| Total costs (annual costs including transition) | 0.47 | 0.25 | 0.36 | 0.06 | 0.04 | 0.05 |
| Total costs (PV costs over 20 years) | 7.1 | 3.7 | 5.4 | 0.93 | 0.52 | 0.73 |
| Limitations | <ul style="list-style-type: none"> • The possibility of additional mitigation costs due to MCZs is not quantified in the IA due to the uncertainty about whether they could arise, and if so, where and to what degree. DECC is concerned that additional mitigation costs could be incurred for future oil and gas installations if, for example, the footprint of the broad-scale habitat is small or if additional importance is given to BAP or OSPAR listed features within a MCZ compared to those outside of an MCZ. However, the JNCC and Natural England advise that in their view, it is unlikely | | | | | |

³ Significant discoveries are those that have been identified by DECC as being significant in terms of flow rate. They are discoveries that either have a Field Development Plan approved or are in production. The lists of blocks with significant discoveries used in the IA was last updated on June 1 2010 (assessed from DECC website on 8th Sept 2011).

| | |
|--|--|
| | <p>that they will advise DECC that additional mitigation is required to protect MCZ features (compared to what it done already outside of MCZs). However, it's not possible for the SNCBs to state definitively that mitigation will never be required.</p> <ul style="list-style-type: none"> • In the absence of information about future oil and gas and CCS development proposals over the next 20 years, the IA had to make assumptions on the number of licence applications. A sensitivity test was conducted on the number of future licence applications which is represented by the high and low costs. • The estimated additional costs anticipated over the next 20 years are generic and may differ depending on the scale and nature of the development proposal and the site in question. |
|--|--|

Option 1

3.2.86 The present value of the impact of rMCZs on oil and gas and CCS operators is estimated to range from £3.7m (low cost estimate) to £7.1m (high cost estimate) over the 20-year period of the IA. The impacts are predominantly associated with 101 rMCZs in the Net Gain (31) and Finding Sanctuary (37) project areas, but also the Balanced Seas (22) and Irish Sea Conservation Zones (11) project areas. This is because these rMCZs are the nearest environmentally protected area (of all marine protected areas) to the licensed oil and gas blocks in the 26th Round and 27th Round (additional acreage compared to 26th Round only). The high and low cost estimate is calculated using an estimate of the total number of future licence applications in blocks in the 26th Round with a 'significant discovery' or 'fallow block with discovery' that is +/- 25% around the best estimate. For the remaining blocks, the total number of future licence applications is assumed to be +/- 50% less than the number used to calculate the best estimate. The best estimate of impact is the mid-point of the low and high cost, which is £5.4m (present value).

Option 2

3.2.87 There are 31 rMCZs in Option 2, compared with 127 rMCZs in Option 1. The present value of the impact of rMCZs on oil and gas and CCS operators is estimated to range from £0.52m (low cost estimate) to £0.93m (high cost estimate) over the 20-year period of the IA. The impacts are predominantly associated with 18 rMCZs in the Finding Sanctuary (12) project area but also the Balanced Seas (3), Net Gain (2) and Irish Sea Conservation Zones (1) project areas. This is because these rMCZs are the nearest environmentally protected area (of all marine protected areas) to the licensed oil and gas blocks in the 26th Round and 27th Round (additional acreage compared to 26th Round only). The best estimate of impact is the mid-point of the low and high cost, which is £0.7m (present value).

3.2.88 The costs in Option 2 have been scaled down by the proportion of rMCZs in Option 2, that are the on list of the 101 rMCZs in Option 1 that are the nearest environmentally sensitive area to the blocks 'potentially awarded' in the 26th Round and on 'offer' in the 27th Round (additional acreage only). 12% (rounded up) of the rMCZs in Option 2 are in the list of rMCZs in Option 1 that are the nearest environmentally sensitive area to blocks 'potentially awarded' in the 26th Round. This scale down factor is assumed to apply to areas of future CCS as well (as they are likely to be predominately associated with existing areas of oil and gas development). 21% (rounded up) of the rMCZs in Option 2 are in the list of rMCZs in Option 1 that are the nearest environmentally sensitive area to blocks 'on offer' in the 27th Round (additional acreage only). Hence, the costs for this sector have been scaled down by this amount for Option 2.

Further information on the likelihood of additional mitigation costs in each regional MCZ project area

Irish Sea

3.2.89 No rMCZs in Option 2 (rMCZs 5, 8, 11 and 14) in the Irish Sea overlap with oil and gas blocks that are to be 'potentially awarded in the 26th Round' in either the 1st or 2nd tranches of this (only PCLZ and rMCZ 2 in Option 1 do). There was one 'significant discovery' in rMCZ 5 but considering this was on

offer in the 26th Round but not taken up (and the block was later relinquished), this would suggest that this is not viable to develop at the present time (although it could be in the future).

3.2.90 There are no 'significant discoveries' currently recorded in rMCZ 8, 11 or 14 (although there could be in the future). rMCZs 5 and 8 in Option 2 do overlap with oil and gas blocks on 'offer in the 27th Round'. However these are yet to be appraised by industry and expressions of interest will not have been submitted for these blocks yet, therefore it is not known if they are of developable interest. Due to the location of oil terminals around the Irish Sea, it is unlikely that new pipelines in the future would travel through rMCZ 8, 5, 14 or 11 unless of course, development took place in either rMCZ 5 or 8. But as already stated, the current evidence suggests that this is unlikely.

Net Gain

3.2.91 No rMCZs in Option 2 (rMCZs 13a, 15 and 16) in the Net Gain project area overlap with oil and gas blocks that are to be 'potentially awarded in the 26th Round' in either the 1st or 2nd tranches of this. rMCZs 15 and 16 in Option 2 overlap with oil and gas blocks on 'offer in the 27th Round'. However these are yet to be appraised by industry and expressions of interest will not have been submitted for these blocks yet, therefore not known if any of developable interest. However there are no 'significant discoveries' in any of the Option 2 sites so suggests that development in these sites is unlikely although it is possible. However, it is possible that licence applications could come forward over the IA 20-year period for new pipelines (maybe CCS, rather than oil & gas) that may seek to pass through NG 15 and NG 16. This is because existing pipelines already pass through the area and these rMCZs lie on the trajectory of pipelines between the offshore oil and gas fields and the oil terminal at Seal Sands, Hartlepool. The IA finds that it is unlikely that additional mitigation costs could be incurred due to MCZs, however to highlight DECC's concerns, it is possible that such costs could be incurred due to NG 16.

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

3.2.92 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 IA. 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. These concerns relating to high mitigation costs have not been quantified as the JNCC and Natural England have advised that these costs are very unlikely, but it is not possible to state definitively that mitigation would never be required. Therefore mitigation costs could be incurred, however, they have not been quantified in the IA.

Ports, harbours, shipping and disposal sites

Baseline

3.2.93 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). There are 131 ports and harbours located within 5km of rMCZs in Option 1, and 42 ports and harbours located within 5km of rMCZs in Option 2. 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

Assumptions:

3.2.94 Two management scenarios are presented in the IA to estimate the range of likely impacts 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. This is assumed to apply to navigational dredging and disposal at sea activities and only known port developments which take place within 1km of an rMCZ. Scenario 2 (the high cost scenario) assumes 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 Maintenance Dredging protocols (MDPs)⁴. To reflect uncertainty about how many ports will collaborate and implement joint MDPs (for example, within an estuary) in the future, two estimates (a low cost estimate and a high cost estimate) are provided for Scenario 2 (to provide a sensitivity analysis; see Annex H11 for an explanation).

3.2.95 For both Scenarios 1 and 2, the mitigation of impacts on MCZ features that is likely to be needed has been identified on a site-by-site basis based on advice provided by Natural England (pers. comm., 2011 and 2012). Where there is uncertainty about the mitigation that may be needed, a low cost option for providing mitigation is included in Scenario 1 and a high cost option for providing mitigation is included in Scenario 2.

Option 1

3.2.96 The cost of mitigating the impacts on ports and harbours are the same in both scenarios and includes the costs to mitigate the impact of the disposal of dredged material for both Padstow Bay and Surrounds rMCZ (Finding Sanctuary) and Beachy Head East rMCZ (Balanced Seas). However, for The Fal rMCZ reference area (Finding Sanctuary), due to the uncertainty of what additional mitigation will be required due to the MCZ, a higher mitigation cost is included in Scenario 2 for planned navigational dredging and the resultant removal of the Cross Roads buoy from the reference areas.

3.2.97 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 (as they are not yet planned). Therefore, some rMCZs could incur a significant unknown cost for mitigation of impact for some future plans and proposals on MCZ features. 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. However, Natural England has stated that this is unlikely (see Annex H11 for an explanation).

3.2.98 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 dredge areas. 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 that impacts will not be mitigated.

⁴ As Scenario 1 assumes that only ports within 1km of an rMCZ with known future development plans will incur additional costs (compared to Scenario 2 which makes assumptions about all ports 5km from each rMCZ will incur additional costs), no assumptions have been made about the cost savings of Maintenance Dredge Protocols (MDPs) if adopted by the ports affected in Scenario 1. This is because the change in cost presented by MDPs would only be very small (and so the analysis required to do this was not deemed to be of proportionate effort). However in Scenario 2, as potentially more ports are affected, it was important to consider the impact of MDPs on the costs.

3.2.99 In these four rMCZs, the impacts in both the high and low cost scenarios would be 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 200). 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.

3.2.100 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. However, it is anticipated that significantly less than an estimated cost of £3.5m would be attributable to MCZs (MCA pers. comm., 11 July 2012)⁵.

3.2.101 The present value over the 20-year period of the IA is £4.7m to £34.5m with a best estimate of £22.5m (a breakdown of annual and one off costs is provide below). 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 16).

3.2.102

Table 16 Summary of the costs for Option 1

| | Estimated one-off costs (£m) | Estimated average annual, excluding transitional costs (£m/yr) | Estimated average annual, including transitional costs (£m/yr) | Estimated present value of costs (£m) |
|---------------------------------------|------------------------------|--|--|---------------------------------------|
| Scenario 1 | 5.7 | 0.04 | 0.33 | 4.7 |
| Scenario 2 - low | 38.1 | 0.075 | 1.98 | 34.4 |
| Scenario 2 - high | 38.4 | 0.075 | 2 | 34.5 |
| Best estimate | 25.4 | 0.09 | 1.36 | 22.5 |
| Industry's assessment of costs | 0.03–1.7 | 0.5–14.9 | 0.5-15 | 6.8–210 |

3.2.103 The best estimate of the costs is the mid-point of Scenario 2 (low cost) and Scenario 2 (high cost) with one exception. The exception that the mitigation cost for The Fal rMCZ Reference Area, for which the best estimate is the mid-point of the cost for Scenarios 1 and 2⁶. For the entire suite of rMCZs, the best estimate is additional annual costs of £0.09m/yr and one-off costs of £25.4m. The present value over the 20-year period of the IA is £22.5m, 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).

Option 2

3.2.104 The mitigation costs are the same in both (low and high cost) scenarios and includes the costs to mitigate the impact of the disposal of dredged material in Padstow Bay and Surrounds rMCZ (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 (as they are not yet planned). Therefore, some rMCZs could incur a significant unknown cost for mitigation of impact for some future plans and proposals on MCZ features. 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

⁵ The £3.5m is based on two categories of costs (however these are over estimates and not all costs are attributable to MCZs which is why they are not included in the summary estimate): the costs to ship owners/mariners to purchase updated charts (this is a legal requirement); and the costs to ship owners/mariners to purchase the Sailing Directions for the area. For details of these calculations please refer to the method paper at Annex H12)

⁶ It has not been possible to establish the likelihood of either scenario for rMCZ The Fal Reference Area and therefore equal probabilities are attached to each and the best estimate of the cost is taken as the average of the two.

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. However, Natural England has stated that this is unlikely (see Annex H11 for an explanation).

3.2.105 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. However, it is anticipated that significantly less than an estimated cost of £3.5m would be attributable to MCZs (MCA pers. comm., 11 July 2012, and refer to footnote 68).

3.2.106 The present value over the 20-year period of the IA is £0.94m to £2.6m with a best estimate of £2.5m.

Table 17 Summary of the costs for Option 2

| | Estimated one-off costs (£m) | Estimated average annual, excluding transitional costs (£m/yr) | Estimated average annual costs including transition (£m/yr) | Estimated present value of costs (£m) |
|--------------------------|------------------------------|--|---|---------------------------------------|
| Scenario 1 | 1.3 | 0.001 | 0.07 | 0.94 |
| Scenario 2 - high | 3.6 | 0.001 | 0.18 | 2.6 |
| Scenario 2 - low | 3.5 | 0.001 | 0.18 | 2.5 |
| Best estimate | 3.5 | 0.001 | 0.18 | 2.5 |

3.2.107 The best estimate of impact is the mid-point of Scenario 2 (low cost) and Scenario 2 (high cost). For the entire suite of rMCZs, the best estimate is additional annual costs of £0.001m/yr and one-off costs of £3.5m. The present value over the 20-year period of the IA is £2.5m.

Concerns raised by eight ports and harbour operators

3.2.108 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.

3.2.109 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). For option 1 the assessment estimates additional annual costs of £0.5/yr to £14.91m/yr to this sector and one-off costs of £0.03m to £1.7m. This represents a present value over the 20-year period of the IA of £6.8m to £210m.

3.2.110 These concerns are not included in the IA Summary. This was mainly because there was little evidence that such costs would be incurred due to MCZs – most were found to be existing costs and were not ‘additional’ costs attributable to MCZs. However, subsequently some cost scenarios in the IA were revised to take into account concerns raised by stakeholders. Please refer to section 3.4 on the process adopted to arrive at these estimates.

Limitations:

- The management scenarios included in the IA are adopted according to advice based on the best available information. As such, the management scenarios for these activities included in the IA may result in overestimates or underestimates of the true impact. For example, for future activities, estimates of the costs of the mitigation of impacts on MCZ features are based on relatively limited details of both the activity and the mitigation to provide an indication of what the costs would be.
- No costs are included for updating MDPs over the 20 year period that may be attributable to MCZs. Although this cost is not known, it is not expected to be significant; however it could be significant for

MDPs where any new plan or project is considered likely to affect estuarine morphology and also the MCZ features.

- The Maritime and Coastguard Agency (MCA) has advised that updating charts and informing mariners about MCZs and the management required for them could incur four types of costs (please see page 20 of method paper H120). These costs have not been quantified in the IA and are only described here and in the Evidence Base. This is because it is not possible to link the costs provided to specific years of the IA period and it is not clear what proportion of the possible costs identified below could be incurred because of the designation of MCZs. The costs are subject to considerable uncertainty which include: the number and location of rMCZs that impact on shipping activities, the level of information that mariners choose to obtain concerning MCZs (beyond the legal requirement), whether provision of information concerning MCZs coincides with other information that mariners require. Radio navigation warnings and notification to mariners would be additional costs incurred which has not been possible to quantify.
- The MCA and DfT (pers. comm. 2012) have outlined concerns regarding the impact of MCZs on the safety of navigation. However, as the transit of vessels is not anticipated to be impacted upon by any MCZs, the IA does not anticipate such safety concerns. Although, it is assumed that anchoring restrictions may be placed on recreational vessels in some rMCZs (as well as those that are reference areas), these are not expected to present safety or navigational concerns with the exception of rMCZ 22 Bembridge, rMCZ The Fal Reference Area and rMCZ Padstow Bay and Surrounds. This is because with the exception of the above, none of these rMCZs overlap with designated anchorages or have evidence of significant levels of informal anchoring. The IA also states that rMCZ 22 Bembridge and rMCZ Padstow Bay and Surrounds are unlikely to incur the costs anticipated as the mitigation is unlikely to be feasible due to prevailing socio-economic reasons. Only rMCZs Padstow Bay and Surrounds is included in Option 2.
- Similarly, the MCA and DfT (pers. comm. 2012) have outlined concerns regarding the impact of MCZs on the safety of navigation for rMCZs for which the IA assumes that mitigation of other vessel activity may be required, such as navigational dredging and disposal of dredge material. This applies in particular to rMCZ Padstow Bay and Surrounds (in Option 2). However, very little change in vessel activity is anticipated as the IA assumes that material can continue to be disposed of in the disposal site but only in the western half of the disposal site only which does not overlap with the rMCZ. Disposal of dredging activity is anticipated to be restricted to winter months in rMCZ Beachy Head East. This assumes that additional vessel journeys will take place each year which may present additional safety risks. For the remaining rMCZs that are near to these port activities, additional costs in future licence applications are anticipated only. Vessel behaviour is not anticipated to be impacted upon by these MCZs.

Recreation

Baseline

3.2.111 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. Common rights also exist for extraction of resources from rMCZ Reference Areas along the North Norfolk coast, for example for cockling, samphire collection and bait digging.

3.2.112 Boating is particularly important within the Finding Sanctuary and Balanced Seas project areas. 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 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.

3.2.113 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.

3.2.114 Under Option 2, none of the areas mentioned above is being proposed for designation in 2013 tranche.

Costs

3.2.115 The management scenarios for many of the rMCZs are expected to have a negligible or no costs to the recreation sector. This is 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. There may be benefits to recreation as a result of some rMCZ - see section 2.3 for a discussion on benefits.

3.2.116 A single management scenario is applied to each rMCZ Reference Area. Under this scenario all extractive and depositional recreational activities and other activities deemed to be damaging or disturbing are not permitted. Whether an activity is deemed to be damaging or disturbing can vary from site to site, and depends on factors such as the intensity of activity, the types of pressures created, the sensitivity of the features being protected and other site-specific characteristics.

3.2.117 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 provided⁷.

Option 1

3.2.118 In total, 55 rMCZs are anticipated to impact on the recreational sector under Option 1, of which 44 are rMCZ Reference Areas. Significant impacts are discussed below.

3.2.119 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 low/high cost scenarios that include installation of eco-moorings, is estimated to result in combined one-off capital costs of between £0.6m to £2.99m⁸ and estimated annual mooring charges costs of between £0.16m/yr to £0.7m/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.

3.2.120 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 £0.67m/yr⁹, which may have significant local economic impacts.

⁷ The method for eco-moorings is based on a feasibility study undertaken on installing eco-moorings in Studland Bay undertaken by Marina Projects, stripping out many of their assumptions and adjusting them for different numbers of eco-moorings in different MCZs. The user fees for the eco-moorings are based on assumptions made by Marina Projects - this includes assumptions about usage - their assumptions (across different types of vessel and length of stay) are for occupancy of between 5% and 55%.

⁸ See Annex N for more details on costs.

⁹ Marina Projects 2011. *Studland Bay Seagrass Project. Visitor Mooring Viability Appraisal*. London: The Crown Estate.

3.2.121 Net of the effects of affected participants substituting expenditure to other locations and other activities, the effect on UK GVA is estimated to be £0.07m/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.

3.2.122 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 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 sites¹⁰ (as there would be an increase in bait collection in those sites, causing greater erosion to sand dunes and coastal paths). The impacts of rMCZs on sea angling in the Finding Sanctuary and Net Gain project areas are likely to be negligible.

3.2.123 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. PV Costs have been quantified for six of these sites, with an estimated £9.4m value of earnings affected (£0.66m/yr UK GVA). 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.

3.2.124 The low/high PV costs of rMCZs arising from the mitigation of impacts of anchoring by recreational vessels and impacts on the revenue charter boat operators is £13.2m to £23.1m, with average annual (including transition) costs ranging from £0.9m/yr to £0.16m/yr. The PV best estimate is a mid-point between the low and high cost scenarios of £19.2m (86% from Balanced Seas and 14% from Finding Sanctuary). These costs are the costs to users and of relevant infrastructure.

3.2.125 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 on other activities.

Option 2

3.2.126 None of the recommended reference areas and the MCZ sites mentioned above are proposed for designation in 2013, so no costs to recreation sector is estimated under option 2.

Limitations

- There is very limited secondary information on recreation activities at a local level. As Stakmap interviews were conducted with a sample of participants, data extracted directly from Stakmap outputs are likely to result in underestimates of actual participant numbers.
- In most instances the cost to the sector has been described in terms of the numbers of participants affected and a qualitative description of any likely changes in the quality of the activity experience. This does not estimate the quantitative cost to the sector.
- Where evidence is not available on which to base adjustments for substitution between activities, assumptions have been used based on an understanding of the nature of the activity being affected. As a result the quantitative impacts may underestimate or overestimate the true cost to the UK economy.

¹⁰ For example, one angler has reported that this would increase his vessel fuel costs by 15% and decrease fishing time by 15% (angler, pers. comm., 2011).

- In some instances it was not possible to obtain sufficient information about potentially damaging and disturbing activities on which to establish potential management scenarios. In such cases it has not been possible to assess the potential costs if additional management is required. This omission is likely to result in an underestimation of the costs and is highlighted where relevant in Annex I.

Renewable energy

Baseline

3.2.127 The baseline provides a description of existing, planned and potential renewable energy developments in each of the rMCZs over the 20-year period of the Impact Assessment (IA) that are currently known. Only those developments that it is assumed will be impacted upon by the designation of Marine Conservation Zones (MCZs) under each management scenario are described in the baseline for the IA¹¹.

Option 1

3.2.128 Wind energy: There are existing or planned wind farms¹² 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 18). 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 18 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 |

3.2.129 Three of the windfarms (in Table 18) 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 Natural England (pers.

¹¹ This data has been sourced from Lee, Stelzenmüller, Rogers (2010) and updated with data from individual developers and The Crown Estate (pers. comms, 2010, 2011 and 2012):

- Any yet-to-be-consented or yet-to-be-constructed offshore wind farms and known power export cable routes for wind farms (including Round 2 and Rounds 1 and 2 extensions).
- The planned locations for wind farm developments within Round 3 zones that developers have released plans for, including known power export cable routes.
- For Round 3 zones for which plans are not available the IA assumes that wind farm development could take place anywhere in the zone.
- Planned developments to generate electricity from wave and tidal energy (described in the IA as wave and tidal energy developments).
- Areas with potential for wave and tidal development during the 20 year period of the IA analysis as indicated by the Department of Energy and Climate Change (DECC) (DECC, pers. comm., 2011) and a study of renewable development potential in the south west (PMSS, 2010). Areas of strategic resource which may see developments over the medium-to-long term (The Crown Estate, pers. comm., 2012) are not expected to come forward within the next 20 years (DECC, pers. comm., 2012) and so are not included in the IA analysis

¹² 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.

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.

3.2.130 Planned or proposed (but not yet consented) wind farm export power cable routes pass through 26 rMCZs including six rMCZs that are Reference Areas¹³. 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.

3.2.131 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).

3.2.132 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).

3.2.133 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).

Option 2

3.2.134 There are no existing or planned windfarms within rMCZs in Option 2. However, an export power cable route associated with the Gunfleet Sands Demonstration site passes through rMCZ 3 Blackwater, Crouch, Roach and Colne Estuaries in the Balanced Seas project area. One rMCZ overlaps with an area of long-term potential development for tidal energy (South Dorset rMCZ in Finding Sanctuary) and two rMCZs overlap with areas of long-term potential development for wave energy (rMCZs Padstow & Surrounds and Isles of Scilly in Finding Sanctuary).

Costs

3.2.135 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). The key assumption for scenario 1 (low estimate) and 2 (high estimate) costs are summarised below for both options. Please look at the method paper (Annex14) for more detail:

- For the purposes of the IA, it is assumed that as a result of MCZs, operators will incur additional costs for Environmental Impact Assessment (EIA) for renewable energy developments (JNCC and Natural England, 2011b)¹⁴. These costs are likely to comprise additional time to consider and report impacts of proposals on achieving the conservation objectives of features protected by MCZs).

¹³ Operational and consented cables routes are not described in the baseline as it is assumed that they will not be impacted by rMCZs.

¹⁴ It is already a regulatory requirement that a proposed renewable energy development must be screened to determine whether an Environmental Impact Assessment (EIA) needs to be undertaken in support of its licence application.

- There will be additional requirements of the EIA to assess the potential impacts of proposed renewable energy developments upon MCZ broad-scale habitats and not on MCZ habitats and species of conservation importance are on the Oslo and Paris Convention (OSPAR) (of Threatened and/or Declining Species and Habitats) and on the UK List of Priority Species and Habitats (UK Biodiversity Action Plan (BAP)) as impacts on the latter should be considered even if the MCZ is not in place.
- In rMCZs that are not rMCZ Reference Areas, in Scenario 1 it is assumed that no additional mitigation of impacts upon features protected by MCZs will be required compared to the mitigation of impacts required in the absence of the MCZ¹⁵. Activities will be prohibited in reference areas but as it is not known if any specific licence applications are likely to come forward for these areas of potential for wave and tidal energy development, the potential cost to the sector is not assessed.
- In Scenario 2, it is assumed that yet-to-be-consented renewable energy cables (export and inter-array) and possible transmission cable routes as illustrated in the Offshore Development Information Statement (ODIS) (National Grid, 2011) will be required to use alternative methods of cable protection when installed in rMCZs that are not reference areas. This will be required to mitigate the potential impact of cable protection upon features protected by MCZs. The IA assumes estimates the cost of mitigation in terms of the additional cost of using removable frond mattressing compared to cheaper and more commonly used forms of cable protection (such as rock dumping) that would impact on the MCZ features¹⁶. The IA assumes that the additional cost of using frond mattressing relative to more commonly used methods of cable protection is £1m/km of cable route, which is based on four quotes from four developers (see method paper in Annex H for more details). For the purposes of the IA, it is assumed that this additional mitigation of impacts is not required for turbine bases
- Scenario 1 is considered more likely than scenario 2. Advice provided by JNCC and Natural England indicates that the scenario 2 assumption is likely to significantly over-estimate the costs as impacts of cable protection could only be considered to be required for soft sediment MCZ broad-scale habitats that are sensitive to impacts of cable protection. Impacts on all FOCI should be provided in the absence of MCZs. JNCC and Natural England also advised that the mitigation could only be considered to be required for MCZ broad-scale habitats for which the footprint of the habitat was deemed to be significantly impacted on by the cable. Hence the best estimate assumes a smaller likelihood of scenario 2 costs, i.e. 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).

Option 1

3.2.136 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.

3.2.137 A summary of the estimated costs to the renewable energy sector in both scenarios is provided in Table 19.

3.2.138 **Table 19** Estimated impact of rMCZs on the renewable energy sector in the Natural England, JNCC and MMO scenarios for Option 1

¹⁵ This is because 1) impacts on MCZ habitats and species that are on the OSPAR List (of Threatened and/or Declining Species and Habitats) and the UK List of Priority Species and Habitats (UK BAP) are already mitigated for in the absence of MCZs and 2) for broad-scale habitats, the footprint of renewable energy developments and their cables is unlikely to significantly impact on the overall condition of the broad-scale habitat.

¹⁶ Frond mattressing is an expensive form of alternative cable protection and assuming this is used to provide mitigation reduces the risk of under-estimating the impact to the sector but JNCC advises that it is likely to be an overestimate.

| 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 | £0.18m one-off cost spread across 2013 to 2016, and 2022 | £469.7m one-off cost spread across 2013 to 2017 and 2022 | £70.6m 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 | £0.19m one-off cost spread across 2013, 2015, 2020 and 2030 | £0.19m one-off cost spread across 2013, 2015, 2020 and 2030 | £0.19m one-off cost spread across 2013, 2015, 2020 and 2030 | <p><i>Finding Sanctuary:</i> Bideford to Foreland Point rMCZ, Hartland Point to Tintagel rMCZ, Lundy 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.</p> <p><i>Balanced Seas:</i> rMCZs 17, 20, 22, 23, 28, 25.2 and Reference Areas 13 and 18</p> |
| Total renewable energy sector | £0.31m present value over the 20-year period of the IA | £396.6m present value over the 20-year period of the IA | £59.8m present value over the 20-year period of the IA | All of the above |

3.2.139 Estimated one-off costs for this sector (wind, wave and tidal energy) range from £0.37m to £469.9m (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 £0.31m to £396.6m.

3.2.140 For reasons outlined under key assumptions, 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 gives a present value over the 20-year period of the IA of £59.8m.

3.2.141 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.

Option 2

3.2.142 Both the low and high cost scenarios make the same assumptions for rMCZs in Option 2 as for Option 1. The low cost scenario assumes that additional costs will be incurred in future licence applications (in the assessment of environmental impact) for an export power cable route associated with the Gunfleet Sands Demonstration site which is planned to pass through rMCZ 3 Blackwater, Crouch, Roach and Colne Estuaries in the Balanced Seas project area. Additional costs would also be incurred in future licence applications for developments that could come forward to develop wave and tidal resource in three rMCZs (rMCZs South Dorset, Padstow & Surrounds and Isles of Scilly) in the Finding Sanctuary project area.

3.2.143 The high cost scenario includes the low cost scenario costs but also includes additional costs that may be incurred to install alternative cable protection on yet-to-be consented export cables in rMCZs that are not rMCZ Reference Areas. This applies to the export power cable route planned for the Gunfleet Sands Demonstration site which passes through rMCZ 3 Blackwater, Crouch, Roach and Colne Estuaries in the Balanced Seas project area. A summary of the estimated costs to the renewable energy sector in both scenarios is provided in Table 20.

3.2.144 **Table 20** Estimated impact of rMCZs on the renewable energy sector in the Natural England, JNCC and MMO scenarios for Option 2.

| 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 | £0.12m one-off cost incurred in 2022 | £12.12m one-off cost incurred in 2022 | £1.83m one-off cost incurred in 2022 | <i>Balanced Seas</i> : Blackwater, Crouch, Roach and Colne Estuaries rMCZ |
| Wave and tidal energy | £0.05m one-off cost incurred in 2015 | £0.05m one-off cost incurred in 2015 | £0.05m one-off cost incurred in 2015 | <i>Finding Sanctuary</i> : South Dorset rMCZ, Padstow & Surrounds rMCZ and Isles of Scilly Sites rMCZ |
| Total renewable energy sector | £0.05m present value over the 20-year | £8.6m present value over the 20-year | £1.3m¹⁷ present value over the 20-year | All of the above |

¹⁷ The route of the cable from Gunfleet wind farm to the shore is assumed to be 38m for option 1 and costs have been calculated on that basis. There is recent published information which shows the cable route to be around 10-12 km. This new length has been used to calculate costs for option 2.

| 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 | |
| | period of the IA | period of the IA | period of the IA | |

3.2.145 Estimated one-off costs for this sector (wind, wave and tidal energy) range from £0.06m to £12.18m (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 £0.05m to £8.6m.

3.2.146 For the reasons outlined under key assumptions, JNCC and Natural England have advised that it is highly unlikely that mitigation of impacts of cable protection in the Blackwater, Crouch, Roach and Colne Estuaries rMCZ will be required due to the designation of MCZs. It is therefore assumed that Scenario 1 is more likely than Scenario 2. 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 gives a present value over the 20-year period of the IA of £1.3m for Option 2.

Concerns of seven renewable energy developers

3.2.147 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.

3.2.148 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).

3.2.149 These concerns are not included in the IA Summary. This was mainly because there was little evidence that such costs would be incurred due to MCZs – most were found to be existing costs and were not ‘additional’ costs. However, subsequently some of the scenarios used in the IA were revised to take into account concerns raised by stakeholders. Please refer to section 3.4 on the process adopted to arrive at these estimates.

3.2.150 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.

Limitations:

3.2.151 There are a number of limitations associated with the approach adopted in the IA that derive from the assumptions made for the purposes of the IA. In both scenarios, estimates of additional costs anticipated over the next 20 years are site-specific where possible. In Scenario 2, the economist has medium to low confidence in the additional cost of frond mattresses compared to other forms of cable protection. It has not been possible to publish all anticipated additional costs to specific rMCZs and developments in the IA because of the commercial sensitivity of some of the data and it has not been possible to verify cost estimates provided by industry. Site-specific costs provided by developers have been used where possible in order to account for the differences in renewable energy developments and their costs.

3.3 Costs of managing rMCZs

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

3.3.1 The management costs are estimated for a 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). Depending on the distance of the rMCZ from the coastline, the responsibility to implement and enforce the management of these activities falls to one of three types of public authority: the MMO, IFCA and Defra and costs have been broken down accordingly. Annex H provides a detailed description of cost assumptions for the respective management authorities

3.3.2 The IA presents low and high cost management scenarios. The low 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 high 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 Both the low and high cost estimates assume that only regulatory measures will be implemented in rMCZs outside 12nm for recreation (including recreational angling) and commercial fisheries outside 6nm. This is because it is assumed that it is impractical to implement non-regulatory measures such as voluntary agreements outside these limits.

3.3.4 Only the cost of enforcement/surveillance of rMCZ management measures is included in the headline figures in the IA Summary, whilst implementation costs are presented in this section only for information. This is because 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 where required, 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 usual policy development costs.

3.3.5 Costs have not been estimated for sites where it is anticipated that no additional management of recreation and/or fishing activity is needed.

Option 1

3.3.6 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 between £103.5m to £119.6m (present value). This can be broken down into a one-off implementation cost of £0.99m to £2.66m, followed by annual enforcement and/or surveillance costs of £7.3m/yr to £8.4m/yr (Table 21). The best estimate of cost is the mid-point, which gives a present value of £111.5m, composed of a one-off cost of £1.82m (one off implementation) and an annual cost of £7.8m/yr (annual enforcement and/or surveillance costs).

Table 21 Estimated costs of MCZ management measure implementation, enforcement and/or surveillance for Option 1

| Body that will incur the cost | One-off cost, £m Implementation | Annual cost (excluding transition), £m/yr Enforcement / Surveillance |
|--------------------------------------|------------------------------------|--|
| Local authorities/private landowners | 0.04 | 0.004 |
| IFCAs | 0.5–1.83 | 1.38–1.81 |
| MMO | 0.42–0.76 | 5.83–6.42 |
| Defra | 0.02 | 0 |
| Total | 0.99–2.66 | 7.3–8.4 |

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

3.3.7 The costs are for 160 to 165 management measures (the above mixture of non-regulatory and regulatory measures) assuming one measure by each regulatory authority (IFCA, MMO and Defra) per rMCZ (irrespective of the number of different activities that require management). More than one regulatory authority may have a management measure in an rMCZ¹⁸, this means that there are more management measures than rMCZs.

Option 2

3.3.8 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 to £11.6m - £12.7m. This can be broken down into a one-off implementation cost of £0.14m to £0.31m, followed by annual enforcement and/or surveillance costs of £0.81m/yr to £0.87m/yr (Table 22). The best estimate of cost is the mid-point, which gives a present value of £12.1m which consists of one off implementation costs of £0.22m and annual enforcement and surveillance costs of £0.84m/yr.

3.3.9 Option 2 will also allow Government to be able to better plan resources and learn from the experience of designating in tranches which will help to lower overall costs of completing a network of marine conservation sites compared to designating Option 1 immediately.

Table 22 Estimated costs of MCZ management measure implementation, enforcement and/or surveillance for Option 2.

| Body that will incur the cost | One-off cost, £m | Annual cost (excluding transition), £m/yr |
|--------------------------------------|--------------------|---|
| Local authorities/private landowners | 0.002m | - |
| IFCAs | 0.09–0.23m | 0.22–0.23m |
| MMO | 0.02-0.05m | 0.59 - 0.64m |
| Defra | 0.023m | - |
| Total | 0.14 - 0.3m | 0.81 - 0.87m |

3.3.10 For both options, only the cost of *enforcement/surveillance* of rMCZ management measures is included in the headline figures in the IA Summary (i.e. excluding implementation costs). Present value best estimate on enforcement costs only for Option 1 is £109.8m and for Option 2 is £11.9m over the 20 year appraisal period. The annual average costs (including transaction/one off costs) is £7.3m/yr to £8.4m/yr for option 1 is £0.8m/yr to £0.9m/yr for option 2.

Costs of MCZ verification, baseline setting and monitoring surveys

3.3.11 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 surveys¹⁹ with further detail provided in annex J2.

3.3.12 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

¹⁸ i.e. IFCA have one management measure for fisheries and angling per rMCZ in 0-6nm, MMO have one management measure for recreation (other than angling) per rMCZ in 0-12nm and angling in 6-12nm and Defra has one management measure for fisheries outside of 6nm.

¹⁹For example, for offshore sites, the costs per km for MCZ verification surveys are approximately equivalent to the cost of £87/km for site verification surveys to ten rMCZs in February and March 2012 on the RV Cefas Endeavour. For inshore site within 6m, costs of verification surveys estimates are based on the number of broad-scale habitat features and habitat FOCI within a site, and assume roughly two days of small boat work and limited associated sample/data analysis per habitat feature, at a cost of £5,000 per habitat feature in each site. For sites outside 6nm, estimates are based on the number of broad-scale habitat features and habitat FOCI within a site, and assume approximately 12 hours of survey time using a large survey vessel such as Cefas vessel Endeavour at an estimated cost of £17,000 per feature in each site.

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.

3.3.13 **Table 23** Total and average one-off and annual costs for site verification, baseline setting and monitoring surveys under Option 1

| | Site verification and baseline setting (£m) | Monitoring (£m/yr) | Annual costs, including transaction/one-off (£m/yr) |
|--|--|---|---|
| Costs | 48.3 | 6.1 | 6.7 |
| | Total one-off costs arising over the period 2013 to 2018 | Annual costs arising over the period 2019 to 2032 | Average costs arising over the 20 year period of the IA |
| Total costs over the 20 year period of the IA (£m) | 97.6 m | | |

3.3.14 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 £97.6m. This can be broken down into a one-off cost of £48.3 m (non-discounted) incurred over the period 2013 and 2018, followed by annual costs of £6.1m/yr (excluding transition) incurred from 2019 to 2032. This is the best estimate of the cost.

Option 2

3.3.15 Costs for Option 2 assume that costs for verification, baseline setting and monitoring setting are equal for each site, and scale down these costs based upon the number of inshore and offshore sites proposed for designation in Option 2. The process for selecting sites for Option 2 means that the data confidence is generally stronger for these sites and therefore costs for this tranche are likely to be lower than estimated.

| | Site verification and baseline setting (£/m) | Monitoring (£m/yr) | Annual costs, including transaction/one-off (£m/yr) |
|---|--|---|---|
| Costs | 11.8 | 1.5 | 1.6 |
| | Total one-off costs arising over the period 2013 to 2018 | Annual costs arising over the period 2019 to 2032 | Average costs arising over the 20 year period of the IA |
| Total PV costs over the 20 year period of the IA (£m) | 23.8m | | |

3.3.16 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 £23.8m. This can be broken down into total one-off costs of £11.8m (non-discounted) incurred over the period 2013 and 2018, followed by annual costs of £1.5 m/yr (excluding transition cost) incurred from 2019 onwards. This is the best estimate of the cost.

Costs of possible stakeholder groups consulted on management of rMCZs

3.3.17 It is possible that 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

3.3.18 The following costs to the public sector will also be incurred as a result of the suite of rMCZs under both options:

- 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.

Limitations

3.3.19 There are a number of limitations with the management cost estimates in this IA:

- The estimated additional costs are indicative only. They will differ from the actual costs depending on what management measures are put in place when, where, how and to what extent. For example, there may be cost savings of one authority introducing one management measure that covers multiple rMCZs which has not been possible to estimate in the IA.
- Management measures are assumed to be implemented in 2013 and that enforcement levels will be constant throughout the 20 years appraisal period. In reality, this may vary. The IA assumes that non-regulatory measures will be 100% effective. In reality, a proportion of non-regulatory measures will not be successful and regulatory measures may vary in effectiveness..
- The costs are expected to reflect the survey costs for MCZs as they are based on a combination of estimates from past surveys and past experience, and they are therefore considered to be reasonable given the assumptions that have been made. However, changes to assumptions to do with the number of sites/features that will be designated, availability of sufficient resources to monitor features once every six years and the distribution of costs between verification surveys and baseline monitoring have the potential to significantly affect the overall estimates. Initial surveys planned for building the evidence for rMCZs are still subject to ongoing assessments, and so the number of sites requiring verification surveys may vary.
- Monitoring will be prioritised through a risk-based approach at the start of every reporting cycle and it is unlikely that every site will be monitored once every reporting cycle as stated in Vina-Herbon and Davies (2011).
- It is likely that some sites or features will not require significant additional baseline information, e.g. where there is already good quality survey information because of an overlap with Regional Environmental Characterisation surveys or existing SAC monitoring data.

3.4 Process and general principles used to inform sector costs in the Impact Assessment

3.4.1 The IA includes details of concerns raised by industry (renewable energy, oil & gas and CCS, ports & harbours only) that are higher than the costs presented in the summary IA impacts. This section explains why this is the case and provides a summary of the key assumptions and the process followed to derive most likely estimate of costs to industry from MCZ designation. Key points:

- The summary impacts in the MCZ IA are based on costs provided by industry. Assumptions about MCZ management used in the IA drive the differences in the costs between some concerns raised by some industry representatives and summary estimates used in the IA. For example, industry concerns have sometimes assumed a far greater restriction on activity than JNCC and Natural England have assessed as likely.
- Importantly, costs to industry must be 'additional' to costs that would have been incurred anyway in the absence of MCZs (i.e. baseline). Industry concerns included costs that were not additional (i.e. not due to MCZ designation, for example, environmental obligations stemming from other regulations) and therefore these costs have appropriately not been included as an impact of MCZ designation.
- IA costs were revised throughout the MCZ designation process to take account of industry concerns that were likely to arise and an extensive process was set up to test and retest assumptions with JNCC, Natural England and regulators. Please see 'process' (below) for more information.
- The costs provided in the summary IA are not net of the anticipated benefits, which were not possible to monetise. If they could be monetised, it is anticipated that the designation of MCZs would be likely to incur net economic benefits in the long term.
- We will use the consultation as another opportunity for industry to present any new information they may have to clarify (and provide evidence) whether there may be the requirement for mitigation measures not covered in the cost estimates, which be directly attributable to MCZs as opposed to costs stemming from existing regulatory requirements.

Key assumptions

3.4.2 When assessing the impacts of MCZs on activities undertaken by industry, the IA identifies costs that are 'additional' and attributable to the designation of MCZs (the policy cost). It does not consider costs that operators would have incurred in the absence of MCZs (due to existing legislative requirements in the baseline or 'do nothing' scenario).

3.4.3 For MCZs that are *not* Reference Areas the IA assumes:

- The cost of assessing and mitigating impacts on habitats and species that are already on the OSPAR List (of Threatened and/or Declining Species and Habitats), the UK List of Priority Species and Habitats (UK BAP) and in Schedule 5 of the Wildlife and Countryside Act cannot be attributed to MCZs. This is because assessment and mitigation of impacts on these habitats and species is already required under existing legislation and hence the cost of these will arise in the absence of MCZs²⁰.
- As a result of MCZs, when operators conduct Environmental Impact Assessments (EIA) there will be additional requirements for them to assess the impacts of proposed plans and projects on MCZ features that are not already protected by existing legislation. This arises only for *broadscale habitats* protected by MCZs²¹.
- Mitigation of impacts of proposed plans and projects on broad scale habitats protected by MCZs, and the associated costs is likely to be required only in some instances. JNCC and Natural England advised that in most cases these impacts are negligible and will not require additional mitigation. This is because the foot print of many developments such as oil and gas rigs, pipelines, and wind

²⁰ Work on the IA has revealed that in practice, the extent to which each sector complies with these existing legislative requirements varies. However, following BIS guidance, this would not be a policy cost (i.e. due to designation of MCZs) as it is something that should be undertaken already. Insert link to BIS guidance.

²¹ Operators will be required to gather and interpret information on the boundary of MCZs that the plan or project could impact on, the features of the MCZ that are broadscale habitats features and the impacts of the plan or project on those broad scale habitats.

turbine bases is likely to be quite small compared to the overall area of the protected broad scale habitat²².

3.4.5 For MCZs that are Reference Areas, JNCC and Natural England have advised that these will be closed to activities that are considered to be extractive or depositional²³ though potentially damaging or disturbing activities may proceed if the necessary mitigation of impacts can be provided. Defra has decided to review the whole approach to Reference Areas, and so Reference Areas have not been proposed for designation under option 2 (first tranche sites) which is Defra's preferred option.

Process

3.4.6 The process followed to identify management scenarios and industry costs is summarised below.

- 1) The management scenarios that are employed in the analysis for the IA were identified using information about the sensitivity of species and habitats recommended for protection in each MCZ, as well as information about the level and type of human activities in each site collected from stakeholders.
 - a) Information on the sensitivity of MCZ features to human activities was provided through research commissioned by Defra²⁴.
 - b) The regional MCZ projects then undertook vulnerability assessments that were informed by the research and other best available data²⁵.
- 2) JNCC and Natural England also advised the management scenarios used in the IA were also informed by advice provided by JNCC and Natural England on the mitigation that is likely to be needed. This advice did not pre-judge the advice that JNCC and Natural England will provide (as statutory nature conservation advisers) for specific licence applications or for any future site-specific licensing decision.
 - a) In collaboration with the relevant regulators, Natural England developed draft assumptions about the mitigation of impacts of certain licensed activities on features protected by MCZs that could be used for purposes of the MCZ impact assessment²⁶. For specific licensed activities, these assume that little additional mitigation that will be required for MCZs that is not already required to meet existing legislative requirements. JNCC and Natural England also provided general advice on the potential impacts of human activities on achieving the conservation objectives for MCZ features and ways in which these could be mitigated²⁷. This advice was peer reviewed by industry representatives.

²² This advice applies to the whole lifetime of developments. Mitigation is likely to be needed only for plans and projects that are not yet consented

²³ Table 1 in annex H - Insert link to Annex H

²⁴ Defra commissions data in 2010 on sensitivity of MCZ features to human activities (Tillin, H.M, Hull, S.C, Tyler-Walters, H. 2010; 'Development of Sensitivity Matrix (pressures-MCZ/MPA features)', which informed the vulnerability assessments used in regional stakeholder groups. This evidence was informed by a number of workshops undertaken with industry and academic experts. Industry representatives provided data and information to inform the analysis. The vulnerability assessments were undertaken in a nationally consistent manner with two rounds of 'sense checks' from SNCB industry advisors who assessed the exposure of features (only) in each specific MCZ area to the said activity taking into account existing site-specific mitigation practices. The sensitivity data was not changed.

²⁵ These assessments examined the degree to which each species and habitat suggested for protection in each recommended MCZ was vulnerable to the level and type of human activities in each site. The vulnerability assessments conducted by the four regional MCZ projects were subject to two rounds of checks by JNCC and Natural England sector specialists who assessed the exposure of features in each specific MCZ area to activities taking into account existing site-specific mitigation practices. The outcome was that most proposed developments of infrastructure (such as oil rigs and wind farms) was found not to be impacting the MCZ features because existing legislation already means that such impacts are mitigated

²⁶ Natural England (2010) Draft assumptions for use in the Impact Assessment for Marine Conservation Zones (MCZs) about the additional mitigation of impacts from certain licensed activities that is likely to be required for features protected by MCZs. (<http://www.naturalengland.org.uk/ourwork/marine/mpa/mcz/guidanceandadvice.aspx>)

²⁷ JNCC and Natural England. 2011. General advice on assessing potential impacts of and mitigation for human activities on MCZ features, using existing regulation and legislation. (http://www.naturalengland.org.uk/Images/activities-advice_tcm6-26819.pdf)

- b) Specialists in JNCC and Natural England provided site-specific advice on the mitigation that is likely to be needed for proposed plans and projects that are not yet consented and could impact on MCZ features. JNCC and Natural England also continued discussions with developers for some specific sites to try to alleviate their concerns e.g. Atlantic Array and the Potential Co-location Zone.
- c) The advice provided by JNCC and Natural England on the mitigation that is likely to be needed is subject to uncertainty. JNCC and Natural England have endeavoured to reflect uncertainty in the mitigation that is likely to be needed in the advice that they have provided to inform the IA²⁸.
- 3) Economists in the regional MCZ projects collaboratively developed draft management scenarios that reflected the mitigation that was likely to be needed, based on the information provided in (1) and (2) above. Feedback on these was sought from Defra, the independent peer reviewers appointed by Defra, specialists in JNCC and Natural England and representatives of the sectors concerned. At the same time, the regional MCZ project economists also sought information on the likely costs of the scenarios from representatives of the different sectors²⁹
- 4) In providing feedback on the draft management scenarios, representatives of some sectors raised concerns that the scenarios under-estimated the costs of mitigation that will be required. To address the concern, a high cost management scenario was added to the IA for renewable energy to capture some of the concerns raised by developers. JNCC and Natural England advised that this scenario was very unlikely to arise and to reflect this, the regional MCZ projects attributed a low probability to this scenario when calculating the best estimate. A high cost management scenario for ports and harbours was added to the IA to take account of some of the concerns raised by industry representatives. Based on advice from Natural England, the best estimate was calculated as being towards the upper end of the resultant range in costs. To incorporate some of the concerns about impacts on oil and gas extraction and production, sensitivity analysis was employed in the IA.
- 5) In addition, in order to ensure that the views of representatives of industry were captured in the IA, the regional MCZ project economists presented the representatives' concerns (summarised in the evidence base and details provided in the documents in Annex H) and worked with industry to develop an 'industry' scenario³⁰. For three sectors ((1) renewable energy, (2) oil and gas exploration and production and carbon capture and storage, and (3) ports & harbours only) these concerns involve costs that are substantially higher than the costs of the management scenarios employed in the IA. However, there was little evidence that such costs would be incurred – most were found to be existing costs and were not 'additional' costs. The consultation process will provide stakeholders the opportunity to provide further information on these costs and clarify their additionality.
- 6) For all scenarios, industry costs are used. It is the assumptions about management which differ which are appropriately informed by the SNCBs and regulator. The best estimate scenario for sectors was informed by an assessment of likelihood of whether the low or high cost scenarios were the more likely. The IA material, including cost estimates by government departments, JNCC, Natural England, stakeholder representatives on the regional MCZ project regional stakeholder groups, and independent experts in environmental economics appointed by Defra. The regional MCZ projects revised the material as appropriate to reflect feedback from the review. The consultation process will further test the estimates and the assumptions underpinning them.
- 7) Where there was a potential for high unquantified costs Defra considered that the site should be subject to further assessment and clarification of costs before being considered for designation.

²⁸ This is because the management required for each MCZ will be developed by the appropriate regulator, in consultation with industry and the appropriate statutory nature conservation adviser, once the MCZ is designated. Also, where details of a proposed plan or project are currently uncertain (e.g. where the location of offshore wind farms and their cable routes are yet to be determined) it is more difficult to identify the mitigation that will be required.

²⁹ For wind farm developments, information on costs was sought from individual developers because MCZs are likely to impact on few planned wind farm developments, the companies that will be undertaking the developments are known and most had already been engaged with the MCZ process.

³⁰ Industry provided the assumptions and unit costs, and the economists undertook the calculations.

Further work will be undertaken on cost estimates on these sites before there is any decision as to whether recommend their designation at a later stage.

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 Under policy option 1 uncertainty around the presence, extent and appropriateness of conservation objectives within some sites means that there is more uncertainty around the contribution of benefits from the suite of rMCZs. Undertaking Policy Option 2 – designating sites where confidence in the feature exists - will enable the full realisation of the benefits described, albeit over a potentially longer timescale.

4.1.3 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.

4.1.4 The total estimated quantified economic costs of all rMCZs (policy option 1) ranges from £15.8m/yr³¹ to £52.6m/yr, with a best estimate of £22.2m/yr. This gives a present value of between £227.4m and £820.6m and a best estimate of £331.2m over the 20-year timeframe of the IA.

4.1.5 The total estimated quantified economic costs of the sites proposed for designation in 2013 (policy option 2) ranges from £2.6m/yr to £6.4m/yr, with a best estimate of £3m/yr. This gives a present value of between £37.2 and £92.3m and a best estimate of £43.6m over the 20-year timeframe of the IA. Policy Option 2 is the preferred option because when designating MCZs Government needs to have confidence that the features are actually present, the extent of their presence is known and the condition they are in is correct. If certainty cannot be reasonably secured there is a risk that by affording them protection Government may not be meeting its obligations under the MCAA and other international commitments whilst putting unnecessary burden upon sea users in the process. Government also needs to be confident that in designating a site, the benefits do outweigh the costs, so where there is uncertainty over the impacts more information needs to be collected. In designating in a phased approach of MCZs where data confidence and costs are more certain, rather than designating all rMCZs immediately, ultimately a more accurate and complete network of marine conservation sites will be designated that yield greater conservation advantages.

4.1.6 The best estimated annual cost to business is £0.5m/yr for option 2 (compared to costs of approximately £8m/yr for option 1). The main costs to government under option 2 are £0.8m/yr (best estimate) for management and enforcement of sites, £1.6m/yr (best estimate) year for survey work as well as small costs to National Defence. 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.

Ongoing and future work to address evidence gaps

4.1.7 The Impact assessment has highlighted a few evidence gaps that Defra will be working to address in the future. Currently Defra is in the process of commissioning two projects that look at ecosystem benefits from the marine environment:

³¹ The low and best estimates are different from the estimates in the published regional project IA as it takes account of displacement.

- A project that will review existing evidence on the impacts of MPAs on recreation and tourism with a view to considering how best to apply this evidence to assess the impact of UK Marine Conservation Zones on recreation and tourism. The research is long term (over a year) and outcome will inform the evidence base for future tranches
- A project that looks at benefits from increase in ecosystem services from marginal changes in state of benthic habitats. The outcome of the research will be used to inform the final IA.

4.1.8 Defra will also be looking to review other ongoing research undertaken externally such study undertaken by The Wildlife Trust³² that looks at benefits from MCZs for purposes of the final IA. In addition, Defra is aware of project being carried out by Blue Marine Foundation in the Lyme Bay SAC and will be considering whether such an approach is feasible and cost-effective in other marine protected areas.

4.1.9 During the consultation Defra will be collecting more information on non monetised costs and any further information that can better inform the cost estimates and assumptions used in the IA.

4.1.10 The Written Ministerial Statement of November 2011 outlined that Defra would commission significant additional work to support MCZ designation. Additional funding was made available to the Defra MCZ project in November 2011 and £3.9m was used to survey a selection of sites from each of the four regional projects. Additional surveys and further development of detailed habitat maps have been planned and Defra has identified this work as a priority and will be providing funding of c£2m per year for the next three years.

References

Attrill, M.J., Austen, M.C., Bayley, D.T.I., Carr, H.L., Downey, K., Fowell, S.C., Gall, S.C., Hattam, C., Holland, L., Jackson, E.L., Langmead, O., Mangi, S., Marshall, C., Munro, C., Rees, S., Rodwell, L., Sheehan, E.V., Stevens, J., Stevens, T.F., & Strong S. 2011. Lyme Bay – a case-study: measuring recovery of benthic species; assessing potential “spillover” effects and socio-economic changes, 2 years after the closure. Response of the benthos to the zoned exclusion of bottom towed fishing gear and the associated socio-economic effects in Lyme Bay. Final Report 1. Report to the Department for Environment, Food and Rural Affairs from the University of Plymouth-led consortium. Plymouth: University of Plymouth Enterprise Ltd.

Austen, M., Malcolm, S., Frost, M., Hattam, C., Mangi, S., Stentiford, G. 2011. Marine. In: The UK National Ecosystem Assessment Technical Report. UK National Ecosystem Assessment. Cambridge: UNEP-WCMC.

Balanced Seas 2011. Balanced Seas Marine Conservation Zone Project – Final Recommendations. URL: www.balancedseas.org/page/RSG%20Resources.html (Accessed 25 June 2012)

Beaumont, N., Townsend, M., Mangi, S., & Austen, M.C. 2006. Marine Biodiversity. An economic valuation. Building the evidence for the Marine Bill. London: Defra.

Better Regulation Executive 2010. Impact Assessment Guidance. URL: www.bis.gov.uk/policies/better-regulation/policy/scrutinising-new-regulations/preparing-impact-assessments (Accessed 25 June 2012)

CADW (2012) Irish Seas Conservation Zones: Archaeology & Heritage. Report to Irish Sea Marine Conservation Zones project. CADW 11th June 2012.

Chae, D.R., Wattage, P., & Pascoe, S. 2011. Estimating the Recreational Benefits of Lundy MNR. A travel cost analysis. Portsmouth: Centre for the Economics and Management of Aquatic Resources, University of Portsmouth.

³² Securing the benefits of the Marine Conservation Zone Network: A Case Study of Torbay recommended Marine Conservation Zone

Commonwealth of Australia 2003. The Benefits of Marine Protected Areas. Department of Sustainability, Environment, Water, Population and Communities. Canberra URL:
<http://www.environment.gov.au/coasts/mpa/publications/wpc-benefits.html> (Accessed 25 June 2012)

Defra 2002. Safeguarding Our Seas. A Strategy for the Conservation and Sustainable Development of our Marine Environment. London: Defra. URL:
http://archive.defra.gov.uk/environment/marine/documents/marine_stewardship.pdf (Accessed 25 June 2012)

Defra 2007. An Introductory Guide to Valuing Ecosystem Services. London: Defra. URL:
<http://archive.defra.gov.uk/environment/policy/natural-enviro/documents/eco-valuing.pdf> (Accessed 25 June 2012)

Defra 2010a. Guidance on Selection and Designation of Marine Conservation Zones (Note 1). URL:
<http://archive.defra.gov.uk/environment/biodiversity/marine/documents/guidance-note1.pdf> (Accessed 25 June 2012)

Defra 2010b. Guidance on the Duties on Public Authorities in Relation to Marine Conservation Zones. URL: <http://archive.defra.gov.uk/environment/biodiversity/marine/documents/guidance-note2.pdf> (Accessed 25 June 2012)

Defra 2010c. The Government's Strategy for Contributing to the Delivery of a UK Network of Marine Protected Areas. URL: <http://archive.defra.gov.uk/environment/marine/documents/mpa-strategy100330.pdf> (Accessed 25 June 2012)

Defra 2011. Consultation on the Evidence Base for a Proposed new English Scallop Order. London: Defra.

European Commission 2007. Benefits of Marine Protected Areas for Fish Conservation. Science for Environment Policy. DG Environment New Alert Service. European Commission.

Fletcher, S., Saunders, J., Herbert, R., Roberts, C., & Dawson, K. 2012. Description of the Ecosystem Services Provided by Broad-scale Habitats and Features of Conservation Importance that are Likely to be Protected by Marine Protected Areas in the Marine Conservation Zone Project Area. Research report produced for Natural England.

Gell, F.R., & Roberts, C.M. 2003. The Fishery Effects of Marine Reserves and Fishery Closures. Washington DC: WWF-US.

Gubbay, S. 2006. Marine Protected Areas: A review of their use for delivering marine biodiversity benefits. English Nature Research Reports No. 688.

HM Government 2006. Natural Environment and Rural Communities Act 2006. URL:
www.legislation.gov.uk/ukpga/2006/16/contents (Accessed 25 June 2012)

HM Government 2009. Marine and Coastal Access Act 2009. URL:
www.legislation.gov.uk/ukpga/2009/23/contents (Accessed 25 June 2012)

HM Government 2010. Ministerial Statement on Marine Protected Areas.

HM Government 2011a. Overarching Impact Assessment for the Natural Environment White Paper – The Natural Choice: Securing the value of nature. URL:
www.archive.defra.gov.uk/environment/natural/documents/newp-ia-110607.pdf (Accessed 25 June 2012)

HM Government 2011b. UK Marine Policy Statement. URL:
<http://archive.defra.gov.uk/environment/marine/documents/interim2/marine-policy-statement.pdf> (Accessed 25 June 2012)

HM Treasury 2003. The Green Book. URL: www.hm-treasury.gov.uk/data_greenbook_index.htm (Accessed 25 June 2012)

Hoskin, M.G., Coleman, R.A., & von Carlshausen, L. 2009. Ecological Effects of the Lundy No-Take Zone: The first five years (2003–2007). Report to Natural England, Defra and WWF-UK.

Hughes, T., Bellwood, D., Folke, C., Steneck, R. and Wilson, J. 2005. New paradigms for supporting the resilience of marine ecosystems. *Trends in Ecology and Evolution*, 20(7): 380–386.

ICM Research 2012. Marine Poll. The Wildlife Trusts.

Irish Seas Conservation Zones Project 2011. Final Recommendations for Marine Conservation Zones in the Irish Sea. URL: www.irishseaconservation.org.uk/node/92 (Accessed 25 June 2012)

JNCC 2010. The UK Biodiversity Action Plan: Highlights from the 2008 reporting round. URL: http://jncc.defra.gov.uk/pdf/pub2010_UKBAPHighlightsReport2008.pdf (Accessed 25 June 2012)

JNCC and Natural England 2010a. Ecological Network Guidance. URL: http://jncc.defra.gov.uk/pdf/100705_ENG_v10.pdf (Accessed 25 June 2012) JNCC and Natural England 2010b. Project Delivery Guidance on the Process to Select Marine Conservation Zones. URL: www.naturalengland.gov.uk/ourwork/marine/protectandmanage/mpa/mcz/default.aspx (Accessed 25 June 2012)

JNCC and Natural England 2010c. Marine Conservation Zone Reference Areas: Guidance document for regional MCZ projects. Version 1.1. Peterborough: Natural England. URL: http://jncc.defra.gov.uk/pdf/mcz_draftreferenceareaguidance.pdf (Accessed 25 June 2012)

JNCC and Natural England 2011a. General Advice on Assessing Potential Impacts of and Mitigation for Human Activities on MCZ Features, Using Existing Regulation and Legislation. URL: http://jncc.defra.gov.uk/pdf/MCZ_ActivitiesAdvice_Final.pdf (Accessed 25 June 2012)

JNCC and Natural England 2011b. Advice from the Joint Nature Conservation Committee and Natural England with Regard to Fisheries Impacts on Marine Conservation Zone Habitat Features. URL: <http://jncc.defra.gov.uk/pdf/1105%20MARINE%20CONSERVATION%20ZONES%20AND%20FISHERIES-FINAL.pdf> (Accessed June 2012)

JNCC and Natural England 2011c. Advice on the Impacts of MCZs on Information Provision and Decisions in Relation to Marine Licensing Proposals. URL: http://jncc.defra.gov.uk/pdf/MCZ_ImpactofMCZsonMarineLicensing.pdf (Accessed 25 June 2012)

Lieberknecht, L.M., Hooper, T.E.J., Mullier, T.M., Murphy, A., Neilly, M., Carr, H., Haines, R., Lewin, S., & Hughes, E. 2011. Finding Sanctuary Final Report and Recommendations. A report submitted by the Finding Sanctuary stakeholder project to Defra, JNCC and Natural England. URL: <http://findingsanctuary.marinemapping.com/> (Accessed 25 June 2012) Mangi, S., Gall, S., Hattam, C., Rees, S., & Rodwell, L. 2011. Lyme Bay – A case study: measuring recovery of benthic species, assessing potential spill-over effects and socio-economic changes 2 years after the closure. London: Defra.

McVittie, A. and D. Moran (2009) Valuing the non-use benefits of marine conservation zones: an application to the UK Marine Bill Ecological Economics 70 (2) Pages 413-424 Edinburgh: Scottish Agricultural College. Moffat, A. 2012 Draft: Anticipated benefits of marine protected area policy. Natural England.

Moran, D., Hussain, S., Fofana, A., Frid, C., Paramour, O., Robinson, L., & Winrow-Giffin, A. 2007. Marine Bill: Marine nature conservation proposals – valuing the benefits. London: Defra.

Murry, N., Medio, D., & Gubbay, S. 2007. Valuing Marine Protected Areas in the UK. WWF-UK, Surrey. URL: http://www.wwf.org.uk/filelibrary/pdf/valuing_mpas_uk.pdf (Accessed 25 June 2012)

Natural England and JNCC 2011. Conservation objective guidance. URL: <http://jncc.defra.gov.uk/PDF/MCZ%20Project%20Conservation%20Objective%20Guidance.pdf> (Accessed 25 June 2012)

Net Gain 2011. Final Recommendations: Submission to Natural England and JNCC. URL: <http://www.netgainmcz.org/> (Accessed 25 June 2012)

Official Journal of the European Union 2008. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008. Establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

OSPAR 2010. Quality Status Report. URL: <http://qsr2010.ospar.org/en/index.html> (Accessed 25 June 2012)

Parliamentary Office of Science and Technology 2007. Ecosystem Services. Postnote No. 281. London: Parliamentary Office of Science and Technology. URL: <http://www.parliament.uk/mps-lords-and-offices/offices/bicameral/post/publications/> (Accessed 25 June 2012)

Partnership for Interdisciplinary Studies of Coastal Oceans 2011. The Science of Marine Reserves (Second Edition: Europe). PISCO Consortium.

Pike, K., Johnson, D., Fletcher, S., Wright, P. and Lee, B. 2010. Social value of Marine and Coastal Protected Areas in England and Wales. *Coastal Management*, 38(4): 412–432.

Potts, T., O'Higgins, T., Mee, L., & Pita, C. 2011. Public Perceptions of Europe's Seas – A Policy Brief. EU FP7 KNOWSEAS Project. URL: <http://www.lwec.org.uk/publications/public-perceptions-europes-seas-policy-brief> (Accessed 25 June 2012)

Ranger, S., Lowe, R., Sanghera, A. & Solandt, J.L. 2011 and 2012. An Assessment of Non-use Value and Other Benefits of rMCZs in England. 'Your Seas Your Voice', Reports for each of Balanced Seas, Finding Sanctuary, Irish Seas Conservation Zone and Net Gain Regions. May 2009 – October 2011. Ross-on-Wye: Marine Conservation Society.

Richardson, E.A., Kaiser, M.J., Hiddink, J.G., Galanidi, M. & Donald, E.J. 2006. Developing Scenarios for a Network of Marine Protected Areas: Building the evidence base for the Marine Bill. Research Report CRO 348. London: Defra.

South West Tourism recreational workshop. Marine Protection Areas: Opportunities and challenges for tourism

Stewart, G.B., Cote, I.M., Kaiser, M.J., Halpern, B.S., Lester, S.E., Bayliss, H.R., Mengersen, K., & Pullin, A.S. 2008. Are Marine Protected Areas Effective Tools for Sustainable Fisheries Management? I. Biodiversity impact of marine reserves in temperate zones. Systematic Review No. 23. Collaboration for Environmental Evidence.

Tilman, D., Reich, P. and Knops, J. 2006. Biodiversity and ecosystem stability in a decade-long grassland experiment. *Nature*, 441(7093): 629–632.

TNS 2009. Fishing for the Future Omnibus Survey. Natural England.

UKMMAS 2010. Charting Progress 2. URL: <http://chartingprogress.defra.gov.uk/> (Accessed 25 June 2012)

UNEP. Governing Marine Protected Areas Technical Report. March 2011