



House of Commons  
Science and Technology  
Committee

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**Marine science**

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**Ninth Report of Session 2012–13**

*Report, together with formal minutes, oral and written evidence*

*Additional written evidence is contained in Volume II, available on the Committee website at [www.parliament.uk/science](http://www.parliament.uk/science)*

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## Science and Technology Committee

The Science and Technology Committee is appointed by the House of Commons to examine the expenditure, administration and policy of the Government Office for Science and associated public bodies.

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Caroline Dinenage (*Conservative, Gosport*)  
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The Committee is one of the departmental Select Committees, the powers of which are set out in House of Commons Standing Orders, principally in SO No.152. These are available on the Internet via [www.parliament.uk](http://www.parliament.uk)

### Publications

The Reports and evidence of the Committee are published by The Stationery Office by Order of the House. All publications of the Committee (including press notices) are on the Internet at <http://www.parliament.uk/science>. A list of reports from the Committee in this Parliament is included at the back of this volume.

The Reports of the Committee, the formal minutes relating to that report, oral evidence taken and some or all written evidence are available in printed volume(s). Additional written evidence may be published on the internet only.

### Committee staff

The current staff of the Committee are: Dr Stephen McGinness (Clerk); Jessica Montgomery (Second Clerk); Xameerah Malik (Senior Committee Specialist); Victoria Charlton (Committee Specialist); Darren Hackett (Senior Committee Assistant); Julie Storey (Committee Assistant); Henry Ayi-Hyde (Committee Office Assistant); and Nick Davies (Media Officer).

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## Summary

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Marine science is crucial to a growing number of Government initiatives, yet our understanding of the marine environment remains patchy. Whilst other countries have undertaken large scale and expensive programmes to map their marine environment, current resource restrictions mean the Government must seek to be more clever about how we advance our understanding of the marine environment and improve our capability in marine science.

The UK Marine Science Strategy and Marine Science Coordination Committee were positive developments for marine science. However, a step change in activity is needed for their benefits to be fully realised. We need to see both delivering results. An implementation plan for the UK Marine Science Strategy would help drive forward strategic oversight and coordination, and put its ideas in practice. The Marine Science Coordination Committee should seek to widen participation and increase its focus on results.

We recognise that the Natural Environment Research Council is operating with inadequate resources at present, which has had an effect on its support for marine and polar science. However, we were concerned to hear about some of the repercussions of its reprioritisation exercises. It seems there are difficulties with both the reduced amount of funding for strategic marine science and the mechanisms by which that funding is delivered. NERC should consider what impact restructuring its research funding has had on its support for marine science. It is important that NERC staff should be able to carry out strategic work without disadvantaging their academic careers.

The Government had a strong public and cross-party mandate to establish a network of Marine Conservation Zones. Despite this, the process has been complicated and protracted to the extent that it has taken three years to reach a point where 31 zones are being consulted on for designation at an unspecified time, with management measures yet to be agreed. We have not seen a clear reason why the Government has selected these 31 zones rather than others and the Government appears to have lost impetus for its vision for these protected areas. A balance needs to be struck between obtaining an adequate evidence base for Marine Conservation Zones and allowing the process to move forward in the face of uncertainty. Government's initial guidance on Marine Conservation Zones required use of the best information currently available to underpin site selection. Delays to the designation process increase uncertainty amongst stakeholders, which causes anxiety, particularly to those local stakeholders who hear scare stories about draconian future management measures. Plans for future tranches of Marine Conservation Zones need to be set out in a clear timetable and Defra should give further consideration to how it engages with local stakeholders.

Collecting scientific evidence about our marine environment is fundamentally important to the Government's marine policy agenda. Further work is clearly necessary. We consider that more could be done within the licensing regime for commercial operations at sea to help gather data, such as seabed surveys or habitat maps, that would improve understanding of the UK's marine environment considerably. We were concerned to hear

about the difficulties scientists encountered when trying to fund long-term monitoring projects and that funding for such projects remains opportunistic and piecemeal. This is an area in which the Marine Science Coordination Committee should redouble its efforts. We were interested to hear about the promising opportunities that autonomous underwater vehicles offer for improving our understanding of the marine environment. These vehicles could dramatically alter the way in which marine data is collected and the UK should seek to be at the forefront of their development.

# 1 Introduction

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## Understanding the oceans

1. Oceans cover over 70% of the Earth's surface, generate 50% of global primary production<sup>1</sup> and hold almost 54 times more carbon than the atmosphere.<sup>2</sup> They are fundamental to sustaining life on Earth.<sup>3</sup> Understanding the oceans through marine science is therefore important to help address the challenges associated with global environmental change and pressure on natural resources. The Government's ultimate vision is to achieve "clean, healthy, safe, productive, and biologically diverse oceans and seas".<sup>4</sup> By making UK marine science "more efficient and effective", the Government believes its UK Marine Science Strategy will provide the understanding of the marine environment that will underpin this vision.<sup>5</sup>

2. The limits of current understanding of the marine environment have been highlighted in the Government's current work to establish a network of marine protected areas around the UK. Oceans support 80% of the world's biodiversity,<sup>6</sup> with UK seas holding over 8500 different species.<sup>7</sup> Protecting this biodiversity is an important part of the Government's vision for the oceans.<sup>8</sup> At present, approximately 4% of UK waters are included in marine protected areas.<sup>9</sup> To help protect the marine environment, the Marine and Coastal Access Act 2009 required UK Administrations to establish a network of marine protected areas. The Act included powers for the Government to introduce Marine Conservation Zones, a new type of marine protected area, which could be used to protect marine wildlife, habitats, geology and geomorphology. This Act was passed with cross-party and public support,<sup>10</sup> yet its implementation has caused controversy in some coastal communities.<sup>11</sup>

## Our inquiry

3. We launched our inquiry in July 2012. We asked for evidence about strategic oversight of marine science in the UK and the UK Marine Science Strategy, the effectiveness of Government marine science bodies including the Marine Science Coordination Committee and Marine Management Organisation, the identification and selection of Marine Conservation Zones, Natural Environment Research Council (NERC) support for marine science, and current activity to monitor the effects of global warming on the

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<sup>1</sup> The production of organic compounds from atmospheric or aquatic carbon dioxide, which forms the base of the food chain.

<sup>2</sup> [http://www.pml.ac.uk/pdf/PML-TechnicalSheet-1\\_Comp.pdf](http://www.pml.ac.uk/pdf/PML-TechnicalSheet-1_Comp.pdf)

<sup>3</sup> UK marine science strategy, HM Government, p4 <http://www.defra.gov.uk/mscc/files/uk-marine-science-strategy-.pdf>

<sup>4</sup> UK marine science strategy p5

<sup>5</sup> UK marine science strategy p5

<sup>6</sup> UK marine science strategy foreword

<sup>7</sup> <http://jncc.defra.gov.uk/page-4524>

<sup>8</sup> <http://www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-111111.pdf> p13

<sup>9</sup> <http://www.ukmpas.org/faq.html>

<sup>10</sup> Q 321 [Richard Benyon]

<sup>11</sup> [http://www.parliament.uk/documents/commons-vote-office/December\\_2012/13-12-12/8-DEFRA-MarineConservation.pdf](http://www.parliament.uk/documents/commons-vote-office/December_2012/13-12-12/8-DEFRA-MarineConservation.pdf)

oceans. We received over 40 submissions and held five oral evidence sessions, during which we heard from scientists, conservation groups, industry groups, NERC and Richard Benyon MP, Parliamentary Under-Secretary of State for Natural Environment, Water and Rural Affairs, Department for Environment, Food and Rural Affairs (Defra).<sup>12</sup> We spoke with scientists at the British Antarctic Survey, Cambridge, and National Oceanography Centre, Liverpool, about their work. We also heard from stakeholders in Falmouth and Liverpool about how the Marine Conservation Zone selection process had been carried out in their area. We are grateful to those who provided evidence and hosted our visits to Cambridge, Liverpool and Falmouth.

4. Our call for evidence also asked about NERC support for science in polar regions. We commented on issues related to this topic in our report on the *Proposed merger of the British Antarctic Survey and National Oceanography Centre*.<sup>13</sup> We intend to return to this issue, and other issues in marine and polar science, during future evidence sessions. We are particularly interested in following up issues relating to technological developments for studying the oceans. In this report, we comment principally on strategic oversight and coordination of marine science by Government and how NERC supports work in this field. We focus on the designation process for Marine Conservation Zones as a particularly important policy issue in which marine science has played a central role. We then consider broader issues relating to data collection at sea and long-term monitoring programmes.

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<sup>12</sup> See end of report for full list of witnesses.

<sup>13</sup> Science and Technology Committee, Sixth Report of Session 2012-13, *Proposed merger of British Antarctic Survey and National Oceanography Centre*, HC 699



## 2 Strategic oversight and coordination

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### The UK Marine Science Strategy

5. The UK Marine Science Strategy sets out a 15 year strategic framework “to support the development, coordination and focus of marine science in the UK, across Government, industry, Non-Governmental Organisations and other sectors”. It gives a view on what evidence is needed to inform strategic decisions and encourages a coordinated approach to deliver this science.<sup>14</sup> The Strategy identifies three high level priority areas for marine science (understanding ecosystem functions, responding to climate change and its interaction with the marine environment, and sustaining and increasing ecosystem benefits) and aims to provide a pathway to deliver this science.<sup>15</sup> In the words of Richard Benyon, Parliamentary Under-Secretary for Natural Environment, Water and Rural Affairs, “the strategy sets out the direction in which we want marine science to go up to 2025”.<sup>16</sup> As a result, the Government believes the Strategy should bring about better coordination of policy priorities, research programmes and funding; bring a focus to cross-cutting issues; and increase collaboration across marine science communities.<sup>17</sup>

6. We heard broad agreement from the marine science community that production of a strategy for marine science was a positive development.<sup>18</sup> There was less consensus regarding its progress since publication. The Minister argued that “good progress has been made” following the establishment of the Strategy. He identified research programmes on ocean acidification, climate change and marine renewables as examples of the “much stronger coordination” it had encouraged.<sup>19</sup> However, others were less impressed with the Strategy’s achievements so far, suggesting that

- “little progress” had been made with delivery;<sup>20</sup>
- “there is little evidence that this has yet produced any substantive and positive outcomes”;<sup>21</sup> and
- “current oversight and coordination of marine science is not fit for purpose”.<sup>22</sup>

7. The Strategy’s slow pace of progress has been attributed to a lack of focus on delivery or outcomes, which have made assessing its success difficult.<sup>23</sup> This leaves the Strategy as a “high level document” without “any clear pathway to carrying out the work and the high

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<sup>14</sup> UK marine science strategy p5

<sup>15</sup> UK marine science strategy p5

<sup>16</sup> Q 314 [Richard Benyon]

<sup>17</sup> UK marine science strategy p5

<sup>18</sup> Ev 97 para 2.1, Ev w23 para 1, Ev w32 para 3, Ev w43 para 3

<sup>19</sup> Q 314 [Richard Benyon]

<sup>20</sup> Ev 123

<sup>21</sup> Ev w41 para 3

<sup>22</sup> Ev 133 para 9

<sup>23</sup> Ev 103, para 11, Ev 127 para 7, Ev 133 para 10

ideals that are expressed there.”<sup>24</sup> We heard that an “implementation plan” was needed to translate the Strategy’s goals into action,<sup>25</sup> but initial efforts made in February 2010 to establish such a delivery plan do not appear to have been updated since.<sup>26</sup> We note that the Minister has held discussions on “success criteria” for the Strategy, but it is concerning that, three years into this Strategic Framework, a clear direction for implementation has yet to be developed.<sup>27</sup> **We welcome the establishment of the UK Marine Science Strategy. However, if the Strategy is to help the Government achieve its vision of “clean, healthy, safe, productive and biologically diverse oceans and seas”, further work is needed to translate its high level goals into substantive outcomes. We recommend that the Government set out an implementation plan for the UK Marine Science Strategy, with a timetable that articulates expected outcomes at intervals over the next ten years, and how success will be measured. This should be updated on an annual basis.**

## Marine Science Coordination Committee

8. The Marine Science Coordination Committee (MSCC) is responsible for delivering the UK Marine Science Strategy and improving UK marine science coordination.<sup>28</sup> It aims to do so by “taking forward the three priority actions within the Strategy relating to: long-term monitoring; communications; and science alignment”.<sup>29</sup> The Committee consists of representatives from Government departments, devolved administrations and marine science providers,<sup>30</sup> who

- provide “a high level decision-making body on marine science to meet priority policy needs”;
- give “a strategic overview of marine science”; and
- consider “the decisions required to deliver UK marine science effectively and efficiently”.<sup>31</sup>

Defra told us that the MSCC has been a “strong and effective vehicle for setting the strategic direction for UK marine science and for delivering better coordination.”<sup>32</sup> However, we have been told that the Committee suffers from a number of shortcomings, regarding its membership, resourcing, and focus.

9. The current membership of the MSCC is dominated by Government departments or agencies.<sup>33</sup> Whilst the MSCC may have proved effective at bringing together this range of

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<sup>24</sup> Q 204 [Professor de Mora]

<sup>25</sup> Q 208 [Professor de Mora], Ev w36 para 6

<sup>26</sup> <http://archive.defra.gov.uk/environment/marine/documents/science/mscc/mss-delivery-plan.pdf>, MS 15 para 3

<sup>27</sup> Q 315 [Richard Benyon]

<sup>28</sup> <http://www.defra.gov.uk/mscc/>

<sup>29</sup> <http://www.defra.gov.uk/mscc/files/Terms-of-Reference-MSCC-February-2013.pdf> p2

<sup>30</sup> <http://www.defra.gov.uk/mscc/members/>

<sup>31</sup> <http://www.defra.gov.uk/mscc/files/Terms-of-Reference-MSCC-July-2012.pdf>

<sup>32</sup> Ev 74 para 17

<sup>33</sup> <http://www.defra.gov.uk/mscc/members/>

parties,<sup>34</sup> the absence of an industry representative has been criticised.<sup>35</sup> The UK's marine science and technology sector has an estimated annual turnover of £1.35 billion and employs approximately 17,000 people.<sup>36</sup> The Marine Industry Liaison Group exists as an industry forum to liaise with the MSCC, but the gap between the two means "they are not close enough in terms of debate or discussion".<sup>37</sup> We heard that full cross-sectoral integration "cannot happen unless those people are sitting in the same room and debating things at the same time".<sup>38</sup> Gaining industry representation on the Committee was described as "probably the most important thing that could be done" to improve its functioning.<sup>39</sup> The Minister appeared to agree with these concerns, explaining that industry representatives would help the MSCC operate "in a corporate way".<sup>40</sup> He assured us that "we are going to get appointees to this body that will properly represent marine industries."<sup>41</sup> Other concerns about membership included the lack representation for overseas territories on the Committee.<sup>42</sup>

10. We also heard concerns about how insufficient resources might be limiting the effectiveness of the MSCC.<sup>43</sup> Whilst its Secretariat was described as "very good and dedicated", we were told "it is under-resourced in terms of both secretariat and funding".<sup>44</sup> As a result, much of the MSCC's work "relies on the goodwill of the marine science community".<sup>45</sup>

11. Criticisms regarding the MSCC's focus echoed those directed at the UK Marine Science Strategy; namely that the MSCC lacked a focus on outcomes, which hindered the delivery of its work.<sup>46</sup> It was suggested that industry representation could help provide this focus alongside "some objectives and real teeth to drive through some of those objectives".<sup>47</sup> Alternatively, Professor Ed Hill, NERC,<sup>48</sup> suggested greater focus could be achieved through the development of a smaller executive group to direct the Committee's proceedings.<sup>49</sup> The MSCC currently reports to a Ministerial Marine Science Group, which

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<sup>34</sup> Q 159 [Professor Hill]

<sup>35</sup> Q 50 [all], Ev w29 para 12

<sup>36</sup> Ev 127 para 3

<sup>37</sup> Q 59 [Phil Durrant]

<sup>38</sup> Q 60 [Phil Durrant]

<sup>39</sup> Q 159 [Professor Hill]

<sup>40</sup> Q 318 [Richard Benyon]

<sup>41</sup> Q 318 [Richard Benyon]

<sup>42</sup> Q 159 [Professor Rodger]

<sup>43</sup> Ev 136 para 32

<sup>44</sup> Q 50 [Phil Durrant]

<sup>45</sup> Q 207 [Dr Frost]

<sup>46</sup> Ev 103 para 11, Ev 127 para 7, Ev 133 para 10

<sup>47</sup> Q 70 [Phil Durrant]

<sup>48</sup> Professor Hill is Director of the National Oceanography Centre. He gave evidence in this capacity and as a representative of NERC.

<sup>49</sup> Q 161 [Professor Hill], Science and Technology Committee, *Proposed merger of British Antarctic Survey and National Oceanography Centre*, para 20

the Minister chairs. He informed us that work was ongoing to see whether such reports “could be supplemented with quantitative indicators”.<sup>50</sup>

12. In September 2012, Defra stated that the MSCC had “made plans to consider, over the next few months, its operation; what it could be doing better or more of; and whether the current structure and approach provide the best fit. [...] The Government therefore intends to wait until this short exercise has been completed before reaching a view on suggested areas for improvement for MSCC”.<sup>51</sup> ***We recommend that Defra includes the evidence submitted to this inquiry regarding the work of the MSCC when considering areas for improvement, such as its membership, resources, and focus on outcomes. The Government should set out a clear timetable for the current review and publish its results on the MSCC website alongside an action plan to address its findings. We note that the Minister has identified the absence of permanent industry representation as a weakness in the MSCC’s operations and we recommend that a seat for an industry representative on the MSCC be identified within three months.***

## NERC support for marine science

13. NERC is responsible for research and training in environmental sciences. It is a non-departmental public body, which receives around £370 million a year from the Department for Business, Innovation and Skills.<sup>52</sup> Its “strategic goal” is “to deliver world-leading environmental research at the frontiers of knowledge”.<sup>53</sup> Research funding is provided through three streams: research programmes, responsive mode and national capability. Broadly speaking, research programme funding supports strategically directed research within selected themes, responsive mode funding supports original investigations within NERC’s remit and national capability funding focuses on long term investment in large scale research infrastructure or long-term programmes.<sup>54</sup> Research programme and responsive mode funding streams are subject to open competition, whilst national capability is usually delivered by research centres on a long-term basis, and is therefore not usually subject to open competition.<sup>55</sup>

14. NERC received a 3% cash reduction in its funding over the current spending review period, which has put its funding streams under pressure,<sup>56</sup> but it us told that it had “invested significantly in ocean research”.<sup>57</sup> In response to the reduction in resources, NERC and its research centres have made some changes to how marine science is supported. These changes were “trying to rebalance” science funding to “move more science into openly competed funding modes” in the hope that this would bring the science

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<sup>50</sup> Q 315 [Richard Benyon]

<sup>51</sup> Ev 75 para 26

<sup>52</sup> <http://www.nerc.ac.uk/about/>

<sup>53</sup> <http://www.nerc.ac.uk/publications/strategicplan/documents/strategy07.pdf> p 1

<sup>54</sup> <http://www.nerc.ac.uk/funding/introduction.asp>

<sup>55</sup> Q 177 [Professor Hill]

<sup>56</sup> Q 153 [Professor Hill]

<sup>57</sup> Science and Technology Committee, *Proposed merger of British Antarctic Survey and National Oceanography Centre*, para 33

community together “to tackle very large earth system questions.”<sup>58</sup> This has resulted in funding being moved away from national capability programmes to competitively-run research programmes, which has implications for NERC-funded research centres such as the National Oceanography Centre and British Antarctic Survey. For the National Oceanography Centre, Professor Hill, Director, explained that “the emphasis has been to try to protect a number of key activities”.<sup>59</sup> This has led to some areas of work being stopped or slowed down, with some staff reductions “to cope both with that funding reduction and to enable it to operate in the more competitive research environment resulting from the change in funding model”.<sup>60</sup> Similarly, at the British Antarctic Survey, Professor Alan Rodger, Director, told us that areas of research “that are fundamentally important for planet Earth” had been prioritised.<sup>61</sup> This included “areas of geology, terrestrial biology and some degree of quaternary and middle atmosphere science”, which were chosen via internal prioritisation and with the input of the NERC Science and Innovation Strategy Board.<sup>62</sup>

15. We heard a number of concerns about job losses at NERC research centres as a result of these funding reductions, changes to funding streams and internal reprioritisation exercises. In the most recent redundancy exercise, the National Oceanography Centre lost 32 staff.<sup>63</sup> The British Antarctic Survey expected to lose 18 staff.<sup>64</sup> There were particular concerns about how these job losses had been determined at the National Oceanography Centre. Staff reductions were based on a set of metrics which included the rate at which staff published papers or won competitive funding, with the result that longer term strategic work was perceived to be of less value.<sup>65</sup> This was described as “a move away from investing in strategic marine science”<sup>66</sup> with staff having to “to start thinking more like university scientists”.<sup>67</sup> Professor Hill disputed that NERC was responsible for these staff losses and told us that it “does not say to centres that they have to reduce staff; it simply controls the flow of money to the centres, and they respond according to their own circumstances and needs”.<sup>68</sup>

16. NERC’s decision to rebalance research programme and national capability funding appeared to be causing a particular issue for the British Antarctic Survey. At present, NERC has “no new significant directed science programmes on the horizon where the British Antarctic Survey can be big players”, though there has been a recent programme on Antarctic ice sheet instability.<sup>69</sup> In addition, “the cost of running large infrastructure is

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<sup>58</sup> Q 153 [Professor Hill]

<sup>59</sup> Q 154 [Professor Hill]

<sup>60</sup> Q 153 [Professor Hill]

<sup>61</sup> Q 153 [Professor Rodger]

<sup>62</sup> Q 154 [Professor Rodger]

<sup>63</sup> Q 170 [Professor Hill], out of approximately 540 staff <http://noc.ac.uk/jobs>

<sup>64</sup> Q 181 [Professor Rodger] , out of approximately 400 staff  
[http://www.antarctica.ac.uk/about\\_bas/our\\_organisation/how\\_we\\_are\\_organised.php](http://www.antarctica.ac.uk/about_bas/our_organisation/how_we_are_organised.php)

<sup>65</sup> Q 123 [Professor Sharples]

<sup>66</sup> Q 123 [Professor Sharples]

<sup>67</sup> Q 123 [Professor Sharples]

<sup>68</sup> Q 178 [Professor Hill]

<sup>69</sup> Q 191 [Professor Rodger]

inflating at a rate far beyond normal inflation”.<sup>70</sup> This raises questions about NERC’s national capability funding more broadly, as it is supposed to cover all facilities as well as long-term science. This is because:

As the cost of maintaining expensive facilities, that is ships, Antarctic bases and aircraft increases—for instance, we were suddenly hit with a massive bill for marine gas oil—it erodes the funding for the long-term science. [...] It is really important that some of the research programmes—and in fact, the responsive mode research mechanism as well—understand and know that national capability is there as a bedrock for what they want to do. As for the actual balance, we would be in real trouble if we eroded national capability any further before we sorted out how that gets divided.<sup>71</sup>

We intend to pursue our interest in NERC support for marine science in future. **We understand the difficulties that NERC faces in prioritising its resources at a time of limited funding. However, we are concerned about the potential for current reprioritisation measures to undermine the UK’s long-term capability in marine and polar science. Marine and polar science should not suffer from structural changes to funding mechanisms. These sciences are particularly dependent on the maintenance of extensive or large scale facilities, sometimes operating over long periods of time. NERC should therefore ensure there is adequate provision for research centres that depend on its national capability resources within its funding portfolio.**

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<sup>70</sup> Q 186 [Professor Rodger]

<sup>71</sup> Q 229 [Professor de Mora]

## 3 Marine Conservation Zones

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### Background

17. A protected area is “a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values”.<sup>72</sup> There are a number of different types of marine protected area in seas and coastal areas around the UK. These include:

- Special Areas of Conservation and Special Protection Areas, designated under the EU Birds and Habitats Directives;
- Sites of Special Scientific Interest, derived from national legislation; and
- Ramsar sites, designated through the Convention on Wetlands of International Importance.<sup>73</sup>

The UK Marine and Coastal Access Act (2009) introduced a new type of marine protected area; Marine Conservation Zones, which the Government is committed to bringing into effect.<sup>74</sup> Sites can be selected in English and Welsh inshore waters and UK offshore waters around England, Wales and Northern Ireland.<sup>75</sup> Marine Conservation Zones can be put in place to conserve marine flora, fauna, habitats, or features of geological or geomorphological interest.<sup>76</sup> This legislation was passed with strong cross-party support.<sup>77</sup> During its consideration in Parliament, Richard Benyon remarked that this legislation provided “an historic opportunity”<sup>78</sup> and Marine Conservation Zones could “make a real difference to the marine environment, but that will happen only if they form a coherent, dynamic and flexible network”.<sup>79</sup> Under the Act, Marine Conservation Zones can be used to protect particular rare or threatened species or to conserve the diversity of UK marine life.<sup>80</sup> In contrast to other marine protected areas, the Act states that when choosing sites to become Marine Conservation Zones, authorities can “have regard to any economic or social consequences”.<sup>81</sup> In addition, the Act specified that Marine Conservation Zones should help “form a network” of protected areas.<sup>82</sup>

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<sup>72</sup> [http://www.unep-wcmc.org/about-protected-areas\\_163.html](http://www.unep-wcmc.org/about-protected-areas_163.html)

<sup>73</sup> Marine Protected Areas (MPAs) in the UK, JNCC and Natural England, June 2012

<sup>74</sup> The Coalition: our programme for government, HM Government, 2010, p18

<sup>75</sup> The Marine (Scotland) Act 2010 gave Scottish Ministers powers to designate marine protected areas in Scotland’s seas. The Northern Ireland Assembly’s Marine Bill includes provision for Marine Conservation Zones in Northern Ireland’s inshore waters. The Welsh Government has undertaken its own Marine Conservation Zone designation project for its inshore waters.

<sup>76</sup> Marine and Coastal Access Act Part 5 117 (1) <http://www.legislation.gov.uk/ukpga/2009/23/part/5>

<sup>77</sup> Q 321 [Richard Benyon], See also HC Deb 2009 27 Oct Col 211 and HC Deb 23 June 2009 Col 767

<sup>78</sup> HC Deb 23 June 2009 col 760

<sup>79</sup> HC Deb 23 June 2009 col 762

<sup>80</sup> Marine and Coastal Access Act Part 5 117 (4 and 5)

<sup>81</sup> Marine and Coastal Access Act Part 5 117 (7)

<sup>82</sup> Marine and Coastal Access Act Part 5 123 (2)

18. In England, recommendations on which sites should be selected as Marine Conservation Zones were developed by the Government's statutory nature conservation bodies, the Joint Nature Conservation Committee (JNCC) and Natural England, through a set of four regional projects.<sup>83</sup> These projects were intended to give local stakeholders an opportunity to recommend possible Marine Conservation Zones in their areas or have their concerns taken into account.<sup>84</sup> In September 2011, following more than 2500 meetings over two years,<sup>85</sup> these regional projects recommended 127 Marine Conservation Zones to the JNCC and Natural England.<sup>86</sup> In December 2012 Defra announced its consultation on the "first tranche" of Marine Conservation Zones for designation. This consultation consisted of 31 possible Marine Conservation Zones, which are shown below (Fig 1 and Box 1).

**Box 1: The 31 sites in Defra's December 2012 consultation:**

Cumbria Coast	Chesil Beach and Stennis Ledges
Fylde Offshore	South of Dorset
Hilbre Island Group	Poole Rocks
North of Celtic Deep	Stour and Orwell Estuaries
East of Haig Fras	Blackwater, Crouch, Roach and Colne Estuaries
Southwest Deeps (west)	Medway Estuary
The Canyons	Thanet Coast
Lundy	Folkestone Pomerania
Padstow Bay and surrounds	Hythe Bay
Isles of Scilly	Beachy Head West
The Manacles	Kingmere
Upper Fowey and Pont Pill	Pagham Harbour
Whitsand and Looe Bay	Aln Estuary
Tamar Estuary	Swallow Sands
Skerries Bank and Surround	Rock Unique
Torbay	

It is the process that led to these recommendations, and Defra's subsequent actions, that were of interest to us in this inquiry. In this chapter, we first consider how scientific evidence was used in producing the recommendations, before looking at how this was balanced with socio-economic concerns. We then turn to the next steps for the process.

<sup>83</sup> Net Gain, Balanced Seas, Finding Sanctuary and Irish Sea Conservation Zones

<sup>84</sup> [http://www.naturalengland.org.uk/ourwork/marine/mpa/Marine Conservation Zone/default.aspx](http://www.naturalengland.org.uk/ourwork/marine/mpa/Marine%20Conservation%20Zone/default.aspx)

<sup>85</sup> Ev 101 para 2

<sup>86</sup> [http://www.naturalengland.org.uk/ourwork/marine/mpa/Marine Conservation Zone/default.aspx](http://www.naturalengland.org.uk/ourwork/marine/mpa/Marine%20Conservation%20Zone/default.aspx) English territorial waters and UK offshore waters ad



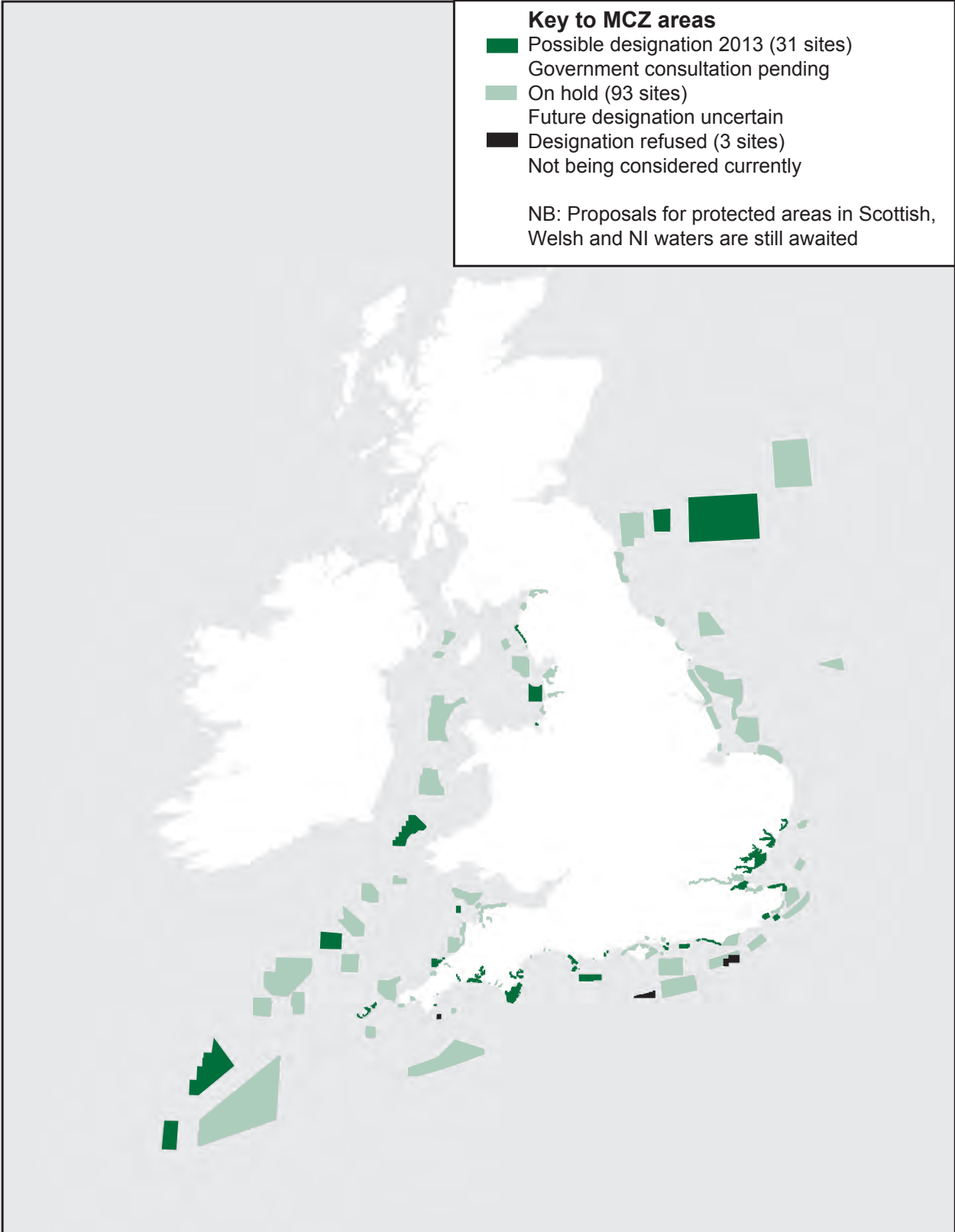


Figure 1 Map of proposed Marine Conservation Zones (image from The Wildlife Trusts)

## Use of scientific evidence

19. In 2010 the four regional projects were directed by Defra to find the best available scientific evidence to underpin their selection of recommended Marine Conservation Zones.<sup>87</sup> Guidance from Defra indicated that sites should be selected “on the best information currently available” and “lack of full scientific certainty should not be a reason for postponing proportionate decisions on site selection”.<sup>88</sup> To assist with this venture, the JNCC and Natural England provided information including a broad-scale habitat map, locations of rare species or habitats and information about existing marine protected areas. This was supplemented with additional local information. After a local consultation process that involved over one million people,<sup>89</sup> these projects reported in September 2011. They recommended a total of 127 Marine Conservation Zones around the UK.

20. Defra established a Science Advisory Panel to support the four regional projects in selecting Marine Conservation Zones. This Panel consisted of “expert marine scientists” who would “support the four regional projects in the Marine Conservation Zone selection process by offering objective scientific assessment of site proposals” and advice to Ministers.<sup>90</sup> The Science Advisory Panel discussed the recommendations made by the regional projects and sent their official advice to Government in October 2011. The Panel’s report identified a number of deficiencies in the regional project proposals. These included: doubts about the robustness of some data cited as evidence, questions about the required minimum proportion of certain habitat types, uncertainties regarding conservation objectives, over-simplicity of management objectives, and gaps in information about the presence or extent of marine features. However, the panel also stated “we are content that, if the recommended network of Marine Conservation Zones is implemented in full, ecological coherence can be achieved”.<sup>91</sup>

21. Shortly after the Science Advisory Panel provided their advice, the Minister announced an additional £5.5 million for further research alongside a statement that Marine Conservation Zones required an “adequate” or “adequately robust” evidence base.<sup>92</sup> Despite the regional projects having proceeded on the basis of best available evidence, he reiterated this point to us, stating “we do not require the most perfect pinpoint accuracy, but we need to have a good, robust evidence base”.<sup>93</sup> This change was purportedly due to a challenge to the designation of European marine sites in the south-west.<sup>94</sup> But as Alec Taylor, RSPB, pointed out:

“best available” is exactly what the Marine Conservation Zone process was set out to use. It is a very different process from that which is used for designating European

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<sup>87</sup> <http://archive.defra.gov.uk/environment/biodiversity/marine/documents/guidance-note1.pdf> These were Balanced Seas, Irish Sea Conservation Zones, Finding Sanctuary and Net Gain.

<sup>88</sup> Ev 101 para 3

<sup>89</sup> Q 8 [Joan Edwards]

<sup>90</sup> [http://archive.defra.gov.uk/environment/marine/protected/Marine Conservation Zone/Marine Conservation Zone-sap.htm](http://archive.defra.gov.uk/environment/marine/protected/Marine%20Conservation%20Zone/Marine%20Conservation%20Zone-sap.htm)

<sup>91</sup> Ev 101 para 4

<sup>92</sup> <http://www.defra.gov.uk/news/2011/11/15/wms-marine-conservation-zones/>

<sup>93</sup> Q 321 [Richard Benyon]

<sup>94</sup> Q 8 [Dr Solandt]

marine sites, which is very much a top-down, science-led process. The marine conservation zone process is a stakeholder-led, consensus-based project using a vast range of both ecological and socio-economic evidence. It could only reasonably expect to be able to use the best available evidence at the time in order to select its sites.<sup>95</sup>

Charles Clover, journalist, went further, arguing that “the ‘best available evidence’ is what the Act says. The ‘best evidence’ is what the lawyers have required us, apparently, to require, and that is completely wrong. It breaks the circle of trust that the public had at the time of the Marine Act”.<sup>96</sup> It appeared that Defra had shifted the goalposts as the Marine Conservation Zone selection process was nearing completion.<sup>97</sup> Instead of providing evidence that reflected the best current understanding of the marine environment in an area to support their Marine Conservation Zone selection, Defra then required the regional projects to produce the best, or most robust, evidence possible, regardless of the feasibility of such a requirement.

22. Questions were raised about whether the burden of proof created by this shift was reasonably obtainable,<sup>98</sup> especially given the level of investment in marine data collection.<sup>99</sup> Less than 20% of UK marine habitats have been mapped and Government would have to “spend an awful lot of money” to get the robust evidence it hoped for.<sup>100</sup> As Professor de Mora, Plymouth Marine Laboratory, put it “you get what you pay for”.<sup>101</sup> It is also questionable whether further evidence would make the Marine Conservation Zone process any less contentious, as Dr Frost, Marine Biological Association, explained:

There is always this sort of utopian ideal that somewhere down the line we will have all—in quotation marks—“the evidence”. Science does not work like that. What science does is it answers questions and, in doing so, raises a whole new set of questions. [...] That is how science works. It produces evidence, answers questions, but in doing so it opens up whole new horizons and gaps. I am not sure that the scientific approach is always appreciated when you are gathering evidence.<sup>102</sup>

23. The JNCC and Natural England reviewed the regional project recommendations, taking into account the findings of the Science Advisory Panel and further evidence that had been produced, to put together their final recommendations to Defra.<sup>103</sup> It recommended that all 127 Marine Conservation Zones should be designated.<sup>104</sup> This advice included an assessment of the presence, extent and condition of marine features that

<sup>95</sup> Q 2 [Alec Taylor]

<sup>96</sup> Q 266 [Charles Clover]

<sup>97</sup> Q8 [all], Q214 [Dr Frost]

<sup>98</sup> Ev w1 para 6

<sup>99</sup> Q 5, Ev 99 para 4.1

<sup>100</sup> Q 217 [Dr Frost]

<sup>101</sup> Q 217 [Professor de Mora]

<sup>102</sup> Q 216 [Dr Frost]

<sup>103</sup> JNCC and Natural England’s advice to Defra on recommended Marine Conservation Zones, July 2012, p1, <http://publications.naturalengland.org.uk/publication/2030218?category=1723382>

<sup>104</sup> JNCC and Natural England’s advice to Defra on recommended Marine Conservation Zones, July 2012, p1

each Marine Conservation Zone intended to protect, which the Marine Conservation Society summarised as shown in Box 2:<sup>105</sup>

**Box 2: Marine Conservation Zone evidence base**

The knowledge on the presence of features within the network is variable, particularly from inshore where there are numerous reports from diver surveys and drop-down video, to offshore where drop-down camera surveys, and side-scan sonar are rarer because of cost, and less human development and infrastructural projects.

There are 127 recommended Marine Conservation Zones within the network based on the presence of 1,205 features.

Each of these 127 sites will have a range of features and for these 1,205 features there is high, low or medium confidence on various features being present: (high = 41% (or 499 features); medium = 20%, (289) features, and low = 36% (436) features). However, just because a site has low confidence for some features does not mean it cannot be designated for other features.

There is high confidence of the extent (area of coverage) for 16% (189) of the features. Again medium or low confidence in extent should not prevent designation; it just reflects lack of investment in marine surveys on the extent of features.

There is generally low confidence on the ‘condition’ of features rather than presence of those features within the sites. The statutory advice given to DEFRA by the JNCC and Natural England in July 2012<sup>1</sup> states the following: “We advise that some features or sites may appear to have less information than others in terms of contribution to the network design principles and ecological benefits; however, this may be a reflection of limited data and evidence rather than an indication of their importance”.

**The Government appears to have moved the goalposts during the Marine Conservation Zone designation process, to require robust evidence showing the presence or extent of marine features rather than the best available evidence reflecting our current understanding of the marine environment. We support the principle that Marine Conservation Zones should be based on sound scientific evidence. We consider that the Government should adhere to its standard of best available evidence, as set out in its initial Marine Conservation Zone guidance, that “network design should be based on the best information currently available” and “lack of full scientific certainty should not be a reason for postponing proportionate decisions on site selection”.**

### **Inclusion of socio-economic evidence**

24. The inclusion of socio-economic concerns in the decision-making process for Marine Conservation Zones was a new development for marine protected area policy. We appreciate that a significant investment of time and energy has been made by all those involved in the stakeholder consultation process. That said, evidence submitted to us and our discussions in Falmouth have highlighted a number of concerns about the way in

<sup>105</sup> Ev 138 para 2.8

which socio-economic evidence has been used. We were also concerned to hear about the extent to which discussions had become “polarised”.<sup>106</sup> We consider here issues with communications and engagement, consideration of socio-economic benefits and discussion of management measures.

### **Communications and engagement**

25. We appreciate that a significant effort was made to engage with a range of stakeholders during the Marine Conservation Zone process. However, our meetings in Falmouth confirmed that there were people who felt excluded from the consultation process. It seems that more use could have been made of the contacts held by the Marine Management Organisation to help the regional projects get in touch with local stakeholders, particularly in local fishing communities who may not otherwise be as forthcoming as other corporate institutions. Local communities, whose practices may be more sustainable should not lose out to larger industrial operations.<sup>107</sup> Stakeholders told us that it could be difficult to keep up to date with the process, particularly given the number of lengthy reports and consultation documents being published.<sup>108</sup> As Joan Edwards, Wildlife Trusts, pointed out “even now, if you go on to the Defra website, it is very difficult to find out where and what marine conservation zones are and what they are trying to achieve.”<sup>109</sup>

### **Socio-economic benefits**

26. The Act provided for consideration of socio-economic concerns when designating Marine Conservation Zones, but this provision appears to have been interpreted solely in terms of the socio-economic costs associated with establishing marine protected areas. As the Minister noted, marine protected areas can also provide socio-economic benefits.<sup>110</sup> Functioning ecosystems and sustainable livelihoods are not mutually exclusive.<sup>111</sup> Joan Edwards, Wildlife Trusts, told us the Government had:

only looked at the impacts on people and industry. It does not look at the benefits of marine protected areas. We think that is ludicrous because we are establishing these [Marine Protected Areas] for a really good reason. We believe this will help bring back our marine environment into a healthy state, and that should be good for fishermen and other people.<sup>112</sup>

### **Management measures**

27. The way in which sites would be managed after being selected as Marine Conservation Zones was a particular concern for people whose livelihoods or leisure activity could be directly affected. Yet consultation on management measures for recommended Marine

<sup>106</sup> Q 222 [all]

<sup>107</sup> Q 13 [Alec Taylor]

<sup>108</sup> See, for example, <http://www.defra.gov.uk/consult/2012/12/13/marine-conservation-zones-1212/>

<sup>109</sup> Q 26 [Joan Edwards]

<sup>110</sup> Q 328 [Richard Benyon]

<sup>111</sup> Q 222 [Dr Frost]

<sup>112</sup> Q 33 [Joan Edwards]

Conservation Zones was not included in the regional projects process. James Cross, Marine Management Organisation, told us “generic descriptions about the types of management measures” were included in discussions, but a full consultation would not come until later in the process.<sup>113</sup> The Minister did not provide further details about when management would be discussed, saying he could not give “a precise answer” but a consultation would happen in the future.<sup>114</sup> Professor Ian Boyd, Defra’s Chief Scientific Adviser, argued that it was first necessary to identify sites before management could be discussed and it was “absolutely right” that the questions of what to protect and how to protect it were separated.<sup>115</sup> He continued:

clearly, what we have not managed to do is to make sure that the stakeholders understand that separation and that their voices will be fully heard within the “What are we going to do about it?” or “How are we going to manage it?” question. At the moment, we are still on the question of what is going to be protected and consulting on that. Once that is out of the way, there is another process to be put in place that will fully engage the local stakeholders that might be affected by this, particularly those who have commercial or economic interests, so that they will have a full say in what happens eventually.<sup>116</sup>

This lack of clarity on management measures creates uncertainty regarding the outcome of the Marine Conservation Zone process for stakeholders, and may even have contributed to a backlash against the project, fostering misleading stories, for example that all activities will be banned, even walking dogs on beaches.<sup>117</sup> Dr Jean-Luc Solandt, Marine Conservation Society, stated “people will see lines on maps but want to know what happens in them. When we get clarity in the measures, then we can have a really decent conversation with stakeholders at the local level.”<sup>118</sup>

**28. We are not convinced that the issues of what to conserve and how to conserve it can be separated as easily as the Minister suggests, particularly in a stakeholder-driven process with negotiations happening at a local level to decide which sites should be chosen to be protected on the basis of their biological importance and socio-economic impact. People need to understand what Marine Conservation Zones mean for their lifestyles and livelihoods. The absence of a substantive discussion on likely management measures perpetuates uncertainty, undermines local support for Marine Conservation Zones and creates room for scare-mongering. We recommend that the Government produce a clear statement on how management measures will be decided and tailored to specific Marine Conservation Zones, alongside a clear timetable showing when these will be discussed.**

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<sup>113</sup> Q 283 [James Cross]

<sup>114</sup> Q 332 [Richard Benyon]

<sup>115</sup> Q 335 [Professor Boyd]

<sup>116</sup> Q 335 [Professor Boyd]

<sup>117</sup> Q 25 [Joan Edwards]

<sup>118</sup> Q 31 [Dr Solandt]

## Defra's current consultation

29. Defra, at time of publication, was considering 31 of the 127 sites recommended to become Marine Conservation Zones. It considers these 31 to be “suitable for designation in 2013” whilst anticipating “additional Marine Conservation Zones to be designated in the future.”<sup>119</sup> Defra stated that these sites have been selected on the following criteria:

Whether a Marine Conservation Zone, and all of its features, are suitable for designation in the 2013 tranche depends on the levels of confidence in the scientific evidence and the balance between the site's conservation advantages and the socio-economic costs.<sup>120</sup>

30. We heard concerns that the balance being struck had shifted too far towards socio-economic concerns and away from conservation priorities, both during the site selection process and Defra's current consultation, with scientific evidence left “disadvantaged” as a result.<sup>121</sup> During site selection, the boundaries of recommended sites were changed so that the final recommendations include “sites that are either not in the most ecologically important areas or have been reduced, clipped or changed as a result of the socio-economic considerations”.<sup>122</sup> Indeed, the Science Advisory Panel reported “the identification of locations for protection has relied greatly on socio-economic considerations with biodiversity often of secondary consideration or taken account of late in the process”.<sup>123</sup> The selection of sites for the first tranche has in effect become a political decision about what weight to attach to socioeconomic and environmental concerns.<sup>124</sup> As Professor Boyd described “there is going to be a judgment call to be made about where the balance sits in terms of costs and benefits to particular conservation features or socio-economic features.”<sup>125</sup>

31. In their recommendations to Defra, the JNCC and Natural England highlighted 59 sites that were at higher risk of damage or deterioration.<sup>126</sup> Indeed, the Wildlife Trusts told us they had evidence of one of these sites being damaged since being recommended for protection.<sup>127</sup> However, only a limited number of the 59 sites identified as being at high risk by the JNCC and Natural England have been put forward for consultation in the first tranche, despite these having “a stronger case for earlier designation”.<sup>128</sup> We compared the 31 sites selected by Defra to the 59 sites recommended by Natural England and the JNCC for early designation on the basis of being at higher risk of degradation. Only eight sites

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<sup>119</sup> [http://www.defra.gov.uk/consult/files/Marine Conservation Zone-condoc-121213.pdf](http://www.defra.gov.uk/consult/files/Marine%20Conservation%20Zone-condoc-121213.pdf) Ministerial foreword

<sup>120</sup> Consultation document /2

<sup>121</sup> Q 220 [Dr Frost], Ev 98 para 4.2, Ev 109 para 15, Ev 138 para 2.7

<sup>122</sup> Q 12 [Alec Taylor]

<sup>123</sup> Science Advisory Panel Assessment, November 2011, <http://www.defra.gov.uk/publications/files/sap-mcz-final-report.pdf> p4

<sup>124</sup> Q 328 [Professor Boyd]

<sup>125</sup> Q 328 [Professor Boyd]

<sup>126</sup> JNCC and Natural England's advice to Defra on recommended Marine Conservation Zones, July 2012, p3

<sup>127</sup> Q 11 [Joan Edwards]

<sup>128</sup> JNCC and Natural England's advice to Defra on recommended Marine Conservation Zones, July 2012, p386

were on both lists. The level of crossover is outlined in Box 3.<sup>129</sup> 28 sites recommended for earlier designation are not in Defra's current consultation.

<b>Box 3: Comparison of "at risk" sites and sites in consultation</b>		
<b>in consultation/not "at risk"</b>	<b>not in consultation/"at risk"</b>	<b>in consultation/"at risk"</b>
Aln Estuary	Beachy Head East	Beachy Head West
Blackwater, Crouch, Roach, Colne Estuaries	Bembridge	Chesil Beach and Stennis Ledges
Fylde Offshore	Cape Bank	Cumbrian Coast
North of Celtic Deep	Celtic Deep	East of Haig Fras
Pagham Harbour	Compass Rose	Folkestone Pomerania
Rock Unique	Dover to Deal	Hilbre Island Group
Swallow Sands	Dover to Folkestone	Hythe Bay
Upper Fowey and Pont Pill	East Meridian	Isles of Scilly
	East Meridian - Eastern side	Kingmere
	East of Celtic Deep	Lundy
	East of Jones Bank	Padstow Bay (and surrounds)
	Greater Haig Fras	Poole Rocks
	Holderness Offshore	Skerries Bank (and surrounds)
	Inner Bank	South Dorset
	Markham's Triangle	Southwest Deeps (west)
	Mud Hole	Stour and Orwell Estuaries
	Norris to Ryde	Tamar Estuary
	North West of Jones Bank	Thanet Coast
	Offshore Brighton	The Canyons
	Ordford Inshore	The Manacles
	Sefton Coast	Medway Estuary
	Slieve Na Griddle	Torbay
	South East of Falmouth	Whitsand and Looe Bay
	South of Celtic Deep	
	South of Falmouth	
	South Rigg	
	Swale Estuary	
	Thames Estuary	

**32. There is a lack of clarity regarding why the proposed 31 Marine Conservation Zones were selected for designation first, despite the JNCC and Natural England's advice that 59 sites, 51 of which are not included in the first tranche, are currently at high risk of further damage. The Government should set out the reasons for not putting these sites forward for consultation and outline action being taken to prevent further damage to these areas as the Marine Conservation Zone process continues. We agree with the principle that socio-economic concerns should be taken into account when designating Marine Conservation Zones. We recognise that it is difficult to balance socio-economic and scientific concerns. However, at present it is not clear why certain sites are being progressed and others not. Given that the weight given to socio-economic concerns**

<sup>129</sup> Sites taken from Natural England's advice package p 386-387 and Defra's consultation document p 2-3



compared to scientific evidence is a political judgement, *we recommend that the Government should publish the criteria being used by Defra to select sites for conservation.*

## Next steps

33. It has been over three years since the Marine and Coastal Access Act was passed, with cross-party consensus that Marine Conservation Zones were necessary and widespread public support.<sup>130</sup> Despite this, the designation process has been repeatedly delayed and Marine Conservation Zones have become increasingly controversial. The project seems to be in danger of losing sight of its original vision for marine conservation in the UK. Charles Clover told us that “nobody knows what the bloody things are for and no Minister has ever said. While we are in this position, we will go on failing”.<sup>131</sup> ***We are concerned that a clear vision for Marine Conservation Zones has not been articulated by the Government. We recommend that it does so in the response to this report.***

34. There is extensive frustration among industry and other stakeholders over the delays to this process, which have created uncertainty and allowed sensitive environments to be further degraded.<sup>132</sup> The Minister seemed to have no clear plans for the future, beyond indicating he would evaluate the findings of the consultation “with a view to designating towards the end of the summer or into the autumn”.<sup>133</sup> This delay appears to stem, in part, from a fear of judicial review. The Minister expressed concerns about leaving the process open to being “buried in the courts”,<sup>134</sup> although he insisted that he had not been “closeted with Defra’s lawyers on this”.<sup>135</sup> We were disappointed to hear that he could not “say precisely when the next tranche will be announced”.<sup>136</sup> ***We were pleased to hear that the Minister is keen to move the Marine Conservation Zone process forward, but we have not seen this intention translated into action. The Minister should not let his priorities be set by fear of judicial review. Further delay to the process perpetuates the uncertainty that has already been damaging to the Marine Conservation Zone project. We recommend that Government set out a clear timetable for designation of this tranche and future tranches of Marine Conservation Zones, with a clear commitment to an end date by which the ecologically coherent network of marine protected areas, as the Marine and Coastal Access Act 2009 requires, will be established.***

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<sup>130</sup> Q 243 [Charles Clover]

<sup>131</sup> Q 259 [Charles Clover]

<sup>132</sup> Q 3, Q 42 [Joan Edwards]

<sup>133</sup> Q 337 [Richard Benyon]

<sup>134</sup> Q 322 [Richard Benyon]

<sup>135</sup> Q 323 [Richard Benyon]

<sup>136</sup> Q 336 [Richard Benyon]

## 4 Marine data collection

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### Current knowledge

36. One of the key issues that was raised in our discussions on Marine Conservation Zones was the lack of information currently available about the marine environment around the UK, both in coastal and offshore areas. The UK's marine area covers almost 3.5 times its terrestrial equivalent, but there is a shortage of reliable habitat data to facilitate policy development. Only between 10% and 20% of the UK continental shelf is said to have been mapped in detail by survey and observations.<sup>137</sup> This lack of understanding will only become more significant as the Government tries to develop marine plans, select Marine Conservation Zones, and implement the EU Marine Strategy Framework Directive, since these need to be underpinned with scientific evidence.<sup>138</sup> Such evidence requires significant data collection. We were interested to hear about work at the British Oceanographic Data Centre in Liverpool, which provides a national centre for storing and sharing marine data.<sup>139</sup> However, despite extensive commercial activity, systematic collection of such data appears to be confined to the public sector. In this chapter we consider two issues that were raised during our inquiry: the use of data collected in commercial operations and the difficulties establishing long-term monitoring programmes. We then turn to an important emerging possibility: the potential for autonomous vehicles to contribute to more extensive data collection in the future.

### Commercial operations

37. Publicly-funded scientists are not the only group researching the marine environment—marine industries carry out considerable activity in UK waters which requires them to collect environmental data. Indeed, the Minister told us that industry collects “enormous” amounts of data around the UK.<sup>140</sup> In a relatively recent development, some of this, in the form of environmental statements, is made publically available by the Marine Management Organisation. We were pleased to hear James Cross, CEO of the Marine Management Organisation, report that industry had been happy to cooperate with it in this initiative.<sup>141</sup>

38. Despite these steps, many of our witnesses argued that industry could go further with regards to sharing its data. We heard that the development of policies to make more data publicly available would be “good for the future of governance of the UK marine environment”.<sup>142</sup> This is because data collected when, for example, laying cables at sea or

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<sup>137</sup> <http://www.parliament.uk/business/publications/research/briefing-papers/POST-PN-388> and Q 149 [Dr Williamson]

<sup>138</sup> Q 86 [Phil Durrant]

<sup>139</sup> <http://noc.ac.uk/data/british-oceanographic-data-centre>

<sup>140</sup> Q 316 [Richard Benyon]

<sup>141</sup> Q 301 [James Cross]

<sup>142</sup> Q 7 [Dr Solandt]

installing offshore wind turbines, could be “highly relevant to much more than just the developments themselves”.<sup>143</sup> As Professor Hill, NERC, explained:

There are some areas where data that are collected for industry—for example, as an obligation as part of licensing for baseline surveys and so forth—would be of much greater value to the industry collectively, to the public good, the regulators, and to scientists if they were somehow pooled and put together. For example, you can imagine how seabed and habitat maps might be stitched together into a more coherent picture of the UK seas as a public good. There is a case to be made as to the condition of some of the licences for those activities in relation to that kind of data, which probably is ultimately not of great commercial value and the public good value is much greater, including the good to the industry sector as a whole.<sup>144</sup>

39. However, representatives from marine industries were more cautious. Phil Durrant, North Sea Marine Cluster, urged “we have to be mindful of who is paying for that data collection” and highlighted the commercial sensitivity of some data sets.<sup>145</sup> The issue of sensitivity may be particularly important to developing industries.<sup>146</sup> As Professor Rayner, IMarEST, put it:

If you look at the example of the oil and gas industry, that started with exactly the same view. Everything they collected they regarded as proprietary and were very reluctant to put into the public domain. That view has changed profoundly in the last decade, because there has been a recognition of the benefit of pooling it for all sorts of reasons, and a recognition that it is not core to the business of the oil and gas industry. The marine renewables sector is a little more difficult. The measurements they make of wind are very core to their competitive position and that is part of what drives their reluctance, but it is also an issue of maturity. I think that as that industry matures it will see the benefit of sharing.<sup>147</sup>

40. The Minister told us “there is an enormous amount of data that is not commercially sensitive, and we have got to be better about harvesting that for the greater good”.<sup>148</sup> Indeed, Professor Boyd, Chief Scientific Adviser, stated:

For example, there are many ships from the marine industry passing through our waters running multi-beam sonar systems. The data are very often not collected. It would be relatively straightforward to collect those data. In fact, if you look at Scotland’s marine atlas, [...] on the front of it is a compendium of Scotland’s seas that is produced from the fishing industry, because fishing boats are running with echo sounders almost all the time. Some of those data are recorded, and if you pull all that together you can get a very high-resolution map of the coastal waters. We have to be a lot cleverer about how we obtain and use data, and then verify that those data are

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<sup>143</sup> Q 7 [Alec Taylor]

<sup>144</sup> Q 167 [Professor Hill]

<sup>145</sup> Q 77 [Phil Durrant]

<sup>146</sup> Q 78 [Phil Durrant]

<sup>147</sup> Q 77 [Professor Rayner]

<sup>148</sup> Q 316 [Richard Benyon]

correct. There is a major job to be done there in terms of data processing and management as much as anything else, and engaging with the stakeholders who are potentially collecting those data.<sup>149</sup>

James Cross told us that this was something the Marine Management Organisation intended to pursue,<sup>150</sup> but he was unsure whether he had the remit to enforce further measures.<sup>151</sup> **We support the Marine Management Organisation in their efforts to encourage data sharing from industry. We agree with Professor Boyd’s assessment that “we have to be a lot cleverer” about using the data that is out there already to improve our understanding of our marine environment. Whilst we recognise there is work underway to address this issue, we consider that this could go further. We recommend that the Government works with the Marine Management Organisation to bring forward proposals that would make sharing of more data collected at sea, particularly seabed and habitat maps, as well as wind data, a licensing condition on commercial activity in UK waters. We recognise that this may have to contain caveats relating to genuinely commercially sensitive information.**

## Long term monitoring

41. Our discussions about the effect of climate change on the marine environment highlighted the importance of data sets that can document environmental change over a long-term period. For example, Professor Rodger, British Antarctic Survey, told us “we are still miles away from understanding the ocean itself. We are under-sampling the ocean, in my view, in a significant way, given that it moves 90% of the heat round the planet”.<sup>152</sup> To effectively monitor the effects of climate change on the oceans, “the core issue is sustainability in terms of regular data collection”.<sup>153</sup> An example of such a project is the international Argo programme (see Box 4).<sup>154</sup> However, there appear to be a number of difficulties collecting and maintaining such data as well as concerns that long-term monitoring programmes “are in danger of being ignored”.<sup>155</sup> We consider here both NERC and Government support for long term monitoring programmes.

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<sup>149</sup> Q 341 [Professor Boyd]

<sup>150</sup> Q 301 [James Cross]

<sup>151</sup> Q 306 [James Cross]

<sup>152</sup> Q 196 [Professor Rodger]

<sup>153</sup> Q 96 [Professor Rayner], Q 122 [Professor Sharples]

<sup>154</sup> See, for example, Q 102 [Professor Rayner], Q 103 [Professor Rayner], Q 122 [all] and Ev 105

<sup>155</sup> Ev 106 para 6

**Box 4: The Argo Programme**

Argo is an array of floating devices that provide observations from the oceans. The floats measure temperature, salt content and pressure between the ocean surface and 2000 metres depth. The array is made up of over 3500 floats with an average spacing of around three degrees in latitude and longitude (approximately 300km). This programme aims to provide data describing conditions in the upper ocean, which can be used to improve satellite monitoring of the oceans, measure the effects of climate change on the ocean over seasons or decades, and improve ocean-atmosphere coupling or forecast models.<sup>1</sup> The UK currently provides approximately 4-5% of the array.

Floats are deployed from a ship. After deployment they remain at the surface for six hours to collect 'house-keeping' data before sinking to a 'drifting' depth of 1000 metres. They remain at 1000 metres depth for nine days before descending to 2000 metres. Thereafter the float ascends back to the surface, recording temperature, salinity and pressure as it does so. The information collected is transmitted to a satellite, which determines its position. This cycle is repeated approximately every ten days.

The UK's contribution to Argo is funded by the Department of Energy and Climate Change, the Ministry of Defence and NERC. It is carried out by the Met Office, National Oceanography Centre, British Oceanographic Data Centre and UK Hydrographic Office. All the information collected by Argo is freely available in real-time.

Argo is a significant source of data for improving our understanding of the effect of climate change on the oceans. Despite its importance, we heard that funding for the programme from the UK is "rather piecemeal",<sup>1</sup> "not a sustained guaranteed input"<sup>2</sup> and "below the proportion that you would expect in relation to UK GDP."<sup>3</sup> A lack of sustained support caused problems retaining the skills to maintain such data sets. Difficulties securing sustained funding arose partly from a lack of coordination, as "it is not clear where that responsibility should lie. It lies across more than one Department, and there is a tendency for it to be passed from pillar to post."<sup>4</sup> It seems clear "there is an issue with sustained observations".<sup>5</sup>

1 Q 102 [Professor Rayner]

2 Q 102 [Professor Rayner]

3 Q 102 [Professor Rayner]

4 Q 103 [Professor Rayner]

5 Q 122 [Professor Sharples]

42. NERC provides funding for long-term monitoring programmes through its national capability funding stream.<sup>156</sup> Professor Hill, NERC, insisted that "long-term observing is crucial to what we do",<sup>157</sup> yet he also told us that NERC is "thinning out the frequency of observing in some of our programmes".<sup>158</sup> In contrast, we heard from others that NERC "is not really in the business of long-term operational measurements", unless they are a by-product of other interesting science.<sup>159</sup> In particular, the changeable nature of NERC funding programmes was reported to be problematic as "programmes tend to get funded

<sup>156</sup> Q 166 [Professor Hill]

<sup>157</sup> Q 173 [Professor Hill]

<sup>158</sup> Q 154 [Professor Hill]

<sup>159</sup> Q 122 [Dr Williamson]

for two, three maybe five years at a time, so you keep hitting these cliff edges”.<sup>160</sup> As a result, developing expertise in the field “is very difficult to do if you cannot constantly look ahead and plan, if you are constantly wondering what funding model is going to be used now and whether they going to scrap this whole programme”.<sup>161</sup> We are concerned that such difficulties could be made worse by NERC’s increasing emphasis on competitively won funding modes.

43. The Minister recognised that “clearly there should be a fully coordinated programme of marine monitoring”.<sup>162</sup> The Marine Science Coordination Committee has made efforts to address the issue of long-term monitoring through its working group on the subject. For example, the UK Integrated Marine Observing Network was described to us as an “embryonic capability to coordinate” long-term data streams.<sup>163</sup> However, a former member of this working group told us that it “had incredibly ambitious targets that could not be met with the resources” available.<sup>164</sup> So despite “good intentions”, the problems associated with funding long-term monitoring proved “just too insurmountable”.<sup>165</sup> Governments, and agencies such as NERC, appear to struggle to make long-term commitments to these programmes, treating them as research projects rather than viewing such data as “fundamental core infrastructure”.<sup>166</sup> We were pleased to hear that Professor Sir John Beddington, Government Chief Scientific Adviser, is “looking at the national infrastructure required in order to sustain long-term monitoring of things like ocean pH, ocean temperature and ocean salinity.”<sup>167</sup> Professor Boyd, Defra’s Chief Scientific Adviser, summarised the issue as follows:

We have to get the balance of the investments right on this. With respect to marine, the costs of doing this are very large indeed. We also have legacy issues to deal with, which involve some very long and excellent datasets. We have to make decisions about whether those long and excellent datasets are the sorts of things we need in the future. Do we need new parameters to be measured and where do we get the resources for that? There are some quite difficult strategic decisions to be made. I think the MSCC is an appropriate forum in which to make those decisions.<sup>168</sup>

He suggested the MSCC should “challenge our marine scientists with the question, Are we measuring the right parameters in the right way and are we doing that in a technologically developed and modern manner?”<sup>169</sup> **We welcome Sir John Beddington’s work on the issue of long-term monitoring programmes, which are of particular importance to understanding long-term environmental change in the marine environment. We encourage Sir Mark Walport to continue to be involved in these efforts. We consider**

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<sup>160</sup> Q 115 [Professor Sharples]

<sup>161</sup> Q 226 [Dr Frost]

<sup>162</sup> Q 314 [Richard Benyon]

<sup>163</sup> Q 92 [Professor Rayner]

<sup>164</sup> Q 207 [Dr Frost]

<sup>165</sup> Q 239 [Dr Frost]

<sup>166</sup> Q 98 [Professor Rayner]

<sup>167</sup> Q 346 [Professor Boyd]

<sup>168</sup> Q 346 [Professor Boyd]

<sup>169</sup> Q 347 [Professor Boyd]

that there are shortcomings in both the Government's and NERC's support for long-term monitoring and we are concerned that the UK's capability in this field appears to be being cut back. *The Marine Science Coordination Committee should meet with Sir Mark Walport within his first six months in office as Government Chief Scientific Adviser to discuss long-term monitoring. We recommend that the Committee produce an action plan to address this issue and answer the strategic questions posed by Professor Boyd about how we measure the right parameters in a technologically developed manner.*

## Autonomous underwater vehicles

44. We were interested to hear about the developing technologies that were enabling data collection at sea, particularly autonomous underwater vehicles. These are robotic vehicles carrying a range of sensors, which can be controlled remotely as they travel underwater. Fifty four such vehicles are currently in operation around Antarctica and are “a fantastic way to begin to resolve some of the simple things, like understanding seasonal variations”.<sup>170</sup> NERC has been “investing quite heavily” in these technologies “in the hope that this could make observing systems cheaper or more efficient”.<sup>171</sup>

45. Professor Boyd, Defra's Chief Scientific Adviser, suggested that “in the UK, we have a lot of the components to turn robotics into a marine success story for us”.<sup>172</sup> He suggested that working with the Technology Strategy Board, which advises Government on removing barriers to innovation,<sup>173</sup> could help achieve this success.<sup>174</sup> Despite this investment, and the technologies that are being developed at the National Oceanography Centre in Southampton, we were concerned by suggestions that the UK was currently “weakly positioned” and at risk of losing its position in the global market for these vehicles.<sup>175</sup> This is partly a result of the difficulty establishing “effective conduits” between the research community driving innovation and industry commercialising that innovation.<sup>176</sup>

46. **We agree with Professor Boyd that priority should be given to harnessing the potential of autonomous underwater vehicle technologies. We were particularly interested in this issue in light of our recent work on the commercialisation of research. This area of innovation should be a focus of attention within the Technology Strategy Board. It could also be used to provide a forum for the Marine Science Coordination Committee to begin to improve its engagement with industry. We recommend that the Marine Science Coordination Committee engages with the Technology Strategy Board on the issue of developing autonomous underwater vehicles.**

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<sup>170</sup> Q 201 [Professor Rodger]

<sup>171</sup> Q 166 [Professor Hill]

<sup>172</sup> Q 352 [Professor Boyd]

<sup>173</sup> <http://www.innovateuk.org/aboutus.ashx>

<sup>174</sup> Q 352 [Professor Boyd]

<sup>175</sup> Q 55 [Professor Rayner]

<sup>176</sup> Q 53 [Professor Rayner]

## 5 Conclusion

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47. Marine science is crucial to a growing number of Government initiatives, yet our understanding of the marine environment remains patchy. Given current resource restrictions, the UK must be clever about how we advance our understanding of the marine environment and improve our capability in marine science. The Government's approach to marine science and the marine environment lacks focus and, despite publication of the Marine Science Strategy, lacks strategic direction. The Marine Science Coordination Committee lacks clear a clear plan or levers to achieve its objectives and needs to start delivering results.

48. The complicated and protracted process to select Marine Conservation Zones highlights the Government's lack of focus. The Marine and Coastal Access Act passed with strong support from the public and Parliament, yet it has taken three years to reach a point where 31 zones are being consulted on for designation at an unspecified time, with management measures yet to be decided. The uncertainties caused by these delays and the lack of clarity in this process create anxiety and risks undermining public support for the project.

49. Changes to NERC funding streams could be inadvertently undermining support for strategic marine research. NERC should consider what impact restructuring its research funding towards competitive modes has had on its support for marine science and whether there are sufficient opportunities for marine scientists to bid for funding in the competitive modes. It is important that staff should be able to carry out strategic work without disadvantaging their academic careers.

50. Maintaining observations of the marine environment is essential to record changes to the environment, particularly those arising from climate change or ocean acidification.<sup>177</sup> Such data collection, particularly from long-term monitoring programmes, should be an essential component of the Government's strategy for marine science. The Marine Management Organisation and the Government need to go further in pressing industry to share more of their data. Efforts by the UK-Integrated Marine Observing Network,<sup>178</sup> and the British Oceanographic Data Centre, in Liverpool<sup>179</sup> to improve long-term monitoring are promising, but long-term monitoring should not be sidelined to individual projects. This monitoring should be considered core infrastructure. Defra and NERC should provide clear, long term commitment of their support of these initiatives.

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<sup>177</sup> Ev w3 para 4, Ev 99 para 6.1

<sup>178</sup> Ev 97 para 1.3

<sup>179</sup> <http://www.bodc.ac.uk/>



# Conclusions and recommendations

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## The UK Marine Science Strategy

1. We welcome the establishment of the UK Marine Science Strategy. However, if the Strategy is to help the Government achieve its vision of “clean, healthy, safe, productive and biologically diverse oceans and seas”, further work is needed to translate its high level goals into substantive outcomes. We recommend that the Government set out an implementation plan for the UK Marine Science Strategy, with a timetable that articulates expected outcomes at intervals over the next ten years, and how success will be measured. This should be updated on an annual basis. (Paragraph 7)

## Marine Science Coordination Committee

2. We recommend that Defra includes the evidence submitted to this inquiry regarding the work of the MSCC when considering areas for improvement, such as its membership, resources, and focus on outcomes. The Government should set out a clear timetable for the current review and publish its results on the MSCC website alongside an action plan to address its findings. We note that the Minister has identified the absence of permanent industry representation as a weakness in the MSCC’s operations and we recommend that a seat for an industry representative on the MSCC be identified within three months. (Paragraph 12)

## NERC support for marine science

3. We understand the difficulties that NERC faces in prioritising its resources at a time of limited funding. However, we are concerned about the potential for current reprioritisation measures to undermine the UK’s long-term capability in marine and polar science. Marine and polar science should not suffer from structural changes to funding mechanisms. These sciences are particularly dependent on the maintenance of extensive or large scale facilities, sometimes operating over long periods of time. NERC should therefore ensure there is adequate provision for research centres that depend on its national capability resources within its funding portfolio. (Paragraph 16)

## Use of scientific evidence

4. The Government appears to have moved the goalposts during the Marine Conservation Zone designation process, to require robust evidence showing the presence or extent of marine features rather than the best available evidence reflecting our current understanding of the marine environment. We support the principle that Marine Conservation Zones should be based on sound scientific evidence. We consider that the Government should adhere to its standard of best available evidence, as set out in its initial Marine Conservation Zone guidance, that “network design should be based on the best information currently available” and

“lack of full scientific certainty should not be a reason for postponing proportionate decisions on site selection”. (Paragraph 23)

### Management measures

5. We are not convinced that the issues of what to conserve and how to conserve it can be separated as easily as the Minister suggests, particularly in a stakeholder-driven process with negotiations happening at a local level to decide which sites should be chosen to be protected on the basis of their biological importance and socio-economic impact. People need to understand what Marine Conservation Zones mean for their lifestyles and livelihoods. The absence of a substantive discussion on likely management measures perpetuates uncertainty, undermines local support for Marine Conservation Zones and creates room for scare-mongering. We recommend that the Government produce a clear statement on how management measures will be decided and tailored to specific Marine Conservation Zones, alongside a clear timetable showing when these will be discussed. (Paragraph 28)

### Defra’s current consultation

6. There is a lack of clarity regarding why the proposed 31 Marine Conservation Zones were selected for designation first, despite the JNCC and Natural England’s advice that 59 sites, 51 of which are not included in the first tranche, are currently at high risk of further damage. The Government should set out the reasons for not putting these sites forward for consultation and outline action being taken to prevent further damage to these areas as the Marine Conservation Zone process continues. We agree with the principle that socio-economic concerns should be taken into account when designating Marine Conservation Zones. We recognise that it is difficult to balance socio-economic and scientific concerns. However, at present it is not clear why certain sites are being progressed and others not. Given that the weight given to socio-economic concerns compared to scientific evidence is a political judgement, we recommend that the Government should publish the criteria being used by Defra to select sites for conservation. (Paragraph 32)

### Next steps

7. We are concerned that a clear vision for Marine Conservation Zones has not been articulated by the Government. We recommend that it does so in the response to this report. (Paragraph 33)
8. We were pleased to hear that the Minister is keen to move the Marine Conservation Zone process forward, but we have not seen this intention translated into action. The Minister should not let his priorities be set by fear of judicial review. Further delay to the process perpetuates the uncertainty that has already been damaging to the Marine Conservation Zone project. We recommend that Government set out a clear timetable for designation of this tranche and future tranches of Marine Conservation Zones, with a clear commitment to an end date by which the ecologically coherent network of marine protected areas, as the Marine and Coastal Access Act 2009 requires, will be established. (Paragraph 34)

## Commercial operations

9. We support the Marine Management Organisation in their efforts to encourage data sharing from industry. We agree with Professor Boyd's assessment that "we have to be a lot cleverer" about using the data that is out there already to improve our understanding of our marine environment. Whilst we recognise there is work underway to address this issue, we consider that this could go further. We recommend that the Government works with the Marine Management Organisation to bring forward proposals that would make sharing of more data collected at sea, particularly seabed and habitat maps, as well as wind data, a licensing condition on commercial activity in UK waters. We recognise that this may have to contain caveats relating to genuinely commercially sensitive information. (Paragraph 40)

## Long term monitoring

10. We welcome Sir John Beddington's work on the issue of long-term monitoring programmes, which are of particular importance to understanding long-term environmental change in the marine environment. We encourage Sir Mark Walport to continue to be involved in these efforts. We consider that there are shortcomings in both the Government's and NERC's support for long-term monitoring and we are concerned that the UK's capability in this field appears to be being cut back. The Marine Science Coordination Committee should meet with Sir Mark Walport within his first six months in office as Government Chief Scientific Adviser to discuss long-term monitoring. We recommend that the Committee produce an action plan to address this issue and answer the strategic questions posed by Professor Boyd about how we measure the right parameters in a technologically developed manner. (Paragraph 43)

## Autonomous underwater vehicles

11. We agree with Professor Boyd that priority should be given to harnessing the potential of autonomous underwater vehicle technologies. We were particularly interested in this issue in light of our recent work on the commercialisation of research. This area of innovation should be a focus of attention within the Technology Strategy Board. It could also be used to provide a forum for the Marine Science Coordination Committee to begin to improve its engagement with industry. We recommend that the Marine Science Coordination Committee engages with the Technology Strategy Board on the issue of developing autonomous underwater vehicles. (Paragraph 46)

# Formal Minutes

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**Monday 25 March 2013**

Members present:

Andrew Miller, in the Chair

Jim Dowd  
Stephen Metcalfe

Sarah Newton  
Graham Stringer

Draft Report (*Marine science*), proposed by the Chair, brought up and read.

*Ordered*, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 50 read and agreed to.

Annexes and Summary agreed to.

*Resolved*, That the Report be the Ninth Report of the Committee to the House.

*Ordered*, That the Chair make the Report to the House.

*Ordered*, That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No. 134.

Written evidence was ordered to be reported to the House for printing with the Report (in addition to that ordered to be reported for publishing on 24 November 2012).

Written evidence was ordered to be reported to the House for placing in the Library and Parliamentary Archives.

[Adjourned till Wednesday 17 April at 9.30 am]

# Witnesses

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## Wednesday 28 November 2012

Page

**Joan Edwards**, Head of Living Seas, The Wildlife Trusts,  
**Alec Taylor**, Marine Policy Officer, RSPB, and **Dr Jean-Luc Solandt**, Senior  
 Diversity Policy Officer, Marine Conservation Society

Ev 1

## Wednesday 5 December 2012

**Phil Durrant**, Managing Director, Gardline Environmental Limited  
 (representing the North Sea Marine Cluster), **Professor Ralph Rayner**,  
 Institute of Marine Engineering, Science and Technology (IMarEST), and  
**Richard Burt**, Chair, Association of Marine Scientific Industries (AMSI)  
 Council

Ev 10

**Dr Phillip Williamson**, Science Coordinator, UK Ocean Acidification Research  
 Programme, **Professor Jonathan Sharples**, Research Centre for Marine  
 Sciences and Climate Change, Liverpool University, and, **Dr Stephen Dye**,  
 Marine Climate Change Impacts Partnership (MCCIP)

Ev 18

## Wednesday 12 December 2012

**Professor Alan Rodger**, Interim Director, British Antarctic Survey, and  
**Professor Ed Hill**, Director, National Oceanography Centre

Ev 26

## Thursday 20 December 2012 (Tremough Campus, Falmouth University)

**Dr Matthew Frost**, Deputy Director, Policy and Knowledge Exchange,  
 Marine Biological Association, and **Professor Stephen de Mora**, Chief  
 Executive, Plymouth Marine Laboratory

Ev 38

## Wednesday 9 January 2013

**Charles Clover**, Columnist, The Sunday Times

Ev 48

## Wednesday 16 January 2013

**James Cross**, Chief Executive Officer, Marine Management Organisation

Ev 57

**Richard Benyon MP**, Parliamentary Under-Secretary of State for Natural  
 Environment, Water and Rural Affairs, Department for Environment, Food  
 and Rural Affairs, and **Professor Ian Boyd**, Chief Scientific Adviser,  
 Department for Environment, Food and Rural Affairs

Ev 62

## List of printed written evidence

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1	Department for Environment, Food and Rural Affairs	Ev 73
2	Plymouth Marine Laboratory	Ev 97
3	The Wildlife Trusts	Ev 100
4	Marine Biological Association	Ev 102
5	Research Centre for Marine Sciences and Climate Change, Liverpool University	Ev 105, 106
6	RSPB (MS 14)	Ev 108
7	Research Councils UK (prepared by the Natural Environment Research Council)	Ev 111
8	UK Ocean Acidification research programme	Ev 119
9	The Institute of Marine Engineering, Science and Technology (IMarEST)	Ev 123
10	Association of Marine Scientific Industries (AMSI) Council of the Society of Maritime Industries (SMI)	Ev 127
11	Gardline Group	Ev 133
12	Marine Conservation Society (MCS)	Ev 136, 141

## List of additional written evidence

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(published in Volume II on the Committee's website [www.parliament.uk/science](http://www.parliament.uk/science))

1	Dr Peter J S Jones	Ev w1
2	Professor Andrew Watson, University of East Anglia	Ev w3
3	Marine Climate Change Impacts Partnership (MCCIP)	Ev w5
4	Dr David J Webb (MS 04)	Ev w9
5	Studland Bay Preservation Association (MS 05)	Ev w10
6	Dr Michael John Simons (MS 06)	Ev w12
7	British Geological Survey (MS 07)	Ev w16
8	Boat Owners Response Group (MS 09)	Ev w18
9	Captain Alex Gibbons (MS 10)	Ev w21
10	Professor Harry L Bryden (MS 15)	Ev w23
11	English Heritage (MS 17)	Ev w25
12	Society for Underwater Technology (MS 21)	Ev w28
13	Scottish Environment Protection Agency (SEPA) (MS 23)	Ev w31
14	The Geological Society of London (MS 24)	Ev w32
15	Marine Alliance for Science and Technology Scotland (MASTS) (MS 25)	Ev w35
16	Energy UK (MS 26)	Ev w38
17	North Sea Marine Cluster (MS 28)	Ev w41
18	Met Office (MS 31)	Ev w43
19	Royal Yachting Association (MS 38)	Ev w46

## List of unprinted evidence

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The following written evidence has been reported to the House, but to save printing costs has not been printed and copies have been placed in the House of Commons Library, where they may be inspected by Members. Other copies are in the Parliamentary Archives ([www.parliament.uk/archives](http://www.parliament.uk/archives)), and are available to the public for inspection. Requests for inspection should be addressed to The Parliamentary Archives, Houses of Parliament, London SW1A 0PW (tel. 020 7219 3074; email [archives@parliament.uk](mailto:archives@parliament.uk)). Opening hours are from 9.30 am to 5.00 pm on Mondays to Fridays.

Marine Management Organisation (MMO)

## List of Reports from the Committee during the current Parliament

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The reference number of the Government's response to each Report is printed in brackets after the HC printing number.

### Session 2012–13

First Special Report	Science in the Met Office: Government Response to the Committee's Thirteenth Report of Session 2010–12	HC 162
First Report	Devil's bargain? Energy risks and the public	HC 428 (HC 677)
Second Report	Pre-appointment hearing with the Government's preferred candidate for Chair of the Medical Research Council	HC 510–I
Second Special Report	Engineering in government: follow-up to the 2009 report on Engineering: turning ideas into reality: Government Response to the Committee's Fifteenth Report of Session 2010–12	HC 511
Third Report	The Census and social science	HC 322 (HC 1053)
Fourth Report	Building scientific capacity for development	HC 377 (HC 907)
Fifth Report	Regulation of medical implants in the EU and UK	HC 163 (Cm 8496)
Sixth Report	Proposed merger of British Antarctic Survey and National Oceanography Centre	HC 699 (HC 906)
Third Special Report	Devil's bargain? Energy risks and the public: Government Response to the Committee's First Report of Session 2012–13	HC 677
Fourth Special Report	Building scientific capacity for development: Government and UK Collaborative on Development Sciences Response to the Committee's Fourth Report of Session 2012–13	HC 907
Fifth Special Report	Proposed merger of British Antarctic Survey and National Oceanography Centre: Natural Environment Research Council Response to the Committee's Sixth Report of Session 2012–13	HC 906
Seventh Report	Educating tomorrow's engineers: the impact of Government reforms on 14–19 education	HC 665
Eighth Report	Bridging the valley of death: improving the commercialisation of research	HC 348
Sixth Special Report	The Census and social science: Government and Economic and Social Research Council (ESRC) Responses to the Committee's Third Report of Session 2012–13	HC 1053



**Session 2010–12**

First Special Report	The Legacy Report: Government Response to the Committee's Ninth Report of Session 2009–10	HC 370
First Report	The Reviews into the University of East Anglia's Climatic Research Unit's E-mails	HC 444 (HC 496)
Second Report	Technology and Innovation Centres	HC 618 (HC 1041)
Third Report	Scientific advice and evidence in emergencies	HC 498 (HC 1042 and HC 1139)
Second Special Report	The Reviews into the University of East Anglia's Climatic Research Unit's E-mails: Government Response to the Committee's First Report of Session 2010–12	HC 496
Fourth Report	Astronomy and Particle Physics	HC 806 (HC 1425)
Fifth Report	Strategically important metals	HC 726 (HC 1479)
Third Special Report	Technology and Innovation Centres: Government Response to the Committee's Second Report of Session 2010–12	HC 1041
Fourth Special Report	Scientific advice and evidence in emergencies: Government Response to the Committee's Third Report of Session 2010–12	HC 1042
Sixth Report	UK Centre for Medical Research and Innovation (UKCMRI)	HC 727 (HC 1475)
Fifth Special Report	Bioengineering: Government Response to the Committee's Seventh Report of 2009–10	HC 1138
Sixth Special Report	Scientific advice and evidence in emergencies: Supplementary Government Response to the Committee's Third Report of Session 2010–12	HC 1139
Seventh Report	The Forensic Science Service	HC 855 (Cm 8215)
Seventh Special Report	Astronomy and Particle Physics: Government and Science and Technology Facilities Council Response to the Committee's Fourth Report of Session 2010–12	HC 1425
Eighth Report	Peer review in scientific publications	HC 856 (HC 1535)
Eighth Special Report	UK Centre for Medical Research and Innovation (UKCMRI): Government Response to the Committee's Sixth Report of session 2010–12	HC 1475
Ninth Report	Practical experiments in school science lessons and science field trips	HC 1060–I (HC 1655)
Ninth Special Report	Strategically important metals: Government Response to the Committee's Fifth Report of Session 2010–12	HC 1479
Tenth Special Report	Peer review in scientific publications: Government and Research Councils UK Responses to the Committee's Eighth Report of Session 2010–12	HC 1535
Tenth Report	Pre-appointment hearing with the Government's preferred candidate for Chair of the Technology Strategy Board	HC 1539–I
Eleventh Special Report	Practical experiments in school science lessons and science field trips: Government and Ofqual Responses to the Committee's Ninth Report of Session 2010–12	HC 1655
Eleventh Report	Alcohol guidelines	HC 1536 (Cm 8329)

Twelfth Report	Malware and cyber crime	HC 1537 (Cm 8328)
Thirteenth Report	Science in the Met Office	HC 1538
Fourteenth Report	Pre-appointment hearing with the Government's preferred candidate for Chair of the Engineering and Physical Sciences Research Council	HC 1871-I
Fifteenth Report	Engineering in government: follow-up to the 2009 report on Engineering: turning ideas into reality	HC 1667 (HC 511, Session 2012-13)

# Oral evidence

## Taken before the Science and Technology Committee on Wednesday 28 November 2012

Members present:

Andrew Miller (Chair)

Jim Dowd  
Stephen Metcalfe  
Stephen Mosley  
Pamela Nash

Sarah Newton  
Graham Stringer  
Hywel Williams  
Roger Williams

### Examination of Witnesses

*Witnesses:* **Joan Edwards**, Head of Living Seas, Wildlife Trusts, **Alec Taylor**, Marine Policy Officer, RSPB, and **Dr Jean-Luc Solandt**, Senior Policy Officer, Marine Conservation Society, gave evidence.

**Q1 Chair:** Good morning. Can I welcome you to our session this morning? It would be helpful, just for the record, if you would be kind enough to introduce yourselves.

**Joan Edwards:** I am Joan Edwards from the Wildlife Trusts.

**Alec Taylor:** I am Alec Taylor from the RSPB.

**Dr Solandt:** I am Jean-Luc Solandt from the Marine Conservation Society.

**Q2 Chair:** Thank you very much. The recommendations for marine conservation sites, we are told, are based on scientific evidence. Are you satisfied that that evidence is strong enough?

**Joan Edwards:** Perhaps we ought to take a step back from getting into the detail of the science. The Marine and Coastal Access Act set about the creation of an ecologically coherent network of marine protected areas, including marine conservation zones, based on best available information. One of the issues we have always been concerned about is that, with the marine environment, you can't always know exactly what is there in exactly the right place. The level of information is always lower than perhaps you have on land, but we know that the marine environment is deteriorating. On an annual basis there are reports saying that there is more damage happening. Generally, we feel that there is enough evidence of damage. We have international requirements to set up a coherent network of marine protected areas and we have to do it now based on what we know. We could spend another 20 years gathering information. The point is, as we said, that the Act said, "Establish a network but establish it on best available information."

**Alec Taylor:** Yes. I think "best available" is exactly what the MCZ process was set out to use. It is a very different process from that which is used for designating European marine sites, which is very much a top-down, science-led process. The marine conservation zone process is a stakeholder-led, consensus-based project using a vast range of both ecological and socio-economic evidence. It could only reasonably expect to be able to use the best available evidence at the time in order to select its sites. Natural England and JNCC both agree that that is what

happened, that the regional projects did use the best available evidence and there is no reason now to delay the designation of the network.

**Dr Solandt:** To add to that, in 2009 we sat in a similar situation asking ourselves as a society whether we wanted to have more healthy and more productive seas. The Government's advice from their own scientific studies, through the "Charting Progress" reports, shows evidence as to decline, particularly from habitats that are affected by bottom-trawl fisheries in the wider seas. We have come through an incredibly in-depth process involving possibly 6,000 in-depth interviews with stakeholders, which has used the scientific information that is currently available to designate sites. This is as much science-led as it is stakeholder-led to achieve consensus and good management. The European marine sites process is top-down and, by European decree, has to protect the best features, but this was allowing stakeholders to a large degree to look at where sites might be set up. So we are in a process that is very different from a purely scientific process here.

**Q3 Chair:** Is there not a danger that people who are not so convinced of the argument are going to say to you, "Hang on a minute, there is only a high level of confidence in the Natural England report for 41% of the features"? There must be gaps in the evidence base. How do we fill those and ensure that there is widespread acceptance of the quality of the data?

**Joan Edwards:** Perhaps I can answer two things there. First, we work with a lot of sea users. In fact, we have just agreed a statement with the sea users development group where they say they would like all 127 marine conservation zones designated as soon as possible because they want certainty. Industry doesn't like this ongoing consultation. I remember giving evidence to the Environmental Audit Committee—possibly 11 years ago—when I sat with the sea users group and we talked about having marine protected areas. They took part in the whole of the regional network projects for about four years, and then we had another delay from November last year when the Minister said that we must gather more information. So it has been another year.

Industry is saying, “We want to know where the 127 are and we want to know how they are going to be managed. Therefore we can get on with our jobs.” That is a very strong message. It is not just the conservationists who are saying, “Get on with the job”; industry is saying that as well because it wants certainty.

**Q4 Chair:** You are saying it is not important that the gaps are filled in the evidence.

**Joan Edwards:** No. We should always collect data on the marine environment, but it should not stop us designating marine protected areas.

**Dr Solandt:** Can I add a bit of qualification to that? Where you are seeing the evidence of high to moderate confidence is for the features that are much more widespread, such as the sedimentary habitats. Where the evidence is possibly lacking, in some of the more offshore rocky habitats, there is still, on an area basis, a large degree of confidence that those sites have mostly a sedimentary habitat base. Even though there might be some discretion between the high, moderate and low confidence, we can be certain that a lot of the sites will be known in terms of their habitat composition in the majority of their area.

**Q5 Chair:** In the written evidence of both the RSPB and the Marine Conservation Society, you talked about a lack of investment in marine science and data collection. How much further investment is needed and where do you think this should come from?

**Alec Taylor:** We have made the call consistently, even before the marine conservation zone process started, that there has been a significant underinvestment in marine data collection. That has caused delays not just in selecting marine protected areas but also in getting appropriate developments in the marine environment.

**Q6 Chair:** Is it the lack of data being collected or the lack of availability of data?

**Alec Taylor:** I think both are reasonable issues. We have to address both issues. In my opinion there are three stages to this process of acquiring better quality information. First of all, we have to make the best use of what we have at the moment. We have to better integrate the information that is collected in order to identify where the gaps are.

**Q7 Chair:** As an example, I have had a complaint about data not being made available from some wind farms on the grounds that it is “commercial in confidence”. Given that we have licensed the wind farms and the direction of the wind is not exactly a secret, the idea that that is “commercial in confidence” seems a bit crass, doesn’t it?

**Alec Taylor:** I would have to agree with you. The work that developers are doing in collecting vast amounts of very important data inside their zones, both pre and post-construction monitoring, is highly relevant to much more than just the developments themselves. It can be used for a whole range of different applications.

**Dr Solandt:** The difference between September 2011—when we had the Science Advisory Panel’s report saying there is further evidence out there—and,

hopefully, the time the consultation is released is that there has a data-mining exercise that pulls some of these databases together. At every single conference I go to on data in the marine environment people say, “Can’t we publicly access data even with commercial contracts after a given period, after publication?” It would be good for the future of governance of the UK marine environment if we had policies based on the public availability of data that were commercially of interest at the time of development. That may be something at which we should look at a higher Government level.

**Joan Edwards:** We have recently taken part in the habitats regulations review, which started at the beginning of this year. The marine evidence group of that review has made a recommendation to DEFRA that, in future, data should be made publicly available when public money is paid for licensing. I understand the Crown Estate is now going to make that a condition of licence. In future, if a wind farm does gather data, those data will have to be made public.

**Q8 Stephen Metcalfe:** Good morning. There is no doubt that the designation of marine conservation zones has the potential to have a huge impact on the access and use of our coastal waters. Why do you think the Minister moved away from saying that he just wanted the best available evidence to more robust scientific evidence? Could you define what the difference is between those two technically?

**Dr Solandt:** We started the stakeholder process with “best available information”, which means the information that is to hand that is being mapped. I was involved in all 12 meetings in the “Balanced Seas” process where we were offered that data on a screen to show the layers of habitats on the seabed, and then we could find out by drawing polygons around the sites how much we were achieving of our targets to protect a representative portion of the UK seas. That used the REC data that was available to the project at the time, which was Government policy, which we all understood was not necessarily the most robust data set. Halfway through the period of the project there was a challenge to the designation of some European marine sites, particularly in the south-west, which resulted in a Government review of the scientific process and evidence required to set up European marine sites. That process, we feel, has affected the policy of how marine conservation zones are designated and set up, which is a much more stakeholder and bottom-up-driven process.

We feel that Government policy has moved away from one process, and we are potentially going to lose sites—though I hope not—that have a lot more stakeholder involvement and buy-in but which might lack a bit more of the scientific rigour, because of a change in policy based on a completely different process. European marine sites have a much more stringent scientific process. We are concerned about that and hope we will still see a significant network.

**Joan Edwards:** I totally agree with J-L. We were very concerned that basically the goalposts were changed just as the regional stakeholder projects were about to complete. We had gone through three years of consultation with over 1 million stakeholders using

“best available information”, then suddenly, out of the blue, a document was published that basically said, “We need better evidence”. But we have had better evidence since then, because last November the Minister made a statement that he felt there was some evidence lacking and the Government were able to spend £5.5 million on extra surveys and extra desk studies. All of that work, we believe, has now reported into DEFRA and hopefully will be part of the consultation. In terms of marine science, £5.5 million is a lot of money.

**Q9 Stephen Metcalfe:** You think that has improved the evidence base considerably, or has the potential to.

**Joan Edwards:** We have not seen the reports or the data, but we have spoken first-hand to some of the people who took part in the surveys and we do know that they were able to find significant evidence of the features that they were looking for.

**Q10 Stephen Metcalfe:** What is the role of the Science Advisory Panel in this new work that is being done?

**Joan Edwards:** The Science Advisory Panel stopped meeting and working at the end of the regional stakeholder projects. They were independent, very influential and very experienced marine scientists, and they were set up to ensure that the Ecological Network Guidance that was published at the beginning of the projects was adhered to and implemented. At the end of the regional projects they looked at the regional project recommendations and made comments on that as part of the process. The most important conclusion that they came to was that, to reach ecological coherence, all 127 marine conservation zones should be designated.

**Q11 Stephen Metcalfe:** You said, I think, in your opening answer to the Chairman that there is increased evidence of damage. Is that evidence that is based on best available data or is it based on robust science? Or is it one of each?

**Joan Edwards:** It is probably one of each. When Natural England and JNCC made their recommendations in July this year, they suggested that 59 of the 127 marine conservation zones were at risk. We do actually have evidence of one of those sites being damaged last winter by scallop dredging in the North sea. We had actual evidence for one site. That is from the Wildlife Trusts, but obviously the statutory nature conservation body is suggesting that, of the 127, 59 are at risk at the moment.

**Q12 Hywel Williams:** Can I first declare an interest in that I am a member of Ymddiriedolaeth Ynys Enlli, which is the Bardsey Island Trust and is outside the subject of our discussion today because it is Wales and MCZs are subject to the Welsh Assembly?

Can I ask you about the scrutiny of the socio-economic evidence for and against selecting the sites during the regional projects? Was the scrutiny sufficient or could it have been done differently?

**Alec Taylor:** In our view, there were certainly cases where the socio-economic evidence was not given the same level of scrutiny or did not require the same

burden of proof as the ecological evidence. There was also the issue of how the socio-economic evidence was used in the selection of the sites themselves.

Throughout the progress of the Marine and Coastal Access Bill, the principle of using socio-economic evidence was that it should be used to distinguish between sites of equal ecological importance and only when ecological network requirements had been met. We feel that in some cases the socio-economic evidence, which we fully support being used as part of the process, was given a high level of influence in the selection of the boundaries themselves. As a result, we have some sites that are either not in the most ecologically important areas or have been reduced, clipped or changed as a result of the socio-economic considerations. In terms of the scrutiny of that evidence in relation to the ecological evidence, we would only ask that the two are consistent. In some cases we would probably say that the socio-economic evidence was largely taken without the same level of rigour as the environmental evidence.

**Dr Solandt:** For example, if I could follow on with that, with some of the sites I know of, I spoke to fishing interest groups. I spoke to Nick Prust in the south-west and discussed some of the sites in the near-shore waters of Cornwall. North Cornwall was not acceptable to his interest group, nor was south of Falmouth. Those were reduced hugely in size and scale because of his interest. We tried to get a site, because of a reef chalk feature, just south-east of Brighton and lobbied long and hard because we had a huge amount of diving data from our diving projects, but that did not get through the process, even though there was very good ecological knowledge. There were other sites in the North sea that were broken up because of cable laying and other commercial interests.

This is not necessarily a criticism of the process. This is the strength of the process in many ways. We had the opportunity to allow these stakeholders to say, “This will really affect our livelihoods.” We can still use this flexible mechanism, this Ecological Network Guidance, to achieve our coherency, which is Government policy. We really hope that these sites go forward, because they have had this very strong process of acceptance.

**Q13 Hywel Williams:** In my own local experience, an area that has been hugely damaged by scallop fishing was excluded because of that commercial interest, and an area where there is sustainable lobster potting—entirely sustainable, and it has been so for many hundreds of years—is actually in. It seems crazy as far as I am concerned.

**Alec Taylor:** It is fair to say that a lot of the burden has fallen on more sustainable local industries at the expense of potentially more damaging commercial activities.

**Q14 Hywel Williams:** If the burden of proof had been higher, would that have affected stakeholder involvement, do you think? Would people have been more wary of involvement?

**Dr Solandt:** I think so; I think they might well have. If they were asked to come to the table with much more stringent data sets, perhaps they would have, and it would have been more difficult to acquire those data sets. Of course, it is of commercial interest for those individuals not to reveal publicly where they might fish, because they know the best grounds, but it could be done through a third party. There was an attempt by one or two of the projects to try and get a very good secure database on fishing activities, particularly in Cornwall, but that evidence was withheld from the project at the last minute because of the fear that it might be used against the fishing industry in that area, which is a shame. But, in saying that, I was impressed—given the difficulties with the process—that people remained around the table. That was to the credit of the staff running this process. They were extraordinary. The amount of work they put in and how they attempted to resolve differences was incredibly professional and a difficult jump.

**Q15 Hywel Williams:** Should the socio-economic evidence have been scrutinised by the Science Advisory Panel?

**Joan Edwards:** That would be difficult because the members of the SAP were marine scientists. Perhaps another panel of a different group of people should have scrutinised it. One of the problems is particularly with, say, “Finding Sanctuary”, which was a project around the south-west area. Four people were employed to go and interview fishermen to produce a thing called “the fish map”. If you go to a fisherman and you say, “Where do you fish?”, and you say, “By the way, we are going to decide where marine protected areas are”, then of course they are going to say, “I fish everywhere.” They spent a lot of money trying to gather information, but the fishermen were worried, and I am not surprised. Fishermen are up against the wall with all the different restrictions and the fact that they are overfishing. That should have been scrutinised by somebody who understood that industry. I don’t think the SAP would be the right people to do that.

**Q16 Hywel Williams:** Can I make one more comment, Chair? It is a tiny example, but the conservation interest is not always monolithic. For example, with the island that I am interested in, the boatman for the trust is also the local fisherman. If he can’t fish, it is not economically sustainable for him to be the boatman as well, so the conservation interests on land might be threatened by conservation interests in the sea. I don’t know if you want to comment on that, or I will leave that hanging before you, if you like.

**Joan Edwards:** The Welsh issue has been very sensitive. I hope the Welsh NGOs have now come to some agreement that perhaps the process that was established in Wales was not the right one. We are definitely not about putting small local potters out of business. Our whole role is to try and get a healthy marine environment, which means stopping the most damaging activities, which is not dog walking, building sandcastles or potting.

**Dr Solandt:** And that is from the conservation sector, remember.

**Q17 Graham Stringer:** You have answered a lot of my questions. You gave three examples of sites that had been screened out because of socio-economic interest. How many others were there? Is there a comprehensive list? Can you give us some?

**Dr Solandt:** I thought I had given enough examples to illustrate the point. However—

**Q18 Graham Stringer:** You did. I am just interested in magnitude.

**Joan Edwards:** It is quite difficult. What happened with the projects was that they started with a map of very broad-scale habitats and went through four iterations. They went through four mapping exercises. At each exercise they involved the stakeholders and looked at the science, and the areas got smaller and smaller until the point where we agreed that they fit with implementing the Ecological Network Guidance but they also fit with keeping all the stakeholders at the table and keeping them happy. It is very difficult to say what we started with and what we ended up with because it was a very iterative process. There were one or two sites we lost that we might feel should be brought back, but, to be honest, as Jean-Luc was saying earlier, the most important thing is that we believe we have an ecological coherent network with our marine conservation zones and European marine sites. What is most important is that 1 million people want those 127 sites. They took part in the process. That is unique. I don’t think that sort of project has been carried out anywhere else in the world.

**Q19 Graham Stringer:** I am still slightly puzzled that these sites were screened out early on and that they have ecological value, and yet you are saying that there is coherence in the totality of the schemes being put forward. Has not the extraction of these different sites damaged the overall projects?

**Dr Solandt:** For example, our organisations would come to the table with sites that we knew about. We run diving projects, which gather and provide it to Government advisers. We also viewed the data, as every other stakeholder did, and saw information on, perhaps where there were more data points per unit area. That doesn’t negate the importance of the other sites that have been set up. They are maybe in the position of having slightly lesser information, but they are of a similar habitat type. That is the key. The key to this guidance was ensuring that there was a part of every sort of habitat protected, much as we do on land where we protect meadow, woodland, upland and hinterland. Those sorts of measures have been adopted in this process. Ensuring that we have something of everything protected is the key to success of this network.

**Joan Edwards:** Another way of looking at it is that at iteration 1 you might have had three areas of pebbly sand. By iteration 4 you had one area of pebbly sand, which meant that you met ecological coherence, but as to that bit of pebbly sand everybody agreed, “We are happy for that to be a marine conservation zone”, whereas perhaps with the other two somebody wanted

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to do something else there, such as lay a cable or go potting or suchlike.

**Q20 Graham Stringer:** Were there any safeguards in place to ensure that extractive stakeholders did not over-influence the process?

**Dr Solandt:** No, not to my knowledge.

**Q21 Graham Stringer:** Does that mean they did over-influence it?

**Dr Solandt:** One of the key statements of the Science Advisory Panel was that they were seeing measures where some sites that they thought were no-brainers didn't go into the network, but in many cases we did get some sites that were acceptable to both parties. There were key difficult discussions over some sites where the conservation sector and the Government advisers might have had better information, but they tended to be in the minority. We got through this process incredibly well, given the fact that we had to achieve it on a very large area of the UK seas. Again, this is different from what I was saying earlier about the European marine sites process, which is a science-led process where we really are using scientific information for the designation. This is much broader than that and has allowed for an acceptance by stakeholders. Moving forward, we should get better-managed marine protected areas out of this.

**Q22 Chair:** Are there any areas, following on from that, where there still remains controversy between members of the SAP and the extraction industry?

**Dr Solandt:** I don't know off-hand, I am afraid.

**Q23 Chair:** Were these disagreements documented?

**Dr Solandt:** Yes. There was always a public record of every single meeting.

**Q24 Chair:** It would be helpful if you could direct us to those.

**Dr Solandt:** Yes. It might take you quite a long time to go through the documents because there were perhaps 6,000 interviews. It depends on how far you want to go into it. The decision makers in the process were 160 people, even though those 160 were informed by local groups. This is why the figure of 1 million has been espoused, and obviously we are representing others. There were 160 people divided into four—so four groups of about 40 individuals—who were meeting 12 times to give information on what they were happy or not happy with. It is a difficult process to think of doing for every site, but I think you could probably get information on which sites were more contentious than others.

**Q25 Pamela Nash:** I am sure the clerks will be delighted that you have given them that level of homework to do this weekend.

I want to move on to stakeholder engagement. In your experience, what is your perception of communities that are local to the conservation zones? How happy are they with the fact that they are living near them?

**Joan Edwards:** It differs, to be honest, around the country. The 40 people whom Jean-Luc was talking

about were 40 representatives of large groups of people. For example, if a Wildlife Trusts person was at one of those meetings, they were representing 800,000 people. I am sure for the RSPB it is about 1 million.

**Alec Taylor:** Yes.

**Joan Edwards:** Through our own channels we were engaging with the local communities. The fishermen were there on behalf of their local communities. A lot of local communities were represented on the groups. I think we have seen reactions to some of the marine conservation zones, but, to be honest, it is normally based on misinformation. Quite often you get one individual who is not very happy about a site that might be close to where they live or work, and the next minute it becomes national news. That is what we found. Often, when you dig down to try and find out what the problem is, they will say, "We won't be able to walk our dogs, walk along the coast or be able to sail. We won't be able to do that." We have to say, "That is not what this process is all about. It is not about stopping people doing things. It is about stopping damaging activities." Often, there is a technical way of getting round issues, something simple like a mooring buoy in yachting races in a marine conservation zone, which is quite normal anywhere else in the world. It is just that we don't do it here.

**Alec Taylor:** I would echo what Joan has said. We had some very good relationships with a range of different stakeholders through the MCZ process, from boat operators to surfers and all sorts of people. I think the way that the MCZ process was communicated could have been improved, for instance in Wales. It has led to some strong backlash in certain areas, which has overshadowed the wider public support for marine protection that is evident and has been evident for years. We know that a large percentage of the public recognise that our seas are in a very perilous state and that marine protection is needed. We managed, as the RSPB, to work very closely with boat operators down in the south-west, for example, to get an MCZ in the Torbay area, and that was led by them. We supported that process. It is very much a consensual thing. It is something that I think the stakeholder process can be quite proud of.

**Dr Solandt:** I don't have much further to add other than the fact that, having sat through those meetings, when you get them together, the majority of people are reasonable in life, aren't they? That was the strength of that process because it allowed 40 individuals who might have been talking to each other through their various communication channels—which might be *Fishing News* or *Marine Conservation* magazine—to come together all of a sudden. The majority of individuals are reasonable and want to find a consensus and a middle ground from which they can operate, but also understand that the implications of some of their activities are damaging to some of these seabed features. That is what we achieved more than any other process, possibly internationally. It is an excellent process. I do not think more could be done on a reasonable basis by Government in this process to deliver something that is accepted by stakeholders.

**Q26 Pamela Nash:** That is quite different from what your colleagues are saying. The issue that you both raise is more about perception rather than the actual effect on people's lives in the zones. In that case, do either of you think that more could have been done to communicate the objectives of the zones or indeed the evidence for the zones to be there in the first place?

**Joan Edwards:** A lot more could have been done. Even now, if you go on to the DEFRA website, it is very difficult to find out where and what marine conservation zones are and what they are trying to achieve. There has not been enough information put out. You are right in that what is interesting is that those people whose livelihoods were going to be affected were at the table and it wasn't comfortable. We did come to agreement at the end, but at the very beginning some of those meetings were quite difficult because there were boat operators, fishermen, the Crown Estate, offshore wind, aggregates and the oil industry and a couple of conservationists. The first couple of meetings were very difficult, but we all knew we wanted to get something out of this process. They didn't want to lose their livelihoods or not be able to access certain parts of the sea, and we wanted conservation areas. The people who seem to be objecting now are those who weren't at the table, and it wasn't because they couldn't be at the table. Some sectors chose not to be at the table. They are the ones that have been quite noisy about it. You sort of feel, "You didn't want to be part of the process. You don't want it and you are just shouting about it now." We can't work like that. That is not how this country works. We have to find a compromise.

**Q27 Chair:** When you say "some sectors", is this generally across the country or in particular geographical areas?

**Joan Edwards:** Some of them are very geographical, so small communities of, say, boat operators and some of the ports didn't engage as well.

**Q28 Chair:** Some ports. Can you give an example?

**Joan Edwards:** One very close to here.

**Q29 Chair:** So the port of London didn't engage.

**Joan Edwards:** No. We tried to engage with them throughout the process and we had several meetings with them to try and explain to them that we weren't going to shut the Thames down to shipping, but they objected all the way along.

**Q30 Chair:** Your position would be that it's tough if they don't like the outcome.

**Joan Edwards:** Yes.

**Q31 Pamela Nash:** As politicians, we all have experience of either planning applications or a variety of different public consultations. It is a constant difficulty to get everyone involved who should be involved, and there is always someone who is very loud after the event. Do any of you have any ideas on how we can fix this and how we can reach out more to the communities that will be affected by the zones? Also, Joan, you mentioned DEFRA. Is it a

responsibility of DEFRA in this case or is there any other stakeholder that should be taking responsibility?

**Joan Edwards:** It would be very easy to turn round and say, "DEFRA do the job", but DEFRA is based here and in Bristol. They don't work out there on the ground. Once we know where the marine conservation zones are, so we have some certainty, then all of us will have a role to play. We are based locally and so are other conservation organisations. We and Natural England, the Environment Agency and the Inshore Fisheries and Conservation Authorities. We all have a role to play, and it is important that we work together and make people aware that these are not bad things; they are good things because we all need a healthy marine environment.

**Alec Taylor:** I absolutely agree. We have done some work. The Wildlife Trusts has done a considerable amount of work in its "Friends of MCZs" campaign, which highlights the reasons why we need these sites. The communication of quite technical detail and language into important messages for local communities is absolutely essential and something that does not quite come across so easily in the technical nature of the MCZ consultation process. It needs an extra layer of translation, if you will, to push the case for these protected areas or why we are fighting for them in the first place.

**Dr Solandt:** Clarity in the measures that will be implemented is needed. People will see lines on maps but want to know what happens in them. When we get clarity in the measures, then we can have a really decent conversation with stakeholders at the local level. Some sites are going to be difficult to anchor in, perhaps on very vulnerable habitat, but there might be adjacent sites where you can have anchoring, which will appease a stakeholder who says, "I can't anchor anywhere", and we can say, "Hold on a minute. We can have that conversation." These conversations are very difficult when you put the lines on the map, so having the people there in the room who are going to be living with that line on that map is what you want, but you can't do that with 40 people. You can do it as best you can to communicate that through the process.

Going forward, the best way of dealing with it, when the lines are on the maps and the managed measures are starting to be implemented, is to create groups in the regions as much as we can sensibly arrange those groups to take place. They already do in some European marine sites and they are very effective. There are advisory committees and statutory committees that meet in some, such as the Falmouth one. Those are excellent forums for getting those concerns voiced. Hopefully, there will be similar arrangements after these MCZs are set up.

**Q32 Pamela Nash:** To be clear, are those arranged and organised by the Government, the public sector, or are they civil society organisations?

**Dr Solandt:** I think it is a variety.

**Q33 Hywel Williams:** At the other end of the scale from the port of London, the boatman I referred to earlier on—Colin Evans—is a boatman and fisherman, but he is a determined conservationist as



well. When we looked at the consultation documents there was quite a lot of information about muds, sands, clams and seaweeds, but on the socio-economic data it was “To be consulted on”, essentially; there were lots of blanks. It is instructive to mine into the process of consultation to this level because that is how it was perceived by very local people. It is not 40 people representing 1 million fishermen, or whatever, but individual people who are going out with their pots in the morning. That is just a comment and I don’t know if you want to respond to it.

**Joan Edwards:** You have to imagine with this process that it is very different from Wales. It is not top-down; this is bottom-up. Fishermen had the opportunity to say which areas were important to them, so a lot of those data were collected.

One of the things that didn’t quite work with our process was the impact assessment. As part of the legislation, an impact assessment has to be carried out. The impact assessment that has been carried out for marine conservation zones—it has not been published but we have seen several drafts, unfortunately they—only looked at the impacts on people and industry. It does not look at the benefits of marine protected areas. We think that is ludicrous because we are establishing these MPAs for a really good reason. We believe this will help bring back our marine environment into a healthy state, and that should be good for fishermen and other people. But, at the moment, the impact assessment does not seem to be looking at the benefits. We have done some work with Plymouth university; we have looked at four individual marine conservation zones and tried to calculate the actual benefit to the local people in terms of tourism, spawning, potters and so on, to try and show the other side—that this is a good thing; it is not just bad.

**Q34 Sarah Newton:** Before I ask my question—which is really for the RSPB—I want to pick up on the communication point, because we have not mentioned media. I representing an area that my family have been in for generations, the media were one of the contentious issues about the reference site. Most people care deeply about the natural environment; I don’t know anybody in the estuary who doesn’t. But, of course, once you start communicating, you run into the media. What do the media love? They love to frame this as “industry and the economy versus conservation”. Nobody—myself included—would see it like that. Try as you might to speak to the media, everybody will be very moderate, but it will definitely come out as somebody with an extreme view about, “Shoot every seagull.” There might be one person who thinks that, and they will be the one quoted. Then there will be the one at the other end of the spectrum saying, “Every piece of economic activity should stop in the port of Falmouth because our habitats are important.” That is how the debate is framed. I do not think any of us have the answer as to how to control the media so that they report these types of issues in a sensible way. That was just a comment.

My question really is as to mobile species like birds, because we have talked very much about the seabed features so far. Do you think that their protection and

concerns for them have been taken enough into consideration in the designation of the zones?

**Alec Taylor:** My answer, in an honest capacity, would be no. We do not think that mobile species—that is to say, groups such as sea birds and marine mammals, which are keystone parts of the food web and indicators of healthy marine environments in general—have been adequately considered in the MCZ process. That stems right back to the start of the process with the Government policy, which was carried through to the Ecological Network Guidance, that mobile species should not be considered in the MCZ process unless there were exceptional circumstances.

We would take issue with that as the RSPB, and I am sure others would feel the same way about other mobile species. The fact that we have six sites included with sea birds as features in the context of that guidance is a tribute to the hard work of our regional staff and also other stakeholders. But, in my opinion, if you ask me as a member and employee of the RSPB whether I am satisfied with national designation processes around the UK, which pretty much ignore sea birds, in combination with the delays in designating a coherent network of European marine sites for mobile species, I would have to say no. However, that does not in any way undermine the fact that we have a network of sites that does meet the other requirements of the Ecological Network Guidance and has used the best available evidence. My comment is not designed to undermine the need to designate what the regional projects have put forward, but it is a start. More work is needed to ensure that mobile species are better represented by a coherent network of marine protected areas in general.

**Q35 Sarah Newton:** So you are helping me answer the next question, which is whether you believe that additional requirements will be needed above and beyond the EU habitats and birds directives to look again at mobile species all around the UK.

**Alec Taylor:** Yes. To take an example, the EU birds directive would not cover marine areas adjacent to terrestrial sites of special scientific interest. There are breeding colonies of sea birds that are protected by SSSIs, the adjacent waters to which would not be covered by the birds directive. There are also some species, in particular the black guillemot, which are not covered by the birds directive and which we do have an MCZ for on the Cumbria coast. So it is a tiered process. In the same way that SSSIs complement the network of European sites on land, we need that same level of buffered approach in the marine environment.

**Q36 Roger Williams:** I think we could all agree that a bottom-up approach is better than a top-down approach, but, talking about the top, could you tell us what the Marine Management Organisation’s involvement has been in this process and how successful you think that has been?

**Joan Edwards:** The MMO is obviously a very new body. It is a regulatory body, so although it took part in the regional projects, it did not have a legal role. It basically took part as an observer so that it had in

mind what the process had been. The MMO will only be able to get involved in marine conservation zones once they are put forward as recommended marine conservation zones by Government. Once we get a consultation at the middle of next month, then, if the Secretary of State is minded to say that a number of marine conservation zones are preferred as possible for designation, they will become real. At that point the MMO will be responsible and if damage is occurring to any of those recommended marine conservation zones, the MMO can bring in emergency byelaws. Obviously, once they have been designated, the MMO is then in a position to regulate them and will have to bring in management plans that fit with the conservation objectives.

**Q37 Roger Williams:** Do you think that not involving it at all until the designation has been completed is the best way of involving the MMO?

**Alec Taylor:** The MMO was part of the projects. It came along to the meetings. We had, generally, quite a positive relationship with it and it was mindful of its responsibilities in relation to marine spatial planning, for instance. It obviously has a huge responsibility going forward in the management of these marine conservation zones. That is not to say that it was not involved in the process, but, yes, it was almost a “getting to know you” phase as it was so new off the back of the Marine and Coastal Access Act. It was one stakeholder in the process. We had a generally positive relationship with the MMO.

**Q38 Roger Williams:** Have you had any discussions with it about possible management schemes for the designated areas?

**Alec Taylor:** Not directly. Those discussions have tended to be with the MMO and the statutory nature conservation bodies, so we—

**Q39 Roger Williams:** We are talking about the MMO here.

**Alec Taylor:** As the RSPB, no, not directly.

**Dr Solandt:** We have had good discussions with them on how European marine sites will be regulated and managed in terms of division of responsibilities between the MMO, their jurisdictions and the inshore fisheries and conservation authorities; and outside 12 nautical miles as well. We have had very good discussions with them about understanding who is going to be responsible for what.

**Q40 Roger Williams:** It has been suggested to me that these designations could be compared to the creation of marine national parks in the same way that terrestrial national parks have been designated. Do you agree with that or is there a better comparison?

**Joan Edwards:** I don't think you could compare them to national parks. You could possibly compare them to SSSIs at sea. National parks are more about access as well as landscape-scale-type conservation. Marine conservation zones are very small. They are not large areas. We need to establish the conservation objectives and that will be the next stage. We need to get the number of marine conservation zones that are going to go forward. We then need to look at their features,

look at what conservation objectives are required, and then, probably site by site, we need to work with the regulator—which, beyond 12 miles, will probably be with the European Commission as well as the MMO—and look at what management measures need to be taken or put into place to ensure that we actually get recovery.

**Q41 Stephen Mosley:** Following on from that, as to what happens going forward, there seem to be quite a number of things that still need to be done. Do you think that the proposals that we have outlined at the moment for the 127 sites would provide an ecologically coherent network of conservation areas around the seas?

**Dr Solandt:** The network that has been established says 127 on the box but it could say another number. What we were offered at the beginning of the process was guidance on how we would achieve a coherent network. It could have been perhaps many fewer but larger sites or it could have been many more but smaller sites set up. The number is almost arbitrary. It is the result of achieving protection for all those different sorts of seabed habitat I talked about earlier but also the rare, threatened and declining species of both national and European importance.

The Science Advisory Panel, which reviewed this network in its entirety, said that it meets the rules to achieve issues such as viability. Are the sites big enough and the boundaries wide enough to protect the features and allow them to grow and replenish? Are there sites of a similar nature close enough to ensure that there is larval and adult supply and exchange of material between those sites? Is there enough replication of a similar habitat in a biogeographical zone? These sorts of rules allow us to sense that a network and ecological coherency are being achieved. We are very confident, as are the Science Advisory Panel, that this exciting opportunity will deliver that Government policy, which will result in a more productive and healthier marine environment.

**Q42 Stephen Mosley:** Within the Wildlife Trusts' evidence you talk about the process being delayed. From what you have just said to the previous question, there is still quite a bit that needs to be done. Could you give some reasons for this delay and your thoughts on it?

**Joan Edwards:** Basically, we expected the network of marine conservation zones to be designated in July 2012. The delay was announced by the Minister, Richard Benyon, in November 2011. He said that they were concerned about the lack of evidence and we were told that the consultation would be delayed until December 2012, which we are waiting for now. At the time it seemed a shame because we had been waiting for so long, but, with hindsight, we have had another year of gathering information and we were very fortunate that the Government were able to find £5.5 million to pay for extra survey work.

I think now we have reached the point where we have been talking about this for an awfully long time. There is report after report saying that our marine environment is being degraded. We need a healthy marine environment for our own health, for climate

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change and for food. All these things are very important to society. Our feeling now is that we need to get on with the job, and, as I mentioned before, other people want the job to be completed because industry is saying that it needs certainty. In terms of development and growth, they need to know where these sites are so that they can get on with their jobs. What we would ask for is, please, is let's hope that all 127 sites are designated as soon as possible and management measures are also brought in as soon as possible. But that might be quite difficult and could take time.

**Dr Solandt:** As a sense of urgency, 59 sites have been identified by the conservation planners—you might have heard this just recently—as being high risk. So we might be further degrading those very sites that we want to protect. By delaying this process, we are not only disfranchising potential investment in business in these marine areas but potentially degrading our environment that we are meant to protect. Delays are understandable perhaps, but, in the face of what we know damages the marine seabed, which is clear, it is time to act.

**Q43 Stephen Mosley:** From your groups, do you have any indication of when this will now happen?

**Joan Edwards:** We understand that a number of the marine conservation zones will be designated next summer. The number is what we are worried about. We are worried that only a few sites will be designated. Our message to Government is that we have been talking about it long enough. We need to

act now. We want all 127 marine conservation zones designated as soon as possible.

**Q44 Chair:** Is that the position of all three of you?

**Dr Solandt:** Yes.

**Alec Taylor:** Yes, and we want firm timetables from this consultation about when that is going to happen.

**Q45 Chair:** Presumably—particularly you, Mr Taylor—you will be sending messages to Her Majesty's Government saying that you represent considerably more people than all of the political parties represented round this table and, therefore, someone ought to listen to you.

**Alec Taylor:** Yes, absolutely. We have a powerful and interested membership looking out for the marine environment at the RSPB in combination with our colleagues. That is essentially what we will say.

**Q46 Chair:** My final question, following on from the questions you were asked about the socio-economic side, is this. Are you confident that you can present that case to the Government in a way that does not damage those sensitive economic areas such as the tiny detail that Mr Williams touched on?

**Alec Taylor:** Yes. I am confident that we can make both the fine-scale case and the wider case for the need for these protected areas.

**Chair:** Thank you very much for your attendance. It has been an extremely interesting morning.

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## Wednesday 5 December 2012

Members present:

Andrew Miller (Chair)

Stephen Metcalfe  
David Morris  
Stephen Mosley

Sarah Newton  
Graham Stringer  
Roger Williams

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### Examination of Witnesses

*Witnesses:* **Phil Durrant**, Managing Director, Gardline Environmental Limited (representing the North Sea Marine Cluster), **Professor Ralph Rayner**, Institute of Marine Engineering, Science and Technology (IMarEST), and **Richard Burt**, Chair, Association of Marine Scientific Industries (AMSI) Council, gave evidence.

**Q47 Chair:** Gentlemen, can I welcome you here this morning? Thank you for agreeing to come and see us. It would be helpful if for the record you could introduce yourselves.

**Phil Durrant:** My name is Phil Durrant, and I am representing the North Sea Marine Cluster.

**Professor Rayner:** I am Ralph Rayner, representing the Institute of Marine Engineering Science and Technology.

**Richard Burt:** I am Richard Burt, representing the Association of Marine Scientific Industries, part of the Society of Maritime Industries.

**Q48 Chair:** In your written evidence, you talk about there being only limited improvements to strategic oversight in marine science since 2007. Why do you think progress has been so slow?

**Professor Rayner:** I had the pleasure, and to some extent frustration, of attending the previous two Select Committees, going back to 1987. In the reports of those two Committees, the central recommendation was not taken up by the Government. In both cases, we ended up with a body that had insufficient power and clout effectively to co-ordinate. To some extent, after the second of those Committees, we replaced what was already working moderately well with something very similar that was perhaps slightly more bureaucratic. We have maintained the status quo in the way this is addressed rather than addressing the central issue of co-ordinating properly.

**Q49 Chair:** Let us push you a bit further on that. We would totally agree with you that Governments of any colour should listen to Select Committee reports very carefully. Let us hear from you: what do you think the aim of the marine science strategy should be, and what outcomes should we be seeking?

**Richard Burt:** Looking at marine science strategy as a whole, as Professor Rayner said, we identified very well in the last session that co-ordination and a joined-up approach for the UK was needed. The report went a long way to suggesting what was required to achieve that. As to where we are now, we still have the desire to achieve an efficient, joined-up UK marine science to meet our obligations, but there are also a number of other factors now. One is the economic climate, which is taking money away from marine science, so there is even more pressure to have an efficient co-ordinated approach. There is also the wider global

view where in Europe, the US and Asia people are pushing ahead with marine science, and we have to see how our activities sit in that context so that there is no duplication at the national level and perhaps not at the international level.

**Q50 Chair:** That is not adequately reflected in the current strategy.

**Richard Burt:** It does not appear to be.

**Professor Rayner:** An area that is not adequately represented is engagement with industry.

**Phil Durrant:** I would agree with that completely. Going back to the strategy, there have been some successes, but it is under-resourced in terms of both secretariat and funding; it is not outcome-focused, which it needs to be. Industry could play an important part in bringing some focus to the MSCC and marine strategy.

**Q51 Stephen Mosley:** I would like to ask you questions relating to the impact of marine science on economic growth in the UK. Do you have any idea of the impact of marine science, and have you got any figures or examples to back it up?

**Richard Burt:** As part of the AMSI activities, we conduct an annual survey that looks at UK oceanographic and marine science industries. We survey about 90 to 100 typical companies in the UK. Most of them are small SMEs of perhaps fewer than 30 employees with a turnover of £1 million to £5 million a year. The survey shows that their annual turnover is about £1.35 billion, of which £500 million goes to export. It is a significant industry on the marine science side in the UK. When we look across to other activities, such as offshore renewables, oil and gas, marine planning and even climate aspects, all of those are underpinned by marine science at the beginning. We have a very important underpinning of industrial activity.

**Professor Rayner:** In a broader socioeconomic rather than straight economic sense, there are all the benefits of safety of life and protection of the environment that are rather more difficult to quantify. They are hard to quantify in strict economic terms, but, if you extend it to a climate dimension, the impact of marine science on our understanding of future risks and our ability to mitigate them is extremely large, but it is very hard to put into a strict economic valuation.

**Q52 Stephen Mosley:** Are you saying there are no figures to demonstrate the rate of return, or anything like that, on investment in marine science?

**Professor Rayner:** There are figures which estimate that for very narrow parts of the activity in marine science, but there is no holistic view. It is extremely difficult to derive a holistic view.

**Q53 Stephen Mosley:** In terms of action in developing a marine growth strategy, is there anything the Government can do to try to improve that?

**Phil Durrant:** Industry engagement is absolutely key here. Richard just said that marine science underpins everything we do. We are talking about return on investment. That filters up through industry and beyond. One of the key things we should be looking at here is getting involved at an early stage with industry in setting objectives and strategies, because they will take that forward in return, in terms of investment.

**Professor Rayner:** It is important to think about this in a wider context than just marine science. One of the difficulties with the present structure is that, understandably, the emphasis is very heavily on science but is very weak on enabling technologies. It is in those enabling technologies that many of the real industry opportunities lie. You have to find ways to create effective conduits into industrial exploitation of the technologies that arise.

**Q54 Chair:** Do you have examples?

**Professor Rayner:** I have many examples from the other side of the Atlantic.

**Q55 Stephen Mosley:** I attended a briefing yesterday at Manchester university on future energy. One of the things talked about was tidal energy. Rolls-Royce have developed a very good turbine for tidal power. Unfortunately, they have just sold the design to Alstom. Do you see that as one example?

**Professor Rayner:** That is an example from a rather different sphere. In the marine science and technology area, we are more concerned with the instrumentation, the sensors and platforms used to observe and understand the oceans, which in its own right is a fairly substantial industry sector. On the other side of the Atlantic, they have been far more effective in fostering the connection between their marine science and technology and its commercial exploitation. We certainly have examples in the UK, as Richard has outlined, of successful companies in that area, but we could do better.

**Richard Burt:** When we talk about industries, it is worth considering how broad are the marine industries that relate to marine science. We can start very small, as Professor Rayner has said, with people who will design and develop technologies that enable you to do marine science at sea, but that leads right the way through to people who perhaps develop the platforms on which these technologies will be used; people who will use the platforms to gather data for a broad range of marine scientific uses, which we have spoken about; people who supply anything from small-size platforms through to survey ships; and large multinational organisations that will process the data

and resell it in another format. It is an extremely broad range of industries from little one-man-band consultancies to large multinationals. How all of these engage with the marine science strategy is important. All of them have parts to play, and their development road maps themselves should map across to the marine science strategy and its delivery plan. That is key to helping the engagement of industry in what we are talking about today.

**Professor Rayner:** Many of those enabling technologies find their way out of the science arena and into other applications in oil and gas and marine renewables, so technologies that are developed on the back of scientific issues and questions quite often find their way into much broader applications, and therefore much larger markets. A very good example of that in the recent past is the development of autonomous underwater vehicles, which is now an enormous global market in which the UK could have been very strongly positioned as a pioneer in that area but currently is pretty weakly positioned.

**Q56 Stephen Mosley:** In a number of different areas we have heard of the problem that we are very good at developing things, but the valley of death comes along and we are not very good at producing commercial applications. From what you are saying, is it the same in marine science as well?

**Professor Rayner:** It is not just the problem of the valley of death; it is creating the right interfaces in the first place. Having created them, you still have to cross the so-called valley of death from a good idea and prototype to a commercially exploitable product.

**Q57 Stephen Mosley:** Surely, the Government have a role in there as a big commissioner and large end-user. Commissioning must play a part in that. How important is Government commissioning in supporting your industry?

**Richard Burt:** It is extremely important. There are some Government initiatives that are working very well. We have seen the recent TSB initiative where an £8 million fund for vessel efficiency has been announced. That was specifically targeted at maritime, but the links between maritime and marine science are becoming closer. The Government initiatives that are drawing those together more closely are not necessarily mirrored across to the marine science strategy, which is talking more about marine science as opposed to maritime. If we look across Europe, from an industrial perspective we see funding mechanisms that are relying on the convergence of marine and maritime, shipping and marine science and transport and marine science, and bringing them closer together. That factor is not necessarily addressed within the marine science strategy. Part of what the Government are doing is being done very well, but it is not linking across to the other activities and producing a joined-up approach.

**Phil Durrant:** It is interesting that you raise commissioning. I do not think commissioning is very prevalent in marine science. There are some good examples where commissioning has been delivered very effectively in marine science, but they are very few and far between. Commissioning needs to be

looked at and embraced a little more in terms of delivery of marine science. By commissioning, you focus on the objectives and aims early on in a process and then bring together a group of stakeholders and a variety of people who can deliver and put it out to get a commercial advantage for UK plc, potentially.

**Q58 Stephen Mosley:** A little bird has told me about the Marine Science Co-ordination Committee. Do you think their members are following best practice in commissioning?

**Phil Durrant:** I do not think they are following best practice in commissioning. I admit I would not be able to tell you exactly what best practice was, but I do not think there is enough commissioning going on in marine science. I said I could give examples. If you look back to the aggregate levy sustainability fund, a programme that is now concluded, that was a very good example of commissioning. A steering committee, which was funded through Government, looked at aims and objectives for research into aggregate-related science and delivered those through a range of vehicles, including the public and private sector. I do not see that continuing into the future. It was a very good model and it should be reconsidered.

**Q59 Sarah Newton:** I want to follow up this rich vein of questioning about the Marine Science Co-ordination Committee and some of the comments we have heard today but also in the written evidence. Can you talk about the extent to which marine science is undertaken by industry and whether that is adequately reflected in the membership of that group?

**Phil Durrant:** To go back to Richard's point about underpinning, industry does an awful lot of marine science; it delivers it in all shapes and forms, whether that is for regulators, developers or even for research institutes and universities. There is no industry representation on the MSCC at the moment. There is Richard's Marine Industry Liaison Group, which is supposed to be industry-focused, or is the industry forum to liaise with the MSCC, but there is too much of a gap between the two entities; they are not close enough in terms of debate or discussion. I come back to the point that there is still no industry representation on the MSCC.

**Q60 Sarah Newton:** In terms of improving co-ordination, do you think it would be critical to have industry representation on the main committee in addition to this sort of sub-group?

**Phil Durrant:** Absolutely. We are talking about co-operation and cross-sectoral integration. That cannot happen unless those people are sitting in the same room and debating things at the same time. You said that it is critical, and that is exactly what it is.

**Q61 Sarah Newton:** You mentioned that industry does a great deal of research. We have understood that now there is a bit of a cross-over or emergence of marine science coming together with maritime science. It would be quite difficult to answer this question, but, as a rough idea, as a percentage of the science undertaken, how much would be done by

industry? It would need to be only an estimate to give us an idea of the scale.

**Phil Durrant:** That is a difficult question. If I may refer to some notes, the DEFRA figure for public sector marine science funding in 2011–12 was about £150 million. Colleagues did some work and estimated that the percentage that potentially came from industry would be in the region of 20% or more of that, but that is directly measurable marine science. An awful lot of investment goes in research outwith pure public marine science. That would be on the very low side of investment.

**Q62 Sarah Newton:** We know there are big gaps in our knowledge of the marine environment, and when industry has collected data it would be extremely beneficial to be able to share that. What other benefits do you think there would be from having industry being more closely involved on the committee working alongside others?

**Professor Rayner:** I am always very nervous about the use of the term “industry” when it is such a broad church. I tend to classify industry engagement with marine science and technology into three types of industry. There are those that provide the means to undertake the science, so people who build the instruments and sensors and perhaps do some of the core scientific research. There are those who use the outputs—the data and information—for practical purposes: policy compliance, safety or economic purposes. There are then the ultimate beneficiaries. You have to distinguish between those three types of industry, because they will have different reasons for being engaged. All three of those groups would benefit from closer engagement: in the provider case, because they would understand more of what is required by the science community and therefore can tailor their offering more closely to that. Even better than that, you can create an interface that fosters developing things that are required. The intermediate industries will have a much closer proximity to what is available to use in practical applications, and the end users will have greater connectivity in terms of the marine science community understanding how science can benefit their end uses, whether it is shipping, oil and gas, marine renewables or whatever area it might be. It is very important to look at it in at least these three classifications; otherwise, you end up blurring lots and lots of different issues because the stakeholders are engaged in very different ways.

**Q63 Sarah Newton:** That is a very helpful segmentation for us to understand. None the less, you are saying that each of those sectors—there might even be more—would benefit from closer engagement together and participation in the committee.

**Professor Rayner:** In both directions.

**Q64 Chair:** For clarity, can I press you, Mr Durrant, on your definitions? Were you describing work that is done through research councils versus work done through industry directly, or were you incorporating the whole of Government? For example, were you excluding the Ministry of Defence?

**Phil Durrant:** I was excluding the Ministry of Defence. I come from the survey industry, so that would be my focus. Data acquisition for the support of marine science would be the focus of my comments.

**Q65 Chair:** Professor Rayner, in your categorisation, those who produce the means are not simply producing for industrial research; they are also producing instrumentation for academic research. One of that sector's customers will be the public sector, won't it?

**Professor Rayner:** That is certainly the case. I would go further than that and say that very often that is where new ideas that can feed into wider industry use come from.

**Q66 Chair:** I have seen myself a fair amount of cross-over between some of the industrial players and the academic community in developing instrumentation.

**Professor Rayner:** There is some but not as much as there should be. I have the good fortune to see this from a US perspective very closely, because I work a week a month in Washington for NOAA. The linkages created in the US framework are much closer, and there is much greater emphasis on trying to take those ideas coming out of the research community. The research community is always looking for new and novel tools to be able to understand the oceans, so it is driving innovation. If you can link that innovation closely into the industries that then produce those tools, those industries can move on to sell those capabilities to other sectors, outside of research. That is the conduit we would like to see being much more effective than it currently is.

**Q67 David Morris:** Professor Rayner, do you think a single UK marine agency rather than a co-ordination committee, like the National Oceanic and Atmospheric Administration in the US, would be needed here?

**Professor Rayner:** It would certainly help, and it was the central recommendation of the previous two Select Committee reports. You have to be a little careful in making a comparison with NOAA. NOAA addresses some of those issues, but I know only too well that NOAA is one of 17 agencies that have interests in marine science in the US. It certainly is not the panacea, but it brings some of the elements into much closer alignment.

**Q68 David Morris:** What do you think the advantages of this particular mechanism would be beyond the Marine Science Co-ordination committee?

**Professor Rayner:** It creates a central focus that has a specific remit and is empowered to take that remit forward.

**Q69 David Morris:** Are you saying you would expect the industry to have a stronger voice in a separate agency?

**Professor Rayner:** I would expect industry to have good proximity to such an agency, yes.

**Phil Durrant:** A separate or dedicated agency is one option; a better resourced MSCC is another

alternative. If you go on to link that to liaison with industry, that could still be facilitated through the MSCC.

**Q70 Chair:** When you say "better resourced", could you put some numbers on it?

**Phil Durrant:** I could not put numbers on it, but it needs better funding; for a start, it needs to control its funding. It needs a better and more substantial secretariat. It has a very good and dedicated secretariat, but it has an awful lot to deal with and a lot of sub-groups. It needs some objectives and real teeth to drive through some of those objectives.

**Q71 Stephen Metcalfe:** I would like to talk a little about the role of NERC in all of this and its support for marine sciences. Could all of you describe for me where you think its strengths and weaknesses lie in the support for marine science?

**Richard Burt:** From the point of view of technology instrumentation, I have experience in liaising and working with NERC for 20 years. NERC is very strong at developing core technologies and science in-house. It has spent a lot of time recently trying to avoid duplication.

**Q72 Stephen Metcalfe:** In terms of duplication of technologies.

**Richard Burt:** The duplication of technologies. There has been pooling of that aspect, which has been very good. Where it falls down is that there is still a rather disparate approach for integration with industry, which comes back to our previous point. Industry can interface with NERC at instrumentation level, but it can also interface at the data exchange and data processing level; it could even interface with industry at the capital asset level: the thorny problem of sharing ships, facilities and things like that. What it is doing in terms of rationalisation and efficiency drives across NERC is very good; it mirrors what industry would do in this sort of climate, but as to clear interfaces, and willingness to interface with industry, there is room for improvement.

**Professor Rayner:** To take that from a slightly different angle, not the industry angle, the remit of the Natural Environment Research Council is research. That means its focus necessarily is on its primary mission, which is to deliver quality research. There is another component of the marine science and technology equation, in terms of delivering regulatory compliance, operational efficiencies and those sorts of areas. That is the area of operational oceanography, where you have routine streams of observations. That is not primarily NERC's core mission. It is more and more important to have those sustained long-term observations for a whole range of different applications. It is more akin to an operational function of the type the Met Office delivers. The current approach is not well structured to enable that sort of capability, and yet it is an extremely important thing to maintain, foster and grow at both a national and international level.

**Q73 Stephen Metcalfe:** You think NERC do not understand that, or just do not see it as part of their remit?

**Professor Rayner:** I am sure they understand it but it is their core remit only to the extent that it underpins particular areas of science. It certainly is not their core remit in terms of creating that capacity to underpin other benefits.

**Q74 Stephen Metcalfe:** Your organisation has been quite critical of NERC, in that it suffers from poor strategic planning on marine issues and inadequate engagement with marine industry. Is that an example of where you think they are failing?

**Professor Rayner:** That is going back to Richard's point.

**Q75 Stephen Metcalfe:** Presumably, the collection of observational data would be through industry.

**Professor Rayner:** No. If you look at it at both a national and international level, the largest proportion of the routine regular collection of data about the marine environment, and routine and regular capacity to predict the marine environment, is largely a public function and is funded through public funds, yet we have no body that really co-ordinates that at the moment. We have some emerging capability in that area.

**Q76 Chair:** Where it is industry that is collecting the data, do you think there ought to be a public duty to make it available to researchers?

**Professor Rayner:** In the main, it is made available to researchers. It would be quite difficult. You can encourage a public duty.

**Q77 Chair:** To take the example of offshore wind, some of the data sets collected by owners of wind farms are regarded as ridiculously commercial in confidence. If I was the Energy Minister, I would make it a licence condition that it should be available for research.

**Professor Rayner:** That would be a very good approach to ensuring that that was the case. If you look at the example of the oil and gas industry, that started with exactly the same view. Everything they collected they regarded as proprietary and were very reluctant to put into the public domain. That view has changed profoundly in the last decade, because there has been a recognition of the benefit of pooling it for all sorts of reasons, and a recognition that it is not core to the business of the oil and gas industry. The marine renewables sector is a little more difficult. The measurements they make of wind are very core to their competitive position and that is part of what drives their reluctance, but it is also an issue of maturity. I think that as that industry matures it will see the benefit of sharing. You could mandate it through the route you have described, and that has been used quite often in other cases. I think it will happen eventually anyway.

**Phil Durrant:** There are a couple of points there that I would like to pick up. We have to be mindful of who is paying for that data collection, and that is the wind

farm developers, whether that is for regulatory purposes or their own commercial purposes.

**Q78 Chair:** I am paying for it in my energy bill, am I not?

**Phil Durrant:** Maybe. Ralph's point is very pertinent. A maturing industry would be more than happy to share that data, and it can still be on a commercially confidential basis. I do not think most developers would mind somebody using that data for research, for example. The key issue is collecting that data in a standard format, storing it somewhere and setting up a proper protocol and procedures for access to that data.

**Q79 Stephen Metcalfe:** I would like to take you back to NERC's role. Do you have anything further to add about strengths and weaknesses?

**Phil Durrant:** I think my colleagues have covered most of it. One of the key issues they picked out, which I would like to re-emphasise, is that currently NERC's strategy does not identify marine science as a separate category. That is the core of this issue. It has to compete with everything else; it is not a core part of NERC's strategy.

**Q80 Stephen Metcalfe:** My next question was to be whether they had a strategy, and the answer to that appears to be no.

**Phil Durrant:** No.

**Q81 Stephen Metcalfe:** You would agree with that. Can you speculate on why that is?

**Richard Burt:** All I can proffer is that NERC's requirement is to deliver the science that the UK needs to underpin its requirements. Marine is just a part of that, and perhaps other larger sectors have a greater priority in the NERC programme.

**Q82 Stephen Metcalfe:** But you have just told us how important marine science is in underpinning all sorts of other areas.

**Richard Burt:** It is.

**Professor Rayner:** To be fair, the view in NERC is that certainly large parts of the marine science portfolio are seen as being part of an overall earth systems approach to understanding the way the planet works. I can understand that approach, but the requirements of the marine sector are very different from those of, say, terrestrial science.

**Q83 Stephen Metcalfe:** But are we not gathering more information from marine science than ever before about the way it is affecting our planet?

**Professor Rayner:** Globally, yes, in a relatively unsustainable way. It is very hard, particularly at international level, to keep those programmes running, some at what would be regarded in overall terms as minuscule cost, and yet for some of those programmes one has to fight tooth and nail to sustain them.

**Q84 Stephen Metcalfe:** Am I right in saying that there have been recent staff reductions at NERC for marine science?

**Professor Rayner:** Yes.



**Q85 Stephen Metcalfe:** Is that an example of what you have just been referring to? We are not putting enough effort into this, with relatively small amounts of money.

**Professor Rayner:** Over the period since the two Select Committee reports we have seen a progressive decline in the UK's capacity in marine science.

**Q86 Stephen Metcalfe:** No one is going to contradict that.

**Richard Burt:** Not at all. Although the marine science part does not appear as a separate line item within the NERC strategy, that is not uncommon, even if you look at it on a European level. If you look at European funding, there tends to be thematic and co-ordination programmes. If you drill down to see where the line is for the funding for marine science, you probably cannot find it. That has been quite common over a number of calls, but, if you look through the aspects that rely on marine science to underpin those activities, they are deliberately there and they are quite significant sums of money. Marine science is there, but it does not have a high enough profile, or a profile of its own, which is one key thing. In the global context, we certainly see a lot of other countries pushing very hard with marine science agendas, and the status of the UK does not want to be left behind. Those are two key important points.

**Phil Durrant:** I'd just like to pick up on those points. You mentioned that we are collecting more data than ever in the marine environment. Globally that is so. We need to be. If you look at what we have got to deliver over the coming years in terms of the marine strategy framework directive, marine protected areas and marine conservation zones, they can be properly delivered only with good scientific data and evidence. We are already seeing delays in marine conservation zones because of a lack of evidence. If we do not seriously consider—this was brought up with previous Committees—that we need to invest in data collection and good evidence, we will struggle to deliver those things.

**Q87 Stephen Metcalfe:** Therefore, a strategy may well help.

**Phil Durrant:** A strategy would definitely help.

**Q88 Stephen Metcalfe:** And a line that said what the budget is so you can see what it is and whether it is declining or decreasing.

**Phil Durrant:** Absolutely.

**Q89 Roger Williams:** NERC's ocean-going research vessels make up a fairly large chunk of its capital expenditure and equipment. It is therefore important that efficient use is made of these vessels. Yet we are told that in terms of days at sea NERC achieves only in the low 200s every year, whereas commercial fleets like Gardline achieve over 300 a year. Can you tell us why that may be, and what industry is doing differently from NERC?

**Phil Durrant:** There are many different reasons why private companies can deliver over 300 days at sea. The first is that they have to, because that is what makes them viable. The one thing that makes a marine

science business successful is the utilisation of its major assets, which are its vessels, so they have to be at sea for a considerable amount of time to reduce overall costs, which means that they can be competitive. We can go into details of maintenance and everything like that, but it is basically efficient running and ensuring that those vessels are at sea as many days of the year as possible with maintenance programmes, planned maintenance and so on. While I would not be able to comment in detail about the operations of ocean-going research vessels, definitely some work has to be done to look at how efficiently they are being operated and whether the private sector can assist in the operation of those vessels. Could they be managed a little more efficiently? It is a piece of work that definitely needs to be looked into in greater detail.

**Professor Rayner:** I add a comment, not so much on the vessels themselves but the future of the way in which data will be gathered at sea. We are literally on the threshold of a revolution in the way that is done. If it plays out the way it looks like it is going to, it will reduce the requirement for research vessels. I refer to the move towards the use of autonomous vehicles for scientific data collection. It is very important that we have an effective approach in the UK to adopting those technologies in a planned and carefully thought-through way, because in 10 years' time, the way in which we collect a large proportion of the data that we acquire, particularly in the global ocean, will move strongly towards using autonomous vehicles and away from very expensive ships. You will still need ships for certain types of activity, but the requirement will change quite profoundly over the next decade.

**Q90 Roger Williams:** You have been questioned about the Marine Science Co-ordination Committee. Does this have a role in making use of these vessels more efficient?

**Richard Burt:** Yes, certainly. Picking up Professor Rayner's point, the key thing is that, when the Marine Science Co-ordinating Committee is looking at the strategy to deliver the science, the foremost science is undoubtedly climate-related, which needs vast amounts of data. To gather vast amounts of data you need to have globally distributed technologies giving you data in real time at the densities that you require it. Shipping will not give you that. The use of autonomous underwater vehicles is almost fundamental; otherwise, your whole science plan changes. They are intimately linked.

**Q91 Roger Williams:** We have been told that the way forward may be not so many ocean-going vessels. Although I can understand why NERC would want to have their own vessels, can you say why they may be over-provided with that facility and could do better if they bought time on commercial vessels rather than running their own?

**Phil Durrant:** That needs to be investigated. The key issue here is that we are all in this together. We talk about restricted funding, and funding being squeezed harder and harder. We have to look at the most efficient way of delivering that science. If that can be done more cheaply with a private sector vessel so that

you can get more scientists on it, do more days at sea and do more science, that has to be the right way to go. It should be looked at in much more detail. We are talking about the efficient delivery of science, whether that is through the private sector, public sector or a combination of the two. It has to be a collaborative approach.

**Q92 Graham Stringer:** You have answered a lot of my questions in your answers to Stephen. You said there was no co-ordination of data collection at one stage. How would it be best co-ordinated? What would be the best way of dealing with data collection so we get the best possible sets?

**Professor Rayner:** At the level of routine data streams, we are seeing the emergence of an embryonic capability to co-ordinate that through the setting-up of the UK Integrated Marine Observing Network. The challenge is how we foster that and grow it from a great idea with no resources to a real co-ordination mechanism that can pull all of the somewhat disparate array of different capabilities together into a coherent framework. I would offer one suggestion. I spend a lot of time working in Washington specifically on this area. One of the things that has driven this quite strongly in the US is having some enabling legislation that recognises the need for an integrated ocean observing system. Enabling legislation has formed a focus for driving capability forward. It is not legislation with funding attached, but it provides a legal mechanism that helps to co-ordinate that activity more effectively.

**Q93 Graham Stringer:** The next question is leading. In answer to David's questions, you pointed out that this Committee had previously recommended a marine agency, and the comparator we were looking at there was the space agency, which has done a lot of space research. Do you think this Committee should recommend for a second or third time that there should be a marine agency? Would that be a good body to co-ordinate the collection of data?

**Professor Rayner:** I cannot speak for the Committee.

**Q94 Graham Stringer:** Would it make your life better?

**Professor Rayner:** I think the Committee can and should make that recommendation only if it believes there is a realistic possibility of it being achieved. Past experience indicates that that is not so.

**Q95 Graham Stringer:** It would reduce the number of recommendations we make. We are optimists.

**Richard Burt:** Past precedent would tend to point to the fact that that is probably going to fall on deaf ears. It would be better to do something better with some of the structures we already have and have some chance of it being enacted than to go for something that could be a much better solution but is unlikely to happen.

**Q96 Graham Stringer:** Where are the big gaps in data collection? Are they in the area of biology, or is it physical data about temperature, salinity and wind speeds?

**Phil Durrant:** All of them, to be honest. We just do not have enough evidence-based data to make the decisions we will need to make. If you look at Ireland, it invested a considerable amount of money—I do not know the exact figure—over four to five years to do a full multibeam survey of its full continental shelf. If we were to do that for the UK, it would take about seven years and cost £210 million—I think that is an underestimate—but that is just multibeam data to get bathymetry data. You mentioned wind, waves, current and tide. I do not know whether Ralph would agree, but we need much more data in all those fields.

**Professor Rayner:** But there are different levels of maturity across those different areas. The core issue is sustainability in terms of regular data collection. You have to distinguish between the data streams we need in perpetuity to support a whole range of applications and those that are dedicated to a particular science question. In the area of routine sustained data, the physical data capacity is much stronger than the chemistry and biology, but the issue in all three cases is sustainability; it is making sure that you can continue those observations on a regular and routine basis into the future, in the same way that you currently do in meteorology.

**Q97 Graham Stringer:** There is a terrible paradox here, isn't there? We are concerned about conserving parts of the sea and we do not have enough data to decide where the best areas are in some cases. While we are not getting the data, these areas are being degraded. To go back to the last report, the concern of the Committee was that we should get in there and do something quickly, even if we did not have all the information. Do you think we should get in before we have the data because what we are trying to conserve may have gone by the time we measure it?

**Professor Rayner:** It is a fundamental tenet of management that you can manage only what you measure, which reinforces your point. If you do not know what the status is of something already, whatever that might mean, it is very difficult to come up with effective management strategies.

**Q98 Sarah Newton:** To move away from marine conservation zones and that aspect of data, which we have been touching on, I would like to broaden it to data related to climate change. How well do you think the impact of global warming on the oceans is being monitored, and what more could the Government be doing to make sure that it is being monitored appropriately?

**Professor Rayner:** At a global level, those monitoring programmes are in moderate shape. However, progress towards the capacity that is envisaged as a fully operational system to observe the oceans has stalled at an implementation level of about 65% of the envisaged capacity that is needed for regular and routine observation of the oceans from a climate perspective.

The UK has played a fairly strong part in creating that capacity, but the issue has always been one of sustainability and making a sufficiently long-term commitment to underpin that capacity. Every time an element of that capacity is under threat, a huge

campaign has to be mounted to sustain it, whereas it should be regarded as fundamental core infrastructure that is needed to understand what is happening and the impacts on everyone.

**Q99 Sarah Newton:** I agree. What made it stall at about 65% capacity?

**Professor Rayner:** At a global level, it has to be a collective endeavour. It is the buy-in of all the nations engaged in that process.

**Q100 Sarah Newton:** Are there any mechanisms to try to encourage people to get round the table and find a way forward?

**Professor Rayner:** There are lots of mechanisms; they are not at the moment yielding any further progress.

**Q101 Sarah Newton:** Is there lack of political will on the part of some of the partner organisations or Governments of the world to push forward with the investment?

**Professor Rayner:** Yes.

**Q102 Sarah Newton:** We can look at our own country's commitment. In some of the evidence there was talk about the UK's commitment to the Argo programme. What is the UK's current commitment to that, and do you anticipate it changing?

**Professor Rayner:** The UK's current commitment is rather piecemeal; it is not a sustained guaranteed input, and it is below the proportion that you would expect in relation to UK GDP.

**Q103 Sarah Newton:** Which is the sponsoring Department for that level of financial commitment?

**Professor Rayner:** That is part of the problem. It is not clear, so we come back to the issue of co-ordination. It is not clear where that responsibility should lie. It lies across more than one Department, and there is a tendency for it to be passed from pillar to post.

**Q104 Sarah Newton:** Which Departments are passing you from pillar to post?

**Professor Rayner:** DEFRA and now BIS through the Met Office, which is now reporting to it. Those are the two that are predominantly involved.

**Phil Durrant:** That is an important point. We are here discussing marine strategy and the MSCC. It would be easy to point the finger at MSCC and DEFRA, but there are many different facets to it. Engagement by other parts of Government such as BIS is critical if we are to deliver what we are talking about here, which is a more integrated approach.

**Q105 Chair:** In terms of the whole process of data collection across the various bits of Government, is there no mechanism for properly co-ordinating it at the present time?

**Professor Rayner:** For routine and regular data, there is an emerging mechanism in the form of the UK Integrated Marine Observing Network, which is a DEFRA-sponsored initiative but with the engagement of most of the other Government bodies, in one way or another, that are concerned with regular and routine data.

**Q106 Chair:** You say "most of the other". Are there any obvious gaps?

**Professor Rayner:** It is pretty inclusive, but it is right at the start of its mission.

**Q107 Chair:** Is that in respect of the continental shelf, or is it all oceans?

**Professor Rayner:** That is in respect of local, national and global, so you would envisage—indeed, it is the case—that the UK Integrated Marine Observing Network is partnered with corresponding observing networks in other parts of the world as a way of ensuring we underpin both the local and global capacity that is needed.

**Chair:** Gentlemen, thank you very much indeed for your evidence this morning. That is very helpful.

### Examination of Witnesses

*Witnesses:* **Dr Phillip Williamson**, Science Co-ordinator, UK Ocean Acidification Research Programme, **Professor Jonathan Sharples**, Research Centre for Marine Sciences and Climate Change, University of Liverpool, and **Dr Stephen Dye**, Marine Climate Change Impacts Partnership (MCCIP), gave evidence.

**Q108 Chair:** Welcome, gentlemen. Thank you very much for coming this morning. For the record, even though I know one of you extremely well, it would be helpful if you could introduce yourselves.

**Dr Dye:** I am Stephen Dye. I am here representing the Marine Climate Change Impacts Partnership. It is a secretariat hosted at Cefas, an executive agency of DEFRA, so I am a Cefas employee.

**Professor Sharples:** I am Jonathan Sharples and I am here from the Centre for Marine Sciences and Climate Change at the University of Liverpool which links between the university and the National Oceanography Centre site at Liverpool.

**Dr Williamson:** I am Phil Williamson and I represent the UK Ocean Acidification research programme. I am a NERC employee based at the University of East Anglia.

**Q109 Chair:** I want to start with the impact that global warming is having on the oceans. Which do you see as the bigger danger: that the oceans will absorb carbon dioxide or that carbon dioxide accumulates in the atmosphere?

**Professor Sharples:** It is difficult to separate them. Basically, you are talking about two halves of the carbonate chemistry of the oceans, so if you increase CO<sub>2</sub> in the atmosphere, which has known warming effects, you will increase the amount of CO<sub>2</sub> that goes into the ocean and increase the acidity of the ocean. I do not know whether you can really separate those two processes.

**Dr Williamson:** The increase in carbon dioxide in the atmosphere results in a temperature increase and that increases the temperature of the ocean. That has all sorts of very crucial and potentially catastrophic effects for the sea level rise, ocean circulation and society in general, and ocean acidification is an additional stress on top of that. But ocean acidification slows down the rate of CO<sub>2</sub> absorption so that is one feedback mechanism, but as soon as the system starts changing—there are a whole lot of other changes as well—the CO<sub>2</sub> in the atmosphere has a warming effect and affects the circulation and stratification of the ocean, which affects the oxygen in the ocean. All these things have ramifications that feed backwards and forwards. As Jonathan said, you cannot really separate the two. One can calculate some of the economic consequences of a certain temperature rise or certain level of acidification.

**Q110 Chair:** We heard in the last witness session—all three of you were sitting in the audience listening—about gaps in scientific knowledge in the broad spectrum of marine science. Are there gaps in this discipline, or is this very well researched?

**Professor Sharples:** If you focus on what happens in the atmosphere if you increase CO<sub>2</sub>, how that gets into the ocean and how the carbonate chemistry in the ocean partitions the CO<sub>2</sub> in different forms, the theory of that is extremely well understood. That is 100% certainty. We understand all those processes. The

chemistry of the situation is well understood. When you start to look at the effects that that has, that is where the uncertainties commence. As to the effects on the rate or acceleration of sea level rise, or the effects of acidification on organisms in the ocean, there are some big uncertainties about the impacts of what we do know is happening.

**Dr Dye:** When we looked at knowledge gaps in this area in the MCCIP programme, the other gap essentially was about how it will change on a local and regional scale. If you look at the global content, maybe we have a good idea, but in local variability and regional impacts potentially there is a greater gap that maybe the ocean acidification programme is helping to address.

**Q111 Chair:** How are these gaps being filled? As a result of gaps, is there a need, as the previous witnesses were saying, to have better co-ordination of data?

**Dr Williamson:** For the ocean acidification programme, at present those gaps are pretty well filled, in that NERC, DEFRA and DECC are working together. We do have a national programme and it is doing the necessary science for a period of years. That has initiated additional measurements to look at some of the factors that Stephen mentioned related to variability. I reiterate that the global picture might be, “Yes, we can have those projections”, but for regional patterns we find that the chemistry does not necessarily behave itself and there are differences. The pH around the UK and European shelf seas is falling more rapidly than expected from the carbon dioxide in the atmosphere, so other things are going on. One does need to make the observations. As we heard from the previous session, we need to make those observations in a sustained way and marry that together with ongoing research on particular effects and processes and then try to improve understanding so we can have some sort of projection for the future.

**Professor Sharples:** The ocean acidification programme is quite a nice example of how I perceive that the NERC strategy over the last few years has worked quite well in trying to identify these gaps, particularly the link between NERC and DEFRA. You have the ocean acidification programme, which I suspect was the first one that really made that connection between the gaps as seen by NERC scientists and as seen by DEFRA, but now we have the macro-nutrients research programme, which again was a NERC-DEFRA focus, particularly on how nutrients are cycled through the catchments and out into the rivers. There is a shelf sea biology and chemistry research programme that is due to start in a year or so. There is another one as well, but I cannot remember it.<sup>1</sup> The NERC strategy has worked by using theme leaders who go out among the marine science community and work out where the perceived

<sup>1</sup> The witness later clarified that, this is the FASTNET shelf edge physics programme, also supported by NERC and Defra.

gaps are in the research, and NERC and DEFRA have very strong links discussing where the parallels are and where the connections can be made. That has been working quite well over the last few years.

**Dr Williamson:** I would like to throw in the extra connection to the Department of Energy and Climate Change because of the implications of ocean acidification for climate change policy. We have a representative of the ocean acidification programme at the Climate Change Conference at Doha, and we have contributed to DECC studies on geo-engineering and related issues. There is also a public perception issue. Even if you do not believe in climate change, ocean acidification is a real phenomenon and that has some resonance with the public. They are interested to know that coral reefs are threatened by ocean acidification: cold water corals off Scotland and warm water corals, and organisms in the Southern Ocean.

**Q112 Chair:** So the feed-in mechanisms are there from the research through the organisations you have described. Is there any evidence of the Government adapting policy based upon advice coming through those structures?

**Dr Dye:** I do not know whether the science is mature enough yet to have fed all the way through a policy process. To take one step back from policy, I know that acidification is now being brought into the Oslo-Paris convention process, OSPAR, which is looking at ways to monitor acidification under that process, or whether OSPAR should be involved in monitoring acidification. I guess that is one step behind actual policy; it is more the regulatory environment.

**Professor Sharples:** To be an optimist on that, you would say that these programmes—I agree with Stephen—are not mature enough yet in terms of where we are through the delivery of the science, but they are set up right from the proposals stage with very clear links among the scientists, DEFRA and marine management organisations. There is now a structure in place, which possibly was not happening quite as strongly maybe five or 10 years ago, where these links to get the information from the science into Government Departments should operate.

**Dr Williamson:** There is raised awareness at the national and international level that these are additional issues that need to be thought about. Whether or not they influence the mitigation policy of CO<sub>2</sub> emissions, that is further along the line, but within Rio Plus 20, and the declaration arising there, ocean issues and ocean acidification came through. In the Intergovernmental Panel on Climate Change process, IPCC, again ocean acidification is coming through. In part, that is because of having European and national programmes and the research community saying, “Hey, this is pretty important. We ought to be thinking about it and taking it into consideration.”

**Dr Dye:** The other place I have just thought of is through MSFD. Acidification is part of the characteristics of that and will feed into the descriptors in some manner, so it is feeding through in the MSFD processes.

**Q113 Graham Stringer:** When you say we need more data and it is improving, I find it difficult to get

a picture of just how many pH measuring points there are around the United Kingdom’s coast and seas.

**Dr Williamson:** Up until now there have been relatively few. It is only in the last year or so that there has been a co-ordinated and properly planned, through Cefas at Lowestoft and Marine Scotland—initiated in part through the ocean acidification programme—taking of pH measurements and carbonate chemistry at the same time at different water depths and having that data. There have been one-off surveys by different countries, but it has only just started. There have been some underway instruments on ships and Atlantic-wide measurements of carbon dioxide in the surface ocean, but there are only a few places in the world that have got a long record of measurements to the required level of accuracy and the information required to tie that very carefully into the full suite of carbonate chemistry measurements.

**Q114 Graham Stringer:** So what is the answer to the question?

**Dr Williamson:** How many places do you need?

**Q115 Graham Stringer:** I did not ask how many you need but how many were being measured at the moment. You can certainly answer the question about how many we need as well.

**Professor Sharples:** There are these systems, as far as I am aware, on three ships at the moment: the Cefas Endeavour; Marine Scotland’s Scotia and also the James Cook. These are continuous underway measurements, so there is a continuous pumping of water through the systems on the ships and you get measurements every few minutes. I am not quite sure how long it takes to analyse a sample. To be able to do this over the whole of the UK’s patch of the north-west European shelf that these vessels are visiting is a relatively recent development. It is tremendously powerful data. You can start estimating the absorption of CO<sub>2</sub> into the ocean as well as changes in the pH of the ocean.

Thinking back to some of the points that came up in the previous session, the difficulty is that a lot of these programmes tend to get funded for two, three maybe five years at a time, so you keep hitting these cliff edges where you are not quite sure and you have to put in another proposal. You are losing staff who are skilled at doing those measurements because there is no security in their job. A lot of these things tend to limp along by little bits of money that are input from other research programmes just to keep them going because it is recognised that it is an important measurement to have.

**Dr Dye:** It is a fairly new process of getting the instrumentation to the state where we can make these measurements with accuracy and confidence. For things like set point measurements—a moored instrument in the Thames, Liverpool bay or something like that—the techniques are still not quite ready to have permanent monitoring to send back data every hour. For the instruments to make those measurements it is really at the development stage.

**Q116 Graham Stringer:** As you said at the beginning, the chemistry is well understood; it is GCSE O-level chemistry, but, as to measuring what is going on, we are in a state of pretty great ignorance over a period of time. Is that fair?

**Professor Sharples:** Theoretically. You can work out these things on the back of an envelope, but to measure what is going on you have to take more samples.

**Q117 Graham Stringer:** You need to have models for the chemistry to see what is happening. Dr Williamson, in your written evidence you say it might be premature to assess the quality of scientific output achieved but the new knowledge will have major policy significance. Isn't it premature to predict that if you are yet to assess the outputs? How can you be sure?

**Dr Williamson:** How can one be sure that the information will be valid? Whatever the information, it is going to be used—even knowledge of a potential uncertainty, but knowing that the ecosystem is responsive to ocean acidification and that some organisms are impacted adversely, some might benefit and some not at all—but that necessarily has some knock-on effects. Perhaps I overreached somewhat in saying it is necessarily going to have policy influence. You can ask at what level or degree, but just knowing that information is pretty important.

**Q118 Graham Stringer:** How is the UK marine strategy responding to the issues presented by ocean acidification, global warming and the other changes we see about? Is the strategy helpful? Could it be reinforced?

**Dr Dye:** My reading of it is that it identifies these as important priorities within the strategy. It is how you implement the strategy and how the individual bodies use that strategy to make their decisions that is really important. That would be how you would know whether it was working. It is a strategy and it cannot really be responsive in itself.

**Q119 Graham Stringer:** You think the strategy is okay but it probably needs resourcing.

**Dr Dye:** I would not really know how the individual bodies would be using that strategy to set their priorities or work out what research funding needed to take place.

**Q120 Sarah Newton:** The Chairman asked the questions I wanted to ask, so I am going to go a little off-piste. Professor Sharples mentioned the Marine Management Organisation, which is a relatively new body. Their role in licensing activities in the marine environment, whether they are scientific or are exploiting the natural resources of the marine environment, is a pivotal one. In order to help them make their decisions they require an evidence base from people who want to do things in the marine environment, putting it very simplistically. I would be very interested to hear your comments on the evidence base collection process used by the MMO. They have one statutory consultee, but they also have independent scientific advisers to help them with this

very important role. Would anyone like to comment on the evidence base used by the MMO and any of your interactions with or participation in that?

**Professor Sharples:** I have not had much interaction with the MMO. They are a relatively new organisation, so to some extent they are still finding their feet about who to interact with and where to get information from. For us, one of the interesting developments recently is how evidence or how data are made available. Within the science community effectively we have been used to a legal requirement to make any data collected using public money publicly available through the British Oceanographic Data Centre. We already do that. But MEDIN, the Marine Environmental Data Integration Network, is trying to draw together the work of the BODC and to start pulling in all these other data streams as well and set up standard protocols for the metadata that describes how data are collected and calibrated. I would imagine that that is the kind of thing the Marine Management Organisation will find valuable.

**Q121 Sarah Newton:** To press you a bit on that, I imagine that they would find that very valuable and as a nation that would be a very good thing for them to do. Are you aware that that is actually happening? I know that the network is in its nascent stages; it is just beginning. You talked about the importance of nurturing it, but are you aware of those links? Does the MMO know of its existence? Is it supporting it? Is it involved in making sure it is using the evidence that has been collected?

**Professor Sharples:** I could not answer for the MMO.  
**Sarah Newton:** Perhaps that is something for us to follow up with the MMO.

**Q122 Stephen Metcalfe:** I would like to return to the vein of questioning I was pursuing earlier about the support by NERC for marine sciences. Could you individually give me your take on where you see NERC support and whether you think they have a strategy? Should they have a strategy?

**Dr Williamson:** NERC does not have a separate marine strategy. It used to 10 years ago and, with the realisation of a whole lot of interactions, it wanted to rearrange the grouping of programmes to encourage interactions and look at different issues and things. To a certain extent, there have been some successes. The ocean acidification programme has come through the system. It takes a couple of years or so under the mechanism we have had for the last five years, but that particular system is now likely to change. I am not quite sure what will come along in future.

The NERC supports lots of individual research projects; it supports blue sky and some of the larger thematic programmes. When they come to the end of their lifetime, that community is expected to continue its research because the community has been developed, but, as has been discussed, it is not really in the business of long-term operational measurements. Sometimes, it does get involved in long-term studies, but it does so from the point of view that, yes, interesting science is coming out of it, rather than a feeling that in some ways it is obliged to

make long-term measurements. Those are its strengths and weaknesses.

**Professor Sharples:** The strategy of NERC over the last few years has had some successes in producing large research programmes that link across the NERC science community and into the DEFRA and Cefas requirements as well, so that has worked quite well. There is an issue with sustained observations and whether or not the UK is pulling its weight, particularly with global observations like the Argo floats, and how you support those kinds of sustained observations and retain the skills needed to keep these data sets of sufficient quality.

NERC is in a bit of a transition stage at the moment; its strategy is winding down and a new one is about to be developed. Certainly, the sense in Liverpool at the moment with the new strategy is that it is starting to focus more on what business can get out of marine science, which is slightly worrying if you are interested in trying to sustain observations and an understanding of how the climate is changing. We have not seen the details yet. It will be interesting to see how the strategy towards development of long-term, established information on how the climate operates sits within the new NERC strategy.

**Dr Dye:** In terms of MCCIP's interaction with NERC, it sits on our steering group and is one of the partners. The scientists who contribute their work are, in the main, part-funded or have been funded by NERC; it is NERC science funding. We get a lot of our information from that pool of excellent science that NERC scientists are producing. Sometimes, it is hard for us to see how MCCIP fits into the NERC structure, because there are climate themes, earth system themes or biodiversity themes and marine climate cuts across all of those.

In terms of having a marine strategy, it is such a diverse area. If you reversed the thinking and said, "Should they have a terrestrial strategy?", there are too many different things or it is difficult to split things up like that. I can see why at the moment there is not central marine science at NERC but it is split across.

**Q123 Stephen Metcalfe:** I take that on board; it is an interesting point. Professor Sharples, you talked about funding cliff edges. Presumably, that funding means it is very difficult to have a long-term sustained programme of science. You have also talked about cuts at the National Oceanography Centre in Liverpool and the impact that those will have on the centre's work. Are those cuts directly related to the fact that there is no long-term strategy and funding comes and goes and you have to adapt to what is coming forward, or do you think this is a move away from investing in marine science?

**Professor Sharples:** It is a move away from investing in strategic marine science. The cuts occurred at the National Oceanography Centre in Liverpool and in Southampton. There was a 24% cut in scientists across the board. It has been forced on the oceanography centre because of the change in the amount of core strategic money that it gets. Two important aspects of that need to be borne in mind. One is that the cuts in staff were based on a set of metrics that looked more

like those on which you might assess university staff. They were not metrics that took into account strategic work; they took into account the rate at which you published work in scientific journals or you were able to win competitive funding. A good proportion of the staff lost were those involved in the strategic work, which does not always feed through to rapid publication.

The other aspect is perhaps long term, which we might see develop if things carry on in this way. Because of that metric-based approach—using publications and grant income, as suggested to the rest of the staff in the oceanography centre, I suspect—that strategic work is not as valued as it used to be. Now they need to start thinking more like university scientists and bring in competitive funding and publish more. There is a worry that the career structure within the oceanography centre is starting to encourage a more non-strategic focus.

**Q124 Stephen Metcalfe:** Is the oceanography centre the only one that has been affected by those metrics, or is that now applying to other strategic areas?

**Professor Sharples:** In terms of the metrics and how that process operated, it was just within the oceanography centre. The cut is all to do with a ramp-down in NERC of what is called national capabilities strategic funding, so that is a NERC-wide mission.

**Q125 Stephen Metcalfe:** But the policy of assessing how good an area of research may be is done on metrics that might better be suited to a university.

**Professor Sharples:** It is within the oceanography centre.

**Q126 Stephen Metcalfe:** And just within there? Can you give me any other examples? I know that is not what we are looking at.

**Professor Sharples:** As far as I am aware, it was just a local process.

**Q127 Stephen Metcalfe:** In terms of the work that all of you are doing at the moment, how secure is your funding? Where is that coming from at the moment?

**Dr Dye:** In MCCIP, essentially a small secretariat is funded to provision the programme. It has moved into phase 2. The first phase was funded at about £100,000 a year; the second phase is £150,000 to £180,000 a year. That funding comes from lots of different funding bodies. The core funding is from DEFRA; there is funding from the devolved administrations, and conservation organisations also put money in. Each different organisation can commit its money over different periods because it has different financial processes. We have our core funding and year on year we get updates of the total amount of funding in place to keep MCCIP going. We are in the second year of the second five years.

**Q128 Stephen Metcalfe:** So you know where you are until 2015?

**Dr Dye:** We know our projected budget but we do not necessarily know which partners will be contributing the money all the way through. Some are committed for this year only and will tell us next year whether

they are committed for next year; others, like DEFRA, can commit for a further period.

**Q129 Stephen Metcalfe:** Does that limit the amount of work you can do?

**Dr Dye:** Not specifically. Because it is a rolling programme and we have a good engagement with those funding partners it is not really affecting our ability to deliver the work. It is a small programme.

**Professor Sharples:** I am employed by the University of Liverpool, so my funding is relatively secure. As long as we keep persuading sixth formers that doing ocean science in Liverpool is a good idea, and we can keep bringing in the responsive money from, for instance, the research council for research projects, we are okay.

**Q130 Chair:** I shall not comment on that as a member of the court of the University of Liverpool. Can I take you back to those metrics and tease out a bit more? In a previous report we produced recently on science capacity building within DFID, one of the issues we came across was the contradiction between the different pressures on research scientists, on the one hand, to publish, and, on the other hand, deliver the job at hand, particularly in the case of young scientists working in key delivery areas of malaria, HIV and so on. There are tensions. In one of our recommendations, we invited the research councils to have a close look at that. Do you see some parallels with the problems you are facing, and would you support the research councils looking closely at how measurements are made of the abilities of bright young scientists?

**Professor Sharples:** I think so, particularly bright young scientists that you want to get involved in this important strategic work. You use malaria and HIV as examples. An example in the NOC would be sea level. It is a globally leading centre for understanding how sea levels varied in the past and being able to predict what sea levels will do in the future, not just in terms of climate change but in fundamental underpinning work that the Environment Agency and the Met Office do in predicting storm surges around the UK coast. That is an example of an area that has been hit by this metric-based approach, in a strategic sense. It would be good to encourage the research councils maybe to have a clearer idea about what areas of science they view as strategically important and how that should get supported long term.

**Dr Williamson:** There is increased emphasis within the research councils on impact, but the problem is quantifying that and realising that impact does not happen in the same time scale as the research award. A programme might last three years, but the impact might be a contribution to something five, 10 or 20 years down the line. Although in the granting of NERC awards there are now pathways of impact, with emphasis on the knowledge exchange aspects within any programme—what you are going to do with that information and how it is going to be used by the wider community—it is difficult to include that within the sort of assessments that Jonathan mentioned.

**Dr Dye:** It is something we notice in MCCIP. We are asking people for their time to write reports that are

not “peer-reviewed ISI” literature and send them to us. They are peer-reviewed by the scientific community, but they are not published in a high-quality journal, if you like, so they will be seen in a different context on their CVs and in terms of their scientific career. We try to make sure they can see the impact that they are having and that the reports they are writing for us feed all the way through to our summary reports, and that does get taken up into the steering group, in various different processes in government and policy.

**Q131 David Morris:** Dr Williamson, what was the UKOA set up to achieve? Do you feel you have achieved these aims, and how do you measure your success?

**Dr Williamson:** We are only half-way through the programme, so the answer to the previous question about the funding is that it is a five-year programme, and within that there are three-year research grants. We are aiming to achieve better understanding and a knowledge base of how organisms and ecosystems respond and react in order to have some predictive capability to say: given the likelihood of a certain change of carbon dioxide levels in future, what are the implications for the ecosystem and ecosystem services and the things we get for free? What are the ecosystem services that have got monetary value? Will it affect the UK shellfish industry? The answer is: maybe not as much as the US shellfish industry because that is already further along the line. Their water conditions are such that they have lower pH to start off with. There is an impact there on shellfish hatcheries. The question is: will that happen in the UK? Maybe, maybe not. For the fishing industry, on a global basis in terms of the stability of shorelines and coral reefs, what is the sensitivity of these organisms? What biodiversity is likely to be lost, and is that important enough to worry about? How do the ocean acidification effects interact with temperature effects in other parts of the globe? We are trying to get an answer to a pretty complicated picture. There will not be an answer at the end of five years to know everything there is to know. We are part of an international effort to try to tease these things out, but it is a relatively young discipline. Ten years ago, ocean acidification was the subject of three, four or five publications a year; now there are hundreds, and it is a matter of making sense of them, putting them together and getting the bigger message out of it.

**Q132 David Morris:** You are working on an ever-evolving project. How do you measure your success in that? How can you say, “We have come from that point to this point”, or, “We envisage that we are at this point now. We may be at that point in future”?

**Dr Williamson:** As to whether there are some conclusions we are drawing from it, every year we have a small annual report with the scientific highlights, but in the discussions having DEFRA and DECC involved in our programme executive board means they hear about things at our science meetings. They respond and say, “That sounds interesting.” The guidance is that maybe you ought to be doing more work in this area or the other. Most of the funding is



now committed, but we do have the opportunity for a little supplementation or additional effort. That is where we have the advice of DEFRA and DECC that this is where a little bit of extra money ought to go to. But as for the success of it—whether we are delivering—we are delivering the science, but is it science in a way that is going to be useful to broader communities, to OSPAR and our international colleagues as well? Does it fit into a bigger picture? Are we helping to fit it into the climate models and impacts and feed into other different processes?

**Q133 David Morris:** Dr Dye, in your written evidence you refer to responding to new challenges, such as supporting marine adaptation strategies. How do you plan to do this?

**Dr Dye:** Adaptation has been more difficult to start up. MCCIP was started to find out what the impacts were. The impacts are the evidence base that you would need to start to think about adaptation. This is taking two directions. I know that a lot of the MCCIP evidence that has been collected was used to help inform the climate change risk assessment process and is also feeding into the national adaptation plans that organisations like DEFRA and Marine Scotland will be working on. In terms of going to the sectors that need to adapt, there are some large ones that are naturally working on adaptation anyway. In particular, the coastal flooding sectors will have a good infrastructure set up to think about adaptation, and the Environment Agency will be heavily involved in that. Recently, we have started working with developing our adaptation approach to work with small marinas to give them the information they need to think about what adaptation they might need to do.

**Q134 Roger Williams:** You have told us about the challenge of funding long-term monitoring projects, and how communities are built up and then funding is withdrawn or diminishes and those communities have to try to keep going. The fundamental question is: is NERC or any other research council the right way to fund long-term monitoring projects, or should the Government be looking to have an arrangement with industry to carry out that sort of work?

**Professor Sharples:** That does not necessarily fit within the remit of industry, especially when you are trying to do this on a global scale. Maybe industry would be less inclined to be involved. The question is almost: do we need a NOAA-type agency or possibly the current Marine Science Co-ordination Committee? In its present form it is not able to do that, but can something be done to that committee to up its remit and resource it properly that would turn it into something that would be able to do that? It would be really useful to have an overall view of what kind of level of involvement we need in long-term sustained observations of the ocean. It is not clear whether there is an existing group that could do that or whether we need a different group. I guess that is for you to suggest in your recommendations.

**Q135 Roger Williams:** We would like a hint from you.

**Dr Williamson:** There is a gap, and we heard about it in the previous session. As to the overall cohesion of the marine data-gathering exercise, there is not anyone who really has that as their main interest; it is always secondary. For any individual Government Department, it is always fairly low down any priorities, but it is a matter of bringing the information together. Within ocean acidification, there is a lot of movement for having global development, but it is bottom up from the scientist rather than Government saying, “This is really important; you’ve got to make it happen.”

**Q136 Roger Williams:** When the current awards to UKOA come to an end, will scientific interest in ocean acidification be maintained, or will it go off the boil, so to speak?

**Dr Williamson:** The scientific interest is going to be there, and then it is going to be competing within NERC for individual projects rather than on any national basis. For the observational work—making routine measurements—if there is sufficient funding within DEFRA on a two-year basis, there might be more money for a little longer, but it will have to fight everything else. Then the pressure will be, “If you do that, what are you going to stop doing elsewhere?” The way the dilemma is phrased is, “If you think that’s high priority, what are you going to stop doing?” That makes it very difficult.

**Dr Dye:** Speaking more from a personal point of view, to make real long-term measurements over 20 or 30 years takes a lot of stamina by individual scientists, and it also takes lots of different career paths, leading scientists to take these things on. You may lose by retirement somebody who has been collecting data for 20 or 30 years, and having a willing scientist to take that over, who also has a profile that is high enough to gain the funding, is a slightly different issue from the basic question: is there funding for it? Are there scientists who can carry this on? It is sometimes a real slog, particularly once you get past the initial stage. We are finding new things: five years on, maybe you are not finding new things, but you need to keep going.

**Q137 Graham Stringer:** You have partially answered this question both in your written evidence and what you said earlier. What commitments do the Government have to do international worldwide research into ocean acidification?

**Dr Williamson:** At present, the governmental research is primarily through the programme. There are some additional studies and efforts outwith that programme, but the current Government effort is focused on what we have got as a national structure, and how that will follow through is not at all certain. For representation at international meetings, most of the money is coming through the programme or people’s own institutions or organisations.

**Q138 Graham Stringer:** If you are going to go to a major international conference on ocean acidification, do you take the initiative, or is there some national co-ordination of that?

**Dr Williamson:** Most of the time it is individuals who want to go, and, if it is for scientific purposes, they would apply through the programme to have a supplement of £1,000, or whatever, to go to some international meeting in order not just to present a paper but have discussions and follow through. There are about five different things that we expect them to do while they are there. For the governmental meetings, if it is a UN climate change conference or a convention on biological diversity, individuals express interest that they would like to go there. Sometimes, DEFRA has some money to assist that process, but on the whole it is, "Well, we've got a national programme. Therefore, the expectation is that that should be able to support it for the time being."

**Q139 Graham Stringer:** That sounds a bit anarchic. Is that fair? Is there anybody within Government who co-ordinates our response and work internationally?

**Dr Williamson:** The Marine Science Co-ordinating Committee does have an international sub-group that has addressed the question. There is a whole range of different bodies, and we spend an awful lot of time going to them. For the Intergovernmental Oceanographic Commission, NERC has the lead role in the responsible delegation; for others, DEFRA or DECC has the lead role in Government representation, and there is the option of whether or not scientists can participate and assist in that process in a non-governmental role as either advisers at these meetings or organisers of side events or exhibitions. The ocean acidification programme has got involved in that. It has had support from DEFRA and DECC to some degree, for which we are grateful, but it is still a little bit separate from the main process.

**Q140 Graham Stringer:** It feels unstructured. Is it fair to say it is a bit chaotic? How do the international policy developments feed back? There seem to be a lot of different people taking a large number of decisions about how to be involved in the international science. How does it come the other way? How does it feed back?

**Dr Williamson:** For the ones that feed back into the science, the Intergovernmental Oceanographic Commission has got most interest in supporting or nurturing scientific activities in the countries. For the others, it is more a matter of energy policy or biodiversity policy, and there tend to be general overall statements of position. Clearly, it depends on the sectors and groups, and there are considerable differences between them.

**Q141 Chair:** Thinking ahead, what effect will climate change predominantly have on marine protected areas, both proposed and existing ones, elsewhere around the world?

**Professor Sharples:** I suppose it is a little bit of crystal ball-gazing. All these marine protected areas are within our coastal waters. On the basic physics of how the coast and shelf seas respond to the warming climate, they are responding very quickly. A typical rate of change of temperature in our shallow seas at the moment is about 0.4° or 0.5° C per decade as a warming trend.

**Q142 Graham Stringer:** Can you say that again?

**Professor Sharples:** If you look at 30 or 40-year time scales for the temperature of shelf seas, the situation is very different from the deep ocean. A constrained water column that may be 100 metres or 200 metres deep tends to respond in our latitudes very quickly to what the atmosphere is doing above it. You tend to have a very strong link between air temperature and how the system reaches a stable temperature in winter. The rates at which temperature increases in shelf seas tend to be a lot higher than in the open ocean. In the open ocean you have 3 or 4 kilometres of water that can redistribute any heat change, so a surface temperature increase is not necessarily what you would—

**Q143 Graham Stringer:** Is the temperature record for the oceans around the United Kingdom better than our record of pH?

**Professor Sharples:** Yes.

**Q144 Graham Stringer:** How good is the record of ocean temperature around the coast?

**Professor Sharples:** A lot of this is based on fisheries surveys. There is a station on the Isle of Man, stations in the western English channel run by the Plymouth Marine Laboratory and stations off the west of Scotland where individual sites are being measured. A lot of the data I use comes from fisheries trawl surveys. They have a temperature recorder on the net when they are doing the survey. Typically, you would be looking for at least 30 years of data to start trying to pull out any climate signals.

**Dr Dye:** In terms of sea surface temperature, we have a lot of data and good climatologies and trends for the waters around the UK. There are also some good time series stations and good gridded data. For sub-surface temperatures, there is a lot less data. We are not so sure about what is going on in the regions of our seas that stratify in summer time or are permanently stratified. For sea surface temperature there is a much better picture of what is going on at the moment than in those places where it is not well mixed.

**Dr Williamson:** If I could respond to MPAs and climate change, within the marine environment it is very rare that a particular very narrowly defined single site is for the conservation of a single species; it is for the habitat and ecosystem. Under climate change, that will alter. Is your area large enough? Is there some sort of network of different protected areas so different species can inhabit different places? That is within the UK shelf seas. Some of our largest MPAs, as I am sure the Committee knows, are in the overseas territories. There is one very large MPA in the middle of the Indian Ocean around the British Indian Ocean Territory. I think it is still the largest MPA in the world, and that is based on coral reefs. They are particularly sensitive to rising temperature and sea level and ocean acidification, but the facilities and opportunities for carrying out research there are relatively limited. It is difficult to get to, but no one is quite responsible for carrying out research there. The FCO provides the facilities of a fisheries protection vessel; there is some money from DEFRA under the Darwin initiative, and from NERC there are

competitive grants, but there is no co-ordinated effort to carry out a research programme for this marine protected area that is a UK responsibility.

**Q145 Chair:** We have seen, at least from BBC filming over the years, what appears to be a strong correlation between a very small rise in temperature and coral reef die-back. Are we going to see the same impacts in UK continental shelf areas? Are there going to be problems in maintaining species?

**Dr Williamson:** There will be problems. Species are moving in the ocean, and they have moved several hundred kilometres. Because planktonic organisms are not fastened to a particular part of the sea floor, as temperature rises, those communities move north, and the fish are moving north as well.

**Q146 Chair:** That raises an obvious question. If we establish marine conservation zones, do they need to be flexible beasts that move as temperatures change?

**Dr Williamson:** One needs to have an ecologically based fishery policy, some of which is stock-related, where there are places for fish to spawn and breed around the whole latitudinal range that the UK has responsibility for.

**Q147 Chair:** So simply setting fixed lines on the map now does not provide a long-term solution, assuming we cannot slow down the processes of change.

**Dr Williamson:** It has protection for the benthic organisms that live on the seabed. If they are not getting trawled over each year, they can build up. It might be modified, but there is a semi-natural ecosystem that has some recovery and restoration if an area is closed off from fishing or has minimal disturbance.

**Professor Sharples:** If you set up a geographically fixed marine protected area the question is: why is that protected area there? Are there particular species in the water column that you want to preserve—that might change as warming increases and so those species might move further north—or is there something intrinsic about that area of the seabed that you want to keep, in which case a geographically fixed area is fine?

**Q148 Chair:** But both could change.

**Professor Sharples:** Yes. The real challenge, which probably goes back to some of the points made in the previous session, is how you monitor what is happening in one of these marine protected areas. I know DEFRA is very interested in the emerging use of autonomous underwater vehicles. The glider is an autonomous underwater vehicle. They carry instruments to measure a very small subset of the total amount of things that you might be interested in measuring, but they can at least keep an eye on the basic parameters within a marine protected area at relatively low cost.

**Q149 Chair:** What you are setting out there is another reason for having long-term data collection

because, even if you establish marine conservation zones, their effectiveness and the need perhaps to modify the boundaries will be a constant challenge for whoever is responsible.

**Professor Sharples:** Just to see how effective setting up that zone has been, certainly.

**Dr Dye:** MCZs or SACs are set very strongly around geographic habitat features, so a type of rock, sediment or reef bed. Within those designations, not very much account is taken of what is going on in the water column above it. There is not necessarily a need to think about stratification, temperature or salinity of the water on top of these things within the main processes, partly because, in the MCZ process at least, we do not really know what is on our seabed. It is about finding out what is there in the first place and then you would have to start to think about processes on top of that. If you were thinking about marine protected areas in a wider sense in terms of closure, or limited closure, of areas for fisheries, already some of those areas, in some years, are not effective because the temperature is too warm to protect the species that it is put in place for.

**Dr Williamson:** I would like to reiterate the need mentioned earlier for high-resolution mapping. Only 25% of the UK EEZ area has been properly mapped. That does cost a lot of money, but that is the first base for a whole lot of other things to know what is on the sea floor and whether there are any particular features. That high-resolution mapping ought to extend all round the overseas territories as well, as that is the basic starting point to know what is there at present. Then you can start measuring areas of particular interest and see this is where the change is happening, and this is where industry can develop and exploit resources.

**Q150 Chair:** At a scientific level, is there a fair degree of openness and transparency among the community across the world in data sharing?

**Professor Sharples:** Yes. Ultimately, we are all interested in doing what we are doing, and, if we can help each other out, we do so.

**Dr Williamson:** Some of the fisheries data are considered to be commercial and in confidence nationally, but scientific information gets exposed pre-publication at science meetings and conferences, and most of the global community, most of the time, are pretty well connected.

**Dr Dye:** In terms of fisheries data, this week the setting-up of the fisheries DAC data archive centre, or the central portal for fisheries data under the MEDIN process, was announced, so that also falls into this. I have talked to people in other fields—glaciologists—and they are always surprised by how open the oceanographic and marine community is to getting its data used, available and shared.

**Chair:** Gentlemen, thank you very much indeed for a very informative session.

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## Wednesday 12 December 2012

Members present:

Andrew Miller (Chair)

Jim Dowd  
Stephen Metcalfe

Stephen Mosley  
Graham Stringer

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### Examination of Witnesses

*Witnesses:* **Professor Alan Rodger**, Interim Director, British Antarctic Survey, and **Professor Ed Hill**, Director, National Oceanography Centre, gave evidence.

**Q151 Chair:** Gentlemen, welcome to the session this morning, with apologies for the slight delay. We have been discussing future inquiries, one of which spills over to the work involved here. Professor Rodger, can I thank you for hosting the visit last week? That was a fascinating insight into the work of BAS.

**Professor Rodger:** Thank you; it was a pleasure.

**Q152 Chair:** The Committee is looking forward to following online the work at Lake Ellsworth. That sounds a fascinating piece of work and needs every bit of publicity it can get, so, hopefully, through the minutes of this meeting people will understand what is going on at Lake Ellsworth.

**Professor Rodger:** We hope so. You will be pleased to know that we should start drilling today.

**Chair:** Drilling starts today.

**Professor Rodger:** Possibly.

**Q153 Chair:** I suppose that takes us into the first question. Some of these projects cost pretty significant sums of money. What impact have the funding restrictions had on marine and polar science since the last spending review?

**Professor Hill:** I can start with marine science. The science budget overall has received a relatively generous settlement compared with other parts of the public sector, and the Natural Environment Research Council has experienced an overall cut over the spending review period of 3% cash, which is much greater in real terms. Those clearly have an impact. In addition, NERC is trying to rebalance its science portfolio to move more science into openly competed funding modes, such that the science community can be brought together in new ways to tackle very large earth system questions. Consequently, there is a rebalancing of funding away from the stream of funding that used to be called national capability into so-called research programmes, which are competitive. That is having an impact that is both a squeeze in volume but also a requirement for NERC centres to re-skill themselves in order to operate in a much more competitive research environment. That has led to some reprioritisation of the national capability portfolio in the marine community. We have stopped some areas of work; we have slimmed down some other activity, and, in addition, the National Oceanography Centre, in particular, has made some staff reductions to cope both with that funding reduction and to enable it to operate in the more competitive research environment resulting from the change in funding model.

**Professor Rodger:** From the BAS perspective, in general, the areas of marine science that are fundamentally important for planet Earth, in terms of some of the physical oceanography, sea level rise studies and the sustainable use of marine resources, are ones we have protected in our reductions and we have focused our reductions on other areas. This is just another example of the prioritisation that Ed described.

**Q154 Chair:** Both the change of direction and the absolute amounts are going to affect some programmes. In respect of the two respective organisations, which programmes are impacted by these changes?

**Professor Hill:** In the kinds of areas where we have reprioritised, the emphasis has been to try to protect a number of key activities. For example, areas we prioritised very strongly were fields like sea level research, and the UK contribution to the Argo float programme was heavily protected, as was long-term monitoring of the continuous plankton recorder. These are some of the more iconic data series in marine science.

Generally, we have tried to keep breadth across the science base and not lose critical mass in any areas. As to some of the programmes that have been affected, we have got out of some areas of numerical modelling that were probably spreading us too thin, in order that we might concentrate very strongly on the Joint Climate and Weather Research programme with the Met Office and focus on development of the NEMO model. We have also thinned out some of the coastal observing system. There is an observatory in the Irish sea, which we have quite heavily thinned out. It had been running for just under 10 years. It had been initiated as a pilot programme and demonstrator of the technologies, but we brought it to what was a natural conclusion. We are thinning out the frequency of observing in some of our programmes as well. There has been a general thinning-out and stopping of a few specific areas of activity, but that is how we have dealt with it.

**Professor Rodger:** We have focused, in the reduction in the British Antarctic Survey, on areas of geology, terrestrial biology and some degree of quaternary and middle atmosphere science. These have been chosen partly through a process of internal prioritisation, but the Science and Innovation Strategy Board of NERC also had a view on that and we took that into account when we came to our decisions.

We have focused on areas where we think we are particularly strong, and we think that some of the areas where we are likely to reduce activity we can bring back through collaboration in the NERC family, for example. Those are ways in which we are trying to ensure we can take this more holistic system science approach to understanding how our planet works, particularly in the polar regions.

**Q155 Chair:** On the issue of collaboration, last night at the Parliamentary and Scientific Committee one speaker made a particular plea for us to recognise the importance of collaborations in polar regions with the Ministry of Defence in terms of submarine activity. Is that kind of collaboration at risk, and does that create a further knock-on in terms of reductions in capacity?

**Professor Rodger:** As the leader of the NERC Arctic programme, we have access to additional data on sea ice from the MOD, for example. Of course, what they will not give you is latitude, longitude and time, which are quite useful things. HMS Protector, which goes to the Antarctic that has some tasking associated with our science, is also an incredibly invaluable resource, so I do not see that reducing at all. There are operational reasons that we cannot predict, and therefore we cannot always be assured of MOD support, but I suggest that today we are working closer with them than we were five years ago.

**Q156 Chair:** What do you think the autumn statement does for NERC budgets? Is it clear yet?

**Professor Hill:** It is not clear yet, but a welcome aspect of that has been the availability of more capital funding for science. That has been a problem for research councils generally. There are a number of aspects of that announcement that fall within NERC areas—for example, big data—but also the marine community has a very strong interest in the area of robotics, and it has a good track record for investing capital in that as well. We do not know the details, but there are certainly prospects there for NERC and marine science in particular.

**Q157 Stephen Metcalfe:** I would like to talk a little bit about the possibility of establishing a marine agency. Could you both expand on the pros and cons of doing that, and whether or not you think the Marine Science Co-ordination Committee could actively fulfil the same role?

**Professor Hill:** This is a perennial issue. It was a topic very much in the last inquiry “Investigating the Oceans. It was a recommendation of that Committee that a marine agency be established. The comparator is often made with the National Oceanic and Atmospheric Administration in the United States. One way to do it might be to do a thought experiment as to what a marine agency might look like in the UK. What would you bring together to create a marine agency? If you use NOAA as the model, it would be like taking the Met Office, probably the Hydrographic Office Survey, Cefas, which is responsible for fisheries, and maybe all or parts of the National Oceanography Centre, along with the Marine Management Organisation, to create a single agency, which would have a remit spanning forecasting for the

atmosphere and the ocean, regulation and fisheries, with a research dimension to it. That is the kind of scope of NOAA.

Would that work in the UK? What does it look like? You can see that it would create quite a few issues, not least the question of devolution. A number of the functions that presently sit in NOAA are devolved. There are separate bodies in Scotland that deal with that, so that is an issue. One positive is that you have everything under one roof. It would then have a very strong focus on delivering services and regulatory functions so that would be clear, and you might have a better chance of dealing with crossover in some of the long-term observing programmes and so forth.

If you did that, one of the obvious problems is that parts of that activity currently sit within the ring-fenced science base and therefore are protected, as opposed to going into an agency of that kind, which presumably would sit outside the science base. Currently, one has marine science being tensioned against other areas of environmental science in the UK, whereas in an organisation like that you would end up with marine science being tensioned against marine services with no real guarantee of protection. Those are some of the problems you might generate by that kind of agency.

While NOAA looks superficially attractive, it has issues. Despite all of that, as would be the case in the UK, you would never capture all of the marine activities under one umbrella anyway, as is the case in the United States. There are attractions for particular areas of activity: the synergies between some of the ocean-observing and atmospheric sciences, particularly as you start to move into climate and seasonal forecasting scales. Many of the observations that you are making in the ocean are very relevant to that, but, putting it all together, it is likely to be unworkable.

**Q158 Stephen Metcalfe:** Could the pros you have described be achieved in a different way, though, without necessarily risking the cons?

**Professor Hill:** I think they can, and the aim of the Marine Science Co-ordinating Committee is to try to generate some of those. There are very good examples of bilateral working between a number of members. For example, since the last marine inquiry five years ago, the Natural Environment Research Council has been working progressively more closely with the Met Office. There is now a Joint Weather and Climate Research Programme in which, for example, much of the ocean modelling of the National Oceanography Centre is co-designed with deliverables and timetables as the ocean component of climate and earth system models and is mutually agreed with the Met Office. That really was not happening before. There are other examples. There is a lot of co-design of programmes between DEFRA and NERC as well, so it is possible to achieve some of this bilaterally and multilaterally, and the MSCC is a very good forum for bringing together those bodies to assist in that process and generally aid the dialogue.

**Q159 Stephen Metcalfe:** Are there any particular barriers to the MSCC engaging with the wider marine

science community? How would you describe its engagement?

**Professor Hill:** Its primary focus has been, and continues at present, to be largely about bringing together the Government players in marine science together and assisting that dialogue. That has been very good. A very diverse range of Government Departments and their executive agencies are involved, and it has been very good for bringing that together. One of the things it has very much helped to address is there could have been a horrible disconnect between Scotland, England and Wales on a variety of issues around the marine environment and marine science. That has provided a very good dialogue, which is co-chaired between Scotland and England.

If you sit in the academic community and you are a researcher at the bench, probably the Marine Science Co-ordination Committee does not impinge on your daily life. Nevertheless, it is operating at a strategic level. An issue recognised by the membership of the Marine Science Co-ordinating Committee right from the outset was the way to engage industry. That has been done with a Marine Industry Liaison Group without industry having a membership on the committee itself. That was because at the outset it was not clear whom to engage and who would be the member. We thought it important that that community should have the opportunity to shape itself, but the time is now right to begin that engagement. That is probably the most important thing that could be done.

**Professor Rodger:** I have little to add. My only comment is that I work in places that are far away and the MSCC is focused largely on European and UK waters, and many of the issues that face us on the planet today are of a global nature. Therefore, at this stage, it is a little underplaying the potential impacts of more international waters. As you will have seen from the recent White Paper on overseas territories, that is another area that is perhaps underplayed at the moment, but remember it has not been established very long and these are areas it can grow into over time.

**Q160 Stephen Metcalfe:** How would you like to see it improved, just to take a wider view?

**Professor Rodger:** I would almost like some people at least representing, say, the overseas territories to be there, because they have very high degrees of biodiversity. As I indicated earlier, if you go to the Southern Ocean, it has the least exploited marine resource left on the planet, so some significant issues of a general nature need to be considered. MSSC spent a number of years getting up to speed. Those are the sorts of areas I would identify. To go back to your original question, whatever you do, there are interfaces between wherever. You can draw boxes round bits of organisations. We are generally getting better at recognising those interfaces and working hard to deal with them. Whether, I hasten to say, it is within NERC or between different organisations, we are doing a lot better now on managing interfaces than we were five years ago.

**Q161 Stephen Metcalfe:** There have been concerns about the size of the MSCC and its infrequency of

meetings. There was talk of establishing an executive group that might make it a bit more accessible. What are your views on that?

**Professor Hill:** That is an observation that the Natural Environment Research Council made in the RCUK submission. The MSCC is a very large body, and when it meets in plenary it is a substantial body. It has a number of much smaller sub-groups that I believe are effective, but the number of large funders is quite small. There is perhaps a case for some of those being able to come together within the MSCC in a more targeted way. There is a model for this, in that the Living With Environmental Change programme, which is also a large multi-agency grouping, has also been examining its mode of operation recently. A train of thought—I wouldn't want to pre-empt any outcomes—is whether that could become a little more focused within the executive group as well. That might assist things. It is always difficult to deal with a very large multi-agency body.

**Q162 Stephen Mosley:** I want to pursue a similar theme but probably coming from a different direction. We have heard from industry reps that they would like permanent representation on there. Do you think the MSCC is representative of the whole breadth of marine science?

**Professor Hill:** One has to recognise what it was set up to deal with, which was a set of specific problems, some of which were to do with the inability to co-ordinate within Government itself. That was the original focus and that was why Government Departments and their agencies came together. That was the starting point. It was not to try to embrace all of the activity. For example, the marine science strategy, which was one of its first products, is slightly misnamed because it is not a strategy that embraces all of marine science. It had a very particular focus, which was how to get the best science in a co-ordinated way to deliver the policy objectives of Government, very much around things like the Marine Strategy Framework Directive. That is where the focus of that strategy is. Some of it is perhaps a little bit of a misnomer in terms of the breadth of its coverage, but probably the single most important area, which was recognised from the outset, was how to engage the industry and business community more effectively in its working.

**Q163 Stephen Mosley:** In the statement you provided earlier, you said that the NOC Association has a role in co-ordinating with industry, learned societies, NGOs and the like. Could you expand on that a bit?

**Professor Hill:** Yes. The whole business of trying to organise and bring coherence into communities is happening across the piece. The National Oceanography Centre has a role to try to bring together the NERC marine science community and to bring to bear common views and vision on issues. That is largely about bringing together the academic university community. We also interact with business and NGOs in various separate ways. That is just one example of trying to bring together some of the

academic NERC-funded community, but, again, it is not comprehensive.

**Q164 Stephen Mosley:** We have one quote that tells us that apparently NERC “suffers from poor strategic planning on marine issues and inadequate engagement with marine industry, hindering ... exceptional R and D.” Do you think NERC could do more to accommodate people who think that?

**Professor Hill:** If you were to take that quote at face value, you would perhaps imagine that NERC was doing nothing, and that would be unfair. NERC does a tremendous amount to engage with business and industry. Its main vehicle for doing that is its centres and programmes like LWEC that it engages in, where there is a very strong business advisory board helping to shape the direction of that programme. Within the National Oceanography Centre, for example, there is very extensive engagement with industry, whether it is the oil and gas sector, which is a very big sector in the marine area, the space industry in terms of designing software and sensors for observing the oceans from space, or the emerging marine renewables sector and other areas too, so there is quite a lot of engagement.

NERC recognises that this is an area where it could further strengthen its engagement, perhaps at the strategic level, as opposed to what is happening at the grass roots or down in individual centres or within individual projects. For example, it has just appointed a director of innovation and communication to lead on the impact agenda and engagement with business and industry at the strategic level. There is a recognition that that is an area where NERC could strengthen what it is doing, but the characterisation of the quote is not fair.

**Q165 Stephen Mosley:** I thought it was a nice quote. Professor Rodger, I am conscious that I have not asked you any questions. Does BAS actively engage with UK industry in terms of the work that you do in the Antarctic?

**Professor Rodger:** The opportunities for business engagement in the Antarctic are rather limited by the fact that there is the Antarctic Treaty, which prevents, for example, mineral exploitation. We really do not have major business activities in the South. The thing I would draw out for you is that NERC has invested £15 million in Arctic research. There is a programme associated with that where we are trying to build business relationships in oil and gas, fisheries, tourism and those sorts of areas to see whether there are new opportunities as a result of the disappearing sea ice in the Arctic region. It is early days yet, and I hasten to say there are some challenges in working with the oil and gas companies, as you would have expected. They have put big money into some of these things and believe they have solved many of the problems that might be associated with oil exploitation of the Arctic. I am less convinced at this time.

**Q166 Stephen Metcalfe:** Some of our previous witnesses have raised concerns about the collection of marine data. Can you tell us what NERC’s ambitions are for data collection?

**Professor Hill:** NERC as a research council is primarily funded to support basic science. The motivation for data collection by NERC and NERC researchers is fundamentally to address science questions. We do not collect data for data’s sake and we do not monitor simply for the sake of it. There are a number of organisations and people motivated to collect data for very specific reasons to comply with regulation, to understand what effects they are having on their environment, whether as a regulator or business, but NERC’s primary motivation for collecting data is to address science questions. Therefore, that determines the type, nature and time scale over which data are collected. Sometimes it is a one-off process study where you want to parameterise something, and one set of measurements or experiments at sea might be enough to do it.

As to other questions that we are addressing, increasingly important in the earth sciences are matters to do with long-term environmental change and variability. As part of its portfolio of observing, NERC has programmes of long-term observing because, fundamentally, it is trying to address questions about decadal change and variability. NERC does this in several ways, but it has a programme of funding through its national capability funding stream that is specifically intended to support long-term programmes. For example, we contribute to the Global Sea Level Observing System that looks after tide gauge records of monthly mean sea levels across the world. There are a number of other sustained observing programmes. I mentioned the continuous plankton recorder survey, which is over 50 years’ duration. That is a very long and unique time series in the world, and NERC is supporting that. There is a variety of these programmes.

In addition, NERC has initiated programmes set up to address particular questions, and the jury is out as to whether they will mature into long-term programmes. The most spectacular example of that has been the Rapid Climate Change Programme, which is monitoring Atlantic circulation at 26° north. It is looking at the overturning circulation of the Atlantic, which is sometimes characterised as the question whether the Gulf Stream will switch off. That array has been running for 10 years because it is trying to address the question: can we detect changes in that circulation, and, indeed, what is the variability of it? It was a very ambitious programme. At the outset, there were quite a number of scientists who believed it was impossible to make these measurements. We have demonstrated that it is possible, and we now understand a lot of the variability. As to whether that is continued, the question will be about the science that needs to be addressed over those time scales, or whether there are any operational users who would like to monitor that system, say, as an early warning system, in which case you might expect some other funding streams to come into that, or not. Those are the kinds of ambitions that NERC has.

In general, aside from the science drivers, NERC has other ambitions in relation to its observing systems. It would like it to become cheaper, or at least more efficient, to enable you to do more with the same amount of money, or more with less. One of the key

mechanisms for doing that is to try to develop and use technologies that allow for more autonomous measurement systems in due course. For that reason, NERC has been investing quite heavily in technology programmes to see if we can make some of these systems much more autonomous over time.

**Q167 Stephen Metcalfe:** Do you think there should be a duty on marine industries to help you do that by supplying some of that data? Would that make it cheaper?

**Professor Hill:** It is an interesting question. When industry is collecting data it has a different motivation from that of NERC. Usually, it wants to understand their impact or the environment it is working in because of hazards that it may encounter. Some of that data is of direct commercial interest—for example, areas of exploration. The question of compulsion is probably not always a helpful one. It is collecting data for those very specific reasons. In many cases data collected by industry are available and can be made accessible to the science community very easily. I will give you an example shortly of how that is being done. There are some areas where data that are collected for industry—for example, as an obligation as part of licensing for baseline surveys and so forth—would be of much greater value to the industry collectively, to the public good, the regulators, and to scientists if they were somehow pooled and put together. For example, you can imagine how seabed and habitat maps might be stitched together into a more coherent picture of the UK seas as a public good.

There is a case to be made as to the condition of some of the licences for those activities in relation to that kind of data, which probably is ultimately not of great commercial value and the public good value is much greater, including the good to the industry sector as a whole. The mechanism to deal with that is probably to encourage enlightened self-interest on behalf of the industry sector as a carrot rather than necessarily the stick of compulsion, although that perhaps needs to be investigated. In areas where the data is very commercially sensitive you are in very difficult territory.

I said I would give you an example of where science and industry are working together very well. There is a programme in which the National Oceanography Centre is a partner called SERPENT, which is about remotely-operated vehicles used by industry to check structures, safety and so forth. When those ROVs are on standby, they have been made available to science. We have worked at about 92 different sites and have done about 390 hours' worth of ROV time. These are data we could not otherwise have got access to. It is of great scientific value. That helps industry to build up environmental baseline information as well, so there is a real synergy and added value by sharing and collecting data together.

**Q168 Chair:** To summarise that point, I see what you mean about some of the data being commercially sensitive and so on, but there are plenty of examples, are there not, where a slightly more engaged licensing regime could help basic British science if some

thought was given to ensuring that the licence conditions required proper data sharing with legitimate science programmes?

**Professor Hill:** Yes, there are. The most obvious examples are around sea floor habitat and mapping in relation to offshore developments. We have a very poor map of the UK sea floor. It is very expensive to collect. It could never be done by science alone. If people are doing it as part of regulation, stitching all of that together is a really important opportunity. The other example is trying to build up a picture of some of the offshore environment by platforms that are already there, where people are making measurements for the operation of those structures—and making that much more accessible to science and for the public good would be of benefit. It is a question of how to make it happen.

**Q169 Stephen Metcalfe:** A couple of my questions have been answered. You talked about some of the long-term projects and the collection of public-good data. I take it from what you have said, although please correct me if I am wrong, that there is no long-term project to map the seabed around the UK. That is not one of your aims, despite the fact that we are designating marine conservation zones and things based on different sorts of data.

**Professor Hill:** There is no single project, national or otherwise, whose aim at this point is actively to map the whole of the UK marine area. However, there are programmes in which we are involved with the British Geological Survey and others. One of them, called MAREMAP, is to do with this question of stitching together what is there, taking data that have been collected for specific purposes and putting them together to build this up slowly. There are discussions, for example, within the EMODnet programme, about whether at European level we ought to be building a detailed high-resolution, high-quality map of Europe's seas for the purposes of marine planning. There is some discussion about what that would cost and how it would be done, so there is a convergence of thought that this is an important thing to do. How to do it is difficult, and at the moment there is no single programme that is doing that. It would be a very exciting programme, because to do it would involve the participation of Governments, who are regulators; it would require a lot of scientific input, and the private sector would be absolutely crucial to delivering a lot of the data gathering. You could imagine creating a huge national capital asset in terms of a high-resolution map of our seas, but that does not exist at the moment.

**Q170 Stephen Metcalfe:** I have two final quick questions. First, who should co-ordinate that in the UK? Would that be NERC? Secondly, should that work be done before we designate marine conservation zones and potentially restrict our ability to use some of our waters at some later point?

**Professor Hill:** As to who should do it, it certainly goes beyond NERC. Industry, Government and the science community would all play a part. In terms of what is happening already, the MMO is playing a very important role in trying to develop the databases and



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maps required. It is in a focal position in England to do that; likewise, Marine Scotland is in that position. They play a very active part in the MAREMAP programme. That is the question of co-ordination. As to whether one should do the map before one sets the marine conservation zones, that is just not possible. We are talking about a 20-year programme here. We are into adaptive management of using the best available information that we have today in order to make evidence-based decisions around designation of areas, so we just cannot stop the world and map the place before we do that.

**Q171 Jim Dowd:** Your responses have been very detailed. You have already alluded to strategic oversight of marine science. Can I ask you, beyond what you have already said, whether you feel there has been improved co-ordination of marine science, and, if there has been, whether the MSCC, new legislation or financial considerations have been the most important element?

**Professor Hill:** There has been improved co-ordination and there have been multiple drivers to bring that about, so the MSCC is not the only force in this. For example, the whole of European and UK legislation in relation to marine planning, which is represented in the UK Marine and Coastal Access Act and Marine Strategy Framework Directive, has set a sort of framework where the policy agenda has become much clearer. That has enabled players to work together. That is where the Marine Science Co-ordination Committee has done a particularly good job in helping to focus, in the context of the UK marine area, on the science needed to address questions relating to the Marine Strategy Framework Directive. That is why Marine Scotland and DEFRA are able to work very constructively, because we are dealing with the same issues and NERC plays into it as well. It has been an important part of providing the forum for these bodies, many of them very diverse, to come together. If it did not exist at this time, we would have to invent it. It is one of those kinds of organisations.

There are a number of really horrible fracture zones that could open up in the way in which we deal with this, and the MSCC has played a part in making sure that does not happen. There are a number of specific examples of things that have been coming together. The issue of long-term observing was raised. The MSCC has helped the partners round the table to think about how they go about prioritising their activity. Each department and body is ultimately responsible for itself, but it has made us stop and think about what others are doing. The UK Integrated Marine Observing Network—IMON—is a product of that thinking. We just cannot carry on observing things like we always did without trying to put them together and think about where we are going long term. Again, that has come out of the atmosphere that the MSCC has helped to create, and there are other examples.

**Q172 Jim Dowd:** Which of the three that I gave you—there might be one I did not mention—do you think is the least important? I referred to the MSCC, legislation and financial consideration.

**Professor Hill:** As I described in my previous answer, the whole regulatory and legislative framework has been important, but all Government Departments sitting round the MSCC table are subject to financial strictures. All of us have to think about how to work together more smartly to save money and get more out of what we are doing. That has undoubtedly been a driver. The fact that senior-level members of the Departments continue to turn up to the MSCC is a testament to how importantly they view it as a means to help them each address the problems that they are facing.

**Q173 Jim Dowd:** On the NOC Association “Setting Course” strategy in this regard, could you briefly describe what ambitions you have for that?

**Professor Hill:** It was an attempt to get the NERC-funded academic community to think together strategically about some of the directions in which they are going and to help that community begin to influence the next phase of strategy development for NERC. I believe that communities that are organised enough to be able to articulate their own missions stand a better chance of influencing those strategies.

To boil down a lengthy document, in a nutshell, the key issues in it are for the marine science community to recognise that, increasingly, marine science is to be delivered in an earth system context, and, increasingly, it will be delivering large societally-driven questions around how we respond to environmental change, how we deal with increasing pressures on natural resources and how we make our societies more resilient to hazards and risks. We are not studying the oceans for their own sake, interesting and fascinating as they are, but, as a community, we recognise the need to work in that broader context and that we are contributing to bigger sets of questions.

With science communities, particularly quite coherent ones like the marine one, it is always a risk that you see activities just within your own context. The thrust of it is very much a recognition of working within a wider earth system context and that the fundamental problems we are dealing with and are able to address are those around decadal-scale change and variability. Long-term observing is crucial to what we do. If we are to continue to be able to deliver marine science effectively with world-class status, which it is, we are in a very expensive business and, increasingly, we are going to be reliant on technologies and innovations to do what we want to do at the scale we want to do it in the future. That is what it comes down to, in a nutshell.

**Q174 Jim Dowd:** Professor Rodger, we have been neglecting you. BAS’s written evidence stated that it had no comment on whether there had been strategic oversight and co-ordination of marine science in recent years. I don’t know whether your silence was strategic, tactical or just practical. Would you care to revisit that now?

**Professor Rodger:** Over the years we have had a strategy. The current one is called Polar Science for Planet Earth. In the same way that Professor Hill has described, the fundamental background to it is that we address problems of global importance best studied in

the polar regions. So, from a marine perspective, it is things like the cryosphere component of sea level rise; it is the fact that the ocean currents are largely driven from the polar regions and they drive 90% of the heat round the planet; and it is the fact that the southern ocean is the biggest oceanic sink of carbon dioxide. Those were very much strategic objectives. What we have not done as well is a more effective integration with the rest of the polar community, and that is something that is very much on my agenda.

**Q175 Jim Dowd:** What is the polar community?

**Professor Rodger:** In the same way that there is a marine community, there are of the order of 500 scientists in this country who are interested in polar region science in all its various guises, from space weather to the deep earth. The marine part is roughly one third of that or so of that community.

**Q176 Jim Dowd:** How do you feel that the marine science strategy has impacted on the work of BAS?

**Professor Rodger:** If you map the marine science strategy on to BAS, or BAS on to the marine science strategy, you would see all the key words in there. I have already given you some examples, but an additional one would be ocean acidification. We are doing work on ocean acidification. The key marine science topics are being addressed. What we did not do in our evidence to you was provide that mapping on the Marine Strategy, but I believe we are hitting the big issues facing planet Earth today.

**Q177 Graham Stringer:** Professor Hill, in your answer to Andrew's opening questions you talked about openly competing funding modes. Can you explain what that means?

**Professor Hill:** NERC has configured its funding into three streams. National capability provides funding for large-scale research infrastructure, and some of the long-term programmes, data centres and so forth. Those are mainly, but not exclusively, delivered through the research centres on a long-term basis and are refreshed and renewed periodically. It has two further funding modes where, essentially, there are open bidding competitions in which research centres and universities can bid for funding.

These are in two forms. One is where the issue is strategically and issue-led, where NERC has determined that there is an area of science that it wishes to grow or it wants a programme in. Therefore, having taken advice, it sets up a programme in a particular area and invites bids from the community for the best science to address the question. For example, the Arctic research programme is one of those. This is an area where NERC decided it needed to increase activity and have more focus. It said, "We're going to work in the Arctic", and then invited bids for the best science in that area.

The third mode of funding is entirely investigator-led; it is responsive mode or blue skies research, where an individual researcher with a bright idea, unconstrained, can simply bid into NERC funding, provided it fits within the broad scope of the NERC remit. Those are open to competition.

When I was talking about the shift of funding I was referring to NERC moving funding from national capability into the issue-led research programme mode to reshape the science.

**Q178 Graham Stringer:** This question was partially answered earlier. NERC has said that BAS and the NOC would have to make larger staffing reductions than other research centres. I would like to know why that was and exactly where we are in staff reductions now at both organisations.

**Professor Hill:** First, we need to be clear on a point that looks like a detail but is quite important. NERC does not say to centres that they have to reduce staff; it simply controls the flow of money to the centres, and they respond according to their own circumstances and needs; so the staff reductions are the responses of centres to funding reductions. The funding reduction, on average, to NERC's research centres in relation to the national capability was a cut of about 15%, with some further bits of top-slicing going on after that, but that is the approximate cut to those budget lines. Each of the research centres is responding differently depending on its circumstances. The National Oceanography Centre and British Antarctic Survey have been responding with formalised programmes of calls for voluntary redundancy.

Other NERC centres have been responding differently because they have different circumstances. For example, the British Geological Survey, apart from its national capability funding line, has never been strongly dependent on NERC competitive modes of funding; it has a lot of commercial and industry income. Its central response is to generate more of that and it has quite a lot of capacity to do so, so that is how it is operating. It is reshaping its staff profile. I am not aware of the details of it, but it is doing some re-skilling in order to be better equipped to bid for more commercial income.

The Centre for Ecology and Hydrology, as you will be aware, has only just come through a very major restructuring in which it reduced from nine to four sites. Very large numbers of staff were lost and there was a big refresh of staff there, so it is already re-skilled and is in a more competitive environment. It was slightly protected in the current rounds of reductions on account of the fact that it has just been through that, so it is operating differently. The response of the NOC has been to re-skill to deal with the more competitive funding and reduce staff to account for the shrinkages in national capability funding, and it is looking to diversify its income sources.

**Q179 Graham Stringer:** I asked where you are now. How many staff have actually gone?

**Professor Hill:** In the most recent formal voluntary call for volunteers, in the end, 32 staff have gone, of whom 25 were on open-ended contracts. The others were on fixed-term contracts, which will not be renewed at their due date. The process requires NERC to treat fixed-term staff and open-ended staff by the same process. That is the gross figure. Then there is a re-skilling process going on, so there will be

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recruitment in some areas of growth where we did not have skills before. That is the number of reductions prior to some recruitment, which will be going on over the next few years.

**Q180 Graham Stringer:** The net figure will be less.  
**Professor Hill:** The net figure will be less.

**Q181 Graham Stringer:** What about at the British Antarctic Survey?

**Professor Rodger:** It is the same general position, in the sense that, essentially, although we had a reasonably good settlement out of the recent spending review, inflation does bear upon us. We are expecting to lose 18 staff. We started our process later than everybody else, in late October, and we are still on that journey of identifying the voluntary redundancies that are necessary to achieve the £1.1 million of savings that we are expecting to make in staff salaries.

**Q182 Graham Stringer:** You say that is where you are now. Are you expecting to make any more redundancies?

**Professor Rodger:** No. At the moment, we have a budget that is fixed through to the end of the spending review period. Therefore, if we make these savings now, we believe we have a sustainable organisation. Who knows what will happen after the spending review?

**Q183 Graham Stringer:** Professor Hill, when you are making the decisions on who is redundant, how do you prioritise the science?

**Professor Hill:** A number of factors played into it. First, we had a national capability prioritisation exercise. There were some areas of science that we knew we were going to stop and some we were going to protect, but, broadly speaking, our policy was to maintain critical mass across all of our major areas, and we wanted to keep the broad base of our observing programme. Our fundamental driver was to maintain and strengthen the breadth across all of the major science areas. We were not getting out of any one major area of science. There were some small areas but not large ones. That was the first thing to do. The second thing was to ensure that we were able to operate in this much more competitive research environment in which we are expecting to operate. By 2014–15, we are expecting about 60% of our funding to come from fully competed sources of funding, and, therefore, we need a work force capable of doing that. We are, however, a strategic centre, not a university department, so you would expect some differences in our approach. We want to be able to maintain focus on long-term programmes and strategic big-team operation. One of the things that characterises research council institutes in that respect is the relatively high proportions of staff who are supporting principal investigator scientists who are leading the research agenda, so there are good levels of scientists but who are in a much more supportive role around them. That is what enables you to deliver big-team strategic science. We were recognising that we needed to ensure we had the right balance of those two populations of staff within our centre.

Then we wanted to ensure that the people leading the science agenda were the most productive researchers; that they were generating output; and that they were most able to take us forward in this competitive research environment, and, therefore, had a track record in grant-winning and so forth. In developing our criteria, we placed the emphasis on having set that background to ensure that we would retain researchers who were most able to lead us in a competitive research environment and were likely to be very productive and keep up our scientific vibrancy, because, of course, the real game we are playing here is to be internationally competitive against competitors in Germany, the US and elsewhere. We want to ensure that we have the highest-performing researchers.

**Q184 Graham Stringer:** Professor Rodger, did you follow a similar process? Are the three senior managers that you lost included in the figures you gave me in response to the last answer?

**Professor Rodger:** To take the latter part of the question, no, they are not included in that sense. Currently, we are carrying those vacancies because we believe they will need to be filled. You will know that NERC has already announced that it will appoint a new director of the British Antarctic Survey. The person might expect to be paid, so we are carrying that salary; those vacancies are not part of the long-term savings.

The approach that we took was a little different, in the sense that we have pared down our organisation to a large extent. We wanted to keep a critical mass, but we chose to try to do this strategically, so it is about turning down the volume knob in areas of science where we felt we were less strong than in other areas. There were areas that are probably less relevant to the issues facing the research programme today. We looked at what was relevant to policy. For example, we do quite a lot of work that is relevant to the sustainable management of the southern ocean's fisheries. We decided to preserve those areas. In the end, we have reduced particular areas of science, and those are the ones I mentioned at the beginning: terrestrial biology, and geology. We have done it by subject more than by some of the characteristics that Professor Hill described.

**Chair:** I am conscious of time. We have four more questions that we want to try and get through in the next few minutes.

**Q185 Stephen Mosley:** Following on directly from the last point, in terms of the work that you do in Antarctica, have you turned down the knob and reduced some of the scientists and the number of days of research you are doing there?

**Professor Rodger:** At the moment, the answer is no, for reasons that I do not quite understand. We think this is the busiest season we have ever had. It is helped by what the Chairman alluded to at the beginning that we have a big party doing the Lake Ellsworth drilling, which was part of one of these responsive mode or blue sky projects. We also carry out a lot of international collaboration. This morning we have perhaps under-emphasised the level of international

collaboration, and, of course, you get much more science when you collaborate internationally. We have a number of international collaborations as well. For example, NASA is coming down to launch balloons to look at energetic particles associated with space weather. There is a variety of activity, so we are more diverse than ever at the moment.

In the same way that Professor Hill described the fact that we are in a competitive world, we too are looking to round about 50% of our science budget being competitively won. We have to continue to do that and be successful at a time when money will probably be harder to get. The demand on the money NERC has will probably be increasing, so we have to continue to be competitive.

**Q186 Stephen Mosley:** Because of the geopolitical situation that you are working in, do you feel that some of your funding should come from sources other than the science budget—maybe from the FCO?

**Professor Rodger:** In the statement by the Science Minister early in November, I was pleased by the fact that he talked about it coming from the science base. I would argue that one of the real strengths of the organisation is our holistic approach, in the sense that the people who deliver the infrastructure and the science and the support staff work exceptionally well as a team. If you start labelling people differently in an organisation, it can lead to difficulties, perhaps almost like some of the things that we heard earlier. It is helpful to think of ourselves as a research organisation.

**Q187 Stephen Mosley:** When David Willetts came before this Committee a while ago, he said that he wanted to see Antarctic infrastructure and logistics being funded through a discrete funding line within the science budget. What would be the pros and cons of such an approach?

**Professor Rodger:** As has been alluded to this morning, the cost of running large infrastructure is inflating at a rate far beyond normal inflation. That is one of the tensions that both of us on this side of the table have faced. The fact is that marine gas oil has gone up, as you will have seen from the evidence, by a factor of six in the last decade. That puts tension on to the science budget. If you have the risk taken away, in principle, that is a great advantage of the infrastructure being funded from elsewhere or from a different line in the science vote.

**Q188 Stephen Mosley:** Have you had any discussions with either the Minister or the FCO on it?

**Professor Rodger:** There was a meeting at the very end of last month—my first meeting as interim director—which was very positive, in the sense that I felt the FCO, MOD, BIS and NERC were all in a room together having meaningful discussions. While the tone is very positive, it is far too early to say exactly what the outcome will be.

**Professor Hill:** From an NERC perspective, it has very much welcomed the Science Minister's announcement of this discrete funding line for Antarctic infrastructure and logistics. The major benefit of it is that it takes out the cost tension that

Alan has described. Some of this activity is maintaining an infrastructure in a wider national interest, and NERC recognises there is a wider strategic national interest involved, but there has always been a risk in relation to the Haldane principle that support for that could crowd out NERC's ability to deliver science in other areas of its very broad mission. The great benefit of that statement is that it provides the basis for taking out some of the tension around the Haldane question, which is why NERC has very much welcomed that statement.

**Q189 Chair:** Isn't the truth that, whatever structure you end up with, there will always have to be, as discussed earlier, well organised interfaces between other agencies, whether it is the Met Office, the Space Agency, Ministry of Defence or the Foreign Office? There have to be effective working arrangements, and the key to that is: how do we make those more effective without being overly-bureaucratic? Isn't that a bit of a challenge for you, whatever structure we end up with?

**Professor Hill:** Yes, it is, but there has been great progress in this area. There are drivers that are causing people to work together more closely, and we have talked about some of those. There are some very good examples. NERC has been co-designing and co-funding a number of major strategic research programmes with DEFRA and DECC and working very closely with the Met Office in joint programmes. These interfaces and interactions are working much better than they were, say, when this Committee held its previous inquiry.

**Q190 Chair:** Some of these are internal tensions as well. In your written evidence, you say that BAS is not recovering sufficient income from NERC research programme funding. This is at the core of it, isn't it? At the end of the day, you have got financial pressures that are very real. It still does not matter where you put the organisation; those tensions will be there.

**Professor Rodger:** The answer is yes, there are always tensions in there. We have won quite a lot of competitive money even since that number was given to you. We are not doing too badly.

**Q191 Chair:** But are there particular difficulties in getting support for Antarctic research programmes?

**Professor Rodger:** At the moment, Natural Environment Research Council has no new significant directed science programmes on the horizon where the British Antarctic Survey can be big players. We will be able to get money from some forthcoming programmes, but the last one was the west Antarctic ice sheet instability programme and we did very well out of that.

**Q192 Graham Stringer:** Professor Hill, in your written evidence you say that you are a key source of scientific advice to the Government, and you talk to them a lot and liaise with them. Can you give an example or examples of where your work has underpinned Government policy? How often do you meet with the scientific advisers at DECC, DEFRA and the Government's main scientific advisers?

**Professor Hill:** The Natural Environment Research Council has regular bilateral meetings with the key Departments, DECC and DEFRA, and the chief scientific adviser at the Met Office. Those fairly regular bilateral meetings normally involve the chief executive, who will sometimes bring along directors in support of those.

**Q193 Graham Stringer:** Are they fortnightly, monthly or quarterly?

**Professor Hill:** No; they would probably be quarterly or six-monthly; it is that kind of interval; they are long enough for strategic developments to occur. The Marine Science Co-ordination Committee is a mechanism for maintaining dialogue at pretty senior level, and that happens frequently. Every six months we will meet there. That dialogue is going on. Can you repeat the first part of the question?

**Q194 Graham Stringer:** Can you give some examples of where NERC's work has underpinned Government policy?

**Professor Hill:** There are a number of areas. It is often very hard to trace a line from one particular piece of research to a direct piece of policy advice. Very often in the environmental sciences, it is the synthesis of research over a long period of time that has the impact, but I will give you a couple of examples. The whole of climate policy is ultimately driven by the advice and findings from the Intergovernmental Panel on Climate Change. NERC researchers have been very active both in terms of delivering the basic research that has gone into that and also as part of the IPCC assessment process. The National Oceanography Centre has two authors on the current AR5 assessment going on, but a huge amount of work is going into that. The modelling efforts of the Hadley Centre are being fed and informed by NERC science. You can trace that synthesis going into the whole of UK climate policy.

As to other more specific areas, the work by NERC in sea level research in terms of both the global mean sea level and regional sea level change and its impact on extremes is ultimately the data informing the whole policy around flood defences, so that is very clear. That is not just one particular piece of work; an accumulation of activity over many years is going into that.

To get into something slightly more specific, over the last few years leading up to 2009–10, the United Kingdom, along with other countries, had the opportunity to make claims for extended continental shelf jurisdiction. This is based on scientific and technical arguments relating to characterising the sea floor and how much extension to continental shelf the UK could claim under the UN Convention on the Law of the Sea. Advice from the National Oceanography Centre fed into that. As a result, the UK has claimed over 2 million sq km of continental shelf extension on the basis of scientific advice. Those are a couple of examples in the marine area.

**Q195 Graham Stringer:** More generally, how are the effects of climate change on the marine environment being monitored, and how do you extract

from that the natural variability in climate from anthropogenic changes?

**Professor Rodger:** There is so much we could tell you about how we are monitoring climate change.

**Q196 Graham Stringer:** Particularly in the marine environment.

**Professor Rodger:** In the marine environment we are making measurements. We are spending about 10% of our national capability budget on monitoring the long-term environment. We have moorings in key positions where we monitor ocean currents and ocean temperatures. Ocean temperatures many kilometres down have warmed. We can trace those waters by looking at their chemical composition and trace chemicals, things like CFCs, embedded in the ocean. I did not get the opportunity to say—and I will say—that the sea, and particularly the ocean, is less well understood and monitored than the backside of the moon. We can monitor the sea pretty well for the space on its surface and into the first few metres, but we are still miles away from understanding the ocean itself. We are under-sampling the ocean, in my view, in a significant way, given that it moves 90% of the heat round the planet.

**Professor Hill:** Some of the most important observations are the sea surface temperature, which is measured from space, using very high resolution radiometers on satellites. The UK is very much involved in influencing those missions and ensuring their continuity, which is a key issue, and measuring the upper ocean heat content in the upper two kilometres of the ocean, which the international Argo float programme is doing. The UK is contributing to that. There is huge added value from getting a global data set, so that is the surface temperature and the heat content in the first kilometres. Sea level is measured from space by using altimeters. Maintaining continuity of the altimeter record and being able to calibrate that and ground truth it with tide gauge records is important, so that is the Global Sea Level Observing System in which the UK, again, plays a very prominent role and is the custodian of that global database.

The Rapid Climate Change Programme is looking at the critical variable of the overturning circulation, which is of interest in its own right. It is also a key test of ocean models. When you are looking to see whether an ocean model is performing, one of the things that you do is look at how well it is representing the overturning circulation. The rapid climate change programme, which is a very innovative and adventurous piece of work that NERC funded, is dealing with that. That is how you get at the variability. A lot of work then goes on in trying to attribute that to human-induced climate versus actual variability.

One of the big unknowns in the climate system, which is where a lot of the attention is turning, is the root of the problem, which is the carbon cycle itself, trying to understand how and the rate at which the ocean takes up carbon into the surface ocean, and how it gets into the deep sea. So measuring carbon fluxes is important. NERC researchers are very active in trying to work on something called the International

Integrated Carbon Observing System to measure carbon fluxes in the ocean, which is all to do with microbial systems and the way plankton take up carbon and so forth. That is a major thrust going into the future.

**Q197 Chair:** The final question is about vessels. We haven't got time to go through all of the data that exist and the various bits of evidence we have heard about the utilisation of vessels, but you have had five reviews over the last few years. Gardline, in their evidence, say that their vessels are used more effectively than publicly funded vessels. These are difficult judgments to make. Your colleagues tell us that the private sector is not comparing apples with apples.

It seems to me that there is a straightforward point here. It must be to everyone's benefit to get the best out of these very expensive pieces of kit. I do not think there would be any doubt about that. Would it make sense if the contrary pieces of evidence were placed before the National Audit Office, for example, and they were asked to say whether there is a better way of managing the ship fleet?

**Professor Hill:** It would be important that the actual data and facts were available and open to scrutiny, and certainly NERC would have no problem with that at all. If I recall, some of the statements that have been made suggesting that NERC is under-utilising its vessels and their days at sea are in the low 200s are not accurate. I can tell you that over the last five years the James Cook has spent, on average, 79% of its time at sea. When you mobilise and demobilise these ships, which are very complex multi-purpose ships, you are reconfiguring them for different science activities. Mobilisation and demobilisation is part of the science programme, and when we give science days that is very much part of it. If you include those as science days, the science mobilisation plus the time at sea means we are talking about 93% of the James Cook being occupied in those ways. We have had problems with the age of Discovery, which have caused her performance to drop below those levels, but we believe there are very high levels of utilisation. I am happy to provide this Committee with supplementary evidence with detailed data behind the remarks I have just made on the utilisation of those vessels.

We also work with our international partners with whom we barter ship time, but we compare data with each other. In terms of the way we use the ships compared with like operators, where we are comparing apples with apples, which are countries operating research vessels, then we are up with the best. Probably the Germans out-compete us slightly, but we are right in the top group of research vessel users in terms of utilisation of the ships. When one is comparing like with like, which is global scientific operations on multi-purpose research vessels delivering front-line leading-edge science, these vessels are being utilised. I will ensure that this Committee has those data so that you can see them. If it would help for that to be scrutinised more widely, I don't think there would be any issue with it, bearing in mind it is apples and apples that need to be compared.

The issue of research vessels is a major one for NERC. NERC has invested very heavily in ships. The new James Cook has been in service since her delivery in 2006, and we are expecting to take delivery of a new state-of-the-art vessel Discovery in June 2013. These are very substantial investments by NERC in marine science. It is in NERC's interests to utilise these vessels fully, but they represent a real challenge for us, because, when both of these procurements were initiated, the present financial climate was not as apparent. The rising cost of marine gasoil is a real issue. There is concern about the affordability of delivering this science and we will be looking for smarter ways of doing it, but up until now and into the foreseeable future we see very heavy utilisation of these vessels.

**Q198 Chair:** There are lots of issues. There is the planning of scientific programmes. I know that a lot of effort goes into maximising utilisation in that sense. That is one aspect. There are issues like ship management contracts. I understand there are different ones for BAS and NOC. These are all issues worthy of close examination in terms of our efforts to make cost savings.

**Professor Hill:** Yes. NERC, as you have said, has certainly not been idle on this score, in that it has been reviewing ships almost to death in trying to get to the root of this question. That is not to downplay some of the complexities. For example, the issue about whether the management of the ships should be outsourced is a perennial one that NERC has asked. Many of the costs associated with ships are fixed. NERC operates crewing standards. There are minimum legal limits and so forth. These vessels are not overmanned. There are a number of areas where private contractors would make savings. They would probably offshore their crew to avoid national insurance and so forth. NERC doesn't do that; I don't think we would be allowed to do that. We generally have a policy of employing UK or EU nationals, whereas other private operators might go to the far east, for example.

Maintenance is pretty much a fixed cost that you would have to bear. Fuel is what it is. A lot of these costs are the same, whoever is operating the ships. Most operators try to reduce costs by spreading the burden over as large a fleet as possible. That perhaps reduces insurance costs. For NERC, that is not an issue because the Government are a self-insurer. NERC is not paying VAT on the services it is providing to itself because it is an in-house operation. That is something you would have to look at in terms of a private operation. There are issues there. That is a question that has been repeatedly raised.

There are particular issues around the outsourcing or private operation of the polar vessels because of the broader national interest and some sensitivities around that. That always makes it a more complex issue for NERC. These are not trivial questions, but it is in our interests to maximise the efficiency of the operation of these vessels. What they do is a niche market and it is expensive. We believe on the basis of the evidence we have that we compare well with international research operators doing the same thing.

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**Q199 Chair:** But, even within that niche market, there is no reason why it should not be managed through a single structure inside NERC.

**Professor Hill:** That is an interesting possibility. There are issues around the management of the polar vessels and blue water vessels. Presently, they are managed as two completely separate and independent fleets in NERC. The question about whether they should be managed as a single entity is one that has been looked at several times, and very recently.

**Q200 Chair:** The final question is about autonomous vessels. They obviously have a role and an increasingly interesting one. I have seen some experiments in Liverpool. We have heard evidence that Britain has lost a leading place there, but we clearly have the science base on which further to develop autonomous vessels. Do you see them as a key part of the future?

**Professor Hill:** Absolutely a key part. It is a different story for another day, probably, as to why the UK may have lost its lead, yet it has not lost its lead, because we are scientifically and technologically in the lead in terms of the development of autonomous vehicles. We have just developed the Autosub6000, which is a unique deep sea autonomous vehicle, and we are about to trial the Autosub Long Range, which has a duration of six months, a depth of 6 km and a range of 6,000 km. This is a unique facility, so, technologically, we are in the lead. The take-up of this to more commercial use has followed a different path in the UK from the United States, and that is an interesting story in its own right. In terms of going forward, they are absolutely essential, and for that reason NERC has been investing strongly in it.

We have established a Marine Autonomous and Robotic Systems Facility at the National Oceanography Centre as a community facility to ensure that we rapidly transition these tools from development into availability for use by the science community and that the science community does not have to duplicate lots of expertise that is required technically to support them. There is also a whole set of legal and planning issues to do with using autonomous vehicles, so there is a single point of focus for that. It is a matter of making these accessible to the community. NERC has been making, and expects to continue to make, quite heavy capital investments both in the development but also the purchase of these autonomous vehicles.

They offer the prospects of taking a number of routine observations of ships. For example, we still make hydrographic sections measuring the basic temperature, salinity and other properties of the ocean in snapshots of time to see how the water mass properties are changing for climate research. If we could put these on to autonomous platforms, then you could imagine that, all day every day, we could be sampling these hydrographic sections instead of snapshots once every few years when ships have to go out and do it. There is huge potential there.

Autonomous vehicles have been able to do utterly spectacular things. A British first was in 2010 when Autosub went underneath the Pine Island glacier in west Antarctica, which is believed to be melting because of warming ocean from below. There is no way you can get a ship under an ice shelf, obviously. It did 500 km of track length in six separate missions underneath an Antarctic ice shelf. They were absolutely unique measurements with colleagues from the British Antarctic Survey and elsewhere. Those are the sorts of exciting frontier science you can do with autonomous vehicles, but there is tremendous capacity to take some of the routine work off ships.

In due course autonomous vehicles might be able to substitute for at least some ship capacity. We could remove ships in due course and put more on autonomous platforms. That is the long-term ambition. Today, we are not there. There are some things that you simply cannot do with autonomous vehicles that you need to do with ships; indeed, there always will be, but over time that must be the long-term strategic ambition. To do it, you need not just the platforms to be able to operate it but much more sophisticated sensors and payloads on them to measure all of the biological and biogeochemical properties that we currently do where you need people and water samples to measure. NERC is also investing very heavily in miniaturised sensors to measure these sophisticated biogeochemical parameters, and it is only the combination of the platform, sensor technologies and instrumentation, with low-power requirements and long endurance, that will ultimately give us the capability to do it. We are not there today, but in 10 years' time I suspect we will be in a place when we will be talking about whether we need as many ships in the global research vessel fleet because of this autonomous capability.

**Q201 Chair:** Professor Rodger, presumably it is particularly important for some of the inaccessible parts that you are interested in.

**Professor Rodger:** Absolutely. If you take our entire portfolio, we have 54 autonomous instruments in Antarctica at the moment. Those are not just in the marine environment. The spatial-temporal ambiguity is resolved the more and separate instruments one has. I would fully endorse what Professor Hill has said. These autonomous vehicles are a fantastic way to begin to resolve some of the simple things, like understanding seasonal variations.

**Q202 Jim Dowd:** Professor Hill, surely you cannot leave it there. Was the glacier melting from underneath, or not?

**Professor Hill:** Yes.

**Professor Rodger:** Yes, of course. We will give you the tutorial on that some other time. We can even explain why the ocean currents have changed and why it is warmer.

**Chair:** We look forward to the tutorial. Thank you very much indeed, gentlemen.

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## Thursday 20 December 2012

Members present:

Andrew Miller (Chair)

Stephen Metcalfe  
Stephen Mosley

Sarah Newton  
Roger Williams

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### Examination of Witnesses

*Witnesses:* **Dr Matthew Frost**, Deputy Director, Policy and Knowledge Exchange, Marine Biological Association, and **Professor Stephen de Mora**, Chief Executive, Plymouth Marine Laboratory, gave evidence.

**Q203 Chair:** I welcome everyone here this afternoon. Normally, when we start these proceedings in our natural home in Westminster, everyone is used to the procedures and we go formal very quickly, but I thought it would be appropriate to explain to the people in the audience what we are doing here in Cornwall and the relevance of the inquiry. We are the Science and Technology Select Committee in the House of Commons. We are a cross-party body. We work on a collegiate basis to try to answer some of the challenging questions that face Governments of all colours about how best to exploit the brilliant science that we have at our disposal. One of the big challenges facing all of us at the present time is the marine environment. We have started an inquiry that is stretching—not physically in terms of Members of Parliament, but intellectually—from Antarctica to the North Pole and all over the continental shelf. We have taken evidence from officials of the Natural Environment Research Council and industry experts. At the beginning of this week we went to the National Oceanography Centre in Liverpool, and now we are down here in what I would normally describe as sunny Cornwall, but regrettably it was not when we were on the river this morning. We had discussions with the Harbour Master and had a little trip up the river in the pilot's boat, which was intriguing. Some of my colleagues had not been on the river at all before. Following that, we had a meeting with many of the stakeholders that have been involved in the discussions about the future conservation issues in the estuary.

This afternoon's session is a formal evidence session, which would normally occur in a horseshoe-shaped setting, with our witnesses facing us. We do not have quite that geography here today, but we will be asking questions of our two expert witnesses as part of a formal evidence session. At the end of today, if anyone in the audience feels that they have something to contribute, although there will not be an opportunity to address us, we would welcome any formal written evidence that anyone cares to submit. With that, I am now going to move into the formal session. May I welcome our two witnesses here this afternoon and invite you to introduce yourselves for the record?

**Dr Frost:** I am Dr Matthew Frost from the Marine Biological Association, which has a research laboratory in Plymouth. We are also an association with about 1,200 members.

**Professor de Mora:** I am Professor Stephen de Mora. I am Chief Executive of Plymouth Marine Laboratory on the Hoe in Plymouth.

**Q204 Chair:** Thank you very much. First of all, how much progress has been made in delivering the UK Marine Science Strategy? What do you think the main outputs resulting from this strategy have been?

**Professor de Mora:** Can I start with that?

**Dr Frost:** Yes, you go.

**Professor de Mora:** There have been some very positive things that have come about as a result of the strategy. I would say it is a very high-level document, so almost anything that people are doing in marine science you can point to the strategy and say, "Look, we are fulfilling at least part of it". It has worked as a framework for marine organisations and Government agencies to come together, to try to co-ordinate and collaborate better than they have done in the past.

Having said that, the Marine Science Strategy is only a strategy and there was never an implementation plan. There was never any clear pathway to carrying out the work and the high ideals that are expressed there. One of the impediments towards progress in that area is the fact that people sitting at the table all have their own budgets and they have not been integrated in any kind of way. One would be very reluctant to lose your budget to somebody else, because obviously what you are doing is dependent upon the funding that you have. There is that side of things, but I would like to say that it is certainly a step in the right direction. There has been some good co-ordination that has gone on. In particular, I hope that what we are trying to do with respect to the UK Integrated Marine Observing Network—which has really taken flight from the MSCC—does succeed in the country.

**Q205 Chair:** Before I ask you to respond, Dr Frost; Professor de Mora, in your written evidence you talk about the strategy providing increased efficiency and effectiveness. What did you mean by that? How is it demonstrated?

**Professor de Mora:** We are still in the early stages of proving that that will be the case, but the strides that we are making with respect to the Integrated Marine Observing Network are steps in the right direction. What we have right now around the country is a set of observatories that are all individually run and financed for different reasons. They have different historical records, and they are funded through different means and were set up for different purposes.



What we are now trying to do with all of that is to make sure that the community at large is aware of all the things that are being done at the different sites, and to piggyback on some of the work that is available. There are enormous databases at some sites and so if somebody wants to do a few more measurements, they have all of the measurements there to rely on. That is one of the key things.

Things have also gradually improved—and Matt will probably want to talk about this as well—in terms of our organisations' involvement in trying to help with implementing the communications strategy from the marine science co-ordination network. We run something on Twitter, where the number of followers is slowly increasing, and Matt's organisation runs an online diary. Things like that are improving, and although I would still say there is a long way to go, there are glimmers of success that we should try to build on.

**Dr Frost:** I am involved at a slightly different level to Steve's, in the sense that when the MSCC was established it set up three working groups initially to address three areas of the strategy: the science alignment group, the communications group and the long-term monitoring working group. I sat on two of those groups so I could see the implementation part that Steve was talking about, so I was at the coalface to see what was being delivered. Out of those three groups, the long-term monitoring group was a bit of a failure. I have to say—and I think most people on it would agree—it did not achieve or deliver anything, for a variety of reasons. As I said in my submission, I do think the communications group was a successful group. It has delivered modest but quite important deliverables, including a lot of the ones that Steve has just mentioned. The third one was the science alignment group. To be honest, I have heard very little from that so it is impossible for me to judge its success.

Essentially, I think there have been some modest things achieved. One of the big problems with assessing the delivery of the whole thing was that, when it was set up, the Marine Science Co-ordination Committee had a marine science strategy that formed the basis of its remit. One of the things that happened down the line was that it merged with the Marine Assessment Policy Committee. To me that led to a degree of confusion. If you read the update report provided by MSCC to the ministerial marine science group, a lot of what it reports in there as progress is based on a few MSCC deliverables with other deliverables based on activities undertaken by what was the MAPC. There are deliverables in the report but I am not sure if a lot of them are anything to do with the MSCC.

**Q206 Chair:** In your written evidence, you talked about areas being more effective than others.

**Dr Frost:** That is right.

**Chair:** Is that what you meant?

**Dr Frost:** Yes, absolutely, I meant—

**Q207 Chair:** Give us a solid example.

**Dr Frost:** I think the communications have been effective. As I said, I declare an interest. I sit on that

committee, but I sat on the one that failed as well. The communications group was a good committee because it engaged the wider community. We went to lots of people. We were very aggressively targeting everybody across the marine community to say, "Give us some quick win practical things that we can deliver to help UK marine science". One of them, which Steve has alluded to, was very simple: why not have a UK marine science calendar that all Government agencies and research councils can use to plan events and to plan meetings? It saves money. It saves time. It is a phenomenally simple idea and, because it is fairly simple to implement, we were able to do that. In that sense, you have something that is quite effective. The communications team recognised early on that we have limited resources. We are not being paid to do this. It is voluntary, and relies on the goodwill of the marine science community. We adapted to that, in terms of the targets we were trying to achieve. I think the long-term monitoring group had incredibly ambitious targets that could not be met with the resources we had. That is what I mean in terms of there being some successes.

**Q208 Chair:** Finally, to both of you, if you had the ability to adapt or amend the strategy, what would you do with it or would you let it run as it is?

**Professor de Mora:** The strategy was written in such a way that it is a very high-level document. When you look at the three science priorities, they are true now and they are going to be true for a long time. In terms of a strategy, it is quite a fine document and I think it is written in a way that should be readily palatable to quite a cross-section of society as well. What it needs is an implementation plan to follow it up to make sure that some of the high ideals that are expressed can actually be carried out.

**Dr Frost:** I would say it is a strong document. I was involved in a lot of the stakeholder meetings that were held to develop it so that the document was not just developed in a back room by two or three scientists there was a lot of effort to engage the wider science community. I think therefore that the document reflects a lot of the expertise and foresight of the marine science community and the actual strategy itself will stand us in good stead for many years to come, as Steve said.

The big problem I have—and it goes back to implementation, as Steve said—is that, now we are at the next stage, there are some issues, particularly, with this merger with the Marine Assessment Policy Committee. I think there is some confusion as to what elements of this strategy are now being pursued, and what elements of the previous work of UKMMAS and MAPC are now incorporated into that.

**Q209 Roger Williams:** Could you tell us what the pros and cons are of having a dedicated marine agency.

**Dr Frost:** Do you want me to go first this time?

**Professor de Mora:** You go first, yes.

**Dr Frost:** Okay. The obvious benefit of that is you would have one central, hopefully, well-funded agency that can take on a lot of functions. Everybody knows what it is and what it does, and you would

hope that it would be well enough resourced to carry out a lot of the activities that have been identified in the past; as an example, collecting data and making data better available. There is obviously something attractive in that.

In terms of the potential problems, I think there are a couple of risks. Firstly, there is the risk that it is set up and it does not have the resources. You would then end up with an agency with very high expectations, which fails to deliver. That could be a real problem if people are expecting it to be all-singing, all-dancing, and to solve all UK marine science problems but it is not adequately resourced. That is one possible problem. The other is the problem of remit. We already have the Met Office. We already have the MSCC. We have Cefas and we have the research labs. When this original idea came up—I think it was 2008—in the last report, *Investigating the Oceans*, I did notice that the suggested remit of a marine agency could include, for example, promoting marine education in schools. My immediate thought was, “We do that as a charity and a learned society. Why would you need a marine agency to do that?” That is another thing we have to be careful with. If the marine agency is set up, we need to be careful that it is delivering functions that nobody else could deliver just as effectively so, it is not just treading on lots of people’s toes and pulling things in.

**Professor de Mora:** The pros are exemplified by what we see in North America, for instance, with respect to things like NOAA and the Canadian Department of Fisheries and Oceans. It does give a voice to the oceans, to the marine environment, where there are not very many voters. What is important about that is giving it a profile, not just with the public but politically as well. You have a person sitting at the table at Cabinet or elsewhere, who is there to look after the marine environment, as opposed to wearing a hat where he has to worry about ash disease and farmers as well as the fishermen. There would be some clarity, in terms of lines of communication and the chain of command, which would be useful at the Government level.

In terms of that agency or Department working, it would certainly be a stimulus towards getting the better co-operation that we need within the country to do things. It can be a bit embarrassing to go to other countries and know that they have a national monitoring programme and we do not. That is the kind of thing to consider. For instance, I would say that it should lead to less infighting with respect to ship operations and the like.

**Q210 Roger Williams:** If the Marine Science Co-ordinating Committee had more resources or a different structure perhaps, could it achieve the ends that you say would be beneficial from such an agency?

**Professor de Mora:** It can go some way along, but I do not think that it would achieve all that we might have a vision for. I did want to say there are some cons to all of this as well. You will note that, when you look at the constituents of the Marine Science Co-ordination Committee, given current devolution, you already have very many representatives, plus within the Department you have different agencies and

departments that are represented. One has to be careful about the expectations that you would place on a new agency because, even so, you would not collect all the marine and maritime interests in one place. There are always going to be port authorities. Where do they sit? Where does shipping sit? Where does the Met Office sit? Where does the hydrographic service sit? Of course, then the Navy will not want anything to do with it anyway. As long as you have realistic expectations and you define the limits of what it can and cannot do, I think it would be a very positive thing.

**Q211 Roger Williams:** Dr Frost, in your evidence you suggested that the Marine Science Co-ordinating Committee had a lower profile than might be expected. Could you tell us a bit about that and what could be done to remedy that?

**Dr Frost:** As I have already alluded to, I think the establishment of the MSCC and the process to do that was very successful. There were widely advertised stakeholder engagement workshops, and it felt to me that there was an awful lot of effort made to say, “This is a committee that is representing the marine science community in the UK, and we are going to fully engage everybody on this”. I do think that unfortunately, once the MSCC was established, that level of effort in engaging the wider community has diminished somewhat. I say this from my own experience. I lecture to students and I also give presentations in lots of places, as does Steve probably. If the MSCC ever comes up, most people have either not heard of it or, for the life of them, they cannot tell me what it does. I am talking about the general marine biology community. I do think there is an issue with profile and, as I have alluded to, when it was established we were all invited to attend the launch event. We were introduced to the committee. We were told who was on the committee, “This is the remit of the MSCC and this is what we will be doing”. To my mind, that has changed somewhat with the merger with MAPC. It is a little more nebulous as to what the MSCC is now.

**Q212 Roger Williams:** Perhaps it should represent a broader range of organisations involved in marine science?

**Dr Frost:** Yes. I said that in my submission. For instance, what I found very odd about the way it was set up, if you take the links with industry, is that I could not see why we appointed a scientist—never mind how good a scientist they are—as an industry liaison person. Why not get industry involved on the committee at the beginning? That would facilitate far wider engagement and a higher profile at a UK level. I think that applies across the board. They have some very good people on the MSCC and good scientists, but those scientists have then been tasked to liaise with NGOs, industry and other sectors. If those sectors had been invited to be involved earlier on, then perhaps we would not have the problem of such a low profile.

**Q213 Roger Williams:** How would you judge the success of the MSCC overall?

**Professor de Mora:** I have already declared my interest, in that I am a member of MSCC. The things that Matt said are true, and I would not argue about that, but what you have to do is look at the origins of the MSCC and why it was formed. I am guessing that the earliest mandate was to make sure that the different Government bodies were talking to each other. I think initially there was no thought to worry about HEIs, industry and NGOs, but clearly when you look at the marine environment, they cannot be ignored. I think it was the first step in getting the Government agencies together and in line, and it did expand because there were, I guess, three appointed members that came on to that, who have set up this liaison group and the like. I became sort of a vestigial member of the MAPC that Matt was talking about. When they merged them, they realised I did not have a seat at the table and I was invited to join the MSCC, which was very nice. The goalposts have been moving, and I think it is fine to say that it is still evolving, because there are some things that it is not doing very well that I would like to see it do better. However I do think the understanding of what it can achieve has changed over time, and I think for the better.

**Q214 Stephen Metcalfe:** Good afternoon. I would like to talk a little bit about the evidence that was used to designate the Marine Conservation Society. Do you think it was good enough that the recommendations were based on best available evidence, or do you think there should have been a more rigorous attempt to find robust evidence before recommending the zones? Who would like to start, Dr Frost?

**Dr Frost:** I think best available evidence is what we always need to use. I know there was a lot of discomfort among the regional projects because they felt that best available evidence was what they were working with and, from the scientific point of view, we felt that that was what was required to deliver to these regional projects. Then the feeling was that the goalposts were moved quite significantly as a result of the SAP review.

Now, talking to lots of people involved, including the scientists, the feeling is that when the MCZs were being set up, it was not about having the most robust scientific evidence at every site. It was about having a network. That was what the ecological network guidelines were all about. That is a very different thing from looking site by site like you do with the SAC and the European network, where you have strict criteria on what features are there and how much of that feature is present. It is very appropriate in that case to have a robust scientific evidence approach. You can say, "We have X amount of this species, which is in annex 2", and so on. I do not think the MCZ process lent itself to that and it was unfortunate that the goalposts were moved. I really think that best available evidence is what we should always be using.

**Q215 Stephen Metcalfe:** As opposed to seeking out robust? Even if your best available is a bit thin, that is the best available, so use that regardless?

**Dr Frost:** If there is more robust scientific evidence available—

**Q216 Stephen Metcalfe:** But if it is not available but could be made available if you found it, I suppose is what I am asking.

**Dr Frost:** Yes. That is right. There are two questions here, and I know that in the SAP review they were slightly critical because they felt that there was more evidence that had not been found. I understand that and, as far as I am aware, that is something that is being remedied.

There is also an issue here of expectation. I work on the Marine Strategy Framework Directive as well, and I have worked on a lot of these different processes whereby evidence is supplied to support some sort of legislation. There is always this sort of utopian ideal that somewhere down the line we will have all—in quotation marks—"the evidence". Science does not work like that. What science does is it answers questions and, in doing so, raises a whole new set of questions. To give you an example, if you had said a number of years ago that I can sit and tell you we have approximately 8,500 multi-cellular species in the UK, and we have them all catalogued and listed, you probably would have jumped up and down and said, "Fantastic, we can do a lot with that information". But from a scientific point of view, what that means is, "Okay, what about the rest of the ecosystem? What about the microbial diversity, the tens of thousands, potentially millions of species we know nothing about?" That is how science works. It produces evidence, answers questions, but in doing so it opens up whole new horizons and gaps. I am not sure that the scientific approach is always appreciated when you are gathering evidence.

**Q217 Chair:** Can I put it a bit more bluntly that, with only 25% of the seabed mapped on the continental shelf, we could seek out stronger, more robust evidence?

**Dr Frost:** We could. We could spend an awful lot of money, which is what it would cost. We have about 11,000 miles of coastline and, 3½ times as much sea area as land. Yes, I have heard 15% to 25%, as being the amount mapped. We could seek more information, but that would involve going out and conducting more surveys such as more multi beam surveys. What I am saying is, as a fundamental principle, I personally believe that if we did that, you would then get questions on the resolution of that data. People would say, "You have gone out and got more evidence. We have mapped the habitats. What about the biotopes and species?" If we map those, then people would want to know, "What about the pressures on those species?" At the moment, the Marine Strategy Framework Directive is asking us to report on food web structure and ecosystem structure. The goalposts can continually move, in terms of what evidence is required. That is why I am saying we have to be very careful, because we have this idea that we can complete the evidence base. I do not think we will ever complete the evidence base in that sense.

**Professor de Mora:** That is a lovely question because it clearly demonstrates you understand that there are gaps in what we know. Matt finally mentioned the most appropriate word in all of that discussion, and that is money. You get what you pay for. One of the

things that is very important going forward, when various things are done, is that there is some kind of harmony of purpose and methodology. As we build up the patchwork quilt of understanding around the country, that means all of those patchworks can stick together in a seamless way rather than saying “We did not actually measure this here or we did not think about that there”. I guess we will come to this in the MMO stuff. When people are thinking about the use of a particular coastal zone, right from the outset you need to think about all the uses because, at that early stage, a small incremental addition to funding can save you having to revisit and resample later on. I do think that what it shows is that there are large parts of the marine coastal environment that we do not know enough about yet, and that is just the UK. If you start talking about overseas territories and things, you expand the problem very quickly.

**Q218 Stephen Metcalfe:** What you are describing, is that written into an overarching strategy yet or are you saying it should be?

**Professor de Mora:** I do not know that it is put quite so bluntly anywhere but, as Matt has indicated, in various quarters we are scrambling right now to make sure that we understand how we can implement the MSFD when that comes online. There is a lot of effort and a lot of good thought going into it, particularly because there is this question of indicators and what are the right indicators. Hopefully, other Europeans will agree when we do come up with indicators, but that is another question. It is being done in various quarters and one would hope that it would all come together to the MSCC.

**Dr Frost:** To add to that, I would also say that it is not as linear a progression as getting the evidence and then establishing an MCZ network. Establishing MCZ. Reference areas, for example, are part of that evidence gathering. As scientists, one of the issues we have is that there are very few areas—well, practically none—in the UK, where we can say, “There are no anthropogenic pressures here”. This is a reference area, so we can begin to understand the science of how the marine ecosystem functions without any of those pressures. So, setting a reference area would help us as part of our overall evidence gathering. There is a degree of irony, in the fact that reference areas have not gone forward as part of this overall view that there is not enough evidence.

**Q219 Stephen Metcalfe:** Dr Frost, the final question for you relates to the ecological network guidance. You said in your written evidence you had some issues with that. Do you think we should not be seeking to create a network as such? Can you elaborate a bit on that?

**Dr Frost:** Yes. The ecological network guidance came from the original OSPAR Guidelines in 2003, when we started to talk about things like a coherent network and issues of connectivity. What was not realised at the time was the difficulty in establishing the science for that. We can take that as a general guideline and, as ecologists, I think we all understand that you have to have some degree of coherence. You cannot just have widely separated sites and treat them as if they

are not part of the same holistic ecosystem. Having said that, if you look at the science that underlies how many of these sites there should be and how near to each other they should be, you are getting into issues like metapopulation dynamics and larval dispersal, and that is phenomenally complicated. I do not think the science can answer those questions at the moment. From people I have spoken to, the general feeling is that it was a very ambitious aim, very early in the process, to have ecological connectivity, and I do not think we can address that with the current science. However what we can do is go partly towards recognising there has to be some sort of connection.

**Q220 Sarah Newton:** Sticking with marine conservation zones, in your written evidence you were both saying that you felt that the whole designation process became dominated by the socio-economic concerns. Do you think that that was taking priority over the evidence, accepting that we know there are gaps in the scientific evidence? Do you think that was a weakness of the evidence or were there other factors? Somewhere else in your evidence, you mention that you felt that the fishing industry were very dominant in the process and were almost hijacking the process.

**Dr Frost:** I will answer first. I did not sit on any of the four regional projects that were set up, however, we did have scientists from the MBA who did. For example, if you look at *Finding Sanctuary*, the criticism I received back from that was that you had 41 members on that steering group and, if you go on to the website and click the science heading, there is one person who sits under there as the lone scientist. I know that there are scientists under other categories, but the feeling is very much that the scientists were a very, very small part of that whole process. There was some frustration with the fishing industry and other commercial sectors that they more or less made up most of that stakeholder group. For example, it did not matter if a number of them did not turn up for a meeting as there were plenty of other people to represent them. Whereas we had times when our scientists could not make it, which meant, therefore, there was no official science representation at that meeting. This is where it came from. Also, anecdotally, I have heard a lot of people say that they had the feeling that, even though everything was supposed to be channelled through these stakeholder groups, these regional projects, they felt that some of the commercial sector—in particular, the fishing sector—were probably lobbying offline and finding other channels to get their voice heard, which of course scientists are not very good at. There was a kind of feeling that, yes, perhaps the scientists were disadvantaged in the whole process.

**Q221 Sarah Newton:** Would you like to comment, Professor de Mora?

**Professor de Mora:** Yes. This is an area that I am not quite so familiar with, but I think in general one of the things is that marine conservation zones wind up with bad press, particularly from the fishing industry lobbyists. A lot of that is based on a misunderstanding of what the ultimate benefits are likely to be. I can

think of an example in New Zealand, where one of the first marine parks in the world was created, off a small town north of Auckland. The local fishermen were very vociferous in their campaign against setting this up. Ten years later, they thought it was the best thing since sliced bread. They would run regularly up and down on the outer perimeter of the conservation zone for fishing, and it acted as a very important nursery for restimulating the lobster industry and the like. I think that is one of those things where there is a real misunderstanding and apprehension about what these zones can do.

**Q222 Sarah Newton:** To quickly follow up on that—and it answers my question really—do you think part of that is there was no proper engagement process with stakeholders to build support for marine conservation zones? You are basically implying in your answers that you do not feel there is a lot of popular support for marine conservation zones. Or perhaps I am wrong; perhaps you think there is a lot of popular support for marine conservation zones.

**Professor de Mora:** I think it is very polarised. I am not quite sure where the balance would be, but the thing is that you are either for it or against it, I think. Sometimes it is impassioned debate rather than actually listening to argument, if that explains it.

**Sarah Newton:** Yes. It does make sense.

**Dr Frost:** Yes. Steve has just used the word “polarised”, and I think that sums up the whole thing. The problem is at the moment people see conservation and sustainable use as mutually exclusive; you can have one or the other. You can either have people working in an area or it is a marine conservation zone. You cannot have long-term economic benefits and protection. I think that is a complete fallacy, to be honest. What we need to do is get the fishing and the commercial interests, the NGOs and the conservation interests to see that we all want the same thing, that this is a functioning, healthy ecosystem that provides livelihoods for people. They are not mutually exclusive propositions.

**Q223 Sarah Newton:** I completely agree with you. To help that process, what more do you think could be done? As for that good example you used of Auckland, I am presuming—perhaps you can enlighten us—that there is quite a swift recovery period. So, once the conservation zone was put in place, there was good recovery in the fishing stocks and then the fishermen started to benefit. What more could we do to understand that—well, it is not necessarily us—what more can be done to overcome these quite considerable communications issues?

**Professor de Mora:** We have to look at home for some of our success stories. There was considerable anguish in the recent past when Lyme Bay was closed to scallop dredgers. Dredging is just about the worst thing you can do to the seabed. It does not matter where you are, with the high resolution sonar eco-sounding that you get now, you can see the claw marks across the sea surface. It takes a long time for that to recover. There was quite an interesting study into the effects of closing that bay to scallop dredgers and the socio-economic impacts of that. The study

also looked at environmental recovery. What you find is that there was significant change in the use of that bay and benefits largely to the community as a whole, although obviously detriment to some of the scallop dredgers. If you look at the overall social impact and socio-economic impact, however, there is increased line fishing, increased diving, so tourism in the area has improved and that kind of thing. Again it all depends. No doubt the scallop fishermen were pretty vociferous that this was not a good idea, but the community at large has probably benefited from the closure. There may well be other instances of that around the country, I am not sure, but we at Plymouth Marine Laboratory have been involved in that particular study, and possibly you were, Matt. It is the kind of thing that you need to put out there to show.

**Q224 Stephen Metcalfe:** Briefly, I want to go back to this New Zealand example where the fishermen now think it is the best thing that has ever happened. Was there a painful transition, though, for them in which they did not all survive?

**Professor de Mora:** Oh, absolutely.

**Q225 Stephen Metcalfe:** We have heard this argument that everyone can benefit, but is the pain too great for those who have to endure it?

**Professor de Mora:** That might be the case for the Lyme Bay, for scallop dredging, because they had to change their practices. They had to go to sites that were further away. Their feeling—perhaps anecdotal evidence—was that the quality of the scallops they were getting was poorer. In New Zealand, we are talking about a pretty small area that was being designated and a pretty small fishing community nearby. Obviously there was displacement of work, but I do not think that anybody was unemployed as a result of it. I guess all of this happened in the early 1980s, and when I went back more recently it is now a huge tourist thing. There are huge car parks and when you go into the water there are all kinds of fish and that. Not only do the fishermen think it is nice, but now it has become quite a major tourist attraction in the region as well, so there are all kinds of things that have changed as a result of it. Whether or not the local small community actually likes that is another thing, but it has changed the socio-economics of the region for sure.

**Q226 Stephen Metcalfe:** Thank you. Changing the subject, I would like to talk a little bit about NERC’s approach to marine science. Can you both tell me where you think their strengths and weaknesses lie in how they approach their support for marine science?

**Dr Frost:** I think the strengths are obvious, in that the NERC community is a very strong community and it is very good at working together. NERC has facilitated a lot of these large programmes, bringing a lot of different organisations and different people together to address key science themes. You just have to look at some of the quality of what comes out of NERC science to appreciate that. In terms of weaknesses, the main thing that we find an issue is the changes, the constant shifting goalposts in terms of the funding models. Oceans 2025 came in and we

were quite excited about that. It is a long-term strategic delivery programme. As a research centre, we think we know how we are going to engage with that, what sort of expertise is needed and what people are required. Of course, then you find out that the funding for that has been withdrawn and another funding model is coming onboard with theme action plans. You then start to hear rumours that they could be coming to an end and something else might be coming in. I think this is a weakness because, for us as an institute, we have staff that we employ with expertise and our goal would be to keep and develop that expertise. That is very difficult to do if you cannot constantly look ahead and plan, if you are constantly wondering what funding model is going to be used now and whether they going to scrap this whole programme. I know the science has to be adaptable, but the way that is funded in the long term could be a little more stable.

**Professor de Mora:** I have all kinds of declared interests in this because I am on NERC SISB and our lab benefits tremendously from it, but I still think that what I say is self-evident. In terms of the strengths, NERC has been really important in bringing the various marine institutes and entities—including the HEIs now—together to work in a common purpose in marine science. I gather when this kind of committee met previously that was not the case, that the UK marine community was quite fragmented. NERC has had an instrumental role in making that happen. It has since evolved to work quite well with other Government agencies, so bringing on board Defra-NERC types of programmes.

One of the other strengths of fundamental importance is the whole financial landscape within NERC and within a centre like us. We used to be NERC, we are no longer but we do benefit from funding for what they call national capability. On the marine side, we went through a very rigorous prioritisation exercise for that. That was handled very well by Ed Hill, with considerable input from the other centres that were receiving national capability. That led to a prioritisation exercise. One of the things that has come out of that, and is gaining recognition as a strength from NERC, is the funding of long-term science. In particular, for instance, both of our labs benefit from funding—not insignificant funding—from NERC to maintain the Western Channel Observatory. If I may do a little PR piece, that is actually one of the three most important sites in the world for long-term monitoring of the marine environment; we argue it is the most important because it is coastal, the others are oceanographic. Also, it is the site in the world where more biological measurements are made more often than any other place in the marine environment. That is because we combine the skills of the higher trophic levels from the MBA and the lower trophic levels from us. The recognition that NERC gives to the importance of long-term science, which is, in fact, in this case excellent science anyway, is very important. Where does it fail? One of the things that really bothers me is not so much NERC but the fact that the research councils in general are not as good as they could be in joining up. There are a lot of gaps. One of the things that has been interesting, for instance, is

that because our lab had been a NERC lab, and came out from that umbrella in 2002, it actually took a long time before other research councils would actually fund us. Now we do get funding from BBSRC. On occasion we get funding from EPSRC. When those various entities, as well as the MRC, look at each other they do not hold hands very closely and there are big gaps between them, which tends to be a little bit frustrating.

**Stephen Metcalfe:** I will leave it there, Chairman. Thank you.

**Q227 Stephen Mosley:** Professor de Mora, I know in the Plymouth Marine Laboratory evidence, when you are talking about polar marine research, you say that the funding has changed fundamentally in the last five years. Could you give us a bit of an outline of what you mean by that?

**Professor de Mora:** No, I probably cannot because that was written by one of our people, who has recently joined us, who used to work in BAS. We all know of some of the more recent things and I guess, like everybody else, BAS was hit by the outcome of the Comprehensive Spending Review. In general, across NERC centres there used to be well-defined pots of money for doing particular areas of research. British Antarctic Survey would have had basically a defined allowance for working in Antarctica. Again, the Oceans 2025 programme was a bit like that when it set up but after one year that funding got eroded, because they wanted to change the funding mechanism within NERC to promote research programmes in the various teams with the seven themes that current NERC strategy has. There was shifting of pockets of the money. I guess that is the best way to explain it.

**Q228 Stephen Mosley:** Dr Frost on polar funding?

**Dr Frost:** To be honest, we have very little engagement on polar funding so I will withhold comment if that is okay.

**Q229 Stephen Mosley:** I will go a bit broader then. In your previous answer I know you were talking about the national capability projects. Do you think NERC now has the balance right between the amount it spends on national capability and the amount it actually spends on research projects?

**Professor de Mora:** The more important question might be: do we have the balance right within national capability, because one of the things that is very scary about that is the way it was defined included all facilities as well as the long-term science that I was talking about. As the cost of maintaining expensive facilities, that is ships, Antarctic bases and aircraft increases—for instance, we were suddenly hit with a massive bill for marine gas oil—it erodes the funding for the long-term science. That is the scary thing.

In terms of the balance between national capability and research programmes, obviously we get national capability funding so I would hate to see it diminish more than it has already. What needs to be thought of is a more integrated approach going into the future. Certainly, we talk about these being separate things, for instance, and quite apart from the routine

measurements that we make at places like the Western Channel Observatory, a lot of other science can hinge on that. It is really important that some of the research programmes—and in fact, the responsive mode research mechanism as well—understand and know that national capability is there as a bedrock for what they want to do. As for the actual balance, we would be in real trouble if we eroded national capability any further before we sorted out how that gets divided.

**Q230 Sarah Newton:** If we can move on now to your relationship with the Marine Management Organisation, do you have much contact with them? How would you describe the contact that you do have with them and what are their strengths and weaknesses, from your point of view?

**Dr Frost:** We do have contact with the Marine Management Organisation. I sit on a lot of workgroups and committees where the MMO are present and I think that is one of their strengths. Let me say upfront that they do make an awful lot of effort, with the resources they have, to engage very widely with the marine science community. They did that when they were being established and they have continued to do that. As a good example of that, recently there has been a big issue among marine scientists who are taking samples from the seabed, because it had become clear that we need a licence under the new conditions from the MMO. I was sent an email from a large group of scientists about this. They asked if, in my role representing the marine biologists with the MBA, I could approach the MMO and ask them about this. I managed to approach the MMO via another committee. I sent them an email saying, “Look, this is what the marine science community are getting exercised about. Do we need a licence to go out and take a sample as part of our work?” They got straight to work on that, basically. They produced a full guidance document that they sent to us, which I could then forward back to the marine science community. It is a small example, but I do think that a real strength of the MMO is that they are very engaged with the marine scientists.

In terms of the cons, there are two issues. One is there is a wide perception that they are under-resourced. You can occasionally see that in things like the time it takes to return tender documents and things like this, and also because they often say they are under-resourced. If they give a talk, they will often mention what their delivery commitment is but point out they only have one person to deliver on a particular area. So that is a possible weakness.

As I alluded to in my evidence, to begin with, when they were set up we were quite concerned that they would not engage the wider science community, in terms of using all the evidence base, and would rely very much on Cefas as the Government agency. They have made an effort to engage, but I am not sure that perception is fully dispersed as yet. For most of us who are outside, we are sitting on lots of scientific expertise and thinking that we want to facilitate marine spatial planning and other things. We hope that the MMO will interact with the wider UK marine science base, in terms of its evidence gathering, and not just rely on Cefas, because of lack of resources

and lack of time; excellent science though Cefas delivers.

**Q231 Sarah Newton:** Yes. That is partly answering my second question, going back to the original questions about gathering evidence and using the best possible evidence. I am glad to hear that they are engaged with the science community, but are they fulfilling a role in co-ordinating that evidence base so it is readily available, so that there is proper public availability of the evidence that has been collected by a whole range of scientists?

**Dr Frost:** I think they are, but I do think this is an area where there is a little bit of confusion. I sit on the Healthy and Biologically Diverse Seas Evidence Group. I am the vice chair of that committee. We liaise with MEDIN in terms of evidence gathering. We gather evidence ourselves using the data archive centres. You then have the Productive Seas Evidence Group that is gathering evidence from industry. Then you have the MMO, which has its own evidence database that it is populating. To be honest, from the outside it can often be fairly difficult to see where all those lines connect. That is quite an important point because, if you are a scientist thinking, “I really want to engage with this” you want to know who the person is and which organisation you need to go to. If I have something important or some important data, which affects how we manage our seas, do I go to the marine data information network? Do I go to BODC? Do I go to a data archive centre? Do I go to the MMO? They are doing a good job in gathering evidence, but I think there is a job to do in co-ordinating all that evidence gathering among the different committees and groups.

**Q232 Sarah Newton:** That is very much talking about those among the scientific community in academic institutions or learned societies like your own. Obviously, the MMO is working with a lot of people who are developing within the marine environment, and through the licensing processes they demand—quite rightly—a lot of scientific evidence. What about the role that the MMO could play, in making sure that commercial developers, whether it is for offshore renewables or whatever, share that information with the wider scientific community?

**Dr Frost:** I think that is a role that they should have and should pursue. However, it goes back to my previous answer. We recently had a meeting where the Productive Seas Evidence Group stated that they wanted to develop data layers, in terms of commercial and industry data. We were also looking into that, and you have the Marine Industry Liaison Group within MSCC. MMO were there and we said the same thing to them, “This is a great idea to collect that data and, yes, make it available to the wider scientific community. That would be great”, but I am still concerned that nobody quite sees that as the sole MMO function yet. There are other groups that are also pursuing that industry liaison in terms of data sharing, and it would really help if the MMO were given that as a remit so we could work with them in doing that.

**Q233 Sarah Newton:** It would be very easy for them to do because they could make it a condition of the licence. If it was made available, the evidence would enable them to do the licensed activity in the marine environment.

**Dr Frost:** That is a great idea, although I can foresee some concerns from the commercial sector, the usual reason being that of commercial confidence.

**Q234 Sarah Newton:** Not all of it is commercially sensitive, is it?

**Dr Frost:** No, and I think we can do a far better job.

**Sarah Newton:** That is great. Thank you very much.

**Q235 Chair:** It is Government Departments that issue the licences for offshore wind and so on and so forth.

**Professor de Mora:** Sorry, can I make a quick comment about that?

**Chair:** Very quickly, because we are running out of time.

**Professor de Mora:** Even with getting the data, you need to make sure that it is all quality assured in the right way, so we are talking about good data because bad data are worse than no data.

**Q236 Sarah Newton:** Also the MMO will only use data that meet their particular standards.

**Dr Frost:** That is right, yes.

**Professor de Mora:** Yes, but it is an important thing to stress.

**Q237 Roger Williams:** Professor de Mora, you have indicated the importance of the Western Channel Observatory as a long-term monitoring project. Do you have difficulty funding that and is NERC the right organisation to do it?

**Professor de Mora:** It has been funded over the years in a very piecemeal way. That is why right now, with the category of national capability funding, I am quite pleased that we have some kind of stability. But again, if there is another prioritisation exercise after the next Comprehensive Spending Review, we may have to cut back on the things that we are doing. I would say that it is not the ideal mechanism in place. I would hope to go to Defra to convince them of the importance of this, because it is a site not only of national importance but of international significance. Just to explain why, I would say that it is one of the longest oceanographic time series in the world, dating back to 1903. Over the years, a huge number of biogeochemical and now biological measurements have been made, so it is the best characterised site in the world and includes genomics. That information underpins the ecosystem modelling that we do. It also underpins some of the algorithm development for remote sensing. There are an awful lot of things that could fall down if we start losing elements of the work that is done there.

**Q238 Roger Williams:** I am sorry to rush you, but Dr Frost also says in his written evidence that some UK marine time series will be possibly lost if more funding is not made available. Could you tell us briefly what those projects might be?

**Dr Frost:** Absolutely. I have been running the marine environmental change work for nearly a decade now. That was set up in response to the Portman Review in 2001, which said that time series are poorly funded, badly co-ordinated and not valued. Since then, in the landscape within NERC, there have been big strides—as Steve alluded to—in terms of recognising their importance, but there are a lot of time series that fall outside any of the research programmes. To give you one example, if you take benthic sampling, which is going out and sampling what is on the seabed, we have four sites around the UK, one in Liverpool Bay, one off Wales, one in the North Sea, and then we have the stuff we do off Plymouth. All of these have decades of data, and I would say at least three of those are now running on the fact that we collect the data because the ship is out there anyway. We do not have any money to analyse those data or to do anything about them. Eventually, people will say, “I am sorry but we cannot keep collecting this if nobody is funding it”.

**Q239 Roger Williams:** Can I ask what input you had with the MSCC long-term monitoring working group?

**Dr Frost:** Yes. I sat on that committee and I was probably a little harsh about it earlier. It had very good intentions and a good group of people on there, but the issue they were looking at was the transparency over funding and coming to some agreement on what time series got funded and how those decisions were made. I think it was just too insurmountable, because you had NERC and other people who all have their own ways of establishing what is a priority, and we could not transcend those agreements.

**Q240 Chair:** That comes back to what was said about joining up some of the boundaries between the research houses. Yes?

**Dr Frost:** Exactly.

**Q241 Chair:** Final question, if I may. Professor de Mora, in your evidence you mentioned three international programmes on marine research that are no longer receiving support from the UK. What are they and should we have pulled out? This is a problem one sees in other disciplines as well, in astronomy and so on.

**Professor de Mora:** This is a problem of the wording because it is quite true. What we said was, “Are not supported by the UK any more”, but that is effectively because these programmes came to an end. It is not that we have decided to pull out and not subscribe to them. Certainly within NERC, and given the situation since the last Comprehensive Spending Review, had these things come on the horizon now we would not have the funding available to support them. At Plymouth, we do run the international project office for an organisation called POGO, which is the Partnership for Observation of the Global Oceans. That is fully funded by subscriptions of the different institutes, so that is not funded through any Government channels. There is a difficulty right now with funding international programmes from the UK point of view.



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20 December 2012 Dr Matthew Frost and Professor Stephen de Mora

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**Chair:** I thank our two witnesses for attending and, usual parliamentary terminology, I will finish the before formally closing the session, I also thank the event by saying, "Order, order". Thank you, everyone. University for hosting our event this afternoon. In the

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## Wednesday 9 January 2013

Members present:

Andrew Miller (Chair)

Jim Dowd  
 Stephen Metcalfe  
 David Morris  
 Stephen Mosley  
 Pamela Nash

Sarah Newton  
 Graham Stringer  
 Hywel Williams  
 Roger Williams

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### Examination of Witness

*Witness: Charles Clover, Columnist, The Sunday Times.*

**Q242 Chair:** Good morning, Mr Clover. Welcome to the session. Just for the record, would you be kind enough to introduce yourself?

**Charles Clover:** My name is Charles Clover. I am the chairman of the Blue Marine Foundation charity. I am the author of “The End of the Line”, which is not an irrelevant book because it is about over-fishing, and I am a columnist on *The Sunday Times*.

**Q243 Chair:** Thank you very much for coming in to see us. The members of the Committee decided that we should invite you in, having read some of your work. In particular, in your article on marine conservation zones, you effectively say that some of the stakeholder groups have picked up some unimaginative habits and features because they are the only ones that could be agreed on. Should there have been a stronger top-down approach, or is there a better way of running the stakeholder process? We have been down to Cornwall and had discussions with the people in the stakeholder group on the Fal estuary, and we have also had discussions with people in the north-west. There does seem to be a bit of a patchwork of different things emerging. What should have happened, in your view?

**Charles Clover:** If I may say so, you have opened a can of worms because that begs so many questions. How this whole process began, how you started off with what was, essentially, a three-party consensus that there should be an ecologically representative network of marine reserves, and how you get to a point where you haven't really got very many and they don't really do any conserving, is an extraordinary process. It is one that can only be transformed or saved by looking at some international comparisons. I have only done the skimpiest of this myself, but I note that other people seem to have done even less.

I notice that, in France, there is a much more top-down approach to precisely this kind of activity. I would be most interested if the Committee was able to look at that. I notice that, in New Zealand, where I have been and where I talked to people some years ago, there is a much more top-down approach about what the basic, broad habitat types were that people wanted to conserve. Whether it was a seamount, a reef or whatever it was, they felt that they should protect a representative selection of these things. So people went out, found them and protected them quite rapidly—not without controversy, but they just

decided that they had a mandate to do it and they did it. This is not what we have done.

**Q244 Chair:** But that would run counter to the localism agenda, wouldn't it?

**Charles Clover:** It begs the question that, if you are going to involve the stakeholders, when do you involve the stakeholders? Perhaps you should get a representative local opinion on it. You do also have to have some clear national vision and guidance, which is probably what is lacking here.

**Q245 Chair:** Originally, there was quite a high degree of cross-party buy-in to the idea. Do you detect any diminution of that cross-party consensus?

**Charles Clover:** To be honest, I don't know of any evidence that there has been any diminution of it at all. There is a much stronger mandate than timid DEFRA officials seem to believe there is. My fundamental point, which I thought I might come to a bit later but I might as well say it at the off, is that DEFRA officials turn to jelly at the sight of the two letters “JR”—judicial review—and this jelly is unnecessary. It is a matter of somebody issuing some guidance as to what the Marine Act actually means.

**Q246 Chair:** Is that what you were getting at when you referred to concessions being made to vested interests? You felt that the system was too afraid of review.

**Charles Clover:** Yes. There are examples—I have brought some with me today—of where areas might be top of your list, if you started afresh to try and conserve the places that are most important in the inshore English marine environment, and, strangely, are not on the MCZ list at all.

**Chair:** We will come to those shortly.

**Q247 Hywel Williams:** Mr Clover, are you familiar at all with the designation process in Wales and what has happened as far as that is concerned?

**Charles Clover:** Wales is extremely different. As you may know, we have a little project in Lyme Bay and it has got a lot of interest among fishermen. We have had a lot of dialogue with Wales, but I have lost touch as to exactly where we are with the Wales process.

**Q248 Hywel Williams:** It is interesting, comparing what you said earlier on about France and New Zealand, that it has been widely seen by stakeholders

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as being very top-down and, in fact, has been abandoned and re-started in a different way specifically because of this. This refers only to inshore waters around Wales. The point I would like to make is that it was seen by stakeholders as being very top-down and pushed by the science rather than the stakeholders. The consequence of that is abandonment and re-starting in a different sort of way.

**Charles Clover:** That is a statement and not a question.

**Hywel Williams:** Yes; exactly. That is what I said. I was just explaining myself.

**Charles Clover:** Fair enough.

**Q249 Graham Stringer:** You have argued that the lack of consideration of the management of these areas in the designation process has been a fatal flaw. How should consideration of the management issues have been part of the designation process?

**Charles Clover:** We have to start with very fundamental things. As a writer and journalist and not a professional conservationist until quite recently, my strengths are with the long view and the wide view, and perhaps not the minutiae of how other countries have achieved it. I will try and answer your question in this way.

You have to realise, and the people who are setting up your network of marine conservation areas, whatever you choose to call them, afresh need to realise, that there is a background in the terrestrial environment to all the decisions they are making. In my view, this was ignored. I take you back to the 1970s when the Duke of Edinburgh, oddly enough, was international vice president of WWF, then called the World Wildlife Fund. The other day I was reading a quote from him as I was writing the proposal for Lyme Bay. It seemed to me to be the nugget of what has been ignored here. He said, and I wrote it down: “No conservation measure works unless the local people support it.” That works, I think he said, whether you are in the Maasai Mara or in Scotland.

No consideration has been given with regard to these marine conservation zones—which are terminologically difficult for me, anyway, because they are not marine protected areas, they are not marine reserves and they are not highly protected marine reserves; therefore, they are deliberately not engaging with international best practice—as to what these things are for, how they are going to be implemented and how they are going to get support. These do not seem to have been the considerations. The considerations seem to have been, “We’ve got to have some of these things. So where are we going to have them and what is the evidence?”

That seems to me to be not what society should be asking of them. Society should be asking, “Why are these areas of value? How can we get the maximum value out of them for everyone while protecting the biodiversity that we know exists and is of importance?” The fundamental questions were not asked. The process seems to have been put together by people who did not have experience of setting up national parks or protected areas afresh in what you might call wilderness situations. I am only calling it a

wilderness situation because it is more analogous than a ploughed field or a grassland SSSI.

**Q250 Graham Stringer:** I think I now understand what you mean by management of the areas. What effect has not considering these issues had? Do you think that it has fatally damaged the projects, or, if they can be put back on track, how can they be put back on track?

**Charles Clover:** I do not think that anything fatally damages the project. The whole thing is a learning experience and you are best to realise that even the most highly qualified people who you have had before you are, essentially, winging it because this has never been done before in the world. We are all learning. It is just that there were some lessons from the terrestrial environment that were never applied. The history of attempts to integrate marine protected areas, going back to Loch Sween and the 1981 Wildlife and Countryside Act, were not applied. I am amazed, but those lessons were not applied.

You may think that the stakeholder process was supposed to engender support for these marine conservation zones, but that is a complete misunderstanding, it seems to me. I am not suggesting that you were making it, but it was a complete misunderstanding by the people who engendered the process. What you need to do is to create a vision that people will align behind, not create a forum in which they will all disagree and never agree at all on the areas that should be most protected.

In terms of the management, I find it easier to talk about the place I know, if you don’t mind. What happened, as we discovered, in Lyme Bay was that, under the usual and quite acceptable pressure from the Wildlife Trust, initially, and Natural England eventually, it was perceived that there was a threat to the Lyme Bay reefs. It led to a statutory instrument, to closure, and to the largest closed area to trawlers and dredgers in the UK, as far as I am aware. At that point, DEFRA seems to have decided to stop. There was no vision as to what was happening. It was just, “Stop the threat. Stop this field—stop this SSSI—from being ploughed up.” It was not, “What are we doing?” It was not a matter of, “What have we created?” It was not, “What is this thing that we have just done? We have stopped one form of activity but we haven’t stopped lots of other forms of activity. What will happen now?” They did not ask that.

What happened, because we went out and found out what had happened, was that into this area, which was banned to trawl gears and scallop dredges because it was then a vacuum, came lots more static gear—pots and nets—than ever was used there before, because it would get trawled over. It was seen as a refuge for static gear. It built up and built up to the extent that the people who were at the westernmost side and most affected by the larger vessels—because there is this historic oddity that the vessel size in Dorset is different from the vessel size in Devon and the site is bisected by the county boundary—were finding that their catches had halved. That would not surprise you because the amount of gear had doubled. This was not very good for them, so the idea that a reserve was a

good idea at all was not saleable to them—that the closure had been a good thing.

If you had dealt with that in the round, that would have brought those people on board, as indeed they were in the first instance because they thought there would be an advantage from the closure, which is why they backed it. They were then horrified to discover that it was not managed; there was no management.

My point is that you cannot do what the processors decided to do, which is to manage features. You have to manage ecosystems, because, if you manage features, your management of the features will affect the ecosystem. So you might as well start off by managing ecosystems, which is what the New Zealanders, the French and the Australians have done.

**Q251 Graham Stringer:** Is it fair to summarise what you are saying in this way? You believe that there should be more leadership and vision and less of the lowest common denominator process. Finally, you have talked about the banning of dredging. Do you accept that in some of these areas certain activities will have to be banned, and what would you expect those to be?

**Charles Clover:** It would look pretty odd if the European sites were managed differently from our national sites. There is now an understanding or ruling, which has been accepted by DEFRA, that article 6 of the Habitats Directive means that damaging operations will have to be removed from SACs and SPAs. That is an absolutely historic legal finding because it means that much more management will have to take place in about a quarter of English inshore waters. There is already an example of the kind of thing that you would have to do, if you are going to have to manage an area well, so there would have to be management. It will be shaming if we don't have management that protects the features that we are trying to protect in these areas. I am afraid that is going to have to be the heavier gear.

**Q252 Stephen Metcalfe:** I want to pick up, if I may, on a couple of points. A lot of the objection to the designation of zones has been the conflict between conservation and the socio-economic activity in the areas. A lot of the resistance has been because we do not know in advance what the impact would be on the various interested parties. When you were answering some of the questions it was not quite clear what the impact would be, because I presume it would change from zone to zone. In fundamental terms, how do you balance that and reassure those interested parties that the measures that may well be put in place are not so draconian that it would change the very nature of a community that is based around a particular area that is designated? It seems that a lot of people have been resistant to the whole process because they don't know what this means for them. How do you balance that? Can you put in, in advance, the measures, the management programme, before you start the stakeholder discussions, or is that just an impractical proposition?

**Charles Clover:** I don't think it is impractical. There are a number of questions there, aren't there? Could I just deal with the socio-economic impacts aspect of it?

There are impacts, but there are also socio-economic benefits. In inshore waters, I would expect that the benefits would outweigh the impacts. I live in the Dedham Vale area of outstanding natural beauty; I live in Constable country. That designation brings money into my village and keeps shops and pubs alive that would not be alive otherwise. As I drive to the station, they are not alive in villages that are outside that designation. It seems inherently absurd to me that DEFRA has accepted that there will be socio-economic impacts without looking at what the socio-economic benefits might be.

This is based on no evidence that we have yet because we are at a very early stage in the project, and everybody involved in this project at Lyme Bay thinks so too, but I think that we will end up with socio-economic benefits. Undoubtedly, there will be impacts for people who are displaced, and the aspect of displacement is a real one and I have great sympathy for the heavy gear guys who will all be displaced by some of these inshore activities. Nevertheless, I think they should be displaced. There should be zones where they can practise their trade and zones where they can't. That is what, it seems to me, this cross-party consensus agreed a long time ago, but it is currently being watered down by DEFRA officials, who are just too close to it and haven't got the big picture.

**Q253 Stephen Metcalfe:** Can I just follow up on that? It struck me from our recent visit to Falmouth that there was not enough understanding, in advance of discussing the zones, about what the potential impact and/or the benefits might be. There did not seem to be enough understanding one way or the other. So the best approach is to say, "No, I'm objecting to this because I don't know what it means for me", whereas, if you had had more information in advance before starting to describe the zones about what the impact might be for all concerned, including some of the benefits, perhaps it would have been easier to engage with some of those stakeholders.

**Charles Clover:** It is all about what stakeholder engagement means. If it means telling people a lot of information, they will remain sceptical at the end of it. If, as we have done in Lyme, almost uniquely, you go in and you say, "What would you like? The Government say that we have to achieve these objectives. We have these objectives of achieving a win for fish stocks, a win for fishing communities and a win for biodiversity in the round. How do you think we should best achieve that?", then all the problems melt away. They say, "Oh, we will do a bit of this. If that doesn't work, we'll do a bit of that. Yes, we could do this."

We have achieved more in six months than IFCA's predecessors, the Sea Fisheries Committees, achieved in 20 years just by saying, "Look, this is what the country wants of you." Nobody is doing any management. Nobody is telling them what this means. So why don't we take hold of the controls and tell them what we think it means and how we might achieve it. Suddenly we are off, and we are in third or fourth gear. Telling people information is not going to get you anywhere at all because they won't believe it.

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You have to give them the power to alter the outcomes themselves and trust them. That is real localism, but they have to have a vision, which is not present.

**Q254 Roger Williams:** Mr Clover, at one stage in your presentation and answering questions, you tried to say that it would have been better if lessons had been learned from terrestrial designations of SSSIs and national parks. Just to go back a little bit, I was on the Committee stage of the Marine Bill and there was a huge euphoria because this was a very long-awaited-for piece of legislation. The Minister, who is now responsible for designation, was actually leading for the Opposition at the time the Bill was going through, but there was a collegiate effect.

The real difference between the terrestrial and marine designations, as far as SSSIs and mostly as far as national parks were concerned, was that there was no consideration of socio-economic factors at all. The designation is made and then the management is brought in afterwards. The socio-economic factors were brought into legislation for very good reasons and it was thought that it would encourage people to work together. In retrospect, do you think it would have been better to make the designation and then work on management structures that could mitigate any socio-economic problems that might arise?

**Charles Clover:** Yes is the short answer to that. There are several questions there. I don't agree with your analysis of the history of nature conservation in Britain basically since the 1949 Act. All these Acts have contained failed measures to deal with socio-economic effects. They contain compensation clauses that Governments could never afford, or, when they could afford them, they became such scandals, because people said they were going to designate a forest with various SSSIs and they got paid X. It was seen as so scandalous that they could not be done again, and quite rightly. Attempts to deal with the socio-economic aspects of these things are necessary. You are displacing people—it is their living—but it is also a different kind of environment that you are seeking to protect from the terrestrial one. The terrestrial one has been altered by man out of recognition for tens of thousands of years. The marine one, though altered by man for tens of thousands of years, is more dynamic. It is less farmed. Some fishermen would disagree with that. If you take away the damaging or the fishing effects, you get more dynamic activity than you would on land. It is more three-dimensional, it is more dynamic, there are more migratory species, and, honestly, you don't know what is going to happen.

The great wisdom, it seems to me, is twofold. It is international and it is not this reductive process that we have called the various post-war Acts. Other people had national parks that were real national parks. I am going back to 1928 or 1929, or whenever the first consideration was given as to where we should have some national parks, which was in response to Yellowstone and the creation of these South African great parks, the Serengeti and so on. It is the wisdom there that we don't seem to have tapped into because those, to this day, increasingly need to engage with the people outside them. They need to

provide benefits to people outside them. They have buffer zones. They have places where you can do some wood extraction, where you can do this and you can't do that, but you can do something. That wisdom, which exists about the Great Barrier Reef, seems to have not been taken on board to the full extent that I think it should have been.

**Q255 Stephen Mosley:** On the employment side of things you focused very much on fishing previously, but, when we went to Falmouth, we saw a harbour that was much more than fishing. There was a shipbuilding industry. There were literally thousands of jobs that were dependent upon the harbour, the sea and the various industries surrounding it there. There was a huge concern because they have seen in the past what happened when the conservation zone was added in the harbour. They were told at the time, "It doesn't affect what you are doing now. It only affects new things." But, of course, within a couple of years, the maerl industry was effectively closed down because of it.

Also, because Falmouth is the first harbour coming in from the Atlantic, there is a buoy in the middle of the area that they have designated as the reference zone. This buoy is only used if there is an emergency out in the Atlantic when they bring a ship in and they need to bring it in safely. It is in the middle of the reference zone, so there is huge concern that, if the marine conservation zone is brought in, with the reference zone in the middle of the harbour, it would have a much wider impact than just on fishing. You have concentrated on fishing, but what about all the other ancillary industries that are reliant upon the sea for jobs in the local economy?

**Charles Clover:** One of the largest industries on the south coast is the leisure industry—the boat owners—and probably Falmouth harbour would be the same.

**Stephen Mosley:** Yes, it is.

**Charles Clover:** There is an inherent value—a socio-economic benefit—in having places that people will want to go and see in their boats because they are inherently interesting, where they want to sail these things to. It is a balanced answer to that question.

I do take the force of your point about references. This whole reference zone issue has been poorly thought out. It should have been considered as part of a wider management system. The imposition of these in this place rather than that place looks very draconian. It has been ill thought through by the conservation lobby. Personally, I have an instinct about what is going to survive but not what will necessarily happen, because what has happened is not what I would have wished to have happened. I confess that I did not concentrate on the Marine Act because I was in the process of making our film "The End of the Line". It took me three years, which is roughly the same time that the Marine Act was going through, so I did not look at any of this. When I did look at it, I was horrified because I thought, "This isn't how you do it. This is an incredibly reductive British way of doing it." It is not the way that my heroes in the conservation movement would have done it, like Bill Ballantine in New Zealand. There is a whole chapter on him in my book.

It is a roundabout way of answering your question. What I am trying to say is that it would help if people started putting in reference areas where they were aligned with other interests. For example, there are places—spawning aggregations, nests of fish, bream and so on—that everyone accepts would enhance fish stocks if you protected them. They might be candidates for reference areas, but those benefits have to be demonstrated.

My feeling is that, in time, that is what will have to be done and a process of negotiation over what is beneficial will occur. If that does not occur, then somebody will be done down and disadvantaged. The force of your question is right—or the suspicion behind it is right; that is what I mean.

**Chair:** You have referred extensively to Lyme Bay. We have a series of questions specifically on that.

**Q256 David Morris:** On the subject of Lyme Bay, Mr Clover, what benefits does ecosystem management offer that protection of features does not, and what should the current marine conservation zone process be doing? Do you see the benefits of this ecosystem management in Lyme Bay coming to fruition?

**Charles Clover:** I think I understand your question. It is separate from the marine conservation zone process. What we are trying to do is look beyond that process and through the eyes of the private sector. One of the more visionary companies in the private sector—Marks & Spencer—has provided our seedcorn funding for this and a substantial percentage of our ongoing funding for this three-year project. The kind of thinking that you get from the private sector and small NGOs is different from the other players. It is not better; it is just different. I would not claim that we are doing anything that the regulators and other people have not thought of already; they just haven't been able to do it. "Wouldn't it be nice if?"

What we set out to do was to create a model of conservation providing benefits to people because we believe that it would. We believe that every other example of it in the terrestrial and marine environment elsewhere showed that it would, unless there was some big problem that we would either have to flag up or resolve. So it has proved. It is not intended to interfere with the marine conservation zone process. It is intended to make it work. I don't see anything that is going to make it work otherwise. This is why we wanted to set an example where people could look beyond this current mess and see something working. It may be that some of the things that we get right and some of the things that we get wrong could be replicated or avoided around the coast if we succeed.

**Q257 David Morris:** Do you find from this project the benefits of scientific evidence in the Blue Marine Foundation's work in Lyme Bay?

**Charles Clover:** I am sorry. The benefits of marine—

**David Morris:** How was scientific evidence used in the Blue Marine Foundation's work in Lyme Bay?

**Charles Clover:** I still don't quite get the question. The science is several things. Perhaps I could take you through what we feel the science is. With science, everybody sets it up as one thing when it is actually

several things. It depends who is paying for it. It makes all the difference who is paying for it.

In this particular working group, which includes regulators, and which is dominated by fishermen but with a conservation remit—it is very important to stress that—with these three wins as its memorandum of understanding, as its working rules, we went out and commissioned some science. That is a different kind of science from government science or anybody else's science. By talking to people, we found that the science that the fishermen wanted was science that guaranteed them access to the resource. As far as we could see, there was no chance of anybody making the whole of Lyme Bay into a reference area, a marine national park or anything else any time soon, though that, effectively, is what it is. We thought that we would have to live with what the regulators were prepared to give us and try to make it work.

For that to happen, the fishermen have to have confidence that they will have access to that resource, so we decided to give them, before anybody else had this idea, environmental assessments of what they were doing, which would be, initially, private to them, so they knew what they were doing, so they could think about what they were doing and modify it if necessary. In that way, they could go back to the people who they were most afraid of—the Wildlife Trust and Natural England—and say, "Here is the evidence that what we are doing is not damaging. We are having a benign, non-damaging, acceptable"—whatever the word is—"effect upon the resource and we are actually your managers. We are the only users of the sea who you can engage in this process and we are managing it for you. You can't afford to pay people to manage these places so you are going to have to work with the users of the sea."

The next thing we did was to say, "Oh dear, the Government do not seem to have done the science on all the things that these people catch." We've got ICES telling us whether or not we can catch cod, which have no value to us at all because there isn't any cod in economic quantities. What these people are catching are whelks, and it appears to me that they are wiping them out, which turned out to be true. Within this protected area, they took 600 tonnes of whelks in one year, and, of course, there are now no whelks. All this happened under the eyes of IFCA and DEFRA, but nobody has local, on-the-ground knowledge; so nobody knows what is going on, but you have to have that knowledge if you are going to manage any of these areas.

We said that prime species would be one of our environmental assessments. We also need to know what potting, which is what most of these guys do, and set netting actually does to the resource so that we can see whether it is sustainable or not, because all these small boat owners like to tell you that what they do is better and more environmentally friendly than what the big boat owners do. Logically, that is not necessarily the case, and there are an awful lot of them. We need to prove this. We also need, by proving it, to establish what a sustainable level of potting is. That will then enable these people to push other people out of their areas, because there are too many. We have our boats from our four ports. We are doing

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a sustainable thing. If you come in, you might be told, "I'm sorry but that is not sustainable." They can say that to regulators and to Government and get something done about it, but they can't do it if they haven't got the evidence. So that is the evidence we have.

The third and really fascinating aspect of the evidence is this. As relatively naive or less naive than some—the Greens, you might say—in the first instance we went along and said, "Look, Lyme Bay is ahead of the game. It is a big protected area. It is not going to be an MCZ but it is an SAC, but it is not being managed. What would we do to create the maximum amount of international best practice in this area to give it conservation top status?" It needs some areas where there is no fishing because that is what people seem to have decided internationally is what you need. We went along to tell the fishermen that twice in the cove in West Bay and we nearly got thrown into West Bay twice. We licked our wounds and went back and said, "They are not going to buy these MCZs", which Mr Mosley is so worried about, and possibly rightly, "unless we prove benefit. If there is benefit, then we can have more of them." So we have been barking up the wrong tree.

What we have to do is to go to these people and debate about the world as they understand it and find out what they need. We said, "To get access to this area on a long-term basis, you need to prove that they are not having the impact as our study is doing." Why not, if these studies were also designed to look at whether there were any spill-over effects from the control areas that we had set up? The four ports have four study areas being monitored by Plymouth university, one of which, for each port, has no fishing. It is not a no-take zone but it is a control area for science. You can't do science without control areas. Fishermen are perfectly happy with that. These are quite small areas, but, funnily enough, they add up to the same acreage as we originally wanted for a no-take zone. They are temporary and the debate will rage within our working group, when we get some results, as to whether there are any spill-over effects or not. That is the best we can do with consent as the private sector, without a hammer or a statutory instrument behind this. That is an incredibly important debate. Whether our areas are large enough to show those effects is another question, but that is our science.

**Chair:** I would like to continue the theme of local engagement.

**Q258 Sarah Newton:** You have answered most of the questions that I had about Lyme Bay. What you are doing there is very important so that we can maximise our understanding of that so that we can learn other lessons more broadly for marine conservation zones. So that I have really understood, from what you are saying, it seems that you have used the power of persuasion through the foundation to bring together all the people who have an interest in that environment to pay for and provide an evidence base to influence existing regulatory bodies. Is that right? How did you build up the credibility to

influence those existing bodies to get the permission to set off this whole process in the first place?

**Charles Clover:** I don't really know. We just listened to people. I don't think they were used to being listened to. We went there. We said, "What would you like?" We said, "This is what we would like. What would you like?" We deleted everything we would like and decided to do it their way, but the objectives are pretty much the same. I have to give enormous credit to this bunch of fishermen, who are a visionary and clever bunch, who understand that the inshore fisherman is a potential manager of the sea and a conservationist. These fishermen think they are conservationists. If we can get some more evidence to prove that they are conservationists, they will be even more of a force in the land than, in my opinion, they are already.

**Q259 Sarah Newton:** That is helpful. Going back to what my colleague Stephen Mosley was saying, that makes absolute sense when you are dealing with fishermen in a marine environment, but there will be—and there are—areas designated as marine conservation zones that have a lot of other activities happening in the marine environment, especially port activities as well as the sailing activities that you talked about. What lessons could we learn from your experience in this area for working when you have those economic and social stakeholders in the marine environment in addition to fishermen?

**Charles Clover:** You need to do something like we have done, but I would say that, wouldn't I? You need to go and listen to people. You need to go into the area and set up a group that is vaguely representative, which may or may not succeed. You may take the view that it has the wrong people on it, and, therefore, you must allow these things to fail and start again. You need a forum in which you give the vision that you want. The problem is that the marine conservation zone story is one lacking in vision. Nobody knows what the bloody things are for and no Minister has ever said. While we are in this position, we will go on failing.

What we need to do is to set up a committee of interests and give it the remit that the public has effectively given it through the Marine Act, which was done with great celebration that we were doing the right thing. It is just that some of the clauses have been used by lawyers, and not scientists of opposing factions, to disaggregate it, atomise it, and that is the process we are all staring at and scratching our heads about now. We need to put it back together by giving the vision to groups and saying, "We've got to do this, but it is up to you how you achieve it", and not, "We're going to put this in", or, "The boundary is going to be there", but, "We are going to manage this area for these objectives. How are we going to do it?"

**Q260 Sarah Newton:** In some of these areas there have already been significant designations. For example, the Fal estuary, which the Committee visited, is an SAC, an SSSI and has protected EU habitats within it. The original vision of the Bill was that there would be a patchwork—a network, as it was described—of marine conservation that included

existing designations and then areas with the new conservation zones. Do you think that some of those existing management structures, like the advisory boards that go with the SACs, could be morphed or changed into the type of co-ordinating forums that you are describing, or is it a wholly separate type of management that is required?

**Charles Clover:** You just have a representative from any of the necessary legal structures on your working group. You don't call it a management board until such time as it earns the right to be called one by popular assent. You will never get 100%, by the way. We have got 50 or 60 fishermen, some of whom drop in and out all the time, but we have four ports. Nobody else has four ports. We have some fishermen who, defiantly, continue to practise their trade outside the area because they don't see why they should be bound by these rules and they are going to go and do something else. You are always going to have the big boat fishermen.

I do not know whether this is the right moment to say it, but the displacement of the big boat fishermen, who I think have a perfect right to ply their trade, as long as they do it sustainably—sometimes they don't—is an important problem, because the effort is displaced, and I do not think that enough is done about that. We are trying to do something about that in Lyme Bay, but we may never do it. We have spent a lot of time trying to get these people to come to our meetings, but inshore fishermen, who are a quite different breed, don't like them there. So it is quite difficult getting them in, but we do want to try and create some value for them in any kind of added value schemes, because some of them are fishing with iVMS and things like that in the area under the MMO's jurisdiction. They are fishing very carefully and responsibly as they see it, and as other people see it, in the gravelly, sandy areas around the reefs. Whether or not they should be allowed into this area, into this designation, is an interesting question. I don't have a view on that. It is for regulators to have a view on that. Nevertheless, these people deserve some recompense for displacement and fishing very responsibly. They are quite different from the people who come in at night and dredge up the scallops. We had three vessels doing that last year and they were all seen off by other fishermen. So our buy-in has had that effect. All these guys were sent down the Devon coast with fleas very much in their ear.

I am trying to answer your regulatory question by saying that you need all these people on board, but that is not enough. You must have local people with vision, which is what you need. The tools are the regulations. The regulations are not your master. It is the vision that should be your master.

**Q261 Sarah Newton:** You mentioned earlier in your presentation that you were surprised about the list of potential marine conservation zones. There were places that you thought would be ideal candidates but were not on the list. Would you share that with us?

**Charles Clover:** I made a few calls yesterday. This came from talking to the people who were putting together the four stakeholder groups during their process. They were saying that there are things there

that people might not think would be there and there are reference areas of 30 hectares designed to protect two worms, which you might think might be protecting a representative ecosystem, but they are that small because nobody could agree. I said, "Are there any that aren't there at all?" I have got this list, which I can annotate and give to you, if you like. It has big things on it like Flamborough Head in Yorkshire. This was put forward as a reference area, for example. I don't really want to make a judgment on whether or not it should be a reference area, because we should be talking about a much more negotiated process in terms of management than we are. We have had a lot of negotiation. Then we are going to stamp these designations on people who were not expecting them. That is a different thing.

Flamborough Head is an SAC but it ain't on the MCZ list, which does not enable you, on my understanding of the law, to maintain or restore it. It is an incredibly important place for cetaceans, seabirds and fish. Cetaceans and seabirds, incidentally, are largely ignored by these MCZ designations, and, because you haven't got any flagship species, you haven't got any public interest. That also seems to me to be completely daft. That is a digression, but, nevertheless, it is quite an important one.

Flamborough Head is one. The Farne Islands, which are an SAC, would have benefited from being an MCZ too. There is a large chunk to the right of Beachy Head, which did not get into the list of 31 MCZs declared, although the bit to the left, which is within 250 metres of the cliff, did, but you can't fish there, so it was uncontroversial. However, in the bit to the right you could fish, so it was controversial.

**Q262 Chair:** Just for clarity, are you looking from north or south?

**Charles Clover:** I am looking south.

**Q263 Chair:** So you are standing on the cliff.

**Charles Clover:** Hang on. Have I got this right? The east got designated but the west did not. I think that is right. I will check that—forgive me—about my left and right hand. The surprising thing there is that there was in the stakeholder groups a complete consensus that there should be an MCZ there, and there is not one, because of subsequent lobbying by towed gear people. That seems to be changing the rules after the football game has been played.

There are examples of this that would be worth looking at. Apparently, there is an area to the south of Falmouth—I can look this up further—where the proposed size of the site has been drastically reduced because the tow guys complained. There is another site north-east of Padstow in Cornwall where the tow guys complained again. I am sorry to say it, but, largely, we will need to manage our inshore waters by means other than towed gear in future. It is more sustainable and gives more income for all, but towed gears are destructive to the features that the spirit of the Act wants to protect, whether or not they are managing it very well at the moment.

So I don't think it is a particularly good idea to favour one destructive interest over all the other interests. That is madness, really. I would commend these



examples to your attention because they are ones where that interest overruled the public interest, and that is not what you are trying to do.

**Chair:** We would welcome your list when completed.

**Charles Clover:** I will annotate it and get it to you.

**Chair:** We will now move on to the broader public interest issues.

**Q264 Pamela Nash:** Mr Clover, I know we have already taken up more of your time than we intended, so I will be as brief as possible. Present company excluded, of course, how well do you think that the media has performed in communicating information about marine conservation zones to the public? I guess I am thinking both of local media, where we have heard evidence that there have been scare stories in the local media about the management of conservation zones, and also nationally. Do you think that the general public even know that these marine conservation zones exist, and, if they do, are they supportive of them?

**Charles Clover:** There are polls. The conservation movement has run polls to see whether the public thinks the sea is protected, and the public thinks that vastly more of the sea is protected than it actually is. If they were told that these MCZs were going to cover 25% of English waters—I don't know if it is the right figure but it is something like that for inshore waters—they would think that that was, kind of, low. There are polls that you can look at.

How has the media dealt with this? That is an interesting question for the media. There was a time when people like me, who used to be full-time specialist correspondents who knew the people, who knew the issues, kept grinding on for those things that we felt were public wrongs that needed to be righted by the likes of yourselves. They have disappeared because of the depredations of the internet upon the newspaper industry and other media. You have lost a whole section of informed people engaging with the public over the past five years or more that this has been a matter of public interest.

You have to engage with the public in different ways. I know that Hugh Fearnley-Whittingstall is making a three-parter on marine protected areas, which is coming out, I believe, at the end of this month. Whether we will be having this conversation about the public not cottoning on to these things after that programme has been screened, I don't know, but it wouldn't take much for one of these areas that is under threat, if it is genuinely under threat and it is not just the conservation lobby that is saying it is under threat and get it designated, to start getting trashed. I remember writing successions of stories about forests, moors, meadows and hedgerows. For over 30 years I have written those stories; I have never seen anybody write those about the sea, but one day somebody will. Then the public will say, "Hey", as they did with Lyme Bay, "you should not be allowing this to be trashed. Do something about it." By then, this process will be over, and, if we have not made the right decisions and you have not recommended the right results, we will not have the mechanisms to do anything about it. That is my real worry here.

**Q265 Pamela Nash:** Why do you think that there haven't been those stories written about the sea?

**Charles Clover:** They have been written. *The Sunday Times* had the sea rescue campaign. I have been amazed by the public response, I should say, to "The End of the Line". We were overwhelmed by the response to that from around the world. We had a huge and unmanageable mailbag and unmanageable Facebook followers. That was a film that we made six years ago, and it has led on to Hugh Fearnley-Whittingstall's programme. When the public can get something in their busy lives that is simple enough and is wrong enough that needs righting, it gets righted pretty quickly. In this particular instance, it is very difficult to persuade people that you should have a protected area for two worms. With none of the flagship species left in—no birds, no mammals, no predators and no migrants—it is very difficult to get the public to engage. Quite rightly, these things are not interesting and it is very difficult to see whether they are a threat, but, if there are some things that are under threat, there is a job for the media to explain what is happening and how it might be destroyed because they are up with the over-fishing story now, I am pleased to say.

**Chair:** The last question from Stephen.

**Q266 Stephen Mosley:** I am going to ask you questions on the next steps, and I think you have been quite clear as to what you think about the fact that 31 are going forward. We have had some evidence from the Marine Conservation Society that suggested they think that all 127 should go forward straight away. Would you agree with that?

**Charles Clover:** I have read the Marine Conservation Society's evidence given to you, and I would not disagree with a word of it, particularly in terms of their comments on evidence. The "best available evidence" is not the same thing as "best evidence". The "best available evidence" is what the Act says. The "best evidence" is what the lawyers have required us, apparently, to require, and that is completely wrong. It breaks the circle of trust that the public had at the time of the Marine Act, it seems to me. To slightly get round your question, but to answer it in a way that I would want to, what needs to happen is a resolution of this evidence issue at a higher level.

This business of judicial review has really been made too much of, to be honest. If you look at what the courts do and how they rule on judicial reviews, when a Minister has given clear enough guidance in planning law or in ordinary law, when a clear vision is set as to what the Government want to do, why they want to do it, why they have a political mandate for doing it and how they expect the courts to interpret the Act, I do not think you will get a judge going against that. I think that is the kind of vision and clarity that needs to be set at the highest level within DEFRA so that we can go forward without this silly argument about evidence. Broad habitat types are obvious to everyone. Why we should be worrying about whether or not it has 912 or 817 of the designated species within those habitats is a nonsense that DEFRA has got itself into, which no other

country in the world has got itself into, and which we should get out of quickly.

**Q267 Stephen Mosley:** We are the Science and Technology Select Committee, though. One thing that we always say, whenever we have Ministers before us, is that they should be looking at the scientific evidence.

**Charles Clover:** Science is several things. Science is an argument. Science involves different values held by different scientists. You can't get out of it by looking at the science. You have to look at the law and at the values behind the law. What we are seeing here is a scientific argument that has been hijacked by people who want to interpret it in a particular way. The country has said that it wants to interpret it in another way. The country has said the "best available evidence". The people who have to apply the law are frightened of the possibility of being taken to judicial review. That is an issue outside science, but science can be subverted to whichever argument you want, so you as legislators have to decide what the country wants. You use science as your tool. Science is not an absolute thing. It is an argument.

**Q268 Stephen Mosley:** But the best available evidence, if there is no evidence, is not reliable evidence at all, is it? The Government's argument that they are proceeding with 31 and that they are looking—

**Charles Clover:** You never get 100% scientific evidence for anything.

**Q269 Stephen Mosley:** But you can get more than zero, can't you?

**Charles Clover:** You will find that there is more than zero for the broad habitat types in these 127 sites and they should be designated.

**Q270 Stephen Mosley:** Do you think that, if there was more scientific evidence, you would be more likely to be able to get local support for some of these schemes that have attracted—

**Charles Clover:** No. I think you are barking up the wrong tree. The country has given its view that we should select sites on the best available evidence, not

the best evidence, and that we should manage them with the objectives of the Marine Act, and we should go out and do that. It is the process of doing that that will solve your problems. It is by giving people the power to decide how those things are managed at local level that will remove the anxieties rather than some arcane argument, which most people won't understand, about whether it is 817 or 997 species that are in these 127 marine conservation zones.

**Q271 Chair:** That is a good point on which to finish. Thank you very much, indeed, for your time this morning.

**Charles Clover:** Could I say one thing, which I meant to say at the beginning?

**Chair:** Indeed.

**Charles Clover:** It is on another subject altogether. On your previous report on the British Antarctic Survey and the National Oceanographic Centre merger, I have admired what the Committee did and what you did, Chairman, very much indeed, because you stopped that merger. I don't think that anyone at NERC understood how vital it was to keep the British Antarctic Survey in existence to help to research the evidence for large marine reserves around Antarctica. This was never mentioned in any of the deliberations, yet this is a major, major job for the British Antarctic Survey. It is the only way, incidentally, legally, that any large marine reserves will come about under the CCAMLR treaty. A science-based, evidence-based marine reserve creation is the only thing you can do. I have one request. I am concerned that the responses to that consultation have not been published. I have sent you the Blue Marine Foundation's response, because I think it is important. If you care to look further on a subsequent occasion into why a research council with "Environment" in its title seems to act as an interest group for various academic factions and not in the interests of the environment at all, and has a long history of doing so, in my experience, I would be absolutely delighted.

**Chair:** We are currently awaiting the Government's response to our report but thank you for your comments. Thank you very much indeed for your attendance this morning.

Wednesday 16 January 2013

Members present:

Andrew Miller (Chair)

Stephen Metcalfe  
Stephen Mosley  
Sarah Newton

Graham Stringer  
Hywel Williams

### Examination of Witness

*Witness:* **James Cross**, Chief Executive, Marine Management Organisation, gave evidence.

**Q272 Chair:** Can I welcome you to our hearing, Mr Cross? First of all, would you be kind enough to introduce yourself?

**James Cross:** I am James Cross. I am the chief executive of the Marine Management Organisation.

**Q273 Chair:** Before we get into the formal stuff, I am interested in how you got into your position. Your career takes you all over the place. We were joking earlier on about the connection between marine and HMRC interesting activities down in Cornwall and so on, but what got you into your current role?

**James Cross:** By accident, I have become, if there is such a thing, a professional regulator. I started my public career with the Inland Revenue, before moving on to Customs and Excise. I spent some time in local government and a fair bit of time over in the criminal justice sector, working ultimately as the assistant chief inspector of court administration for England and Wales, working with the police, probation and prisons. Throughout that, I have built an expertise in how to run an efficient and effective regulatory body. It is those skills that the chair of the Marine Management Organisation, and ultimately the Secretary of State, thought were relevant to this organisation. I think that is how I have ended up here, Chair.

**Q274 Chair:** The Marine Management Organisation was established in 2009. What do you think its main achievements have been since then?

**James Cross:** The MMO was vested on April 2010. There are many achievements that the team have produced that make me proud. There is the ability to deliver a business-as-usual function at the same time as building a new organisation. The two stand-out achievements have been to implement a new streamlined marine licensing system, bringing into being new legislation and the systems and processes that underpin that—we did that on time, which was pleasing—and to get us in a position on our marine planning work that is really going to put an interesting dynamic on the way we manage our marine resources. They are the two stand-out achievements for the organisation in terms of expectations that were given to the Marine Management Organisation pre-vesting.

**Q275 Chair:** What have been the main challenges?

**James Cross:** The biggest challenge for me was repositioning the organisation in the eyes of our own people and in the eyes of our customers away from being a fisheries management organisation, or a fisheries regulator, into an organisation that is seen

and acts separately from policy. The MMO does not set Government policy: we take decisions and we regulate in accordance with the law and Government policy, based on the best available evidence. It was helping our cultural shift, internally aligned with that. That has been the big challenge for me.

**Q276 Chair:** Finally, before I pass over to other colleagues, tell us about your vision for the next five years and what your priorities will be.

**James Cross:** I give a very clear steer to my organisation, which is that we operate in a very difficult operating environment. Where possible and where we have the scope to do so, our decisions need to promote growth, enhance the environment and have a social benefit. We do not have the luxury of doing one or the other. That is the challenge for me. I will be seeking to find ways to achieve that through understanding what the delivery ask from Government is in terms of delivery and reform of the common fisheries policy, understanding the delivery ask around the MCZs portfolio of work, and also, as I say, taking forward marine planning. Those are the key milestones for me over the next five years.

**Q277 Stephen Mosley:** One of the areas that you are responsible for is marine planning. Could you briefly describe what your vision is of the marine planning system?

**James Cross:** Yes. Marine planning takes an existing Government policy portfolio—primarily the marine policy statement but other national policies that exist—and fuses it with the best available science and applies it to a specific geographical region. That will shape the decision making of our licensing teams. It brings a huge benefit to the economy and to the environment because it brings a strategic element to decision making. It moves my organisation away from taking decisions about port development or renewable energy, for example, away from a first-come-first-served footing, to something that is more strategic. We start thinking now about some of the decisions that we will need to take over the next five to 10 and right up to 20 years. It is bringing the debate forward.

**Q278 Stephen Mosley:** What sort of impact do you think it will have on marine users, economic activity and people who want to do development of the sea?

**James Cross:** In terms of economic development and economic benefit, it does not provide certainty to industry, but it improves the odds, if you like. It allows decision makers and investors to think about

the decision making criteria that my teams will use. It helps to reduce uncertainty to investors and decision makers about what activities are likely to be able to proceed in certain areas, which I think is a huge step forward in terms of what industry wants. In terms of the local society, one of the frustrations that often gets fed back to me is that people can feel under pressure when they have been asked to consult on a project that quite literally is potentially 12, 24 or 36 weeks away from decision. They feel constrained by the immediacy of the decision, whereas, again, when we are planning, it puts the debate on the table three, five, 10 or 20 years ahead of the decision. It creates much more freedom in that consultation and discussion.

I believe it also brings an environmental benefit. If we start to understand now, today, some of the environmental and scientific questions that we are going to need to know in five, 10 or 20 years' time, then, hopefully, we can capture these questions in our strategic evidence plan. We take our strategic evidence requirements around the scientific community and start saying, "We are going to struggle in five years' time because we don't know the answer to these questions." Those are the big benefits for me of marine planning.

**Q279 Stephen Mosley:** How will the marine planning environment mesh with the marine conservation zone programme?

**James Cross:** As I say, the marine plans reflect law and the policy portfolio as it exists. The marine conservation zones exist as part of that higher stratosphere. In short, the marine plans will fold in the marine conservation zones. We will not seek to unpick them or add to them. They will exist, and we will reflect them in the marine plans in the same way as we reflect a shipping lane or a Round 3 energy zone. We will also show where a marine conservation zone is and the associated restrictions on that front.

**Q280 Stephen Mosley:** Lastly, you have described what it should look like. How does it actually work? What sort of progress are you making?

**James Cross:** 2013 is an exciting year for the MMO in terms of marine plans. We are at the stage where we have done a tremendous amount of engagement and consultation with industry and stakeholders. This is the year where we hope to be formally consulting with the public and move towards adoption of the first two marine plans.

**Q281 Stephen Mosley:** Where will they be?

**James Cross:** The first two marine plans we have been working on run from Flamborough Head down to Felixstowe, out to 200 nautical miles.

**Q282 Sarah Newton:** During the marine conservation zone designation process was the MMO involved in the regional projects?

**James Cross:** We were, after we were vested. There was a certain degree of work carried out before that, but certainly we had a presence on all of the local projects. We were there in the same capacity as the rest of the local stakeholder community. The feedback that I have had from the local projects is that we

provided good local expertise, local knowledge, and were able to offer a generic description about the type of management that maybe could be used in certain circumstances.

**Q283 Sarah Newton:** You have touched there on the management measures. We have heard a lot of evidence from people saying that they felt it would have been really helpful had a list of potential management measures been published during the process to help people understand the implications of designation. What is your view of that?

**James Cross:** My understanding is that the consultation process and discussions did include generic descriptions about the types of management measures that could be used, whether it was a byelaw or a marine works licence variation condition, for example. Beyond that, I am not entirely certain if anything else could be brought to that.

For example, once the marine conservation zones are designated, we have the conservation objectives and the associated conservation advice. Where there is the regulator—because sometimes it will be the MMO and sometimes it will be the local IFCA—I can say that the MMO will engage in a full consultation exercise and a full engagement process. At that point, we will be able to tease out the specifics. We need to know the specifics around the local activity. My job in that scenario will be to assess the activities that I need to undertake to change behaviour. That is what I am interested in, so I need to try and get a sense of the local activity, the mindset, and what I need to do around persuasion and education. That change of behaviour is much more than a byelaw or a piece of regulatory infrastructure.

**Q284 Sarah Newton:** That sounds like a very big thing to try and achieve in a whole range of zones to get that behaviour changed. What level of resources are you going to have to be able to look at the management measures for each of those conservation zones? Related to that, how are you going to enforce them, police them or prevent unauthorised activity once the management measures have been identified?

**James Cross:** It is a tactical pursuit of compliance. One of the things I have learned as a regulator is that, if you make that initial investment—of time, primarily—to understand and engage the local community and sea users, gain buy-in and seek involvement in the solution, compliance is much easier to achieve and, therefore, it is cheaper in the long run. Although there is a big initial investment, we think it is ultimately value for money. We have been able to trial that to some degree in our work around Lyme Bay, which is an EU-derived marine protected area, and it certainly worked.

In terms of resources, one of the challenges I had at the beginning of my leadership at the MMO was to look at our business model. We were vested with a budget of £32 million per annum and a headcount of 250 people. Looking at the challenges, I realised that we needed more people. Initially we were under-resourced. Of course I needed to generate efficiency savings to help Government contribute to the reduction of the structural deficit but over-engineer

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our efficiency programmes to pay for an uplift in headcount from 250 people to around 330 people. As we stand today, when I look at the MCZ policy, I think of it in terms of delivery challenge. Do I have the resources, the skills and the people I need to deliver it? As it stands at the moment, I think we are in the right place. There is always going to be an element of tweak and so on there, but we should be fine.

**Q285 Sarah Newton:** I have a final question on this. We did take evidence from a not-for-profit organisation—I think it was Blue Seas, was it not, Chair?—in Lyme Bay. So that we are absolutely clear, you would see the MMO having overall responsibility for policing the marine conservation zones, but you might subcontract that, for want of a better word, to another organisation to be the managers on the ground linking all the various partners in a particular zone together. Is that what you are saying?

**James Cross:** That is not necessarily what I am saying. In terms of overall responsibility, the responsibility for the enforcement of the MC zones rests not solely with the MMO inside nought to six nautical miles for the purposes of fisheries conservation, for example. The lead regulator would be the Inshore Fisheries Conservation Authority, but, in broad terms, yes, we are the lead regulator in how we do it.

I would never rule anything out. One of the few luxuries we have, which is very different from previous roles I have occupied, is that this is not a high-throughput environment. We have the luxury of taking a case-by-case approach, judging every scenario on its merits and looking at whatever solution works. As long as it works, and as long as it is lawful and within our remit, we will consider it.

**Q286 Chair:** How will you ensure that no unauthorised activity occurs?

**James Cross:** This is the challenge of the regulator. We have tools available. We have technology and monitoring mechanisms. We have data, reports and landing information. We are also part of different intelligence networks; we take siting data. None of that guarantees compliance; none of that guarantees abidance with the law. There are two effective weapons. One is self-regulation. If the users of that environment buy in to the objectives of that site and want to comply, they will, which is why we focus as part of our strategy on education and persuasion and making sure we take that local community with us. It is really easy to underestimate the power of buy-in. Resting alongside that, once that local community and the local sea users recognise the benefits of enforcement, they also start to self-regulate and self-police. They work very closely with the MMO to say, “Do you know what? Actually, there are one or two people who are not playing by the rules.” It is a kind of patchwork-quilt approach.

**Q287 Hywel Williams:** I want to ask you about the area around Lundy Island, which I understand has been designated since 2010. Can you tell us a little bit about how that has been managed and whether any activities have been either banned or even restricted?

**James Cross:** Lundy is an interesting example. In terms of fisheries activity, primarily the responsibility for that, as the Committee will be aware, lies with the local IFCA. The MMO assess Lundy in terms of the conservation objectives and activity. It is a low-risk site. There is a good community buy-in to what is looking to be achieved. We touch base often with the local IFCA. As I say, we are satisfied that they are well on top of their remit.

The responsibility for assessing how effective the concept of designating an MCZ is lies with Natural England. It is their responsibility to make an assessment about how effective the designation has been. They would be in a far better position than I to talk about that. In the discussions we have had with them, as I understand it, they have made those interim assessments and they are finding a positive effect of designation.

**Q288 Hywel Williams:** So you would say that the area has benefited from designation.

**James Cross:** That is my understanding. That is the feedback I have had from Natural England, yes.

**Q289 Hywel Williams:** I am interested in engagement with local communities, from my experience—in Wales, which I have to concede is somewhat different. Have you engaged with local stakeholders in the area to secure their co-operation, and if so, how has that gone?

**James Cross:** Not a lot. As I say, primarily the lead regulator in respect of fisheries management around Lundy will be the IFCA. My expectation would be that the IFCA would do that. As I say, we work closely with the local IFCA so we watch that. Lundy is an interesting designation. Although it is an MCZ, its conservation objectives have not been designated as yet. Once those conservation objectives are designated, we will then look at that to see to what extent we need to change our engagement. As it stands at the moment, it is a low-risk area for us. Our response has to be proportionate to the needs. The intelligence and the evidence we are getting is that it is working.

**Q290 Hywel Williams:** From what you were saying earlier on, your dependence on local stakeholders is quite high. It is a matter of self-policing.

**James Cross:** Yes.

**Hywel Williams:** With this particular example, you have the confidence that that is correct. Can you generalise that to the other potential sites?

**James Cross:** We can generalise that. We have already begun some work where we started to log all of the different marine protected areas and make an assessment around risk. What are the features that are trying to be protected; what activities do we know happen in those areas; what is the scale of the conflict? We have high-risk sites and we have low-risk sites. We have a finite set of resources. So I tend to focus my resources on those high-risk sites. Lundy exists towards the bottom, which is good, but there are sites that are at the top of that list. I need to start thinking about what activities I will need to engage in to start to move the compliance mindset. Ultimately, that may

mean that we need to have a byelaw or a management measure, but certainly we have to have a graduated approach, if that makes sense.

**Q291 Graham Stringer:** You mentioned previously, in answer to Sarah's question, how well you thought the Lyme Bay marine protected area had gone. Last week we had Charles Clover here talking about that and comparing the process of designating marine conservation zones unfavourably to what had happened in Lyme Bay. Do you agree that the difference between the processes is distinct and has been inferior in the designation of marine conservation zones?

**James Cross:** The designation process for MCZs, and indeed the designation process for the European marine protected areas, is not a work area that I have responsibility for, so I am not overly close to it. I am worried that I am not—

**Q292 Graham Stringer:** But you have observed them, haven't you?

**James Cross:** Yes.

**Graham Stringer:** We are interested in your observations, having seen them.

**James Cross:** Indeed. When I observe them, I tend to think of them in terms of deliverability: what is it going to mean to me in terms of achieving compliance in these areas? The MCZ process has had a lot of stakeholder engagement and a lot of discussion with the local communities, and that provides a good basis for me to understand that level of buy-in. From that, there has been a desire expressed to have confidence around the science used, which was something that was revealed during Lyme Bay. There was a desire to have some confidence in the evidence base there.

As to my observations, I am really struggling to answer that. It is not something I feel best placed to answer; I am sorry.

**Q293 Graham Stringer:** What do you think of the proposals that DEFRA have put forward for the 31 conservation zones?

**James Cross:** Again, I tend to think of these challenges in terms of, "Do I have the resources and can I deliver them?" In broad terms, the consultation document talks about tranches. As a pragmatic and unimaginative delivery expert, I prefer phased implementation because it allows a graduated roll-out, review, lessons learned and a continuation of that process.

**Q294 Graham Stringer:** So it is easier for you to work in groups of 30 rather than to have 127 of them in one tranche.

**James Cross:** Yes, from a delivery point of view. I am sure that has no bearing on the Minister's decision, but from my point of view that is an easier delivery challenge.

**Q295 Graham Stringer:** Are you surprised at the actual choice of the 31 and that some of these areas that have not been chosen are areas where our two species of seahorse live, for instance?

**James Cross:** No. Again, I tend to think about site selection in terms of what we know will be the conservation objectives, what we know in terms of the activity that exists there, and again what we are going to need to do to bring about a change in behaviour to protect those features. That tends to be the limitation of my thought process.

**Q296 Graham Stringer:** We have had a lot of representations. Some have been highly critical, some moderately critical and some supportive of the process and designation for different stakeholders. What do you think are the overall feelings of people who have been involved in the process?

**James Cross:** It really is as mixed as you have described it. It varies according to people's backgrounds and industry areas. Our approach here always is that, whenever we make a decision in my world, it usually offends somebody. What we always try to do is play a straight bat. We think about what the legislative framework, the policy framework and the best available evidence tells us. We use that to inform our decisions. Some of the people I talk to are wholly supportive and some are wholly unsupportive. The majority lie somewhere in the middle.

**Q297 Chair:** Among the 31, are there any examples where there is either total buy-in by the stakeholders or total opposition, or are they all a mixed bag?

**James Cross:** No; I have never yet been blessed with a designation that has absolute, unequivocal buy-in.

**Q298 Chair:** Is there an example of something that has a large and significant buy-in?

**James Cross:** Yes. Lundy is a good example where there is a good buy-in already. That is largely because—

**Q299 Chair:** At the opposite end of the spectrum, among the 31, are there any sites where there is a large degree of stakeholder objection?

**James Cross:** I cannot recall the exact sites from memory, but certainly there are a good 15 or 16 sites at the top of that risk register where we are going to have a delivery challenge in terms of achieving that sort of buy-in.

**Q300 Chair:** Can you give an example?

**James Cross:** I cannot remember the names. Do forgive me; I am happy to write to the Committee and make that available.

**Q301 Stephen Metcalfe:** One of the issues that have been highlighted to us during our inquiry is perhaps some of the lack of evidence around what we know about the seabed around our coasts. You have a lot of dealings with commercial and private companies in your licensing activities. During their commercial activities they collect a lot of data. Do you think there should be an obligation and a duty on those companies to share those data once they have collected them to help improve our knowledge of what is out there?

**James Cross:** It is interesting. One of the first decisions we took as an organisation was to inform industry that we were going to be publicising their

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environmental statements as part of the licensing decision. That was a first in the marine area. That had never really consistently been done before. We felt we had the remit to do that. We were not sure of the kickback from industry. The reality was that we did not get any, and industry was happy to do that. It picks up on this graduated and phased approach.

It has always been our intention that in the next financial year we would move into the space where we would be inviting industry to share the data that lie beneath that. We have had some informal discussions with industry. That is the space that we do intend to move into. It would be a really good idea, and it is something we intend to pursue.

**Q302 Stephen Metcalfe:** That is going to be a softly, softly approach, is it?

**James Cross:** Yes. We are nudging up against the edge of our remit here. We believe we have the remit to do it. We want to persuade industry to come with us because it is easier. They have some sensitivities around what they consider to be commercially confidential to them. I would rather work with industry to build up a consensus around what is and what is not shared.

**Q303 Stephen Metcalfe:** If industry don't decide to co-operate in that process, or they decide that too much of the information that is collected is commercially sensitive, what mechanism will you have to push back against them?

**James Cross:** We have the remit to—sloppy language here, forgive me—force the disclosure of anything that forms part of the decision-making process. It is our view that the data underlying those environmental statements form that. We feel as if we have good ground to do it, but we work with industry and we don't want to put ourselves in a difficult position, so we will invest the time to persuade, cajole and reach consensus, but it is still our intention to force the issue as far as we can.

**Q304 Stephen Metcalfe:** I have one final point on that. Do you have access to all the data that are collected? Is that shared with you and then it is a question of what is made public, or what is shared from that?

**James Cross:** Sometimes. The process is that we will take an environmental statement, for example, if we stick with that analysis, and we quality assure it. We run it through our quality assurance standards. As part of that, we will make an assessment about the underlying data and the methodologies used, and if we have cause to question it, we will call it in and review it. Sometimes we exercise our right to have access to it, but we don't routinely hold it, I guess is what I am saying.

**Q305 Stephen Metcalfe:** If you don't know that the data exist and if you have not actually seen them, how would you know if the company or industry is then sharing them?

**James Cross:** If we get a sense that a conclusion or the contents of an environmental statement are not based on data, if the data don't exist, then that puts us

into a position where we are not going to be able to move forward with a decision. We seek assurances that the data exist of course, but, more than that, we delve into the methodologies used. We review the sampling methodologies. All of that is a full and heavy part and parcel of our validation process so that we have confidence that the data are there and exist, but we do not routinely trawl through them to make an assessment.

**Q306 Chair:** Following that through, some companies are very proactive about sharing data. Some of the cable-laying companies, for example, work closely with the marine organisations, but there are other examples where it seems to me that commercial confidentiality is used as an excuse. There is an example I have come across in Liverpool Bay where data were collected on a wind farm licensed by the Government to exist and yet claiming commercial confidentiality about the wind data. It seems to me that that is information that ought to be accessible to the National Oceanography Centre or the Met Office. Don't you think it is reasonable that we should impose licence conditions to require the sharing of data?

**James Cross:** There is no doubt in my mind that, if all of that data were shared and freely available, the science database would be enhanced and it would be easier all round. I am not entirely certain that I have the remit to force that; so some things would need to happen behind the scene.

**Q307 Chair:** But you would support it.

**James Cross:** We would support it and we do occupy the right space to execute that, if that makes sense.

**Q308 Chair:** You have recently published your strategic evidence plan. What do you hope that will achieve by, say, 2015?

**James Cross:** Our relationship with science may be slightly different from other organisations that have given evidence to the Committee. Our relationship with science is all about enabling our decision making. It is not for policy formulation. It is to enable us to make regulatory decisions or decisions in a marine environment. Our work around marine planning is starting to say that, in three or five years' time, we know we are going to need the answer to some of these questions, and if we start to do that work now—we have articulated those questions in our strategic evidence plan—we will be able to make a determination on a marine licence more quickly. That is my ultimate hope, by saying to the scientific community through the co-ordination committees, "Look, we have an operational requirement for this piece of scientific work that will enable us to make operational decisions to the benefit of the economy and the environment, and we need to start it now." That is my hope for that strategic evidence plan.

**Q309 Chair:** That would be your priority within the strategies.

**James Cross:** That is right; yes.

**Q310 Chair:** What would success look like?

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**James Cross:** Success looks like the list of questions that I have articulated in that strategic evidence plan being provided in time for me to make that decision. The MMO has a very small research budget of about £500,000 a year. The questions that we need the answers to far outweigh that. I have not quite begged, stolen or borrowed, but I am saying, “Look, we have £X million worth of advances needed here. Who wants to do it for me?” The success criteria is somebody who will do it—

**Q311 Chair:** That is presumably partly because there are great swathes of our continental shelf about which we have very little mapped information.

**James Cross:** Yes, certainly the seabed, absolutely. As part of our marine planning work that I talked about earlier, we have stitched together, for want of a better word, the marine seabed maps that exist to form the basis of those marine plans. We are going to be doing two marine plans every two years between now and 2021 so that we get all of the English seabed mapped and all of the English marine plans completed. We also have really interesting questions around what is the impact of the cumulative effects of consenting work. In marine plans, we are starting to understand spatially how many wind farms we can squeeze into an area, for example, and how that can co-exist along

with a shipping lane, fishing activity and port development. We are not certain yet about what the environmental tolerances are. It may be that we have the space for 10 wind farms, but the environment can only sustain eight. We need to know those questions now.

**Q312 Chair:** That is because the science has not been undertaken. Am I right, therefore, in assuming that, if Ministers are serious about accepting your strategic plan, part of your ask would be that they resource the organisations that are necessary to provide the research data that you need?

**James Cross:** I am a pragmatist, Chair. Everybody knows we need to co-ordinate and work better. I do, certainly. The reality is that when resources are squeezed—and that is the environment I find myself in—you tend to find better co-ordination and collaboration between partners. I find it in a delivery environment. People are willing to work with me to sweat efficiencies. My belief and my hope is that, although one lever would be to inject more resources, a more pragmatic lever for me to pursue is to work collaboratively with people who have far larger funding budgets than I have.

**Chair:** Mr Cross, thank you very much for your attendance this morning.

### Examination of Witnesses

*Witnesses:* **Richard Benyon MP**, Parliamentary Under-Secretary for Natural Environment, Water and Rural Affairs, and **Professor Ian Boyd**, Chief Scientific Adviser, Department for Environment, Food and Rural Affairs, gave evidence.

**Q313 Chair:** Good morning, Minister. Welcome to our hearing. For the record, Professor Boyd, would you kindly introduce yourself?

**Professor Boyd:** I am Professor Ian Boyd. I am the Chief Scientific Adviser at DEFRA.

**Q314 Chair:** We welcome both of you to the meeting. The Marine Science Strategy aims to achieve “clean, healthy, safe, productive and biologically diverse oceans and seas”. Your written evidence argued that good progress had been made in delivering that strategy. How would you describe progress in achieving this vision?

**Richard Benyon:** Thank you, Chairman, for giving us the opportunity to talk about this important subject. The strategy sets out the direction in which we want marine science to go up to 2025. Work on this early phase has focused on various key priorities. Good progress has been made and there is undoubtedly more to do. The UK’s targets and indicators on good environmental status have been a key priority. These have been prepared for the Marine Strategy Framework Directive, so it is a parallel piece of work, and building on the 2010 assessment under the UK seas known as Charting Progress 2. That is one area of progress.

There are jointly funded programmes on key areas such as ocean acidification and shelf seas biochemistry; and that is good co-operation between NERC and DEFRA, but it has also involved other

Government Departments. MCCIP—the Marine Climate Change Impacts Partnership—has produced some really important climate change knowledge data, starting to fill knowledge gaps. There is a much stronger co-ordination in sharing of research—for example, on marine renewable energy.

There are other areas that I am happy to go into such as a communications strategy and a stronger sharing of resources. I could go on and just give you some ideas where I think there is more work to be done, if you would like me to.

**Chair:** Yes; please do.

**Richard Benyon:** We think further development of areas that I have already described will be important. Clearly, there should be a fully co-ordinated programme of marine monitoring. We think it is important that we develop a co-ordination of UK operational oceanography to bring together all the essential marine measurements that underpin the use of our seas’ activities, marine industries and our understanding of the marine environment.

For example, a conference is taking place this week in Southampton jointly organised by the MSCC along with other bodies to try and draw this together. We think there is more work to be done to develop close co-ordination with industry. We are jointly funding with industry a marine science needs capability study. That is a key area.

What we have achieved is, first of all, the strategy, and now we are into much more of the delivery phase.



What we must be concerned with are outcomes at a time when there is less Government money available. We need to work much more coherently, not just with marine industries but also with the devolved governments, which is an added complication. That sounds pejorative, but it is just an added part of the dynamic. I think things are going well but there is more work to do.

**Q315 Chair:** Clearly, you have thought a lot about this. The delivery plan was last updated in 2010. You have described some gaps that you still believe require filling. How are you measuring that delivery plan and what does success or failure look like?

**Richard Benyon:** Success is being measured against the delivery of individual actions identified in the UK Marine Science Strategy. Any subsequent actions will be identified and followed through. There is a progress report on the delivery of the strategy actions. This is provided to the Marine Science Co-ordination Committee for examination at each of their six-monthly meetings. A key part of their work is to measure progress against these delivery objectives.

A strategy progress report has also been issued to the Ministerial Marine Science Group in 2012. The MSCC is also looking at whether this could be supplemented with quantitative indicators, but it has not actually identified meaningful and reliable measurements yet to which that can be used. That is another area of progress—to make sure that we are identifying our success criteria and then seeing how we are moving on those.

**Q316 Chair:** What are the main challenges affecting that strategy, and how are you delivering them?

**Richard Benyon:** We need to look across the whole area of marine science. Clearly, Government put a lot of money in through various different silos, not least DEFRA but also other Government Departments, co-ordinated clearly through David Willetts and his science strategy. There are then the devolved governments and their scientific priorities. There are then the marine science hubs in places like the Plymouth Marine Laboratory and the National Oceanography Centre. That is part-funded through the taxpayers—through the Government, obviously. These are all centres of excellence. Added to that, there is the work being done by industry. That is a complex landscape. What we have been trying to do over the last few years—the previous Government as well—is to try and draw those disparate groups together to make sure that it is coherent. The big challenge is on the work being done in industry.

Industry has enormous amounts of data, some of which is commercially sensitive. They need to be able to protect that. That is absolutely understood. But there is an enormous amount of data that is not commercially sensitive, and we have got to be better about harvesting that for the greater good.

**Chair:** We totally agree with that; we have identified that already.

**Q317 Stephen Mosley:** In response to the Chairman's questions, you said that the MSCC is responsible for measuring the progress of the Marine

Science Plan. Who is responsible for measuring the success of the MSCC?

**Richard Benyon:** There is a ministerial group. First of all, the MSCC is co-chaired by the marine director in DEFRA, who is responsible to me. I am responsible to Parliament and yourselves. That is the first point. There is then a Ministerial Marine Science Group that makes sure that Ministers across Departments—and this is a cross-departmental body—get value for money and that we are using the right systems and techniques to get the right answers for what we are trying to achieve.

**Professor Boyd:** The only other thing I would add is that it is self-evident that there is a self-generated measure of success by the fact that so many bodies want to be involved with the MSCC—not only governmental bodies but also non-governmental bodies. That includes industry. If the MSCC was not performing a function and was not seen to be performing a function, then there would be a relatively slow process of disengagement, but I think disengagement would happen. There is no evidence that that is happening at the moment.

**Q318 Stephen Mosley:** You could almost argue the opposite, though. We have had witnesses in front of us who argue that there have been some issues with transparency and value for money with the MSCC. You got the impression that industry representatives like Gardline Group and so on wanted to be involved because they felt it was not performing as well as it could have done.

**Richard Benyon:** Is this industry representatives?

**Stephen Mosley:** Yes.

**Richard Benyon:** It was a pity that, when non-executive members were sought for the committee, there were not deemed to be the right people coming from industry, or that the right people did not apply from industry, whichever way you like to look at it. Obviously, you want people to bring an industry perspective and to think in a corporate way when they sit on a committee like that rather than perhaps just representing a particular strand of interest. I think that has been corrected and we are going to get appointees to this body that will properly represent marine industries. We can start getting that concern addressed.<sup>1</sup>

**Q319 Stephen Mosley:** One other complaint that we have received is that the MSCC has failed to provide value for money in marine science and that a strategic overview of expenditure and value for money in marine science did not exist. Does the MSCC have a grasp on these issues and how is it ensuring that it does achieve value for money?

**Richard Benyon:** As I said earlier, we all know that money is tight. We are really focused on making sure that every penny counts. That is part of the Government's science strategy. We have protected science in terms of spending, but there is less from

<sup>1</sup> The witness later clarified that, while it is currently intended that there will be one industry representative appointed to the Marine Science Co-ordination Committee at any one time, over time a number of representatives of different marine industries are expected to have been members of the Marine Science Co-ordination Committee.

my Department. It is much less than the cuts we faced across the board but nevertheless a reduction. We want to make sure that we are using this as effectively as possible. That means making sure, first of all, that it is coherent and that we are working across other agencies, but also using the devolved Governments' marine priorities in accordance with ours. That can just come down, for example, to being a more effective use of vessels so that there are joint activities going on on a particular scientific trip. It comes down to basic co-ordination like that.

On a high-level scale, it is about making sure that we can see the demands for evidence coming ahead. For example, through the designation of marine conservation zones, we discovered there was a paucity of data and we have had to throw some money at it. It would have been lovely if, at the very start of the Marine Act process, we could have identified those shortfalls and started work on it perhaps half a decade ago rather than a year or two ago when we discovered that, in order for this process to be robust, to be able to stand up and be properly evidence-based, we were going to need to do some more work. We had to throw three million quid at it in order to achieve that.

**Q320 Stephen Mosley:** I know that in your written evidence you say that the budget that DEFRA provides for marine science has decreased from £31.8 million to £30 million last year. What has had to be missed out to accommodate that reduction in budget?

**Richard Benyon:** I will ask Ian to give you perhaps more detail. What I am hoping we can prove is that we are achieving a lot with less. Whether I can say we are achieving the same with less I don't know, but there are some very important areas of work that we have been able to continue to prioritise. I hope that, through the clever use of other organisations and other budgets, we have been able to keep the pressure up.

**Professor Boyd:** I cannot say that we have cut anything out. I think we have probably found those savings through efficiencies. I would also say that we are increasingly successful in leveraging our funding against other funding. This is partly driven by the activities of the MSCC, in that we are able to jointly fund projects and, therefore, DEFRA gets the benefits as well as other organisations. We have also had a lot of success with our European funding applications. Even though the DEFRA budget may actually have declined, we are probably doing more marine science now than we did before. We would intend that trend to continue in the future.

**Q321 Graham Stringer:** DEFRA has said that the MCZ projects are expected to use best available scientific information. You said on 15 November, in a Radio 4 programme that went out yesterday, and in answer to Stephen, that you need an adequately robust evidence base. You said it has always been the case that the designations were going to be determined on scientific evidence. That did not really answer the question between "best available" and "robust". What is the difference, and why is there a difference?

**Richard Benyon:** Going through all 319 clauses of the Marine Act, which I did as the Opposition

spokesman—and it was a fantastic piece of cross-party support, because it is a good piece of legislation—I remember agreeing with the then Minister and other colleagues about the importance of making sure that section 5 of the Act, which is this part, was evidence-based. What do we mean by that? At a first level, it means that we are not just drawing lines on maps and feeling good about it. That is greenwash; that is absolutely pointless. We want to know what is there. Whether we can tell exactly what is there or not, I am absolutely clear that we do not require the most perfect pinpoint accuracy, but we need to have a good, robust evidence base to support the designation of a marine conservation zone. That is important because it is going to have an impact on industry. If you are potentially harming or impairing a socio-economic activity, as a Government, you have to be able to justify that.

I also want this to be able to stack up internationally and I will tell you why. For example, if we are going to stop fishermen from fishing in a particular way outside the six- nautical-mile limit, we have to stop all fishermen and those who have historic rights to fish in our waters from abroad. The system has to be credible, so we cannot say to our fishermen, "You have to stop, but a Belgian beam trawler can go straight through that piece of ground," when our beam trawlers cannot. Therefore, it has to stack up at European level, and of course at an international level it simply would not if you did not have a robust evidence base.

There are those who say that the system should have been more top-down and more centrally controlled, and then it could have been co-ordinated through Ian's predecessor downwards. It would have been cheaper, which is undoubtedly true. Working through the regional bodies is a good example of bottom-up governance. It took a lot of the controversy out of the air because you had fishermen sitting around a table with conservationists and other marine users working off less than perfect scientific data and trying to produce the results they did.

We know from the independent Science Advisory Panel that some of the 127 sites that came forward stack up. Most of them are in the first phase of our designation process currently out to consultation. The independent Science Advisory Panel said that many of them did not. As I said to Mr Mosley, we have had to put a lot of resources into trying to find more information. We are going to continue to do that to be able to designate the next phase.

I have not really answered your question about where we are in terms of an adequate level of scientific evidence and total information. There has to be some judgment call at some point. That is a key feature of the Act.

**Q322 Graham Stringer:** Is the judgment call driven by legal advice on the possibility of judicial review in this country or a submission to the European Court of Justice at a different level? Is that what is driving the difference between best available evidence and robust evidence?

**Richard Benyon:** Your question is particularly timely. In *The Times* today, there is a big article about judicial

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review and the numbers of judicial reviews, which have increased exponentially over the last 20 years. There is a justifiable concern in Government that you do not want to lay yourself open through failures in process that result in good bits of policy—and marine conservation is an example—being buried in the courts, and valuable resources that come from the budget that I have responsibility for being spent on a legal process rather than being spent on marine conservation. There is a proper caution about judicial review, but I don't think it has been an overbearing one. I know that there are accusations, possibly generated by some of the things I have said. I have said that I don't want this to end up buried in the courts and I want this to be a process that goes ahead as quickly as possible. But I don't think that we have been like rabbits in the headlights about judicial review.

**Q323 Graham Stringer:** Certainly, Charles Clover, when he was here last week—this isn't his exact phrase—said that, basically, you had been swamped with legal advice, which was delaying the process. The RSPB have said that you can never have perfect scientific information, and going for the same quality of evidence that you get in terrestrial designations is not possible and is just delaying the designation of MCZs. How do you respond to those accusations? Simply, are you getting a lot of legal advice?

**Richard Benyon:** I am getting legal advice. I have to say that the idea I have been closeted with DEFRA's lawyers on this would be an absolute first. I obviously get advice from officials who have talked to lawyers, but I cannot say that lawyers have come to see me saying, "Minister, we have a potential problem here." That is absolutely not the case.

I do think we have to get that balance right. It is a glib comment, but I have been attacked in fairly equal measure by fishermen and other socio-economic users of our seas as I have been by conservationists. That might just indicate that we are getting it right somewhere. At the end of the day, I think we are going to be the best in Europe, or certainly right up there with the best in Europe, in terms of marine conservation. We are ecologically coherent, properly evidence-based, and it is something that all sides of this House, who supported the Marine Act, and organisations like the Wildlife Trust, the RSPB and others, can feel genuinely proud about. It is a process and it will go on. We are 31 sites in this round and more in the future.

**Q324 Graham Stringer:** Can I ask my final question on this section in a slightly different way? How do you judge that the evidence is adequate? You say you are not overwhelmed with legal advice. How then do you judge that the level of evidence that you have, given that it is never going to be perfect, is adequate?

**Richard Benyon:** I will ask Ian to come in with some detail on that, if you will allow me. Before that, I would say that the point about the Marine Act designations and marine conservation zones is that Ministers can and should apply a judgment on the basis of socio-economic activities, unlike in marine protected areas where they cannot under European

designation. This is a UK measure. It fits in with various international obligations such as OSPAR and the Marine Strategy Framework Directive, but it is our bit of legislation. It is something that this Parliament wanted to do. We can make that judgment call between evidence about a feature and the activity that could possibly put that at risk.

Within the whole process of this Act, there is undoubtedly an understanding that the evidence will always be so good and it might not be absolutely perfect. I forget the actual wording in the guidance but I think that is a factor. What the independent Science Advisory Panel decided was that there was not evidence to support a great many of the 127 sites. That was a major concern, and I think we were right to delay the process to make sure that we did provide the evidence on the initial designation sites. Some of that was a desktop exercise. There was the data if we went out and looked in various marine laboratories and other organisations, but in other ways we had to go out and find it.

I was down off the south coast on the IFCA—Inshore Fisheries and Conservation Authority—vessel looking at one particular feature of one particular marine conservation zone that showed an area where the sea bream breed. This piece of evidence from an underwater camera showed that, in order for that to be effective, we needed to stop trawling on the bottom on that piece of the seabed for about six to eight weeks a year to protect this incredibly valuable stock. It is valuable to the fishermen and valuable ecologically. It is really interesting to see how the management plan that will come to support that marine conservation zone can be tightly confined to a particular activity of one stock for a particular time of year. That is a really effective use of scientific resources.<sup>2</sup>

**Professor Boyd:** Your question was aimed particularly at how we make a judgment about the robustness of evidence.

**Graham Stringer:** What is adequate; yes.

**Professor Boyd:** There are well-trodden paths with respect to this. With respect to MCZs, we put a process in place for acquiring evidence and then making a judgment about that. Right at the centre of that process is peer review. Right throughout the scientific community, there is a strong consensus that peer review is the way to make judgments about the quality of evidence. In the particular case of MCZs, that peer review was done against a set of criteria. As a result of that, the independent Science Advisory Panel, which is the peer review panel in this particular

<sup>2</sup> The witness later clarified that, the Science Advisory Panel reviewed the recommendations from the Regional MCZ Projects against the Ecological Network Guidance and undertook a quick review of the evidence provided in support of the recommendations. An Independent Expert Group reviewed the protocols to be used by Natural England and the Joint Nature Conservation Committee (SNCBs) in providing their advice to Defra and the draft SNCB advice. A separate independent review was undertaken of the evidence base supporting the SNCB recommendations. Defra considered the SNCB evidence and advice in drawing up recommendations for proposals for MCZs to be included in tranche 1; the approach adopted in drawing up the recommendations for consultation were tested with the then Defra Chief Scientific Advisor.

case, has the last word about the robustness of the evidence and which MCZs stack up with respect to some of the objectives that have been set. I see the way that the MCZ evidence has been used is entirely consistent with the standard procedures by which evidence is judged within the scientific community generally.

I would finally say that we have learned a lot during the MCZ process. There were problems with it in terms of how the process was set up, but in the next tranches that will probably work a lot better because we have learned a lot from the experience we have had. In the end, we want to come up with a consistent procedure so that everybody knows how it works and there are no surprises to all stakeholders. We want it to provide a proportionate, transparent and non-discriminatory outcome. In the end, that is what we have come to but it has been by a slightly circuitous route perhaps.

**Q325 Chair:** By way of example, on a very wet day in Falmouth, we met many of the stakeholders. They criticised Governments for drawing lines on maps, to go back to your earlier phrase, Minister. Of course, Falmouth was not in the original 27 that have been designated. We obviously all know that there are some valuable habitats in that area that ought to be protected, but is it right to infer from that that, when Falmouth is revisited, there will be a fresh look at some of those lines on maps responding to some of the local evidence?

**Richard Benyon:** I notice that a member of your Committee will have a particular interest in this. Falmouth has become a prime example of a totemic area for all the complications of marine management. There is a very active port and there are a number of different stakeholders whose livelihoods depend upon the viability of that port. There is a lot of leisure activity around there and tourism. There are some absolutely wonderful and fairly rare ecological features that need protecting. What Falmouth has taught us is the importance of communication. There is certainly a polarity of views down there from local stakeholders about what needs to be done. The impact of some of those comments is sometimes discussed at a national level. Communication is the first point.

In terms of the Marine Act, the ability to apply a socio-economic test to any designation is important for the community there. We have to remember, though, that this is not the only show in town. We have lots of different layers of international designations, which have worked pretty well, with times of controversy over the years. We want to make sure that we are not adding to the complication.

We are really concentrating on outcomes. We want to achieve the continuing viability of that port, and the impact that can have on the hinterland for that part of the south-west is massive in terms of jobs, tackling deprivation and all of that. I completely get that, but we have to balance that with the need to protect these rare ecological features.

I cannot give you an answer about whether, in 10 years' time, when we look back at this period, we will have got that right, but it won't be through lack of trying. The reference area debate clouded the issue in

a way. Our get-out-of-jail card has been that it is a temporary reprieve. The statutory notice conservation body said that the case had not been made for reference areas, but we do need to look at how we manage marine conservation zones to assess whether they are working or not. Once we have drawn our evidence-based lines on maps and have good management plans, we want to be able to come back and say in years to come whether that has worked or not. The seas are fast-moving, ecological—

**Q326 Chair:** Just to take the two phrases you have used there, the criticisms about the particular lines on the maps and whether they should be adjusted to accommodate the deep-water buoy that is used for emergency shipping purposes was one issue. The second was the leisure one, which is a management process one. It is not necessarily a banning of leisure or sailing there; it is a question of whether it is possible to put in place a management process that will maintain the necessary protection of the maerl beds and at the same time allow the leisure sailors to enjoy their races. From your answer, I take it that your preferred solution would be to find a practical way around that rather than simply designate it as a no-go area.

**Richard Benyon:** The maerl beds are a really good example. The Marine Management Organisation has worked really hard on this. I hope the trial it is doing will be the way forward and will prove that you can, through the use of the right science, which is robust in its methodology, find solutions allowing commercial activity to go on.

There is another example of an area up in Norfolk where local people were really concerned that the implementation of a marine conservation zone was going to prevent them doing things they have done for years, such as walk along the shorefront or that a dinghy sailor whose boat got into trouble and landed on this piece of coastline would be somehow breaking the law. That is absurd if taken literally. We want to encourage more people to use the coast and enjoy the natural environment. Sometimes the wording can be taken out of context and cause people alarm. It is really important that we come back to my original comments and that we are focusing on good evidence.

**Q327 Stephen Metcalfe:** The designation of a marine conservation zone is highly likely to change the activity that can happen in that zone, however that might be managed. Where do you think the balance lies between the scientific evidence and the conservation aspect of the work you are trying to do, and the socio-economic impact? What is the balance between those two, which could often be quite diverse demands?

**Richard Benyon:** It is important at the end of the process that we can be independently verified as having created something that is ecologically coherent. That means protecting various different features around our coasts, soundly based on a clear knowledge of what is there and what is needed to be done to protect it. If the feature to be protected is on the seabed, such as sea fans, reefs and other features, it seems absolutely logical to me that other activities

higher up the water column, such as long-line fishing or other activities that don't involve the seabed, should be allowed to continue.

I look at this like national parks. You are allowed to farm in national parks, but you are constrained in what you can do with regard to stocking rates and you can't pull down dry stone walls and all those sorts of things. Most people in this country get that. There are some purists who believe, "Absolutely not—no activity has to take place at all." There will be certain areas that will be very prescribed and perhaps completely protected. We will be judged on how well we are managing those.

It is a difficult question to answer. It is a judgment call. If I was just being attacked by one side and not the other, you would say I had got that balance wrong. I cannot say I could do a particularly scientific study of the level of opprobrium that is heaped upon me. My gut feeling is that we will get this right.

**Q328 Stephen Metcalfe:** The demands are so diverse. What will ultimately tip the balance? If that balance cannot be met and there isn't this judgment, will it be the conservation demands or the socio-economic demands?

**Richard Benyon:** We are doing this because we want to conserve certain features that we think, if they continue to go unprotected, would be lost and there would be damage. This sounds like a real politician's answer here, but there can actually be a benefit for both sides. If you are protecting an area where fish spawn, you will get more fish. In relation to those sea bream that I talked about, there will be a benefit to the local fishing community, more, of a high-value catch for them. They are very supportive of that. There is socio-economic activity working with a conservation activity in virtuous circles all round.

Are there clashes pending? Yes, of course there will be. We have to make sure that we are not driving people out of business. Part of what we are trying to achieve in Government is keeping coastal communities alive. We understand the impact of that, but there is room in our seas for proper, meaningful conservation and activities, whether fishing, marine aggregates or marine energy. To answer your question, I am determined to get this right, but we will only be able to judge whether we have in time.

Ian, is there a more scientific answer you could give?

**Professor Boyd:** No, I think it is a politician's choice. All I would say is that it is almost impossible to generalise. In every circumstance, there is going to be a judgment call to be made about where the balance sits in terms of costs and benefits to particular conservation features or socio-economic features. Those are going to have to be played out in the individual management plans for the individual MCZs. As the Minister says, there are going to be some tough calls and some relatively easy ones. Obviously, what we want to do is exploit the experience with the easier ones as much as we possibly can to make sure that we have a process in place that develops consensus among the stakeholders. As the Minister says, these have been specifically set up to protect certain type of features. Clearly, there is going to be an initial assumption at least that those

features are what are there to be kept. If there are going to be activities that threaten those features, they will be looked at very closely. There may be management measures put in to stop some of them under certain circumstances.

There are many circumstances in which, if the stakeholders involved were to think about it, there are ways around the problem. In other words, it is not just a matter of doing what we have always done in the same way as we have always done it. There may be ways of doing things differently in certain circumstances. That is a very generalist response, but we need to develop specific management measures in particular areas.

**Q329 Stephen Metcalfe:** You have talked about some of the clashes between interested parties and also about the benefits that can come from marine conservation zones. Do you think that those have been communicated well enough to the parties involved? Is there a way that we can improve that communication so that people can see earlier, perhaps, what the benefits might be?

**Richard Benyon:** That is a really interesting point. When I was the Opposition spokesman and we were debating these on the floor of the House and in Committee, the only people who lobbied me were the conservationists. I had plenty of contact with fishing organisations and other marine activities, but with the possible exception of marine renewables, I got very little pressure. I suspect it was different in Government.

The last Government set up the regional bodies and they did a lot to take the controversy out of it because you had all these different interests sitting round the table. They were able to apply anecdotal evidence to the debate, which was overlaid by other evidence. I have already described how what was actually produced was lacking in some cases. That was a very important process in tackling that communication issue. What we have to do now is make sure that we are really engaging everybody. That is why we get criticised in Government for consulting too much—we certainly get criticised if we don't consult enough. Now, we are consulting on these 31 sites, and regulators will consult on the management measures that we will implement on those sites when we designate them later this year. That offers everyone an opportunity. I don't want to feel that it is just one side. I want them to feel that there is mutual benefit in many of these sites so that they can feel positive that Government are doing something good. Fishing organisations should not be seen as being opposed to this. In many cases they are being extremely helpful in this process.

**Q330 Stephen Metcalfe:** I have a final point. What is going to be important is that, of the 31 that you are going to consult on, whatever the outcome, there are likely to be some parties who are still unhappy. How will you demonstrate to all parties, even if they don't necessarily like the outcome, that the process was fair and that the balance was the right one?

**Richard Benyon:** Having regard to the process, its length of time and the convoluted nature of different

consultations—with the delay that we had to announce a year ago, the extra evidence and seemingly endless consultations—I don't think anyone can accuse us of rushing this. I hope the majority will feel that we have got it just about right.

There are no national secrets here. This is data that can be shared, and, if people are not aware of it, they can have access to it, with all the evidence that we are producing to back this up. People must feel that this is part of an ongoing process. This is not a designation on, say, 1 September, or whenever it will be, and that will be the end of the argument. We want to go on looking at how these sites work. We have the burdens that we are going to create in terms of governance on the Marine Management Organisation, on IFCAs and others. Local government will be involved in this and there will be lots of opportunities through the democratic process and stakeholder engagement to make sure that we are justifying what we are trying to achieve here.

**Q331 Hywel Williams:** You have already addressed the issue of engaging the local communities to an extent in other answers. I would like to take that on a bit further. In fact, I think this is developing as something of a theme in some of the evidence that we have received. In your written evidence, you say that plans are being developed to engage with coastal communities in the formal marine conservation zone consultation. What are these plans and, indeed, where are they at present?

**Richard Benyon:** We have put the proposal for the 31 sites out to consultation. That involves every conceivable group of people that would be interested, from the original proponents of marine conservation, organisations like the Wildlife Trust, the RSPB and other NGOs that you will be very familiar with, to much more local interest groups and local authorities. There will also be national bodies on the socio-economic side such as the NFFO—National Federation of Fishermen's Organisations—and other representatives such as the marine renewables industry and marine aggregates. Again, locally, it is crucial that ports, individual authorities and organisations that represent key economic activities as well as tourism and leisure feel part of this.

If, at the end of this process and your research, you find that there is an organisation that somehow feels excluded, I very much want to know before 26 March, or whenever the consultation ends, so that we are able to engage them. It is only through that that we have credibility. This process has to be credible across a wide range of different stakeholders. That is why we are consulting.

**Q332 Hywel Williams:** One of the points that has been raised in other sessions is about management measures. They were not included in the regional stakeholder process for discussion. Why not, and when will consultation and management measures begin?

**Richard Benyon:** I cannot give you a precise answer to that, but regulators will be consulting on management measures. I suspect my officials will quail when I say this, but I can't believe that this is

too complicated. We know what we are trying to protect and we know what activities will cause damage. We want to be able to create management measures that prevent that but allow other activities to continue.

**Q333 Chair:** Presumably, you mean appropriate to the particular site.

**Richard Benyon:** Yes, but there will be areas within the site that will require a high level of protection and areas that won't. Technology can help us now. I was down in Lyme Bay looking at vessel monitoring systems, which you can measure from the MMO's office in Newcastle. Where a vessel is within a few feet of a line, a telephone call or some form of communication with that vessel will tell him and they can adjust their course accordingly. Technology is going to be a great help here, but the management measures are crucial. If they are deemed not to be adequate, then we are back into the territory of lines on maps and justifiable accusations that we are not doing this seriously.

**Q334 Hywel Williams:** Clearly, that is what worries key stakeholders locally. I am a Welsh MP and have been a little bit involved in the MCZ designation and local meetings in north-west Wales, which were far from the success we had hoped they would be in fact. Uproar would be the word to describe the meeting I attended in Pwllheli some months ago. I am worried about the proper inclusion of local stakeholders and whether that can be managed properly. People were very concerned about how very local environments would be managed, for example, around Bardsey Island. I will not go into the detail but it was very difficult.

Do you have any concerns that the consultation document, which is 50 pages long, and repeated consultations would be a significant barrier to working people having their voices heard? Is that the way to do it?

**Richard Benyon:** I have discussed what is happening in Wales with the Welsh Minister. I understand the level of controversy. The work of the stakeholder bodies around the country, even if some of their proposals were found scientifically wanting, has been really valuable and will be used way into the future. That involvement from a process level is important, but, from the crucial point of view of taking some of the controversy out of it by having them as part of the decision-making process, it has diminished the possibility of the kind of upset that you describe. I am not trying to prescribe to other parts of the United Kingdom how they should do this. I do think it is an important job to make sure that we are joined up in England with what is happening in Wales, Scotland and Northern Ireland, and with countries like France and the Republic. If we are to have something that is ecologically coherent, it would be daft just to think that we can do that within our own waters.

**Q335 Hywel Williams:** I am just concerned about empowering local people who have lots of other things to get on with to engage properly in the process. Certainly, the process that I was involved in

felt very top-down. People were presented with fairly hefty documents, which went into some scientific detail but did not seem to mention commercial or leisure activities at all, or, when they were mentioned, it was as issues that would be looked at later when the scientific discussions had been completed. I am just making that as an observation of the process that I went through along with other people.

**Professor Boyd:** One of the problems here that has been identified is that a lot of the stakeholders are interested in what will be done eventually in terms of the management. The process as it has stood is that we are identifying what needs to be protected and then asking the question, "How do we go about protecting it?" It is absolutely right that you separate those questions out. Clearly, what we have not managed to do is to make sure that the stakeholders understand that separation and that their voices will be fully heard within the "What are we going to do about it?" or "How are we going to manage it?" question.

At the moment, we are still on the question of what is going to be protected and consulting on that. Once that is out of the way, there is another process to be put in place that will fully engage the local stakeholders that might be affected by this, particularly those who have commercial or economic interests, so that they will have a full say in what happens eventually.

**Q336 Graham Stringer:** Why only 31 designated areas? You said in one of your answers that they would be designated later this year. Can you be more precise on designation and whether that will be at the same time as management for the areas is agreed? When will the next tranche be announced, how many will be in it, and will you publish a schedule for the whole 127 sites?

**Richard Benyon:** On that last point, we have published comments on all 127 sites. Against those, we have announced that 31 are being taken forward now. I cannot say precisely when the next tranche will be announced. Why only 31? The original Science Advisory Panel said that around 25, and possibly slightly more than that, had adequate evidence to take them forward. We are now taking forward 31.

Is there a cost element consideration? Yes; this is an expensive process. It is an expensive process for Government. As I have said, we have had to find more money from Ian's budget to make sure that the evidence is robust. The cost of the regional stakeholder process was much more expensive than a more top-down method would have been. I have already discussed why I think it had its merits. There are new burdens that we create for organisations like IFCAs, which are funded in part through local authorities. Am I conscious of cost? Yes, absolutely. It would be quite wrong of me not to be. As Ian has said, we are learning from this process in a way that means that we can do the rest perhaps quicker and will be able to take forward more sites in the next round.

**Q337 Graham Stringer:** Can you be specific about when they are going to be designated—you did say earlier it would be later this year—and when the next tranche will be announced?

**Richard Benyon:** This consultation period ends towards the end of March. We will then evaluate the findings of that, with a view to designating towards the end of the summer or into the autumn. If I said September, I would hope that that would be an accurate month. I have yet to have a detailed discussion about when the next tranche will come forward. I very much make the point that this is the start of a process. We have a lot more sites that we want to designate and there are a lot of people who want us to do that. We recognise that it is important.

**Q338 Graham Stringer:** Did you listen to the Radio 4 programme that you appeared on yesterday at 11 o'clock about the designation of these sites?

**Richard Benyon:** I have not listened to it.

**Q339 Graham Stringer:** In terms of the actual selection of them, there was some criticism that really important habitats and zones had been missed out. The features they picked that they did not believe were being properly protected were cold-water corals and the two species of seahorse there are around the coastline. Do you have any response to those criticisms?

**Richard Benyon:** I hope that we will be able to bring them forward in the next round. In the meantime—

**Q340 Graham Stringer:** I think they were saying they were not part of the 127, not of the 31.

**Richard Benyon:** The sea grass one—

**Graham Stringer:** Seahorses.

**Richard Benyon:** But the seahorse lives in the sea grass in Dorset. I think that is one of the proposed 127 sites. If there is damage happening to those sites now, there is already provision for the Marine Management Organisation or an IFCA to prevent that activity taking place, either through a byelaw in the latter case or through a prescriptive measure that the MMO can take. Where there is evidence that there is damage occurring now, either on one of the 31 sites before it was designated or one of the ones that is not, there are measures that can be taken to protect those sites.

**Q341 Stephen Mosley:** Currently, only about 10% of the UK marine shelf is covered by habitat maps. I know you have mentioned several times throughout your answers that you are putting additional resources in as part of the marine conservation zone process to create those maps. Some other European countries—I know Ireland is one example—have a more strategic approach. They have a long-term approach, looking at all the coastal waters around Ireland. They have decided that they are going to do habitat maps for the whole area on a strategic project. Do you think there might be potential for doing something similar in the UK?

**Richard Benyon:** It is important to state, and I know it is not the point you are making, that we have mapped all our waters. The detail we have discovered that we need to know for this kind of activity, and indeed to inform other marine industries applications as we go through marine planning, which we are now rolling out as part of the Marine Act, does mean that

we have to have a better understanding. That is why we are trying to improve our knowledge base.

Technology is a great help here. Marine industries are also doing a lot. It is about pooling the data that we receive. Whether we can actually say to your Committee what percentage we will have mapped, to what degree and by what date, I am not sure.

**Professor Boyd:** I would agree that we need to do more. Habitat mapping to the kind of levels you are talking about is enormously expensive and resource-intensive. I believe that we can do a lot more with the technologies that are either available to us now or in the pipeline that will reduce those costs. For example, there are many ships from the marine industry passing through our waters running multi-beam sonar systems. The data are very often not collected. It would be relatively straightforward to collect those data. In fact, if you look at Scotland's marine atlas, which was their response to the CP2—Charting Progress 2—on the front of it is a compendium of Scotland's seas that is produced from the fishing industry, because fishing boats are running with echo sounders almost all the time. Some of those data are recorded, and if you pull all that together you can get a very high-resolution map of the coastal waters. We have to be a lot cleverer about how we obtain and use data, and then verify that those data are correct.

There is a major job to be done there in terms of data processing and management as much as anything else, and engaging with the stakeholders who are potentially collecting those data. It is not necessarily just the job of Government to go out there and fund surveys. I think those data are already there. We just need to be cleverer about how we collect them.

**Q342 Chair:** Stephen used the phrase and talked about the Irish strategic plan. All of the potential sources of data you have alluded to require a strategic plan. Would it be your advice to the Minister that we should consider creating a strategic plan?

**Professor Boyd:** It is in fact my advice to the Minister that, in DEFRA, we have a geography strategy. That is basically a strategy about collating spatially referenced data. That includes both terrestrial and marine data.

**Q343 Chair:** Going back to the Minister's earlier observation about some of the data that are available, albeit there is a little grey area, much smaller than some companies claim, that is genuinely "commercial in confidence", what we need to try and do is pin down all of those potential sources and create a data collection mechanism that could be fed into the National Oceanography Centre or some central body that can then translate it.

**Professor Boyd:** Exactly—I agree. We have the capability in UK marine science to do this. This is a matter of co-ordination.

**Chair:** And organisation.

**Professor Boyd:** I would assure you that there is a direction of travel here, which is towards making this happen.

**Richard Benyon:** At the risk of alphabet soup, within the UK marine monitoring and assessment strategy—part of the MSCC's work—the British Geological

Survey leads a seabed mapping working group that brings together those bodies with active interests in seabed mapping. It has recently taken on the role of overseeing the co-operation on the memorandum of understanding on multi-beam data.

I would add that organisations like the Crown Estate are doing a lot of work on this. It is about our role and the MSCC's role in drawing that together.

**Q344 Stephen Mosley:** Is what we are discussing today and those projects you are discussing there just England-specific or do they include the devolved areas of Scotland and Northern Ireland, and also overseas territories?

**Richard Benyon:** One part of the MSCC's remit is to make sure that there is co-ordination across devolved Governments. Also, this means sharing resources such as marine survey vessels and that on the same cruise they are doing multi-purpose activities. As far as the overseas territories are concerned, there is an extensive activity on marine conservation. Some of that is led by those countries concerned, some of it is assisted by NGOs and a lot of it is co-ordinated by the Government. It fits in with some terrestrial conservation work and the marine environment, but over the coming years we are going to see many more examples, such as in the Chagos Islands, of a fantastically valuable marine protected area supported by the Government because of their responsibilities, but also through an NGO that is providing resources to manage that marine protected area. That is a very exciting way forward for the areas that have about 90% of the biodiversity for which Britain is responsible.

**Q345 Graham Stringer:** In quite a lot of the evidence we have taken from scientists from different organisations, they have expressed worry that the monitoring of acidification in the oceans and the monitoring of temperature change is piecemeal and may well lose its funding in the near future, and, if you do not keep measuring these things, then all the work that has been done previously loses its value. What are you doing to make sure that these series are maintained?

**Richard Benyon:** The Government, in partnership with the research councils, are supporting a range of monitoring and research activities to better understand some of the ocean processes and changes that are taking place and the impact that these changes will have. We are continuing to contribute to something called the international Argo float programme.

**Q346 Graham Stringer:** That is a definite commitment for the future, is it?

**Richard Benyon:** Yes. We are supporting the Jason-3 satellite altimeter, which measures sea level height, which is more relevant to your question.<sup>3</sup> There is also a research programme to increase our

<sup>3</sup> The witness later clarified that, Argo is an important programme that has delivered useful information about the deep oceans which is essential for understanding climate change. It currently has funding committed until March 2015 and we will be looking at its funding in the longer term as part of the next Government spending review taking into account scientific requirements and wider priorities.



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understanding of the impacts of ocean acidification on marine life and how changes in ocean chemistry are impacting on issues such as global warming. I recently looked at one of these projects at the Plymouth Marine Laboratory. It was looking at the integrity of shellfish shells as a result of different temperatures and acidification. It was a fascinating and really important piece of work.

**Professor Boyd:** The only thing I would add is that Sir John Beddington, Government Chief Scientific Adviser, is looking at the national infrastructure required in order to sustain long-term monitoring of things like ocean pH, ocean temperature and ocean salinity. There is a certain amount of fair criticism with respect to how this has been done in the past.

Coming back to the co-ordination role that MSCC plays, there is work going on in MSCC to address this. I know that NERC is very active in this field. We have to fulfil two functions here. We have to fulfil a research function, which is trying to find out the basic knowledge that we need in order to be able to make decisions. Then there is an operational function about just monitoring through time what is actually going on so that it can inform immediate policy decisions.

We have to get the balance of the investments right on this. With respect to marine, the costs of doing this are very large indeed. We also have legacy issues to deal with, which involve some very long and excellent datasets. We have to make decisions about whether those long and excellent datasets are the sorts of things we need in the future. Do we need new parameters to be measured and where do we get the resources for that? There are some quite difficult strategic decisions to be made. I think the MSCC is an appropriate forum in which to make those decisions.

**Q347 Graham Stringer:** That is an interesting point you have made. We know it has had a long-term monitoring working group, but we have been told that it failed to provide any clear output from that monitoring group. Why do you think that happened? You have partially answered what you are doing about that, but why do you think there was that failure; or do you think it is not a fair criticism?

**Professor Boyd:** The criticism is perhaps fair but it is a very difficult job to do. One is doing two things. One is trying to second-guess what is going to be required in the long-term future and one is trying to match that against what we have been doing in the past. I think we should continue to discuss this and challenge ourselves on this. As I said, the MSCC is an appropriate place to do it. I would like to see the MSCC picking this up again because I would challenge our marine scientists with the question, "Are we measuring the right parameters in the right way and are we doing that in a technologically developed and modern manner?" All those questions need to be addressed.

**Q348 Graham Stringer:** Is your answer that we can expect them to be providing us with clear outputs in the future?

**Professor Boyd:** I would hope so.

**Q349 Graham Stringer:** I have a final point. You mentioned the role of the research councils, and there are a number of research councils involved. Are they really the appropriate bodies or should there be a separate funding body for this important area of research?

**Professor Boyd:** I think the research councils are appropriate for certain functions. The research councils are there to carry out leading edge, both strategic and tactical, research. They are less appropriate for carrying out the here-and-now research—the operational research—that bodies like DEFRA require to be done. In those circumstances, we need strong partnership arrangements between the different delivery bodies for those different types of research.

Within the UK, we have a diverse and quite complex landscape of delivery bodies for those types of research, which again is partly a legacy issue, but it is where we are. Many of those bodies are excellent at what they do. My feeling is that a single body to carry out all these functions is an impractical way forward, partly because of the legacy issues, but partly because many of the strengths we have in UK marine science are highly distributed among the different bodies, some of which are in devolved administrations or in other parts of the system. Again, this points towards the functionality of the Marine Science Co-ordination Committee in trying to bring together all those functions and giving the Marine Science Co-ordination Committee more power to be able to make that happen in the future. As a result of that, I do not think that a single body is really practical in the UK context or necessarily desirable.

**Q350 Chair:** I will wrap up with a couple of questions of clarification. Going back to the 31 proposed sites, I think I am right in saying that the Science Advisory Panel said that, for 25 of those, there was robust scientific evidence. Why were the others included?

**Richard Benyon:** Between the 25 and 31?<sup>4</sup>

**Chair:** Yes.

**Richard Benyon:** Because we have gone out and got better evidence.

**Q351 Chair:** So they are all evidence-based, in other words.

**Richard Benyon:** Yes. There is now evidence to support the designation of all those 31 sites.

**Q352 Chair:** My final question to you, Professor Boyd, is this. This area of work is right up your street and obviously an important part of the Minister's role. As we look around the marine science world in the UK, we see some fantastic work going on, but we also see examples of where Britain's pre-eminence in some technologies has not been exploited as well as it could have been. For example, there is fantastic research being done on automated submersibles, and yet there

<sup>4</sup> The witness later clarified that, The SAP undertook a quick review of the evidence provided by the regional MCZ projects. The 31 site proposal comes from a more thorough review of the evidence by the SNCBs and some additional evidence gathered since the regional project recommendations.

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is not the manufacturing capacity here. Do you think we can do something about that by perhaps working with the TSB and finding some way of getting us back to where we ought to be? The science is ours but the exploitation is not.

**Professor Boyd:** Yes. I share your views about the trajectory of UK marine science in a global context. There are all sorts of reasons for that. It is partly because marine science is rising in the agenda of many other countries. The UK does still play a very strong leadership role at an international level.

To come to your specific question about technologies, we probably have to make some hard decisions in the UK about the sorts of marine science we want to do. Like any scientific field, it is expanding all the time. Perhaps one of the reasons why the UK has declined relative to many of our other partners in marine science is because we have not made some of those hard decisions early enough. We will probably have to specialise more. At the same time, we still need to keep our general capability so that we can maintain an across-the-board expertise. That is a difficult thing to do. We have extremely strong universities in the UK. We have some very strong research institutions in marine science in particular and we have quite strong marine industries as well. We need to make better use of all those different components in combination.

Having done that, I think we would find solutions to the kind of specific problem that you raised with regard to some of our submersible technologies, for example. If we had a higher level of co-ordination across all those different players in the marine sector, we would see an uplift in economic capability and an uplift in investment. At the end of the day, it is about where the investment comes from to exploit those types of technologies. At the moment, I would have said that the UK is not a big player in terms of investment in marine technologies. We have a very buoyant oil and gas industry and we have a developing marine energy industry. In terms of our marine technologies, particularly the kinds of technologies you mentioned but I could also mention gliders, for example, robotics is going to be a huge thing for the future. In the UK, we have a lot of the components to turn robotics into a marine success story for us. Perhaps we ought to be, as you have suggested, trying to spin up activity with the TSB and other types of funding organisations to make that happen. We need to be able to express that vision. Again, I would come back to the MSCC as a challenge to it to try to express that kind of vision for the future and make these things happen.

**Chair:** Minister and Professor Boyd, thank you very much for your attendance today.

# Written evidence

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## Written evidence submitted by the Department for Environment, Food and Rural Affairs

This memorandum was prepared by the Department for Environment, Food and Rural Affairs with input from other departments, their agencies and the Marine Management Organisation. The response to question 4, which is a devolved issue, is in relation to England only.

### Introduction

1. The Government remains committed to world class marine science that increases understanding of the marine environment and helps to shape policies for *clean, healthy, safe, productive, and biologically diverse oceans and seas*.

2. Advances in understanding come from the UK's world-leading marine scientists, the UK's vibrant marine industry sector, non-Governmental organisations and others. The Government therefore involves a wide range of stakeholders when developing its evidence base.

3. Marine industries and maritime services contribute around £17 billion per annum to the UK economy, with the potential to rise to £25 billion per annum by 2020.<sup>1</sup> The Government is working with industry, through the Marine Industries Leadership Council, to achieve this increase.

4. Addressing the six matters identified in the Committee's Call for Evidence in turn:

1. *Since 2007 has there been improved strategic oversight and coordination of marine science?*

5. Changes since 2007 to the processes for providing strategic co-ordination of UK marine science have led to significant benefits.

6. The Government's response to the Science and Technology Committee's 2007 report, "*Investigating the Oceans*", accepted that the existing cross-Departmental mechanism for marine science management and co-ordination, the Inter-Agency Committee on Marine Science and Technology (IACMST), had its weaknesses as well as its successes, and it promised to establish a new Marine Science Co-ordination Committee (MSCC).

7. The MSCC, since its formation in 2008, has:

- provided new high level leadership and co-ordination for UK marine science, bringing together key departments, the Devolved Administrations, NERC, and other major research and delivery bodies;
- members—senior scientists and policy makers—who can take decisions on key issues;
- benefited from independent expertise and challenge from three non-executive members appointed through open competition, with academic, Non-Governmental Organisation and Government science backgrounds;<sup>2</sup>
- created a renewed a sense of common purpose and working together within its membership and in the wider marine science community; and
- articulated a clear strategic direction for UK marine science in the UK *Marine Science Strategy* (2010).

8. MSCC is co-Chaired by the two senior officials responsible for marine issues in Marine Scotland and Defra,<sup>3</sup> in contrast to IACMST's single chair, and is supported by a joint NERC-Defra Secretariat. This provides a broad perspective on UK marine science. All MSCC members participate on an equal basis and are jointly responsible for its work. MSCC reports to Ministers from the three Devolved Administrations and seven Whitehall Departments, who form the Ministerial Marine Science Group (MMSG). Details of the MMSG and MSCC reporting structure can be found at Appendix A.

9. The MMSG is headed by Defra's Parliamentary Under Secretary for Natural Environment and Fisheries. The MMSG has guided the work of the MSCC in practical ways, such as through its input to the UK Marine Science Strategy, and by commissioning new actions, in March 2011, to strengthen co-ordination of activities between MSCC bodies in an increasingly challenging financial environment.

10. Further details of significantly improved co-ordination, including joint research programmes and the co-ordination of marine monitoring and assessments, are provided at Appendix B. A number of these key marine programmes, such as those on ocean acidification, marine renewables and the Continuous Plankton Recorder, are Living with Environmental Change (LWEC) accredited.

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<sup>1</sup> <http://www.bis.gov.uk/assets/biscore/business-sectors/docs/s/11-1310-strategy-for-growth-uk-marine-industries.pdf>

<sup>2</sup> <http://www.defra.gov.uk/mscc/members/non-executive-members/>

<sup>3</sup> Defra and DECC manage their marine science budgets on an England and Wales basis.

## 2. What progress has been made in delivering the 2010 Marine Science Strategy?

11. Good progress has been made in delivering the Strategy. This is a long-term strategy running to 2025, so much work still remains. This Government, the Devolved Administrations and partner bodies on MSCC remain committed to seeing its delivery through.

12. Since 2010, MSCC and its member organisations have addressed a targeted set of issues related to high level science priorities and barriers to delivery, mainly focussed around joining up the science, plus a series of new actions commissioned by the Ministerial Marine Science Group. Strong engagement by MSCC members, has been a major factor in the progress made.

13. Details of progress with delivering the Strategy—and wider MSCC actions—are given in the progress report to the Ministerial Marine Science Group at Appendix B. It includes the work of the UK Marine Monitoring and Assessment Strategy (UKMMAS) and other MSCC groups, and provides details of MSCC members' spends in 2010–11 and 2011–12.

14. MSCC has benefited from valuable input provided by external stakeholders from industry, NGOs and the research and academic sectors, for example on development of a UK Marine Science Communications Strategy, where the proactive approach of partners has led to the more rapid and efficient delivery of Strategy outcomes, at low cost.

15. Further details of MSCC activities can be found on the MSCC webpage.<sup>4</sup>

16. MSCC intends to carry out a review of the Strategy every five years or so, to check that it continues to be fit-for-purpose and to make any necessary adjustments in the light of external developments and progress with delivery.

## 3. How effective have the Marine Science Co-ordination Committee (MSCC) and Marine Management Organisation been, and what improvements could be made?

17. As described above, MSCC has provided a strong and effective vehicle for setting the strategic direction for UK marine science and for delivering better co-ordination.

### Terms of Reference

18. Against its Terms of Reference,<sup>5</sup> the MSCC has successfully:

- provided the high level decision-making body envisaged in the Government's response to "*Investigating the oceans*";
- provided an effective strategic direction for marine science, including through the UK Marine Science Strategy;
- taken decisions needed to deliver UK marine science effectively and efficiently, including identifying high level science priorities for UK marine science: *understanding of how the marine ecosystem functions; responding to climate change and its interaction with the marine environment; and sustaining and increasing ecosystem benefits*;
- worked with partners to identify and address barriers to the delivery of marine science;
- acted as a forum for discussing key marine science issues. Its meeting in September 2010, for example, considered ways to address the effects of possible budget reductions and the potential loss of scientific expertise on four key areas of marine science—monitoring, data, R&D and capability (staff, resources, facilities, equipment and vessels). Practical actions resulting included a system for reducing costs by sharing expensive scientific equipment and facilities between MSCC members;
- promoted the role of evidence, gathered from monitoring and assessment, research, development, economic and statistical analyses, and social research, in informing policy and science decision making. MSCC is working to identify ways to source more data from industry and so avoid duplication of data gathering; and
- Promoted strong co-ordination between public sector bodies and with other sectors within the UK and overseas. MSCC is, for example, jointly planning a conference on Operational Oceanography with the Institute of Marine Engineering, Science & Technology (IMarEST) and the Society for Underwater Technology (SUT) for January 2013.

19. MSCC's co-ordinated approach to marine science and data, particularly through UKMMAS and the Marine Environmental Data and Information Network (MEDIN), is helping to expand the shared evidence base and to achieve more with the existing resources. Progress includes the bringing together of UK observation networks in a smart way through the UK Integrated Marine Observing Network (UK-IMON).<sup>6</sup>

<sup>4</sup> [www.defra.gov.uk/mscc/](http://www.defra.gov.uk/mscc/)

<sup>5</sup> <http://www.defra.gov.uk/mscc/files/Terms-of-Reference-MSCC-July-2012.pdf>

<sup>6</sup> <http://www.westernshellobservatory.org/uk-integrated-marine-observing-network-ukimon-initiative>

20. A key long-term driver for UK marine science is the EU Marine Strategy Framework Directive (MSFD). MSCC's UKMMAS groups have provided significant input to the implementation of the MSFD in the UK, helping to define targets for good environmental status in UK seas. Their delivery of Charting Progress 2<sup>7</sup>—a comprehensive and authoritative assessment of the state of UK seas—has been used along with Scotland's Marine Atlas and Northern Ireland State of the Seas as the basis for the UK's initial assessment under the MSFD. These reports have also underpinned the marine aspects of the National Ecosystem Assessment.

21. UKMMAS's Healthy and Biologically Diverse Seas Evidence Group has, in particular, led groundbreaking work to define biodiversity targets. This has helped the UK to play a leading role in Europe on the development of evidence-based targets.

22. MSCC has assigned increasing importance to the work of the MEDIN<sup>8</sup> in improving the availability and consistent management of data. MSCC recognises the benefits that MEDIN's approach to data of “*collect once, use many times*” brings and is working to ensure that all MSCC members' data are provided to MEDIN, and to encourage industry to share more of their data.

#### *Wider impact of the MSCC*

23. MSCC's impact is wider than simply the result of delivering the actions within the UK Marine Science Strategy and co-ordinating marine science. It has provided renewed leadership and confidence within UK marine science, and has helped, through its activities and those of its members, to raise the profile of UK marine science, including internationally, where the UK Marine Science Strategy has generated much interest. For example, NERC has merged institutes to create the National Oceanography Centre, which now provides a national focus for co-ordination of active researchers from across the whole community through the NOC Association. MSCC will shortly be strengthening its links with industry, by co-opting the new industry co-Chair of MSCC's Marine Industries Liaison Group, when in post, as a direct industry representative on MSCC.

24. MSCC is also a vital common platform for co-ordination between the UK Government Departments and the Devolved Administrations. Marine and fisheries policy is a devolved issue.<sup>9</sup> However, our partners in the Devolved Administrations actively participate, on equal terms, in MSCC and share and jointly fund marine science.<sup>10</sup>

#### *Improvements in the MSCC*

25. There will always be room for improvement in all structures and processes, including MSCC.

26. Prior to the announcement of this Select Committee's inquiry, MSCC had made plans to consider, over the next few months, its operation; what it could be doing better or more of; and whether the current structure and approach provide the best fit.

27. This self assessment exercise will go ahead. The Government therefore intends to wait until this short exercise has been completed before reaching a view on suggested areas for improvement for MSCC.

#### *How effective has the Marine Management Organisation been, and what improvements could be made?*

28. This evidence focuses on the MMO's marine science evidence base. Details of the MMO's status and responsibilities are at Appendix C.

29. The MMO has made considerable progress in using marine science effectively since its creation in April 2010. It is working with maritime industry, academia, research councils and fellow public bodies to build a robust marine evidence base to inform its decision making. Over the last two years, the MMO has identified the critical gaps in evidence that the MMO will need to fill in.

30. This work has led to the development of a Strategic Evidence Plan (SEP), setting out evidence/research priorities from 2011 to 2015. These are based on the needs of MMO functions, particularly marine planning. There are eight priority areas, each of which is a research programme that has a series of projects. The areas are: cumulative effects, co-location, socio-economics, fisheries management, seabed habitat mapping, Marine Protected Area management, data management; and ecosystem management.

31. MMO has shared the SEP widely with the Defra Network and interested parties to ensure resources are maximised and to avoid duplication of effort. The MMO also participates actively in UKMMAS and MSCC to ensure alignment with other organisations in the wider marine science community.

32. The MMO is finalising a Framework Agreement for commissioning evidence quickly and efficiently. It addresses the MMO's need for: (a) broad ranging technical expert advice services and a facility to review existing evidence as and when required; and (b) expertise on priority areas of research and development.

<sup>7</sup> Charting Progress 2 (<http://chartingprogress.defra.gov.uk/>) was published by the UKMMAS community in July 2010, immediately prior to its merger with MSCC.

<sup>8</sup> <http://www.oceannet.org/>

<sup>9</sup> Each of the UK Administrations will continue to exercise functions affecting the marine environment in accordance with the current devolution settlements.

<sup>10</sup> For Wales, while marine and fisheries policy is devolved the marine science budget is not.

*Quality assurance*

33. The MMO seeks to use the best available evidence and information for its decision making. It has published a quality assurance policy and developed internal processes to assist staff to assess the robustness of the evidence. It has implemented such processes into all of its functions and has shared such processes with Defra and the Network. The MMO commissioned a Quality Management Systems manual for the organisation to help it embed good practice processes. The MMO has also signed Defra's Joint Code of Practice for Research and asks all its suppliers of evidence to adhere to it.

*Transparency*

34. The MMO publishes a summary of evidence behind all its major decisions on marine licensing and fisheries management to increase transparency of practice. The MMO is working towards publishing the evidence and data on other areas of its decision making, such as decisions on grants. Comments received through the MMO's 2012 customer survey demonstrated that the organisation's approach to transparency has been well received, and its plans to increase the level of transparency across all decision making is supported by customers.

*Example of a recent project*

35. The MMO, in partnership with Marine Scotland, has begun to improve the availability and use of marine social and economic data for decision making. A dual purpose project to collate, describe and improve marine social and economic data and secondly to review socio-economic analytical tools and methods has been completed for use in marine planning. This is the start of the MMO's programme to integrate social and economic data and analytical methods into marine management.

4. *Has the selection of proposed Marine Conservation Zones (MCZs) been based on robust scientific evidence? How well has the scientific evidence been balanced with socio-economic considerations and communicated to affected coastal communities?*

*Introduction*

36. The Marine and Coastal Access Act 2009 requires UK Administrations to establish a network of marine protected areas (MPAs) which contributes to the conservation or improvement of the marine environment, is representative of the range of features present in the UK marine area, and reflects that conservation of a feature may require designation of more than one site. The Act also provides for designation of national sites—marine conservation zones (MCZs) to complement existing types of MPAs to form the network. Marine nature conservation policy is devolved and although each Administration is following the OSPAR<sup>11</sup> principles for designing MPA networks, each has interpreted these differently and is taking a different approach to designating MCZs. This section covers the approach taken in the waters Defra is responsible for—English inshore waters and English and Welsh offshore waters.

37. Ensuring a robust scientific evidence base is a key element of Ministerial decisions on sites to designate as MCZs. Data confidence for the marine environment is poor, for example the UK National Ecosystem Assessment<sup>12</sup> noted that the “characteristics and biodiversity of a large proportion of the UK subtidal marine habitats is still unknown and not mapped”. Given the poor state of evidence, Defra has put in place arrangements for independent peer review of the advice on which decisions will be based and commissioned significant additional evidence gathering work to support the MCZ designation process including a review of the evidence base supporting site recommendations and a programme of seabed and habitat surveys.

38. Following concerns about the state of the evidence supporting MCZ designation, in November 2011, Environment Minister Richard Benyon announced:<sup>13</sup>

- designation of MCZs in tranches with the best evidenced sites being designated first;
- a revised timetable for MCZ designation with formal consultation planned for December 2012 and designation of first tranche sites in 2013 (reflected in Defra's updated business plan);<sup>14</sup> and
- additional funding for evidence gathering to support the MCZ designation process.

39. We are on track to meet this revised timetable and expect to launch a public consultation in December 2012 which will set out which sites are proposed for designation in the first tranche, which require further investigation and which will not be progressed any further. We will also set out plans for designating future tranche(s) of MCZs. We also intend to use the formal consultation to describe uncertainties in decisions on sites to take forward to designation and invite comments on this supported as appropriate by submissions of

<sup>11</sup> Oslo and Paris Commission (Ospar) Guidance on Developing an Ecologically Coherent Network of Ospar Marine Protected Areas, (Reference number 2006–3)

<sup>12</sup> The UK National Ecosystem Assessment, published October 2011. <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>

<sup>13</sup> Written Ministerial Statement on Marine Conservation Zones, 15 November 2011. <http://www.defra.gov.uk/news/2011/11/15/wms-marine-conservation-zones/>

<sup>14</sup> Business Plan 2012–2015, Department for Environment, Food and Rural Affairs, 31 May 2012. <http://www.number10.gov.uk/wp-content/uploads/2012/05/DEFRA-2012-Business-Plan.pdf>

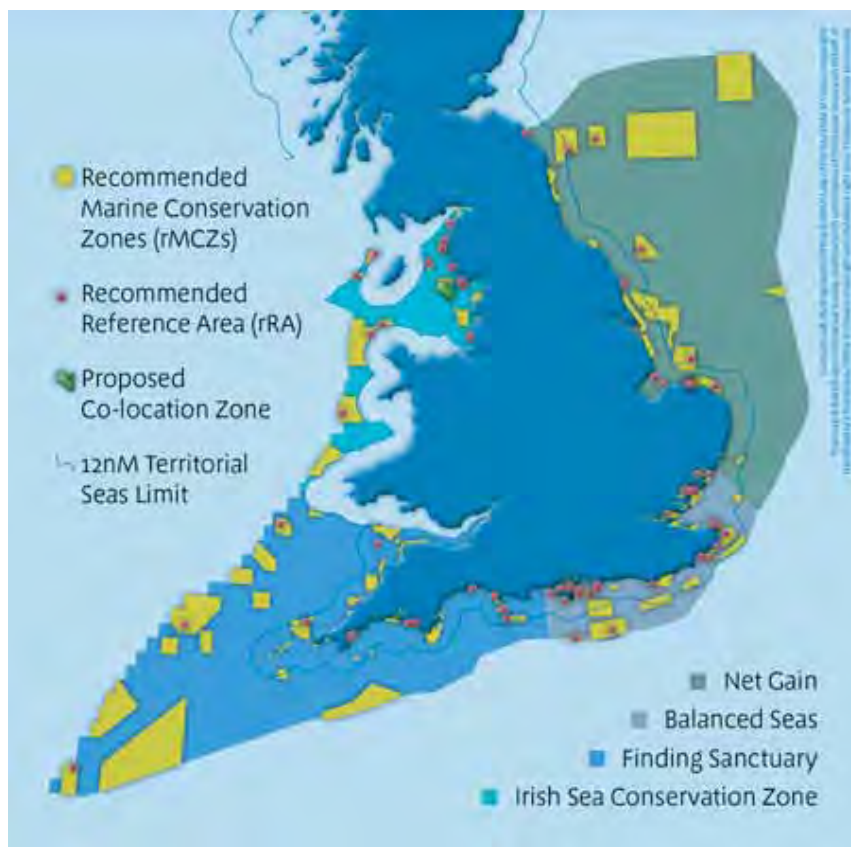
additional evidence which will be considered before Ministers make final decisions on which sites to designate in the first tranche.

### *Selecting proposed MCZs*

40. Recommendations for 127 locations for MCZ sites have been made by four stakeholder-led Regional MCZ Projects managed by the Statutory Nature Conservation Bodies (SNCBs), Natural England and the Joint Nature Conservation Committee (JNCC). See Figure 1.

**Figure 1**

#### REGIONAL MCZ PROJECT AREAS AND RECOMMENDATIONS FOR LOCATIONS FOR MCZS



This figure shows the areas covered by the four Regional MCZ Projects, Net Gain, Balanced Seas, Finding Sanctuary, Irish Sea Conservation Zone. It also shows the recommended locations for MCZs and Reference Areas made by the Projects including one zone proposed to be co-located with proposed windfarm developments.

41. The Projects were provided with project guidance from the SNCBs including the Ecological Network Guidance<sup>15</sup> setting out criteria, based on the OSPAR MPA network design principles, for selecting MCZ sites. They were also given a series of national data layers providing information on location of habitats and species, location and intensity of activities in the marine environment eg fishing, possible areas for windfarm developments, shipping lanes, wrecks, areas for military use and a sensitivity matrix to provide information on the likely sensitivity of conservation features to environmental pressures associated with human activities. The Regional MCZ Projects also collected information from a range of sources including national, regional and local stakeholders, online resources, publications, licensed data packages and through their own data gathering. Stakeholders made local decisions about how this information was used.

42. In broad terms, the Regional MCZ Projects were expected to use the best available scientific information to identify possible locations for sites for MCZs and then use information and local knowledge about impacts on sea users to determine which sites to recommend to SNCBs and Defra. In practice the clear separation did not occur and the stakeholders considered both science and socio-economics in the same discussions in developing their recommendations making recommendations that took some account of socio-economic implications.

<sup>15</sup> JNCC Natural England Marine Conservation Zone Project Ecological Network Guidance, June 2010 [http://jncc.defra.gov.uk/PDF/100705\\_ENG\\_v10.pdf](http://jncc.defra.gov.uk/PDF/100705_ENG_v10.pdf)

43. The final Project reports were evaluated by an independent Science Advisory Panel, established by Defra to support the Regional MCZ Project process which reported its conclusions<sup>16</sup> in November 2011. These included, at Defra's request, commentary on evidence base supporting the site recommendations. The Panel concluded that there were shortcomings in the evidence cited by the Projects and recommended an in depth review of the evidence base supporting site recommendations. Following receipt of this advice, Richard Benyon made the Written Ministerial Statement described in paragraph 3.

44. A key element of the advice to Ministers in selecting sites to take forward to designation is the formal advice from the SNCBs.<sup>17</sup> This was presented to Defra on 18 July and included an overview of the Regional MCZ Project process; an assessment of the available scientific evidence; an assessment of the recommended MCZs which should receive priority protection; advice on the contribution of MCZs towards meeting an ecologically coherent network of MPAs; and an overall view of the Regional MCZ Project recommendations.

45. The advice was developed taking account of the recommendations from the independent cSAC review<sup>18</sup> including the development of protocols for formulating and independent review through a second independent expert review group established by Defra.

#### *Balancing scientific evidence and socioeconomic considerations*

46. As noted above socio-economic considerations were taken into account in the regional project process in the stakeholder discussions on site recommendations. However, as well as making recommendations on possible MCZ sites, the Projects were asked to provide an impact assessment<sup>19</sup> setting out the costs for their recommendations which was also presented to Defra by the SNCBs on 18 July. Economists in the Regional MCZ Projects were supported by economists in the SNCBs and Defra to ensure the impact assessment was completed to the standards required by the Government's Regulatory Policy Committee. The impact assessment and the methodologies developed to assess the impacts on different sectors were subject to independent expert peer review.

47. Decisions on which sites to propose for designation in the first tranche will be based on the information provided in:

- The Regional Projects' site recommendations and impact assessment;
- The Science Advisory Panel assessment;
- The formal SNCB advice; and
- Any additional evidence that has become available since completion of these documents.

48. Each of the Regional Projects' MCZ recommendations is being assessed as suitable for designation in 2013; requiring further consideration (ie potentially for a later tranche) or not suitable for designation.

49. Whether a site is being considered suitable for inclusion in the MCZ network depends on the strength of the conservation advantages it offers, relative to the socio-economic implications of its likely management measures. Given the concerns about the marine evidence base, a key element in determining suitability for designation in the 2013 tranche is the level of confidence in the data for the features. Where this is low, or absent sites are not being considered for designation in the first tranche but considered for further evidence gathering and designation in future tranches. An exception to this general principle is for sites identified by the SNCBs as being at high risk. For these, consideration is being given to designation to protect sensitive features on a precautionary basis. In broad terms, the most expensive sites are only being considered for designation if they provide an opportunity to protect a feature or features where there are limited opportunities regionally or nationally for protection or if it is the best national or regional example of a feature or features.

50. This work is being developed at the moment and further details can be provided to the Committee in future. The formal consultation planned to start in December 2012 will include a fuller explanation of the how sites have been chosen for the first tranche and will provide an opportunity for stakeholders and others to provide comments and further evidence.

51. The formal consultation will be accompanied by an impact assessment which will be reviewed through the normal government processes, including the Regulatory Policy Committee before the consultation document is finalised and published.

<sup>16</sup> Science Advisory Panel assessment of the Marine Conservation Zone Regional Project Final Recommendations, November 2011. <http://www.defra.gov.uk/publications/2011/11/15/pb13680-sap-mcz-assessment/>

<sup>17</sup> JNCC and Natural England's Advice on recommended Marine Conservation Zones report. July 2012. <http://publications.naturalengland.org.uk/publication/2030218?category=1723382>

<sup>18</sup> Independent review of the evidence process for selecting marine special areas of conservation, 21 July 2011. <http://www.defra.gov.uk/publications/2011/07/21/pb13598-graham-bryce-independent-review-marine-sacs/>

<sup>19</sup> Regional MCZ project Impact Assessment materials. July 2012. <http://publications.naturalengland.org.uk/publication/2071071?category=1730361>



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*Consulting coastal communities*

52. The Regional MCZ Projects made significant efforts to engage representatives from all the stakeholder groups with an interest in MCZs including those from coastal communities in their work. The time constraints of the regional project process, however, meant that this was not exhaustive and we are aware that some local stakeholders feel they did not have the opportunity to engage as much as they would have liked.

53. Plans are currently being developed for ensuring engagement of coastal communities in the formal consultation and giving them the opportunity to provide any additional evidence before ministers make final decisions on sites to designate in the first tranche. We can provide an update to the Committee when these plans have been further developed.

*5. How effectively does the Natural Environment Research Council (NERC) support marine science in polar and non-polar regions?*

54. Despite enormous pressure on public spending, funding for science and research programmes has been prioritised, demonstrating the Government's commitment to rebalancing the economy and promoting economic growth. This is compared to significant cuts in many other areas of Government expenditure. Like the other research councils, NERC manages its operations independently of Government and it is for NERC to determine how best to do this.

55. Additionally, in common with the other research councils, NERC is subject to the Haldane Principle which means that decisions on individual research proposals are best taken by researchers themselves through peer review. This involves evaluating the quality, excellence and likely impact of science and research programmes. Prioritisation of NERC's spending within its allocation is not a decision for Ministers or BIS officials. The Coalition Government supports this principle as being vital for the protection of academic independence and excellence.

56. NERC funds world-leading research across the following areas of environmental research: marine, polar, atmospheric, geological, terrestrial and freshwater. It does this through funding research in universities and its own centres such as the National Oceanography Centre and British Antarctic Survey—as well as training and supporting environmental scientists. The Government notes that NERC is currently undertaking a consultation on a proposed merger of the two above research centres and understands that NERC will submit written evidence on its research in marine science.

57. The Government recognises the challenges of prioritisation across different areas of environmental science—especially when funding is reducing in real terms. By the end of the 2011–15 period the annual NERC resource budget will have been reduced by 3%, excluding the effects of inflation (eg affecting marine fuel oil costs significantly).

58. As sponsor of NERC, the Department of Business, Innovation and Skills (BIS) acknowledges the benefits of improved strategic oversight and coordination of marine science provided by the MSCC. Both BIS and NERC are members of the MSCC. BIS considers that NERC works effectively with other Government departments and the wider public sector, ensuring that NERC science is well-aligned with that managed by others. NERC also has a good record of ensuring that those with an interest in the potential outcomes of their research are consulted when setting overall priorities. This has greatly developed the UK's research capacity in marine science and also delivers maximum value to the taxpayer.

*6. How well are the current and potential impacts of global warming on the oceans (for example temperature changes and acidification) being monitored and addressed by Government and others?*

59. Greenhouse gas emissions and global warming are expected to impact on the world's oceans in a number of ways, from changes to biogeochemistry, temperature, and salinity, through to rising sea levels and changes in ocean circulation patterns; changes which will also impact upon marine ecology and biodiversity.

60. Government is supporting a range of monitoring and research activities to enhance our understanding of physical ocean processes, the changes which are taking place, and the impact these changes will have. These programmes are important both for our understanding of the current state of the climate system as well as underpinning the development of climate models in order to be better able to predict the future impacts of climate change.

61. Monitoring the oceans and addressing the impacts of global warming upon them is a global concern which transcends national boundaries. The Global Climate Observing System (GCOS), which constitutes the climate observing component of the Global Earth Observation System of Systems (GEOSS), has identified 50 *Essential Climate Variables* (ECVs)<sup>20</sup> which are required to support the work of the UNFCCC and the IPCC

<sup>20</sup> See: <http://www.wmo.int/pages/prog/gcos/index.php?name=EssentialClimateVariables>

in monitoring and understanding the impacts of climate change. Of these 50 ECVs, 17 are oceanographic.<sup>21</sup> The UK is contributing to the global effort through this framework, including funding a number of relevant international monitoring programmes. These include:

- the Advanced Along-Track Scanning Radiometer (AATSR) instrument on ENVISAT<sup>22</sup>, funded by DECC, which provided measurement of global sea surface temperatures (SST). Following ENVISAT's failure, effort is now focused on reprocessing the data to incorporate further improvements in the data quality, and ensuring this vital SST record can be linked to, and extended by, a new SLSTR (Sea and Land Surface temperature Radiometer) instrument, to be launched on the European Space Agency Sentinel 3 satellite in 2014. In preparation for this the UK Space Agency (UKSA) will support UK experts in international collaborations in the Committee on Earth Observation Satellites (CEOS) SST committees to ensure there is continuity in the data sets and appropriate calibration and validation for use in climate models;
- The international Argo programme<sup>23</sup>—the UK's contribution is funded by DECC, NERC and the Met Office, with additional floats being deployed under the auspices of the NERC Arctic Research Programme;
- the EUMETSAT (European Organisation for the Exploitation of Meteorological satellites) JASON-3 satellite altimeter (the third in a series) which can measure sea-level height more accurately than any other means, funded by BIS, DECC, Defra and DFID;
- *in situ* measurements of sea level around the British Isles, Gibraltar, and the South Atlantic which contribute to the global ocean sea-level system (GLOSS); and
- in-kind contributions from the UK's Ocean Acidification research programme to the recently established International Atomic Energy Agency (IAEA)'s Ocean Acidification International Coordination Centre<sup>24</sup>.

62. The Government is also supporting research and assessments designed to understand how changes to the oceans will impact on our societies and economies, including impacts upon food security, and to enable the UK to address the risks which these changes pose. This work includes the DECC and Defra funded Climate Programme at the Met Office Hadley Centre which undertakes world-leading climate change research and modelling, and provides essential policy-relevant evidence to Government on the anticipated impacts of climate change—both to the UK and globally.

63. NERC, often in partnership with other institutes including Government Departments, is funding a variety of research programmes which will help to improve our knowledge of fundamental physical ocean processes. This improved understanding will enable ocean processes to be better represented in climate models and further our understanding of how climate change will impact upon the oceans, and how changes to the oceans will impact upon other parts of the climate system. These research programmes include RAPID-WATCH, a seven year monitoring and research programme designed to help assess the risk of rapid climate change associated with a slowdown in the Atlantic Meridional Overturning Circulation, and a five year ocean acidification research programme jointly funded with DECC and Defra to increase our understanding of the impacts of ocean acidification on marine life and how changes in ocean chemistry feedback to the atmosphere and global warming.

64. The UK Marine Climate Change Impacts Partnership (MCCIP) was established to provide high quality evidence on marine climate change impacts, and guidance on adaptation and related advice, to policy advisors and decision-makers. Its main outputs—of report cards which summarise the state of knowledge on marine climate change impacts across a range of topics—are an integral part of the marine climate change adaptation strategies of both UK and Scottish Governments and of the Adaptation Plan within the Welsh Government's Climate Change Strategy for Wales to help address the impacts of marine climate change.

September 2012

<sup>21</sup> Surface: Sea-surface temperature, Sea-surface salinity, Sea level, Sea state, Sea ice, Surface current, Ocean colour, Carbon dioxide partial pressure, Ocean acidity, Phytoplankton. Sub-surface: Temperature, Salinity, Current, Nutrients, Carbon dioxide partial pressure, Ocean acidity, Oxygen, Tracers.

<sup>22</sup> [http://www.esa.int/esaEO/SEMWYN2VQUD\\_index\\_0\\_m.html](http://www.esa.int/esaEO/SEMWYN2VQUD_index_0_m.html)

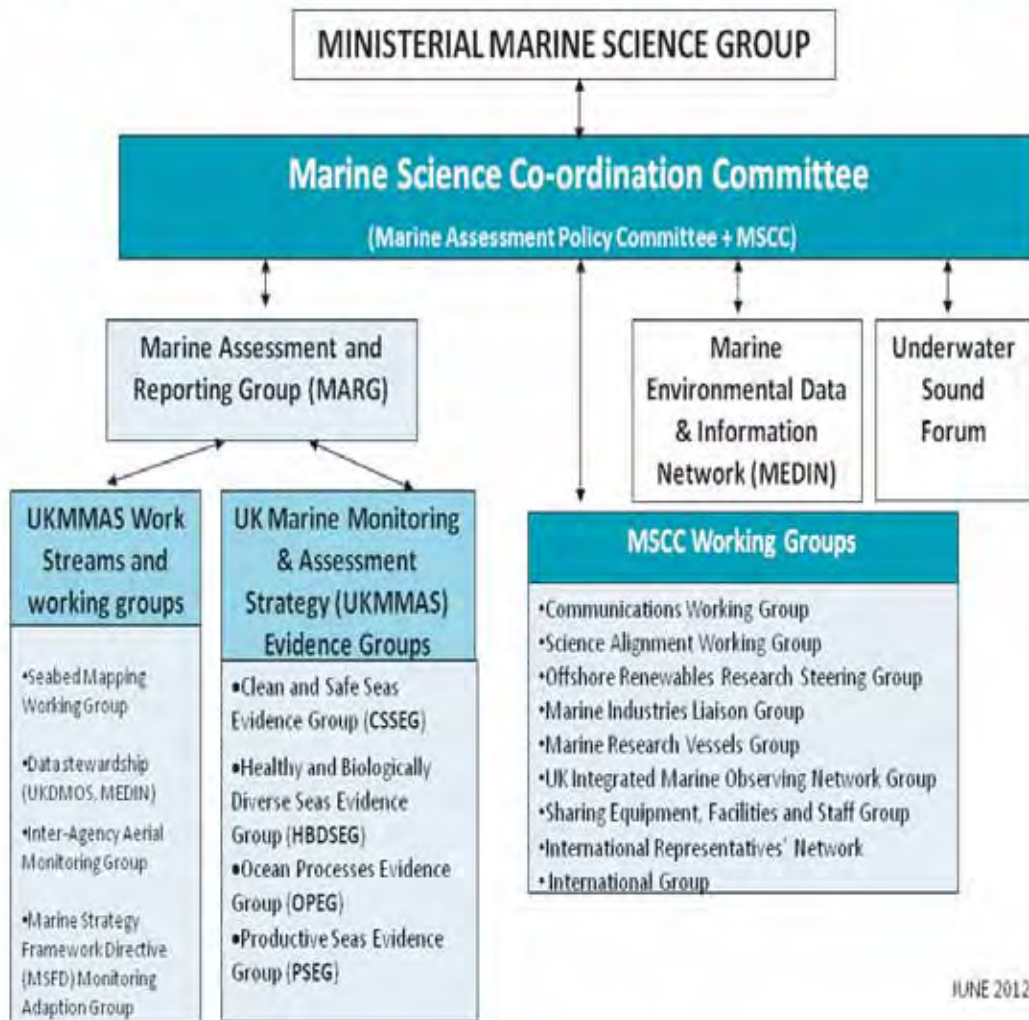
<sup>23</sup> a global array of around 3,000 floats that measure temperature, salinity and currents throughout the world's oceans

<sup>24</sup> <http://www.iaea.org/newscenter/pressreleases/2012/prn201218.html>

## APPENDIX A

## MSCC GOVERNANCE ARRANGEMENTS

## Structure of the Marine Science Co-ordination Committee



## APPENDIX B

## UPDATE REPORT TO THE MINISTERIAL MARINE SCIENCE GROUP (2012)

## Update Progress Report—The Marine Science Co-Ordination Committee

*Summary*

This report outlines progress with the work of the Marine Science Co-ordination Committee (MSCC) and its delivery of the UK Marine Science Strategy, since the Strategy's publication in February 2010. It has been prepared by the MSCC and covers the activities of MSCC itself and of its related groups, such as the UK Marine Monitoring and Assessment (UKMMAS) groups<sup>25</sup> and the Marine Environmental Data and Information Network (MEDIN).<sup>26</sup> It includes information on public marine science spend in 2010–11 and 2011–12 (at Appendixes I and II).

The UK Marine Science Strategy sets a 15 year vision. In its first two years MSCC and its member organisations have addressed a targeted set of issues related to high level science priorities and barriers to delivery. This includes initiating work on six new activities agreed by the Ministerial Marine Science Group in March 2011, which focus particularly on opportunities for efficiencies through sharing resources and making good use of existing evidence. Despite it being early days in the Strategy's delivery, significant progress has been made on a range of fronts.

<sup>25</sup> The MSCC merged with the Marine Assessment Policy Committee, which oversaw UKMMAS, in summer 2010, reducing bureaucracy and creating financial savings.

<sup>26</sup> <http://www.oceannet.org/>

The MSCC's activities are being delivered within the context of the current financial constraints, which brings additional challenges—and opportunities. While the MSCC's work is positive and should save money in the longer term, it requires substantial staff resources now—at a time when effort is being spread very thinly—in order to work together to develop and deliver the actions needed for the future.

#### *Joint working*

A major factor in the progress achieved by the MSCC has been the strong engagement by partner bodies, both directly in MSCC and in related initiatives such as joint research programmes. The MSCC plays a key role as a common platform for co-ordination between the different administrations. At the same time, there is recognition that the MSCC's work strands will need to continue to take account of different Departmental and Devolved Administration needs. MSCC has also worked closely with external stakeholders from industry, NGOs, the research and academic sectors and international partners. In addition, the MSCC has seen a range of softer but notable successes—such as the way the MSCC provides space for discussions which encourages collaborative working, the proactive engagement of partners, the creation of virtual communities for communications and other issues, and the application of modern technology to hasten activities and disseminate information. MSCC members themselves have reported a renewed sense of common purpose that has come from working together.

Examples of co-ordination and progress include:

#### *Monitoring, assessment and research*

- Strong and continued co-ordination of monitoring and assessments, through the UKMMAS groups, which has delivered Charting Progress 2,<sup>27</sup> as a comprehensive and authoritative assessment of the state of UK seas, providing the basis for the UK's initial assessment under the EU Marine Strategy Framework Directive and underpinned the marine aspects of the National Ecosystem Assessment;
- A new initiative to co-ordinate marine observatories around the UK—UK-IMON—which will help to improve the co-ordination of non-statutory monitoring and provide potential cost savings;
- Sharing of research priorities at an early stage between Government funders of marine science, and joint research programmes between members, such as the five year ocean acidification programme<sup>28</sup> and the shelf sea biogeochemistry programme.<sup>29</sup> This avoids duplication of research effort and leads to better research programmes;
- A co-ordinated view on climate change and knowledge gaps from the Marine Climate Change Impacts Partnership (MCCIP), which will help to focus future research on climate change;
- Increased co-ordination of marine renewables research and data, which is helping to identify critical gaps in knowledge and avoid unnecessary duplication of effort;
- The development of a transparent evaluation process to make funding decisions on cross-cutting, non-statutory monitoring programmes;
- Improved certainty on long-term funding for key monitoring programmes which will reduce bureaucracy and help to retain key researchers;

#### *Better use of evidence and more efficient operations*

- Significant progress by MEDIN in establishing and consolidating an operational framework for making available and ensuring good management of marine data from all marine organisations;
- Work in progress on opportunities to co-ordinate further the management and operation of Government marine research vessels, including using commercial vessels where appropriate, to make them more effective and efficient;
- A new online system for sharing expensive scientific equipment and laboratory facilities between MSCC member bodies. This should lead to expenditure savings for those participating; and
- MEDIN has provided the basis for authoritative and influential UK input to European and International data initiatives, helping to ensure cost-effective and best practice approaches are taken;

#### *Better communications and stronger partnerships*

- A UK Marine Science Communications Strategy, including an e-alert system for highlighting UK marine science to the press and wider marine science community, which has speeded up the communications process by using the latest technologies;

<sup>27</sup> Charting Progress 2 (<http://chartingprogress.defra.gov.uk/>) was published by the UKMMAS community in July 2010, immediately prior to its merger with MSCC.

<sup>28</sup> <http://www.nerc.ac.uk/research/programmes/oceanacidification/>

<sup>29</sup> <http://www.nerc.ac.uk/research/programmes/shelfsea/>

- The MSCC’s Underwater Sound Forum (USF)<sup>30</sup> has used the expertise within its large membership to provide high quality advice on underwater noise to inform key UK and international initiatives, such as ASCOBANS which is working to save Europe’s small whales, dolphins and porpoises.
- An industry subgroup of MSCC, the Marine Industries Liaison Group, which is ensuring that relevant industry issues are highlighted to the MSCC for action;
- A new subgroup looking at international issues, including promoting UK marine science and associated technologies in international markets; and
- Discussions in progress on partnership working with a UK-based Aquarium to promote marine science within the national curriculum.

Further activities are described in the main report.

*Next steps:*

The MSCC will be focussing over the next year on a number of issues:

- completion of current key Strategy actions, in particular work to align science programmes on ecosystem modelling and the continued co-ordination of monitoring and assessments via UKMMAS to provide key information for the implementation of the Marine Strategy Framework Directive and other initiatives;
- Identification of future issues through horizon scanning, linking to forward looks being planned by a number of learned societies;
- how marine science can contribute more strongly to the growth agenda, including green technologies and international markets; and
- a review of the working and performance of MSCC.

## Update Progress Report—The Marine Science Co-Ordination Committee

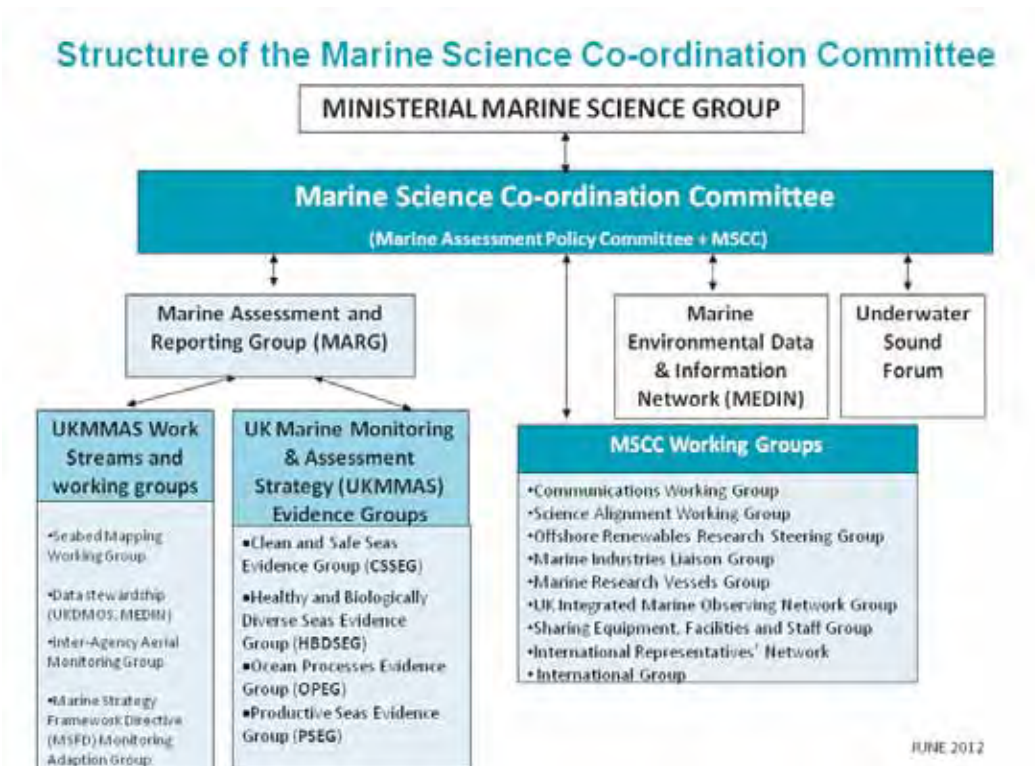
### *Introduction*

The report covers:

1. Delivery of the UK Marine Science Strategy.
  - 1.1 Background to the Strategy.
  - 1.2 High level science priorities—progress with delivery.
  - 1.3 UKMMAS—UK Monitoring and Assessment Strategy.
  - 1.4 Progress with addressing the three key barriers:
    - 1.4.1 Alignment of science effort.
    - 1.4.2 Sustained long-term monitoring.
    - 1.4.3 Communications:
      - 1.4.3.1 Communications Strategy.
      - 1.4.3.2 International Network
  - 1.5 Working with others to deliver outcomes on:
    - 1.5.1 Effective access to data:
      - 1.5.1.1 MEDIN.
      - 1.5.1.2 Other data access activities.
      - 1.5.1.3 The Underwater Sound Forum.
    - 1.5.2 Future skills needs.
    - 1.5.3 Development of a Marine Industry Strategic Framework.
  - 1.6 Horizon scanning and future actions:
    - 1.6.1 Horizon scanning.
    - 1.6.2 Further Strategy actions.
2. Other activities undertaken by the MSCC
  - 2.1 Links with the marine science community.
    - 2.1 Linking with the marine science community:
      - 2.1.1 Research & Academic sector link.
      - 2.1.2 NGO sector link.
      - 2.1.3 Industry sector link.

<sup>30</sup> The USF became a sub-group of the MSCC on the MSCC’s creation. Its membership has since expanded to include 80 key stakeholder organisations from Government, academia, NGOs, industry and other EU countries.

- 2.2 Website development:
- 2.3 Join-up with other organisations.
- 2.4 Delivery Plan.
- 2.5 Success indicators.
- 2.6 Public Sector Expenditure.



## 1. Delivery of the UK Marine Science Strategy

### 1.1. Background to the UK Marine Science Strategy

The UK Marine Science Strategy is a framework for co-ordinating delivery of world class marine science for the UK, though identification of priorities and tackling barriers to delivery. It runs from 2010–25 and is delivered by the MSCC, reporting to the Ministerial Marine Science Group. The Strategy was a recommendation of the House of Commons Science & Technology Select Committee’s Report, “*Investigating the Oceans*” (2007).

### 1.2. Delivery of the high level science priorities:

The UK Marine Science Strategy identified three high-level science priorities:

- *Understanding how the ecosystem functions;*
- *Responding to climate change and its interaction with the marine environment;*
- *Sustaining and increasing ecosystem benefits.*

These have been taken forward through individual and joint research projects and monitoring funded by MSCC member organisations and through related initiatives, such as the Living with Environmental Change partnership’s Flood and Coastal Erosion Risk Management Research Strategy<sup>31</sup> and the Scottish Marine Science Strategy 2010–15.<sup>32</sup> Brief examples are given below. The MSCC recognises that the UK cannot service all its marine science evidence needs from within its own resources. It therefore also seeks to achieve maximum leverage from its external interfaces with the European Union and broader international fora.

The MSCC’s science alignment working group will be producing a highlights report, collating details of the top five actions taken by each MSCC member in the three priority areas. The report will be prepared ahead of the March 2013 MSCC meeting.

<sup>31</sup> <http://www.lwec.org.uk/activities/uk-first-flood-research-strategy>

<sup>32</sup> <http://www.scotland.gov.uk/Publications/2011/03/02092716/0>

*(a) Understanding how the ecosystem functions:*

Knowledge of how the marine ecosystem works is essential for informing management decisions, such as marine planning and licensing. The MSCC and partner organisations have:

- through the UKMMAS framework, made extensive technical input to the development of robust targets and indicators for defining the good environmental status of UK Seas, as required under the Marine Strategy Framework Directive;
- established joint research programmes, to improve understanding of carbon and nutrient cycling in shelf seas and their overall role in global biogeochemical cycles, and will be investigating the impacts of marine food webs on ecosystem services;
- increased understanding of deep sea ecosystems through NERC research cruises, such as to the East Scotia Ridge, beneath the Southern Ocean, where new species of crab, starfish, barnacles and anemone were discovered around hydrothermal vents<sup>33</sup> and through the joint work of Marine Scotland and JNCC in the Rockall Trough and Marine Scotland's monitoring in the Faroe-Shetland Channel;
- conducted a review of marine social and economic data and tools, jointly funded by the MMO and Marine Scotland and managed by MEDIN, which included the preparation of a metadata catalogue of social and economic data, to help facilitate decision making.
- made significant improvements to the physical and biogeochemical models used at the Met Office to predict physical parameters in UK waters on a daily basis,<sup>34</sup>
- provided leadership in the UK and Europe on revisions of the Common Fisheries Policy (CFP), to move away from the current annual quota setting focus on fish stocks towards multi-annual management advice for fisheries, and an ecosystem approach to fisheries management. The UK has led on innovations such as catch quota trials and new designs of fishing gear, and leads the way in Europe on reducing fisheries discards, an important part of UK ambitions for a reformed CFP; and
- developed new models for assessing human pressures so as to assess impact and thus influence spatial planning, with a specific focus on the renewable energy industry around Scotland.

*(b) Responding to climate change and its interaction with the marine environment:*

Changes in the oceans, as a result of climate change, have important consequences on the marine ecosystem. The MSCC and partner organisations have, in this context:

- developed a major jointly-funded research programme on ocean acidification which will provide a greater understanding of the actual changes taking place, the implications of these changes and risks to ocean biogeochemistry, biodiversity and the whole Earth system;
- improved understanding of climate change impacts through the work of the Marine Climate Change Impacts Partnership (MCCIP), including on fisheries and foodwebs;
- enabled the introduction of seasonal assessments and predictions of Arctic sea-ice at the Met Office,<sup>35</sup>
- generated the first UK marine and coastal climate change projection report, and improved forecasting of storm surges and extreme events;
- supported the international Argo programme. This has for the first time made sub-surface observations of the World's oceans available at a spatial and temporal resolution needed to estimate its evolving state and to validate predictive models on timescales that are useful operationally and climatologically; and
- supported the Inter-governmental Panel on Climate Change—UK marine scientists are playing a lead role in drafting the text for the fifth assessment report.

*(c) Sustaining and increasing ecosystem benefits:*

It is essential to understand the implications of different management options in marine planning. To this end, the MSCC and partner organisations have:

- developed standardised methods for the analysis and mapping of fishing effort data across national boundaries to provide advice on the interactions between fishing activity and proposed Marine Conservation Zones and European Marine Sites across Europe;
- developed reliable ecosystem models that allowed the UK to take the lead in OSPAR<sup>36</sup> and establish the relative impact of different nutrient sources in the North Sea. This work has supported policy decisions about the most appropriate measures to achieve the OSPAR aim of no “problem area” status;

<sup>33</sup> <http://noc.ac.uk/news/%E2%80%98lost-world%E2%80%99-discovered-around-antarctic-vents-0>

<sup>34</sup> <http://www.metoffice.gov.uk/research/news/marine-predictions>

<sup>35</sup> <http://www.metoffice.gov.uk/research/news/sea-ice>

<sup>36</sup> The OSPAR Commission works to protect and conserve the North East Atlantic and its resources.

- improved confidence in sea bed mapping through more advanced techniques, and more coherent approaches and standards, including through UKMASS's Seabed Mapping Group, to support policies such as designation of marine conservation zones and marine planning; and
- developed collaborative work on marine renewable energy research, including a four year research programme funded by NERC and Defra, MMO work on cumulative effects, and a portfolio of projects funded by Marine Scotland addressing interactions with Natura species. Programmes are co-ordinated through the Offshore Renewables Research Steering Group.

### 1.3. UKMMAS—UK Monitoring and Assessment Strategy

The successful delivery of the UK Marine Science Strategy and the wider work of the MSCC and partner organisations depends significantly on the work and membership of the UK Marine Monitoring and Assessment Strategy (UKMMAS)<sup>37</sup> groups. UKMMAS provides essential and continued co-ordination of marine monitoring and assessment between the Devolved Administrations, UK government departments and their agencies, with the overall aim of ensuring the cost-effective provision of information needed for policy, operational and management decisions to deliver the UK marine vision of clean, safe, healthy, productive and biologically diverse oceans and seas.

The work of UKMMAS is steered by the Marine Assessment and Reporting Group and technical co-ordination of monitoring and assessment work is carried out in four active thematic evidence groups: The Clean and Safe Seas Evidence Group, the Healthy and Biologically Diverse Seas Evidence Group, the Productive Seas Evidence Group and the Ocean Processes Evidence Group. The evidence groups draw together scientific and technical experts responsible for marine monitoring and observation programmes in government agencies in each of the four UK administrations as well as partners drawn from research and academic organisations and, where relevant from non-governmental bodies, both green and industry.

Immediately prior to being brought within the frame of MSCC, the UKMMAS groups delivered Charting Progress 2 (CP2). CP2 provides a comprehensive and authoritative assessment of the state of UK seas to inform policy decisions on their future management. CP2's findings have underpinned the marine aspects of the National Ecosystem Assessment and provided the basis for the initial assessment of UK Seas under the EU Marine Strategy Framework Directive. The CP2 evidence base has been drawn on to inform development of national marine planning, for example in the preparation of Scotland's Marine Atlas and the development of the OSPAR Quality Status Report 2010 at the scale of the North-East Atlantic. The technical capacities developed through the three year preparation of CP2 enable UK scientists to lead and influence international scientific collaboration in bodies such as the International Council for Exploration of the Sea and the implementation processes for European Directives.

Since 2010 UKMMAS groups have focused on addressing the recommendations from Charting Progress 2 so that future marine monitoring and assessments can deliver information relevant to policy goals and marine management, including marine conservation, planning and the regulation of activities. UKMMAS has made substantial technical input to the national implementation of the EU Marine Strategy Framework Directive.

A key achievement has been the considerable technical development work for UK Government Departments, to define targets for good environmental status in UK seas. In particular, the Healthy and Biologically Diverse Seas Evidence Group has led groundbreaking work to define targets for the environmental quality status of biodiversity and foodwebs, which has enabled the UK to lead the thinking in Europe on the implementation of the Directive. This is important as it ensures that the overall implementation of the Directive is in line with UK approaches and capacities. Alongside this the Productive Seas Evidence Group has supported the improved analysis of the social and economic value of the UK's marine sectors and their use of the marine environment. UKMMAS is now commencing work to co-ordinate the way that marine agencies adapt monitoring programmes to monitor progress towards these MSFD targets in a cost-efficient way.

The Marine Environmental Data and Information Network (MEDIN) provides important support for UK work of UKMMAS and there is a strong synergy between UKMMAS work on monitoring and the work on improving sharing and use of data by MEDIN. These and other UKMMAS activities have required a substantial commitment of staff time from the organisations involved. The priority with which UKMMAS work is treated reflects its key importance to Government, the wider UK marine science community and beyond.

### 1.4. Progress with addressing the three key barriers:

The Strategy identified three key barriers to delivery of UK marine science and actions for addressing them. These have been a focus of MSCC's activities to date.

#### 1.4.1 Alignment of science effort:

*Strategy actions: to develop a rolling programme of marine science alignment where greater collaboration and alignment between MSCC members' programmes will have the largest impact. The alignment process will identify gaps in scientific knowledge, areas of duplication and areas for further collaboration and alignment.*

<sup>37</sup> <http://www.defra.gov.uk/environment/marine/science/ukmmas/>



*The capacity and capability to deliver the science will also be assessed. The initial group of science issues will be identified during the first quarter of 2010.*

Research and monitoring of the marine environment is generally expensive. The Science Alignment Working Group, chaired by Prof Ed Hill (NERC), is focussing on four issues—marine renewables, ecosystem models, joined-up technologies and access to industry data—where greater co-ordination could have a significant impact. It is also considering how MSCC members are delivering the three high-level science priorities noted above.

- (a) Marine renewables—Work to align publicly funded research programmes on the environmental impact of marine renewables is led by the MSCC’s Offshore Renewables Research Steering Group (ORRS),<sup>38</sup> which is co-chaired by the MMO and Marine Scotland, working with the MMO’s joint industry-Government Offshore Renewable Energy Licensing Group. ORRS has compiled a list of projects being funded by its members, enabling it to identify gaps and overlaps in current and planned research. ORRS is also working jointly with NERC’s Knowledge Exchange programme on marine renewables, and its work will be relevant to marine aspects of the Government’s recent review of implementation of the EU Habitats and Birds Directives. Further details of ORRS are provided on its webpage.<sup>39</sup>
- (b) Ecosystem models—ecosystem management will require increasingly sophisticated decision tools for operational management and scenario planning. The working group is bringing together modelling experts in a workshop to identify (a) the options for improving existing models without additional research, (b) which developments would be a priority if additional funding allowed, and (c) how models can generate the information needed to inform economic/social models/assessments. The sub-group is hosting the workshop with the Marine Alliance for Science and Technology for Scotland (MASTS),<sup>40</sup> later in the year.
- (c) Alignment of Joined-up technologies—The deployment of buoys, autonomous floats (such as ARGO floats) and gliders, while often collaborative,<sup>41</sup> is still expensive; it therefore makes sense to maximise the number of sensors that each of these platforms hosts. A sub-group will use a provider-led workshop to promote opportunities to deploy additional sensors on a range of platforms (buoys, autonomous floats, gliders, etc). This work is currently commencing.
- (d) Access to industry data—A large volume of relevant data is collected and owned by industry and others. The Marine Management Organisation (MMO)—with the support of the Working Group—is developing thinking on how to access these data. This activity will link with related work being taken forward by MEDIN. In addition, the MMO recently commissioned work to create a set of corporate GIS data layers to define the spatial location and associated attribution of legacy MMO licences providing a summary of the supporting data and documentation supplied by industry as a part of the licence application process.

#### 1.4.2 Sustained long-term monitoring

*Strategy action: to make the process for selecting long-term monitoring and observation systems for funding more transparent and provide secure, longer-term and cross-cutting funding for priority datasets.*

The MSCC has led work to identify a programme of key monitoring and observations needed to deliver the Marine Strategy Framework Directive, to help achieve the aspiration of “*clean, healthy, safe, productive, and biologically diverse oceans and seas*”, and to inform strategic decision making on climate change and other issues. It has done so primarily through its member bodies and through UKMMAS and has built on knowledge gathered during the production of Charting Progress 2.

The Strategy action is aimed at improving the process for selecting individual monitoring projects and for providing longer-term funding for key projects. A working group of representatives from Government, industry and an NGO, was established, under the chairmanship of Prof Howard Roe. Its recommendations were agreed by MSCC, including:

- establishing longer-term funding for priority monitoring programmes—to reduce bureaucracy and provide greater security of funding for the researchers concerned; and
- the provision of an evaluation process to make funding decisions on cross-cutting, non-statutory monitoring programmes more transparent, through the use of a differentially-weighted scorecard and a Committee of Funders to help assess proposals and reach joint decisions.

The Group ceased operation on completion of the Strategy action.

Some key monitoring programmes have now received longer-term contracts, including the Continuous Plankton Recorder (funded by NERC and Defra). In addition the Government Chief Scientist, with Departmental CSAs, has been looking at funding mechanisms for nationally critical cross-cutting observation

<sup>38</sup> ORRS has a membership spanning the Devolved Administrations, a range of Whitehall Departments, NERC bodies and The Crown Estate.

<sup>39</sup> <http://www.defra.gov.uk/mscc/groups/offshore-renewables-research-steering-group/>

<sup>40</sup> <http://www.masts.ac.uk/>

<sup>41</sup> <http://www.ncof.co.uk/ODAS-buoy-recovery.html>

programmes, such as Argo, and seeking to agree principles for co-funding. The outputs from the Long-Term Monitoring Working Group—of the differentially weighted score card and Funders Committee approach—have been fed into the Forum’s work. The MSCC is jointly providing the Secretariat to this Forum.

### 1.4.3 Communications

#### 1.4.3.1 UK Marine Science Communications Strategy

*Strategy action: to develop a pro-active communications strategy for strengthened two-way engagement with the public on the importance of marine science and deliver an action plan for improving communication between scientists and policy makers.*

The MSCC’s Communications Working Group, under the chairmanship of Prof Dan Laffoley, published a low-cost Communications Strategy, “Communicating UK Marine Science”<sup>42</sup> in April 2011. The Group is highly dynamic and includes public and private sector communications experts, and a leading scientific journalist.

The UK Marine Science Communications Strategy’s aim is to raise awareness of the importance of the marine environment and the central role that marine science plays in our understanding of it. It will operate until 2020 and the target audiences include the public, policymakers, politicians, industry and other users of the marine environment, and the wider scientific community. The Strategy sets out a series of key messages about the marine environment, our impact on it and the importance of marine science. These messages will be communicated via the implementation of nine specific actions, delivered in a phased approach.

A number of practical outputs have already been generated:

- an E-alert system for publicising UK marine science discoveries and research—this alert is now received by over 240 organisations and people including national journalists, Government policy advisors, Government agencies, NGOs, academics and members of the public;
- an online marine science events calendar for publicising events across UK bodies and avoiding wasteful date clashes;
- strong interest in the communications strategy—and its potential use as a communications strategy template—from Australia and from Europe;
- agreement, in principle, by the Defra Marine Science Minister to host *ad hoc* meetings on marine science with Parliamentarians, to help raise awareness. The Devolved administrations are considering their approaches; and
- MSCC members have been working to strengthening science <-> policy interactions. For example, NERC has updated guidance<sup>43</sup> to help scientists interact with policy makers and runs regular science into policy workshops<sup>44</sup> every six months.

*and further actions are in train:*

- Members of the group are identifying opportunities for internships, job shadowing and studentships, to increase exposure of scientists to policy makers and *vice versa*;
- Discussions are underway with a UK-based Aquarium on partnership working to promote marine science within the national curriculum;
- Training is ongoing in a range of MSCC bodies to help policy makers and scientists understand how best to engage with each other;
- Options are being considered for delivering a web portal, to help the public and others access information on marine science.
- The group is investigating the possibility of a unified UK Marine Science identity to help showcase the world-leading capabilities and growth potential of UK marine organisations, particularly at international events.

#### 1.4.3.2 International Representatives’ network

*Strategy action: to establish a network of UK marine science representatives to identify common marine science issues and to exchange views on the latest scientific thinking.*

The International Representatives’ Network shares information on emerging scientific issues across a wide range of intergovernmental marine science fora. Issues discussed by the Network include ocean fertilisation and the restructuring of the Global Ocean Observing System Programme (GOOS) by the International GOOS Committee and Intergovernmental Oceanographic Commission (IOC).

<sup>42</sup> <http://www.defra.gov.uk/mscc/files/mscc-comms-strat.pdf>

<sup>43</sup> <http://www.nerc.ac.uk/publications/corporate/policy.asp?cookieConsent=A>

<sup>44</sup> <http://www.nerc.ac.uk/site/guides/policymakers/workshop.asp?cookieConsent=A>

## 1.5 Working with others

### 1.5.1 Effective access to data—

*Strategy action: The MSCC will work with UK stakeholders, in particular MEDIN, and, where appropriate, European and International bodies to address the data access issue. MEDIN should consider whether to develop an Information Strategy to help improve the discovery and accessibility of data, the harmonization and promotion of marine data policies and data management.*

#### 1.5.1.1 MEDIN

The MSCC has worked with a range of bodies in seeking to strengthen data access and re-use. The Marine Environmental Data & Information Network (MEDIN), has been brought under the MSCC, as the primary route for Government to make available and source marine data. Optimising data sharing is essential to ensure the maximum return on resources invested in marine science and ensure that the most comprehensive evidence base is available to support policy, science and marine operations, and their regulation. MEDIN is the means for delivering the UK Marine Data and Information Strategy, on behalf of the MSCC. The key objectives of this strategy are:

- to deliver improved discovery and accessibility of marine data;
- to establish good data management practices across the UK marine sector; and
- to establish a common set of policies on marine data, to provide consistent and clear terms and conditions for data use.

MEDIN was identified by the Habitats and Birds Directives Implementation Review as a key mechanism for improving the use and development of the marine evidence base.

Significant progress has been made by MEDIN over the past two years in establishing and consolidating an operational framework for making available marine data from all marine organisations and ensuring these data are consistently managed through use of common standards. MEDIN now provides a single web portal through which data from all marine organisations, including the private sector can be accessed. Substantial progress is being made to extend the range of data that can be accessed through this portal. Through this work, MEDIN has:

- put in place an operational marine data framework which includes:
  - a network of specialised marine Data Archive Centres (DACs) to provide secure long term management of marine data, and easy access to quality assured, authoritative data;
  - a suite of standards for marine metadata and data, so that they can be easily discovered, accessed and re-used. MEDIN has worked directly with all Government bodies to ensure they are able to apply the appropriate data management standards;
  - a central marine data discovery web portal, now containing information on over 3500 marine data sets which is growing rapidly;

In addition the MEDIN framework has:

- supported Government initiatives on data and transparency, including data.gov.uk and marine implementation of the EU INSPIRE<sup>45</sup> Directive;
- played a key role in validating the data used in Charting Progress 2;<sup>46</sup>
- provided the basis for authoritative and influential UK input to European and International data initiatives, helping to ensure cost-effective and best practice approaches are taken; and
- MEDIN is engaging with industry to encourage sharing of data collected by the commercial sector.

The MEDIN framework for data management and access is now fully operational, but to ensure that the MSCC data and information strategy is fully implemented it is essential to secure full engagement from all key members of the marine community, by the adoption of best principles for good data management as codified by MEDIN. These principles cover the use of standards, publication of metadata, making arrangements for data archival, and establishing clear terms for data access and re-use. There is also a need to continue to work with industry to gain better access to data collected by the commercial sector.

#### 1.5.1.2 Other data access activities

Other activities by MSCC members to improve access to data include work by the Foreign and Commonwealth Office (FCO) to collate information from research cruises. The FCO, being the conduit for the securing of diplomatic approval required for foreign flagged vessels to conduct marine scientific cruises in UK waters, has introduced a new database. The database can easily identify and track the cruises by different types of marine research, and highlight where research cruise reports have never been forwarded, so retrospectively collect these data reports.

<sup>45</sup> <http://data.gov.uk/location/inspire>

<sup>46</sup> <http://chartingprogress.defra.gov.uk/>

### 1.5.1.3 *The Underwater Sound Forum*

The Underwater Sound Forum has a membership of 80 key stakeholder organisations from Government, academia, NGOs, industry and other EU countries; the Forum has grown in membership since it became a sub-group of the MSCC in 2008. Its purpose is to enable Government and stakeholders to share knowledge about the effects of underwater noise on marine life. It has had a number of notable successes/outputs which include:

- input by Forum members to the development of the Marine Strategy Framework Directive (MSFD) indicator on noise, ensuring that it is based on sound evidence;
- a yearly conference to share knowledge on underwater noise issues—the 2011 conference focussed on ambient noise in UK and European waters and was attended by over 80 delegates from seven countries, while the 2010 piling noise workshop, funded by The Crown Estate, was oversubscribed;
- The provision of a pool of expertise for providing timely and balanced input to regulatory consultations on underwater sound, for example on ASCOBANS<sup>47</sup> and OSPAR;
- Expert input to developing standards for underwater noise with the National Physics Laboratory, the British Standards Institute and ISO—helping to ensure they are meaningful.

### 1.5.2 *Future skills needs—*

The availability of skilled staff is of key importance for UK marine science. NERC led a Review of Skills Needs in the Environment Sector<sup>48</sup> on behalf of the Environment Research Funders' Forum (ERFF) in 2010. The review identified 224 skills needed by businesses, government and academics and 15 critical skills in short supply, including numeracy, computer modelling and field research. NERC and other bodies have used the review's findings to inform their actions. NERC is currently carrying out a further "Skills Review 2012"<sup>49</sup>, to update the work.

Section 1.6.2 of this report includes work to promote sharing of the skills and time of specialist staff between organisations, which should help to address immediate skills gaps in organisations and enable more to be achieved.

### 1.5.3 *Development of a Marine Industry Strategic Framework—*

The importance of UK marine industries was highlighted in the UK Marine Science Strategy, particularly noting their value to the UK economy, their employment of graduates and postgraduates in marine science and their research and monitoring programmes. The Department of Business, Innovation and Skills (BIS) has since published, in liaison with the marine industries, a Strategy for Growth for the UK Marine Industries<sup>50</sup>. This is being delivered through the Government-industry Marine Industries Leadership Council (MILC).

The MSCC, working closely with BIS, has developed an industry group focussed on marine science—the Marine Industries Liaison Group (MILG)—drawn from a range of marine industry sectors. The Secretariats to MILG and MILC work closely to ensure that the groups are complementary. Further details of the MILG's work are in section 2.1.3 below.

## 1.6 *Horizon Scanning and future actions*

### 1.6.1. *Horizon scanning—*

*Strategy action: options for commissioning "horizon scanning" projects will be considered by the Marine Science Co-ordination Committee during 2010–11.*

MSCC routinely includes some form of forward look activity during its meetings. The MSCC meeting in March 2011 included a workshop session on horizon scanning, during which there were initial discussions of potential options for taking forward horizon scanning exercises. The options ranged from the MSCC undertaking an independent, major forward look exercise in order to identify future marine science issues and needs, to the MSCC engaging with a number of existing and planned forward look exercises by partner bodies, including learned societies, to provide the framework of an horizon scanning programme, with any remaining gaps in coverage to be addressed by the MSCC.

The MSCC will now build on its initial discussions to identify a clearer view of the likely critical issues for the MSCC and UK marine science for the future. It will also take stock of wider initiatives, drawing on the work of the Centre for Environmental Risks and Futures, to avoid duplication and overlap and on the findings of the current UK National Ecosystem Assessment marine work package that is considering horizon scanning through the development of scenarios.

<sup>47</sup> Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas.

<sup>48</sup> <http://www.nerc.ac.uk/funding/available/postgrad/skillsreview/>

<sup>49</sup> <http://www.nerc.ac.uk/funding/available/postgrad/skillsreview/review2012.asp>

<sup>50</sup> <http://www.bis.gov.uk/assets/biscore/business-sectors/docs/s/11-1310-strategy-for-growth-uk-marine-industries.pdf>

## 1.6.2 Further Strategy actions—

*Strategy action: Further actions will be developed during the life of the Strategy.*

In March 2011, the Ministerial Marine Science Group agreed six new activities for the MSCC to deliver, following a Ministerial write-around. The actions were developed in the context of pressures on marine science budgets, and aim to strengthen the ways in which MSCC members work together, in order to achieve efficiency savings. The six activities, which are at different stages of delivery, are summarised below, with an indication of current progress.

*Six new MSCC activities:*

- (i) Marine Research Vessels—to assess options for increased co-ordination of the operation and maintenance of large Government research vessels. Some co-ordination already occurs, and this project is building on existing knowledge to identify actions needed to effect significant cost savings. *A draft assessment has been produced and is currently being developed further.*
- (ii) Monitoring and Observation programmes—to ensure that the non-statutory evidence programmes, covering physical, chemical and biological development of marine ecosystems, are fit-for purpose and co-ordinated. *A programme for integrating the UK's marine observatories—UK-IMON—has been established.*
- (iii) Sharing and/or pooling of Government-funded equipment and facilities, including high cost equipment such as Remotely Operated Vehicles and underwater gliders. This could offer rapid savings. *A table detailing equipment and facilities available for sharing between MSCC members is provided on the MSCC website.*
- (iv) Sharing staff, skills and technology development between research organisations. This builds on work by the Marine Alliance for Science & Technology for Scotland (MASTS) and Defra and is in progress.
- (v) Strengthened data co-ordination through the Marine Environmental Data & Information Network (MEDIN)—to achieve better access to marine data through stronger engagement by Departments and the Devolved Administrations with MEDIN, the existing marine data management system. *This work is ongoing.*
- (vi) Data mining of past research and monitoring—to develop guidelines to ensure that, prior to commissioning new work, checks are undertaken to identify whether the data already exist from old research projects. *This work is being taken forward by MEDIN and will commence shortly.*

The MSCC has also recently established an International Group, which is complementary to the work of the International Representatives' Network, and will address international issues of relevance to the MSCC. This includes the UK's participation in international marine science activities, such as the Inter-Governmental Oceanographic Commission (IOC), and identifying opportunities for promoting UK marine science abroad. The Group has developed a Strategy for International Engagement which seeks to promote increased and more effective international engagement by MSCC organisations, in the first instance. It has identified a series of low cost activities that, if implemented, could raise the level of international engagement—and the benefits accruing from it—significantly.

## 2. Other activities undertaken by the MSCC

### 2.1 Links with the marine science community

*Strategy action: MSCC members to be nominated to act as “links” to industry, the research and academic sector and Non-Governmental Organisations (NGOs), to develop networks with these communities and to grow an integrated relationship with them.*

#### 2.1.1 Research & Academic sector link (Prof Howard Roe, non-executive member)

Organisations have been kept informed about MSCC activities, and invited to provide feedback, via a regular email newsletter and through a series of talks and presentations.

#### 2.1.2 NGO sector link (Prof Dan Laffoley, non-executive member)

NGOs have provided input to both the development and delivery of the UK Marine Science Strategy via workshops. A regular E-bulletin is now being sent to NGOs.

#### 2.1.3 Industry sector link (Prof Laurence Mee, non-executive member)

The Marine Industries Liaison Group (MILG), including representatives from major industry sectors, provides advice to MSCC on marine industry issues. It has developed a joint industry-Government funded project, currently out-to-tender, to identify Government and industry marine science needs, industry's capabilities and opportunities for green growth. MILG members are also providing input to other Government/

MSCC initiatives, such as the Communications Strategy's delivery. Links have been established between the MILG and BIS's Marine Industries Leadership Council.

## *2.2 Website development*

The MSCC's website is fully operational and its content is being expanded and updated on a regular basis. It is hosted by Defra on behalf of the MSCC organisations as a cost saving measure. It can be found at: <http://www.defra.gov.uk/mscc/>.

## *2.3 Join-up with other organisations*

The MSCC works closely with a range of other organisations and individuals, and experts from research, academic, industry and NGO sectors have also joined some delivery sub-groups. For example, MSCC members are involved with bodies such as the Marine Climate Change Impacts Partnership, the UK Earth Observation Framework (UK-EOF)<sup>51</sup>, the LWEC partnership, and the Institute of Marine Engineering, Science & Technology (IMarEST)—they are currently developing a conference on Operational Oceanography with IMarEST and the Society for Underwater Technology (SUT) for January 2013.

In addition, the MSCC merged with Marine Assessment Policy Committee (MAPC) during the summer of 2010, to reduce bureaucracy and generate cost savings. Representation on the UKMMAS Marine Assessment and Reporting Group (MARG), which had reported directly to MAPC, has been strengthened and MARG now reports directly to the MSCC.

## *2.4 Delivery Plan*

A Delivery Plan has been developed and will be placed on the MSCC website shortly.

## *2.5 Success indicators*

*Strategy action: more detailed success indicators will be developed during 2010*

Success is being measured against the delivery of the individual actions identified in the UK Marine Science Strategy and any subsequent additional actions identified.

## *2.6 Public Sector Expenditure*

*Strategy action: Latest available details of public sector expenditure on marine science will be published with the update report.*

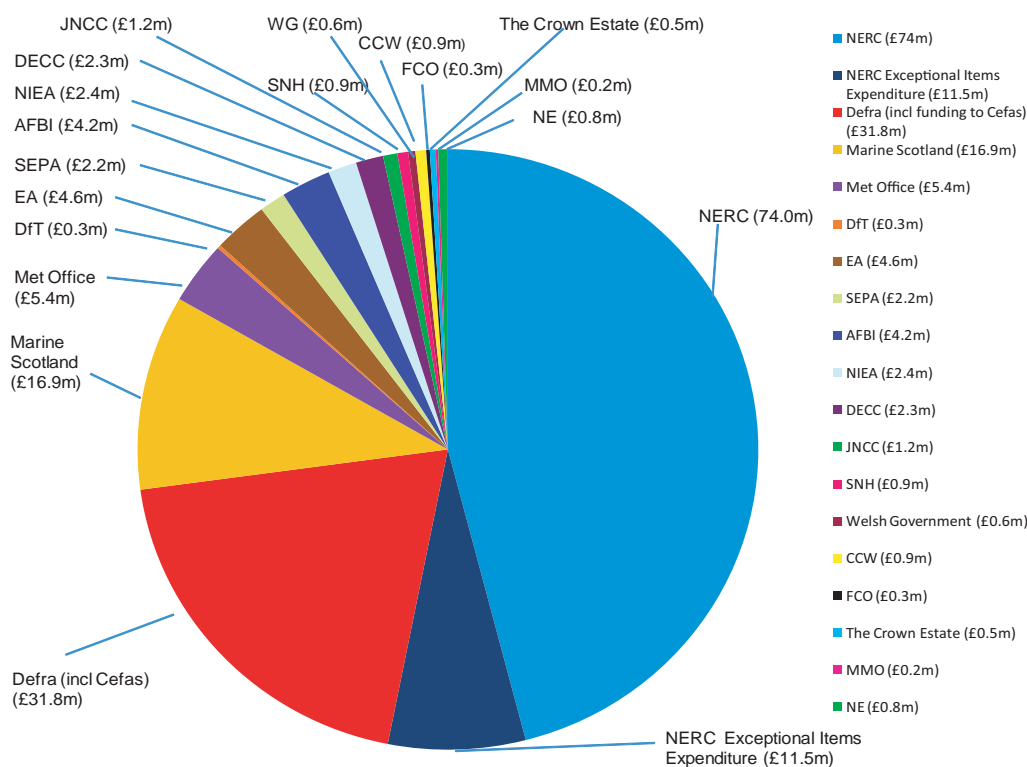
Details of public sector spend on marine science in 2010–11 and 2011–12 are provided at Appendixes I and II.

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<sup>51</sup> <http://www.ukeof.org.uk/>

## APPENDIX I

## MARINE SCIENCE FUNDED BY MSCC MEMBER ORGANISATIONS 2010–11 (£ MILLION)



Total spend: £160.9 million.

[Total spend excluding NERC “Exceptional items expenditure”: £149.4 million]

## Notes

It is difficult to obtain accurate data from past years that are consistent across MSCC members because of different ways that organisations categorise their spending. The figures in the pie chart are the most accurate available but should be viewed with caution. In particular:

- **NERC** has reviewed and revised its 2008–09 expenditure data to incorporate some previous omissions. The revised NERC spend in 2008–09 was c. £67.1 million. The increase in spend in 2010–11 is due to the addition of NERC’s responsive mode expenditure and some exceptional costs, such as building and replacement research vessel costs.
- **Defra’s** 2010–11 spend takes into account the re-imbursement received from the E.C. for DCF-related monitoring, and no longer includes the disbursement of the Aggregate Levy Sustainability Fund.
- Defra, Marine Scotland, EA, SEPA and AFBI figures include vessel operating costs.
- The **SEPA** marine science budget of £2.24 million for 2010–11 should be compared with a figure of £2.25 million for 2008–09 when calculated on the same basis.
- **MOD** funds occasional environmental research projects—none was carried out in 2010–11. The research previously included in the 2008–09 spend chart (£11.4 million) is no longer classified as marine research.
- The corresponding spend by the **Met Office** on observations in 2008–09 was £2,300,000. The 500,000 drop between 08–09 and 10–11 is a combination of improvement in efficiency of maintenance of MAWS buoys and a drop in spend on Argo.
- **DfT** funding is directed through the Maritime and Coastguard Agency but the maritime component of the Public Weather Service is excluded from the figure shown. However, the **Met Office** figure does include spend within the Public Weather Service programme on marine R&D.
- The **MCA** has rationalised its spend on research by combining its efforts with **DfT** to provide a more focussed and targeted strategy. The reduction in DfT/MCA’s Marine Evidence budget also reflects the changes to DfT/MCA’s overall budget allocation over this period.

- The **EA** figure does not include any additional marine expenditure by regional offices for conducting investigations. The reduction in spend since 2008–09 is a result of lower investment in research projects in some areas of EA business, associated with a move to a new Evidence Directorate which has led to better use of available information. Investment in monitoring activities has slightly increased.
- **DECC** spend in 2010–11 included: co-funding (£1.4 million) for observations (Argo, Advanced Along-Track Scanning Radiometer (AATSR) and Jason) and Ocean Acidification programmes; and funding (£0.9 million) for other marine research including the costs and benefits of offshore wind, wave and tidal energy to the marine environment and research to inform broader environmental assessment of marine energy plans, programmes and projects.
- The **FCO** spend figure represents a best estimate as the FCO has no dedicated R&D fund and spend details are not recorded against R&D criteria.
- The **Scottish Government (Marine Scotland)** figure excludes development and testing of wave and tidal energy technology (£13 million spread over 2008–09, 2009–10, 2010–11).
- Fisheries Research Services (**FRS**) was merged with parts of Scottish Government and the Scottish Fisheries Protection Agency on 1 April 2009 to become Marine Scotland, a Directorate within the Scottish Government. As such the figures for 2008–09 and 2010–11 are not directly comparable.
- Marine Scotland has invested £15.2 million in a new science building in Aberdeen in 2009–10 and 2010–11.
- The **Welsh Government** figures do not include wider EU regional development funding or EU fisheries funding. Details of the spend on research that the Welsh Government has commissioned are included. This research is focussed on Wales-specific requirements. The research budget is not devolved and is managed by Defra and DECC on an England and Wales basis.
- The **MMO** is working with others to build a robust marine evidence base to inform its decision making. Most of the evidence the MMO uses is gathered from a variety of existing sources, including commercial sources, research councils and academia. Critical gaps in this evidence are filled by the MMO's evidence programme to inform MMO functions, particularly marine planning and licensing.
- **JNCC** provides UK level coordination on MSCC for the country conservation agencies including **Natural England (NE)**. The majority of the NE marine science spend is on statutory monitoring of Natura 2000 sites in English waters. Where these cross the 12nm boundary, NE works in partnership with JNCC to collect sound evidence on the location and monitor the state of MPAs.

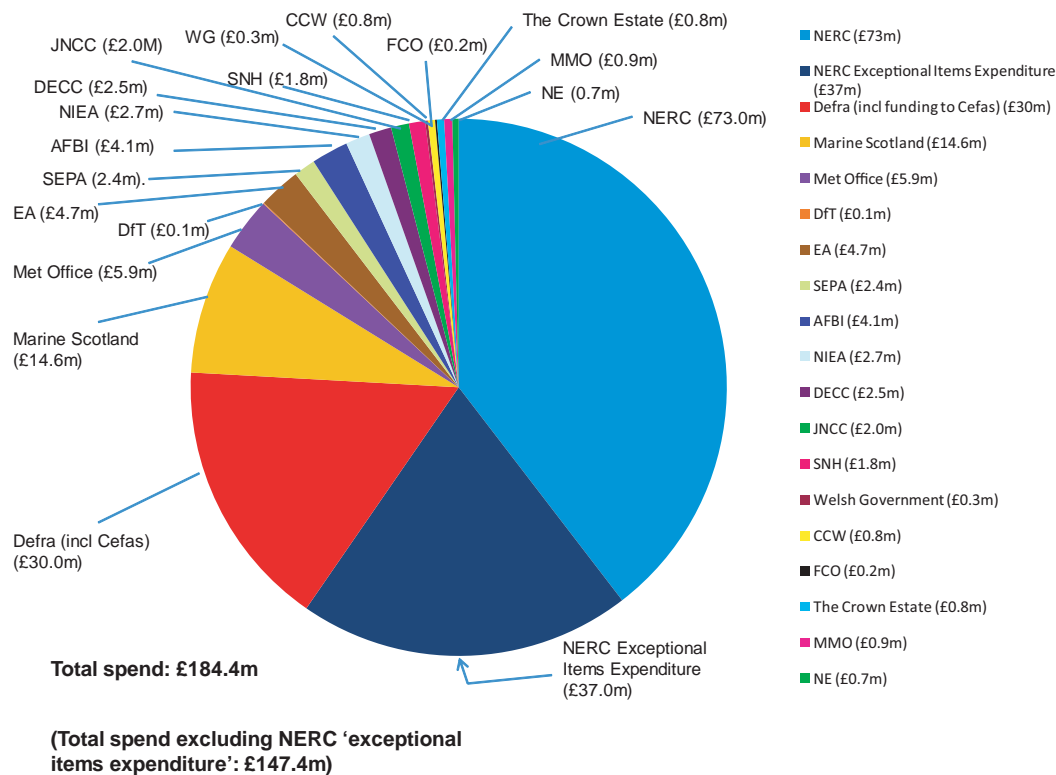
*To note: A number of **additional MSCC organisations** have been included in the 2010–11 pie-chart compared with those represented in the 2008–09 pie chart (in Appendix II of the UK Marine Science Strategy). The additional organisations are: CCW, MMO, FCO, NE and The Crown Estate.*

**Key:** NERC: Natural Environment Research Council; BIS: Department for Business, Innovation and Skills; Defra: Department for Environment, Food and Rural Affairs; Cefas: Centre for Environment, Fisheries and Aquaculture Science; EA: Environment Agency; AFBI: Agri-Food and Biosciences Institute; NIEA: Northern Ireland Environment Agency; DECC: Department of Energy and Climate Change; SEPA: Scottish Environment Protection Agency; JNCC: Joint Nature Conservation Committee; NE: Natural England; SNH: Scottish Natural Heritage. CCW: Countryside Council for Wales; FCO: Foreign and Commonwealth Office; DfT: Department for Transport; MCA: Maritime and Coastguard Agency; UKHO: United Kingdom Hydrographic Office; MOD: Ministry of Defence.



## APPENDIX II

## MARINE SCIENCE FUNDED BY MSCC MEMBER ORGANISATIONS 2011–12 (£ MILLION)



*Notes:* It is difficult to obtain accurate data from past years that are consistent across MSCC members because of different ways that organisations categorise their spending. The figures in the pie chart are the most accurate available but should be viewed with caution. In particular:

- **NERC** has reviewed and revised its 2008–09 expenditure data to incorporate some previous omissions. The revised NERC spend in 2008–09 was c. £67.1 million. The increase in spend in 2011–12 is due to the addition of NERC's responsive mode expenditure and some exceptional costs, such as building and replacement research vessel costs.
- **Defra's** 2011–12 spend takes into account the re-imburement received from the E.C. for DCF related monitoring.
- The reduction in Defra's Marine Evidence budget reflects the changes to Defra's overall budget allocation over this period. In addition to Defra funding, Cefas also receives funding from the Food Standards Agency.
- Defra, Marine Scotland, EA, SEPA and AFBI figures include vessel operating costs.
- **MOD** funds occasional environmental research projects—none was carried out in 2011–12. The research previously included in the 2008–09 spend chart (£11.4 million) is no longer classified as marine research.
- **DfT** funding is directed through the Maritime and Coastguard Agency but the maritime component of the Public Weather Service is excluded from the figure shown. However, the **Met Office** figure does include spend within the Public Weather Service programme on marine R&D.
- The **MCA** has rationalised its spend on research by combining its efforts with **DfT** to provide a more focussed and targeted strategy. The reduction in DfT/MCA's Marine Evidence budget also reflects the changes to DfT/MCA's overall budget allocation over this period.
- The **EA** figure does not include any additional marine expenditure by regional offices for conducting investigations. The reduction in spend since 2008–09 is a result of lower investment in research projects in some areas of EA business, associated with a move to a new Evidence Directorate which has led to better use of available information. Investment in monitoring activities has slightly increased. For 2011–12 there is a slight increase in research spend compared with 2010–11.
- Examples of marine research being developed include: ocean acidification and satellite and in situ observations of ocean temperatures, salinity and sea levels; the costs and benefits of offshore wind, wave and tidal energy to the marine environment; and research to inform broader environmental assessment of marine energy plans, programmes and projects.

- The reduction in spend for **Scottish Government (Marine Scotland)** is due to restructuring and a reduction in staff numbers.
- The **FCO** spend figure represents a best estimate as the FCO has no dedicated R&D fund and spend details are not recorded against R&D criteria. This figure does not include small amounts of indirect support for marine science.
- The **Welsh Government** figures do not include wider EU regional development funding or EU fisheries funding. Details of the spend on research that the Welsh Government has commissioned are included. This research is focussed on Wales-specific requirements. The research budget is not devolved and is managed by Defra and DECC on an England and Wales basis.
- The **MMO** is working with others to build a robust marine evidence base to inform its decision making. Most of the evidence the MMO uses is gathered from a variety of existing sources, including commercial sources, research councils and academia. Critical gaps in this evidence are filled by the MMO's evidence programme to inform MMO functions, particularly marine planning and licensing.
- **JNCC** provides UK level coordination on MSCC for the country conservation agencies including **Natural England (NE)**. The majority of the NE marine science spend is on statutory monitoring of Natura 2000 sites in English waters. Where these cross the 12nm boundary, NE works in partnership with JNCC to collect sound evidence on the location and monitor the state of MPAs.

*To note: A number of additional MSCC organisations have been included in the 2011–12 pie-chart compared with those represented in the 2008–09 pie chart (in Appendix II of the UK Marine Science Strategy). The additional organisations are: CCW, MMO, FCO, NE and The Crown Estate.*

**Key:** NERC: Natural Environment Research Council; BIS: Department for Business, Innovation and Skills; Defra: Department for Environment, Food and Rural Affairs; Cefas: Centre for Environment, Fisheries and Aquaculture Science; EA: Environment Agency; AFBI: Agri-Food and Biosciences Institute; NIEA: Northern Ireland Environment Agency; DECC: Department of Energy and Climate Change; SEPA: Scottish Environment Protection Agency; JNCC: Joint Nature Conservation Committee; NE: Natural England; SNH: Scottish Natural Heritage; CCW: Countryside Council for Wales; FCO: Foreign and Commonwealth Office; DfT: Department for Transport; MCA: Maritime and Coastguard Agency; UKHO: United Kingdom Hydrographic Office; MOD: Ministry of Defence.

## APPENDIX C

### THE MARINE MANAGEMENT ORGANISATION

- The Marine Management Organisation (MMO) is a non-departmental public body established and given powers under the Marine and Coastal Access Act 2009, The MMO is remitted to make a significant contribution to sustainable development in the marine area and to promote the UK government's vision for clean, healthy, safe, productive and biologically diverse oceans and seas.
- The MMO incorporated the work of the Marine and Fisheries Agency (MFA) and acquired several new roles, principally marine-related powers and specific functions associated with the Department of Energy and Climate Change (DECC) and the Department for Transport (DfT).
- The MMO is sponsored by the Department for Environment, Food and Rural Affairs (DEFRA), the Ministry of Defence (MOD), the Department for Communities and Local Government (DCLG), DECC and DfT.
- The MMO has a wide range of responsibilities, including:
  - Implementing a new marine planning system designed to integrate the social requirements, economic potential and environmental imperatives of our seas;
  - Implementing a new marine licensing regime that is easier for everyone to use with clearer, simpler and quicker licensing decisions;
  - Managing UK fishing fleet capacity and UK fisheries quotas;
  - Working with Natural England, Joint Nature Conservation Committee (JNCC) and other managing authorities to manage a network of marine protected areas (Marine Conservation Zones and European Marine Sites) designed to preserve vulnerable habitats and species in UK waters;
  - Responding to marine emergencies alongside other agencies; and
  - Delivering fair and impartial decisions based on the best available evidence and robust, transparent processes.

## Written evidence submitted by Plymouth Marine Laboratory (PML)

### 0. Declaration of interests

0.1. PML is a NERC National Capability Delivery Partner, and receives significant funding from NERC and Defra on a number of projects and initiatives.

0.2. PML maintains MarineRipple on behalf of Marine Science Coordination Committee.

0.3. Stephen de Mora is an *Ad Hominem* appointee to the MSCC, Chairs the National Centre for Ocean Forecasting, and is a member of NERC Science Innovation and Strategy Board, Ocean Processes Evidence Group (OPEG), and UK-Integrated Marine Observatory Network (UK-IMON) Executive Board.

0.4. Mel Austen is the Chief Scientific Advisor to the MMO since September 2010. She undertakes this role on a part time basis equivalent to one day per week.

0.5. Dr Steve Widdicombe chairs the Defra appointed Independent Expert Review Group (IERG) and has had a direct involvement in reviewing the processes used by the Statutory Nature Conservation Bodies (SNCB) in providing advice to Government on the designation of recommended Marine Conservation Zones (rMCZs).

### 1. *Since 2007 has there been improved strategic oversight and coordination of marine science?*

1.1. NERC financed *Oceans 2025*, a long-term marine research programme that was multi-disciplinary and multi-institutional in character, the latter point contributing to better collaboration amongst the major marine research establishments in the UK.

1.2. There have been several examples of good cooperation between different competent agencies. NERC and the Met Office collaborate in many ways, including through NCOF. Also, there have been a number of jointly coordinated and funded research initiatives, with a notable example being the NERC-Defra programme in ocean acidification.

1.3. MSCC has initiated the on-going development of the UK—Integrated Marine Observatory Network, which aims to bring together the different monitoring programmes in the UK in order to be more effective, more cost-effective and to facilitate better and easier access to collective marine data.

### 2. *What progress has been made in delivering the 2010 Marine Science Strategy?*

2.1. The Strategy is the first to be produced in the UK, and therefore its development and buy-into by all relevant bodies was a significant achievement. As it has only been in place for a very short time, it is probably premature to expect a full implementation and a fulfillment of its vision. However, some principles have been set.

2.2. The strategy aimed to help the UK (a) to be more efficient and effective in using the resource available, (b) to tackle barriers of delivery and (c) to work with industry and international partners. These comments address the three objectives in turn.

2.3. Before the publication of the Strategy, the UK marine science community suffered from a fragmentation in the funding base, separating the organizations that received funding through RCUK and those financed through Defra. This funding fragmentation inevitably filtered through the delivery of science. Since the publication of the strategy, and partially thanks to the formation of the MSCC, the RCUK and Defra have co-funded research, and thus have contributed to reducing fragmentation in the science delivery, increasing efficiency and effectiveness. Examples are the UK Ocean Acidification programme, and the forthcoming UK Shelf Sea Biogeochemistry and UK Marine Ecosystems programmes.

2.4. The marine science community has always been operating in an international context, often providing leadership in vision and implementation. Examples of this are the coordination offices of major international programmes like the WCRP Climate Variability (CLIVAR), the IOC-IGBP Global Oceans Ecosystem Dynamics (GLOBEC) or the IGBP-SCOR Surface Ocean Lower Atmosphere (SOLAS) programmes. It is fair to say that while UK scientists remain well placed to lead international initiatives and coordinate UK science efforts to these, and that the international footprint of UK marine science remains high, the UK has lost some of its international infrastructure in support of international efforts. The three programmes listed above, for example, are not supported by the UK anymore.

### 3. *How effective have the Marine Science Co-ordination Committee (MSCC) and Marine Management Organisation been, and what improvements could be made?*

3.1. MSCC has made strides in coordinating marine science across the UK, but in some cases, initiatives are still in their infancy and so difficult to judge success. The interaction with industry is welcome, as is the encouragement to form UK-IMON. Nevertheless, the stewardship of the UK and territories marine environment would be better assured with a dedicated governmental agency, as seen in North America with NOAA (USA) and the Department of Fisheries and Oceans (Canada).

3.2. Some recent actions serve to improve communications amongst UK marine scientists. These encompass an on-line events diary maintained by the Marine Biological Association (MBA) and MarineRipple, a tweeter-based information system run by PML.

3.3. Since its formation in 2009 the Marine Management Organisation (MMO) has gradually increased its visibility within the scientific community. The MMO participate in the Marine Science Coordination Committee and some of its sub groups as well as the UK Marine Monitoring and Assessment Strategy. The MMO has developed a Strategic Evidence Plan (SEP) which identifies its scientific advice and research requirements to support its regulatory functions. As well as being shared among the MMO's partner organisations and agencies the SEP has been made openly available on the MMO web site and has been disseminated at various science meetings and other meetings where scientists are among the stakeholders around the UK.

3.4. More recently the MMO has started the process of commissioning projects to support the SEP. As well as generating interest in research funding from the wider scientific community the commissioning process is likely to have further raised awareness of the work and research requirements of the MMO.

3.5. The MMO has commissioned scientific experts in the wider scientific community as consultants on specific issues, such as the independent Science Advisory Panel providing advice concerning potential environmental impacts of licence applications.

3.6. The increasing visibility of the role of science in supporting MMO's activities is welcome. We would encourage the MMO to continue to expand their dialogue and interaction with the broader science community as much as possible to (a) ensure that the activities of the MMO are widely understood and hence encourage the research community to undertake research that will support these needs and (b) that the MMO is cognisant of developments in research that can support their activities now and in the future.

3.7. PML has been a recipient of data from the MMO, particularly VMS data on fishing activity and fish and shellfish landings data to support our research activities. Landings and effort data has become increasingly accessible via the MMO web site. Fishing activity monitoring data (satellite Vessel Monitoring Systems (VMS) and vessel sightings) is made available on request which is a slower process. However, due to the commercial in confidence nature of spatially and temporally resolved VMS data the anonymised finer scale data is much less freely available. This can constrain research effort into the spatial and temporal patterns of use of UK seas including social research into conflicts among marine users and the value of different ecosystem service benefits.

3.8. Marine research is hampered by lack of field data because it can be extremely expensive to obtain. Licence applicants are often required to obtain environmental impact and economic impact data in support of their applications. The MMO has access to much data from public and commercial sources in support of its regulatory activities, especially licencing, fisheries management and planning. The MMO could take a much stronger leading role in encouraging commercial organisations to share their data more freely to facilitate the gain of greater research based understanding of the marine environment and its spatial and temporal variability as well of the social and economic costs and benefits of human use of the marine environment.

*4. Has the selection of proposed Marine Conservation Zones (MCZs) been based on robust scientific evidence? How well has the scientific evidence been balanced with socio-economic considerations and communicated to affected coastal communities?*

4.1. On the whole, the selection of the rMCZs has been based on the best available evidence. That said the actual quantity and quality of the evidence that was available to the SNCBs was not always high. Thus, while the best evidence was used, there is a concern that a number of decisions and proposals have a high degree of uncertainty associated with them. Within the UK there is a serious lack of fundamental evidence concerning the distribution and state of important coastal habitats. Much of the habitat mapping has been based on the physical mapping of features with little data available on the diversity of flora and fauna actually inhabiting these habitats. There is also little appreciation for how these habitats will change naturally through space and time. In addition, there was a lack of data which could adequately determine the extent to which habitats had been impacted by human activities, such as fishing. Indeed, in many cases the state or recoverability of habitats was based solely on knowledge of the pressures that occurred in an area and an assumption of what impacts these pressures would have on the ecosystem. Clearly this is a major weakness in the process.

4.2. Unlike the purely conservation ecology based considerations involved in the designation of Special Areas of Conservation (SAC) the designation of MCZs has relied heavily on input from key marine stakeholders and if anything the balance was skewed towards stakeholder opinion and away from conservation based science. Stakeholder input was heavily influenced by specific sectors (particularly the fishing industry) and more could have been done to engage with other stakeholders. In addition, the socio-economic focus appeared to be on determining how the designation of MCZs would negatively impact local economies with limited consideration as to how increased nature conservation could be used to underpin other social and economic benefits. Finally, within the four regional projects there seemed to be different approaches taken. It would have been better to have a more universal approach to ensure that all areas were considered equally.

4.3. Communication between the SNCBs and local communities was generally good and there was significant use of public consultation at several stages throughout the process.

5. *How effectively does the Natural Environment Research Council (NERC) support marine science in polar and non-polar regions?*

5.1. The most rapidly changing environments in the world are in polar regions. In both the Arctic and Arctic this rapid regional climate change is most clearly manifested in reductions of sea ice and melting of ice sheets, but climatic warming has much wider ramifications with impacts (positive and negative) on ecosystem services. Coupled to the rapid regional climate change at both poles, cold water biota are pre-adapted to low, seasonally stable temperatures and thus sensitive even to slight temperature increases. For these reasons polar environments are of fundamental scientific importance.

5.2. While these generalities unite the Arctic and Antarctic, their scientific histories contrast greatly. The Arctic does not have the same great history of research as the Antarctic. Therefore the unprecedented rates of Arctic climate change, coupled to its proximity to UK waters have posed a major challenge for NERC to address. NERC recognised in the 1990s that marine research efforts in the Arctic were relatively piecemeal, poorly grounded, and lacking in strategic direction. A Workshop on the priorities for UK marine Arctic research in spring 2009 addressed this issue, and since then, large amounts of NERC funds have gone into funding Arctic Research. These include components of the Research Programme (RP) funds from the Ocean Acidification and Arctic programmes.

5.3. The Antarctic, by contrast, benefits from a rich, 90-year history of marine research and a very strong backbone of on-going, sustained marine observation. The costly resourcing of this has been mainly via the ring-fenced funding to the British Antarctic Survey (BAS) who both maintain a vital strategic presence in Antarctica at five bases (two of which are at South Georgia) and conduct world-class marine research. In 1999 the "Antarctic Funding Initiative" marked a transfer of some of this funding towards open competition within the UK, for blue skies Antarctic research. This, however, stopped during a series of large recent re-organisations of the BAS, and blue skies Antarctic research funding is now in competition with the whole-NERC grant rounds.

5.4. In the last five years a series of concurrent factors have acted together to fundamentally alter the landscape for NERC-funded polar marine research. Major factors include (a) the present harsh economic regime, coupled to the great expense of polar logistical operations and their sensitivity to variable oil prices, (b) the re-prioritisation of NERC funds which has favoured the so-called Research Programmes but placed pressure on the so-called National Capability, (c) the increased emphasis on Arctic work, (d) a long series of major reorganisations within BAS, most recently an initiative to merge the delivery of UK polar and marine components into a central logistical function at Southampton.

5.5. These changes are on-going and are having both disadvantages as well as advantages. Advantages include better collaboration, harnessing the combined strengths of multiple UK marine institutes to examine major issues within polar waters. This is illustrated, for example by NERC's RP Thematic on Ocean Acidification, with multi-institute participation in cruises to the Arctic and Antarctic. It also provides NERC with the agility it needs to take high level strategic decisions that respond in a coherent way to pressing issues; this being a major rationale behind Research Programme funding.

5.6. A major disadvantage of the multiple recent changes is the risk of diminishing the UK's acknowledged role as a world leader in Antarctic research. BAS is becoming increasingly disadvantaged in competing for funds because (a) it is limited in scope to the polar and sub-polar domain and cannot compete for non-polar funding calls, (b) the science proposed is criticised by some reviewers as being expensive and often high risk (compared to non-polar work) and (c) despite a strong track record in some areas (e.g. science underpinning sustainable resource management) the collaborators and stakeholders are international, not UK networked, so leverage for mounting thematic collaborative research programmes calls is reduced.

6. *How well are the current and potential impacts of global warming on the oceans (for example temperature changes and acidification) being monitored and addressed by Government and others? [468]*

6.1. Long-term observations are essential to detect the impacts of global warming on marine ecosystems. NERC contributes to the funding of these observations through the PML-MBA Western Channel Observatory, which has provided evidence of change since the early 20th century. The WCO provides not just some of the longest time series of physical and biological change in the world's oceans, but is also the most complete observatory in the world, monitoring all ecosystem components from bacteria to fish, as well as ancillary physical and chemical information. The WCO is part of a national initiative named UKIMON (Integrated Marine Observing Network), coordinated through MSCC.

6.2. PML also coordinates, with NOC, the Atlantic Meridional Transect Programme. The programme, also co-funded through NERC National Capability, has contributed evidence of change in physical, chemical and biological components of the North and South Atlantic for over 20 years.

6.3. Computer models are essential to forecast climate change impacts. NERC recently completed the QUEST programme (Quantifying and Understanding the Earth System), a pioneer programme aiming at establishing strong multidisciplinary research across the natural and social sciences to address societal demands. Unfortunately the completion of QUEST has not maintained a funding base for this cross-disciplinary research.

NERC and a number of government departments created the ambitious LWEC (Living with Environmental Change) programme, but funding is extremely limited.

6.4. Some funding from NERC is also devoted to providing National Capability for ecosystem modeling, and PML (as well as other UK players) has benefitted from this investment. It is however essential that modeling is not limited to the living and non-living components of the marine environment, but include human impacts and societal implications in order for adaptation measures to arise. Currently, this research is not considered to be on the edge of a single scientific discipline, and is therefore penalized in traditional funding modes.

6.5. In the last decade, ocean acidification has emerged as another serious product of anthropogenic CO<sub>2</sub> emissions contributing to climate change. The current rate of change in ocean chemistry has not been experienced for 300 million years and could have profound effects on marine ecosystems. NERC, DECC and Defra are jointly funding a five-year (2010–15) UK Ocean Acidification research programme (UKOA) to increase our understanding of how changes in ocean chemistry impact marine organisms, ecosystems and ecosystem services, and how changes in ocean biogeochemistry feedback to the atmosphere and climate change. As this is a time limited programme, further coordinated UK research is needed to understand how ocean acidification, together with additional stress factors, such as ocean warming and deoxygenation, will synergistically impact the marine environment and its functioning.

6.6. Other nations have invested in ocean acidification research (EU, Germany, US, China, Korea, Australia, Japan). The UK and other countries are providing significant in-kind support to the Ocean Acidification International Coordination Centre, which will work to manage this growing international research effort. The foundations for an international initiative to monitor and observe ocean acidification globally have been laid which include the US National Oceanic and Atmospheric Administration, the International Ocean Carbon Coordination Project and the Global Ocean Observing System, as well as national programmes such as UKOA.

6.7. The UK has played a major role in bringing the science of ocean acidification, warming and deoxygenation to policy makers and other stakeholders, contributing to IPCC 4AR and 5AR, the UNFCCC SBSTAs and COPS, CBD, UN-OCEANS, IOC-UNESCO, UNDP, OSPAR, and Rio+20. Ocean acidification and warming are now recognised by all these intergovernmental organisations and, most recently, mentioned in The Oceans Compact. This is an initiative announced by Ban Ki-moon, the Secretary General of the United Nations, to set out a strategic vision for the UN system to deliver on its ocean-related mandates, consistent with the Rio+20 outcome document “The Future We Want”.

September 2012

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### Written evidence submitted by The Wildlife Trusts

This submission refers to Point 4 in the Terms of Reference.

#### Summary Points

- The nature of the stakeholder process for selecting Marine Conservation Zones led to a number of compromises in the network balancing ecological requirements against socio-economic concerns.
- The guidance from Defra to the regional MCZ projects stated site selection should be on the basis of the best available evidence.
- It is unreasonable and inappropriate to apply the same rigorous evidence levels from SAC designation to a collaborative stakeholder-led process.
- Peer reviewed publication is not always the end aim of data collection and non-published data should not necessarily be viewed as less robust.
- We would query whether the same level of scrutiny was applied to the socio-economic data used in the process.
- Failure to designate the recommended Marine Conservation Zone network in its entirety as soon as possible leaves ecosystems vulnerable to continued pressure, reducing opportunities and chances for recovery and may create a network that is not ecologically coherent.

*Has the selection of proposed Marine Conservation Zones (MCZs) been based on robust scientific evidence? How well has the scientific evidence been balanced with socio-economic considerations and communicated to affected coastal communities?*

1. The Wildlife Trusts (TWT) welcomed Government commitment to achieving an ecologically coherent network of Marine Protected Areas (MPAs) in UK waters and the contribution that the designation of MCZs will make to this network. As a result TWT has engaged in all four of the Regional MCZ stakeholder projects. Engaging at national, regional and local levels we have been working to ensure that the recommendations put forward to government represent the best possible gain for marine biodiversity.

2. In September last year, after over 2500 meetings spread over two years, the stakeholders presented recommendations for 127 Marine Conservation Zones to Natural England and JNCC. The stakeholder led process included representatives from a wide range of marine sectors; this led to a number of compromises in the network. Despite this, TWT believes that these recommendations will make a significant contribution to a wider network of MPAs in UK waters. These sites represent the views of as wide a range of stakeholders as possible and have ensured that socio-economic interests have been taken into account whilst ensuring that those sites put forward have been based on the best available evidence at the time. We believe that for the most part, this network meets the requirements of the Ecological Network Guidance (ENG). (*Guidance on Selection and Designation of MCZs (Note 1)*, Defra, September 2010).

3. Data requirements for the sites were made clear in advice from Defra to the regional projects and in the ENG which stated, “Network design should be based on the best information currently available. Lack of full scientific certainty should not be a reason for postponing proportionate decisions on site selection.”

4. The Science Advisory Panel (SAP) recognised the value of the network towards achieving an ecologically coherent network of MPAs, stating in its assessment of the recommended network, “If the recommended network of MCZs is implemented in full, ecological coherence can be achieved.”

*(Science Advisory Panel Assessment of the Marine Conservation Zone Regional Projects Final Recommendations, 15 November 2011).*

5. The SAP did however raise some doubts about the robustness of some of the data cited as evidence for the sites. The Minister made the following statement in response to the SAP advice which stated, “It is vital that we have an adequate evidence base for every site if we are to create successful well-managed MCZs. An adequately robust evidence base will be essential when we come to implement management measures.” 15 November 2011.

6. TWT are concerned that this statement indicates intent to increase the burden of proof for designation of recommended MCZs- one not present at the outset of the Regional Project process. As a result, the designation of MCZs has now been delayed. As we understand it, two reasons are given for this delay:

- Extra time is needed to learn lessons from the review of the evidence base supporting the designation of the most recent tranche of candidate Special Areas of Conservation—the cSAC review.
- A review of the evidence base is called for by the comments of the Science Advisory Panel.

7. The cSAC review looked at evidence supporting three cSACs. This concluded that the evidence base was sufficient, but made some recommendations about transparency and stakeholder engagement in the process. However, it is our view that it is unreasonable and inappropriate to apply the same rigorous evidence levels from SAC designation (a top-down, science based process), to a collaborative stakeholder-led process where, following Defra guidance, discussions have been based on “best available evidence” and where compromises made during the decision making process, frequently moved MCZs away from well-understood and well-evidenced areas for socio-economic reasons. It seems particularly unreasonable to apply these evidence levels after the fact.

8. Furthermore, it is unclear if the SAP concerns around data are aimed at the quality of evidence used in the stakeholder process or in the quality in the way it has been reported. We are aware of cases where datasets were used by stakeholders in developing recommendations, but were not cited in the final report. Additionally the robustness of some data was downgraded by the SAP due to a lack of publication in peer reviewed journals. We would refute the claim that as a result non-published data is less robust as publication is not always an end aim of data collection. Additionally, we would query whether the same level of scrutiny was applied to the socio-economic evidence.

9. The Wildlife Trusts welcome the investment that Government is making in the collection of new information as part of the data review. However, data requirements should be balanced against the practicalities and costs of gathering data in the marine environment, the urgent need to act to protect our marine environment and the precautionary principle which states that “lack of scientific certainty should not be used as a reason for postponing cost effective measures to prevent environmental degradation.” Evidence requirements should therefore be reasonably obtainable considering urgent timescales.

10. TWT support the advice from JNCC and NE regarding the recommended network where it states, “overall the recommendations submitted by the regional MCZ projects, when combined with the contribution with existing MPAs, have met many of the network design principles and represent not only good progress towards the achievement of an ecologically coherent network but also a balance between the ecological requirements for the network and minimising impact on socio-economic interests” and furthermore, where they state “we note that the availability of evidence is only one factor when considering whether a recommended MCZ should go forward for designation.”

11. It is our view that the Regional Stakeholder led projects followed the ENG and therefore the intent and ambitions of the Marine and Coastal Access Act. Further delay to the process in order to gather increasing levels of evidence leaves ecosystems vulnerable to continued pressure, reducing opportunities and chances for recovery. We also remain concerned that designation of a few of the sites will result in the creation of a network which fails to meet its “ecologically coherent” target and therefore fails to meet the aims and ambitions

of the Marine and Coastal Access Act and international targets set by the Marine Strategy Framework Directive. Recognition should be made that this network attempts to balance socio-economic needs against the requirements of the ENG and that, if designated in full, represents our best opportunity to contribute towards an ecologically coherent network of MPAs in UK waters.

September 2012

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### Written evidence submitted by the Marine Biological Association

#### Summary of Main Points

1. There has not been a clear and obvious improvement in the coordination of marine science as a result of the establishment of the Marine Science Coordination Committee (MSCC).
2. Some progress has been made in delivering the Marine Science Strategy mainly in the area of communications.
3. The effectiveness of the MSCC is hampered by limited funding, narrow representation and a lower profile than would be expected.
4. For Marine Conservation Zones (MCZs) we identify that “robust scientific evidence” to be able to design an “ecologically coherent network” can refer to what we know about:
  - (a) ecosystem structure and function and processes,
  - (b) what marine habitats and species occur where in UK waters, and
  - (c) what it is important to protect (because of rarity, decline, sensitivity)
5. We conclude that we do not know enough to be “formulaic” in designing a site series but that the objective of an “ecologically coherent network” was anyway unnecessarily ambitious compared to a more achievable objective of identifying and protecting a representative series of sites that included the most threatened and best examples of habitats and species. With regard to “socio-economic considerations”, we conclude that everything possible was done to include users of the marine environment in the site selection process but that biodiversity conservation came second both in timing and importance.

#### General Comments and Declaration on Interest

6. The Marine Biological Association (MBA) is a Learned Society established in 1884. The MBA has about 1,200 members (including international members) and runs The Laboratory in Plymouth where approximately 60 scientific staff work. MBA members have been at the forefront of providing scientific information to support marine environment protection, management and education and much of the scientific information that underpins decision-making about environmental protection has come from work undertaken at the Laboratory.

7. Declaration of interest: The MBA has applied for and receives funding from some of the organizations mentioned in this submission including the Natural Environment Research Council (NERC) and the Marine Management Organization (MMO). The MBA has also had considerable involvement in the Marine Science Coordination Committee; has undertaken contract work to identify biodiversity hotspots and to contribute to the “Evidence” project just completed as a part of the MCZ process; and represented science interests on the Stakeholder Group of Finding Sanctuary. Dr Keith Hiscock (MBA Associate Fellow) was an independent member of the Marine Protected Areas Science Advisory Panel. However, the MBA believes there is *no conflict of interest* affecting the comments provided as this submission reflects the views of the members of the learned society, not just MBA staff members who may have benefited from the aforementioned funding bodies or who are engaged directly with the activities mentioned above.

#### Select Committee Questions (detail)

*Since 2007 has there been improved strategic oversight and coordination of marine science?*

8. Since the MSCC replaced the Inter-Agency Committee on Marine Science and Technology (IACMST) there have been some improvements as the MSCC has a clearer remit and a more defined reporting structure. Despite this there has been little evidence of “improved coordination” of marine science although whether this is down to a lack of progress or just that evidence of progress has not been communicated is unknown.

9. There are a number of useful activities supported by the MSCC which will contribute to better coordination and strategy such as the United Kingdom—Integrated Marine Observing Network (UK-IMON) and the Marine Climate Change Impacts Partnership (MCCIP) report on marine climate knowledge gaps. However, these activities were developed initially outwith the MSCC and these projects are also focused on single aspects of marine science coordination and strategic direction rather than overall coordination at a UK level.



10. A difficulty with evaluating coordination occurs due to the integration of the MSCC with the United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS). UKMMAS has been successful in both coordinating long-term marine monitoring programmes and linking science with policy needs (eg delivering the requirements of the Marine Strategy Framework Directive). UKMMAS was overseen by the Marine Assessment Policy Committee (MAPC). When the MAPC and MSCC merged it was never made clear how the new merged committee functioned and whether its TORs had changed. The old MAPC was largely concerned with the policy drivers for marine monitoring and the MSCC has a wider remit, coordinating UK marine science; so which remit remains?

*What progress has been made in delivering the 2010 Marine Science Strategy?*

11. Delivery has been more effective in some areas than others. However, it is also not clear how “delivering the strategy” is being measured (and by whom)?

12. Concerning specific priorities of the science strategy, making the process for funding sustained long-term monitoring more transparent has clearly not been accomplished. The MSCC Long-Term Monitoring Work Group established to address this issue failed to provide any clear outputs: a report was produced but there has been no further progress or implementation. The funding for long-term monitoring is still opportunistic and piecemeal.

13. Another priority area of the Science Strategy is communications. There has been clear progress on this and the communications element of the strategy is being delivered. The MBA has been involved in helping with better coordination of communication activities through, for example, its establishment of a UK Marine Science Events Calendar and a number of other activities are underway. The communications group has worked by developing a clear plan with prioritized objectives, being realistic about its resources (i.e. extremely limited funding) and targeting “quick-win” deliverables.

*How effective have the Marine Science Co-ordination Committee (MSCC) and Marine Management Organisation been, and what improvements could be made?*

14. The MSCC has provided a very useful mechanism for focusing on a marine science strategy at a UK level. It has not been effective as it could be however as:

- (a) The MSCC seems to have a large remit but with *few resources* to undertake the work required. Having served on two of the MSCC committees, it is clear that the amount that can be achieved is limited by not being able to provide even modest funds to support activities.
- (b) The MSCC also lacks adequate funding to facilitate engagement. The delivery of much of the strategy is based on the goodwill of the marine science community. This automatically limits the involvement of and contributions from the wider science community. It does not have a high visibility and is not well-known enough among the marine science academic community. The main committee consists of a large number of government departments, SNCBs and executive agencies. As regards representation therefore, the MSCC seems to be rather narrow. The MSCC should represent the “entire marine community” but there is very little knowledge of what the MSCC is. Many marine scientists are not even aware of its existence, much less what it does. There needs to be much wider representation on the committee. For example, why task scientists on the committee with engaging marine industry rather than have a high level industry representative actually sit on the committee to begin with? The same can be said for NGOs, HEIs and other groups with which the committee would like to engage.

15. The MMO delivers many previous disparate functions, so overall the establishment of the agency has been a success. However, it is still worth noting that there is a perception among the marine community that (a) there are very limited funds available for the MMO to carry out its work and (b) that the agency is still therefore mainly reliant on CEFAS with limited opportunities for other marine scientists to engage.

16. The MMO should have a list of all projects with details of funding and project outcomes on its website. This would mirror what Defra does on its website and enable greater transparency.

*Has the selection of proposed Marine Conservation Zones (MCZs) been based on robust scientific evidence?*

17. Network “design”: the principles/criteria used to design a “network” of marine protected areas (of which MCZs are a part) came mainly from OSPAR and may therefore be considered as “required”. However, the OSPAR “Ecological criteria/considerations” which followed well-established site selection criteria for nature conservation (and for which a great deal of robust scientific information was available) were far more useful and relevant than the later and more scientifically difficult “Network design principles” that were used in the MCZ Ecological Network Guidance (ENG). The interpretation of those design principles as quantitative measures was scientifically naïve and did not benefit from knowledge of ecological processes and ecological functioning in particular. All-in-all, the process of site selection/design was made more difficult than it needed

to be. The review of the developing ENG seems to have been internal within the SNCBs and may not have involved independent marine conservation scientists. Commissioned reports came too late in a rushed process to adjust approaches and the Science Advisory Panel played only a late and minor role in reviewing the final draft of the ENG. There was also an unwillingness on the part of the SNCBs to accept that some criteria were unrealistic or uninformed by relevant science—for instance, OSPAR had, early in its process, virtually “dismissed” connectivity as a design criterion except where “a specific path between identified places is known” (“Principle 9”) and “viability” as size seemed to have been derived by the SNCBs from measures of larval dispersal distances, not what makes an area or population of a species “viable”. However, our comments are not meant to encourage more research on connectivity or viability but just to take a more measured approach to identifying meaningful criteria based on current knowledge.

18. Site selection: Information on what features occurred where was not adequately looked-for by the Regional Projects, perhaps in part because their personnel did not include marine ecologists with relevant experience. Furthermore, the MCZ site selection process was well-advanced when the results of the assessment of biodiversity hotspots became available and what should have been a leading source of relevant information, was not adequately taken account of.

19. Best available (scientific) evidence: A major problem for the MCZ project was knowing where particular habitats and species occurred. Knowledge of the physical character of the seabed and of the distribution of species is sparse and patchy at best and absent for many areas of our seas including some inshore areas. Predictive modelling did not work and the MCZ process was left with large areas of seabed and many pMCZs where the confidence in what was there was very low. The Regional Projects and subsequent studies still have not taken advantage of all of the evidence available and, unwisely, old data that, for many habitats, will still be relevant may be being set-aside. Properly, the design criteria indicated use of “best available evidence” but the interpretation of that “best available evidence” should have majored on applying selection to areas where there was evidence of the presence of representative habitats and features of conservation importance.

20. Another aspect of evidence relates to the impacts of bottom trawling on level sedimentary seabed and the difficulty of finding areas that might be unimpacted, therefore best candidates as MCZs to act as reference areas in the future. It seems likely that, although previously un-trawled seabeds may have been rich in species and highly productive, their character will now have changed and what they will or might recover to if bottom trawling is prohibited is uncertain. More work is needed including with historic data to provide a better idea of productivity and character including any potential benefits to fisheries of protected areas—MCZs that represent sedimentary habitats and where bottom trawling is prohibited provide the opportunity to understand what such changes might be.

21. Choosing between prospective sites: The Regional Projects identified alternative sites with the same broadscale habitats and features. However, the process of deciding which would be the best for biodiversity conservation was poorly carried out. Matters such as the presence of rare, scarce, in decline or threatened with decline species or biotope richness or a high species richness should have been used more effectively. It was very strange that high biodiversity and high productivity were a secondary consideration (“Additional Ecological Importance”) in the ENG and seemed to be rarely used to decide between sites.

22. Information resources: The information needed to assist the selection of MCZs will, of course, never be complete but efforts were made during the process, especially with regard to identifying the locations of “features of conservation importance”, to make it as complete as possible. Nevertheless, more effort is needed to improve the “touchstones” that are needed not only for site selection but, more especially now, site management.

*How well has the scientific evidence [for the selection of pMCZs] been balanced with socio-economic considerations and communicated to affected coastal communities?*

23. The MBA provided scientific input to the Finding Sanctuary (FS) Steering Group and Stakeholder Group. FS and the other Regional Projects made the most significant possible effort to engage sea users in understanding what the MCZ project was about.

24. However, the process of determining site locations started before ecological information had been assembled and the significance of available information seemed to be “lost” on many of the FS staff. Whilst the science input from MBA personnel and others with relevant marine biological experience was important, they could not always be present at stakeholder meetings. There were too few independent experienced and objective (unbiased) scientists involved in the process. Representatives from industry (especially the fishing industry) influenced much decision making about locations, possibly more-so than ecological considerations. Domination by socio-economic considerations meant in particular that the identification of Reference Areas (where no extraction or deposition would be allowed) stalled.

25. There is a view that scientific evidence (perhaps especially the application of the ENG criteria) dominated a process that was supposed to be based on stakeholder involvement and compromise. Whether or not that happened is a key consideration but our views are based on poor or incomplete use of the available science and draw attention to where improvements in the science are needed.

26. The case for each pMCZ could be much better made than is allowable within the required parts of the ENG. In particular, there are many more species of conservation importance likely to be present at a location than those that are listed as “Features”.

27. During the MCZ selection process, the likely or possible fishery benefits from protected areas seems not to have been sufficiently taken into account. However, paragraph 21 above relating to absence or paucity of evidence is relevant.

*How effectively does the Natural Environment Research Council (NERC) support marine science in polar and non-polar regions?*

28. NERC have always supported marine science although there is concern over funding cuts coupled with ineffective delivery mechanisms in many areas of the marine science programme.

29. Overall it appears that far from improving the delivery of strategic marine science NERC has implemented changes that are severely affecting its timely progress. The reduced amount of funding for strategic marine science is a clear problem, however the mechanism currently operating to deliver that funding also has severe shortcomings. NERC has recently moved from supporting longer term strategic research programmes across multiple marine research institutes and HEIs, eg *Oceans 2025* (2007–12), to funding more narrow Theme Action Plans (TAPs) addressing a strategic science issue (eg Marine Renewables). The principal problems with this process have been that too few projects have been developed by NERC Theme Leaders with the marine community, resulting in an underuse of expertise within the existing marine science base. Furthermore, for those TAPs that have been developed the road to a “Call for Proposals” can be a long one, which may in some cases have taken a number of years (eg Marine Biodiversity TAP).

30. MBA feels there is need for a thorough review of the effectiveness with which NERC Themes support the marine science programme, particularly in the area of marine biodiversity. Key issues to consider are the needs for demonstrating transparency in how strategic issues are identified and developed, ensuring timeliness of the development process, and that there is some broad parity across NERC Themes in the number of TAPs developed.

*How well are the current and potential impacts of global warming on the oceans (for example temperature changes and acidification) being monitored and addressed by Government and others?*

31. The Marine Climate Change Impacts Partnership (MCCIP) is a key government initiative which acts as an independent broker of knowledge of climate and the marine environment. This along with a number of funded major research programmes means the UK is leading the way in studies of climate change and the oceans. However, MCCIP in particular is reliant upon the knowledge and expertise of marine scientists actively engaged in research on climate change and its impacts. To a large degree this research capability is underpinned not only by modelling but by long-term monitoring programmes of physical and biological measurements of the sea. Some of these UK programmes are over 100 years long and provide data of unparalleled importance for understanding past change, a knowledge which is used to inform modelling studies aimed at predicting future changes. Therefore there is a pressing need to maintain UK long-term monitoring programmes. Unfortunately these programmes have faced severe funding cuts recently which put their future in jeopardy. For example NERC did not ring-fence marine monitoring programmes in their latest funding review which meant that certain programmes received a 10–20% cut in funding despite having highly supportive scientific reviews. It seems quite likely that some UK marine time series will be degraded to such an extent that they will be rendered useless if more funding is not made available.

*September 2012*

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**Written evidence submitted by the Research Centre for Marine Sciences and Climate Change,  
Liverpool University**

1. *Since 2007 has there been improved strategic oversight and coordination of marine science?*

1.1 There probably has been an improved strategy for Marine Sciences with the formation of the National Oceanography Centre (NOC), merging the NERC funded laboratories at Southampton and Liverpool together.

However, that strategic overview is in danger of being lost. There was a recent cut of marine scientists at NOC with losses of 24% out of a total of 155 scientists. This cut was driven by a metric assessment of individual staff (based on grant income and paper outputs) and ignored any strategic context of their work. The staff that have been lost were disproportionately made up of junior staff and part-time staff. Given the criteria used to make the cuts, the ability of NOC to perform in a strategic manner has been hampered. The message to junior NOC staff from the metric-based assessment is that it will damage your career to spend time on work that does not produce immediate scientific outputs, even though that work may be of strategic importance.

2. *What progress has been made in delivering the 2010 Marine Science Strategy?*

3. *How effective have the Marine Science Co-ordination Committee (MSCC) and Marine Management Organisation been, and what improvements could be made?*

4. *Has the selection of proposed Marine Conservation Zones (MCZs) been based on robust scientific evidence? How well has the scientific evidence been balanced with socio-economic considerations and communicated to affected coastal communities?*

5. *How effectively does the Natural Environment Research Council (NERC) support marine science in polar and non-polar regions?*

5.1 At present, there is an artificial divide between how marine sciences is supported between the Antarctic sector and the rest of the globe. The proposed merger of the National Oceanography Centre and British Antarctic Survey makes sense from a purely scientific perspective in removing an artificial divide in terms of remit and scope of activity.

What is unclear though is whether the proposed merger is being driven by a cost saving exercise, which might then disguise a run down of the activity of polar and non-polar marine research.

There needs to be some care that the partnerships between any new National Centre and the outside community, involving Universities and other research centres, is maintained in an inclusive and constructive manner. There is a risk of losing intellectual diversity when a research area is dominated by one Centre.

6. *How well are the current and potential impacts of global warming on the oceans (for example temperature changes and acidification) being monitored and addressed by Government and others?*

6.1 We have world class expertise in the climate modeling based at the Hadley Centre, but there is an organization gap in terms of sustaining ocean monitoring.

The Natural Environment Research Council (NERC) is good at supporting responsive mode or thematic grants addressing aspects of climate change. However, the monitoring is in danger of being ignored. For example, for global warming, the most important integrated measure is ocean heat storage, which is only reliably being monitored with autonomous floats called ARGO. This international programme involves 30 countries and supports over 3,000 profiling floats at any one time. This data is crucial in constraining the initialization of Hadley Centre climate model forecasts. However, the UK only currently provides typically 110 to 140 of those floats in the water, only making up 4–5% of the monitoring array. The UK contribution to ARGO is being funded by the Department of Energy and Climate Change (DECC), the Ministry of Defence (MoD) and the Natural Environment Research Council (NERC), and is undertaken by a partnership involving the Met Office, the National Oceanography Centre, Southampton (NOCS), the British Oceanographic Data Centre (BODC) and the UK Hydrographic Office (UKHO).

In addition, longterm funding for time-series programmes need to be secured, such as the Atlantic Meridional Transect Programme; this is currently supported under NERC through National Capability.

Part of the danger is that government initiatives and priorities organized through the Department for Environment, Food and Rural Affairs (DEFRA) usually focus on the coastal zone and have not taken on board a global perspective.

The UK is missing having a body directed with the task of monitoring climate change, analogous to National Oceanic and Atmospheric Administration (NOAA) in the USA.

Similarly, while the UK has hosted the international centre for sea level data from tide gauges (the Permanent Service for Mean Sea Level) since 1933 and is a world leader in sea level science, its ability to maintain even a small number of strategically-important tide gauges outside the UK is under great pressure in the present environment.

September 2012

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**Supplementary written evidence submitted by the Research Centre for Marine Science and Climate Change, University of Liverpool**

Following the select committee session on 5 December 2012 we would like to submit a few points of additional information arising from the questions. These points largely arise as a result of those questions addressed to the witnesses representing marine science industries during the first evidence session, but not revisited later.

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1. *Question concerning the impact of marine science on economic growth (Q51)*

The tenor of this question was focused on how marine science can deliver short-term economic benefit, particular through the marine survey and marine instrument industries. There are 3 points we would like to add to this:

- (i) As pointed out by Mr. Richard Burt, the marine science instrument industry to a significant extent relies on the marine research community to provide new challenges for instrument development. We regularly suggest new ideas to the industry to help us make the measurements we need, and the rigorous field-testing that is inherent in our work at sea often provides the industry with development and testing opportunities that would otherwise be financially precluded. This kind of activity has reduced considerably in the past two or three years, due to the increasingly restricted capital budgets available through NERC research projects, and provided to the NERC research centres.
- (ii) The National Oceanography Centre has considerable expertise in, and expends National Capability funds on, the development of novel measurement technologies. A continuing problem often faced by the development engineers is one of how to take a newly developed instrument forward to the stage of becoming commercially viable. The details of this stumbling block are perhaps worth pursuing (related to Q56).
- (iii) Marine science is a fairly small, niche market. While much effort is ongoing in the development of new measurement techniques, there will never be a large economic impact. The real strength of marine, indeed environmental, science lies in what it prevents us from having to spend money on. As a timely example, fundamental strategic research into sea level over the past 50 or more years has led to a coastal flood forecasting service that hugely reduces loss of life and damage to coastal infrastructure around the UK. Protecting the city of London, the Thames Barrage represents a major engineering achievement that rests on this strategic research, in its original design, in the decisions made on when to close the barrage, and in the ongoing work to design the next barrage. This strategic investment continues to support collaboration between the National Oceanography Centre, the Met Office, the Environment Agency and civil engineering that is vital to the UK economy. It is always difficult to quantify how much spend has been avoided, but the recent damage caused by hurricane Sandy in New York clearly indicates the value of this particular area of marine research.

2. *Days spent at sea per year by NERC research vessels compared to commercial vessels (Q89)*

A metric of days spent at sea per year is far too simple to be used in determining the relative efficiencies of NERC and commercial vessel operations. NERC vessels have to service an enormous range of types of marine research, with cruises invariably requiring very different sets of equipment installed on the vessel. The NERC vessels are designed for this flexibility, but demobilising one cruise and mobilising the next is often very complex. Commercial vessels are usually tasked to do a more limited range of work, and often carry out the same sorts of work on many cruises so that most of the required equipment is left onboard. This significantly reduces the time required in port. Our own experience of working from NERC vessels has never indicated that the ship takes an unreasonable amount of time to prepare for a cruise; the staff of the National Marine Facilities are highly efficient.

3. *Use of AUVs in place of research vessels (Q89)*

Ralph Raynor was keen to extol the virtues of Autonomous Underwater Vehicles (AUVs), suggesting that 10 years from now we should see reductions in the need to use expensive research vessels. At best this is very optimistic. At the moment there are perhaps four to six parameters that can be measured from an AUV reliably. The issue is both one of the availability of a technology to make a particular measurement, the power requirements of the sensor and the stability of the sensor over the few months of, say, a two to four months glider mission. Temperature and current speed are robust measurements we can carry out from AUVs. Salt and dissolved oxygen are fairly robust, but calibrations degrade after a few weeks. Chlorophyll is possible, but probably not reliable beyond two to three weeks because of biological fouling of the sensor. The NOC is currently developing nutrient sensors which should be able to operate on AUVs for three to six weeks. By contrast, the record for the number of individual parameters measured from a single bottle of water collected by a research vessel currently stands at about 850. AUVs have great potential for some basic monitoring. The marine science research community views them as complementary to research vessels rather than a replacement.

### Written evidence submitted by the RSPB

*“Has the selection of proposed Marine Conservation Zones (MCZs) been based on robust scientific evidence? How well has the scientific evidence been balanced with socio-economic considerations and communicated to affected coastal communities?”*

#### Introduction

1. The RSPB is Europe’s largest wildlife charity, with more than one million members, and we manage one of the largest conservation estates in the UK, comprising over 200 nature reserves. We are part of the BirdLife International partnership, a global alliance of independent national conservation organisations working in more than 100 countries. The RSPB’s policies are based on detailed and comprehensive scientific research, and we have considerable expertise on the operation of terrestrial and marine ecosystems, the identification and management of protected areas and the factors governing bird population trends.

2. The RSPB campaigned strongly for the provision of MCZs in the Marine and Coastal Access Act 2009, to form part of an ecologically coherent network of Marine Protected Areas (MPAs). We have put extensive time and effort into the MCZ processes in England and Wales, including attending local and regional stakeholder workshops, supplying data and responding to consultations.

3. Any discussion on the use of scientific evidence in the selection of MCZs in England and Wales must be seen in the wider context of significant and continuing under-investment in data collection at sea, to inform both marine protected area selection and strategic planning. This point has been made repeatedly by the RSPB to Governments in relation to seabirds for over a decade, and has also been recognised at the parliamentary level, for example by the Energy and Climate Change Select Committee.<sup>52</sup>

#### Overall response

4. Our headline response to the Committee’s question, based on this experience, is that:
- (a) In large part the scientific evidence in the MCZ process was accurate, but was restricted by the criteria and guidance placed on the MCZ processes by governments and the statutory nature conservation bodies (SNCBs). In particular, this led to the exclusion of mobile species (and supporting evidence) from consideration during the site selection process, but also led to a focus on areas with high data availability.
  - (b) Although the evidence was considered best available in general, some important evidence and data sets were not considered by all stakeholders in the regional MCZ projects.
  - (c) The application of socio-economic evidence has been inconsistent and often undermined the primary objective of achieving a coherent MPA network. Sites important for large scale economic activity were screened out or moved at early stages of the MCZ processes in both England and Wales, despite clear ecological importance, and poor communication at a local level has led to an unbalanced impact upon (often more sustainable) local industries. The consequence of this has been strong anti-MCZ sentiment in many coastal communities, particularly around proposed highly protected sites.<sup>53</sup>
  - (d) The scientific proof required for the presence, extent and condition of features worthy of protection by MCZs has in general been greater than required by the socio-economic evidence. While ecological evidence has been subject to rigorous scrutiny and quality assurance processes, no such processes have been applied to socio-economic information used in the MCZ projects. Given the nature and scale of the UK marine area, there is also a high risk that the increasingly strict requirements for robust scientific evidence are both unfeasible and detrimental to the MCZ process, which JNCC and Natural England both agree has used the best evidence available at the time of selection.

#### On the use of scientific evidence

5. It is our opinion that in large part the scientific evidence used by the MCZ process was accurate, and in general represented the best available evidence at the time. This view is shared by JNCC and Natural England in their advice to Defra.<sup>54</sup> We also believe, however, that the ability and willingness of regional MCZ projects to consider all available scientific data was restricted by the criteria and guidance applied to them by governments and the Statutory Nature Conservation Bodies (SNCBs), in particular for mobile species.

6. While the Ecological Network Guidance for both England and Wales did not completely exclude the possibility of designating MCZs for mobile species, it certainly did not encourage it. We feel that the exclusion of seabirds from the list of features for which MCZs should be sought, alongside a specific statement (in England) that MCZs should only be designated to protect seabirds covered by the Birds Directive “*in exceptional circumstances*”,<sup>55</sup> was a key flaw which led to the exclusion of mobile species, and supporting evidence, from consideration by stakeholder groups. As a result, and given delays in the designation of marine Special Protection Areas (SPAs) for seabirds and waterbirds around the UK, the resulting MCZ proposals with

<sup>52</sup> <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/1624/162402.htm>

<sup>53</sup> Reference Areas in England and highly protected MCZs in Wales.

<sup>54</sup> <http://publications.naturalengland.org.uk/publication/2030218?category=1723382>

<sup>55</sup> <http://archive.defra.gov.uk/environment/marine/documents/protected/mcz-factsheet-mobilespecies.pdf>

other MPAs together will not form an ecologically coherent network, as required by a range of legal obligations and international commitments.<sup>56</sup>

7. The lack of mobile species consideration also meant that some important evidence on these species, which would have been of wider relevance in highlighting biodiverse and productive areas, was not considered at the site selection stage. For example, in Wales, mobile species have not been considered at all in the initial selection of sites and their boundaries.<sup>57</sup> It is our experience that it was a struggle, in our engagement with certain regional MCZ projects, to ensure that any seabird data were included at all, even where those data were in line with those used for, and supported by analysis undertaken in support of, the UK Government's scientifically rigorous selection process for marine Special Protection Areas under the EU Birds Directive.

8. We also feel that the MCZ guidance did not adequately allow or encourage examination of the relationships between MCZs and other MPAs (including Scottish MPAs), in the context of seeking a coherent UK MPA network. As a result the criteria and approaches, and hence the used of scientific evidence, was subject to variation, particularly between Welsh and English projects.

9. Although the wider evidence was considered best available in general, some important data sets were not considered by all stakeholders in the regional MCZ Projects, such as The Wildlife Trusts' data on Areas of Additional Pelagic Ecological Importance (APEI),<sup>58</sup> which was designed to be considered alongside existing datasets. This included a new composite spatial data layer provided by the RSPB on seabird foraging density.<sup>59</sup> Additional to this, RSPB also provided, and continues to offer, species specific seabird factsheets and foraging radii maps to both the English and Welsh MCZ processes.

10. Furthermore, scientific data collected after March 2012 (in particular scientific survey data) has not been included to date and it is unclear how this will be used in the final selection of sites put forward for public consultation in December 2012.

#### On the use of socio-economic evidence

11. The principle of using socio-economic evidence in the MCZ process while the Marine and Coastal Access Bill was being debated was that it should primarily be used to determine preference between two sites of equal ecological importance, so as to minimise the socio-economic impact of designation.<sup>60</sup>

12. It is our opinion, however, that the use of socio-economic evidence was at best not consistently applied, in part stemming from the unclear nature of the relevant Project Delivery Guidance for regional projects,<sup>61</sup> and at worst significantly undermined the primary objective of the MCZ process to "deliver and recommend an ecologically coherent network of Marine Protected Areas".<sup>62</sup>

13. It is also our opinion that for the process of selecting highly protected MCZs in Wales, the consideration of economic activities resulted in the exclusion of important habitat areas, as well as mobile species. This was due to the way in which areas important for economic activity were screened out, resulting in highly protected MCZs which are neither likely to prevent the most damaging activities nor result in proposed sites covering the most ecologically important areas.

14. In addition, the burden of these highly protected sites, especially in coastal and inshore waters, has fallen disproportionately upon local communities, which often act in a more sustainable fashion than larger commercial interests. As a consequence, and due also to poor communication, large anti-MCZ sentiment has built up in some coastal communities, especially in and around proposals for highly protected sites.

15. In England, several sites identified on the basis of their features, based on the best available scientific evidence, were also reduced and moved following the consideration of socio-economics. For example, site NG1 in the Net Gain project as initially proposed was divided and reduced, with particular regard to proposed offshore wind and associated cable routes, to a selection of four significantly smaller sites, only two of which

<sup>56</sup> This includes the OSPAR commitment for an ecologically coherent network in place by 2012 and well managed by 2016, World Summit on Sustainable Development Agenda 21 commitment for representative networks of MPAs by 2012, Convention on Biological Diversity target for ecologically representative and well-connected systems of protected areas (as renoted at Rio+20) and the MSFD requirement for spatial protection measures contributing to coherent and representative networks of MPAs in place by 2016.

<sup>57</sup> <http://wales.gov.uk/docs/desh/consultation/120419marinesiteen.pdf> Page 91.

<sup>58</sup> [http://portal.oceannet.org/search/full/catalogue/medin.ac.uk\\_\\_MEDIN\\_2.3\\_\\_ISCZ00000001.xml](http://portal.oceannet.org/search/full/catalogue/medin.ac.uk__MEDIN_2.3__ISCZ00000001.xml)

<sup>59</sup> Based on foraging radii maps and Seabird 2000 colony data, as well as species-specific measures of decreasing density with distance from colony and colony size.

<sup>60</sup> Explanatory note 335 to the Marine and Coastal Access Act 2009 states, "Where there is a choice of alternative areas which are equally suitable on ecological grounds, socio-economic factors could be more significant in deciding which areas may be designated as an MCZ."

<sup>61</sup> <http://jncc.defra.gov.uk/PDF/Project%20Delivery%20Guidance%20FINAL%20020710%20secure.pdf>

<sup>62</sup> Ibid. Section 4.1.

were put forward in the final recommendations, against the advice of the UK Science Advisory Panel (SAP).<sup>63</sup> As a result, the locations of the final recommended sites cannot claim to be based primarily on environmental evidence.

16. Indeed, in the cases of both the Net Gain and Irish Sea Marine Conservation Zone Projects, sites were selected away from areas of socio-economic activity from the outset, rather than purely on biological grounds. This was the reason why, for example, the Flamborough-Helgoland frontal system, crucial for a range of marine wildlife, was omitted, and relevant scientific evidence not considered by the stakeholder group, despite clear advice from the SAP to do so.<sup>64</sup>

### On the burden of proof for scientific evidence

17. It is our view that during the MCZ process, the burden of proof for scientific data and evidence was far greater than required for socio-economic evidence, which was not subjected to the same level of scrutiny or data standards. Evidence in the marine environment will never be perfect for all areas, given the complexity of interactions and scale of the UK marine area, and it must be accepted that the level of suitable evidence for marine designations cannot reach that of terrestrial designations. Furthermore, the availability of data on wildlife at sea has been constrained by significant under-investment in data collection at sea to inform both MPA selection and strategic planning.

18. The original Ecological Network Guidance<sup>65</sup> Design Principle 9, prepared by Natural England and JNCC for the regional MCZ Projects in England, states that:

*“Lack of full scientific certainty should not be a reason for delaying network design and planning, including decisions on site identification.”* (Page 4)

19. Furthermore, the MPA Science Advisory Panel (SAP), in reviewing the first iteration of MCZs,<sup>66</sup> has stated that:

*“We emphasise that the MCZ process requires the use of the “best available evidence”. Some level of uncertainty in data is inevitable, and project teams should use the data provided unless there is robust evidence to the contrary available for particular areas.”* (Paragraph 2.1.1)

20. It should also be noted that the statutory advice given to Defra by JNCC and Natural England in July 2012<sup>67</sup> states the following:

*“We advise that some features or sites may appear to have less information than others in terms of contribution to the network design principles and ecological benefits; however, this may be a reflection of limited data and evidence rather than an indication of their importance”* (Page 7)

21. Furthermore, Natural England and JNCC are clear in this advice that:

*“Moderate and low confidence features should not necessarily prevent sites from being progressed for designation, particularly if there is confidence on the presence of the feature”* (Page 10).

This is particularly true for feature condition, which was expected by JNCC and Natural England to have limited scientific evidence, especially outside existing designated sites.

22. We fully support the need for the selection of MPAs to be based upon the best available evidence, and we continue to call for further systematic research and monitoring to improve our knowledge of the marine environment. However, this need for an evidence-based process must not be used as a reason to delay the designation of MCZs, especially where they are regarded as being at risk from potentially damaging activities.

23. This fundamentally contradicts the Precautionary Principle, which states that lack of scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

<sup>63</sup> UK Science Advisory Panel (SAP) Draft response to Net Gain 3rd Iteration Report, May 2011, Paragraph 2.9.3, <http://tiny.cc/gbp9jw> (note the Net Gain website and public access to previous iterations of MCZs is currently unavailable as of 7 September 2012). The SAP response also states that *“we remain concerned that largely un-quantified [i.e. before an impact assessment is prepared] socio-economic issues based on stakeholder views are having a strong influence on the choice of individual sites at the earliest stage of each discussion... the primary purpose of MCZs is to conserve habitats and species that are representative and important indicators of ecological health; protection of unproductive areas of the seabed will not accomplish that.”* (Paragraph 2.2).

<sup>64</sup> E.g. *ibid*, Paragraph 2.9.14.

<sup>65</sup> [http://jncc.defra.gov.uk/pdf/100705\\_ENG\\_v10.pdf](http://jncc.defra.gov.uk/pdf/100705_ENG_v10.pdf)

<sup>66</sup> <http://archive.defra.gov.uk/environment/marine/documents/protected/20100705mczsap-netgainresp.pdf>

<sup>67</sup> <http://publications.naturalengland.org.uk/file/2097275>

<sup>68</sup> The High Level Marine Objectives for marine planning include *“The precautionary principle is applied consistently in accordance with the UK Government and Devolved Administrations’ sustainable development policy.”*



This Principle is a fundamental part of the Marine and Coastal Access Act's development and subsequent implementation in other areas, in particular marine planning.<sup>69</sup>

September 2012

### Written evidence submitted by the Natural Environment Research Council (NERC)

#### NERC NATIONAL OCEANOGRAPHY CENTRE RESEARCH VESSEL STATISTICS

##### Introduction

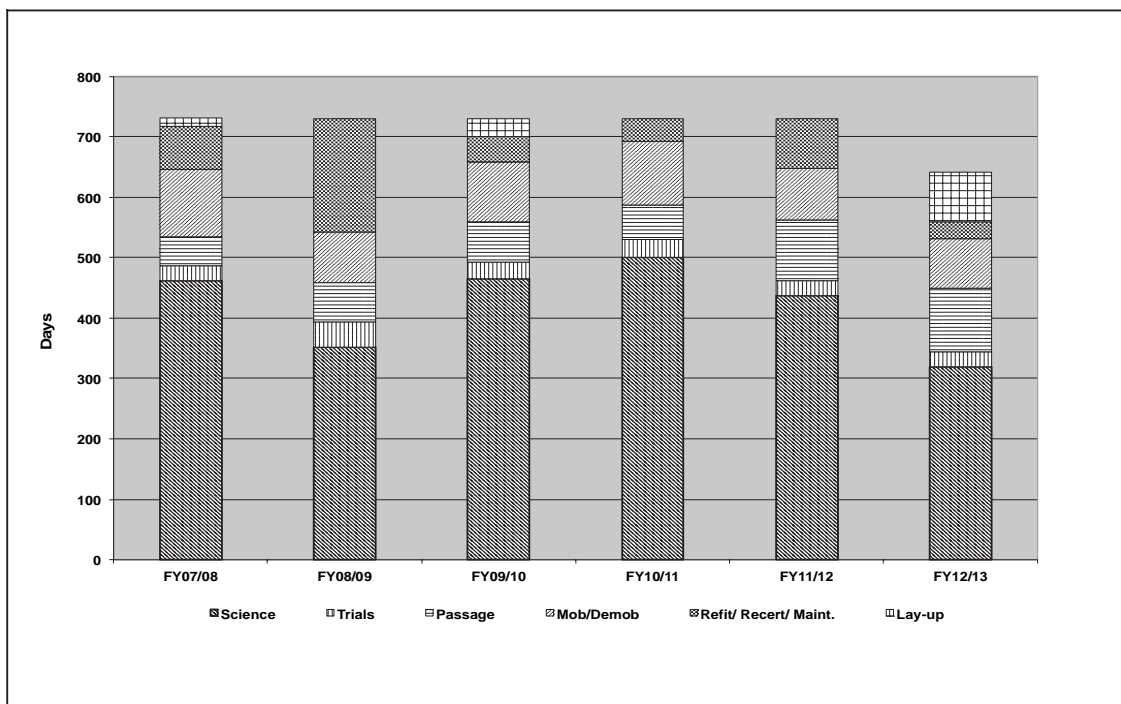
The National Oceanography Centre (NOC) operates two global class multidisciplinary research vessels, *RRS Discovery* and *RRS James Cook* on behalf of NERC for the UK marine science community. The National Marine Facilities—Sea Systems (NMFSS) group of NOC manages these vessels and supports a comprehensive suite of equipment comprising the National Marine Equipment Pool (NMEP) with a team of specialist technicians.

##### Usage

Figure 1 below shows combined activity for the two vessels operated by NMFSS over the current FY and previous five years. The current FY comprises less than two full ships years as the *RRS Discovery* completed its final science cruise in November 2012 and has recently been sold for recycling. However, taking the previous five full years, the annual average days spent at sea is 540—ie 270 for each ship. This is slightly lower than NERC's planning figure of 550 annually for both ships, and reflects the substantially reduced sea days in FY08/09, when *RRS Discovery* suffered a major breakdown of her obsolete machinery control system (nb, the ship was originally launched in 1962).

Figure 1

NMFSS SHIP DAYS BY ACTIVITY FY07/08–FY 12/13



<sup>69</sup> The High Level Marine Objectives for marine planning include “The precautionary principle is applied consistently in accordance with the UK Government and Devolved Administrations’ sustainable development policy.”

**Table 1**  
NMFSS SHIP DAYS BY ACTIVITY FY07/08–12/13

Activity Category		FY07/08	FY08/09	FY09/10	FY10/11	FY11/12	FY12/13
Non	Lay-up	14	0	30	0	0	82
Science	Refit/Maintenance	72	188	42	37	82	28
	<b>TOTAL</b>	<b>86</b>	<b>188</b>	<b>72</b>	<b>37</b>	<b>82</b>	<b>110</b>
		<b>(12%)</b>	<b>(26%)</b>	<b>(10%)</b>	<b>(5%)</b>	<b>(11%)</b>	<b>(17%)</b>
Science	Mob/Demob	111	83	99	105	86	83
	Passage (Sea)	49	66	67	58	100	105
	Trials (Sea)	24	41	27	29	25	25
	Science (Sea)	462	352	465	501	437	319
	<b>TOTAL</b>	<b>646</b>	<b>542</b>	<b>658</b>	<b>693</b>	<b>648</b>	<b>532</b>
		<b>(88%)</b>	<b>(74%)</b>	<b>(90%)</b>	<b>(95%)</b>	<b>(89%)</b>	<b>(83%)</b>

It is also worth noting the following in interpreting Figure 1:

- Maintenance days in FY11/12 is largely comprised of waiting time for a dry dock to become available in Mexico, following entanglement of the *RRS Discovery's* prop in fishing gear in the Easter Pacific in January 2012.
- Each ship spends 40–50 days each year in port mobilising and demobilising equipment between cruises. The actual number of days required is a function of the nature and complexity of the science, and consequently these days are designated are also counted as days available for science. The ships are designed to be flexible so the working decks and labs are reconfigured on a cruise-by-cruise basis to suit the planned science. In this respect, most equipment including the Remotely Operated Vehicle (ROV), comprising over 90T of equipment is considered “portable”. The ships do not return to the UK to do this, but rather undertake this activity at a suitable port as close to the operating area as possible. NMFSS ships 800–1,000 Tonnes of freight, including ca. 150 20-foot ISO containers annually to underpin this activity.

Overall, the days available for science (science, transit and mobilisation days) were 87% for the period, while if the older *RRS Discovery* is discounted; the *RRS James Cook* achieved an average of 339 days (93%) available for science, of which an average of 288 days (79%) were spent at sea.

Figure 2 below shows the number of scientists embarked multiplied by the number of days at sea on science. The data shows that on average, NOC<sup>70</sup> scientists account for 36% of the days, while the split between all NERC and non-NERC scientists is almost exactly 50/50, although in FY10/11 and FY11/12, the proportion of non-NERC days substantially exceeded the NERC days. Discounting FY08/09 and FY12/13, which comprised reduced ship availability, as explained above, there has been an upward trend in occupation since the *RRS James Cook* was introduced into service in 2006. Increasing trends towards multidisciplinary science teams has driven this and total science berths available on the two vessels will have increased from 18 and 28 prior to 2006 to 28 and 32 once the new *RRS Discovery* comes into service. These capacities are substantially larger than other research vessels operated by the fisheries laboratories as well as most commercial vessels.

<sup>70</sup> Includes University of Southampton scientists based at the NOC waterfront campus.

**Figure 2**  
SCIENTIST SEA DAYS BY PARENT INSTITUTE

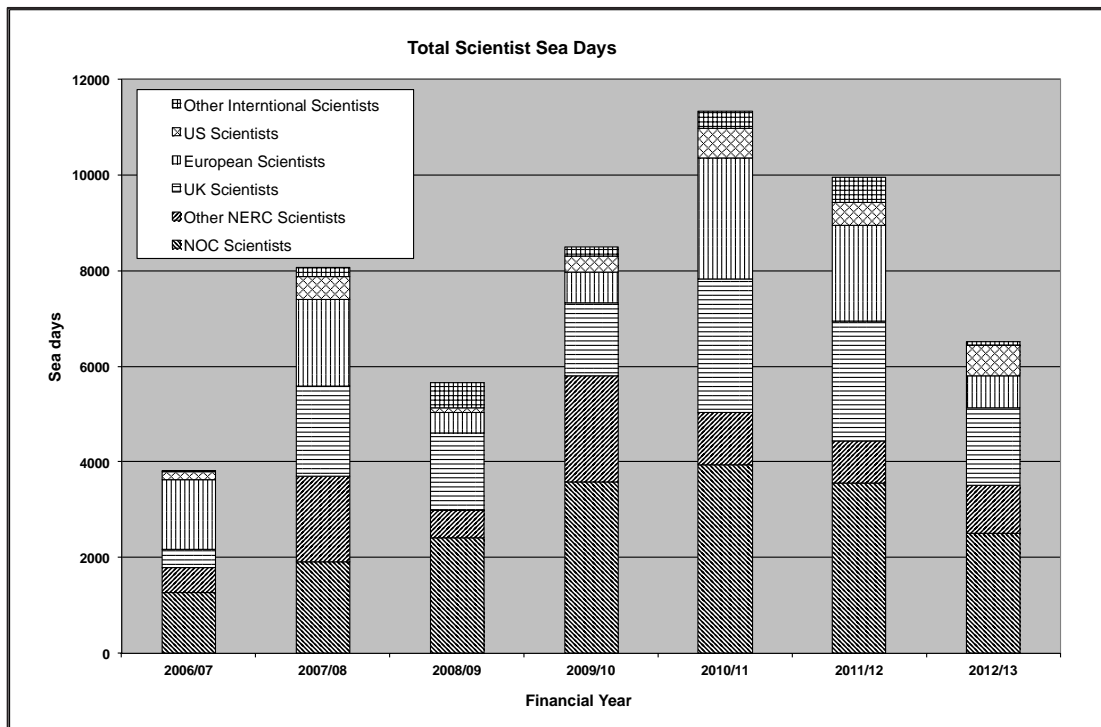


Figure 3 and Figure 4 below indicate the general operating areas of the two vessels between FY08/09 and FY11/12.

It is clear from Figure 3 that the *RRS Discovery* has worked predominantly in the North Atlantic, and has been the workhorse for supporting the sustained observing Porcupine Abyssal Plain, RAPID/RAPIDWatch and Atlantic Meridional Transect cruise series. The latter has regularly taken the ship as far afield as Punta Arenas at the southern tip of Chile. Nevertheless, the ship's more limited capabilities; particularly lack of multibeam echosounder and dynamic positioning (DP) has progressively restricted its utility over recent years.

Figure 3

RRS DISCOVERY GEOGRAPHIC OPERATING AREA

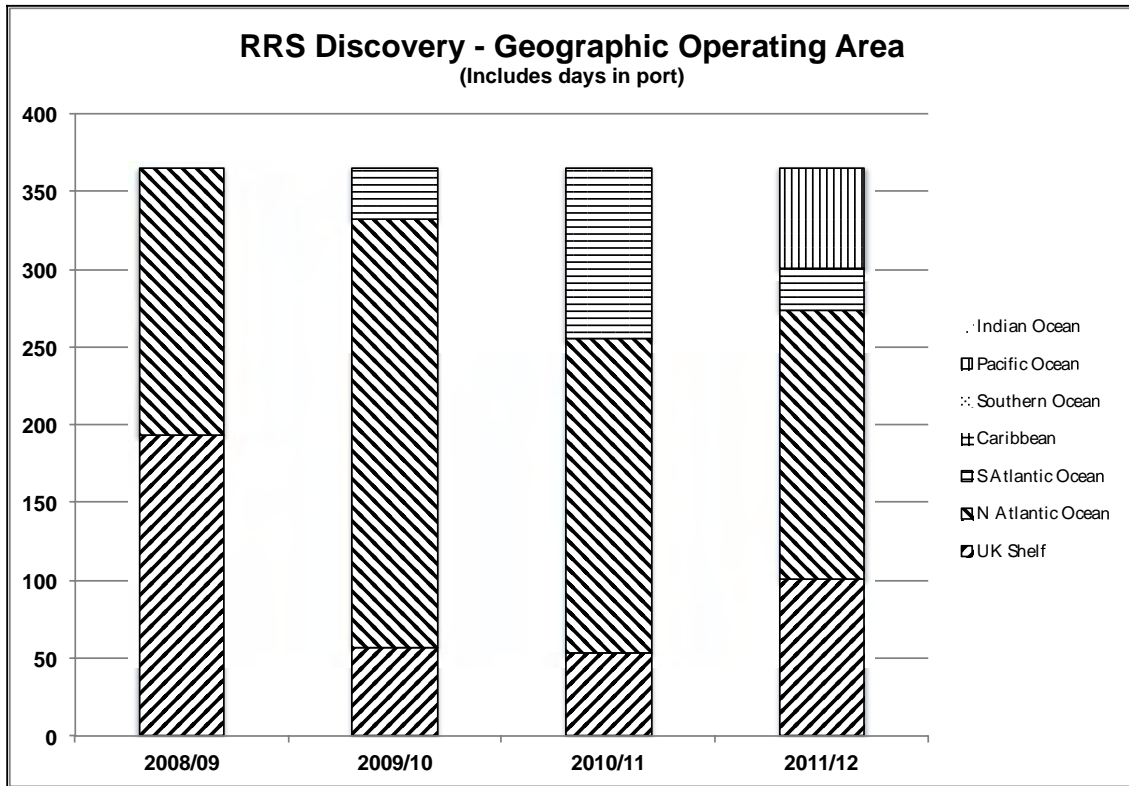


Table 2

RRS DISCOVERY GEOGRAPHIC OPERATING AREA

Operating Area	2008-09	2009-10	2010-11	2011-12
Indian Ocean	0	0	0	0
Pacific Ocean	0	0	0	64
Southern Ocean	0	0	0	0
Caribbean	0	0	0	0
S Atlantic Ocean	0	33	110	27
N Atlantic Ocean	172	275	202	173
UK Shelf	193	57	53	101

In contrast the *RRS James Cook* has worked in more diverse and remote areas, generally reflecting cruises that require use of the ship's dynamic positioning capability (required for ROV operations) and/or its greater scientific capabilities as well as berths.

Figure 4

## RRS JAMES COOK GEOGRAPHIC OPERATING AREA

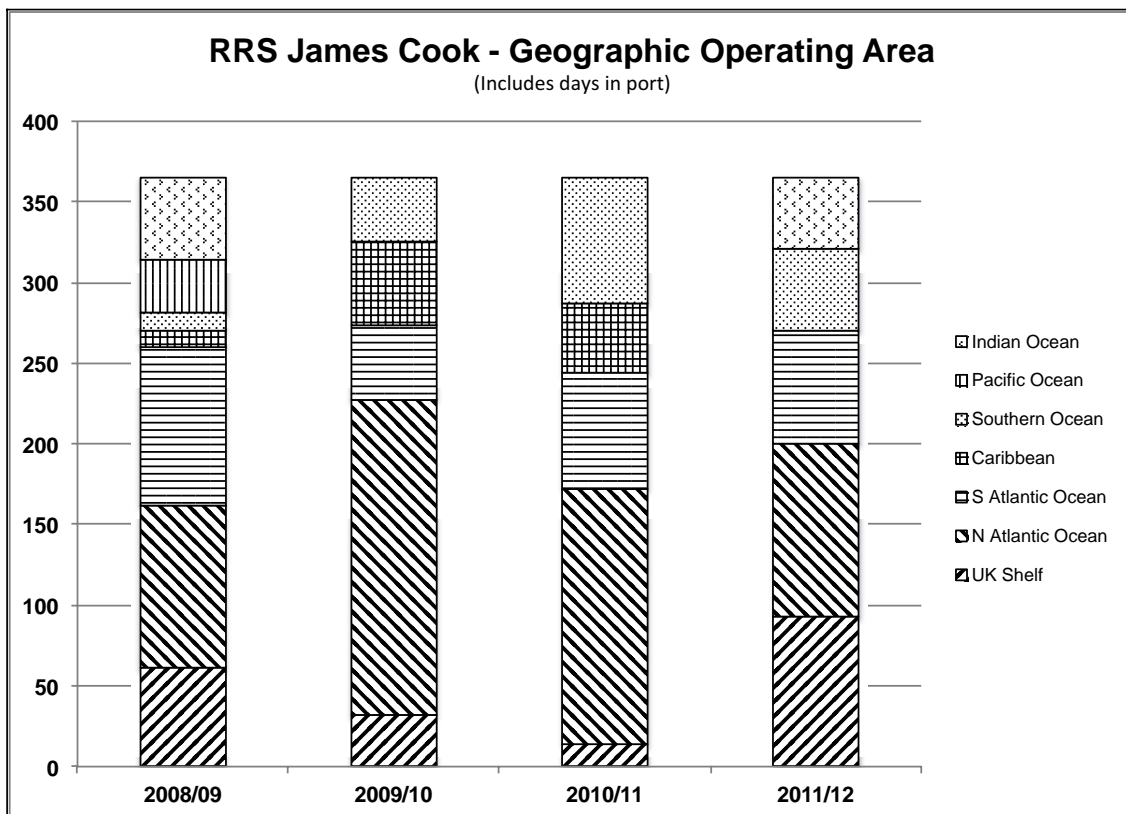


Table 3

## RRS JAMES COOK GEOGRAPHIC OPERATING AREA

Operating Area	2008-09	2009-10	2010-11	2011-12
Indian Ocean	51	0	0	44
Pacific Ocean	33	0	0	0
Southern Ocean	11	40	78	51
Caribbean	10	51	43	0
S Atlantic Ocean	98	47	72	70
N Atlantic Ocean	101	195	158	107
UK Shelf	61	32	14	93

A significant proportion of the UK Shelf time shown in both graphs is in connection with refits and major mobilisation of the vessels. Indeed science time on the UK shelf is very limited temporally and spatially (eg there has only been one large cruise in the North Sea in the last 10 years.) This has been particularly noted during the MSCC working group on research vessel operations, as the operating footprint is very different to the fisheries laboratory ships, which conversely work predominantly on the UK shelf.

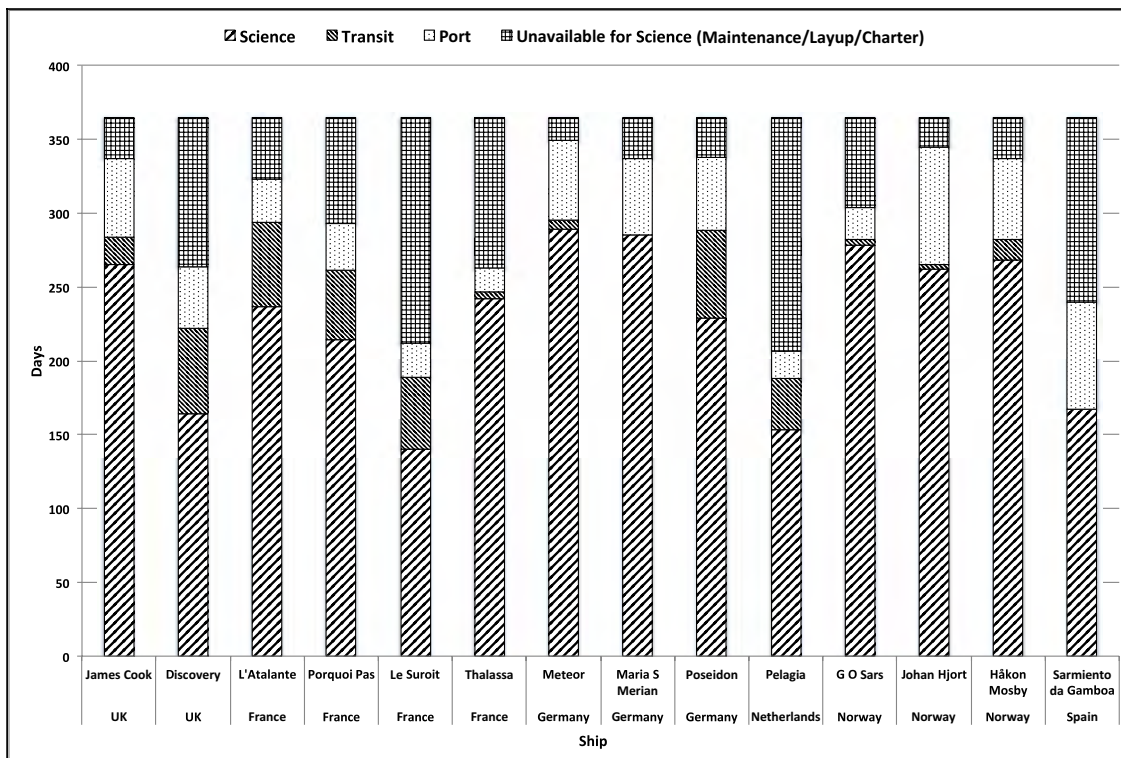
## Comparison with other Operators

Figure 5 below outlines activity of the main vessels of the Ocean Facilities Exchange Group (OFEG) during CY2012. The members of OFEG operate all eight non-polar global class European vessels and 12 out of 15 ocean class European vessels ships.<sup>71</sup> As a consequence the data is a good basis for comparison, as the ships are generally of similar sizes and operating on a worldwide basis. The one exception to this is the Norwegian ships, which predominantly operate around their coast and continental shelf with occasional excursions to Iceland. This data shows that the *RRS James Cook* pattern is comparable to similar French and German vessels, but as noted above, 2012 is not a representative year for the *RRS Discovery*, which was subject to entanglement in fishing gear in the Pacific: this entailed a substantial delay and subsequent dry-docking, which has significantly reduced the number of days at sea in 2012.

<sup>71</sup> Only the global class and the main ocean class are shown in the graph.

Figure 5

## OCEAN FACILITIES EXCHANGE GROUP (OFEG) SHIP ACTIVITY 2012



A number of other features need explaining:

- France (Ifremer) operate their four main vessels with three crews;<sup>72</sup> consequently utilisation of the *Pourquoi Pas?* and *L'Atalante* tends to be maximised, while the *Thalassa* and *Le Suroit* spend substantial periods laid up. The other French vessel *Marion Dufresne*, operated by IPEV is primarily a resupply vessel for the French sub-Antarctic islands in the Indian Ocean, so only operates in this role for the Austral season, and spends the remainder of the year as a training vessel or on charter.
- Netherlands (NIOZ) only has funding to operate the *Pelagia* for about half the year; the remainder is spent on charter or laid up.
- Spain (CSIC) has suffered significant funding cuts over the past year and as a consequence, the *Sarmiento da Gamboa* has spent extended periods tied up alongside in its home port of Vigo.

### Running Costs

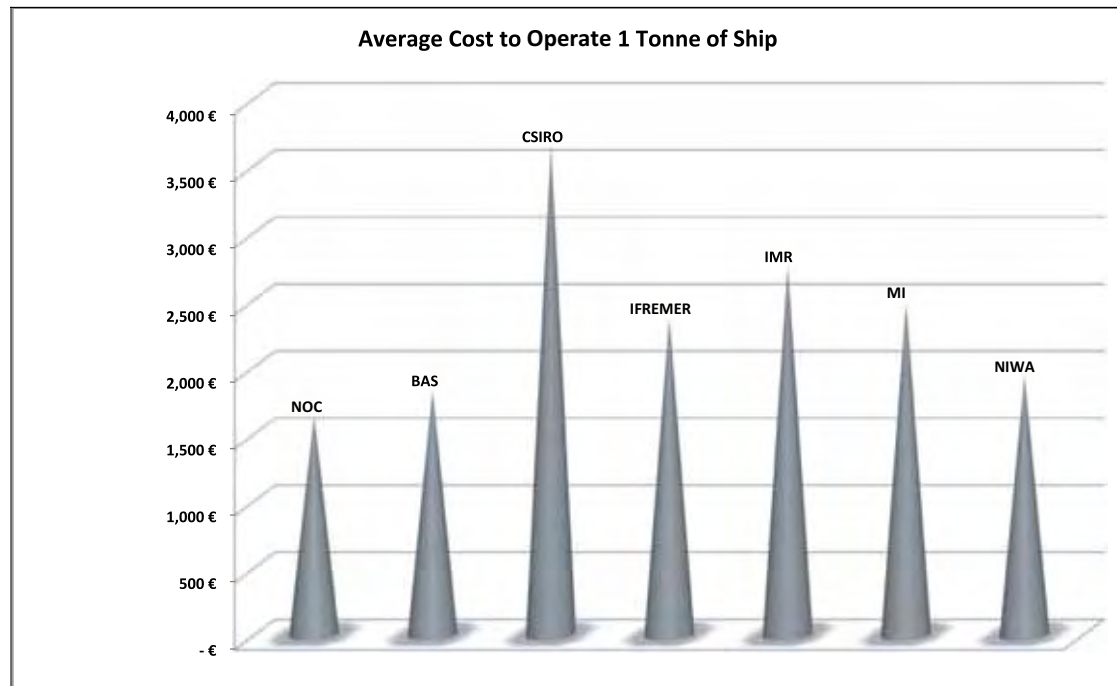
Informal discussions with other operators have repeatedly indicated that both the NOC and BAS operations are among the most cost-effective for global class vessels: The NATO Undersea Research Centre (NURC) and US National Science Foundation (NSF) have both provided data that indicates comparable costs for like vessels in their fleets, while information provided by Germany has indicated costs which are substantially greater. It is worth noting that while the NSF vessels are publicly run, operation of NATO's vessel *Alliance* is contracted out, as are the majority of the German vessels.

In addition to these informal discussions, a subset of operators, comprising a selection of in-house, outsourced and Companies Limited by Guarantee (CLG), from the International Research Ship Operators' (IRSO) group undertook a formal benchmarking of their ship operations in 2009. While the purpose of this exercise was predominantly for the benefit of the Irish Marine Institute (MI), who were re-tendering their outsourced ship management contract at the time, the data was shared with all participants. The Irish chose to index the data by ship length, and although this is a poor measure for this purpose, both BAS and NOC were close to the average for the group on this basis. The data in Figure 6 re-works this data indexed instead to Gross Registered Tonnage, which is considered to be a better measure: the reasoning being that the NOC operated ships are both of similar length, however operating costs for the larger *RRS James Cook* are significantly larger, mainly due to fuel consumption and maintenance. Under this measure, both the NOC and BAS operations come out as most economic, while under both measures the average of in-house costs was lower than the outsourced operations.

<sup>72</sup> Actually six crews as there are two mariners per post.

Figure 6

## INTERNATIONAL RESEARCH SHIP OPERATORS (IRSO) BENCHMARKING 2009



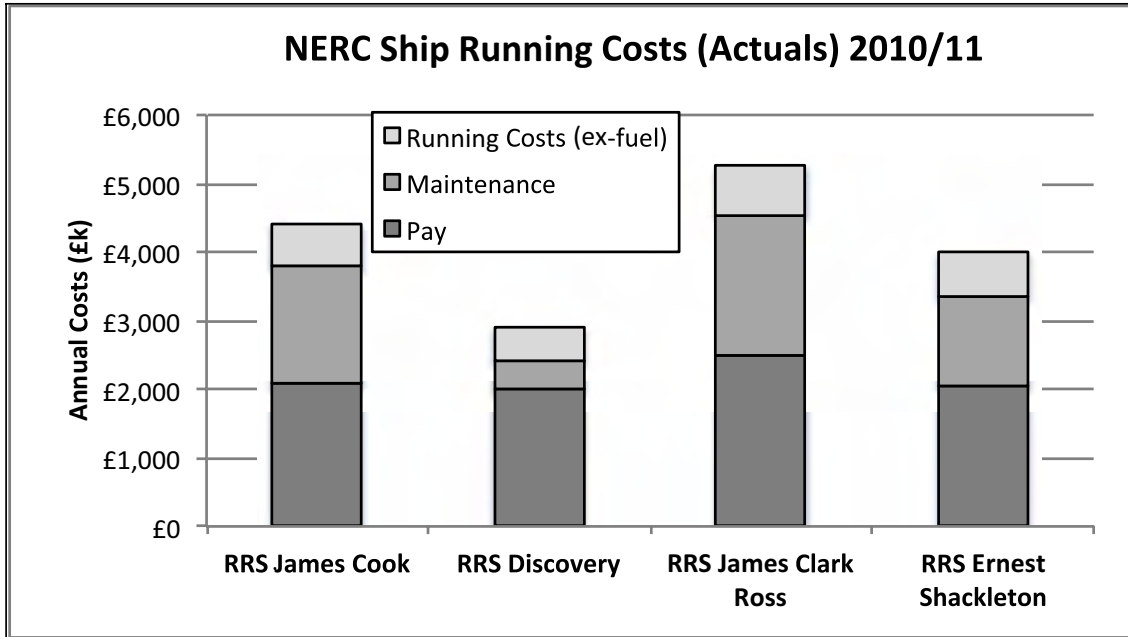
Institute	NOC	BAS	CSIRO	Ifremer	IMR	MI	NIWA
Country	UK	UK	Australia	France	Norway	Ireland	NZ
Management	In-house	In-house	Outsourced	CLG	In-house	Outsourced	CLG
GRT	8,808	7,641	1,594	15,738	9,451	2,765	2,591
No. of RV	2RV	2RV	1RV	7RV	6RV	2RV	2RV
Av. Cost to Operate 1T (GRT) of Ship	1,627 €	1,817 €	3,645 €	2,357 €	2,746 €	2,474 €	1,925 €

In considering the above, the following factors are worth noting:

- The National Institute for Water and Atmosphere—NIWA (NZ) costs do not include scientific technical support, unlike the others, so these costs are artificially low.
- The Ifremer (France) fleet includes three small vessels of less than 25m in length and ca. 100 GRT each.
- The Commonwealth Scientific and Industrial Research Organisation—CSIRO (Australia) and MI (Eire) operations are both outsourced to P&O Maritime Services.

Figure 7 below reflects a more recent exercise conducted during the 2011 NERC Ship Management Review, which baselined cost across the four NERC vessels. These figures show that crew pay costs continue to be the main cost component of operating these vessels, while it should also be noted that maintenance costs can vary substantially from year to year. Fuel costs have been explicitly excluded as they are closely related to operating regime, nevertheless these are the most rapidly increasing component of ship operating costs. Typical annual fuel costs for the NERC vessels range from £1.35–2.4 million depending on vessel and programme.

**Figure 7**  
NERC ANNUAL SHIP RUNNING COSTS (ACTUAL) FOR 2010–11



The data have also been compared with NSF's costs for same year<sup>73</sup> for the *RV Knorr* (operated in-house by Woods Hole Oceanographic Institute—WHOI), which is similar in size to *RRS Discovery*<sup>74</sup> as below:

Running Costs	£0.724M
Maintenance	£1.091M
Pay	£2.215M
<b>Total:</b>	<b>£4.030M</b> (£1 = US\$1.60)

The reality is that the majority of ship running costs such as pay, fuel and maintenance are incurred irrespective of management model, while pay and the majority of maintenance are fixed costs and unaffected by usage. Outsourced operations tend to be at their most economic when the management company can spread its management costs over a larger number of vessels. This also produces economy of scale in buying insurance, although this is not relevant to the NERC vessels while they remain in-house, but Hull and Machinery Insurance for the two NOC operated vessels has been quoted at £230k for both vessels. Most commercial companies also employ their staff through offshore agencies, thereby avoiding NI contributions, while many also source cheaper labour for lower skilled roles from Asia. NERC's continuing policy has been to source its labour from the EU and not to avoid contributions to the UK exchequer. Finally, NERC would be subject to VAT on services not subject to end-user relief provided by a contractor.

Several commercial operators have asserted that they can run the NERC vessels with less crew, however evidence from a variety of sources suggest that this is unlikely:

- Figure 8 below is extracted from the annual IRSO manning survey and shows crew composition for the global class vessels operated by members, with a variety of management models. This clearly shows that the NOC vessels are the most leanly manned, and generally comparable to similar US vessels.

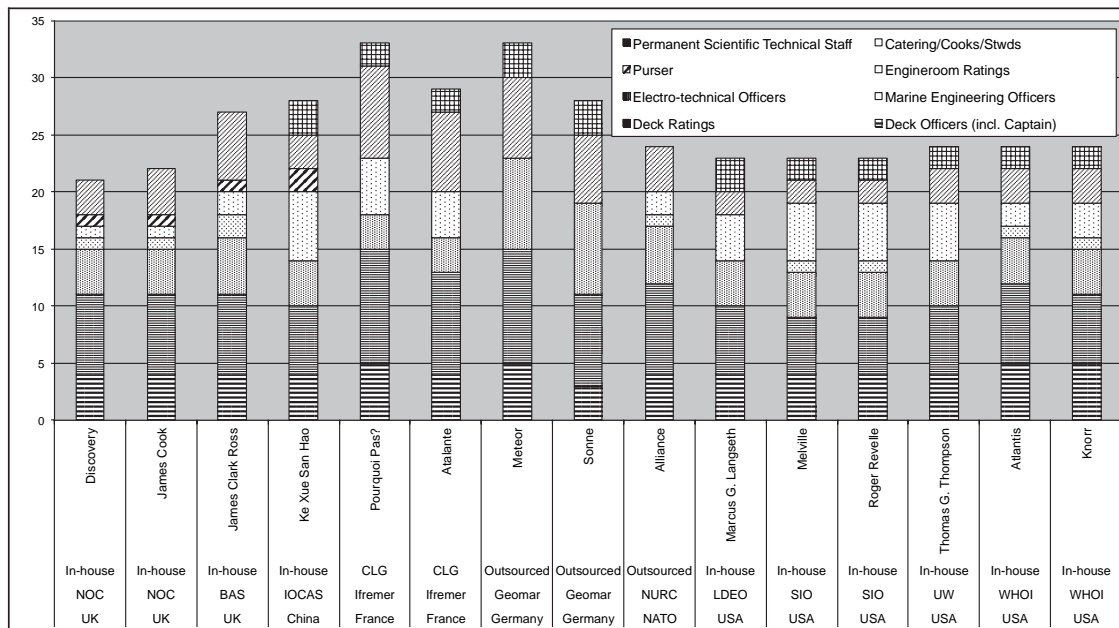
<sup>73</sup> 283 days at sea and 59 days maintenance.

<sup>74</sup> *RV Knorr* 85m LOA and 2,518 GRT compared to *RRS Discovery* 90m and 3,008 GRT.



Figure 8

## MANNING OF GLOBAL CLASS RESEARCH VESSELS



- Three ship management companies, P&O Maritime Services, Smit UK and Anglo Eastern were questioned during the 2009 NERC Ship Management Review. All three clearly indicated that they would retain the current NERC manning levels if they were contracted to operate these vessels. They also confirmed that the 2:1 man/berth (crew FTE per onboard rank/post) in NERC was, “normal or even low in the market place.”<sup>75</sup>
- None of the ship operators interviewed in 2009 (Alfred Wegner Institut, [Germany], MI [Eire] or Centre for Environment, Fisheries and Aquaculture Science—CEFAS [UK],) could demonstrate quantitative savings from having outsourced their ship operations. In 2011 CEFAS and MI were again interviewed, together with NURC (NATO), Geomar (Germany) and CSIRO (Australia). All confirmed that manning levels on their ships had not changed as a consequence of outsourcing.

NERC does not discount outsourcing management of its ships, (indeed NOC management is positive towards such a measure,) however it would difficult to justify this on cost saving alone, and business risk reduction (particularly with respect to access to a larger crew pool and more efficient spares procurement) would be the main driver.

January 2013

### Written evidence submitted by the UK Ocean Acidification (UKOA) research programme

#### 1. Introduction

1.1 The Science and Technology Committee identified ocean acidification as an issue of specific interest to its inquiry on marine science, in the context of global warming (Q6 of the inquiry announcement). The main direct cause of ocean acidification—rising carbon dioxide (CO<sub>2</sub>) in the atmosphere—is the same as for global warming, but the two processes are distinct; ocean acidification has therefore been called “the other CO<sub>2</sub> problem”.

1.2 This submission considers the recent development of UK research on ocean acidification in terms of its strategic oversight and coordination (in response to Q1); the delivery of the Marine Science Strategy (Q2); the balance between polar and non-polar research (Q5); and the monitoring and assessment of global change impacts (Q6). Summary information on relevant training, communications and science-to-policy outreach is also included on the basis that such aspects may be of interest to the Committee.

1.3 The authors of this submission recognise that ocean acidification is very likely to be mentioned in the evidence provided by Research Councils and government departments, and maybe others. The justification for a separate, single-focus submission is that ocean acidification can be considered as a case study of an emerging marine environmental topic of high societal importance, and how that is being addressed (successfully, from a scientific perspective) by the research community, UK funding agencies and international bodies.

<sup>75</sup> Report of the Ship Operations Review Project, NERC, February 2009.

## 2. The development of UK ocean acidification research

2.1 Within the past decade it has become evident that human-driven changes in atmospheric composition are also causing global changes in seawater chemistry, with potentially damaging impacts on marine ecosystems and the services they provide for human well-being. The Royal Society's 2005 review of ocean acidification<sup>76</sup> played a major role in bringing scientific (and policy) attention to this issue. In that year, there were only around five other research publications specifically on ocean acidification; since then, the annual total has increased more than 40-fold, to ~280 in 2011 (Table 1). Over that seven year period, around 14% of ocean acidification research papers have had UK lead authors, second only to the USA.

2.2 In 2007, the early development of UK research on ocean acidification was greatly assisted by the outcomes from the Defra/DTI-funded project "Implications for the Marine Environment of CO<sub>2</sub>" (IMCO2)<sup>77</sup> led by Plymouth Marine Laboratory. There were also several relevant activities and work packages in the newly-started, NERC-funded Oceans 2025 programme, with an associated Strategic Ocean Funding Initiative (SOFI) research grant awarded to Essex University and the Marine Biological Association.

**Table 1.** Worldwide research publications in ocean acidification\*: annual totals 2005–11 and number of UK papers, based on lead author's affiliation. The "top ten" for national research output on that basis over that period was: (1) USA, 229 papers; (2) UK, 104; (3) Australia, 80; (4) Germany, 60; (5) Japan, 32; (6=) Canada and France, 31; (8) China PR, 20; (9) Sweden, 18; (10) New Zealand, 15. Twenty-seven other countries also contributed to the scientific literature on ocean acidification over that seven-year period. Note that this publication summary contains few publications directly arising from the UK Ocean Acidification research programme, for which the main research outputs are expected in 2012–15.

	2005	2006	2007	2008	2009	2010	2011	Total
Total no. of papers	6	13	37	88	140	172	280	736
UK papers	1	2	9	18	17	19	38	104
	(16%)	(15%)	(24%)	(21%)	(12%)	(11%)	(14%)	(14%)

\* Data from ISI Web of Knowledge v5.3 using "ocean acidification" as the search term and checking abstracts for relevance. Use of additional search terms (e.g. pH and CO<sub>2</sub>) is likely to have increased the number of papers, particularly in 2005–07, but would have required more subjectivity in assessing relevance. A similarly rapid recent increase in ocean acidification publications is reported in Gattuso J-P & Hansson L (2011) *Ocean Acidification*, Oxford University Press.

2.3 Planning for a more comprehensive, national research effort—the UK Ocean Acidification research programme, UKOA—began in 2007–08, with the development of a NERC Theme Action Plan. This Action was approved by NERC Council in 2009 and subsequently accredited by the Living with Environmental Change (LWEC) partnership. Co-funding by NERC, Defra and DECC was agreed at the combined level of £12.4 million over five years.

2.4 Based on the UKOA Science Plan and Implementation Plan, multi-institute consortium proposals were solicited. Awards were made in 2010, following international peer review. UKOA currently supports seven research consortia, an analytical laboratory and 12 research studentships, involving a total of ~120 researchers and collaborators at 26 universities, NERC research centres and other institutions (including Cefas, Marine Scotland and the Meteorological Office/Hadley Centre). It is directed by a Programme Executive Board, representing funders, and guided by a Programme Advisory Board, involving national and international experts.

2.5 UKOA research is focussed on the following science areas: observations and trends in oceanic pH; impacts on upper ocean biogeochemistry; impacts on benthic (seafloor) ecosystems; impacts on commercially-important species and socio-economic implications; previous ocean acidification events, on geological timescales; and regional and global modelling of ecosystem responses and climate feedbacks. UKOA also supports a carbonate chemistry analysis laboratory for research groups in the programme.<sup>78</sup>

## 3. Match to UK Marine Science Strategy

3.1 The UKOA programme directly addresses a specific issue identified in the MSCC's 2010 UK Marine Science Strategy "Effects of acidification on marine organisms", within the broader science priority of "Responding to climate change and its interaction with the marine environment".

3.2 Other issues, science priorities and strategic goals of the UK Marine Science Strategy are also covered by the programme. Examples of UKOA's match to more generic objectives include maximising the benefits of international collaboration; developing cost-effective sustained observing systems; pro-active communication to a wide range of stakeholders; training the next generation of marine scientists; and using sound science responsibly to promote good governance. Several of these aspects are considered in greater detail below.

<sup>76</sup> Royal Society. 2005. *Ocean acidification due to increasing atmospheric carbon dioxide*. Policy document 12/05; The Royal Society, London.

<sup>77</sup> The IMCO2 project (2003–07) also addressed CO<sub>2</sub> leakage issues relating to CCS (Carbon Capture and Storage). IMCO2, together with a NERC responsive-mode research grant, funded the construction of the PML ocean acidification experimental system that has underpinned much subsequent research.

<sup>78</sup> [www.oceanacidification.org.uk](http://www.oceanacidification.org.uk).

#### 4. International context

4.1 During the past five years, many other countries have also greatly increased their support for ocean acidification research. Complementarity of effort has been maximised, and duplication minimised, through three main mechanisms:

- *EU funding and coordination* through the European Project on Ocean Acidification, EPOCA (€16m, 2008–12)<sup>79</sup> and the Mediterranean Sea Acidification in a Changing Climate project, MedSeA (€6 million, 2011–14).<sup>80</sup> Both projects have multiple UK science partners. In EPOCA, the UK had a lead role for education, outreach and knowledge exchange; science-to-policy highlights included the EU Ocean Acidification day (Brussels, 9 May 2011) and two recent presentations by UK researchers in the European Parliament. EU/EC funding does, however, depend on matching support from national sources.
- *Enhanced international coordination and collaboration on a worldwide basis*, primarily achieved to date by a joint working group of the Surface Ocean-Lower Atmosphere Study (SOLAS) and the Integrated Marine Biogeochemistry and Ecosystem Research project (IMBER), with knowledge exchange assistance by the (UK-led) international Reference User Group on Ocean Acidification. The recently established International Coordination Centre for Ocean Acidification Research, based in Monaco, will take forward that global facilitating role, in close liaison with the Future Earth initiative of ICSU and the Belmont Forum.
- *Bilateral linkages between national programmes*, both at the strategic level and via direct contacts between researchers. The UKOA Implementation Plan included formal links with the German BIOACID programme, through meetings, collaborative fieldwork and cross-membership of Advisory Boards. The delivery of such connections has been assisted by a UKOA supplementary funding scheme, providing (modest) additional support for international studies that add significant value to the national effort. Links with US ocean acidification researchers have also been promoted by the FCO-BIS Science & Innovation Network, that funded ten US-UK working exchanges through Collaborative Development Awards and a joint US-UK workshop.

#### 5. Geographical scope

5.1 The geographic coverage of the UKOA programme has three main groupings:

- *UK coastal seas and the North-West European shelf*. These areas provide the main focus for laboratory and field studies on the effects of pH change on marine organisms (microbes, invertebrates and fish), to be scaled-up by regional modelling. The programme's first two research cruises (RRS *Discovery* 366;<sup>81</sup> RRS *James Cook* 73;<sup>82</sup> were mostly in UK waters, in June 2011 and June-July 2012, and can be considered the world's first research cruises specifically directed at measuring ocean acidification and its ecosystem implications.
- *Polar regions* are also of considerable interest, since ocean acidification impacts on calcifying organisms (through calcium carbonate undersaturation) seem likely to be greatest there. In July 2012, the Greenland and Norwegian seas were investigated by the 3rd UKOA research cruise (RRS *James Clark Ross* 271),<sup>83</sup> and the programme's final cruise will be in the Southern Ocean, in January-February 2013.
- The *global scale* is also important for modelling activities within UKOA, since regional models need to be closely coupled to global climate change and biogeochemical feedback processes, particularly when assessing future ocean acidification and its projected impacts. The palaeo- components of the programme also have a global scope, using the geological record from coastal East Africa, North America and elsewhere to re-construct past events involving major, global-scale changes in atmospheric CO<sub>2</sub> and ocean pH.

#### 6. Long-term observations and monitoring

6.1 A five-year research programme, such as UKOA, has a limited role for longterm observations and monitoring. Nevertheless, UKOA's "Observations and synthesis" component is helping to support longterm Atlantic-wide measurements of CO<sub>2</sub> fluxes and carbonate chemistry parameters, and has assisted the initiation of new, large-scale ocean acidification observations in UK shelf seas, in partnership with Cefas and Marine Scotland. Thus underway pCO<sub>2</sub> systems are now operational on RV *Cefas Endeavour* and RV *Scotia*, together with time series stations based on SmartBuoys and additional discrete sampling for carbonate chemistry parameters.

6.2 A framework for international coordination of ocean acidification observations is currently being developed, led by the US National Oceanic and Atmospheric Administration (NOAA), the International Ocean Carbon Coordination Project (IOCCP) and the Global Ocean Observing System (GOOS). The UK is fully

<sup>79</sup> [www.epoca-project.eu](http://www.epoca-project.eu)

<sup>80</sup> [www.medsea-project.eu](http://www.medsea-project.eu)

<sup>81</sup> [www.surfaceoa.org.uk/?page\\_id=50](http://www.surfaceoa.org.uk/?page_id=50)

<sup>82</sup> <http://changingoceans2012.blogspot.co.uk>

<sup>83</sup> [www.surfaceoa.org.uk/?page\\_id=1369](http://www.surfaceoa.org.uk/?page_id=1369)

involved in that process, and is planning to host the 2nd workshop to develop that initiative (St Andrews, July 2013). High quality data management is a core requirement for longterm observing systems, and the UK has particular strengths in that area, through the British Oceanographic Data Centre, BODC.

## 7. Research training

7.1 The UKOA programme includes support for 12 PhD research studentships, closely linked to the consortium-based science groups. These students present their results for discussion at UKOA Annual Science Meetings, attended by other researchers and stakeholders with relevant interests. The programme's 2012 ASM also included participation by 10 other research students, not directly UKOA-supported. Travel awards are available to UKOA students and early-career researchers to enable them to present their results at major international meetings; e.g. the 3rd "Ocean in a High CO<sub>2</sub> World" symposium (Monterey, 24–27 September 2012).

## 8. Communications and science-to-policy outreach

8.1 Working closely with European and international partners, the UK has played a seminal role in bringing the issue of ocean acidification, and its policy implications, to a wider audience. Specific activities and outputs in recent years, mostly led by the UKOA Knowledge Exchange Coordinator (Dr Carol Turley), have included:

- "The Other CO<sub>2</sub> Problem" (2009) a short animated film produced by secondary school students and Plymouth Marine Laboratory.
- "Ocean acidification: Connecting science, industry, policy and public" (2011), a widely shown and downloaded short film that covers the perspectives of both scientists and stakeholders.
- Involvement in (and UKOA support for) the International Ocean Acidification Reference User Group, with OA-RUG publications including "Ocean Acidification: the Facts", "Ocean Acidification: Questions Answered" and "Ocean Acidification: Acting on Evidence"
- "Hot, Sour and Breathless—Ocean under Stress"<sup>84</sup> a policy guide on multiple climate-driven ocean stressors led by UKOA and supported by international and intergovernmental organisations.
- Involvement in Planet under Pressure (London, April 2012) with a UKOA-led and DECC-chaired discussion session, also an "Ocean under Stress" exhibit and poster presentations.
- Engagement in UNFCCC Conference of Parties (in 2009, 2010 and 2011) through exhibitions, presentations and side-events, with associated media coverage.
- Engagement in the UN Conference on Sustainable Development (Rio+20) through exhibitions, presentations and side-events, with associated media coverage.
- Major contributions to the 5<sup>th</sup> Assessment Report of the Intergovernmental Panel on Climate Change (currently in preparation) by UKOA scientists, as Lead Author, Review Editor, Contributing Authors and chapter draft reviewers.

## 9. Conclusions

9.1 The UK has responded strongly to the strategic research challenge presented by ocean acidification, with actions that are well-coordinated at the national and international level. The interests of NERC, Defra and DECC are fully complementary in this area, and an excellent working partnership has been developed through the UKOA programme. Whilst it may be considered premature to assess the quality of the scientific outputs, there can be little doubt that the new knowledge obtained will have major policy significance.

9.2 The challenge will be to maintain the necessary level of scientific attention to ocean acidification and its impacts when project awards within the UKOA research programme come to an end, mostly in 2014.

## Declaration of Interests

1. Dr Phillip Williamson is a NERC employee working in the School of Environmental Sciences, University of East Anglia with the role of Science Coordinator for the UK Ocean Acidification (UKOA) research programme (40% effort, 2010–15)

2. Professor Harry Elderfield is a member of the academic staff of the Department of Earth Sciences, University of Cambridge. He is Chair of the UKOA Programme Advisory Group and a member of the UKOA Programme Executive Board. He does not receive any research support from the programme.  
*September 2012*

<sup>84</sup> [www.oceanunderstress.com](http://www.oceanunderstress.com)

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## Written evidence submitted by The Institute of Marine Engineering, Science & Technology (IMarEST)

### Executive Summary

- An independent, well-funded, and empowered national marine agency is necessary.
- Strategic oversight and coordination of marine science are not much improved since 2007.
- The UK-Integrated Marine Observing Network requires support.
- Little progress has been made in delivering the 2010 Marine Science Strategy.
- The MSCC has been largely ineffective, due to, e.g. inadequate funding, incomplete marine sectoral representation, lack of autonomy, extensive internal approval process, a plethora of bureaucracy and an over-complicated committee structure.
- The MSCC should fully utilise the capabilities of marine-focused Learned and Professional Societies.
- The NERC does not support marine science in polar and non-polar regions effectively.
- The NERC suffers from poor strategic planning on marine issues and inadequate engagement with marine industry, hindering its ability to implement exceptional R&D.
- The NERC must address the document “Setting Course: A Community Vision and Priorities for Marine Research,” developed by the National Oceanography Centre Association, and provide adequate funding for the objectives set out.
- Reducing scientific and technological staff and research funding of marine, geological and polar institutes may bring a short-term, small financial benefit, but that benefit is both negated and outweighed by the long-term financial costs of regaining skills, staff, and strategic advantage.
- The focus on UK waters must not preclude the UK from fulfilling its international marine obligations and commitments.
- Current and potential impacts of global warming on the oceans are inadequately monitored and addressed by Government.
- Continued and preferably increased support for UK marine science and technology, marine scientists and technologists, and their home institutions is essential to, e.g. predict weather and climate, assess the marine environment, preserve life, mitigate anthropogenic changes in the marine and coastal environment, and to advance the scientific understanding that makes this possible.

### Introduction

1. The IMarEST is an international professional membership organisation and learned society for all marine professionals working in marine, coastal and offshore environments and supporting industries. The Institute, with Headquarters in London, currently has nearly 15,000 members; around half are based in the United Kingdom. The IMarEST promotes scientific development and inter-disciplinary understanding of Marine Science, Technology and Engineering and enhances the knowledge of professionals across the international marine community.

2. The IMarEST provided two sets of evidence to the 2007 Inquiry into Marine Science: on behalf of the Membership and the Marine Information Alliance Ltd., respectively. Professor Ralph Rayner provided oral evidence on behalf of the Institute. A response was sent to the Government following its response to the Select Committee’s report “Investigating the Oceans”. Many of the concerns expressed in this response remain today.<sup>85</sup>

3. Following the Government’s response to the Select Committee, the IMarEST canvassed the UK membership of professional and learned bodies for the marine engineering, science and technology sector by an e-survey distributed to professionals drawn from industry, academia and government that covered all the marine disciplines.

4. As well as seeking general comments on the Report’s recommendations, the survey asked:

- *Do you generally endorse the recommendations contained in the Select Committee Report?*
- *Do you specifically support the need for an independent marine agency to replace and broaden the limited coordination role performed by the present Inter Agency Committee for Marine Science and Technology?*

5. The overwhelming response was general endorsement of the Report’s recommendations and a strong endorsement of the need for an independent marine agency (91% and 90% of respondents, respectively). Almost all respondents expressed their dissatisfaction and concern that the Government rejected the central recommendation for a marine agency and many of the other specific recommendations made by the Select Committee.

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<sup>85</sup> The original responses are on the IMarEST website <http://www.imarest.org/Technical/TechnicalActivities/PolicyandConsultation.aspx>.

6. The Government proposal for a Marine Science Co-ordination Committee (MSCC) had similarities to the Government of the day's response to the earlier Select Committee report on these matters (Second Report from the House of Lords Select Committee on Science and Technology, *Marine Science and Technology*, HL47, Session 1985–86). Yet it was the decision not to implement the core recommendations of this earlier report and to ignore many of the recommendations of the Committee set up to establish what became the Inter-Agency Committee on Marine Science and Technology (IACMST) that led to many of the deficiencies that the 2007 Select Committee sought to overcome and that still exist. The case for strengthened coordination and additional funding is now even more pressing than in 1985 and 2007. Therefore, since the original survey was conducted, the Institute has no reason to believe that the views of the respondents have changed.

7. The IMarEST considers that the MSCC does not fulfil the recommendations made in the Select Committee's Report of 2007. The report made a robust case for strengthened coordination and additional funding. The MSCC remains hugely under-resourced and, despite best efforts of its highly capable secretariat, does not have the funding, staff resources and executive power to play an effective role in wide coordination. Furthermore, the MSCC is narrow in representation, especially from industry/users, and lacks extensive independent membership from the non-public sector and those not ultimately dependent on public money.

### Answers to Specific Questions

*Since 2007 has there been improved strategic oversight and coordination of marine science?*

8. The IMarEST respondents, particularly those working within the private sector, consider that little change has occurred since 2007.

9. Encouraging individual developments include the establishment of the UK-Integrated Marine Observing Network (UK-IMON) at the MSCC's request. Many marine data are collected for non-statutory purposes, but co-ordination between statutory and non-statutory organisations is currently limited. Improving this co-ordination could enhance the quality and spatio-temporal coverage of data cost-effectively, augment our knowledge and understanding of the marine environment, and make assessment of its condition more robust. Initially the UK-IMON is to promote co-ordination and integration of non-statutory UK marine monitoring/observing programmes. The ultimate aim is a fully operational single UK-IMON. It is too soon to assess whether this initiative will benefit industry end-users and society, but this assessment, with quantification of any benefits, should be formally scheduled. It is critical that the focus on UK waters does not preclude the UK from fulfilling its international obligations/commitments. (See also paragraph 24.)

10. The IMarEST re-iterates its original concerns that the current MSCC is less inclusive than its predecessor IACMST. It is unclear whether the MSCC is dealing with issues relating to co-ordination of marine technology. (See also paragraph 13.)

*What progress has been made in delivering the 2010 Marine Science Strategy?*

11. It is unclear what is meant by the term delivery, and to whom this delivery is contemplated.

12. After discussions on developing and launching a Marine Science Strategy began, the NERC reviewed its investments in research institutes and decided to reduce marine science staffing levels across the British Geological Survey (BGS), the British Antarctic Survey (BAS) and the National Oceanography Centre (NOC) significantly. This decision, including encouragement of early retirement of experienced staff who will not be replaced, severely depletes UK marine scientific and technological expertise, which can only be detrimental to the implementation of the Strategy.

13. While the marine science strategy certainly demands the skills of scientists, it cannot be too highly stressed that understanding the oceans requires both scientists and technologists. Working in the ocean is difficult; to monitor and understand this harsh, remote environment requires various combinations of ships, satellites and other proximate and remote measuring devices. Most data must be collected by instruments which must be deployed from a platform, such as ships, moorings, drill strings, remotely or autonomously operated vehicles, submersibles, aircraft, satellites, etc. Designing and running the instruments and platforms is primarily the function of technologists, who are often electrical and mechanical engineers. Once the data are obtained, their quality must be assessed by another group of technologists, data managers and data systems operators. These are essential and costly tasks. Only considering Marine Science, in isolation, creates a fundamental risk that drivers for science and for technology development are mismatched.

*How effective has the Marine Science Coordination Committee and Marine Management Organisation been, and what improvement could be made?*

14. The industry perspective is that the MSCC has been largely ineffective. Some IMarEST respondents are unsure of the MSCC's purpose; others are unaware of its very existence. The Marine Industry Liaison Group, of which the IMarEST is a member, has bold objectives but relies heavily on volunteers to deliver them. Attendance at meetings varies, largely due to the voluntary nature of the commitment and the fact that a

number of key sectors are either not represented at all or by junior staff. Industry representatives often work solely or predominantly on government-funded (often defence-related) projects; therefore they are not truly representative of the full extent of UK industry, especially the true private commercial sector which does not depend on the UK taxpayer for its work. Sectors particularly noticeable by their absence include shipping, offshore renewables, tourism, marine aggregates and fisheries.

15. Both the MSCC and the MMO must be able to obtain expert support and input from key specialists (individuals and organisations) within industry, but they do not seem to have adequate funding to make these links. The Marine Industries employ over 90,000 people in the UK and are worth around £10 billion (source: Marine Industries Alliance). By not fully engaging with the marine industries the MSCC is missing out on a vital opportunity.

16. The excellent MSCC communication lists the following actions:

1. Events schedule.
2. Drumbeat messages.
3. Political forum.
4. Policy/science workshops.
5. Internships.
6. Web hub.
7. Community outreach.
8. Marine curricula.
9. Annual UK Marine Science meeting.

However, the strategy recognises that limited MSCC resources mean that only numbers one to three will be implemented in the short term. The Marine Ripple news feed and the Central Events database are useful resources but are as yet not well marketed to the wider community. The more ambitious goals, which would be especially worthwhile and deliver most value, are not achievable because resources and funding do not exist to deliver them. If funding for these activities continues to be unavailable, the MSCC must further develop relationships with other organisations in order to initiate progress. The IMarEST implores the MSCC to fully utilise the capabilities of marine-focused Learned and Professional Societies, such as the IMarEST itself, the Society for Underwater Technology (SUT), the Marine Biological Association (MBA) and the Challenger Society, to help them. Communications form a vital part of a Learned Society's remit, together with contributions to policy and regulatory development and organization of learned meetings and events. Furthermore, several organisations, such as the Science Council and Engineering Council, have programmes to provide input to curriculum development.

17. Finally, there are concerns that the MSCC secretariat does not have the autonomy to operate in a timely and independent fashion. The dedicated secretariat seems to be hindered in progressing actions by an extensive approval process, a plethora of bureaucracy and an over-complicated committee structure. This is detrimental to its working relationships with organisations such as the IMarEST, who are committed to supporting the work of the MSCC, but who find it virtually impossible to actually do so.

18. It is encouraging that some of the excellent initiatives established under the IACMST continue to flourish under the MSCC. The Underwater Sound Forum is a particularly constructive example: it includes the relevant industry, communicates effectively and, judging by the level of attendance at meetings, is hugely successful. However, the success of the initiative is driven largely by the dedication of a number of key individuals both within the MSCC secretariat and on the Forum. Once again, it relies heavily on voluntary effort and suffers from lack of financial commitment.

19. The IMarEST respondents did not comment on the MMO's effectiveness.

*Has the selection of proposed Marine Conservation Zones (MCS) been based on robust scientific evidence? How well has the scientific evidence been balanced with socio-economic considerations and communicated to affected coastal communities?*

20. There is insufficient information in the public domain for the IMarEST to respond.

*How effectively does the Natural Environment Research Council (NERC) support marine science in polar and non-polar regions?*

21. Respondents consider that the NERC suffers from poor strategic planning and inadequate engagement with industry, which hinders its ability to be able to implement exceptional R&D.

22. It is imperative that the NERC address the details highlighted in the document "Setting Course: A Community Vision and Priorities for Marine Research," developed by the National Oceanography Centre Association, and that the NERC provide adequate funding for the objective to be achieved.

23. The NERC must address a number of emerging issues. There is increasing realisation of the damage that human activities are causing to the oceans by, eg, overfishing and pollutants, including growing volumes of microplastics. Global warming effects include alterations in ocean currents and water mass characteristics, with concomitant changes in species distributions, predator-prey relationships, and community compositions, which also affect human (sea)food resources and further imperil already vulnerable species, eg, sea turtles, sea birds and marine mammals. The addition of CO<sub>2</sub> to the atmosphere continues to affect the ocean by exchange through the air-sea interface, slowly increasing its acidity, which has risen by 30% since the Industrial Revolution and is projected to continue rising until at least 2100. Polar oceans have the lowest saturation in the carbonate species needed to build CaCO<sub>3</sub> skeletons for planktonic organisms, such as pteropods, that are near the base of the marine food chain. Models suggest that continued ocean acidification will affect polar oceans first, damaging the base of the food chain, especially in the Southern Ocean. Our information on the processes and effects of ocean acidification is insufficient to determine how to address the problem and the time-scale required.

24. Marine geological and geophysical investigations of the deep ocean are essential to guide investments in offshore mining of ores and petroleum. Oil and gas exploration increasingly seeks ever deeper waters; production now occurs at depths >2500m and is moving steadily deeper. Training and development of staff to meet these expensive industrial challenges, and of the scientists to assess resource prospects and conduct environmental impact studies, are critical. The challenges are technological and scientific. Novel technologies are needed to comprehensively investigate the seabed. The deep sea is not the only new frontier—there is also the Arctic, where vast oil deposits are thought to lie—but as yet remain to be found—offshore. Highly competent scientists, technologists and engineers are needed to address this challenge, and the possible environmental impacts from accidents in deep water and ice environments. Despite the recognition that less oil and gas should be burned to combat global warming, as yet few less environmentally damaging and economically viable alternatives are available to supply the needs of a rapidly growing population.

25. Substantial ore deposits lie on the deep sea floor. These may soon be mined and the UK should be further involved in these activities (the International Seabed Authority granted a mining exploration license to a UK-sponsored company in July 2012). The scientific and technological skills must be developed to investigate the nature and distribution of these deposits and develop their sustainable exploitation. Marine Institutes are well placed to undertake this work if their marine scientific and technological staffing is not reduced.

26. In summary, reducing scientific and technological staff and research funding of marine, geological and polar institutes may bring a short-term, small financial benefit, but that benefit is both negated and outweighed by the long-term financial costs of regaining skills, staff, and strategic advantage.

*How well are the current and potential impacts of global warming on the oceans (for example temperature changes and acidification) being monitored and addressed by Government and others?*

27. Oceans are the flywheel of the global climate system, (re)distributing heat around the world. Therefore understanding and forecasting climate change demands ocean observations from many sources, including ships, satellites, buoys, moorings and autonomous vehicles (e.g. gliders and Autosubs). These data are contributed to the UN's Global Ocean Observing System (GOOS), a part of the Global Climate Observing System (GCOS) run by the Intergovernmental Oceanographic Commission of UNESCO (IOC), the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP). Cutting key ocean staff, especially those with scientific and technological experience of open ocean work, will remove the UK and the data obtained from its waters from this vital database, leaving a crucial information gap that will hamper accurate forecasting.

28. Given the challenge of global climate change, it is imperative that the UK continues to contribute to the monitoring of ocean change (e.g. ocean warming and acidification) as the basis for supplying data to develop models to forecast future climate change with increasing accuracy. A major source of information on ocean warming is through the international Argo profiling float programme,<sup>86</sup> which has seeded the ocean with ~3000 profiling floats operating in the upper 2000m of the water column. This has vastly increased our understanding of the behaviour of the upper ocean, formerly only known mostly from data collected by ships along shipping routes that cover at most ~one-tenth of the ocean. Deployed in every ocean, Argo floats must be replaced every 4–5 years. The relatively low cost of maintaining the Argo system, which is conducted under the auspices of the IOC, is shared among many nations. Contributing to this cost is arguably a requirement under the 1982 Law of the Sea Convention,<sup>87</sup> to which the UK is a party (see, e.g. Article 243).<sup>88</sup> The UK should at the very least confirm its commitment to continue supporting this crucial programme, because these data are “essential for the efficient acquisition, integration and use of ocean observations gathered by the

<sup>86</sup> For a description and analysis of the importance of this truly visionary ocean observing programme in the international marine scientific and regulatory context see P. A. Verlaan, Current Legal Developments: the Intergovernmental Oceanographic Commission of [UNESCO] (2009) 24 *International Journal of Marine and Coastal Law* 173–183.

<sup>87</sup> United Nations Convention on the Law of the Sea (LOSC), Montego Bay, 10 December 1982, in force 16 November 1996, 21 *International Legal Materials* [ILM] 1261 (1982).

<sup>88</sup> LOSC Article 243: “States and competent international organizations shall cooperate, through the conclusion of bilateral and multilateral agreements, to create favourable conditions for the conduct of marine scientific research in the marine environment and to integrate the efforts of scientists in studying the essence of phenomena and processes occurring in the marine environment and the interrelations between them.”



countries of the world for a wide variety of purposes including the prediction of weather and climate, the operational forecasting of the marine environment, the preservation of life, the mitigation of human-induced changes in the marine and coastal environment, as well as for the advancement of scientific understanding that makes this possible.”<sup>89</sup> The same reasoning applies to the need for continued and preferably increased support for UK marine science and technology, marine scientists and technologists, and their home institutions in general.

September 2012

### Written evidence submitted by the Association of Marine Scientific Industries

1. This evidence is being submitted on behalf of Association of Marine Scientific Industries (AMSI) Council of the Society of Maritime Industries (SMI). The AMSI Council of SMI sets the policy and guides the activities for the marine science and technology market area within the Society of Maritime Industries, utilising the extensive expertise of its members. We welcome the opportunity to submit evidence to this important enquiry and would be happy to arrange a personal briefing to the committee.

2. In summary, our key points are as follows:

- The Marine Science Coordination Committee (MSCC) and the public sector marine science community in general do not engage effectively with private sector users, funders or providers of marine science.
- Strategic coordination of marine science has seen limited improvement since 2007, with priorities not sufficiently aligned to needs and little consideration given to marine science in relation to supporting “UK plc” more generally.
- Little progress has been made in improving value for money in the delivery of marine science, for example, by seeking greater understanding of private sector capability.

3. The 2012 AMSI Council survey of the UK’s marine science and technology sector shows a sector with an estimated annual turnover of £1.35 billion but dominated by SMEs (85% of companies surveyed) employing nearly 17,000 (up by 12% on 2011). 77% of companies export to a value of £500 million.

4. The private sector is an important and growing provider of marine science. It is also a major user of and investor in UK marine science. Industry turnover and gross value added in research and development is about six times that of the public sector and ten times of Higher Education Institutes.<sup>90</sup> The number of people employed in research in industry is similarly much larger than that in the other sectors.

5. This submission focuses on questions, 1–4 in the Committee’s terms of reference for the enquiry.

*Since 2007 has there been improved strategic oversight and co-ordination of marine science?*

6. In the period since 2007, the need for high quality marine science has grown, driven by new policy and regulatory drivers and a step change in growth of the marine economy. In the same period private sector R&D investment continues to grow. In our view, although some progress has been made, the strategic oversight and co-ordination of marine science remains sub-optimal. Our key concern is that the important role of the private sector as a funder, user and provider of marine science has yet to be recognised or incorporated into the work of the MSCC.

7. After the initial flurry of activity, following publication of the Government’s response to the Committee’s 2007 report, the pace and drive of the follow up appears to have waned. It was over two years before the Marine Science Strategy appeared following the Government’s response to the Committee’s recommendations and another three before the communication strategy appeared. Most of the recorded activity has been directed at producing papers of various kinds, setting up working groups and holding meetings. Whilst clearly there is a place for this and it was to be expected that early application would be on establishing the governance arrangements, mapping out the UK Marine Science Strategy and the subsequent Communications Strategy, it would be reasonable to expect that the focus would then shift to delivery. We have yet to see strong evidence of this shift and of the “step change” promised in the UK Marine Science Strategy. We suggest that the collective effort should now be highly focussed on achieving firm outputs and outcomes.

8. Improved coordination and cost effectiveness in the delivery of marine science to support implementation of key policies is urgently required. There are a number of pressing examples. Five years ago the Committee drew attention to the importance of sound evidence to select and designate marine protected areas. It is worth looking back at the Government’s response at the time. It was stated that Defra and its agencies already had a fairly good scientific understanding in relation to the current network of sites, and intended to build on this to inform the development of the overall MPA network. Natural England was committed to enabling a designated network of sites by 2012. The timetable has since slipped, quite substantially. In a statement to Parliament, the Minister explained in November last year that an independent Science Advisory Panel had concluded that the

<sup>89</sup> IOC Assembly Resolution XXII–6 in 2003, quoted in Verlaan, *supra* note 1 at 175.

<sup>90</sup> The Crown Estate, Socio-economic indicators of marine related activities in the UK economy, 2008.

science and evidence base was insufficient. “Significant additional work” was needed. As a result the designation of Marine Conservation Zones (MCZ) is now going to be phased with the first designations in 2013.

9. Marine planning is another area where the Committee and the Government, in its response, identified that effective co-ordination of research was vital. The marine planning process is now well underway. CEFAS reported in July 2010<sup>91</sup> that there was a basic lack of information about the shape and makeup of the seabed. To fill gaps, projects such as UK SeaMap (2010) produce broad scale predictive habitat maps based on “best available data”, but the confidence in some of the maps is as low as 20%. The CEFAS report indicates that the Marine Management Organisation (MMO) is reliant on this tool as “best available evidence”, however the low confidence levels associated with some of these modelled data may limit the effectiveness of early marine plans. Charting Progress 2 echoed this finding. There are the comments that “current habitat maps cover only 10% of the UK continental shelf. For future assessments we will need to improve the accuracy, resolution and scope of these habitat maps by undertaking more surveys and making the existing data more widely available.” The dearth of adequate data is likely to be a continuing issue as marine planning extends around the English coast. There is no obvious long term delivery plan to address these gaps in a systematic way.

10. It is evident that marine conservation measures, marine planning, the Marine Strategy Framework Directive (MSFD) are all highly dependent upon a robust scientific information base. Without it implementation will be flawed, delayed (with associated costs of uncertainty) and could lead to unwanted and unintended consequences. These areas are illustrative of wide ranging and high impact policies that call for the type of co-ordinated approach previously advocated by the Committee but yet to be delivered in a systematic or transparent manner.

11. It is not apparent that the arrangements in place to provide strategic oversight and co-ordination of marine science up to now have enabled science effort and expertise to be aligned to areas of high impact. The experience of MCZs is a strong pointer to where problems have occurred and Government and stakeholder objectives frustrated. Marine planning and implementation of the MSFD could be similarly held back.

12. We suggest that there should be refocusing of effort—scientific resources and capacity—on these and other areas requiring immediate action in order to secure very considerable medium and long term environmental, economic and social benefits. This might mean examining all marine science funding and allocating a greater proportion to immediate and applied policy and regulatory needs.

*What progress has been made in delivering the 2010 Marine Science Strategy?*

13. The Marine Science Strategy promised “actions and not just words”. It is difficult to judge objectively how well the MSCC has delivered on this. The Marine Science Strategy stated that there would be a publically available dynamic web based delivery plan. It was reported that this would identify the actions being taken to implement the Strategy. A measure of the success of the Strategy was to be the effective completion of the proposed actions and the outcomes of the decisions taken by the MSCC. The most recently published version of the delivery plan appears to date back to February 2010.

14. The MSCC’s work is overseen by a Ministerial Marine Science Group. The Committee is required to provide an annual published report which includes progress on delivering the Strategy and details of the level of public sector expenditure on marine science. The minutes of MSCC meetings indicate that reports may have been prepared, but the reports do not appear to have been made publically available (there is no reference to them on the MSCC web-page).

15. Sight of minutes of meetings of MSCC only offers a fragmented and incomplete picture. The Communications Strategy has produced, perhaps of necessity low cost, modest and insular communication tools which fail to meet the stated aspiration of “engaging the wider public in discussions on marine science issues, raising public awareness of the impact of the seas and oceans on our lives and the impact of our actions on them.” We suggest that the disciplines originally proposed to strengthen accountability, improve communication beyond the immediate circle of MSCC membership and help drive the step change promised should be put in place. The delivery plan should be regularly reviewed, actions should be monitored and assessed and both the delivery plan and the annual report to the Ministerial Group should be made publically available. Programme management principles should be applied, there should be a greater sense of urgency and the Strategy and its Delivery Plan should be employed to drive the changes required.

*How Effective have the Marine Science Co-ordination Committee (MSCC) and Marine Management Organisation (MMO) been, and what improvements could be made?*

16. The focus of these comments relate to the MSCC rather than the MMO. Many of the above observations apply in response to this question in relation to the MSCC. Our key concern is that the MSCC and the public sector marine science community in general do not engage with private sector users, funders or providers of marine science in any systematic way and has yet to move to a model of delivery. There is a significant opportunity for improvement. The capable secretariat is not sufficiently resourced or set up to succeed.

17. The lack of current engagement with the private sector is demonstrated by the fact that the MSCC does not include a single representative from the private sector. This is despite earlier announcement that it would

<sup>91</sup> CEFAS, Marine survey needs to underpin Defra policy. July 2010

do so. The omission of anyone from industry is concerning, because the Marine Science Strategy recognises the importance of and contribution made by UK marine industries. “Marine industries play a strategic role in enhancing the UK’s science base and in delivering core research and data through their own major research, monitoring and development programmes.” It is also noted that “UK industry develops and manufactures key, and often novel, marine research equipment that provides the UK with greater capability, for example, to explore new parts of the oceans or to make measurements with greater precision.” Marine science makes a positive contribution to the UK industry’s competitive edge. We are told that “It is important for scientists to understand the needs of the sector and to engage with them” and that “The UK marine industry is a significant employer of the country’s graduates and postgraduates in marine science and has a highly skilled research base.”

18. After concerns were expressed by the private sector about the absence of any industry representation on the MSCC, it was agreed to set up the Marine Industries Liaison Group (MILG) in December 2010. This is chaired by a non-executive member of MSCC who is not from industry, but serves as the link member with the Committee. The MILG has made a slow start, but has the potential to make a useful contribution, if effectively employed by MSCC and given appropriate secretariat support. It should not, however, be seen as a satisfactory substitute for industry representation on the MSCC itself. This arms-length relationship with MSCC is not conducive to effective coordination and perpetuates misconceptions between the sectors on capability, areas of expertise and priorities. Industry should be encouraged and enabled to play a much more prominent role in helping to inform and deliver the Strategy.

19. In considering how the MSCC can more effectively interface with the private sector it may be useful for the committee to reflect on examples from other sectors. Part of the issue is marine science, to date, has not been adequately considered through the lens of economic and industrial policy or broader benefits to “UK plc”. In recent years, the Government has aimed to support growth and development of a number of science based sectors. Common approaches include a sector strategy to support the UK’s competitive science base, attract investment, support exports, enable the development of skills and remove barriers to growth. Such strategies are generally backed up by specific actions to align policy, governance and funding to support closer working and “clustering” between academia, research institutions, industry and government. In most cases a strategy is overseen by a single agency or department with an actively engaged Ministerial lead. Examples include:

- (a) A UK Space Strategy which sets out a vision to seize 10% of the Global Market by 2030. The Strategy is coordinated by a single agency working with industry and academia.
- (b) A UK Life Sciences Strategy, which supports clustering and the commercialisation of research.

20. There is an immediate opportunity to address this in marine sciences. The Marine Industries Growth Strategy is a welcome initiative and encompasses a range of marine activities including ship building and repair, leisure, defence and offshore renewable energy with a tacit reference to the marine science industry. To date the role of marine science and survey industries has not been adequately considered as part of the workstreams. The MSCC and Defra should seek closer alignment with these activities and be given a revised mandate and terms of reference to deliver a programme of work to explicitly support the growth of the sector.

21. More recently (August 2012) the MILG has commissioned a capability review of private sector marine science which invites recommendations on where and how the private sector can help to deliver the Government’s marine objective. This review has been part funded by Government and Industry and although modest in scale has the potential to have strategic significance. The findings and the recommendations from this review must be used to inform a programme of actions to enable more effective working between sectors and support the points made above in paragraphs 19 and 20.

22. Notwithstanding the outcome of the review mentioned in the above paragraph we believe that there are areas that the MSCC should take forward which can support the broader UK marine science base. One action could be to commission a strategic view on future technology requirements, for example, monitoring equipment needs for the EU Marine Strategy Framework Directive or equipment needs for more deep sea exploration) and how research agencies can work with industry to support the R&D development “pull through” and commercialisation of these technologies. At the very least this would offer the UK supply chain greater long term certainty on needs. A second area of action could be to make available existing research/data to enable the development of value added products (along the lines of the “open government” programme<sup>92</sup>).

23. In addition to opportunities for more effective collaboration there are also barriers that have been identified. A number of members have offered examples of public sector funded agencies or assets being used to compete against private sector providers. An example is Cefas, an executive agency of Defra, which has specific revenue raising objectives, business development staff and aggressively competing against the UK private sector within UK and overseas markets. It is not clear how Cefas charging and commercial activity is in line with relevant guidance on public spending and governance and supports a “level playing field”. How the principle of the UK public and private marine science sector competing against each other best supports the aims of the UK Marine Science Strategy, or the competitive position of UK science and economy more broadly, warrants further investigation by the committee.

<sup>92</sup> <http://data.gov.uk/>

24. One of the central aims of the MSCC and the Marine Science Strategy has been to improve value for money. This would be assisted if the MSCC had in place a set of suitable indicators to enable them and others to judge whether or not they were making progress in this direction. Industry might well be able to assist here. Without metrics or transparency there is a risk that the MSCC becomes a forum for coordinating inefficiencies within and between public sector bodies.

25. Commissioning should also have a role. Commissioning practices—as opposed to traditional procurement—vary enormously across Government Departments and agencies. Some are much further ahead than others on this. The Marine Science Strategy refers to commissioning: “The commissioning process will... be key to ensuring best value for money and the Marine Science Co-ordination Committee members will ensure that they apply best practice in commissioning...”. We support this, and suggest that the MSCC should be encouraged to prepare firm proposals implementing commissioning. There may be an absence of expertise among MSCC members and their support staff in this field but external advice is available—including from elsewhere within Whitehall.

26. The Committee previously highlighted the fragmented nature of marine science interests and the need for a single agency. There remains a complex web of co-ordination bodies in the publicly funded marine science sector. The attached organogram, produced by Defra, clearly demonstrates that this remains the case. Although each will no doubt be able to justify its existence and will be attended by, dedicated, committed and hard working individuals, they soak up resources and capacity and because of this can prove an obstacle to progress. The MSCC should constantly seek to rationalise these groups and keep the number to the absolute minimum in the interests of efficiency.

27. The 2007 report highlighted the committee’s view that there is scope for better integrated management of research vessels. We understand there to be an MSCC programme looking at this and highlight this as an area where greater transparency and the use of expertise from the private sector is utilised. Similarly, the committee recommended that NERC consider the costs and benefits of greater utilisation of commercial vessels and an independent review undertaken of vessel operation. The Government response cautioned that “expectations should be realistic”. We understand that NERC have undertaken work examining this, however much of this is not in the public domain with “commercial confidentially” used as a blanket reason not to subject analyses to external expertise and scrutiny. In the absence of any evidence of actions to reduce cost and improve efficiency we believe there is a case for an independent review.

28. Two years ago the signatories to the Marine Science Strategy concluded that “the challenges are significant. We need to deliver the right marine science at the right time in order to meet both current and future policy needs. This requires a clear focus on what science is needed, tighter alignment of programmes and funding and greater coherence of effort across funders and deliverers.” Those needs stand and, if anything, are today more acute with the new and pressing obligations arising from the Marine and Coastal Access Act and various strands of European Legislation. The MSCC needs to accelerate its pace and ensure that its co-ordination efforts are effectively targeted, monitored and delivered. The MSCC should have more active Ministerial Leadership, as well some actual “levers” (particularly some element of pooled funding) to drive and enforce coordination and delivery.

### **About the Society of Maritime Industries**

The Society of Maritime Industries is the voice of the UK’s maritime engineering and business sector promoting and supporting companies which build, refit and modernise commercial and naval vessels, and supply equipment and services for all types of ships and underwater vehicles, ports and terminals infrastructure, offshore oil & gas, maritime security and safety, marine science and technology and offshore renewable energy.

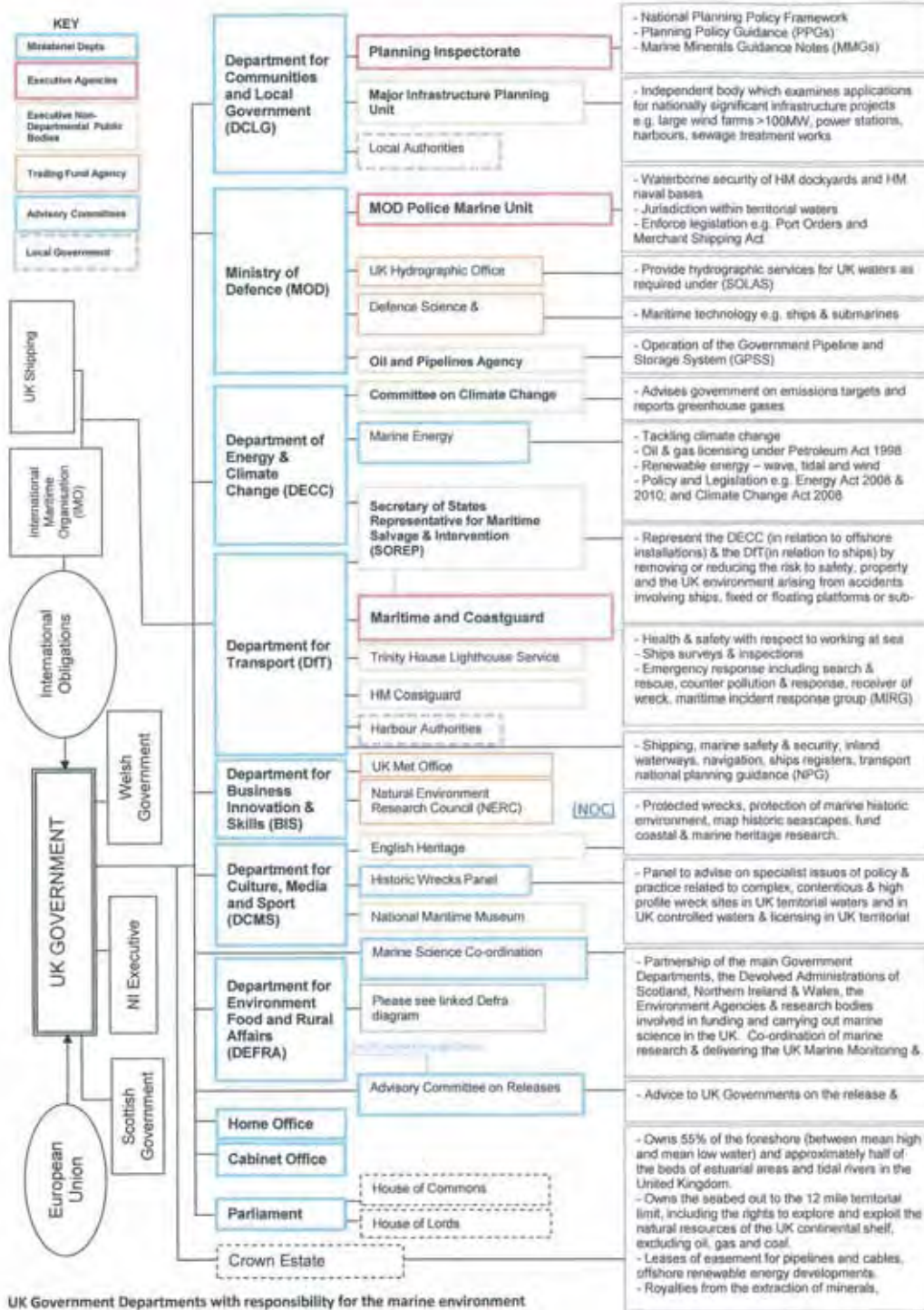
### **The AMSI Council**

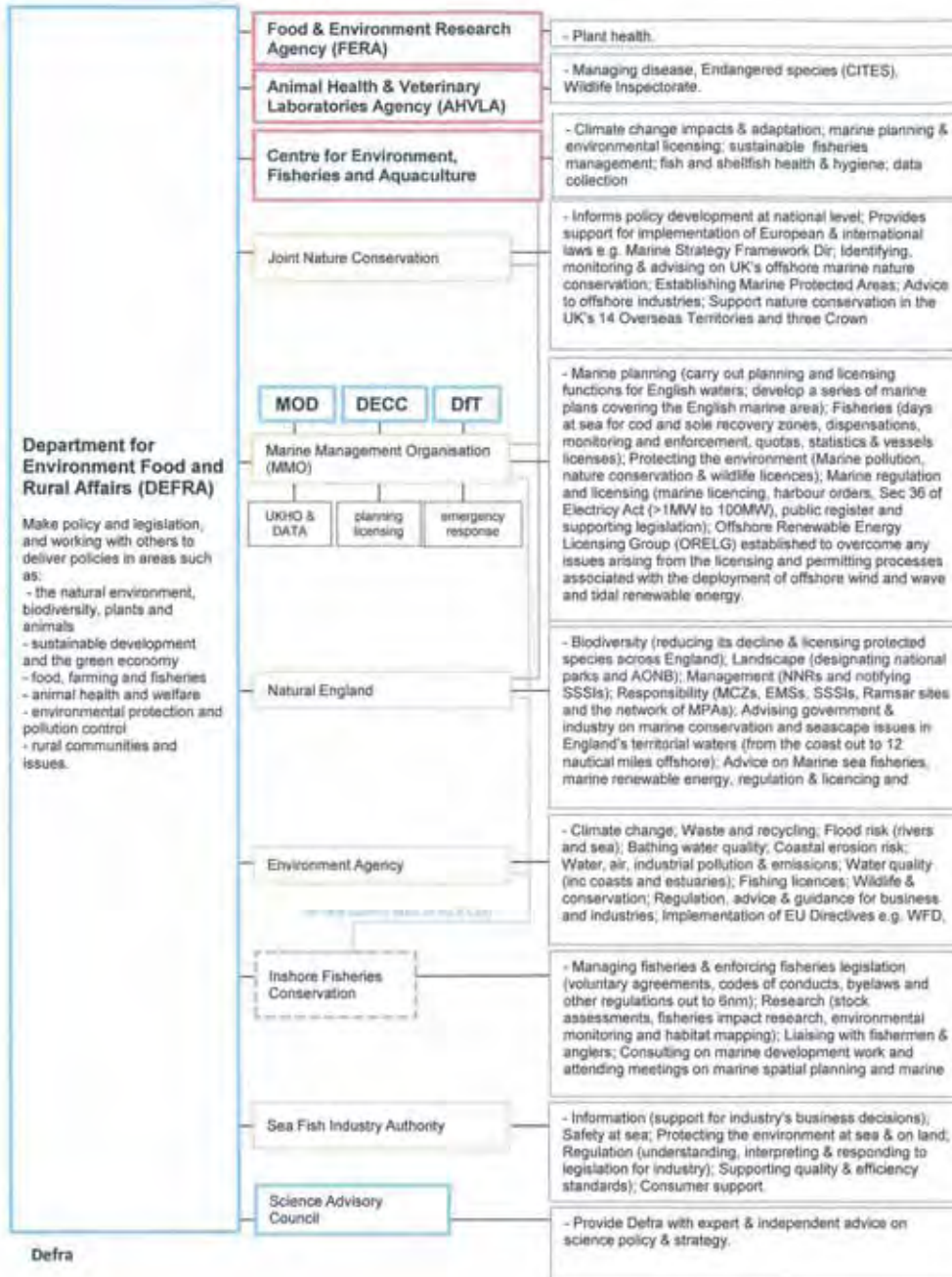
The Association of Marine Scientific Industries (AMSI) Council sets the policy and guides the activities for the marine science and technology market area within the Society of Maritime Industries, utilising the extensive expertise of its members.

*September 2012*

APPENDIX

REFERENCE PARAGRAPH 26—UK GOVERNMENT DEPARTMENTS WITH RESPONSIBILITY FOR THE MARINE ENVIRONMENT AND DEFRA ORGANOGRAM





### Written evidence submitted by the Gardline Group

1. This evidence is being submitted of the privately owned UK company, the Gardline Group. We would be happy to meet the committee and/or invite Committee members to East Anglia where they can visit our facilities.

2. The Gardline Group comprises over 30 companies and is headquartered in Great Yarmouth. Our marine related businesses employ around 1800 people around the world, including offices in SW England, London, Wales and Scotland. Our turnover is around £200 million per year and over 60% of this is from outside of the European Union. We have offices in five continents and are earning valuable export venue for the UK in many emerging markets with our largest investment being in the Asia Pacific region. We have employed, on average, 40 UK marine science graduates per year for the last 4 years.

3. We specialise in marine data acquisition, interpretation, analysis and consulting covering oceanography (of all types) hydrography, hydrology, geology, geophysics, geotechnics, acoustics, biology and environmental sciences. We work for all marine users, from the oil and gas sector, to offshore windfarms and the fishing industry. We also provide high quality scientific advice and services to UK Government Departments, the JNCC, Natural England, the Environment Agency, the MMO, and overseas Governments.

4. We own and operate a fleet of 15 ocean going survey vessels and a similar size fleet of coastal vessels which service a range of sectors. We also operate a number of laboratory facilities around the UK including one of the leading benthic taxonomy laboratories.

5. We invest in research and development, for example programming bespoke positioning software as well as new technologies and methodologies for data acquisition and modelling. We have also been actively engaged in government sponsored research activities such as those funded through the now defunct Aggregate Levy Sustainability Fund.

6. In the interests of transparency, we would like to put on record that we are members of the Society of Maritime Industries, Association of Marine Scientific Industries and the North Sea Marine Cluster. We understand that these organisations have also submitted evidence. Representatives of the company have also been involved in the Marine Industries Liaison Group, a sub-committee of the Marine Science Coordination Committee.

7. We would also like to preface our comments with a general observation regarding UK marine science and our evidence should be seen in this context. The UK has a strong history in marine sciences. It is something that as a nation we are good at; combining technology and systems design, practical seamanship and high quality multi-disciplinary scientific investigation. Across the country, in the public sector, private sector and NGOs, talented and committed marine scientists make an important contribution to sustainable development of our seas. As a company we would like to see the UK's competitive position in marine science grow and our observations in the evidence below support this aim.

*Since 2007 has there been improved strategic oversight and co-ordination of marine science?*

8. In our view, there has been very limited improvement in the co-ordination and oversight of marine science since 2007. Notable achievements include the presence of a common strategy, the UK marine science strategy, and the publication of Charting Progress 2.

9. However, we are disappointed with the rate of progress and believe that the current oversight and co-ordination of marine science is not fit for purpose. Specifically we believe that:

- (a) Investment in Marine Science is not being directed to the priority areas in a timely manner.
- (b) There remains significant opportunity to improve value for money in the delivery of marine science by UK public sector organisations.
- (c) The private sector has yet to be meaningfully engaged.

10. There remain a number of Government Departments, Non-Departmental Public Bodies and Executive agencies with a role and budget related to marine science. Diligent officials operating in these organisations make an important contribution to the sustainable development of our marine environment. The UK marine science strategy offers some welcomed strategic direction, however the budgets and levers to deliver the aims of the strategy remain disparate. As a result, the delivery of marine science is fragmented and the focus of co-ordination and activity to date seems to be insular and focussed on process and documentation rather than a focussed on delivery or change in outcomes.

11. There are a number of examples that demonstrate that current arrangements for marine science have yet to deliver the outcomes envisaged in the Committee's 2007 report. High priority policy needs, such as the designation of Marine Conservation zones, have been delayed because of weaknesses in scientific evidence. Funding and responsibilities for evidence were split between at least three public sector bodies (Defra, Natural England, JNCC). Additional funding (£3.5 million) has recently been made available for the science and evidence necessary to support the implementation of Marine Conservation Zones. It can be argued that if the marine science strategy and coordination mechanisms were working effectively than this investment in evidence could have happened a number of years ago, avoiding these delays and the associated uncertainty and cost.

12. In the above example, it is worth reflecting on how the additional funding was utilised to fill gaps in evidence and science. It is a reasonable example of public/private collaboration to deliver applied marine science. CEFAS rapidly undertook an open procurement process and many private companies (including Gardline) were successful in winning work which was completed alongside CEFAS to a high technical standard.

13. The UK is embarking on a series of far-reaching reforms, such as a new marine planning system, and implementation of the EU Marine Strategy Framework Directive with fundamental gaps in our understanding of UK Seas. The limitations in data are well documented, with only 10% of the UK shelf covered by habitat maps.<sup>93</sup> Whilst we do not advocate delaying welcome reforms such as marine planning, we are concerned that without adequate evidence the reforms will be undermined and/or delayed which will have a negative impact on public and private sector alike. It is concerning that there appears to be limited ambition and plans to systematically fill gaps in evidence and data. By contrast, other member states, such as Ireland, have an ambitious and long-term programme in place to investigate and chart up to their exclusive economic zone.<sup>94</sup> The economic benefits<sup>95</sup> of this programme have been estimated to be as high as 439 million Euro.

14. A further issue where greater strategic coordination and prioritisation is required is the balance between applied science and blue skies science. We are a supporter of blue skies science and recognise the value of investment in it. It is critical to the long term strength of our competitive science base and the sustainable development of the marine environment. We do however question whether the balance is currently right between blue skies science and applied science. Often the debate between scientists and industry is somewhat artificial. For example the academic community might be wary of being seen to fund R&D that should be funded by the private sector and the private sector become impatient when the benefits of some science investment may be unclear or not realised for decades. This is an unhelpful debate and most people recognise the issue is one of balance and more effective collaboration rather than “either/or”.

15. We do believe that more of the public investment in marine science should be viewed through the lense of broader economic and industrial benefits for the UK. For example, 10 years ago some of the many scientific challenges and uncertainties around the scaling up of offshore energy were apparent (eg cumulative and in combination impacts, issues of marine noise) and there was arguably a case for more investment in these areas to help facilitate the roll-out of new windfarms. Much of the R&D was industry led, with some support from the Crown Estate. The lack of evidence in some cases has delayed consenting and delivery of offshore windfarms for a number of years. A proactive and strategic approach to marine science should be looking at a long-term horizon and assessing where investment in science might benefit UK plc—for example wave and tidal technologies, deep-sea marine resource extraction etc. This would also provide a mechanism to coordinate and leverage funding and investment from the private sector.

*What progress has been made in delivering the 2010 Marine Science Strategy?*

16. The delivery of Charting Progress 2 is a notable achievement. We have not been able to find any information on delivery/actions in the public domain for the last two years.

*How Effective have the Marine Science Co-ordination Committee (MSCC) and Marine Management Organisation (MMO) been, and what improvements could be made?*

17. In our view, the MSCC does not coordinate marine science. It exists as a mechanism to coordinate the plethora of departments, agencies, regulators, advisors and committees funded by the taxpayer. It is not resourced to do this properly. It is not representative of the marine science community as private sector funders, users and providers of marine science are not represented on the MSCC.

18. The only industry representation on the MSCC is via an arms-length Marine Industries Liaison Group (MILG) which is chaired by a non industry member of the Marine Science Coordination Committee. The MILG has made a very slow start, but has potential to be useful. It should not be seen as a substitute for full engagement at the MSCC level.

19. An example of the potential value of the MILG is its recent commissioning of a capability review of the private sector marine science which invites recommendations on where and how the private sector can help to deliver the Government’s marine objectives.

20. Another area where closer industry collaboration can add value is around greater coordination of research and development. As a company we would be interested in greater line of sight into publically funded R&D, including proposals that are turned down for public funding but may have value to, or be funded by, private sector operators such as Gardline.

21. The MSCC has a stated aim to improve value for money in marine science. It has failed to deliver this. To date we have not seen any evidence (eg figures or metrics) that value for money in marine science has improved and are concerned about the lack of transparency on information relating to marine science expenditure. Even basic figures, such as the amount invested in marine science per year are hard to come by. The fact that these figures are not readily available and are scattered across the budgets of a number of agencies

<sup>93</sup> <http://chartingprogress.defra.gov.uk/>

<sup>94</sup> <http://www.infomar.ie/about/>

<sup>95</sup> [http://www.infomar.ie/documents/INFOMAR%20Options%20Appraisal%20Report\\_PwC.pdf](http://www.infomar.ie/documents/INFOMAR%20Options%20Appraisal%20Report_PwC.pdf)



suggests to us that a strategic overview of expenditure and value for money across the public sector marine programmes does not exist.

22. The Committee has previously highlighted the potential for cost savings and more science days at sea through better management of public sector vessels. Our own analysis of the limited information in the public domain suggests that public sector research assets are being systematically under-utilised and costing the taxpayer millions of pounds per year that could be re-invested into marine science. It is difficult to get a handle on all of the details (see above point on transparency). Different measures are used, for example a vessel might be describe as having “300 days availability” which although technically accurate is misleading as the asset may only be used or have funding for science 2.5 days per week. Similarly, another indicator that is often used is “days at sea” which can cover considerable transit times. In Gardline, our metric is “operational days at sea”—ie when our vessels are out earning revenue and undertaking data acquisition and scientific investigation.

23. By way of example, we have analysed publically available information from the NOC National Marine Facilities Sea System Programme.<sup>96</sup> We have examined two NERC vessels over the last four years, the RSS Discovery and the RSS James Cook.

The following table outlines operational days at sea:

<i>Operational days at Sea Year</i>	<i>RSS Discovery</i>	<i>RSS James Cook</i>
2009	216	258
2010	224	230
2011	250	252
2012	161	216

24. By way of a private sector comparator, mean operational days from the Gardline fleet is in excess of 330 days per year.

25. In addition, it is concerning that the RSS James Cook, a vessel that was delivered to NERC in August 2006 at a reported cost of c£35 million, lost 119 days between 2009 and 2011 on refits and trials.

26. We have struggled to find figures on the utilisation of the Cefas Endeavour, but understand that current funding constraints are such that it is only being utilised on a part-time basis.

27. Given the above figures and the fact that the day rate for all Gardline vessels is considerably lower due to a much lower capital base per ship along with efficient use of resources, it is clear that limited progress has been made in terms of improving value for money of key UK publically funded research assets.

28. We have noted with interest developments in Government policy around the commissioning of services.<sup>97</sup> For example, the commissioning of services is a core and growing part of how the NHS is operated. The Home office are considering which policing duties can be delivered by different sectors, including the forensic science labs. The MOD has long entrusted scientific and R&D services to the private sector that were once thought to be too sensitive to national security. The Department of Justice is working with voluntary organisations on the provision of probation services. The Cabinet office is trailing the utilisation of different sectors to provide policy advice to Ministers. It is therefore striking that similar debates are not happening in the marine science community.

29. The scale of the challenge in terms of delivering the growing requirements for marine science and the tough spending environment is such that new ways of delivering marine science need to be considered. Discussions at this stage seem to be kept within the many public sector agencies involved in marine science. There are many vested interests in safeguarding budgets and facilities and the current work looking at, for example, coordination of publically owned vessels risks masking inefficiency, or just sharing inefficiency between agencies. We therefore believe that there is a need for an independent cross-sector review of whether, where and how commissioning might improve value for money in marine science.

30. The committee may also like to consider relevant experience from overseas. One example is in Australia, where fisheries and immigration enforcement services for the Australian Government are delivered by Gardline Vessels.

31. We, unsurprisingly, believe that the private sector can play a greater role delivering marine science in the UK, offering better value for money and exporting this capability around the world for the benefit of UK PLC. Equally, NGOs and public sector organisations can also offer innovative ways to deliver marine science. We believe that the best way to approach commissioning is a clear and transparent view on what objectives and outcomes need to be delivered and an informed debate as to how collectively all sectors can pull together to deliver best value for money.

<sup>96</sup> [http://www.noc.soton.ac.uk/nmf/sea\\_sys\\_index.php](http://www.noc.soton.ac.uk/nmf/sea_sys_index.php)

<sup>97</sup> <http://files.openpublicservices.cabinetoffice.gov.uk/OpenPublicServices-WhitePaper.pdf>

32. The MSCC is serviced by a highly capable but under-resourced secretariat and our concerns are directed at the MSCCs composition, terms of reference and mode of operation rather than the secretariat. A small secretariat without budget or strong levers to drive coordination is not going to deliver the aspirations of the marine science strategy. The terms of reference and composition need to be revised to include full engagement with the private sector (funders, users and providers of marine science), pooled resources, an open and transparent work programme with measurable performance indicators and outputs.

### Role of the MMO

33. The committee also invited comments on the effectiveness of the MMO. The MMO has been in existence for two years or so and has made a promising start. The real proof of effectiveness will be in how well it delivers marine planning and licencing as well as ensuring the growing network of marine protected areas are effectively managed.

34. In relation to the MMO's role as a commissioner, funder and user of marines science, the early signs are positive and we have been impressed at the dedication and professionalism of the staff. There is a strategic evidence plan which is aligned with the UK Marine Science Strategy and a transparent statement of needs.

35. The MMO has been proactive in engaging a range of its stakeholders and we were pleased to host a visit from the regional liaison officer. The MMO has also made genuine efforts to be transparent and routinely publishes information regarding high-profile cases on its website. This is a welcome approach which should be adopted across the marine science community and extend to broader set of performance indications such as value for money and how it is working across sector to support the UK science and industrial base.

36. We also note that the MMO are seeking to diversify sources of marine scientific advice. In the first 12 months we understand that there was a near monopoly of public-sector agencies providing scientific advice including a requirement for the MMO to utilise a proportion of its budget with CEFAS. The MMO is currently procuring a framework contract for this purpose. We believe that this is a welcome step forward. As an independent regulator, the MMO needs to have a choice in where it sources advice and has recognised that there are many capable private sector organisations as well as universities and NGOs that can play a role. We believe that there is scope to go further, with the MMO being resourced to play more of a leadership role in commissioning applied marine science research. Future areas could be a more strategic and transparent dialogue with other sectors on how new technologies and approaches can help meet the challenge of cost effective MPA management.

September 2012

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## Written evidence submitted by the Marine Conservation Society

### Introduction

The Marine Conservation Society (MCS) is the UK charity dedicated to the protection of our seas, shores and wildlife. MCS campaigns for sustainable fisheries, clean seas and beaches, protection of marine life and their habitats, and the sustainable and sensitive use of our marine resources now and for future generations. Through advocacy, community involvement and collaboration, MCS raises awareness of marine conservation issues and promotes individual, industry and government action to protect the marine environment.

We welcome the Committee's inquiry into Marine Science and the opportunity to submit evidence.

### Response to Questions:

1—Q. 1/2/3 *Since 2007 has there been improved strategic oversight and coordination of marine science? What progress has been made in delivering the 2010 Marine Science Strategy? How effective have the Marine Science Co-ordination Committee (MSCC) and Marine Management Organisation been, and what improvements could be made?*

1.1 While marine science co-ordination and oversight seems to have improved, MCS is still concerned that there is insufficient investment in new marine science; specifically seabed and habitat surveys. This lack of investment is causing issues for nature conservation and the MCZ network (covered under Q.4), as well as economic development.

1.2 The marine economy currently contributes more than £47 billion<sup>98</sup> annually to the UK economy, with the potential to significantly increase. The vast potential for expansion in the marine economy demands greater investment in our understanding of the science that underpins these goods and services. Only by better understanding these ecosystems can we exploit them both sustainably, and therefore in the long term, most productively.

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<sup>98</sup> Marine Management Organisation, August 2012, <http://www.marinemangement.org.uk/news/press/120801.htm>

1.3 Of relevance to these points is the following paragraph from the Marine Science Strategy, which states:

“The potential of the marine environment to increase food and energy security is clear but more work is needed on defining its full potential, including the limits on sustainable production and the changes in human behaviour needed to achieve a correct balance. Marine science will have an important role to play in informing such decisions—for example, through seabed and habitat mapping—and in assessing the efficacy of such policies by monitoring and interpreting observed outcomes.”

1.4 We would therefore recommend that there is further investment in seafloor and habitat surveys to reflect the importance of our seas to UK nature conservation and also the importance of maritime industries to the UK economy.

2—Q. 4 (i) *Has the selection of proposed Marine Conservation Zones (MCZs) been based on robust scientific evidence?*

2.1 It is important to note that the Government’s own recommendation for MCZ site selection was not initially premised on the need for “robust” scientific evidence in affirming the presence of a habitat feature. The burden of proof was qualified as having to use “the best scientific evidence available”. Moreover, a lack of what might be termed “robust” evidence was acknowledged as being a characteristic of the marine environment. In line with this recognition, the Government’s own advice on site selection was that a lack of evidence should not be invoked to justify not selecting sites—“network design should be based on the best information currently available. Lack of full scientific certainty should not be a reason for postponing proportionate decisions on site selection.”<sup>99</sup>

2.2 This position was ratified by the Government’s own statutory Nature Conservation Bodies in July 2012 upon reviewing the proposed 127 MCZs.<sup>100</sup> The Government’s Science Advisory Panel (SAP), in reviewing the first iteration of MCZs,<sup>101</sup> has also stated that:

“We emphasise that the MCZ process requires the use of the “best available evidence”. Some level of uncertainty in data is inevitable, and project teams should use the data provided unless there is robust evidence to the contrary available for particular areas.” (Paragraph 2.1.1)

2.3 If the burden of proof on site selection has therefore shifted to require “robust scientific evidence”, such a position needs to recognise that any such consideration can only take in place in the context of the scientific evidence of decline. In this context it is important therefore to acknowledge the “robust evidence” which demonstrates the need for MCZs. This scientific evidence of decline is both robust and compelling, and set aside the accuracy of the best available science used in the selection of the proposed MCZ sites, heightens the justification for designation of all 127 sites at the earliest opportunity.

2.4 The scientific evidence of decline:

- The evidence in support of the need for MCZs is unequivocal, largely because of the evidence of the decline in benthic habitat and ecosystem integrity.
- Charting Progress and Charting Progress 2 revealed that benthic habitats including rock, sediment and deep sea habitat are degraded by bottom trawling. This is confirmed by scientific peer reviewed literature on trawling and dredging impacts over temperate seabed habitats.
- Trawling is proven to decrease the biodiversity of infaunal habitats and the invertebrate community in and around sediments.<sup>102</sup>
- Trawling affects rocky reef community (where it occurs), including degrading the habitat, reducing the abundance of both annual bryozoan growth, and upright sponge and other filter feeding organisms.
- The chronic impact of trawling has been seen in the anecdotal record of both habitat change and fish catches.<sup>103</sup> For example, the southern North Sea had a patch of native oysters the size of Wales at the end of the 19th century. This is now sand and shell gravel habitat.<sup>104</sup>
- It is undoubted that the seabed productivity (growth and carbon capture and storage) has declined as a result of this bottom trawling over the past century. This is in part due to the loss of carbon from the system (biomass of fish), and the loss of filter feeding seabed organisms that gain nutrition from plankton.
- Other industries that cause damage or destruction of benthic habitats include aggregate dredging, port development and oil and gas. These impacts, while still wide-spread in the case of aggregates, are generally site-specific and more quantifiable and localised.

<sup>99</sup> DEFRA, *Guidance on the proposed approach to the selection and designation of Marine Conservation Zones under Part 5 of the Marine and Coastal Access Act*, September 2010.

<sup>100</sup> <http://publications.naturalengland.org.uk/publication/2030218?category=1723382>

<sup>101</sup> <http://archive.defra.gov.uk/environment/marine/documents/protected/20100705mcszapnetgainresp.pdf>

<sup>102</sup> <http://www.jstor.org/discover/10.2307/5881?uid=3738032&uid=2129&uid=2&uid=70&uid=4&sid=21101007311693>

<sup>103</sup> <http://www.ncbi.nlm.nih.gov/pubmed/19425437>

<sup>104</sup> <http://icesjms.oxfordjournals.org/content/57/5/1389.full.pdf>

- Small-scale static gear fishers (using pots, traps, lines and nets) don't generally impact the seabed unless used in excess, but then certainly not to the scale of the damage caused by trawling.<sup>105</sup>
- In the UK demersal fish stocks have declined by 94% since 1884.<sup>106</sup>

## 2.5 The scientific evidence of the benefits of MPAs:

- MPAs are an essential tool for the effective management of the marine ecosystem.<sup>107</sup>
- MPAs coupled with sustainable management and sympathetic development can lead to the sustainable exploitation of marine resources, and a vastly more productive resource base.
- A scientific review of MPA performance in 2009 has revealed that they result on average in a 450% increase in biomass, 120% increase in abundance, and 20% increased in biodiversity.<sup>108</sup> MPAs in temperate seas in this review were more productive than MPAs in tropical seas at recovering biomass of previously exploited species.
- If left alone, over time many marine habitats can recover and become productive again, as proven by the science undertaken in Marine Protected Areas in the Irish Sea (Isle of Man closed area),<sup>109</sup> Georges Bank (USA),<sup>110</sup> and Cabo Pulmo (Mexico).<sup>111</sup> However, if the damage is too extensive, what has been lost may never be restored. As well as being used as a tool to aid recovery where damage has already taken place, marine reserves are an essential part of the package of precautionary measures that are needed to prevent healthy ecosystems from becoming degraded in the first place.

## 2.6 Has the selection of proposed MCZs been based on robust scientific evidence?

- The ecological guidance governing the design of the network was peer-reviewed.
- The ecological guidance was a technical document, however, it was also communicated to stakeholders in a short-hand version to enable quick uptake of the rules.
- The network rules ensure that a representative proportion of both broadscale habitat and species and habitats of conservation concern should be protected in the network.
- In the absence of complete marine ecosystem knowledge, protecting the broadscale habitat (such as coarse sand, mud in deep water, reef) is essential, as they act as surrogates for different species groups, and when protected within MPAs, will provide the building blocks for effective ecosystem management, as they will recover to a higher productive state.

## 2.7 What is the knowledge base on the distribution of different features?

- The knowledge base on the distribution of features is variable across the network.
- As the scale of the project is so large, it is inevitable that some areas will have less than perfect knowledge on the distribution and extent of habitat and species.
- The stakeholder process allowed (predominantly fisher) stakeholders to move the boundaries, eliminating sites in areas of highest profitability to them. Inevitably, this led to many sites being designated in areas of lesser biodiversity interest being protected, and areas with less information.
- However, in the broadest sense, the Science Advisory Panel, made up of nine individuals with excellent scientific background have stated that if the network were to be designated in full, the Government would achieve its policy goal of an ecologically coherent network.

## 2.8 The knowledge base on presence, extent and condition of features within sites.

- The knowledge on the presence of features within the network is variable, particularly from inshore where there are numerous reports from diver surveys and drop-down video, to offshore where drop-down camera surveys, and side-scan sonar are rarer because of cost, and less human development and infrastructural projects.

<sup>105</sup> <http://onlinelibrary.wiley.com/doi/10.1046/j.1523-1739.2000.99264.x/abstract;jsessionid=A69F9504DA1CD91D5AF0EB661F5C5546.d01t04?deniedAccessCustomisedMessage=&userIsAuthenticated=false>

<sup>106</sup> Thurston, R.H., Brockington, S, Roberts, CM (2010). The effects of 118 years of industrial fishing on UK bottom trawl fisheries. *Nature Communications* 1:15

<sup>107</sup> [http://www.google.co.uk/url?sa=t&rct=j&q=evidence%20base%20for%20large%20mpa%20networks&source=web&cd=9&ved=0CE0QFjAI&url=http%3A%2F%2Fpublications.naturalengland.org.uk%2Ffile%2F300602&ei=DeU8ULzmFsaW0QXTioHwDQ&usg=AFQjCNEvpW4O7QpOTR4asURfNT04u\\_FeFQ](http://www.google.co.uk/url?sa=t&rct=j&q=evidence%20base%20for%20large%20mpa%20networks&source=web&cd=9&ved=0CE0QFjAI&url=http%3A%2F%2Fpublications.naturalengland.org.uk%2Ffile%2F300602&ei=DeU8ULzmFsaW0QXTioHwDQ&usg=AFQjCNEvpW4O7QpOTR4asURfNT04u_FeFQ)

<sup>108</sup> <http://www.int-res.com/abstracts/meps/v384/p33-46/>

<sup>109</sup> Bradshaw C, Veale, LO, Hill, AS, Brand, AR (2001). The effect of scallop dredging on Irish Sea benthos: experiments using a closed area. *Hydrobiologia* 465(1):129-138

<sup>110</sup> Fogharty, MJ, Murawski SA (2005). Do Marine protected areas really work? Georges Bank experiment provides dues to longstanding questions about closing areas to fishing. *Oceanus*: 1 February 2005. [www.whoi.edu/oceanus/viewArticle.do?id=3782](http://www.whoi.edu/oceanus/viewArticle.do?id=3782)

<sup>111</sup> Aburto-Oropeza, O, Erisman, B, Galland, GR, Mascareñas-Osorio, I., Sala, E, Exequiel Ezcurra, E. (2011). Large Recovery of Fish Biomass in a No-Take Marine Reserve. *PLoS ONE* 6(8): e23601. doi:10.1371/journal.pone.0023601

- There are 127 recommended MCZs within the network based on the presence of 1,205 features.
- Each of these 127 sites will have a range of features and for these 1,205 features there is high, low or medium confidence on various features being present: (high = 41% (or 499 features); medium = 20%, (289) features, and low = 36% (436) features). However, just because a site has low confidence for some features does not mean it cannot be designated for other features.
- There is high confidence of the extent (area of coverage) for 16% (189) of the features. Again medium or low confidence in extent should not prevent designation; it just reflects lack of investment in marine surveys on the extent of features.
- There is generally low confidence on the “condition” of features rather than presence of those features within the sites. The statutory advice given to DEFRA by the JNCC and Natural England in July 2012<sup>112</sup> states the following:

“We advise that some features or sites may appear to have less information than others in terms of contribution to the network design principles and ecological benefits; however, this may be a reflection of limited data and evidence rather than an indication of their importance” (Page 7).

Furthermore, Natural England and JNCC are clear in this advice that:

“Moderate and low confidence features should not necessarily prevent sites from being progressed for designation, particularly if there is confidence on the presence of the feature” (Page 10).

- Condition’ is only rarely known prior to the designation and monitoring of sites. And in any case, it is usually clear from the scientific literature what affects human activities have from a variety of sources, and hence the condition. Thus, in many cases, the relevant appropriate management of different human activities can be carried out.
- The level of confidence for the final recommended sites also has to be understood in terms of the ability of extractive stakeholders (particularly fishers) in many circumstances to move the boundaries of sites away from areas of greater information. As a result, it is clear that on the one hand the process has achieved greater stakeholder buy-in and support, whilst perhaps selecting the sites with lesser biological knowledge, or biodiversity richness.
- Natural England have advised that as more information becomes available in the future, site boundaries, and management of human activities can be modified so as not to damage features.
- MCS believes it isn’t necessarily the current condition of different habitats that is important from this process, but the implications of habitat recovery once damaging activities (particularly bottom trawling) are restricted, that is most important to the development of a fully functioning MPA network.
- It is essential that the public and stakeholders understand that it is not unusual for marine mapping and monitoring to fail to provide cast-iron evidence of the presence or extent of features over such a vast scale.
- It would cost UK PLC vastly greater sums to undertake the necessary surveys to provide cast-iron evidence of the extent and condition of benthic habitat and species. This can be relatively easily and cheaply undertaken on land. However, at sea, it is not either realistic or necessary to carry out such costly activities.
- In order to anticipate these constraints, Government policy at the start of the process allowed for the best available evidence for designating sites.
- A criticism from the Marine Conservation Society of the stakeholder-led design process was that there were not enough experienced UK marine biologists, with first hand in-depth knowledge of the distribution of features within different UK regions.
- A criticism from the Science Advisory Panel that follows is that there was not enough dispensation to suggest sites that didn’t necessarily have one or more of the habitats or species listed within the ecological network guidance for the designation of sites. They would have rather seen more flexibility in the approach to designate sites.

*Q.4 (ii) How well has the scientific evidence been balanced with socio-economic considerations and communicated to affected coastal communities?*

2.9 The MCS welcomes the breadth and extent of stakeholder consultation involved in MCZ site selection. However, it is fundamental to recognise that the consideration of socio-economic factors was consistently applied as a means of determining preference between two sites of equal ecological importance, so as to minimise the socio-economic impact of designation.<sup>113</sup>

2.10 In this sense, socio-economic considerations were not “balanced” with scientific evidence, but the principal determinants in the application of scientific evidence. Several sites identified on the basis of their features, based on the best available scientific evidence, were reduced and moved following the consideration

<sup>112</sup> <http://publications.naturalengland.org.uk/file/2097275>

<sup>113</sup> Explanatory note 335 to the Marine and Coastal Access Act 2009 states, “Where there is a choice of alternative areas which are equally suitable on ecological grounds, socio-economic factors could be more significant in deciding which areas may be designated as an MCZ.”

of socio-economics. For example, site NG1 in the Net Gain project as initially proposed was divided and reduced, with particular regard to proposed offshore wind and associated cable routes, to a selection of four significantly smaller sites. Only two of these sites were put forward in the final recommendations, against the advice of the UK Science Advisory Panel (SAP).<sup>114</sup> In the Net Gain and Irish Sea Marine Conservation Zone Projects, sites were selected away from areas of socio-economic activity from the outset, rather than purely on biological grounds. This was the reason why, for example, the Flamborough-Helgoland frontal system, crucial for a range of marine wildlife, was omitted, and relevant scientific evidence not considered by the stakeholder group, despite clear advice from the SAP to do so.<sup>115</sup> As a result, the locations of the final recommended sites cannot claim to be based primarily on environmental evidence.

2.11 This, critically, has not been communicated effectively to the broader public. The media narrative, particular in Wales, and general public perception of MCZs is that they represent arbitrary environmental designations, to the likely detriment of the local economy. The lineage of site designation needs to be clearly presented to the public, to prevent the erosion of stakeholder buy-in and the development of misconceptions about the environmental effectiveness of the network. Arguably, the selected sites are not the best representation of the habitat diversity that needs to be protected.

2.12 Despite this, given the centrality of socio-economic considerations, to have achieved a portfolio of 127 sites which the Government's independent Science Advisory Panel has argued will meet the environmental goal of achieving an ecologically coherent network should be regarded as a triumph. To not designate all 127 sites would be to disenfranchise those stakeholders who have navigated a complicated and expensive process that, guided by socio-economic considerations, if implemented in its entirety will achieve its environmental goal.

2.13 Each of the four regional MCZ projects had considerable lengthy input from relevant commercial and recreational stakeholders. Each project region had a wide variety of stakeholders to represent their sector that all had considerable input into the process. A breakdown of the sectors represented at the regional stakeholder group meetings is as follows:

- Industry (22).
- Commercial fishing (24).
- Government bodies and regulators (20).
- Recreational interests (20).
- NGOs and charities (12).
- Other (18).

2.13 The ecological network guidelines were flexible enough to allow stakeholders to pick areas based on the best ecological knowledge available, combined with an understanding that relevant percentage areas of each broad scale habitat needs to be protected to ensure that sites are both viable, and not spaced so far apart that there is no site that is ecologically isolated.

2.14 Stakeholders at the regional scale were informed of they suggested by individual local groups that were often convened at the county level, or lower. For example, within the Balanced Seas (southeast) project region, the Isle of White, Solent, Sussex and Kent, Thames and Essex were all local groups that were gathered into local group meetings.

2.15 Thus, the recommendations were communicated to both national and local stakeholders on a continuing basis between mid 2010 and Autumn 2011. This positive feedback between the regional and local stakeholders helped enable greater local buy-in to the location of the recommended sites.

*September 2012*

<sup>114</sup> UK Science Advisory Panel (SAP) Draft response to Net Gain 3rd Iteration Report, May 2011, Paragraph 2.9.3, <http://tiny.cc/gbp9jw> (note the Net Gain website and public access to previous iterations of MCZs is currently unavailable as of 7 September 2012). The SAP response also states that "we remain concerned that largely un-quantified [i.e. before an impact assessment is prepared] socio-economic issues based on stakeholder views are having a strong influence on the choice of individual sites at the earliest stage of each discussion... the primary purpose of MCZs is to conserve habitats and species that are representative and important indicators of ecological health; protection of unproductive areas of the seabed will not accomplish that." (Paragraph 2.2),

<sup>115</sup> Eg *ibid*, Paragraph 2.9.14

### Supplementary written evidence submitted by Marine Conservation Society (MCS)

On behalf of the Marine Conservation Society (MCS), I would like to thank the Committee for the opportunity to provide oral evidence on 28 November 2012 to the inquiry into Marine Science. The MCS has monitored the inquiry with great interest, and welcomed the breadth of evidence submitted on not only the Marine Conservation Zone (MCZ) process, but discussions more broadly around the strategic and investment plans for marine science.

In light of the greater detail on MCZ proposals set out on 14 December 2012 within the Department for Environment, Food and Rural Affairs consultation, I would like to take one final opportunity to highlight the response of the MCS to the relevant questions posed by the inquiry. This letter does not seek to alter the evidence set out in the MCS's original submission, but highlight our key views on the Committee's lines of inquiry now that greater clarity has emerged on the Government's proposals.

- *Use of "best available" science*—The Committee has heard evidence on the recent shift in the burden of proof required for MCZ site designation; away from the original guidance of using "best available science" to the need for "robust science". The MCS believes that the Government's original guidance on the site selection process to use "best available science" accurately gauged the evolving nature of our scientific knowledge of the marine estate. The Statutory Nature Conservation Bodies (SNCBs) and Science Advisory Panel also argued that the pursuit of "robust" science should not be used to justify delaying site designations. Furthermore, the Committee has heard evidence that the notion of obtaining "robust" science within the marine estate represents a limitless pursuit, with significant economic costs. While informative, we do not think it is essential to have detailed data on the hundreds of individual features prior to designation, but believe designation could primarily be based on broadscale habitats, which we believe is usual practice internationally eg Australia.

*Ecologically Coherent Network*—Government claims to still be committed to designating an Ecologically Coherent Network, but how it can achieve this without designating the full network of MCZs is not clear. Defra's Science Advisory Panel of independent scientists, as well as both the SNCBs, stated that all 127 are needed if the Government is to achieve its international commitments to designate an Ecologically Coherent Network. The Sea Users Development Group has also joined eNGOs in producing a statement in support of an Ecologically Coherent Network of Marine Protected Areas. Government is beginning to argue that they already protect 24% of our seas in Marine Protected Areas, but this is misleading on three counts. Firstly, these sites are not actually protected eg not one site has a ban on all bottom towed fishing gear; secondly Government includes Special Protection Areas in this statistic that are designated solely for birds and do not protect wider marine habitats; and thirdly 24% relates only to inshore waters—across our whole seas only 12.8% is protected. We therefore still need the 127 MCZs, which amounts to 15.3% of English waters out to 200nm and added to the 12.8% existing sites would result in just 28.1% designated in sustainably managed MPAs.

- *Due consideration of socio-economic impact*—The Committee has heard a number of witnesses emphasize that the substantial consideration of socio-economic impact throughout the MCZ proposal stages often resulted in ecologically important sites failing to make the final recommendations. While the MCS was disappointed that a number of ecologically important sites were lost, it also acknowledges that this reflected the distinctive nature, and great strength, of the MCZ proposal process; in contrast to the selection of other Marine Protected Areas, MCZs considered throughout not only the scientific evidence of conservation need, but the potential socio-economic impact on local stakeholders. Indeed, the Committee has heard how site selection based on more "top down" and strictly scientific approaches have generated much resentment within local communities, most recently evident in the Highly Protected Marine Conservation Zone process within Wales. The MCS feels that it was the breadth and local nature of this engagement with stakeholders throughout the site selection stage that accords value to the whole network of 127 sites proposed.

However, the MCS is now concerned that the Government's proposals to designate only a small number of sites disenfranchises the vast amount of peoples time and public money that went into getting the network to this stage. Moreover, the MCS does not believe that socio-economics should be invoked at this late stage as justification for not designating sites. The due regard for socio economic impact throughout the proposals stages ensured that the proposed network represents a working compromise between ecological protection and mitigating socio-economic impact. Failure to designate sites at this late hour on the basis of socio-economic concerns fundamentally undermines the process that has led to this stage.

Finally, the MCS remains concerned that while the Impact Assessment within the Government consultation has ascribed best estimated costs to each MCZ site (frequently as little a £1,000 per site per year), no attempt has been made to quantify the potential benefits of individual MCZs, or the network as a whole. This is particularly concerning in light of the fact that the Government currently believes that the cost of designating the full network of 127 sites would be as little as £8 million per year. The MCS believes that were such studies to be undertaken, they would likely demonstrate the clear economic benefit of an Ecologically Coherent Network.

To place this in context, the Scottish Environment Link recently published a report which suggested that a network of Marine Protected Areas in Scotland's seas could provide economic benefits worth £10 billion.

On behalf of the MCS I would like to thank you again for the opportunity to contribute to the inquiry, and look forward to seeing the Committee's final report.

*January 2013*

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