

## **Annex C: Benefit estimation taken from published report - *The value of potential Marine Protected Areas in the UK to divers and sea anglers*<sup>1</sup>**

As part of the NEAFO<sup>2</sup>, the University of Aberdeen has developed case studies to assess the economic and social benefits of conserving the marine environment. This particular case study on diving and angling is one of four that was produced under the marine environment component of the NEAFO and was developed in partnership with the Marine Conservation Society (MCS), British Sub Aqua Club (BSAC) and the Angling Trust (AT). This annex draws directly on the report to present the study methodology as it is used to derive indicative benefits for the second tranche of MCZs. While wider literature was considered as part of the second tranche, the Kenter et al. study is still considered the best available for deriving illustrative benefits for specific rMCZs.

The report investigated the recreational use and non-use values of UK divers and sea anglers for 22 Scottish potential Marine Protected Areas, 119 English recommended Marine Conservation Zones and 7 existing Welsh Marine Special Areas of Conservation. The report concludes that, if expressed in economic terms, the benefits to divers and sea anglers of designating marine protected areas outweigh the cost of designation (consisting of monetised costs to government and industry). The study estimates one-off non-use value of protecting the sites to divers and anglers alone would be worth £730 – 1,310 million<sup>3</sup>, excluding divers and anglers' willingness to pay for specific restrictions on other users; i.e. this is the minimum amount that designation of 127 sites is worth to divers and anglers. In addition, the study says this would safeguard an annual recreational value currently worth £1.87 - 3.39 billion for England alone (excluding benefits of restrictions on other users and contingent on designation not significantly restricting diving and angling). These figures come with a number of limitations.

### *Methodology*

Information was gathered using an online questionnaire. The questionnaire included a monetary valuation section, a mapping section to establish visit numbers to potential MPA sites, and a non-monetary valuation section consisting of subjective wellbeing questions<sup>4</sup>. A total of 1683 usable responses were received from 1261 divers (75%) and 422 anglers (25%).

---

<sup>1</sup> Kenter et al. (2013) <http://uknea.unep-wcmc.org/LinkClick.aspx?fileticket=Mb8nUAphh%2BY%3D&tabid=82>

<sup>2</sup> <http://uknea.unep-wcmc.org/NEWFollowonPhase/tabid/123/Default.aspx>

<sup>3</sup> This 'non use value' is mainly measuring the willingness to pay to protect features from an uncertain future risk and an insurance against future harm and degradation. The researchers state that knowing the precise risk of harm is not essential. They provide the example of home insurance - it seems likely that the vast majority of those who take up building or home contents insurance, while they have risk preferences generally, have little quantitative knowledge on the actual risk of fire or theft. Then, it is the value of the goods and general level of risk aversion that determine willingness to pay, rather than the actual specific risk to the object of value.

<sup>4</sup> Cultural ES benefits that were assessed included recreational, aesthetic, spiritual, educational, health, identity, social bonding, sense of place and existence value for marine biodiversity. Example of monetary valuation question asked: *If this is a real protected area do you think you can afford to and would be willing to give a one*

At the beginning of the survey participants answered a screening question to find out if they were divers/snorkelers or sea-anglers. Respondents not engaged in any of these marine activities (e.g. freshwater anglers) were screened out. Using the responses to the screening question, the survey wording was geared towards either diving and snorkelling or sea-angling. They ensured that the survey prevented mixing activities within the survey, and it ensured that with each single participant either diving or angling behaviour was being considered, not both (to avoid double counting).

**Table 1 MPA survey outline**

1. General background questions (educational background, etc.) and questions on how the participant engages with the environment (how often they go diving/angling, etc.).
2. Short descriptive section on the MPA proposals.
3. A combination of a travel cost, frequency based choice experiment and contingent valuation, where participants are asked to allocate trips to hypothetical sites, and their willingness to pay for protection against a risk of future harm.
4. Follow-up questions on choice-making strategies and decision-making rules.
5. An interactive mapping session to establish how often participants visit 15 potential MPA sites randomly selected from the region where they dive or angle most.
6. A non-monetary valuation component consisting of a series of Likert scale questions on the subjective wellbeing participants derived from the sites that they indicated they visited.
7. A set of psychometric questions based on the Values-Beliefs-Norms (VBN) theory and the Theory of Planned Behaviour (TPB).
8. An opportunity to leave their name and email or postal address if participant expressed an interest in participating in one of the phase 2 deliberative workshops.

The monetary valuation component of the survey consisted of an two-stage approach. In the first stage, a choice experiment (CE) was used. CEs are a stated preference technique where respondents are presented with a series of choices between more or less desirable alternatives (Hanley, Wright & Adamowicz 1998). These choices are described by of a number of attributes. Each attribute is available at different levels. Here participants were asked to compare hypothetical diving or angling sites each with a range of environmental and recreational attributes, including travel distance, which was used as a cost-proxy. This provides a lower bound for participants' use values for the sites presented, with other costs (accommodation etc.) assumed constant. Further attributes were: marine landscape, underwater objects present, fish and other sea life present, restricted activities, access, number of vulnerable species found at the site that would be protected and size of the protected area (Section 2.2.2 and Table 7 of the report<sup>5</sup>). In the CE,

---

*off donation of £6? Your donation will be used to set up a local management trust to maintain this site as it is shown above, protect its natural features against the risk of future harm and degradation.*

<sup>5</sup> Kenter et al. (2013) <http://uknea.unep-wcmc.org/LinkClick.aspx?fileticket=Mb8nUAphh%2BY%3D&tabid=82>

participants were asked to allocate the next five opportunities for diving/angling they have within the next year between these three options: two sites, A and B, and 'staying at home'.

In the second stage, one of the two presented sites was selected at random and a contingent valuation question asked participants about their willingness to pay (WTP) for future protection of the site and its natural features (example in Figure 6). In contrast to CEs, where participants choose between multiple scenarios, in Contingent Valuation Method (CVM) participants are presented with a single hypothetical scenario and asked directly whether they would be willing to pay to attain it. The authors state that their attribute-based CVM allowed them to better understand preferences and trade-offs than would be possible in a conventional CVM approach by incorporating an important benefit of choice experiments into contingent valuation. Participants completed four sets comprised of a CE and CVM task.

The authors state their CVM design can be thought of as eliciting an insurance value. Donations requested from respondents can be thought of as a premium to pay for the avoidance of harm to environmental goods of value. They considered motivation for paying this premium to be associated with three sources of non-use value: option value (the value of retaining the possibility of using a site in the future, including the value of avoiding irreversibility of harm (c.f. Arrow & Fisher 1974; Farber, Costanza & Wilson 2002)); bequest value (the value of securing the site for future generations) and existence value (the value of knowing that the site and its sea life is secured regardless of any other benefits). The authors state that the nature of the value that is elicited through the two different instruments, CE and CVM, is fundamentally different, as a result of the different framings: one on whether someone would currently use the site, the other whether they would be willing to pay for its protection.

To transfer the benefits from the hypothetical sites included in the survey to real sites and aggregate them across the UK populations of divers and sea-anglers, they used a matrix of sites and their characteristics, matching actual sites against the attributes of the CE/CVM. GIS was used to establish distances between each participant and each actual candidate MPA in England and Scotland. Recreational use values were calculated by multiplying individual WTP by visit numbers. Visit numbers were based on how often the participants stated they visited a random selection of 15 sites in their region in an interactive mapping application within the survey. To avoid double counting of those who were both divers and anglers, the survey was framed to prompt participants to only consider one or the other activity when indicating numbers of trips.

*Assessing diver and angler recreational values for the proposed MCZs*

Bringing together the results of these various tools, the authors could estimate current diver and angler recreational values for each pMPA and the value of protecting the pMPA, as well as aggregates for the sites that are within the group of 23 English rMCZs that have been proposed by Defra to be designated as part of the second tranche, the larger group of 120 rMCZs (of 127; seven excluded due to depth<sup>6</sup>), 22 of 35 proposed Scottish sites 23 (13 excluded due to depth), and the seven existing marine SACs in Wales to be included, given that when this research was conducted, it was uncertain which Welsh sites would be selected as candidate (HP)MCZs. It was assumed that the value functions can be applied to estimate divers' and sea anglers' values for any future UK potential marine protected areas.

There are clearly many benefits to designating marine protected areas, just as there are costs. These benefits are challenging to estimate and Defra recognises the complexities of the scientific evidence as well as the effort that has been made by the report to value these estimates. Caution is needed in interpreting the figures and the report highlights that there are a range of limitations related to either sampling issues or framing of the monetary valuation.

For example as the report notes, there is considerable uncertainty about the real number of divers and anglers in the UK and their geographical distribution<sup>7</sup>. Based on existing evidence, the visitor estimates used in the report looks high and are a key factor driving the high recreational benefits numbers<sup>8</sup>.

Discussing limitations of the estimates the authors note there may be some framing bias in responses and that use of a voluntary contribution payment vehicle may not fully reveal individual values. Also the respondents were also asked to provide a hypothetical donation to a hypothetical site, which may result in bias of benefits (although budget constraints are emphasised)<sup>9</sup> and the estimates value individual's perception to restricting the sites rather than actual ecological protection following designation.

The report looks at restriction scenarios where the sites are completely closed to specific activities<sup>10</sup>. In reality most of the new MCZs will be multi-use areas. This means that only potentially damaging activities will be restricted or need additional management, just as is the case at existing sites<sup>11</sup>. The report also highlights limitations for using voluntary donations to estimate the one off non-use benefits<sup>12</sup>.

---

<sup>6</sup> Sites at a depth of over 100m were excluded from the full list of English rMCZs and Scottish rMPAs.

<sup>7</sup> Visitor estimates were based on self-reported visits and assumptions were made that self-reported visit counts were representative for regional populations in terms of the sites they visit.

<sup>8</sup> This report states on average this constitutes 12 visits per individual in UK diver per annum to the pool of sites considered in this survey and 39 per angler. Compared to the National Angling Survey, which came to 34 days out across the UK for anglers in general, these estimates look high.

<http://www.anglingtrust.net/page.asp?section=816&sectionTitle=National+Angling+Strategy>

<sup>9</sup> Hausman, Jerry, Contingent valuation: from dubious to hopeless. *Journal of Economic Perspectives* 26(4):43-56, 2012; <http://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.26.4.43>

<sup>10</sup> no potting and gillnetting; no anchoring or mooring; no dredging and trawling

<sup>11</sup> Restricted activities will vary from site to site, depending on the natural features and species that are being protected. The additional management that is needed for the new sites will be identified after the sites are

The CVM do not depend on the visitor numbers. Table 16 in the report provides CVM estimates for each site corresponding to 4 restriction scenarios – e.g. ‘no restriction’, ‘no Dredging and Trawling’, ‘no dredging, trawling, potting and gillnetting’ and ‘no dredging, trawling, anchoring and mooring’. Therefore, the values in Table 16 of the report were matched to the management scenarios considered in the second tranche IA to come up with site and tranche specific estimate ranges. Depending on the management scenario in each of the 23 sites these estimates were matched according and aggregated to get a total one off non-use value (£137m to £284m).

---

designated using further information on the impacts of activities. In the vast majority of cases, activities that do not damage the environment could continue.

<sup>12</sup> In terms of CVM framing the report used voluntary donations as a payment vehicle to estimate the willingness to pay to protect features from an uncertain future risk and an insurance against future harm and degradation. Although commonly used, there are risks that respondents ignore their budget constraints when responding to the survey. In addition, there might be free rider concerns as well. The report states that a separate potential framing bias in the CVM is that the preamble mentions BSAC, AT and MCS as research partners, and that the results of the study may be used in their consultation submissions. This might have increased willingness to donate if participants felt sympathetic to these organisations