The value of potential marine protected areas in the UK to divers and sea anglers

Final report – July 2013

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The following public data sources were also utilised:

Abbreviations

AT	Angling Trust
BAP	Biodiversity Action Plan
BSAC	British Sub-Aqua Club
CE	choice experiment
CL	conditional logit
CVM	contingent valuation method
DMV	deliberative monetary valuation
ES	ecosystem service(s)
FOCI	features of conservation interest
GIS	geographic information system
HPMCZs	Highly Protected Marine Conservation Zone
HSDM	Human-Scale Development Matrix
JNCC	Joint Nature Conservation Council
MCA	multi-criteria analysis
MCS	Marine Conservation Society
(r)MCZ	(recommended) Marine Conservation Zone
(p)MPA	(potential) marine protected area
MENE	Monitor for Engagement with the Natural Environment
NEA(FO)	(UK) National Ecosystem Assessment (Follow-on phase)
rRA	(recommended) Reference Area
SAC	Special Area of Conservation
SNH	Scottish Natural Heritage
SPA	Special Protected Area
SSSI	Site of Special Scientific Interest
TC	travel cost
WTP	willingness to pay

Headline results

1. This report investigated the *recreational use* and *non-use* values of UK divers and sea anglers for 25 Scottish potential Marine Protected Areas (pMPAs), 119 English recommended Marine Conservation Zones (rMCZs) and 7 existing Welsh marine Special Areas of Conservation (SACs) using a combination of monetary and non-monetary valuation methods and an interactive mapping application to assess site visit numbers. The results are based on an online survey with 1683 divers and sea anglers run between Dec 2012 and Jan 2013. Monetary results include *annual recreational values* (estimated using a travel cost choice experiment method) and the *non-use value of protection* of sites (estimated using contingent valuation). The latter is thought to include the option to enjoy a site and its features in the future as well as the value of knowing that the site is protected for future generations, and for the species that live there in their own right (Section 2.1). *Use values* to anglers and divers could increase as a result of restrictions on other users (these effects were assessed) or ecological improvements and increased site visits (these effects were not assessed).

Table 1 Headline monetary valuation figures (£ million)

	England (rMCZs)			*Scotland (pMPAs)*[1]	*Wales (marine SACs)*
	Sites nominated by Defra for designation in 2013	*Sites not nominated for designation in 2013*	*Total*		
Annual current recreational use value					
Divers	46-76	58-97	104-173	33-56	11-19
Anglers	498-906	1,271-2,311	1,769-3,217	34-61	57-103
*Maximum added recreational use value resulting from restrictions associated with protection**					
Divers† ‡	8-14	12-20	20-34	5-8	1-2
Anglers‡	51-93	136-247	187-340	6-10	10-18
Non-use value that would result from protection					
Divers – base level	26-43	76-127	102-167	20-33	10-16
Divers – max. value restrictions† †† *	30-51	89-148	119-199	22-37	11-19
Anglers – base level	159-289	470-854	628-1,143	105-191	56-97
Anglers – max. value restrictions† †† *	186-339	552-1,004	738-1,343	120-218	62-113

† No potting and gillnetting; ‡ no anchoring or mooring; †† no dredging and trawling.
* The actual value associated with restrictions can not be calculated because it is uncertain which restricitions will come into place at each site; hence the actual value will lie somewhere between zero and the stated maxima.

[1] These figures only include the aggregate value of 20 of 25 areas assessed. Our initial assessment included one site that has now been dropped altogether (Gairloch to Wester Loch Ewe, although we recognise Northwest Scotland Sea Lochs has been extended to include Loch Ewe) and four sites in our assessment remain as search areas (Eye Peninsula to Butt of Lewis; Shiant East Bank; Skye to Mull; Southern Trench). These four search areas and Gairloch and Loch Ewe have been removed from aggregate results and from individual site results in Tables 14 (p. 55) and Table 18 (p. 83), as they will not be part of the network configuration that will shortly go out to consultation in Scotland. However, they are presented in Annex 1.

2. The assessed monetary benefits of the two marine user groups are likely to outweigh best estimates of the cost of designation, as far as they are known[2]. The English MCZ impact assessment[3] estimated aggregate costs at present value over a 20 year time scale for all 127 rMCZs at £227 - 821 million including costs to the renewable energy sector, the fisheries sector, oil and gas, commercial shipping, recreation, and implementation, management and enforcement costs. The baseline, one-off *non-use value of protecting the sites* to divers and anglers alone would be worth £730 – 1,310 million, 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. Only taking these non-use values into account indicates a benefit - cost ratio for designation of -1.1 (lower bound of minimum benefits vs. highest estimate costs) to 5.8 (upper bound of minimum benefits vs. lowest estimate costs). Comparing the impact assessment best estimate costs scenario (£331 million) to a central estimate of the mimimum benefits expected (£957 million) leads to a benefit - cost ratio of 3.1. Although these figures come with a number of limitations (see below), designation of 127 sites is most likely efficient, even without accounting for the benefits of restrictions on others to divers and anglers, potential inceases in use values resulting from designation, or the values of other user groups and the non-use values of the general public.

3. In addition[4], this would safeguard an *annual recreational value* currently worth £1.87 - 3.39 bln for England alone (excluding benefits of restrictions on other users and contingent on designation not significantly restricting diving and angling). Again, these figures come with a number of limitations (see below).

4. For Wales, designation of the seven marine SACs already supports an annual recreational value of £68 – 122 million and generates a one-off non-use value of £66-129 million.

5. For Scotland, the areas assessed currently provide an estimated £67 – 117 million in annual recreational benefits. Their protection would generate a total one-off non-use value of £125 – 255 million. Mean site use values for anglers are lower for Scotland than England and Wales as a result of lower visitor numbers. For divers, Scottish sites have some of the highest mean use values. Non-use values, which are not a function of visitor numbers, are substantial for both groups.

6. Non-use value estimates and use value estimates for divers are considered to be lower bounds and values fall within the range that might be expected from the literature. Results for *recreational use values* of anglers are more strongly limited (see below) and hence subject to greater uncertainty; these values could be under- or overestimates and need to be read as indicative only.

7. In terms of non-monetary assessment of cultural ecosystem services, our results indicate that the most important benefits to divers and anglers of marine sites were *engagement and interaction with nature* (including feeling connected, getting to know nature, and appreciating its beauty),

[2] Both costs and benefits depend on site-specific management regimes that are still uncertain. The low-cost scenario assumes that there are only very limited management restrictions at sites following designation; the high cost scenario assumes intensive management and heavy restrictions are put in place across most sites.

[3] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/82721/mcz-designate-ia-20121213.pdf

[4] Note that it is not sensible to add up the *recreational use value* and the *non-use value of protection* because they represent very different types of value. The former is an estimate of the annual value of current recreational benefits. The latter is a measure of aggregate willingness to pay for protection. To evaluate the *total value of protection*, one could aggregate and discount annual marginal benefits associated with increased recreational values resulting from restriction measures over time, and add this to the one-off value of protection. To do this, a projection of potential management measures would need to be established for each site, which was beyond the scope of this report.

transformative values (including memorable experiences) and the sites' *social bonding value*. However, *therapeutic, identity* and *spiritual* values of nature were also important at sites across the UK. The highest values tended to be found at sites with lower recreational values and visitor numbers. Scottish sites scored highest for their contribution to individual subjective wellbeing within the UK; the highest scoring English region was the southwest.

8. Per-site monetary benefits are listed in Table 16, p. 61 and non-monetary wellbeing indicators in Table 18, p. 83. Maps on pp. 10-13 and pp. 69-80 show the geographical distribution of monetary value across sites.

Limitations to the study

9. For Scotland the results are based on a preliminary configuration of sites that has been superceded by more recent proposals[5]. The final value of the proposed Scottish network will differ, though magnitudes are very likely to remain similar.

10. There are a range of limitations related to either sampling issues or framing of the monetary valuation. In terms of sampling, there is considerable uncertainty about the real number of divers and anglers in the UK and their geographical distribution. Also, the sample size for anglers in particular is limited by the accuracy of visitor estimates and in some cases visitor estimates could not be made. Angler visits to sites and angler *recreational values* need to be read as relative trends, allowing us to distinguish popular from less popular sites, but with considerable uncertainty about exact numbers. Note that this issue only affects the *recreational use* values and not the *non-use values of protection* that are not dependent on visitor numbers.

11. In terms of framing, there are further limitations to the study results. Key issues include: use of voluntary donations as a means of payment; not providing a local context (hence not accounting for particular local benefits); only providing one region to indicate visit numbers (losing out on visits to far-away sites, which may lead to underestimation of the recreational value of Scottish and Welsh sites in particular); not estimating potential increases in recreation associated with ecological improvements that may result from protection; uncertainty about the presence/absence of ecological features (i.e. features included in the values may not be there in some cases while it is also possible that there are features of value present that have not been included because we don't know of them yet); not accounting for the value of features that were not used as selection criteria for rMCZs/pMPAs; lack of data on rock formations in Scotland; not estimating the additional ecological benefits of designating a network of sites; not accounting for higher travel costs of boat use; not accounting for additional expenditure such as accommodation, equipment, etc.

12. As most of these issues suggest *underestimation* of values, we expect individual and aggregate estimates to represent a *lower bound* of willingness to pay for both the use values and non-use values, at least for divers. For *recreational use values* of anglers there is considerable *uncertainty* as to whether results are under- or overestimates as a result of uncertainty around the implications of the sample size for visit numbers to individual sites (although the latter affects *aggregate recreational use values* only, as only these depend on visit counts).

[5] For some sites, boundaries have shifted, in some cases significantly (e.g. Firth of Forth Banks), and we excluded five sites that we initially assessed from our main results tables (see footnote 1).

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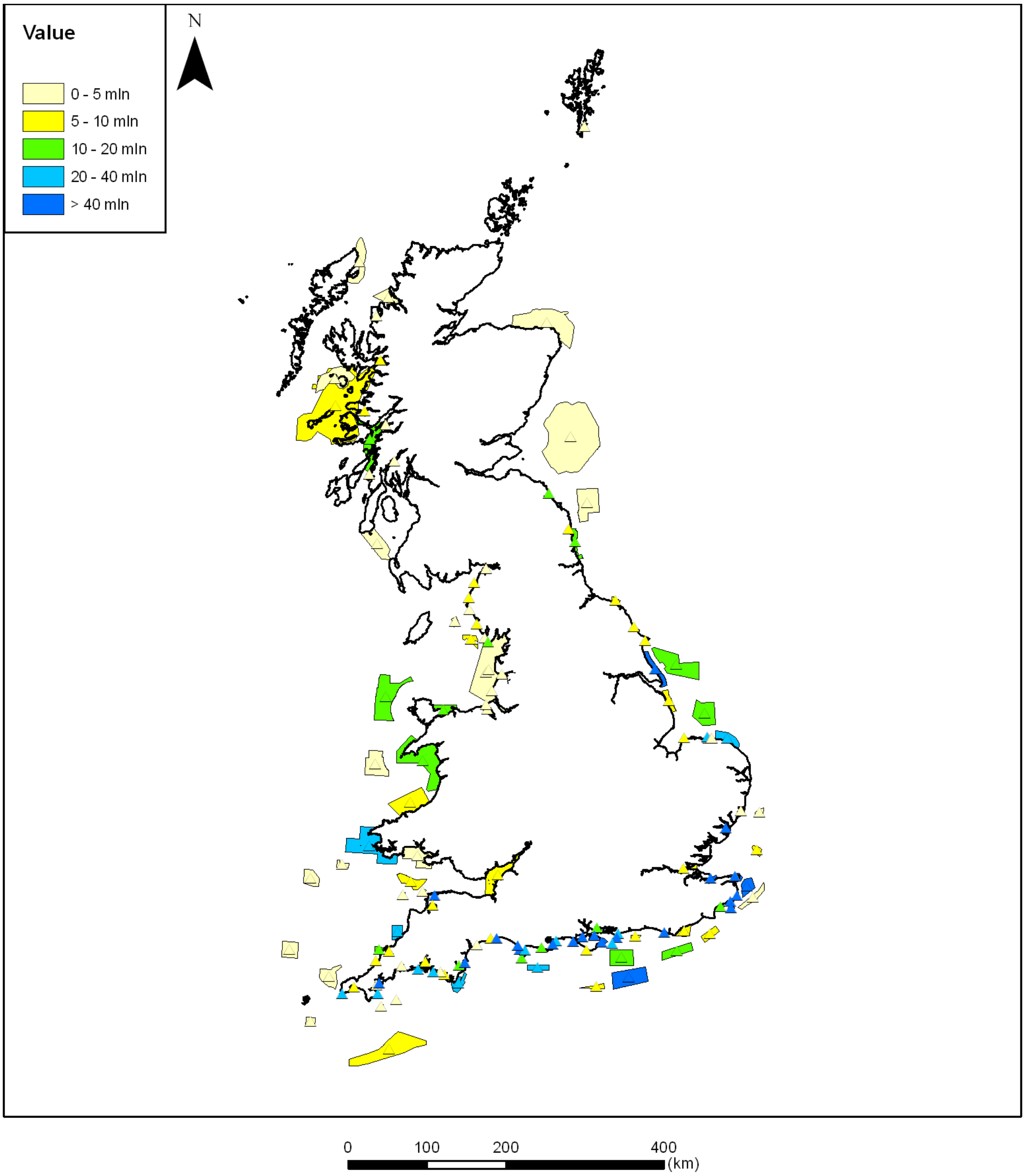


Figure 1 Central estimate of anglers' current annual aggregate recreational use value (mln £) for English rCMZs, Scottish pMPA and Welsh SACs for the total population of UK anglers[6].

[6] Figures 1-4 include four areas (Gairloch and Wester Loch Ewe, Eye Peninsula to Butt of Lewis, Shiant East Bank, Skye to Mull and Southern Trench) that were included in our survey and our original analysis but that will not be put forward for consultation initially. Their values are not included in aggregate totals but reported separately in Annex 1.

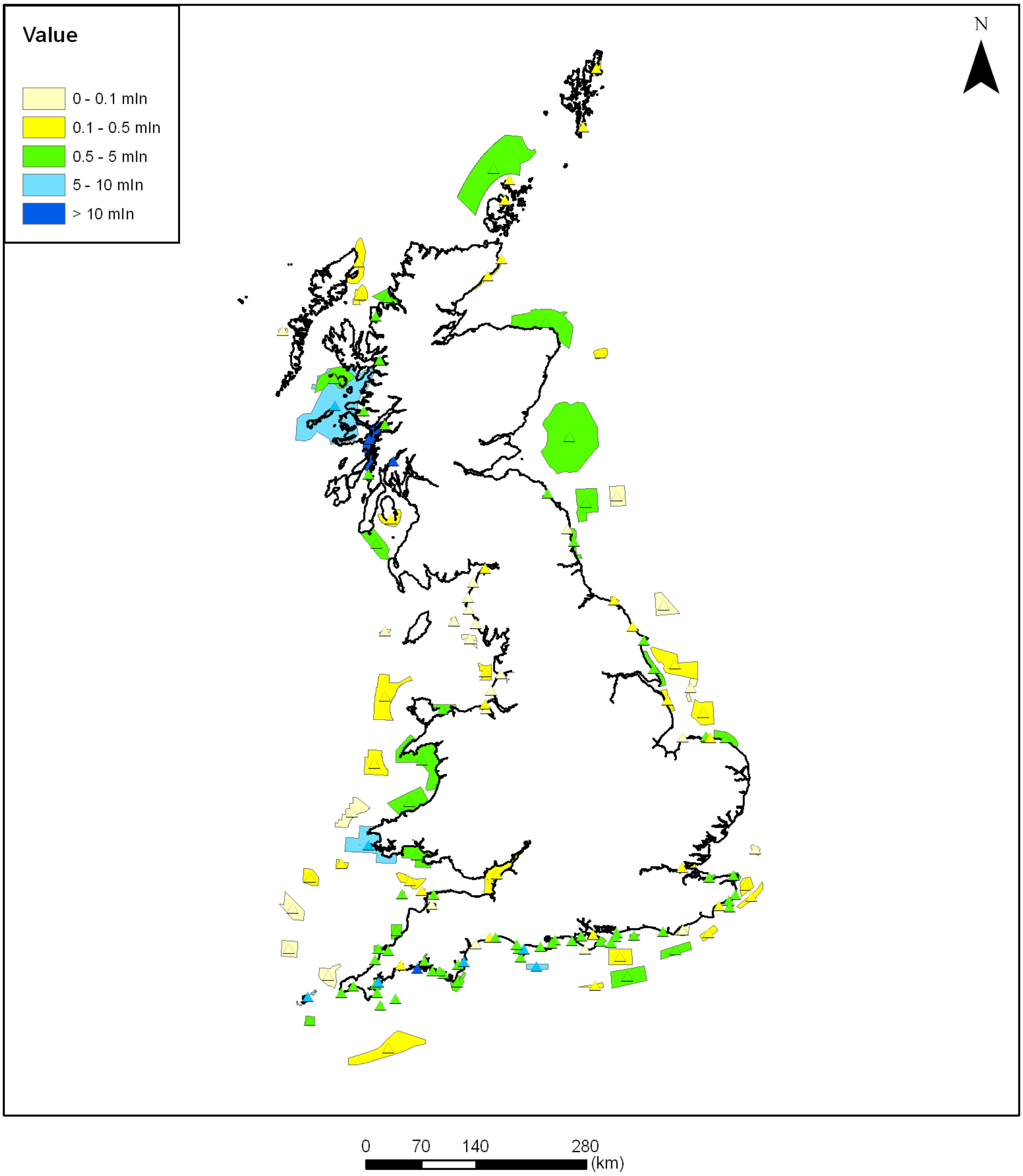


Figure 2 Central estimate of divers' current annual aggregate recreational use value (mln £) for English rCMZs, Scottish pMPA and Welsh SACs for the total population of UK divers.

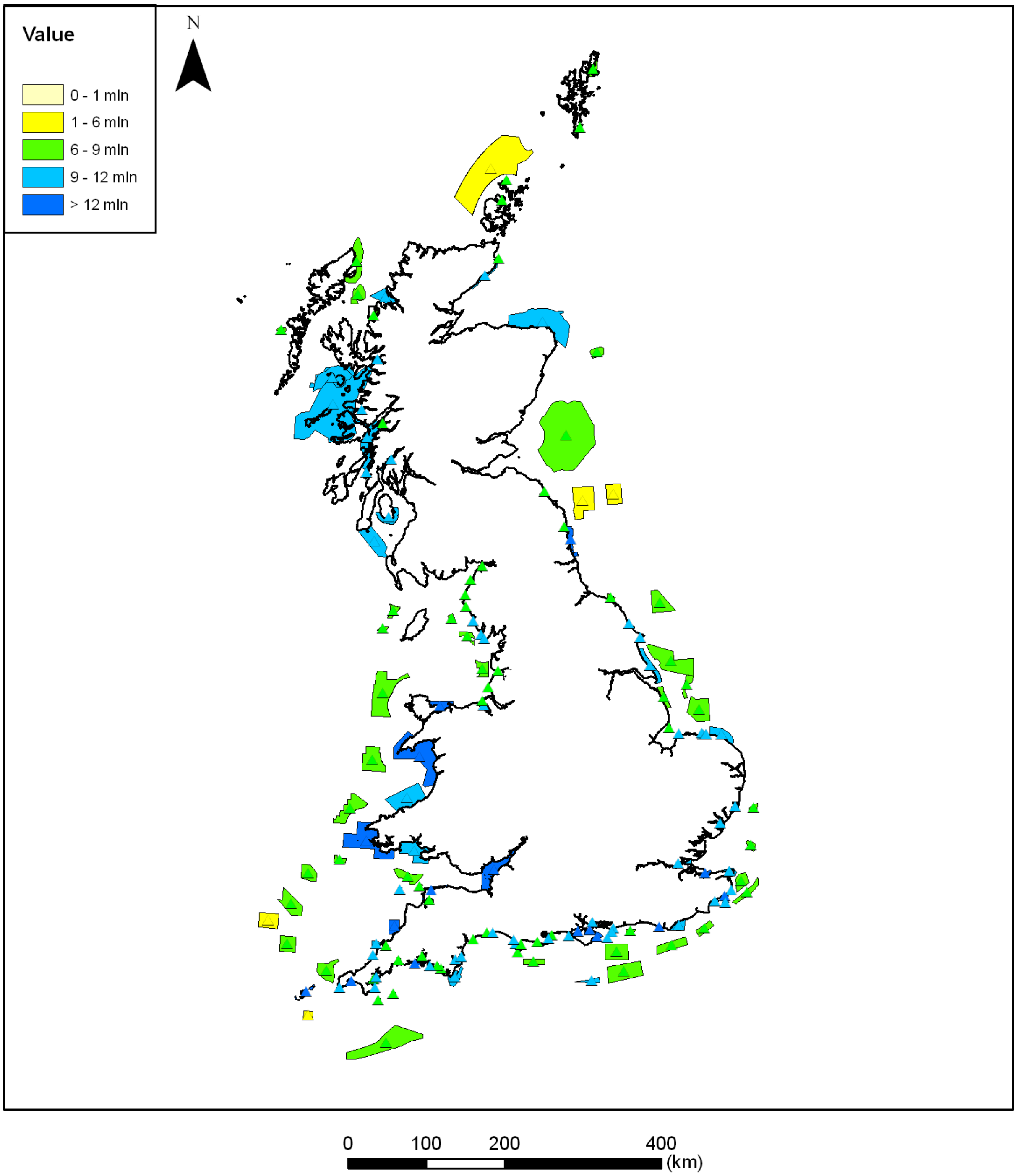


Figure 3 Central estimate of anglers' aggregate willingness to pay for protection of English rCMZs, Scottish pMPA and Welsh SACs with no dredging, trawling, potting and gillnetting (highest value restrictions) for total population of UK anglers.

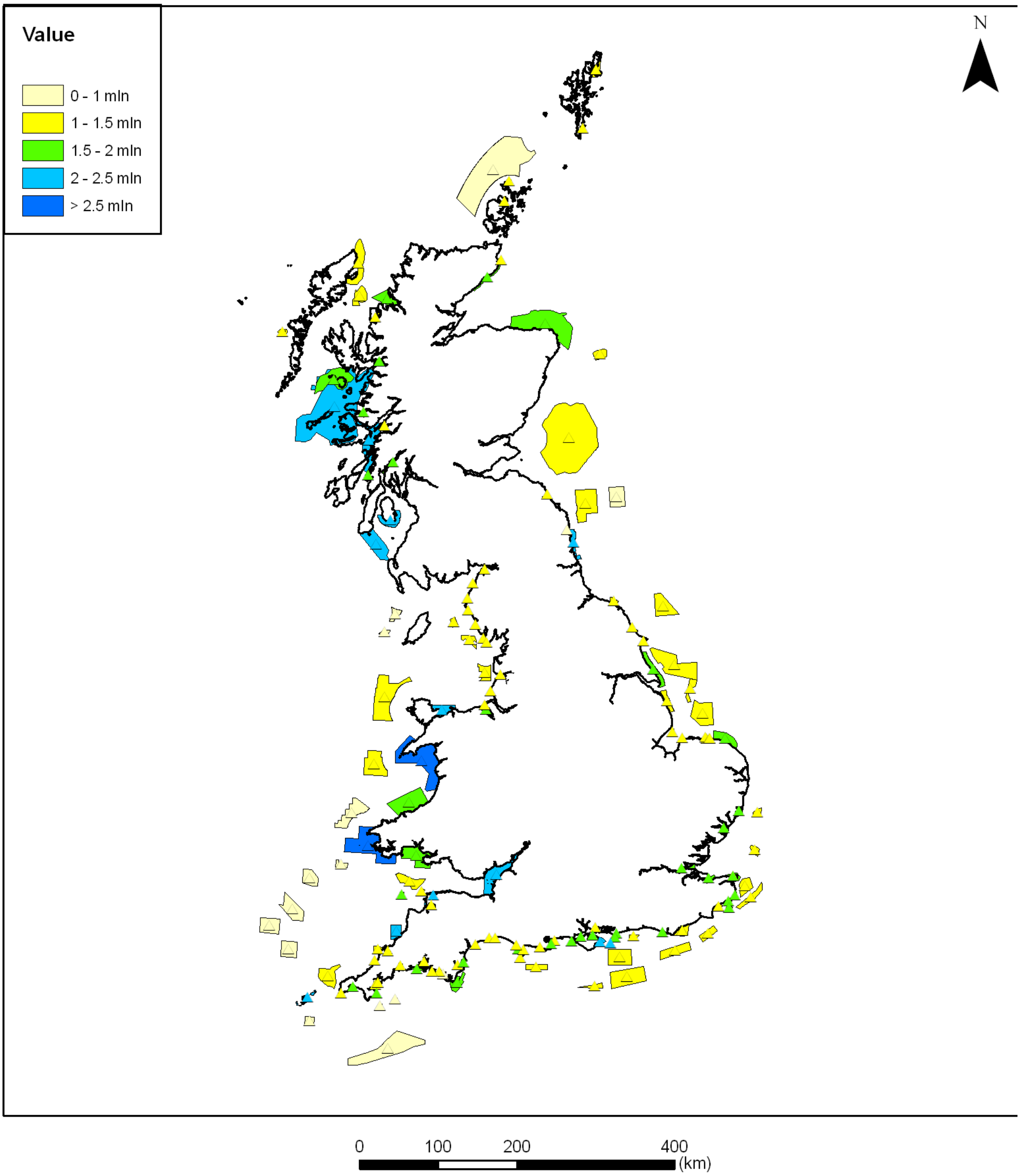


Figure 4 Central estimate of divers' aggregate willingness to pay (mln £) for protection of English rCMZs, Scottish pMPA and Welsh SACs with no dredging, trawling, potting and gillnetting (highest value restrictions) for total population of UK divers.

Executive summary

1. This research was conducted between October 2012 and March 2013 by a team led by researchers from the University of Aberdeen in partnership with the Marine Conservation Society (MCS), British Sub Aqua Club (BSAC) and the Angling Trust (AT). It was funded by Defra, Welsh Government, NERC, ESRC and AHRC to provide baseline results for one of four case studies for the Shared, Plural and Cultural Values work package of the follow-on phase of the UK National Ecosystem Assessment (NEA) (Box 1, p. 27). Additional funding was received from the Calouste Gulbenkian Foundation through MCS.

Aims and scope

2. The research aimed to elicit values of cultural ecosystem services (ES) of UK sea anglers, divers and snorkelers for candidate marine protected areas in England and Scotland and existing marine SACs in Wales and provide useful data for the MCZ Impact Assessment and evaluation of Scottish potential MPAs, and for future marine protected area designation in Wales. Through a combination of primary valuation and benefits transfer, monetary and non-monetary valuation, the survey assessed the use value and non-use value of 22 Scottish pMPAs, 120 English rMCZs and 7 Welsh SACs[7]. Cultural ES benefits that were assessed included recreational, aesthetic, spiritual, educational, health, identity, social bonding, sense of place, and existence values for marine biodiversity.

3. The research also forms the first phase of one of three case studies in the *Shared, Plural and Cultural Values* work package of the UK NEA follow-on phase. The overall aim of the work package is to investigate differences between individual and 'shared' values of nature, and to operationalise shared values for decision-making. This report presents results of the first stage of the MPA case study. In stage two, the individual responses received during the online survey will be compared with deliberative responses obtained during a series of 16 regional valuation workshops held across the UK during March - April 2013. The NEA follow-on synthesis and technical reports will be released in 2014.

Methods

4. Data 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.

5. The monetary valuation section of the survey used an innovative two-stage approach. Choice experiments (CEs) provided the first stage to the valuation methodology. CEs are a stated preference technique where respondents are presented with a series of choices between more or less desirable alternatives. Here, we provided the respondent with choice tasks where the respondent was asked to consider hypothetical diving or angling sites with a range of environmental and recreational attributes including travel distance, which was used as a cost-proxy. Each marine site was described in terms of its characteristics. These were: marine landscape and underwater objects present in the area, fish and other sea life present in the area, restricted activities, access, number of species found at the site that would be protected, size of the protected area, and travel distance to the site. Participants were asked to choose between two sites, A and B, and a 'stay at home option', allocating their next five opportunities for diving/angling within the next year between these three options (example in Figure 5). Next, one

[7] Sites at a depth of over 100m were excluded from the full list of English rMCZs and Scotttish pMPAs.

of the two presented sites was selected at random and a contingent valuation question asked respondents' willingness to pay for future protection of the site and its natural features (example in Figure 6).

6. Recreational WTP was based on a conservative estimate of return car travel cost of £0.088 per mile (Section 2.2.2). We accounted for car sharing but did not account for additional mileage costs associated with boat use.
7. Our approach allowed an assessment of multiple components of economic value. The choice experiment estimated a lower bound of current recreational use value and marginal changes to this value under differing sets of management restrictions. Our contingent valuation design elicited non-use value, including option-use value, existence and bequest value associated with conservation of potential MPAs, again under different sets of management restrictions.
8. In order to transfer the benefits from hypothetical to real sites, we used a matrix that matched habitats, species and other features of actual sites against the attributes of the hypothetical sites from the choice experiment and the contingent valuation. Recreational use values were calculated by multiplying individual WTP by visit numbers. Visit numbers were based on how often our participants stated they visited a random selection of 15 sites in their region in an interactive mapping application within the survey. The marginal non-use value of protecting sites was calculated on the basis of the contingent valuation results and was aggregated over UK sea angler and diver populations using GIS to account for distance decay (as participants valued nearby sites higher than sites further away). We used 150-250,000 as a UK diver population estimate, based on a BSAC estimate of 200,000 (A. Dando, Pers. Comm.). The angler population range used was between 1.1 million (Drew Associates, 2004) and 2 million (CEFAS, 2013).
9. A set of 15 non-monetary, subjective wellbeing indicators (on themes such as identity, knowledge, health, connectedness to nature, social bonding) were developed on the basis of a wide range of literature sources on cultural ecosystem services and implemented through Likert scales. They were linked to the mapping section, so that participants could directly associate their answers with specific sites. This allowed us to estimate mean wellbeing dimensions for each of the pMPA sites (Section 2.2.5). We placed mean scores into three easily interpretable classes that indicated whether their ranking fell into the top, middle or bottom third of scores within the pool of pMPAs across the UK.

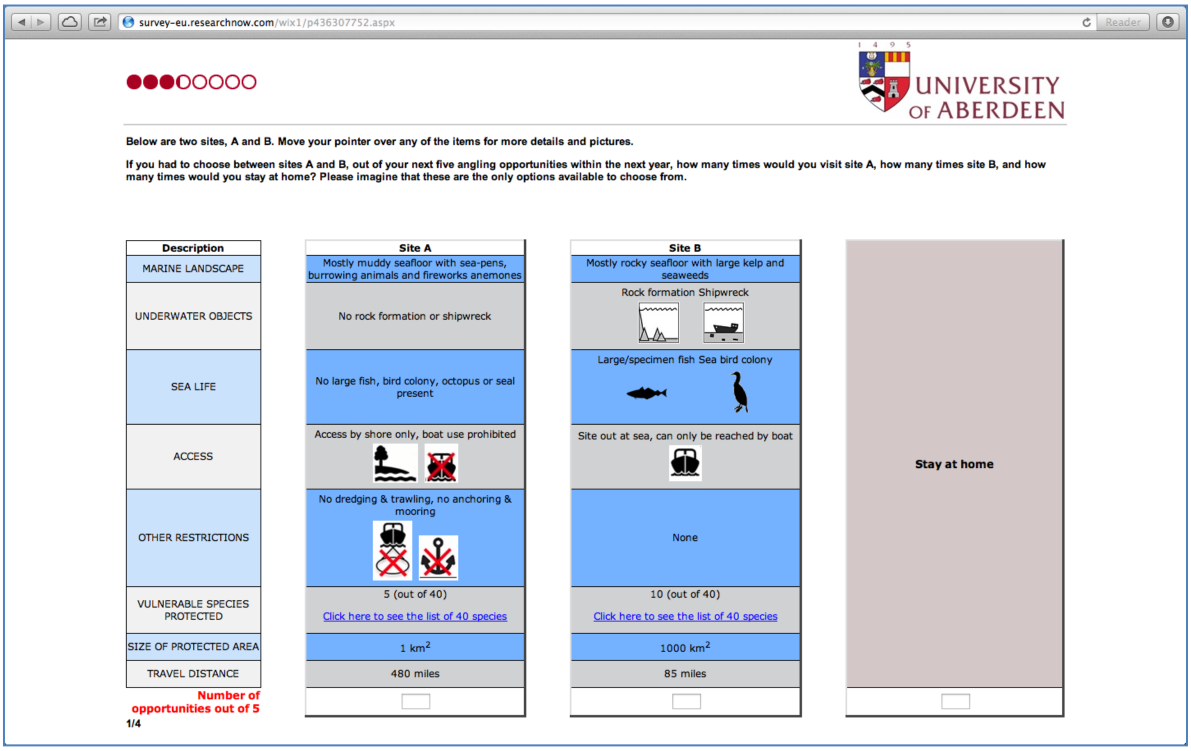


Figure 5 Example choice experiment task.

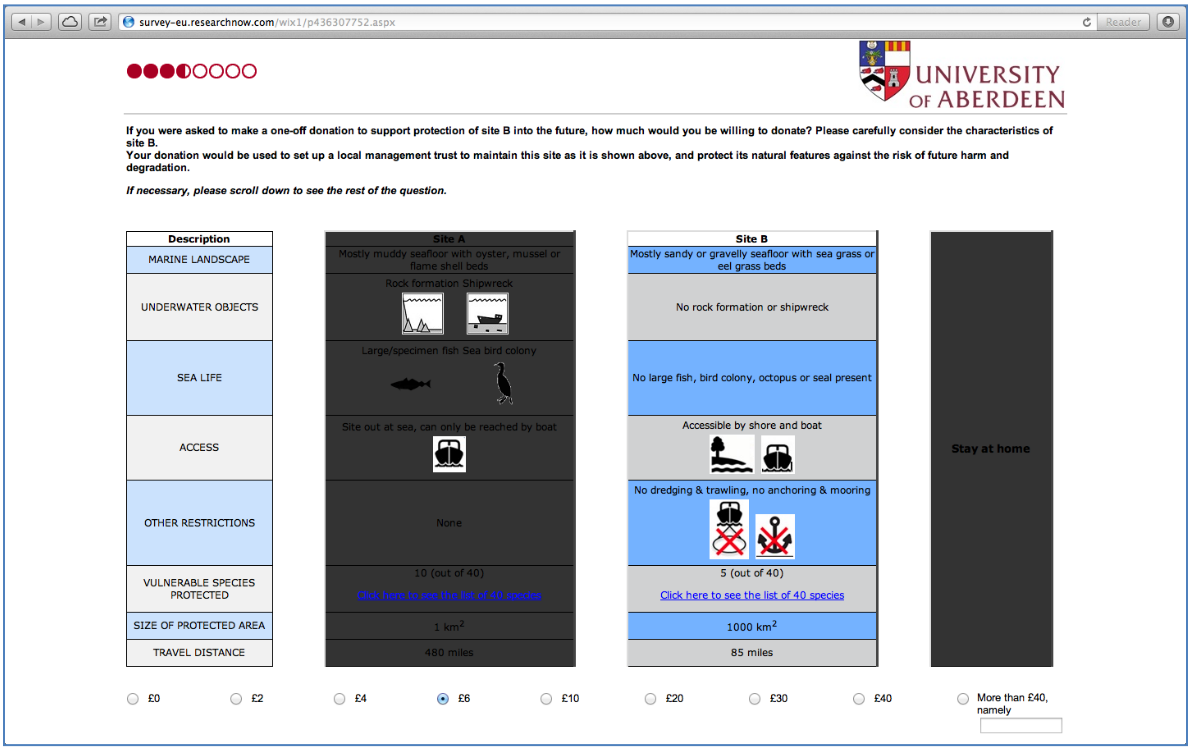


Figure 6 Example contingent valuation method task.

Results and discussion

10. **Choice experiment results:** For anglers, the most important CE attributes were specimen fish (willingness-to-pay (WTP) £23.58) and rocky seafloor with tide swept channels (£25.14). Anglers were willing to pay £0.30 for each additional protected species in the area. Shipwrecks were of intermediate importance (£8.87). For divers, rocky habitats were most important, along with wrecks (£18.98). Large fish (£7.64), bird colonies (£7.02), octopus (£13.42) and most of all seals (£15.97) were also important. The presence of protected species, even whilst the chance of encountering them was very low, was also valued (WTP £0.44 per species). Income, education and dive/angling experience, but not gender significantly influenced WTP to visit sites over staying at home for both groups.[8]

11. **Contingent valuation results:** For the contingent valuation part of the survey we asked participants if and how much they would be willing to pay and could afford to give a one-off donation for protection of the dive/angling site presented to them and its natural features into the future against risk of harm and degradation. On average anglers were willing to donate £10.28, divers slightly but not significantly more at £11.13. A large amount of variation was explained by individual rather than site characteristics. Donating money to an environmental organisation, support for MPAsand income positively influenced WTP. Values were subject to distance decay, i.e. divers and anglers were willing to donate less for distant sites. The most influential site-based parameters for both groups were shipwrecks, presence of specimen fish, and management restrictions; there was particularly high WTP to restrict dredging and trawling. Thus participants were WTP considerably more when they felt adequate measures would be put in place that reduced risk of harm to the site. Conversely, participants perceived restrictions on anchoring and mooring resulting from protection as negative. Divers and anglers did not have clear preferences in terms of protecting one type of habitat over another, except for a strong diver preference for the protection of ‘soft water corals, sponges and anemones’. Protection of vulnerable marine species added to WTP though for divers this was of less worth than protecting charismatic animals, such as octopus, seal and birds.

12. **Visit numbers:** As might be expected, the highest visit[9] numbers were in Southeast England, with the Southwest taking second place. Mean site visits for England and Wales were on average 5-6 times higher than for Scottish sites. In total, we estimated 1.2-2 million visits a year by divers to pMPAS in England, 462-772 thousand visits for Scotland and 128-213 thousand to the seven marine SACs in Wales. Anglers made an estimated 26-47 million visits in England, 1.2-2.1 million visits to Scottish pMPAs and 2.0-3.7 million visits to Welsh marine SACs. On average, this constitutes 17 visits per individual UK diver per annum to the pool of the sites considered in this survey, and 39 per angler (comparison to other angling surveys is discussed in par. 20, below).

13. **Aggregate monetary values:** Aggregated values for the travel cost and contingent valuation results per site and per country/region are given in Table 16, p.61. Headline figures for England, Scotland and Wales are given in Table 1, p. 4. The aggregated annual recreational use values elicited and the willingness to pay for marine protection each indicated the tremendous value that marine sites and their protection have to both divers and anglers. This value was not equal across sites; it depended on visitor numbers and geographical remoteness, as well as the features of the sites, including habitats, number of protected species, presence of charismatic species and underwater features, and restrictions placed on other users.

[8] Results presented are statistically significant except where mentioned that this is not the case. For significance levels for the CE see Table 13 (p. 48) and for the CVM see Table 15 (p. 52).

[9] Visit number figures can not be directly compared against ‘days out’ as more than one site may be visited per day. A full discussion on the limitations of visit counts can be found in Section 4.2.1. Note that aggregate estimates for Scotland exclude the five areas listed in Annex 1 (remaining search areas and Gairloch and Loch Ewe).

14. For England, the *average current recreational value* of the sites proposed for designation in 2013 for divers (between 1.6-2.7 million) was considerably higher than that of the sites not currently being considered for designation in this tranche (0.7-1.1 million), reflecting perhaps that these sites have outstanding ecological features, which add value for divers, in particular, and that some of the most popular dive sites were included, particularly in the Finding Sanctuary region (Southwest England). For anglers rMCZs proposed for designation in 2013 did not have more value, on average, than those not proposed for designation in this tranche.

15. If 31 out of 127 sites would be designated, a considerable aggregate current recreational value would not be protected by MCZ status: 58-97 million annually for divers and 1.27-2.31 bln for anglers (reflecting that there are 5-10 times more sea anglers than divers).

16. Designation would generate a considerable amount of additional benefits. These can be split into the increase in annual recreational use value to divers and anglers if certain restrictions are put in place on other users, and the non-use value of protection. The increase in annual use value from protection[10] measures would depend on the measures in place and differ by site. The non-use value of protection for divers would be a one-off value of 26-51 million for the 31 English sites nominated for designation in 2013 and 102-199 million for the 89 remaining English sites[11] depending on protection measures in place, and for anglers 159-339 million and 628 million - 1.34 billion, respectively. Maintaining or improving annual use values is contingent on designation not significantly restricting diving and angling. Similarly, the option use value that is part of the value of protection would only be realised if diving and angling would continue to be permitted at sites.

17. For Scotland, the areas assessed currently provide an estimated £67 – 117 million in annual recreational benefits. Their protection would generate a total one-off non-use value of £125 – 255 million. Mean site use values for anglers are lower for Scotland than England and Wales as a result of lower visitor numbers. For divers, Scottish sites have some of the highest mean use values. Non-use values, which are not a function of visitor numbers, are substantial for both groups.

18. Section 4.1.4 discusses results in comparison to values from other studies. Both individual WTP and aggregate values fall within the range that might be expected from the literature, providing external validity to the results.

19. **Limitations of monetary estimates:** There were a range of limitations that had to do with either sampling issues or framing of the monetary valuation. In terms of sampling, there is considerable uncertainty about the real number of divers and anglers in the UK and their geographical distribution. For sea anglers it was most challenging to evaluate representativeness of our (self-selected) sample. A further limitation of the study was the impact of the sample size for anglers (422 vs 1261 for divers) on the accuracy of visitor number estimates. 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. While survey respondents expressed high levels of certainty in terms of which sites they indicated they visited, the limited size of the angler sample meant that a smoothing method was needed for this user group to avoid random individual extremes from influencing site counts unduly (Section 2.2.4). As a result anglers' visits at highly popular sites might have been underestimated while visits at less popular sites might have been overestimated. In some cases estimates could not be made at all. Estimates of individual visit numbers also appear to be high compared to the very small number (2) of existing studies, and these also have their own significant limitations. Clearly, more research is needed to establish with more certainty anglers' recreational activity in relation to

[10] Note that this does not account for potential increases in use value and potential increased visitor numbers from ecological improvements that may result from designation (Section 4.2.2). It only includes the value of restrictions.

[11] Seven English offshore rMCZs at >100m depth were not assessed.

pMPAs. In conclusion, angler visits to sites need to be read as *relative trends*, allowing us to distinguish popular from less popular sites, with considerable uncertainty about exact numbers. Angler aggregate recreational values need to be read as *indicative.* Aggregate recreational use values are proportional to visit numbers; hence they are highly sensitive to changes in visit estimates: if the latter would be reduced by half, the recreational use value would be reduced by the same degree. E.g. if anglers in reality visit pMPAs only 70% as much as they stated in this survey, aggregate annual recreational values in England would shift from 1.8-3.2 billion to 1.2-2.3 billion. However, it is important to note that issues around visitor numbers did not affect estimates for the non-use value of protection, nor values at an individual level.

20. In terms of framing, there are further limitations to the study results. In terms of the CVM framing, we used a voluntary contribution payment vehicle, which, although commonly used, is considered not fully 'incentive compatible', meaning that it does not fully reveal individual values (Arrow *et al.* 1993). In particular, voluntary donations may be reduced because of free rider concerns[12]. 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. However, strategic bidding was effectively removed through control questions (Section 2.4.2).

21. By not providing a local context, we omitted the added value of local features and benefits that were particular to specific sites and added to their specialness, an issue common to benefits transfer (e.g. Spash & Vatn 2006).

22. Moreover, our estimates were based on sets of natural features used to select English FOCI and Scottish search features that underpinned recommendation of particular sites as an rMCZ or pMPA. On the one hand there is uncertainty about the presence of these features. Hence features might be valued that are not actually there, leading to overestimation of value. On the other hand, for some sites, there will be features of interest present, but the site wasn't necessarily designated for those specific features, as other sites in the network were used to meet target levels of those features. As we only accounted for features associated with recommendation, this suggests a downward bias. Moreover, species might be present and valued by divers and anglers that were not taken into account by the recommendation process or our analysis, again suggesting underestimation. A further note on features is that we were not able to establish data on the distribution of rock formations in Scotland, which provides a downward bias for divers' values for that country.

23. Also, we only investigated the value of protecting existing natural capital and did not account for potential environmental improvements in the state of MPAs, which might have increased their recreational value. Furthermore, our aggregation method did not take into account the added value of the whole over the sum of parts, particularly the biodiversity benefits of designating an integrated ecological network. However, there is insufficient evidence available to estimate benefits in biodiversity terms and relate ecological improvements to ecosystem services and benefits enjoyed by divers and anglers at the site level within the UK, although there is substantial evidence on the efficacy of MPAs in temperate waters more broadly (Lester et al 2009).

24. A further limitation was that participants were restricted to providing site visit numbers for sites associated with a single UK country or region of their choice only (Scotland, East of England, Southeast England, Southwest England, and Northwest England and Wales). This meant that visits outside of the chosen region were not counted. In addition, visits by foreign tourists are not counted. Finally, our travel cost estimates were not only based on a conservative estimate of actual travel costs (Section 2.2.2), but also did not take the additional costs of boat use into

[12] I.e. participants pay less or not at all because others are already paying and they can enjoy the benefits for free.

account. Travel cost by definition is a lower bound in terms of WTP for recreation as it does not account for additional expenditure in terms of accommodation, equipment etc. Also we did not take into account international diving and angling visitors.

25. As most of these issues suggest *underestimation* of values, we expect individual and aggregate estimates to represent a *lower bound* of willingness to pay for both the TC use values and CVM non-use values, at least for divers. For anglers, there is significant *uncertainty* around aggregate recreational values as a result of implications of the size of the sample for accuracy of visit numbers; this means estimates for anglers' recreational use values may be under- or overestimated.

26. A final limitation is that monetary results for Scotland are based on a preliminary configuration of sites. Our assessment utilised map layers from the 5th Scottish MPA stakeholder workshop[13], which was the latest state of Scottish network configuration available at the time of survey design. This means that, for some sites, boundaries have shifted, in some cases (e.g. Firth of Forth Banks) significantly. Our initial assessment included one site that has now been dropped (Gairloch to Wester Loch Ewe, although we recognise Northwest Scotland sea lochs has been extended to include Loch Ewe) and four sites in our assessment remained as search areas (Eye Peninsula to Butt of Lewis; Shiant East Bank; Skye to Mull; Southern Trench). These four search areas and Gairloch have been removed from aggregate results but are presented in Annex 1. Targeted species and habitat features were updated on the basis of the *Report to Scottish parliament on progress to identify a Scottish network*[14]. Nonetheless, Scottish site and aggregate values are preliminary. Aggregate recreational use values at least give an indication of magnitude of value that is unlikely to change with the final network configuration. The non-use value estimates based on contingent valuation do not depend on visitor numbers, which means that value differences between the assessed and the final sites will be minor.

27. **Wellbeing outcomes:** Strongly positive responses to the non-monetary indicators revealed that sites had considerable subjective wellbeing value for anglers and divers. Indicator statements loaded onto three principal factors that we thematically summarised as *engagement and interaction with nature*, *place identity* and *therapeutic value*. Four indicators did not load on any of the factors. Three of these were single-item indicators for *a priori* constructs of wellbeing – *social bonding*, *spiritual value* and *transformative value*. These were taken forward as single-item dimensions. Out of these six dimensions, *engagement and interaction with nature* scored highest, followed by *transformative* and *social* values. Divers were more struck by the beauty of sites than anglers, whereas for anglers the *place identity* indicators scored higher on average. However, overall differences were remarkably small.

28. There was a significant negative correlation between individual wellbeing scores and per-site estimates of monetary recreational use value and visitor numbers. Hence the quieter sites delivered higher individual wellbeing.

29. There are clear regional differences between wellbeing values that could be associated with this negative correlation. Scotland showed higher values compared to England and Wales in terms of engagement with nature, transformative and social values. Within England, the east coast scored highest, particularly in terms of broad therapeutic benefits and place identity. The Southeast consistently has the lowest scores for most types of benefits compared to other regions. However, these are relative rankings; actual mean dimension scores for all sites across regions are all positive. Scores for place identity were similar across all regions suggesting that people broadly have similar feelings of identity from sites local to them across the country.

[13] http://www.scotland.gov.uk/Resource/0039/00396098.doc
[14] http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork/MPAParliamentReport

30. In terms of the set of 31 MCZs being proposed for designation in 2013 in England, most score average or below average, with a small number of exceptions: Flyde Offshore in the Irish Sea, Padstow Bay in the Southwest and Rock Unique in the NorthEast of England. In contrast, none of the five highest ranked English sites: South of Celtic Deep, Blakeney Seagrass, Orford inshore, Blakeney Marsh or Glaven Reedbed (all with at least 5 of 6 wellbeing dimension scores in top third), are currently being proposed for designation in 2013.

31. While it is likely that these subjective wellbeing benefits were also captured to some degree by monetary recreational use values and willingness to pay for site protection, the non-monetary indicators gave a clearer insight in the particular types of benefits that participants derived from marine sites. Hence, this type of instrument provides a useful tool for operationalising cultural ES.

Conclusions

32. This study has shown the importance of accounting for the non-market values of beneficiaries of marine conservation, which are wide-ranging. The value of marine sites and their conservation is substantial for the user groups considered, with both use and non-use values into the billions of pounds. Moreover, this research only considered the values of two user groups, whereas there are many other water users (e.g. surfers and yachters), plus non-users in the general public, whose values are not accounted for here. Thus, considerably more valuation work is necessary if the value of the marine environment is to be fully accounted for. Furthermore, it may be difficult for respondents to fully articulate some aspects of the value they place on marine environments in surveys of this type, and more participatory and deliberative methods may be needed to help understand these values (see Box 1, p.27).

33. The assessed monetary benefits of the two marine user groups are likely to outweigh best estimates of the cost of designation, as far as they are known[15]. The English MCZ impact assessment[16] estimated aggregate costs at present value over a 20 year time scale for all 127 rMCZs at £227 - 821 million including costs to the renewable energy sector, the fisheries sector, oil and gas, commercial shipping, recreation, and implementation, management and enforcement costs. The baseline, one-off *non-use value of protecting the sites* to divers and anglers alone would be worth £730 – 1,310 million, 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. Only taking these non-use values into account indicates a benefit - cost ratio for designation of -1.1 (lower bound of minimum benefits vs. highest estimate costs) to 5.8 (upper bound of minimum benefits vs. lowest estimate costs). Comparing the impact assessment best estimate costs scenario (£331 million) to a central estimate of the mimimum benefits expected (£957 million) leads to a benefit - cost ratio of 3.1. Although these figures come with a number of limitations (see above), designation of 127 sites is most likely efficient, even without accounting for the benefits of restrictions on others to divers and anglers, potential inceases in use values resulting from designation, or the values of other user groups and the non-use values of the general public.

34. Designation would protect sites with a recreational ecosystem service flow worth £1.87-3.76 bln for England to divers and sea anglers. For Scotland, the areas assessed currently provide an estimated £67 – 117 million in annual recreational benefits. Their protection would also generate a total one-off non-use value of £125 – 255 million. For Wales, seven marine SACs support an annual recreational value of £68-142 million and generate a £66-129 million of non-use value

[15] Both costs and benefits depend on site-specific management regimes that are still uncertain. The low-cost scenario assumes that there are only very limited management restrictions at sites following designation; the high cost scenario assumes intensive management and heavy restrictions are put in place across most sites.
[16] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/82721/mcz-designate-ia-20121213.pdf

associated with protection. Again, there are significant limitations to these figures. Estimates of non-use value of protection may be considered *underestimates*. Total recreational use estimates need to be read as *indicative* only (see above and Section 4.2).

35. The study suggests that, where there are significant visitor numbers, if sites would carry access restrictions to divers and anglers, this could result in significant reduction of cultural ecosystem service benefit values to those groups[17]. Of further interest is the apparent negative correlation between aggregate recreational values and visitor numbers on the one hand, and individual wellbeing scores on the other. Although the non-monetary valuation utilised for assessing cultural ecosystem service benefits requires considerable further development and reliability testing, and there are significant limitation in terms of it application to individual sites, results suggest that more wild, remote or quiet sites provide the greatest individual benefits in terms of subjective experience, even though highly popular sites provide the greatest aggregate monetary value, though this effect is more visible for anglers than for divers. To increase subjective wellbeing from sites, site managers might wish to explore these issues. Further research in this area would be useful to gain further understanding on how divers' and anglers' subjective wellbeing experience could be increased through appropriate management.

36. Finally, it is relevant to note that sea anglers, though one of the largest groups of marine recreational users, are poorly organised and hence very limited in terms of the capacity to represent their values and interests. Additionally, UK sea anglers appear to have considerable mistrust around marine management, marine conservation and research in this area. As to divers, while there is much more organisation, there is very little research available on their values and needs in relation to the marine environment. Altogether, this makes it likely that the interests and values of these groups are under-represented in terms of their influence on decision-making, even while the monetary and non-monetary benefits of marine sites to these user groups are substantial. More research and engagement is needed with these groups to ensure that the value of nature to these groups is adequately taken into account.

[17] Quantification of this is beyond the scope of this report. On a site-by-site basis it would be a considerable undertaking as it would require modeling of the flow of values to substitute sites under different management scenarios.

1 Background

The UK has signed up to international agreements including the Convention on Biological Diversity and the OSPAR Convention that set the task of establishing an 'ecologically coherent network' of Marine Protected Areas (MPAs) by 2010 that is 'well-managed' by 2016. Under the Habitats and Wild Birds Directives, Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) with marine components continue to be established as part of the Natura 2000 network. In addition, the EU Marine Strategy Framework Directive requires EU member states to put in place measures to achieve or maintain good environmental status in their seas by 2020, and to establish an MPA network as a means towards this goal. In accordance with these policy drivers and to progress towards the UK administrations' joint vision, expressed in the UK Marine Policy Statement, for 'clean, healthy, safe, productive and biologically diverse oceans and seas', governments are working towards designation of an ecologically coherent network of MPAs in UK waters. This would ensure that sites collectively provide more benefits than the sum of their parts. There are a variety of different designations for sites which all contribute to the MPA network. Historically, these include:

- Sites of Special Scientific Interest (SSSIs), and Marine Nature Reserves established under the Wildlife and Countryside Act 1981 and the Nature Conservation (Scotland) Act 2004 to protect species, habitats and geological features of national importance.
- European marine sites (Special Areas of Conservation and Special Protection Areas) established under the EC Habitats and Birds Directives as part of Natura 2000, an EU-wide network of nature protection areas that aims to assure the long-term survival of Europe's most rare and vulnerable species and habitats.
- Ramsar sites established under the 1971 Convention of Wetlands of International Importance to promote the conservation and wise-use of wetlands of international importance and their resources.

More recently, the Marine & Coastal Access Act 2009 and Marine (Scotland) Act 2010 put in place both the power and obligation to designate new sites linked to the UK network as a whole. These new sites include:

- Marine Conservation Zones (MCZs) to protect nationally important marine wildlife, habitats, geology and geomorphology inshore and offshore in England and Wales.
- Scottish MPAs for the protection of nationally important marine biodiversity and geodiversity features in Scottish inshore and offshore waters.

Different processes and timetables have been adopted in constituent national areas to select and designate these new types of sites. In England, of the 127 recommended Marine Conservation Zones (rMCZs) identified through intensive stakeholder engagement, 31 are being considered in a public consultation (Dec 2012 - Mar 2013), while in Scotland 33 MPA proposals have been recommended by statutory scientific advisors (SNH and JNCC) as well as a further four wider MPA search locations that are still under consideration. In Wales, work is underway to re-identify candidate MPAs following controversy over initial proposals to designate a number of highly protected Marine Conservation Zones (HPMCZs) from which all extractive, damaging and disturbing activities would have been prohibited. In Northern Ireland the development of a Marine Bill, which will provide the powers to designate MPAs, is still underway.

The main driver for the selection of MCZs and Scottish MPAs is their ecological characteristics. In England, Scotland and Wales detailed guidance has been developed for individual site selection and the creation of an ecologically coherent network of MPAs. In England ecological characteristics considered in MCZ site selection included broad scale habitats and features of conservation interest (FOCI). A list of both species and habitat FOCI was generated during the inception phase of the MCZ project in England. In Scotland the focus has been on a set of 'search features' including both habitats and species and including mobile species. In Wales the focus was on SAC features (habitats and species).

In recognition of the fact that our seas are subject to intense use, with highly contested spaces, social and economic factors have been taken into account in planning MPAs. In England extensive stakeholder engagement was undertaken over a two year period through the regional Marine Conservation Zones Project, with the aim of creating a network of sites that minimises adverse impacts to legitimate social and economic uses, whilst maximising benefits for nature conservation. The use of socio-economic data in MCZ site selection distinguishes this process from conservation designations under the Birds and Habitats Directives, which are based solely on ecological science criteria. In Scotland, there is a policy commitment for sites to be selected on the basis of biodiversity and geodiversity criteria with stakeholder engagement more limited to providing additional data and scrutinising the scientific advice. However, social and economic factors can be taken into account where Ministers have the option to consider ecologically equivalent sites and also during site management. In Wales, the first tranche of potential HPMCZs was selected without taking social and economic impacts into account. This, in part, led to the significant public outcry over Welsh Government proposals during the 2012 consultation phase.

Alongside ecological information, data on economic costs of designation is available to varying degrees for a range of uses including fisheries, energy and extractive industries and the economic costs of MPA implementation (Chapman *et al.* 2012). The English impact assessment process considered six ecosystem services (ES): fisheries, recreation, research and education, regulation of pollution, environmental resilience and natural hazard protection, in addition to general non-use benefits of ecosystems (their option-use, existence and bequest values) (Chapman *et al.* 2012). Earlier valuation work on the impact assessment of the Marine Bill also included 'cognitive' (educational/scientific) values and cultural heritage and identity (Beaumont *et al.* 2008; Hussain *et al.* 2010)[18], which these authors considered as separate to recreational values. These categories are likely to provide a significant amount of non-market benefits. Such non-marketed benefits may be monetised, or provided in a quantitative or qualitative non-monetary format where monetisation is not possible or not appropriate.

However, there is a paucity of knowledge on the social-economic benefits of MPAs in a UK context. Various aggregate ex-ante valuation studies of the UK MPA proposals have been undertaken on the basis of value transfer (Hussain *et al.* 2010), but transferred values have been drawn from an extremely small base of primary valuation data. For most cultural ecosystem service benefits no primary data is available (e.g. cultural identity) or is only available for marketed benefits (e.g. recreation). Also, data is not available for all components of economic value, with no assessments of option-use values to date. The lack of data has resulted in some of the authors and reviewers involved in these value transfer studies to question whether a defensible policy evidence base can be developed without more primary valuation and, in particular, valuation that can attribute values to specific sites (Hussain *et al.* 2010).

In parallel with the formal MPA identification process, the Marine Conservation Society (MCS) ran an online project entitled 'Your Seas Your Voice'[19] as a mechanism for members of the public to share their views on the designation of 73 specific potential MPA sites around the UK. People were invited to comment on whether they thought certain sites should be protected or not and their responses included details of how they use the sea, how and why they value it, and how they believe sites should be managed. Between November 2009 and October 2011, 23,909 votes were cast on sites in

[18] These authors also included other types of services that would in more recent ecosystem service frameworks such as that of the UK NEA be classified as ecosystem functions or processes, rather than services, because they do not directly generate benefits.

[19] http://www.mcsuk.org/mpa/england/yourseasyourvoice

England, Scotland and Wales;15,127 of these related to sites in England, of which 9,300 (61%) were in favour of rMCZ protection and 5,827 were against (of which 66% were against protection of a single site: Studland Bay). In Scotland, 3,824 votes were received on 18 sites; 2,997 (78%) votes were in favour of protection at these sites and 827 against. Finally, in Wales, 4,956 votes were received on 14 sites with 4,253 (86%) in favour of protection and 703 against.

The majority of votes were from non-extractive recreational sea users such as divers, walkers and wildlife watchers. Analysis of the comments received alongside the votes highlighted several key benefits that inspire people to support MPAs, including aesthetic appreciation, emotional attachment and existence values, as well as an appreciation of specific habitats, species or marine landscapes. The National Ecosystem Assessment considered that place-based cultural benefits may not always be fully captured by the *nomer* of amenity and recreation (Church *et al.* 2011). Thus, if the social value of marine conservation is to be adequately understood, these may need to be assessed separately.

When considering the value of benefits, it is useful to distinguish between that of users and non-users. Existence values of marine biodiversity (the satisfaction derived from knowing that marine habitats and species exist even when they do not provide any direct or indirect use or other benefit; (Aldred 1994)) are relevant to both users and non-users (the general public). However, most ES benefits, including cultural ES benefits such as amenity and health value of marine ecosystems, are relevant to users only.

Sea anglers and divers are amongst the largest marine user groups. Within the UK, an estimated 1.1 (Drew Associates 2004) to 2 million (CEFAS 2013) people go sea angling every year. There are around 200,000 UK divers and snorkelers (BSAC, personal communication). The recreational activities of these groups make significant contributions to local economies, but also gain considerable non-market value from marine ecosystems (Beaumont *et al.* 2008; Stolk 2009; Scottish Government 2009). Nonetheless there have been no studies assessing, in a systematic way, the cultural ES values for the sites that sea anglers, divers and snorkelers visit, nor have their been studies to establish monetary values for the environmental benefits that users enjoy. Within the literature, most studies of marine recreation have focused on lower latitude destinations, perhaps echoing the notion that “one has to be quite a rigorous individual to dive in cold countries” (Carr & Mendelsohn 2003). As such there is a keen interest from marine user organisations and government for research that provides baseline information on user values for UK marine sites.

There are also compelling theoretical arguments for establishing values to specific beneficiaries beyond those of the general public. First, to avoid double counting, it is important to distinguish final from intermediate ecosystem services. Final ecosystem services deliver goods directly to beneficiaries, whereas intermediate ecosystem services do so indirectly, via final services. However, what constitutes a final service differs between different groups of beneficiaries (Fisher & Turner 2008). For example, water purification is a final service to water companies, but an intermediate service to fishermen. If fishermen are asked to state their values for both water and fish, the aggregate would likely be an overestimate, since the value for fish includes an implicit value for clean water and the value for clean water might then be counted twice (Boyd & Banzhaf 2007).

Secondly, while it is extremely challenging to establish the value of all ecosystem services to everyone, and it is more feasible to establish what are the most important final services and benefits to specific beneficiary groups. Using a beneficiary approach reduces the risk that important benefits are overlooked, particularly at larger scales, and provides a more systematic way to assess benefits. Of course, the flip side of the coin is that when it is not feasible to assess values for all beneficiary groups, aggregate value estimates will be lower bounds and incomplete.

Finally, public familiarity with marine ecosystems is mainly limited to the coastline and estuaries due to their greater accessibility, while sea anglers and divers have a far greater familiarity with a range of marine ecosystems. While the UK public can express a generic value for marine and coastal settings and generally support protection of the marine environment (Pike *et al.* 2010; McVittie & Moran 2010), its knowledge of the undersea landscape is very limited (Rose, Dade & Scott 2008; Jobstvogt *et al.* 2013). Public participants, when confronted with unfamiliar habitats, are less likely than user groups to have pre-formed values (Christie, Hanley & Hynes 2007) and hence expressed values are more likely to be a reflection of approval or disapproval for nature conservation in general, rather than values for specific features of the marine environment. Hence valuation of specific marine habitats and species is only appropriate with users.

1.1 Objectives and scope

This research aimed to elicit UK sea anglers, divers and snorkelers' values of cultural ecosystem services of for candidate marine protected areas in England and Scotland and existing marine SACs in Wales. Through a combination of primary valuation and benefits transfer, monetary and non-monetary valuation, the survey aimed to be comprehensive both in terms of the sites assessed and cultural ecosystem service benefits assesed (including recreational, aesthetic, spiritual, educational, health, identity, social bonding, sense of place, and existence values for marine biodiversity) and provide useful data for the MCZ Impact Assessment and evaluation of Scottish potential MPAs, and for future marine SAC impact assessments.

In addition to these policy-orientated objectives, this research forms the first phase of one of four case studies in the Shared, Plural and Cultural Values work package of the UK National Ecosystem Assessment (NEA) follow-on phase (Box 1). The overall aim of the work package is to investigate differences between individual and 'shared' values of nature, and to operationalize shared and cultural values for decision-making. Conventional valuation studies, including the survey detailed in this report, are largely based on the aggregation of individual preferences to establish social welfare. However, many of the benefits that the natural world provides to humans through ecosystem services have collective meaning and significance to groups and communities of people, who are in turn influenced by their cultural and social setting. It is important to recognise these shared values in order to make better-informed and more sustainable decisions.

This report presents results of the first stage of the MPA case study, investigating the individual values held by divers and sea anglers, using an online monetary and non-monetary valuation survey. In stage two, the individual responses received during the online survey will be compared with deliberative responses obtained during a series of 16 regional valuation workshops, held across the UK during spring 2013 with respondents to the online survey. The research discussed here thus provides a baseline for further, deliberative valuation with divers and anglers, which will provide detailed insights into shared values for the cultural benefits associated with marine conservation.

Box 1 NEAFO Work Package 5: Shared, Plural and Cultural Values of Ecosystems

Introduction

This National Ecosystem Assessment follow-on phase work package will focus on developing effective monetary and non-monetary deliberative valuation methods that account for shared, plural and cultural values of the environment. The project will review the existing literature and conduct case studies to deliver practical, widely transferable methods for assessing these values and provide empirical evidence that clarifies the relationship between individual, aggregated individual and shared values; and the role of deliberation and social learning in shaping shared values. Its main aim is to operationalise cultural, shared and plural values for decision-making.

Background

Policy-makers need to understand the likely social impacts of future policies. A range of market-based and non-market economic methods exist that try to capture the importance of the environment to human wellbeing. However, these may not fully capture the shared values and meanings ascribed to nature. This research aims to address some of these limitations and provide decision-makers with tools that they can use to incorporate shared, cultural and plural values in decision-making.

People hold different types of values; contextual values around how valuable something is to them, but also 'transcendental' values around principles and deeper beliefs. They may also hold different values depending on whether they are asked as a householder or a member of their local community or interest group, or as a consumer versus a citizen. There is also evidence that values around nature are not pre-formed, and often implicit. People may need to form values through deliberation with others. Deliberative processes can inform values, as well as bring out the communal and cultural transcendental values, beliefs and meanings that shape individual values. They also allow consideration of fairness, debate around risk and uncertainty, and more consideration of long-term impacts. Therefore, these shared social valuation processes are thought to generate different value outcomes than valuation on the basis of conventional individual survey methods. To elicit these shared, plural and cultural values, it is necessary to use a mix of monetary, non-monetary and hybrid approaches to capture the fullest possible range of values to inform more robust, inclusive and far-sighted decision-making.

Marine Protected Areas case study

The two staged MPA case study compares the results of the survey detailed in this report with those of 16 participatory valuation workshops using Deliberative Monetary Valuation (DMV) and Multi-Criteria Analysis (MCA), plus other tools including storytelling. We will investigate:

- whether individually expressed values change through deliberation;
- the effects of different deliberation processes (focusing either on information sharing or on 'moralising' by discussing the shared 'transcendental' values of divers and anglers);
- whether group value expressions provide different outcomes;

Also we will provide a rich, mixed evidence base on the value of MPAs, by combining monetary valuation, subjective wellbeing indicators, and qualitative evidence from discussions and compilations of stories. In surveys such as this one, it may be difficult for respondents to articulate some aspects of the value they place on marine environments, and more participatory and deliberative methods may be needed to help understand these values.

Other case studies

- *Inner Forth*: Working with RPSB Futurescape and Inner Forth Landscape Initiative projects, *ex-ante* evaluation of the potential benefits of landscape-scale conservation, coastal realignment and heritage projects, using deliberative choice experiments.
- *Hastings Inshore Fisheries*: Working with Hastings Fisheries Local Action Group, evaluation of shared values around inshore fisheries to feed into Europe-wide evaluation. The case study uses an iterative series of workshops that incorporate non-monetary methods including MCA and a novel form of with a range of stakeholders.
- *Coastal and marine values in the media*: This case study uses content analysis of a wide range of media publications to assess shared cultural values around marine environments and the coast.

2 Methods

2.1 General outline

Data was gathered using an online questionnaire that took participants around 20 minutes to complete. Separate links to the survey for divers/snorkelers and anglers were distributed through direct emails by membership organisations, social media, and online and offline adverts (Section 2.3).

Table 2 provides an outline of the survey instrument; the full survey is presented in Annex 2. The questionnaire combined a monetary valuation section consisting of both a choice experiment (CE) and contingent valuation method (CVM) questions (Sections 2.2.1-2.2.3), a mapping section to establish visitor numbers to potential MPA sites (Section 2.2.4), a non-monetary valuation section consisting of subjective wellbeing questions (Section 2.2.5), and a psychometric section. The latter is beyond the scope of this report and will not be detailed or analysed further here[20].

At the beginning of the survey participants answered a screening question to find out if they were divers/snorkelers or sea-anglers. Respondents who were 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. If participants were engaged in both activities (sea-angling and diving or snorkelling) then the version of the questionnaire that they received was determined by their entry link (either www.marinevalues.org/anglers or www.marinevalues.org/divers). This prevented mixing activities within the survey, and it ensured that with each single participant either diving or angling behaviour was being considered, not both. Apart from wording, both respondent groups were asked the same questions with one exception: a question on diving experience was framed as number of dives in a lifetime and a question on angling experience was framed as number of years engaged in the activity. For the purpose of this question snorkellers were included with anglers, but for all other purposes with divers.

[20] The psychometric section of the survey aimed to help us understand how ethical values, environmental worldviews and more specific preferences related to one and another, the degree to which individuals were influenced by others, and their perceived behavioural control over the issues at stake. This is one of the first studies where these instruments are used in environmental valuation (Spash *et al.* 2009; López-Mosquera & Sánchez 2012). In phase 2 of the NEA case study, it will be assessed in detail if and how these constructs change through deliberation and the process of eliciting shared values.

Table 2 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 innovative two-stage approach. In the first stage, a choice experiment 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 vulberable species found at the site that would be protected and size of the protected area (Section 2.2.2 and Table 7). In the CE, 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'. An example choice task is given in Figure 5.

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 CVM participants are presented with a single hypothetical scenario and asked directly whether they would be willing to pay to attain it. Our innovative attribute-based CVM allowed us 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.

Our approach also allowed assessment of different components of economic value. The transport cost method assessed current recreational use value at the lower bound (given that expenditure beyond travel costs is not assessed), and marginal changes to this value under differing sets of management restrictions that might be associated with protection. Our 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. We 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[21]. Though option-value is sometimes classified as a use value, when referring to non-use values as a whole we mean the bundle of all three of these categories of value.

Hence, 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. Consequently we would expect these values to be independent and to not overlap. However, given that insurance value is obviously related to the value of the good that is to be insured, we do expect them to be correlated. Thus we would expect estimates of value within our suite of actual pMPAs to correlate between the two methods, even after benefits transfer and aggregation; this would provide considerable theoretical and convergent validity to the results.

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, we used a matrix of sites and their characteristics, matching actual sites against the attributes of the CE/CVM. We used GIS 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 our 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. Bringing together the results of these various tools, we 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 31 English rMCZs that have been proposed by Defra to be designated, the larger group of 120 rMCZs (of 127; seven excluded due to depth), 22 of 35 proposed Scottish sites[22] (13 excluded due to depth), and the seven existing marine SACs in Wales that we included, given that when the research was conducted, it was uncertain which Welsh sites would be selected as candidate (HP)MCZs. In principle, the value functions that we establish can be applied to estimate divers' and sea anglers' values for any future UK potential marine protected areas.

Non-monetary, subjective wellbeing indicators were developed on the basis of a wide range of literature sources on cultural ecosystem services and implemented through Likert scales. They were linked to the mapping session, so that participants could directly associate their answers with specific sites. This allowed us to estimate mean wellbeing dimensions for each of the pMPA sites (Section 2.2.5). We placed mean scores into three easily interpretable classes that indicated whether their ranking fell into the top, middle or bottom third of scores within the pool of pMPAs across the UK.

2.2 Design and framing

2.2.1 CE and CVM framing

After an initial introduction to the survey and a series of personal background questions, the MPA policy context was briefly explained to participants (Table 3), and participants were asked for their degree of support for MPAs and for increased protection of the marine environment in general. After this, a brief introduction followed on the hypothetical sites (Table 4) and then a single site was presented. Participants were prompted to move their mouse over each of the attributes andon doing

[21] While these different types of non-use value may be theoretically separated, in practice it is often neither possible nor necessary to be able to disaggregate between different components of non-use value.

[22] Out of these, at the time of writing, four are still indicated as search areas and one was dropped as a pMPA by the Scottish Government altogerher; these are excluded from the main results and listed separately in Annex 1.

so a pop-up box appeared that explained the attribute in more detail. Participants were then asked first, whether they would be willing to travel to the site, and second, whether they would be willing to and could afford to provide a donation. Participants were also urged to consider their travel choices and donations as if they were real, and to think of their other expenditures and household budget constraints (c.f. Cummings & Taylor 1999; Murphy, Stevens & Weatherhead 2005). The CVM question framing and budget constraints script is given in Table 5.

After the example site questions (which were not included in the CE and CVM analysis), four CE task (between sites A, B, and 'stay at home') and CVM questions were presented. The CE question asked participants to examine the sites, and then allocate their next five opportunities for diving/angling to these sites, or to staying at home.

Our frequency-allocation design was based on the work of Christie *et al.* (2007) with some minor adaptations to the phrasing (asking participants about future 'opportunities' rather than 'trips'; in order to make the phrasing more sensible in relation to the 'stay at home' option). The frequency-based approach has several advantages over a single choice approach. First, more information is gathered. Second, the use of frequencies is a more accurate reflection of divers' and anglers' real behaviour, where they would be happy to travel to far-away, excellent sites, but only so often. This prevents over-estimation of benefits when participants would be confronted with a high-utility, far-away site, which they might well choose in a conventional choice experiment because they would go there at some point, even though the chances for any given opportunity of them actually going to a lower-utility site nearby might be much higher in reality. Further justification of our approach was that divers and particularly anglers in focus groups expressed that they enjoyed completing the questionnaire using this approach, as it allowed them to express their preference for variety.

Table 3 Introduction on marine protected areas presented to participants before commencing with choice tasks.

The seas around the UK are home to over 8000 species. They also provide major contributions to our lives, including food, recreation, climate regulation and cultural, spiritual and aesthetic values.

Human activities affect many marine environments and the species that live there. To protect these species and environments, there are already over 100 marine sites under some kind of management for nature conservation in the UK. The UK, Scottish and Welsh governments propose that these sites should be extended with a further 127 sites in England and a yet to be confirmed number of sites in Wales and Scotland. These governments believe that this is necessary to form a more coherent network that can effectively protect the diversity of marine species, habitats and seabed features for the future.

To inform the designation of these sites, research projects and public consultations are being carried out to understand the range of values that users place on the marine environment, and the likely positive and negative impacts of designating proposed new protected areas on different users.

Most of the new marine protected areas 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. 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 designated using further information on the impacts of activities. It may include restrictions on development, restrictions on trawling and dredging for commercial fisheries where they are damaging habitats, and restrictions on dropping anchor (except in emergencies). In the vast majority of cases, angling and diving, and other activities that do not damage the environment, could continue.

A number of highly protected sites (In England called 'Reference Areas') are also being proposed. These areas will be no take zones, where nothing can be taken out or deposited and where all activities that may damage or disturb the area will be prohibited.

Table 4 Introduction on monetary valuation.

In this section we will ask you to make a number of choices between dive sites that we will present to you and which could be protected. Each site is described in terms of its characteristics. These characteristics are: marine landscape and underwater objects present, fish and other sea life present in the area, restricted activities, access, number of species found at the site that would be protected, size of the protected area, and travel distance to the site. *We would like you to imagine the sites, and consider whether they would be worth you visiting, and whether they would be worth protecting. The sites may be similar to ones that you would usually visit, or there may be differences. All of the sites we are presenting are hypothetical; they don't exist in reality. The aim of these questions is to get an idea of what things are most important about the marine environment from the perspective of divers.* *Now have a look at an example on the next page, and please move your pointer over any of the items to read more about what they mean.*

Table 5 Example CVM question and short script on budget constraints

If this was a real protected area, do you think you could afford to, and would be willing to give a one-off donation of £6? Your donation would be used to set up a local management trust to maintain this site as it is shown above, and protect its natural features against the risk of future harm and degradation. *In this question and questions that follow, it is really important for our analysis that you consider travel distances and financial amounts as if they were real. Thus, you need to consider your household income and expenditures, and what you might need to give up to be able to afford a donation, or the cost of travelling to a site.*

After each CE task, a CVM question 'zoomed in' on a randomly chosen site out of A and B (Figure 6). It asked about participants' willingness to provide a one off donation, if one of the two sites would be established as a real MPA. It was framed that the donation would be used to set up a local management trust to maintain the site as it was presented, and protect its natural features against the risk of future harm and degradation. A single bounded payment card was presented on one of two scales (£0-£20 or £0-£40) selected at random in order to reduce framing bias. Maximum amounts for the payment card were established after focus group discussions and then piloted (Section 2.3).

A limitation of the voluntary contribution payment vehicle is that it is not fully 'incentive compatible': that it does not fully reveal individual values (Arrow *et al.* 1993). In particular, voluntary donations may be reduced because of free rider concerns, which induce respondents to donate less as they do not trust others to donate because of the voluntary nature of the payments (Bush *et al.* 2012). However, voluntary payments can nonetheless be more appropriate for particular contexts as they may be more credible than a compulsory payment vehicles (Champ *et al.* 2002; e.g. Berrens *et al.* 2002; Biénabe & Hearne 2006). In addition, focus groups and discussions with stakeholders suggested that any compulsory mechanism (tax or entrance fees) would lead to considerable protesting, particularly amongst anglers.

We chose a one-off payment over an annual payment because marine users are commonly asked for some kind of site based contribution. We deemed it likely that a one-off contribution would be more closely linked to site characteristics than a recurring donation to some hypothetical body, which might be more strongly associated with attitudinal, political or moral expression. One-off payments also avoid the problem in aggregation where donations are asked for multiple competing sites; participants would be unlikely to make annual subscriptions to more than a handful of sites, while focus groups suggested divers and anglers were quite used to paying multiple one-off donations or site fees over a period of time.

After completing the CE and CVM tasks, participants were asked to complete two follow-up questions that aimed to establish' participants decision-making behaviour and rules (Table 6). The first question was used to validate CE responsens and identify respondents who picked randomly, ignored travel distance or had too much difficulty with the hypothetical nature of the task to express their preferences. The second question was used to identity 'protesting' and strategic bidding in the CVM tasks and distinguish 'protestors' from genuine zero-bidders, as well as for internal validation. Those who were excluded from the CE analysis were not necessarily excluded from the CVM analysis, and vice-versa.

Table 6 Monetary valuation follow-up questions. Respondents who picked italicised answers in Q3.7 were excluded from the CE analysis and in Q3.8 from the CVM analysis.

Q3.7 Which statements best describe how you picked the sites you preferred?
You can pick more than one answer.

1. *I chose **randomly**.*
2. I picked the site that **reminded me most of my favourite angling sites in reality**.
3. I usually or always chose **the nearest site out of A and B**.
4. I mostly chose sites that were **below a certain maximum distance** that I was willing to travel.
5. I chose the sites that I **liked most relative to the distance**.
6. *I chose the sites that I **liked most regardless of the distance**.*
7. **I picked one or two types of benefits** of the site and mostly based my choices on that
8. *I usually or always chose **'Stay at home'** because I **could not really imagine any of these sites***
9. Other (text box)

Q3.8 Which statements best describe how you decided the amounts you were willing to donate?
You can pick more than one answer.

1. *I picked zero or low amounts because **I wanted the average that comes out of the survey to go down**.*
2. *I picked high amounts because **I wanted the average that comes out of the survey to go up**.*
3. I considered my household budget, and **how much I could spare**.
4. I considered **how much I would pay, if I was really asked** to donate.
5. I thought about **what others would donate**.
6. I picked high amounts because I thought it was **the right thing to do**.
7. *I picked zero or low amounts because I thought money needed for managing this site **should come from another source,** such as taxes.*
8. *I picked zero or low amounts because **I do not agree with proposed policies** around marine protected areas.*
9. I picked an amount depending on **what I thought protecting a specific site was worth**.
10. Other (text box)

2.2.2 CE and CVM attributes

Attributes included marine landscape, underwater features, sea life, access, other restrictions, vulnerable species protected at the site, size and distance from home. Where appropriate, attribute levels (Table 7) were displayed using simple pictograms as well as text indicators. Participants were also able to access more detailed information and photos by hovering their mouse over the attributes and their levels. Attributes were selected and evaluated on the basis of four focus groups (Section 2.3).

Marine Landscape: This attribute was based on grouped habitat categories derived from a combination of English MCZ habitat Features of Conservation Interest (FOCI) and Scottish MPA 'search features' and hence readily align to the habitat categorisations used for actual pMPA sites. For Wales, we were able to align SAC conservation features with English FOCI. We combined landscape descriptions with substrate characteristics ('mostly rocky', 'mostly sandy or gravelly', or 'mostly muddy') as focus groups suggested substrate was highly relevant to divers because of its relation to underwater turbidity and visibility. Because many habitats are only found in combination with particular substrates, combining habitat and substrate into one attribute prevented presentation of unrealistic combinations to respondents.

Because of the large number of FOCI Habitats and Scottish Search Features, four habitats (littoral chalk communities, peat and clay exposures, sheltered muddy gravels, and deep water mud) were excluded after multiple focus groups concluded that they would be of little interest to divers and anglers. Given that we expected a sample of at least 1000 respondents and the aim of adequately evaluating all proposed MPA sites, we nonetheless included 18 habitat/substrate combinations (Table 8). For each habitat, participants could access photos as well as descriptions by hovering over the attribute (Figure 7).

Vulnerable species protected: The species attribute was framed as the number of vulnerable species present at the site that would be protected, out of a total of 40 vulnerable species. Species again correspond to a combined list of English FOCI and Scottish search features. Participants could click to access a list of species in a separate browser window or tab with name, biological family, photo and a link to the Natural England website for further information (Figure 8; Annex 3). It was suggested to participants that it was very unlikely that they would either encounter or catch one of these species if they would dive or fish at the site. Although it is known that different species and taxa are not necessarily valued equally (Ressurreição *et al.* 2012), because of the large number of attributes in our design we decided to implement this as a single continuous variable.

Restrictions, access options, and sea life: A list of restrictions and access options was identified from proposed policy documents and discussed in focus groups to evaluate which restrictions would be most relevant to participants. Similarly, various non-protected, charismatic species of interest to divers and anglers for the 'sea life' attribute were evaluated for relevance, whilst making sure that there was no significant overlap between 'sea life' and vulnerable species. Presence/absence data for these species were sourced from the English MCZ Impact Assessment, Scottish Government MPA Progress Reports, Welsh SAC Reports, the UK National Biodiversity Network Gateway (http://data.nbn.org.uk/) and from the JNCC seabird colony database (last updated in 2010).

Size of protected area: Size was provided in a logarithmic range between 1-1000 square km, with a pop-up explanation relating square km to football fields and square miles.

Travel distance: Travel distance was incorporated as a cost-proxy for the CE and to calculate distance decay for the CVM results. The travel distance used comprised two elements. First, a series of six base level distances ranging from 5-400 miles was derived from the experimental design. This was then 'corrected' by adding each respondent's stated distance to the coast, to ensure that participants who lived inland were not provided with unconvincing scenarios. For the CE results, an initial figure of £0.176 per mile was used to convert mileage to WTP, based on Christie *et al* (2007) plus 17.49% inflation correction[23]. This figure corresponds well to current at-the-pump prices for fuel. However, Christie *et al* (2007) did not take car sharing into account, which could lead to overestimation of willingness to pay. The average occupancy rate for cars in the UK is 1.6 (Department for Transport 2011). However, for holiday and day trips the figure is higher at 2.0; we used the latter figure, leading to a final per mile rate of £0.088. To convert travel miles to WTP, we used return distances.

While this does not cover the full individual economic cost of transport including purchase and maintenance, we expected that respondents would make their decisions based on their marginal cost of driving additional miles. However, it is important to recognise that many divers and anglers will in reality consider their vehicle purchase partially on the basis of their diving/angling needs (e.g. estate car for transporting equipment, 4x4 car to be able to access remote sites). Hence their *actual* cost may be higher than their stated willingness to pay.

[23] Based on the Composite Price Index set by the UK Office of National Statistics.

Other attributes that would influence the utility of a site, such as parking and other facilities, were considered; however, such facilities are not directly relevant to the environmental value of the site and would further increase the complexity of the tasks. Also, these attributes are indirectly captured through our direct approach to estimating visitor numbers (Section 2.2.4). Similarly, remoteness/chance of encountering others, which did not directly relate to marine protected area policy, were not deemed to be very important by our focus groups, and could be accounted for in direct visit counts, were considered but then excluded. Terrestrial/coastal landscape setting was also excluded on the basis of focus group discussions and considerations of cognitive burden.

To establish which combinations of attributes would be presented in the hypothetical sites, we used a D-efficient statistical design with 64 rows in 16 blocks developed using Ngene 1.1.1 software (ChoiceMetric Pty Ltd), using zero priors, and with a small number of logical constraints (e.g. the 'site only accessible by boat' access attribute level would not be available for estuarine habitats). We chose not to use priors derived from the survey pilot for the main survey, because we are using the design for two distinct modelling exercises (the CE model and CVM model). Participants were allocated to blocks using a random quota algorithm that allocated them to a random block but also ensured participants were equally distributed among blocks.

Table 7 CE and CVM attributes and their levels

Attribute	*Description presented*	*Levels*
Marine landscape	These are details on the type of sea floor and marine landscape, including features that scientists have indicated are of conservation importance.	See Table 8.
Underwater objects	Potential underwater objects that could be found at the dive site are a **rock formation** (for example: a vertical wall, gully or archway), or a **shipwreck**.	Wreck and rock-formation are presented together but form two attributes in the statistical design and analysis. Each consists of a absence/presence dummy.
Sea life	This will indicate some of the animals that you have the chance to encounter at the site. Note that there may be other sea life present in addition to what is featured here. We will consider: • **seal** (grey or common) • **sea bird colony** (e.g. puffins, cormorants, kittiwakes) • **octopus** We will also consider the presence of **specimen fish**, or any type of **large fish** (for example: ray, dogfish, cod, ling or other large fish over 50 cm / 20 inches). We will indicate if you are likely to encounter large/specimen fish, otherwise you are likely to encounter small fish only.	Fish and sea-life are presented together but form two attributes in the statistical design and analysis. Fish: large/specimen fish absent/present dummy. Sea life: as in description plus a 'no seal, sea bird colony or octopus present' base level.
Vulnerable species protected	**There are 40 marine species around the UK that scientists have identified as endangered or vulnerable and that are to be protected by new marine protected areas**. They include particular species of fish, dolphins and whales, crabs, shrimps and lobsters, anemones, jellyfish, snails, sea horses, oysters and mussels, algae and others. Click here to see a list of these species. Here we will indicate how many of these species would be present in the area**. Please note that it is very unlikely that you will encounter, see or catch any of these species at the site.**	4 levels: 0, 5, 10, 15

Attribute	*Description presented*	*Levels*
Access	Here we will indicate how you can access the site. The options are: • Accessible by shore and boat • Access by shore only, boat use prohibited • Access by shore, boat, and pier • Site out at sea, can only be reached by boat	4 levels: as in description.
Other restrictions	Some activities are not allowed in the area. These could include: • **No dredging & trawling** (restrictions on commercial fishing) • **No potting & gillnetting** • **No anchoring & mooring** (safety lines for diving and use of anchor in emergencies allowed)	4 levels: • No restrictions (base level) • No dredging & trawling • No dredging & trawling, no potting & gillnetting • No dredging & trawling, no anchoring & mooring
Size of protected area	The size of the protected site in square kilometres. Not all features of the site will occur everywhere within it. 1 km^2 is about the size of 130 football fields. Around two and a half km^2 fit into one square mile.	4 levels: 1, 10, 100, 1000 km^2
Travel distance	The distance that you have to travel to get to the site from your home (all sites are within the UK).	6 levels: 5, 20, 50, 100, 200, 400 miles; each *plus* distance participant to coast. Participant presented with actual number; e.g. if participant lives 25 miles from coast he may be presented with 30, 55, 125, 225 or 425 miles).

Table 8 Marine landscape attribute levels with substrate/habitat combinations

Attribute level	*Description*	*Descriptive text on 'mouseover'*	*Mapped habitat FOCI (England) and Search Features (Scotland)*
1	Mostly muddy seafloor, no particular features	Fine sediment	n/a
2	Mostly sandy or gravelly seafloor, no particular features	Coarse sediment with shell fragments or gravel	n/a
3	Mostly rocky seafloor, no particular features	Boulders or bedrock	n/a
4	Mostly sandy or gravelly seafloor with oyster, mussel or flame shell beds	Beds of horse mussels, blue mussels, oysters or flame shells. These shellfish species tend to form dense reefs on the seafloor and provide a food source for other animals.	Blue mussel beds (*Mytilus edulis*), file/flame shell beds (*Limaria hians*), horse mussel beds (*Modiolus modiolus*) and native oyster beds (*Ostrea edulis*)
5	Mostly muddy seafloor with oyster, mussel or flame shell beds	Beds of horse mussels, blue mussels, oysters or flame shells. These shellfish species tend to form dense reefs on the seafloor and provide a food source for other animals.	
6	Mostly rocky seafloor with oyster, mussel or flame shell beds	Beds of horse mussels, blue mussels, oysters or flame shells. These shellfish species tend to form dense reefs on the seafloor and provide a food source for other animals.	
7	Mostly rocky seafloor with large kelp and seaweeds	Different species and sizes of seaweed grow on rocks and boulders. They provide shelter for young fish and other animals.	High energy infralittoral rock: rocky habitats with macroalgae (*Laminaria spp.*)

Attribute level	*Description*	*Descriptive text on 'mouseover'*	*Mapped habitat FOCI (England) and Search Features (Scotland)*
8	Mostly rocky seafloor with anemones, soft corals, and sponges	A rocky habitat where all sorts of anemones, soft corals, or sponges grow. Among these animals are many slow growing species.	Fragile sponge and anthozoan communities on subtidal rocky habitats
9	Mostly muddy seafloor with sea-pens, burrowing animals and fireworks anemones	A muddy habitat where you may find long slender sea-pens and a variety of burrowing animals, including shrimps, small lobsters and burrowing fireworks anemones.	Sea pen and burrowing megafauna communities
10	Mostly sandy or gravelly seafloor with honeycomb or rossworm colonies	Honeycomb worms or ross worms, grow in very dense colonies of many thousand tubes, which often look like a honeycomb. They provide a hard surface for other animals and plants to grow on, and hiding spaces for snails and crabs.	Subtidal & intertidal biogenic reefs on sediment: Honeycomb worm reefs (*Sabellaria alveolata*) and ross worm reefs (*Sabellaria spinulosa*)
11	Mostly rocky seafloor with honeycomb or rossworm colonies	Honeycomb worms or ross worms, grow in very dense colonies of many thousand tubes, which often look like a honeycomb. They provide a hard surface for other animals and plants to grow on, and hiding spaces for snails and crabs.	
12	Mostly sandy or gravelly seafloor with sea grass or eel grass beds	These plants grow in very dense patches, which look like underwater meadows. They provide young fish and shellfish with hiding spaces, and pipefish and sea horses may be found here.	Sea grass beds (*Zostera spp.*)
13	Mostly muddy seafloor with burrowing sea urchins and brittle stars	This muddy area hosts burrowing heart urchins and brittle stars, a relative of the sea stars.	Inshore deep mud with burrowing heart urchins (*Brissopsis lyrifera*) & brittle stars (*Amphiura chiajei*)
14	Mostly sandy or gravelly seafloor with scallops and sea urchins	This sandy gravelly patch of seafloor is characterised by scallops, a shellfish with two shells, and different species of sea urchins. Life can be rich at this site and support sea snails, red seaweed, and sea cucumbers.	Subtidal sands and gravels
15	Mostly sandy or gravelly seafloor in tide swept channel	These environments are characteristic for their strong currents. They are found at the entrances to fjords, lochs and lagoons, between individual islands, and between islands and the mainland. The plentiful supply of food brought in on each tide supports rich and varied communities of marine life.	Tide swept channel
16	Mostly rocky seafloor in tide swept channel	These environments are characteristic for their strong currents. They are found at the entrances to fjords, lochs and lagoons, between individual islands, and between islands and the mainland. The plentiful supply of food brought in on each tide supports rich and varied communities of marine life.	
17	Mostly rocky seafloor with rocky habitats in estuary	The rich and sheltered waters of estuaries provide nursery grounds for fish, and rocky areas are particularly important for this.	Estuarine rocky habitats

Attribute level	*Description*	*Descriptive text on 'mouseover'*	*Mapped habitat FOCI (England) and Search Features (Scotland)*
18	Mostly muddy seafloor with intertidal boulders	The undersurfaces of boulders (stones of at least 10 inches diameter) provide a living space for a wide variety of life and are an important refuge for the eggs of fish, dog whelks and sea slugs.	Intertidal underboulder communities

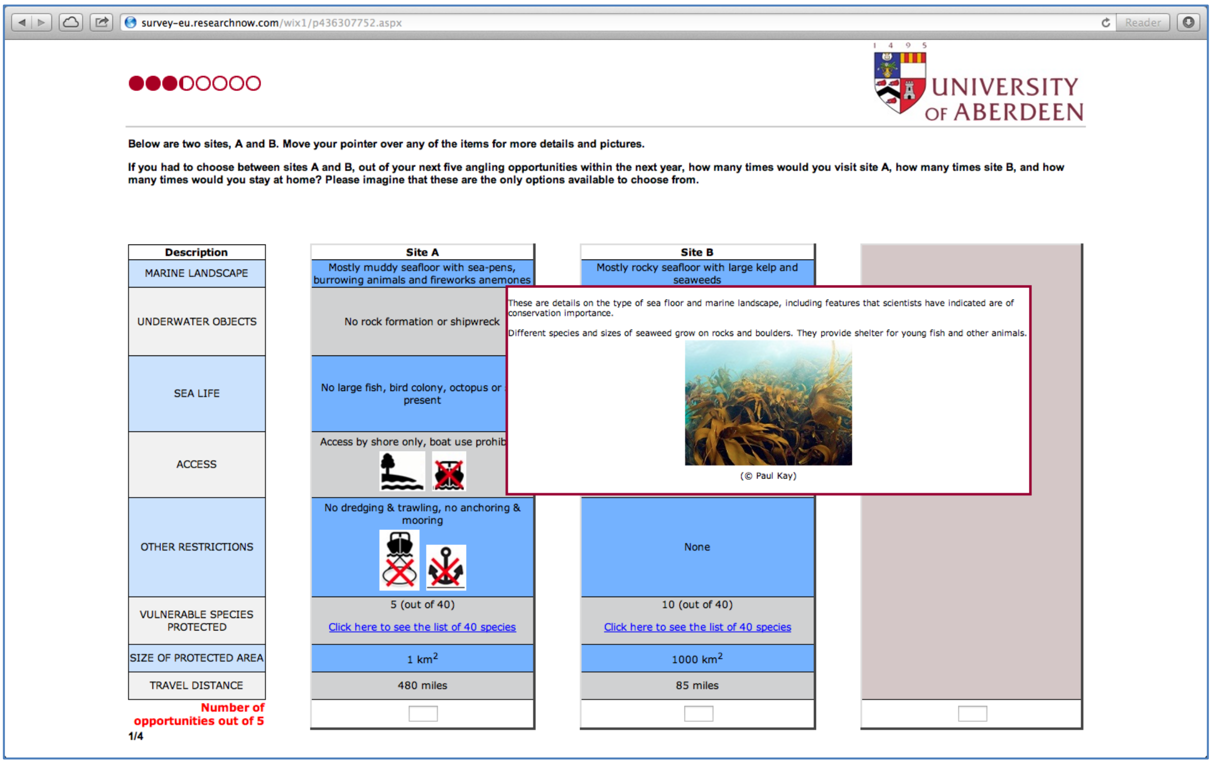
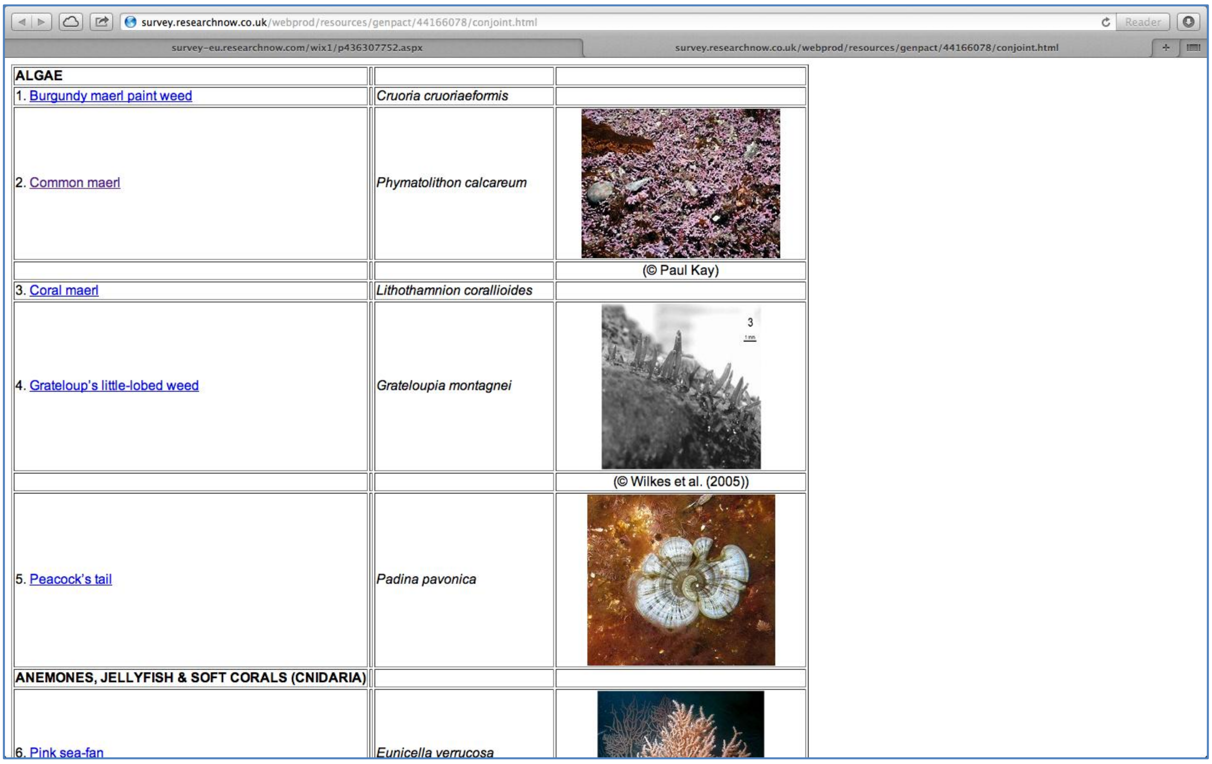


Figure 7 Example hover photo and description.



ALGAE		
1. Burgundy maerl paint weed	*Cruoria cruoriaeformis*	
2. Common maerl	*Phymatolithon calcareum*	
		(© Paul Kay)
3. Coral maerl	*Lithothamnion corallioides*	
4. Grateloup's little-lobed weed	*Grateloupia montagnei*	
		(© Wilkes et al. (2005))
5. Peacock's tail	*Padina pavonica*	
ANEMONES, JELLYFISH & SOFT CORALS (CNIDARIA)		
6. Pink sea-fan	*Eunicella verrucosa*	

Figure 8 List of protected species accessible to participants in a separate browser window or tab. Links directed to species information pages on the Natural England website. The list of species used can be found in Annex 3.

2.2.3 Rationale for framing in relation to the policy context

In designing the monetary component of the survey we considered several ways in which we could establish marginal values for the protection of marine features under investigation. The first was to use a consumptive surplus approach, where we would allow participants to compare a status quo site and an improved site. An alternative would be an equivalent loss approach where participants would compare the status quo with the (potential) loss incurred through degradation. A third option would be to focus on how participants would evaluate differences between different types of sites, rather than the difference between the current state of a site and its improved or degraded state. We chose to combine the second and third options, assessing (1) the current recreational value of these sites; (2) the degree to which particular natural features were important to this value, and (3) the degree to which participants would be willing to pay to insurance against harm to or degradation of these features for the future.

Motivations for these choices included several policy-related, ecological, and cognitive considerations. First, it is important to realise that our survey did not stand within a project appraisal context where some easily defined object of value is achieved or improved upon, but a policy appraisal context where policy benefits are less tangible. The primary focus of UK MPA policies is to protect existing features and habitats from harm, rather than the improvement of features. Hence, an equivalent loss approach is more appropriate than a consumptive surplus approach. However, the risk of this harm is poorly defined. While the origins of risk to these features (e.g. damaging commercial fishing operations) have largely been identified, there are no projections available on the extent of the potential impact or their likelihood.

Second, there is very little empirical ecological evidence on what the beneficial ecological impacts of proposed policies will be. The ecological aim of the policies is to create an ecologically coherent network of sites, but there is little evidence on what improvements in ecosystem services this will provide beyond the status quo and how they would be geographically distributed; in some places there may not be any benefit. If hypothetical benefits would be assessed for their value, it would be impossible to aggregate such benefits when their extent is unknown. There is an assumption that benefits will occur on the basis of substantial global evidence (e.g. Lester et al 200) and local experience (e.g. Lyme Bay, Isle of Man), but the scale of impacts, effects on individual species, and the timing of recovery is somewhat unpredictable on the basis of current evidence. Indeed, the aggregation of these impacts over the scale of the dozens of MPAs that are being considered here as a 'network' is indeterminate.

Thirdly, even if it would be clear what ecological changes might be expected, with perhaps the exception of extinctions and changes to fish stocks, it is extremely difficult to present these in a conceptually meaningful way to participants, let alone when trying to associate these changes with the chance that a diver or angler would recreate at a particular site. Conceptually, it makes most sense to evaluate presence/absence of features, and values derived from this will be most robust. Moreover, it is unlikely that adding further conceptual complexity would allow us to evaluate the large number of habitats featured in the network. The protection - presence/absence approach bears similarities with the framing approach taken in the Defra-commissioned CE study on the value of the UK Biodiversity Action Plan (Christie *et al.* 2010) and in a study on the ES benefits of SSSIs in England and Wales (Christie & Rayment 2012). Both of these studies asked respondents to evaluate habitats that were either maintained, or not maintained and did not consider the quality of the maintained/protected habitat.

Finally, focus groups and discussions with stakeholders suggested that anglers and divers are aware of the uncertainty surrounding the evidence on ecological improvements, if any, that could result from designation and on what damage might be avoided through designation. Hypothetical scenarios featuring improvement or degradation may not be convincing and this could lead to a significant number of protest bids.

In conclusion, there is a strong argument to be made in favour of valuing the actual benefits of the policy: protection of features from an uncertain future risk and an insurance against future harm and degradation. As such our approach is designed in a way that is very similar to any insurance; first participants are asked to estimate the current worth of the goods in question (by implicitly asking them how far they would be willing to travel to them in a CE), and then they are asked how much they would be willing to contribute towards insuring these goods (in the CVM). It is helpful to realise that knowing the precise risk of harm is not essential. For example, 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. Similarly, there is no need to be precisely aware of what harm is avoided. Again, in the home insurance example, a wide range of potential harms is imaginable from minor to severe. Different policyholders will have taken up a policy based on different anticipations of what type and magnitude of harm might befall them.

A final point to mention is that the surveys included a range of features that are not features of conservation interest for the MPA policies (e.g. octopus and seals). However, this makes no difference in terms of benefits to divers and anglers of the policy. Surveys such as these measure perceptions of value; as long as participants perceive that the policy will protect these features and they find these features to be of value, then this is should be assessed as a benefit in terms of accounting for the value of the policy to divers and anglers. Here it may also be relevant to note that in analysis of the CVM results, presence of a single feature (such as presence of seals) will not carry substantial value, because it is the composite of values that is valued, with addiditonal added features providing higher value. This is because WTP, as is common in CVM, is linked to the sum of the weights assignd to features through a natural logarithmic function (Section 2.4.2). This means that a site with just seals or octopus will not be attractive to divers, but if you add a valuable habitat, a number of endangered species and a package of restrictions to a hypothetical site, WTP increases more for each feature added. The role of distance to the site is then to add a ‘break’ to WTP, i.e. WTP increases more and more slowly the further away the site is. Obviously there would be a point where WTP can be assumed to flatten again after it rises; hence WTP does not represent a truly logarithmic function but is only assumed to approximate a natural logarithmic function to the limit of the maximum number of features that respondents are confronted with in a hypothetical site[24].

2.2.4 Assessment of visitor numbers

Following the monetary component of the survey, participants were invited to engage with an interactive mapping exercise to establish visitor numbers for a suite of sites based on the listings of 127 rMCZs in England, 39 pMPAs or search areas in Scotland and existing marine SACs in Wales. Sites with a depth of over 100m based on GEBCO bathymetry were excluded, Isles of Scilly were considered as one site, and sites within sites were also excluded to avoid confusing participants. The final set of sites included 22 Scottish sites, 120 English sites and 7 Welsh sites (see Section 3 for details). In the mapping process, participants first selected country and region, leading to five groups (Scotland, Wales and Northwest England, Southwest England, Southeast England and Northeast England). English regional boundaries were based on the four MCZ project areas that have generated the lists of recommended MCZ sites. Given the remit of the English consultation, which is open to any UK resident, we allowed respondents from Northern Ireland to enter into the survey, but they were forced to choose one of the other UK regions to indicate their visit numbers. Hence aggregated survey results are inclusive of Northern Irish visits to Wales, Scotland and England.

Next, respondents were presented with a scrollable and zoomable map of their region with markers indicating the centroids of 15 pMPAs (marine SACs in Wales) that were selected from the regional listings using a random quota algorithm ensuring random but equal distribution of participants across sites. A list of site names was provided where participants were asked to indicate whether or not they had visited each site in the last 12 months, or whether they were unsure. Participants could click on markers or site names to bring up a short site description and local map of the area (Figure 9). Piloting indicated that this approach allowed participants a high level of certainty on whether or not they had visited sites with few respondents indicating ‘unsure’. Next, the interactive map and table were refreshed with only sites selected ‘yes’ showing, and participants requested to indicate the frequency of their visit to each site over the past year (Figure 10).

[24] Beyond this a polynomial model might prove a better fit.

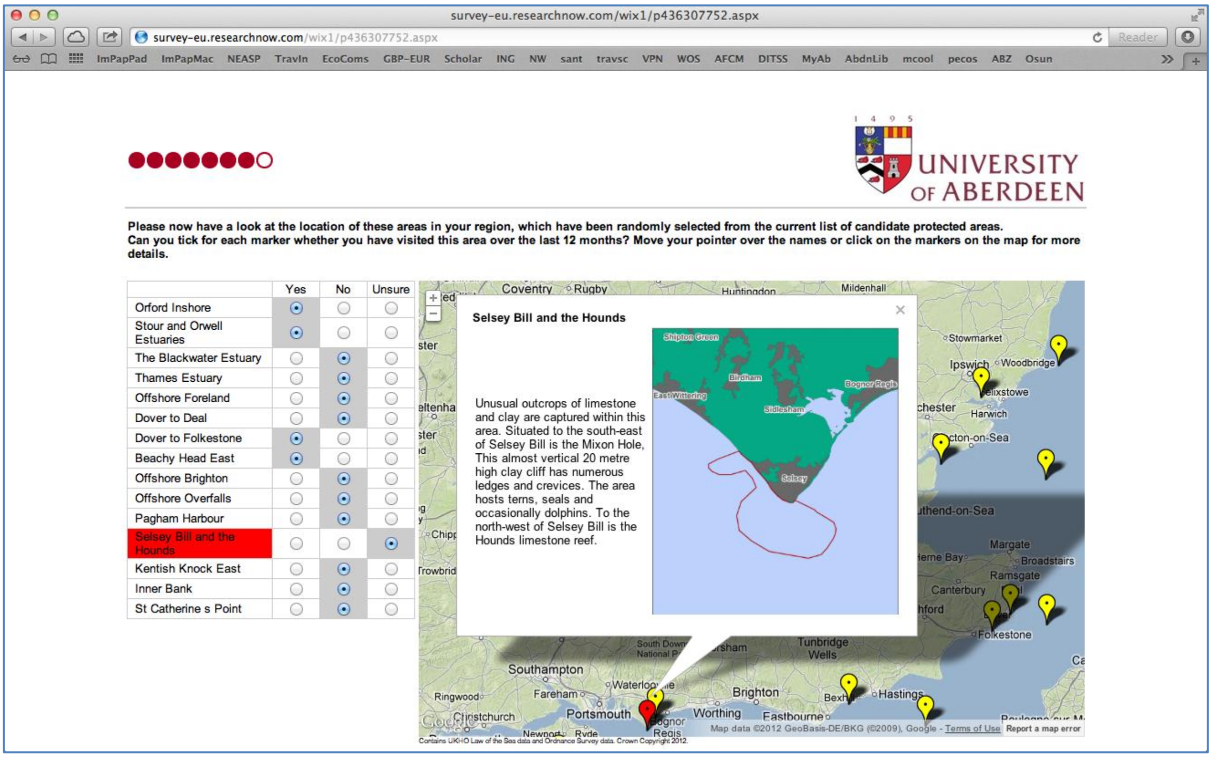


Figure 9 First stage of interactive mapping exercise to establish pMPA visitor numbers.

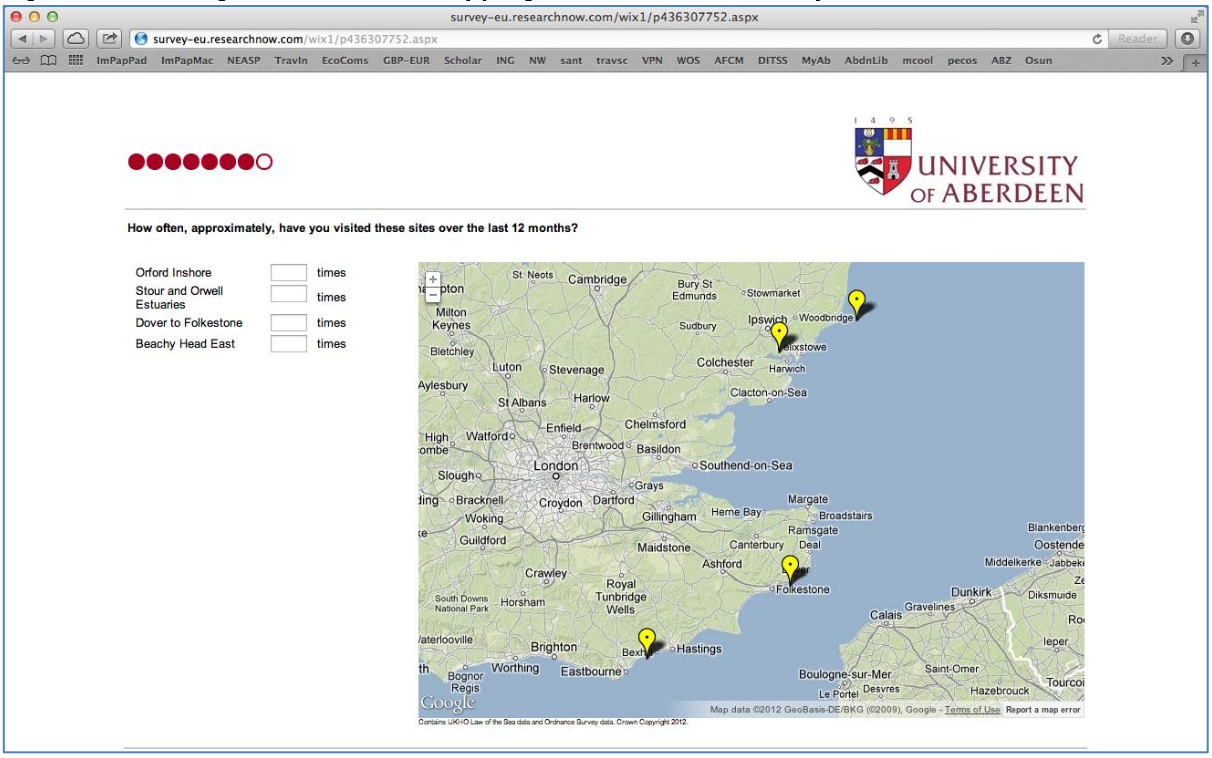


Figure 10 Second stage of interactive mapping exercise to establish pMPA visitor numbers.

2.2.5 Design of wellbeing indicators

Constructs of wellbeing that we *a priori* identified would be relevant to recreational users of marine sites (Table 9) were drawn from a wide range of sources, including literature on the benefits of green spaces and biodiversity in relation to concepts of sense of place and identity (Manzo 2003; Fuller *et* *al.* 2007; Irvine *et al.* 2010; Dallimer *et al.* 2012), and conceptualisation of the benefits of cultural ES in the UK NEA (Church *et al.* 2011) and Max-Neef's Human Development Matrix upon which the NEA draws (Max-Neef 1989; Cruz, Stahel & Max-Neef 2009). Others were the indicators used in Natural England's Monitor of Engagement with the Natural Environment (2012) that will be implemented in the NEA follow-on phase, and recent thinking on cultural ecosystem services, goods and values (Chan, Satterfield & Goldstein 2012) and the relation between cultural services, identity and landscapes (Tengberg *et al.* 2012). Selected constructs and their indicators were oriented on the place-based UK NEA cultural ES approach (Church *et al.* 2011), which conceives environmental settings themselves as cultural services, which deliver a range of benefits such as health, knowledge and amenity goods. While monetary valuation of recreational benefits is well established, we conceived that less tangible benefits were more readily assessed using a non-monetary instrument such as the subjective wellbeing indicators common to the 'green spaces' literature. Potential indicators were both drawn from previous research (Fuller *et al*. 2007; Dallimer *et al*. 2012) and developed for this study. They were crosschecked against results from the MCS 'Your Seas, Your Voice' survey and discussed in focus groups (Section 2.3) and with BSAC and AT. This process led to a novel instrument consisting of 15 items using a continuous five point Likert scale (*strongly disagree* to *strongly agree*). While the instrument was designed for assessing the subjective wellbeing benefits of marine settings with marine beneficiaries, the instrument could easily be adapted for broader assessment of cultural ES.

Items were presented in random order, and participants were prompted with the question: 'The following questions are about the many ways in which the sites that you indicated you visited might be important to you. Please indicate how much you agree with each statement in relation to these sites.' (Figure 11).

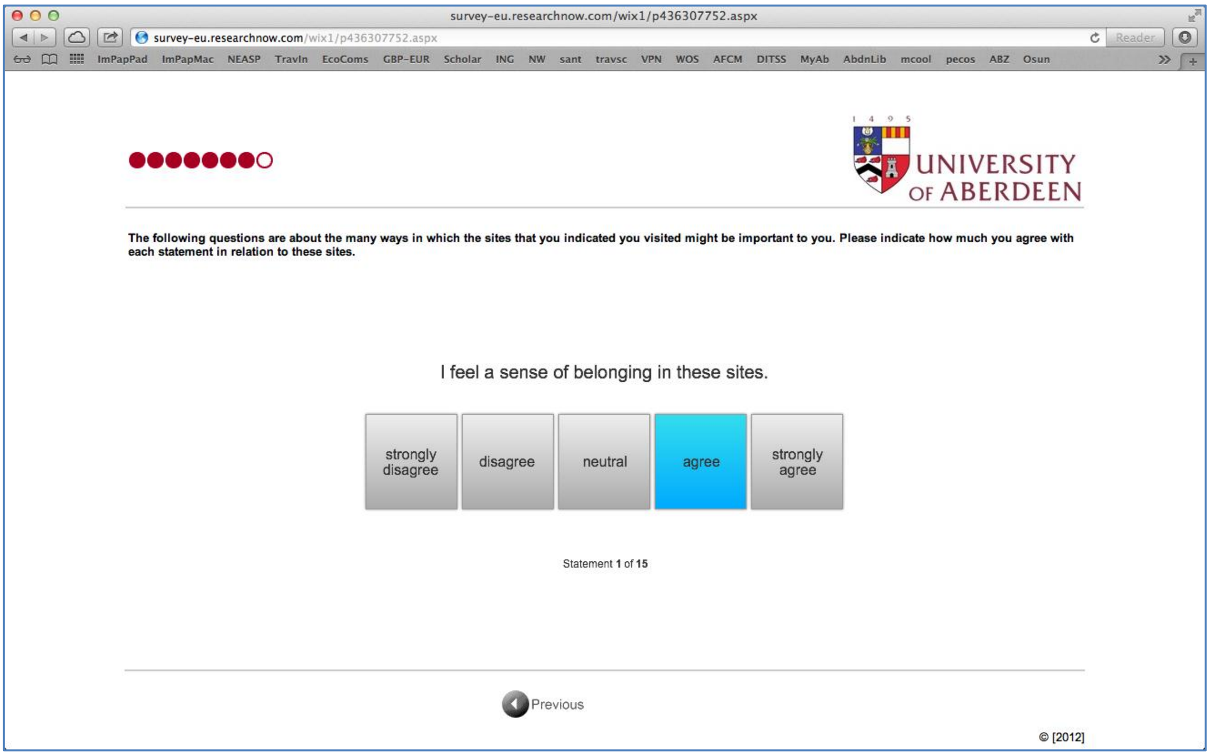


Figure 11 A sample subjective wellbeing question.

Table 9 Subjective wellbeing questions and *a priori* constructs.

Item	*A priori constructs;* *links to literature & existing instruments*
1. Visiting these sites clears my head.	1-4: Reflection and sense of wholeness (Fuller *et al.* 2007; Irvine *et al.* 2010; Dallimer *et al.* 2012) 3: Connection to nature (MENE) 4: Spiritual value (NEA; Chan *et al.* 2012)
2. I gain perspective on life during my visits to these sites.	
3. Visiting these sites makes me feel more connected to nature.	
4. At these sites I feel part of something that is greater than myself.	
5. These sites feel almost like a part of me.	5-8: Sense of place: place identity and continuity with past (Fuller *et al.* 2007; Dalimer *et al.* 2012; Tengberg *et al.* 2012) 7: Transformative values (Chan *et al.* 2012); 5: Identity (MENE)
6. I feel a sense of belonging in these sites.	
7. I've had a lot of memorable experiences in these sites.	
8. I miss these sites when I have been away from them for a long time.	
9. Visiting these sites has made me learn more about nature.	Knowledge (NEA; MENE)
10. I have made or strengthened bonds with others through visiting these sites.	Social bonds (HSDM)
11. I feel like I can contribute to taking care of these sites.	Participation (NEME; HSDM)
12. I have felt touched by the beauty of these sites.	Aesthetics (NEA) Appreciation (MENE)
13. These sites inspire me.	Inspiration (Chan *et al.* 2012)
14. Visiting these sites leaves me feeling more healthy.	Health (NEA; MENE)
15. Visiting these sites gives me a sense of freedom.	Freedom (HSDM)
HDSM: Human Scale Development Matrix (Max-Neef 1989; Cruz, Stahel & Max-Neef 2009) MENE: Monitor of Engagement with the Natural Environment (Natural England 2012) NEA: UK National Ecosystem Assessment: Cultural Services (Church *et al.* 2011)	

2.3 Testing and dissemination

The online valuation survey was designed and distributed in partnership with the British Sub Aqua Club (BSAC) and the Angling Trust (AT), the largest UK diving and angling organisations. The questions and framing were tested using two divers' and two anglers' focus groups during Oct-Nov 2012, with members of BSAC, AT, Aberdeen Thistle Sea Angling Club and Aberdeen University Dive Society. This included consideration of the cognitive burden of the survey, which had a relatively high number of attributes and levels. The survey was then piloted with a sample of 70 divers and 25 anglers recruited via direct email to a selection of 900 BSAC and 300 AT members, which led to a limited number of changes in word phrasing, visual design and technical implementation; no major conceptual changes were necessary. Pilot results were not included in the final sample.

The survey was advertised to 28,000 BSAC members and at least 3,000 AT members (plus an unknown number of local angling club members by proxy; AT is a federative organisation). Digital means used were direct emails, websites, Twitter and Facebook. Adverts were printed in the nationally distributed magazines 'Scuba' and 'Sea Angler'. The survey was also distributed via either email or website by the Scottish Sea Angling Conservation Network, the Welsh Federation of Sea Anglers, ScotSAC and via three online discussion fora: the World Sea Fishing Forum, the UK Sea Fishing Forum, and the Sea Fishing Forum.

2.4 Analysis

2.4.1 Analysis of the choice experiment

In our analysis of the choice experiment we developed frequency-based conditional logit (CL) models using NLOGIT 4.0 (Econometric Software). The econometric theory behind frequency-based CL model is not different from that for other CL models, as the probability that site *j* will be selected remains the logit of the utility of *j* over the remaining alternatives and independence of irrelevant alternative and independent but identical distribution of the error terms are assumed. For more details on this, see Christie *et al.* (2007).

Models included a single alternative-specific constant equal to 0 for the 'stay at home' option and equal to 1 for sites A and B. We included a range of individual-specific characteristics as ASC interactions: income, education, age, gender, number of years angling or number of dives completed in a lifetime, membership or donation to an environmental organisation, and level of support for proposed MPA policies. Continuous attributes were all included in linear form, except for size of the sites which was analysed as a base 10 logarithm, after adding 1 to avoid zero values. WTP was derived from the marginal rate of substitution between the attribute and travel distance coefficients, multiplied by the travel cost per mile (Section 2.2.2). To account for the panel nature of the data, we clustered observations at the individual level to derive robust standard errors. To test the assumption of independence from irrelevant alternatives (IIA), we used a Hausman-McFadden test.

2.4.2 Analysis of contingent valuation

Since WTP values were assumed to be positive and significantly skewed, WTP from the CVM questions was transformed using the natural logarithm. Thus we modelled that:

$$\log(WTP_{CVM} + 1) = \beta_0 + \beta_1 X_1 + \cdots + \beta_k X_k + u_i \quad (1)$$

with β_0 the intercept, β_k the regression weight for an attribute or individual characteristic X_k and u_i the residual, which is assumed to be normally distributed with a mean of zero. While the use of payment cards for CVM has significant advantages (e.g. cognitive ease for respondents, reduction of starting point bias), exact WTP is not elicited from respondents. Instead, WTP is assumed to lie in the interval between the amount indicated and the next higher amount. Estimating using midpoints or lower bounds can lead to bias, which can be avoided by using interval regression on the basis of maximum likelihood estimation (Cameron & Huppert 1989). We applied a random effects specification to account for the clustered nature of the data. Birol et al (2008) provide further detail on analysis of multi-attribute payment card data using random effects interval regression.

We used the *xtintreg* procedure of STATA 12 software with 12 quadrature points; robustness of the estimation was verified by estimating additional 8 and 16 quadrature point models to check the coefficients were stable.

Because we expected that individual-specific characteristics would explain a large amount if not most of the variation in WTP, we used a pooled angler-diver model whilst accounting for differences between the groups by including interaction terms. Initially, we evaluated a full set of site attributes and interactions. While in choice modelling it is the convention to retain choice attributes in the model regardless of their significance (but not interactions with individual characteristics), for the purpose of deriving a benefit transfer value function, we simplified the model by only retaining parameters that were significant at the 5% level in the initial models.

To assess possible framing bias in relation to payment card scales (£0-20 and £0-40), we applied a t-test to compare the two scale means.

2.4.3 Transfer and aggregation of monetary values

In order to assess monetary values for large numbers of individual sites across the UK, we developed an innovative value transfer approach on the basis of site habitats, species, recreational characteristics and management restrictions. It provides considerable flexibility and not only allows us to estimate values for individual sites, but also for groups of sites. For example, the recently announced decision to nominate 31 sites only in England was made after designing this research; nonetheless our approach allows us to compare the value of these 31 sites vs. the value of the remaining 96 out of 127 English potential sites.

For transfer of both the use and non-use data from hypothetical to real sites we developed a matrix of real site characteristics that identified actual attribute levels for each of our attributes for each site. Key sources for presence/absence of habitats and species included site descriptions by Natural England (MCZ impact assessment), Scottish Government, the Wildlife Trusts, the UK Biodiversity Gateway (for seals, octopus, fish species) and JNCC (seabird colonies), and SAC designations for Welsh sites. Access options were established manually using Google Earth software. Data on rock formation and wreck locations was sourced from the MCZ impact assessment as well as online community *UKDiving.co.uk*. Location of rock formations could not be established for Scotland, but otherwise there were no significant caveats. Presence of any given type of FOCI habitat / search feature within a site was counted once only for the purpose of aggregation.

We used 150-250,000 as a UK diver population estimate, based on a BSAC estimate of 200,000 between 150.000-250.000 (A. Dando, Pers. Comm.). The angler population range used was between 1.1 million (Drew Associates, 2004) and 2 million (CEFAS, 2013). To assess the suitability of our sample for aggregation against the population of UK divers and sea-anglers, demographic statistics were evaluated by BSAC and AT representatives. There are no definite data sets known to us or our research partners on the spatial distribution of divers and anglers; BSAC membership is in some regions underrepresented due to presence of other membership organisations, while the AT remit does not cover Scotland.

For aggregation of the CE results, we first estimated mean WTP for both divers and sea-anglers for each site on the basis of per-site utility. WTP is a function of respondents' maximum distance they are willing to travel to a site scaled by the travel cost. Per site utility was derived from real site characteristics X multiplied by their coefficients X and coefficients β. Thus:

$$WTP_{use} = -2c\frac{\beta_0 + \beta_1 X_1 + \cdots + \beta_k X_k}{\beta_d} \quad (2)$$

where c is the travel cost per mile (with factor 2 to take return distance into account), and β_d the coefficient for the travel distance attribute. For this purpose, the 'site out at sea' level of the access attribute was ignored. As this factor is already implicit in visitor counts, including it in the utility function would have led to double counting. In terms of the restrictions attribute, we made separate site aggregate calculations for each of the restriction levels, to consider the impact of different management scenarios.

The aggregate use value V_{use} of either divers or sea-anglers for site s can then be calculated as:

$$V_{use} = \frac{N \cdot n_{r_s}}{n \cdot n_v} WTP_{use,s} \sum_{i=1 \ldots n} F_{i,s} \quad (3)$$

where $F_{i,s}$ is the frequency of indicated visits for respondent i to site s, n is the sample size of divers or sea-anglers, n_v is the number of respondents that viewed a site within the mapping session (each participant viewed a randomly selected subset of sites within their region; see section 2.2.4), N is the UK population of divers or anglers, and n_{rs} is the number of respondents in region r that harbours site s. After evaluating our data, because our sample of anglers was relatively low compared to the large number of sites we were evaluating (Section 3.1), we smoothed anglers 'yes' counts with mean frequencies to mitigate the effects of chance occurrences of unrealistically high mean visits. To do this, we constituted $F_{i,s}$ as the number of respondents that indicated they had visited a site multiplied by the mean number of visits across sites. For divers $F_{i,s}$ indicates the actual number of visits indicated by respondents.

For the aggregation of the CVM non-use values, we adapted the value function methodology outlined in Bateman *et al.* (2006) to our context, developing a GIS with ArcGIS 9.3 software. First, we created a base layer consisting of the UK road network. Second, we created a layer containing polygons for each (p)MPA site considered by this study. Third, we used a postcode layer to establish each respondent's location. This then allowed us to calculate the shortest distance (x_d) from each individual participant to each site. To calculate distance to polygon edges rather than centroids, we used RSGISLib (Earth Observation Group, Aberystwyth University: http://www.rsgislib.org). Using the CVM model results, we then calculated non-use WTP for each participant for each site based on actual site and respondents' individual characteristics, taking distance decay ($\beta_{dist}<0$) into account, and aggregated this over the estimated UK population size of divers and anglers:

$$V_{non-use} = \frac{N}{n} \sum_{i=1 \ldots n} e^{\beta_0 + \beta_d x_{d,i} + \sum \beta_k x_{k,i}} - 1 \qquad (4)$$

Again, we separately estimated aggregates for each different level of site restrictions.

For assessment of visitor numbers and the travel cost (TC) approach we excluded sites at depths over 100m (Section 2.2.4). Although in theory it would be possible to assess aggregate non-use values of these sites using our CVM results, we felt they were too much of a 'class apart' given that our assessment was framed from a user perspective and these sites will not have any significant use from divers or anglers[25].

We also assessed correlations between per site CVM and TC individual WTP for divers and anglers, per site aggregate CV and TC results, and the mean of the non-monetary wellbeing indicators (see next section) in STATA using a spearman rank matrix with Bonferroni correction. The aim of comparing TC and CVM results was to assess convergent validity, while comparison with non-monetary outcomes allows consideration of the complementarity of the monetary and non-monetary approaches.

To clarify the aggregation and transfer process, we provide a brief discussion of the transfer process for a specific site, Folkestone Pomerania in Box 1.

[25] For recent research on the value of the deep sea we refer to Jobstvogt et al. (2013).

Box 2 Example of benefit transfer: diving at Folkestone Pomerania

The benefit transfer process used differed between the travel cost CE (use values) and contingent valuation (non use values) methods. Transferring the travel cost estimates involved the following steps:

1. Mapping the site characteristics according to the CE attributes.
2. Estimating mean WTP for an individual visitor to the site based on its characteristics.
3. Estimating visitor numbers per annum
4. Aggregate results equal the product of mean individual WTP and visitor numbers.

Folkestone Pomerania rMCZ[26] includes rock formations and wrecks and there is boat access only. Habitats include subtidal sands, honey- and rossworm reefs, blue mussel beds and fragile sponge and anthozoan communities. These are then matched against habitat types used in the survey (mapping detailed in Table 8). The site has no species proposed for designation and there are no bird colonies, seals or octopus. Fish species include Atlantic cod, ballan wrasse, corkwing wrasse, cuckoo wrasse, Dover sole, goldsinny, pollack and thornback ray; hence the site qualifies as a site with specimen fish present. Combining this data with choice model results (Table 13), we are able to estimate mean individual utility of the site over staying at home for an individual diver visiting; WTP is then the inverse of the ratio of utility of the site over the disutility associated with travel, times travel cost for a return trip (Equation 2, above). Given the attractiveness of the site to divers with its variety of habitats, large fish, rock formations and wrecks, mean individual WTP amounted to £95.
To estimate visitor numbers, we calculated the ratio of the total number of diver respondents in the Southeast region who had been presented with the site over the number of divers who indicated they had actually visited the site in the past 12 months. We multiplied this with the ratio of the estimated population of UK divers over the number of diver respondents. We then multiplied this by the total frequency of visits that respondents who were presented with the site had made to the site. Because we used a lower and upper bound for the UK diver population (150,0000-250,000) we came to a lower and upper bound of visits per annum to Folkestone Pomerania: between 16 and 26 thousand visits per year. Multiplying this by mean individual WTP gives an aggregate value per annum of £1.5-2.5 million. These calculations are summarised in Equation 3, above.
To calculate the annual use value of particular management measures, we simply increased individual utility (and hence WTP) by the appropriate amount derived from the divers' choice model (Table 13).

For the CVM aggregation, we used a different approach as discussed in the main text. This consisted of the following steps:

1. Mapping the site characteristics according to the CE attributes.
2. Estimating the distance of each respondent to the site.
3. Estimating individual WTP for each survey respondent to the site.
4. Extrapolating the aggregate for the survey respondents to the UK population aggregate.

Site characteristics are assessed as described above. Distances to the site were estimated using a GIS, calculating distance across the UK road network from each respondent's postcode to the site. Boat miles were counted as car miles, leading to some underestimation of values (Section 4.2.2) for Folkestone Pomerania, which lies about 5 miles south of the English coast. Knowing site characteristics, distance, and demographic and social-economic characteristics of our respondents, we were then able to fill in the value function to calculate individual WTP for protection of this site for each of the respondents; on average this was £8.09. This value reflects the attractiveness of this site, but also that it is in a high population density area, as proximity of sites increased WTP (Sections 3.3 and 4.1.1). Summing respondents' values, and then multiplying by the ratio of the total UK diver population over the size of the sample of divers, gave us the aggregate value of £1.2-2 million. These calculations are summarised in Equation 4. The effect of adding particular management measures could be calculated by including utility of a measure within the individual value function.

[26] For details on Folkestone Pomerania rMCZ, including features proposed for designation, see http://www.balancedseas.org/gallery/download/1308.pdf

2.4.4 Analysis of wellbeing indicators

Wellbeing indicator response scores on a consistent symmetrical 5 point Likert scale were analysed through exploratory factor analysis using *R* (psych package: R Development Core Team, V2.15.2). Principle axis factoring (pairwise deletion of missing data) with oblique rotation (*oblimin*) was used to identify indicators measuring distinct components of wellbeing following the approach outlined in Fuller *et al.* (2007). We felt an exploratory factor analysis was appropriate;while some of our items were part of recognised constructs in the literature we included a series of items reflecting other aspects of wellbeing, which were not part of any a priori construct; we therefore decided against a confirmatory factor analysis at this stage. Factors were constructed from indicators with factor loadings of 0.4 and above and *Cronbach's alpha* was calculated to evaluate reliability of the resulting dimensions. Scores were averaged across indicators within the factors to give three factor scores for each participant to use in subsequent analyses. Indicators that did not load onto the principle component factors and were associated with single-item *a priori* constructs were considered as single-item dimensions. In addition to factor analysis, a cluster analysis was used to examine the relatedness of indicators in terms of how they were scored by participants. The responses to the indicators were treated as continuous over the 5-point scale.

Given that participants were asked to associate their responses to the marine sites that they indicated they had visited in the past year, we were able to examine associations between wellbeing scores and individual sites by calculating mean scores and standard deviations for each of the sites across visitors. While these may be considered 'smoothed' scores as most individuals will have provided single scores for multiple sites, this nonetheless gives an indication of between-site differences per dimension. To analyse trends, we then took minimum and maximum mean scores per site for each dimension. For each construct, we calculated thirds of the maximum distance between site means to establish a three-level colour coded relative scale. While these relative scales cannot be interpreted in relation to the original Likert scale, they nonetheless provide a useful indication of the relative value of each site for each of the wellbeing constructs.

3 Results

3.1 Descriptive statistics

A total of 1683 usable responses were received consisting of 1261 divers (75%) and 422 anglers (25%). Those completing the full survey numbered 1220 and 1332 completed the monetary valuation section of the survey. The remainder were only included in our GIS (Section 2.2.4). The spatial distribution of respondents is shown in Figure 12. Of those who fully completed the survey, 811 (69%) expressed a willingness to be involved in phase two of the study (deliberative workshops) indicating that our sample was highly interested and motivated. On average, angling respondents lived nearer the coast (18 km) than divers (37 km). 73% of the divers were male while all angling respondents were male. Age distributions are shown in Figure 13. Anglers were on average older than divers showing a far higher proportion of pensioners (15% vs. 6%). Female diving respondents had a lower average age than male divers or anglers and included more 16-24 year olds and fewer 65+ respondents, although the age of the oldest respondents was similar in all cases. Regardless of the absence of female anglers, demographic statistics were representative of the membership of BSAC (A. Dando, pers. comm.) and AT (D. Mitchell, pers. comm.). Within the UK sea-angling community as a whole, only 3.3% of anglers are estimated to be female (Drew Associates 2004).

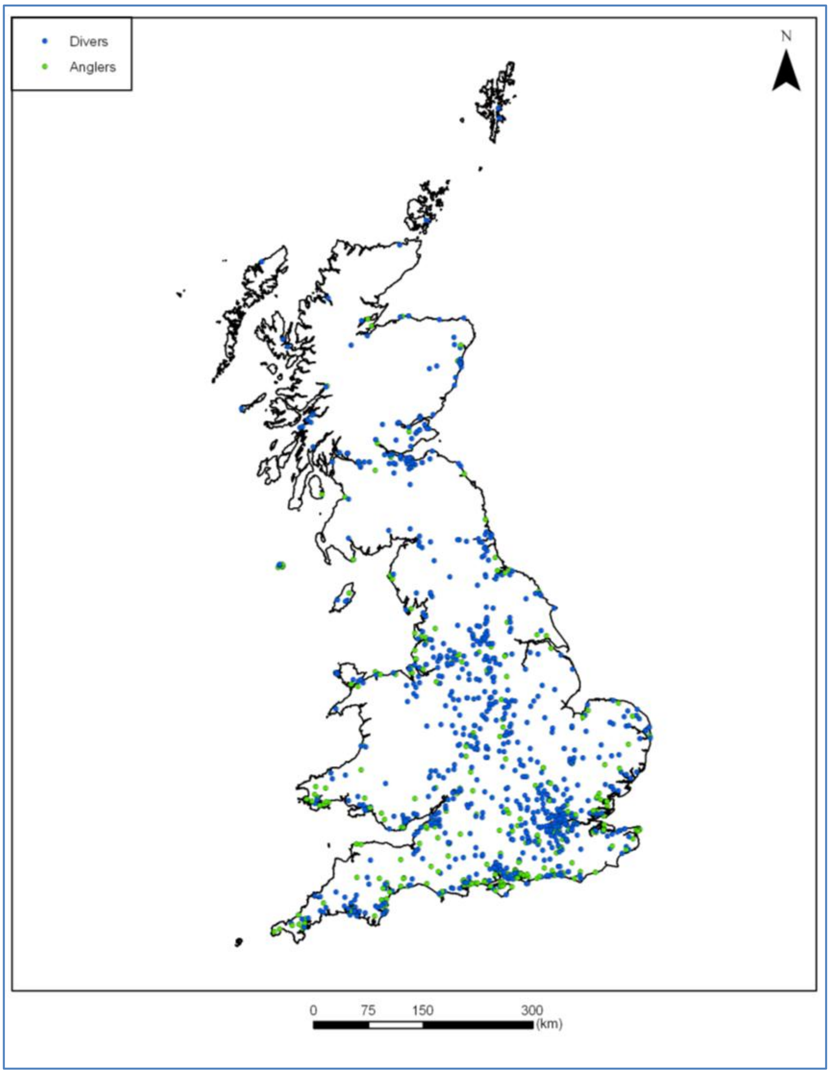


Figure 12 Spatial distribution of survey respondents.

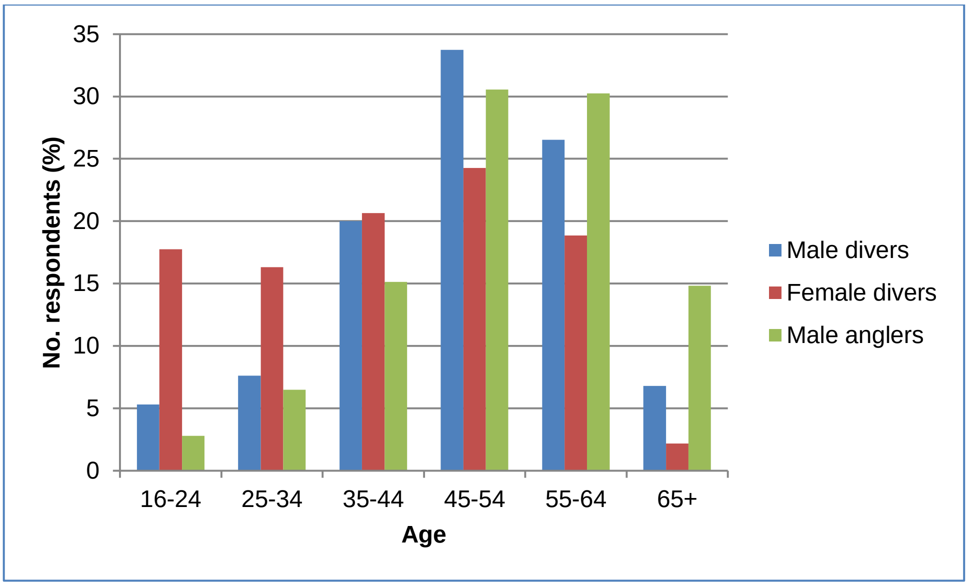


Figure 13 Age distribution of respondents. Note that all angling respondents were male.

Education & income: Overall, divers received higher levels of education than anglers, with undergraduate (34%) or postgraduate (26%) level most common amongst divers, compared with a predominance of A-level (27%) and GCSE (25%) equivalents amongst angling respondents (Figure 14). Household income amongst the highest proportion of both divers (22%) and anglers (19%) fell in the £35,000-50,000 per annum bracket, with angler incomes distributed amongst lower categories than diver incomes (Figure 15). Identical proportions of divers and anglers (18%) chose to withhold this information.

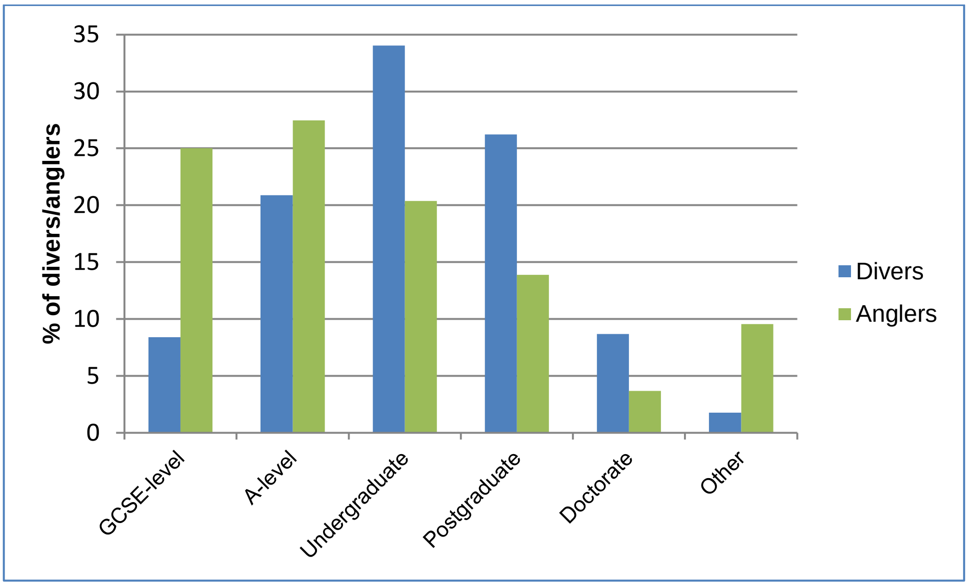


Figure 14 Highest level of education attained by respondents.

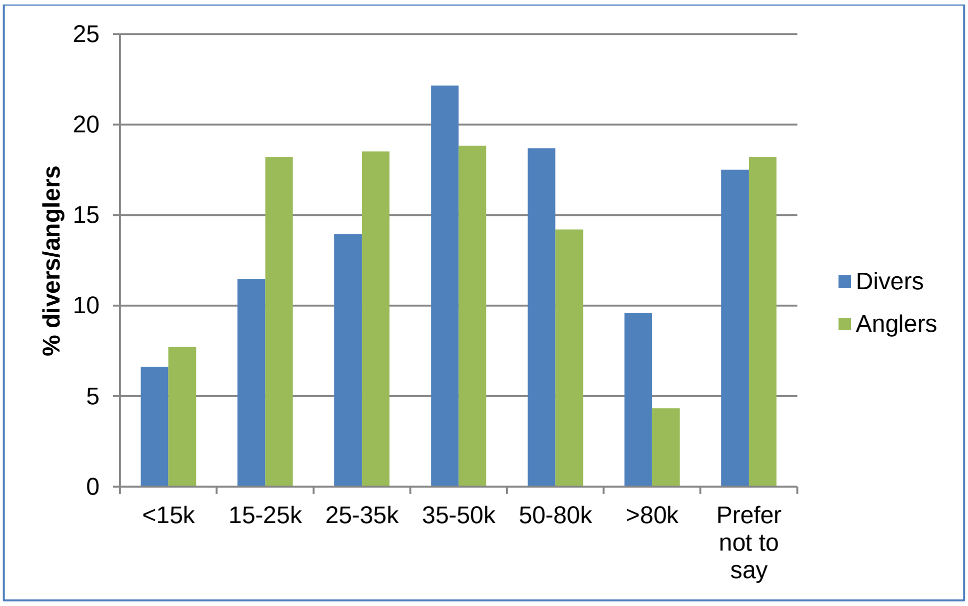


Figure 15 Household income (in £1000s, after tax and including any benefits).

Activities and experience: While we identified the primary category of respondents through their survey entry link, the range of activities that the two groups are involved in overlap, with a considerable numbers of divers also going angling and vice versa (Table 10). Anglers spent more time out than divers, with 52% of anglers having spent more than 21 days sea-angling, compared with 28% of divers (Table 3). This is also reflected in the higher mean number of days out amongst anglers (56 days) and divers (47 days) in the >21 days category. High figures in this survey reflect results of the National Angling Survey 2012, where most UK anglers wanted to go fishing more, but were restricted by work and family commitments (Brown 2012). Our sample of divers had considerable experience: 26% completed 200-500 dives during their lifetime and 23% completed over 1000 (Table 5). Angling respondents had a greater number of years experience (mean 32) than snorkelers (mean 12), averaging 32 years for anglers, compared with 12 for snorkellers.

Table 10 Activities

	Freshwater angling	*Sea shore angling*	*Boat angling at sea*	*Diving by boat, at sea*	*Diving from sea shore*	*Sea snorkelling*	*Freshwater snorkelling or diving*
Divers	6%	7%	9%	97%	89%	30%	48%
Anglers	44%	91%	69%	2%	3%	10%	1%

Table 11 Number of days that respondents indicated they spent sea angling or diving/snorkelling in UK waters over the last 12 months.

	None	*1 or 2 days*	*3-7 days*	*8-14 days*	*15-21 days*	*More than 21 days*
Anglers	0	3%	9%	14%	22%	52%
Divers	0	4%	14%	23%	31%	28%

Table 12 Approximate number of dives completed by divers over their lifetime.

	1-19	*20-49*	*50-199*	*200-499*	*500-999*	*≥1000*
Divers	2%	6%	22%	26%	19%	23%

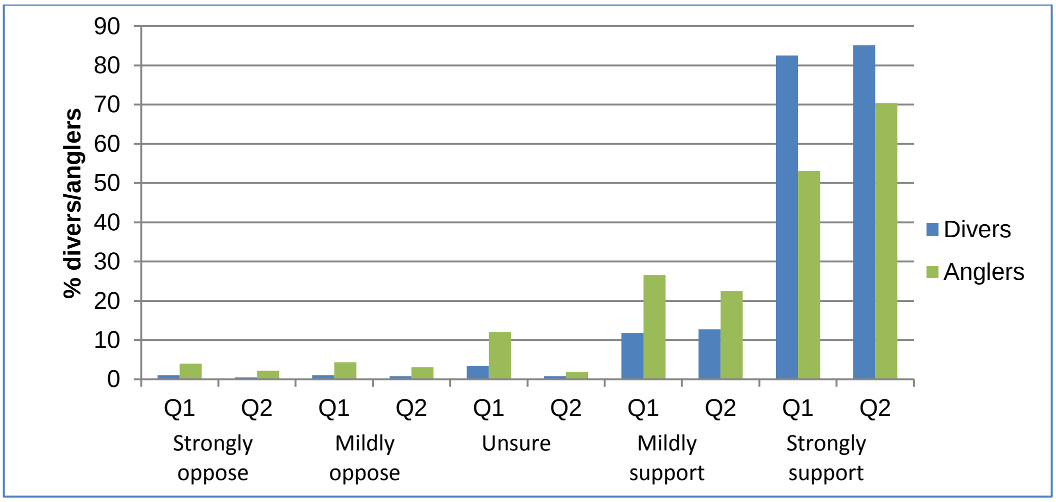


Figure 16 Support for extending the network of MPAs (Q1) and increased protection for the marine environment in general (Q2).

Support for environmental protection: Donations/ membership of environmental organisations was higher amongst divers (50%) than anglers (38%); 6% of both groups preferred not to say. Both divers and anglers express more support for than opposition towards extending the MPA network, with higher levels of support amongst divers (82% strongly support) than anglers (53% strongly support). When asked about their level of support for increased protection of the marine environment (without specifying MPAs as the mechanism), support further increased (85% strongly agree amongst divers; 70% amongst anglers). Differences between divers and anglers may reflect uncertainty over changes to recreational access and activities, particularly the threat that more restrictions may be placed on angling than diving as a result of the designation of new MPAs.

3.2 Choice experiment results

After excluding those participants who indicated they chose randomly, could not envision the sites or ignored travel distance (24%) from the sample (see Section 2.2.1), a total of 1075 respondents were included in the travel cost model estimation. Hausman-McFadden tests could not reject the null hypothesis that the data fulfilled the IIA assumption. Analysing both user groups separately significantly improved model fit (likelihood ratio test; χ^2=700, p<0.001) and clearly highlighted different choice preferences for the favourite site depending on group affiliation. Model fit was good for both the angler (*Pseudo-R^2*=0.17) and diver (*Pseudo-R^2*=0.13) models. As expected, travel distance as a measure of cost showed a negative sign and was highly significant in both angler and diver models (Table 13). This means survey participants were less likely to choose site X if it was further away, all other things being equal. The presence of clear preference similarities for types of habitats (anglers) and substrate (divers) provide further internal validation for the models, as attribute levels were blindly estimated without any pre-assumed correlations. In the following sub-sections we highlight which site and respondents' characteristics were most important for choosing different angling/diving sites.

3.2.1 Anglers

273 anglers were ultimately included in the travel cost model. The 'stay home' alternative was selected at least once (out of five visits per choice task) in 42% of the choice tasks. Age, income and angling experience significantly influenced the decision of how often to go out. Older respondents were more likely to stay at home whereas income and angling experience were positively correlated with the angling activity. The level of education was not significant, but having donated money to an environmental organisation did have a significant positive effect on selecting any site as opposed to 'staying at home'.

As might be expected, the chance of finding specimen fish was one of the most important considerations to anglers, worth £23.58 in travel costs. However, anglers were also willing to travel considerable distances for the presence of several FOCI habitats: tide-swept channels (£25.14) and honeycomb or rossworm colonies with sandy (£20.04) or rocky (£22.79) substrates. Substrate did not appear to significantly influence site choice. Anglers did show an interest in the 'number of vulnerable species protected' included in the proposed protected area, with average travel cost values of £0.30 per additional protected species (respondents were presented with up to 15 of 40 vulnerable species; Section 2.2.2). Among the underwater objects at the site shipwrecks were of intermediate importance (£8.87), whereas the underwater rock formations paramter was not statistically significant. 'Access by shore only' was preferred over the baseline with 'access by shore and boat', which suggests that the exclusion of boat users is generally seen as a positive attribute by anglers. Restriction of dredging and trawling or anchoring and mooring does not influence recreational preferences, while restriction of potting and gillnetting is favoured (WTP £4.76). Larger protected areas are seen as slightly negative (WTP -£0.79 per times 10 size increase). Presence of bird colonies or octopus was also, on average, seen as a slight negative factor for angling recreation (-£4.13 and -£4.17 respectively).

Table 13 Conditional logit travel cost models for anglers and divers.

	Divers				*Anglers*			
Parameter (unit of measurement)	*β*		*SE*	***WTP***	*β*		*SE*	***WTP***
ASC (go out)	0.193	*	0.115	**7.52**	0.674	***	0.206	**20.78**
* Female	NS							
* Angling experience (10 yr)					0.132	***	0.022	**4.06**
* Number of dives in lifetime (100)	0.040	***	0.007	**1.57**				
* Angling/diving days last 12 months (10)	0.012	***	0.001	**4.70**	0.029	***	0.001	**0.90**
* Age (10 yr)	-0.063	***	0.018	**-2.47**	-0.204	***	0.033	**-3.22**
* Income (£1000)	0.003	**	0.001	**0.11**	0.006	***	0.002	**0.19**
Not stated	(-0.080)		0.076		(-0.025)		0.111	
* University degree	0.086	*	0.048	**3.37**	(-0.085)		0.073	
Not stated	0.477	**	0.201	**18.61**	(0.203)		0.134	
* Donated money to environmental organisation	0.201	***	0.045	**7.86**	0.127	*	0.072	**3.93**
Not stated	(-0.080)		0.076		0.352	**	0.144	**10.90**
Vulnerable species protected (1 sp)	0.011	***	0.002	**0.44**	0.010	**	0.004	**0.30**
Size of protected area (Log10)	(-0.003)		0.005		-0.026	***	0.009	**-0.79**
Accessible by shore only, boat use prohibited	-0.160	**	0.067	**-6.24**	0.368	***	0.116	**11.37**
Access by shore, boat and pier	0.162	***	0.045	**6.30**	(0.016)		0.073	
Site out at sea, can only reached by boat	-0.142	***	0.028	**-5.54**	-0.668	***	0.055	**-20.61**
No dredging and trawling	(0.042)		-0.047		(-0.018)		0.078	
No dredging, trawling, potting and gillnetting	0.110	***	0.042	**4.28**	0.154	**	0.072	**4.76**
No dredging, trawling, anchoring and mooring	0.157	***	0.036	**6.12**	(-0.040)		0.067	
Large/specimen fish	0.196	***	0.023	**7.64**	0.764	***	0.047	**23.58**
Bird colony	0.180	***	0.033	**7.02**	-0.134	**	0.064	**-4.13**
Seals	0.409	***	0.052	**15.97**	(-0.125)		0.082	
Octopus	0.344	***	0.053	**13.42**	-0.135	*	0.080	**-4.17**
Wreck	0.486	***	0.023	**18.98**	0.288	***	0.043	**8.87**
Rock formation	0.130	***	0.025	**5.05**	(-0.011)		0.047	
Mostly sandy or gravelly seafloor with oyster, mussel or flame shell beds	(0.041)		0.077		(-0.204)		0.131	
Mostly muddy seafloor with oyster, mussel or flame shell beds	(0.047)		0.071		(0.051)		0.120	
Mostly rocky seafloor with oyster, mussel or flame shell beds	0.195	***	0.195	**7.61**	(0.094)		0.118	
Mostly rocky seafloor with large kelp and seaweeds	0.173	**	0.072	**6.75**	0.458	***	0.120	**14.15**
Mostly rocky seafloor with anemones, soft corals, and sponges	0.397	***	0.070	**15.49**	0.299	**	0.124	**9.22**
Mostly muddy seafloor with sea-pens, burrowing animals and fireworks anemones	0.221	***	0.073	**8.64**	0.220	*	0.117	**6.77**
Mostly sandy or gravelly seafloor with honeycomb- or rossworm colonies	(-0.047)		0.079		0.649	***	0.128	**20.04**
Mostly rocky seafloor with honeycomb- or rossworm colonies	0.277	***	0.079	**10.81**	0.739	***	0.142	**22.79**
Mostly sandy or gravelly seafloor with sea grass or eel grass beds	0.182	**	0.076	**7.10**	0.250	**	0.127	**7.72**
Mostly muddy seafloor with burrowing sea urchins and brittle stars	(0.061)		0.077		-0.296	**	0.143	**-9.13**
Mostly sandy or gravelly seafloor with scallops and sea urchins	0.198	***	0.069	**7.71**	0.639	***	0.140	**19.70**
Mostly sandy or gravelly seafloor in tide swept channel	(-0.006)		0.066		0.254	**	0.116	**7.85**
Mostly rocky seafloor in tide swept channel	0.611	***	0.076	**23.85**	0.815	***	0.129	**25.14**
Mostly rocky seafloor with rocky habitats in estuary	0.193	***	0.070	**7.53**	(-0.093)		0.113	
Mostly muddy seafloor with intertidal boulders	(-0.064)		0.063		(0.054)		0.113	
Travel distance (10 miles)	-0.045	***	0.000		-0.057	***	0.000	
Number of respondents	802				273			
Number of observations	3208				1092			
Log-likelihood ratio (χ^2)	4395	***			2035	***		
Pseudo-R^2	0.13				0.17			

***p<0.01 **p<0.05 *p<0.10. Parameters in brackets are not significant. SE: Standard Error; WTP: Willingness-to-pay in GBP; NS: not significant and for this reason not included as parameter in final model. ASC: Alternative Specific Constant. Indented parameters are interactions with the ASC and WTP for these parameters is WTP to visit a site over staying at home.

3.2.2 Divers

For the 802 divers that were included in the travel cost model 'dive experience' (i.e. total number of dives), 'age', 'income' and having 'donated money to an environmental organisation' were significant determinants of visiting a site rather than staying at home. Respondents with a university degree had higher willingness to travel (+ £3.37) than the remainder of the divers even whilst taking income into account (+ £0.11 per £1000 increase in income). There were no significant differences between men and women.

Knowing that species would be protected, even whilst the chance of encountering was very low, was highly valued (WTP £0.44 per species), as was the presence of large fish (£7.64), bird colonies (£7.02), octopus (£13.42) and most of all seals (£15.97). Wrecks and rock formations were valued at £18.98 and £5.05, respectively. Preferences for habitats were more evenly spread with more habitats being favoured by divers than anglers. Generally, divers appeared to prefer habitats with rocky seafloor as opposed to muddy or sandy sites (where visibility is reduced). For example, presence of honeycomb- and rossworm habitats with rocky seafloor can be valued at £10.81, while the same habitat-type with sandy substrate was not of significant interest. Tide-swept channels (£23.85) and anemones, soft corals and sponges (£15.49) were most popular. Nonetheless, some non-rocky landscapes were valued, e.g. muddy seafloors with burrowing animals and fireworks anemones (£8.64). This habitat was highlighted by focus groups as an advanced dive site: difficult diving due to the muddy substrate which easily impairs visibility, but also with a high scenic value attached to it. In contrast to anglers, no habitats were seen as negative compared to a seafloor without specific features.

Access was an important factor for choice making and less flexible options such as 'access by shore only, boat use prohibited' or 'site out at sea, can only be reached by boat', were perceived as negative site characteristics with WTP for travel of -£6.24 and -£5.54 respectively. Access by pier in addition to the baseline with shore and boat access was favoured at £6.30, suggesting that piers, and perhaps harbour sites, are more important to divers (for sheltered and easy access diving) than anglers. In terms of travel choices, divers had no significant preference for the restrictions on trawling and dredging but were willing to travel further to reach sites with restrictions on potting, gillnetting, anchoring and mooring. The positive ASC suggests significant unobserved utility for diving over staying at home. 44% of all choice tasks included answers where people had chosen to 'stay home' at least once out of five visits.

3.3 Contingent valuation results

For the contingent valuation part of the survey we asked participants if and how much they would be willing to pay and could afford to give a one-off donation for protection of the dive/angling site presented to them and its natural features into the future against risk of harm and degradation. 283 respondents (21%) were excluded from the analysis as 'protestors'. On average (mean of payment card interval mid-point; Table 14), anglers were willing to donate £10.28, divers slightly but significantly more at £11.13 (t-test of the natural log of lower bound WTP: $d.f. = 4194$, $t = -6.50$; $p<0.01$). In 18% of the CVM tasks participants stated zero values for the site they were presented with.

Table 14 CVM mean stated willingness to pay for lower and upper bound and the mid-point of the payment card interval, with confidence intervals.

	Lower bound		*Mid point*		*Upper bound*	
	Anglers	*Divers*	*Anglers*	*Divers*	*Anglers*	*Divers*
Mean	£8.29	£8.83	**£10.28**	**£11.13**	£12.27	£13.44
95% confidence interval	£7.61	£8.53	£9.58	£10.82	£11.52	£13.09
	£8.97	£9.12	£10.98	£11.44	£13.01	£13.77

We used two single-bounded payment card scales: one from £0-20, the other £0-40; average WTP between them differed significantly at £9.46 for the low scale and £12.48 for the high scale (t-test of the natural log of lower bound WTP: t= -3.16; df=4194; p<0.01).

CVM model results are presented in Table 15[27]. Interaction coefficients for anglers are stated as contrasts. The interval regression model showed a good fit (ρ^2=0.466). As expected, a large amount of variation was explained by individual rather than site characteristics. Donating money to an environmental organisation (β=0.206), support for MPAs (β=0.186) and income (β=0.003 per £1000) positively influenced WTP. The values of divers and anglers were equally prone to distance decay, indicated by the negative and significant travel distance coefficient (β=-0.011 per 10 miles). Against *a priori* expectation, size of the protected area was insignificant. The most influential site-based parameters were shipwrecks (β=0.163), presence of specimen fish (β=0.151), and management restrictions. There were various significant site attributes for which preferences across the two marine user groups differed. Divers were indifferent to access options that sites offered, whereas anglers preferred sites where boats were restricted (β=0.204) and sites that included a pier (β=0.109) in addition to the baseline of both shore and boat access. Both groups were more likely to donate towards sites where commercial fisheries were restricted ('no dredging and trawling': β=0.111). Adding restrictions on small-scale fisheries increased WTP only slightly ('no dredging, trawling, potting and gillnetting': β=0.144). Participants perceived restrictions on anchoring and mooring in as negative, ('no dredging, trawling, potting and gillnetting': β=0.085 vs. 'no dredging and trawling' alone. Divers were willing to pay more for protection of sites with octopus (β=0.131) than anglers β=-0.102). The same trend was apparent for the occurrence of rock formations (β_{divers} =0.070, $\beta_{anglers}$=-0.094) and seals (β_{divers} =0.143, $\beta_{anglers}$=-0.166); for these two attributes anglers WTP was slightly negative. Throughout different model configurations, WTP for habitats was unstable and mostly insignificant, suggesting that divers and anglers mostly did not have clear preferences in terms of protecting one type of habitat over another. However, divers in particular showed a positive preference for 'soft water corals, sponges and anemones' (β_{divers} =0.193 and $\beta_{anglers}$=-0.143). Protection of vulnerable marine species added to WTP (β=0.005 per species; we presented a maximum of 15 out of 40, though, at least for divers, protected species were less important than charismatic animals such as octopus, seal and birds.

[27] Note that for these models, individual parameters or their ratios cannot be directly interpreted in monetary terms as WTP as response variable is transformed on a log scale (Section 2.4.2); total site values per site are given in the next section.

Table 15 Interval regression CVM models for divers and anglers

Parameter (units)	*β*		*SD*
Constant	0.739	***	0.170
Angler	(-0.004)		0.071
Income (£1000)	0.003	***	0.001
Donated money to environmental organisation	0.206	***	0.047
In favour of MPAs	0.186	***	0.034
Number of vulnerable species protected	0.005	***	0.002
Access:			
Access by shore only	(0.053)		0.044
* Anglers	0.204	**	0.083
Access by shore, boat and pier	(0.035)		0.027
* Anglers	0.109	*	0.058
Offshore site, access by boat only	(-0.034)		0.025
* Anglers	(-0.049)		0.053
Restrictions:			
No dredging and trawling	0.111	***	0.027
No dredging, trawling, potting and gillnetting	0.136	***	0.026
No dredging, trawling, anchoring and mooring	0.085	***	0.029
Large/specimen fish	0.151	***	0.018
Seals	0.143	***	0.027
* Anglers	-0.166	***	0.051
Bird colony	0.105	***	0.026
Octopus	0.131	***	0.027
* Anglers	-0.102	**	0.050
Shipwreck	0.163	***	0.018
Rock formation	0.070	***	0.020
* Anglers	-0.094	**	0.042
Habitat with soft corals, sponges, and anemones	0.193	***	0.041
* Anglers	(-0.143)		0.095
Travel distance to the site (10 miles)	-0.011	***	0.001
Pseudo-R^2 (ρ^{2})	0.466		
Log likelihood	-6835		
Wald $\chi 2$	579.0	***	26 df
Number of respondents	1049		
Number of observations	4196		

***p<0.01 **p<0.05 *p<0.10; df: degrees of freedom.
Interactions are stated as contrasts.

3.4 Visitor numbers

Participants appeared to have no trouble identifying whether or not they visited sites. Out of a total of 18,300 screen views of individual pMPA sites in the respondents region of choice, on average 17% of the time respondents indicated to have visited the site over the past 12 months, 81% they had not, and in 2% of the cases they were unsure (counted as 'no' for subsequent analyses), while the maximum proportion of 'unsure' answers was 6.9%. For the cases where respondents indicated 'yes', mean individual visits across sites per person were 3.4 for divers and 7.6 for anglers; anglers far more often indicated frequencies in the 10s than divers. This is consistent with the picture established by our general descriptive questions (Section 3.1). Overall, those sites more popular with anglers also tended to be popular with divers and vice versa. As might be expected, the highest visitor numbers were in Southeast England, with the Southwest taking second place (Table 16). Mean site visits for England and Wales were on average 5-6 times higher than for Scottish sites.

In total, depending on the total population figure of divers, we estimated 1.2-2 million visits a year by divers to pMPAS in England, 462-772 thousand visits for Scotland and 128-213 thousand to the seven marine SACs in Wales. Anglers made an estimated 39-72 million visits in England, 1.2-2.1 million visits to Scottish pMPAs and 2.0-3.7 million visits to Welsh marine SACs. On average, this constitutes 12 visits per individual UK diver per annum to the pool of the sites considered in this survey, and 39 per angler.

We were unable to estimate visitor numbers for six sites for divers (Table 16). The omissions consisted of a number of offshore sites (NE of Haig Fras, South Rigg, Dogs Head) and a number of estuaries (Stour & Orwell, Fareham Creek, Orford Inshore). Hence it seems possible that visitor numbers for divers are indeed very low at these sites. For anglers English sites with zero visitor numbers were all offshore sites (Rock Unique, NE of Haig Fras, South of Celtic Deep, South Rigg, Dogs Head) plus the Isles of Scilly. However, a considerable number of Scottish sites were also omitted, again including offshore sites but also including East Caithness Cliffs, Fetlar to Haroldswick and the Monach Islands that are likely to have some visitors. These omissions are, like the Scilly Isles, most likely an artefact of the smaller group of anglers compared to divers within our sample.

3.5 Aggregated monetary values

Aggregated values for the travel cost and contingent valuation results per site and per country/region are given in Table 16, below. Headline figures are given in Table 1. UK maps of aggregate value are given in Figures 1-4, regional maps are given below in Figures 17-40.

3.5.1 Divers

For divers, the recreational value of English sites established through the TC method is worth 104-173 million pounds per annum, depending on visitor numbers. This can be split into 46-76 million for the 31 sites being considered for designation in 2013, and 58-97 million for those sites not being considered. This means that the mean value of the 31 sites being proposed for designation in 2013 (between 1.6-2.7 million) is considerably higher than that of the sites not being considerd in this tranche (0.7-1.1 million). This is a result of the slightly higher individual WTP for the 31 sites (£56 vs £49) and of the inclusion of a large number of highly popular sites in the Southwest. Overall, the Finding Sanctuary sites were generally highly valuable, the Irish Sea sites were less valuable to divers as a whole, and the ranking of sites on the East and Southeast coasts was mixed.

Management restrictions would improve the use value of the sites to divers. While dredging and trawling alone brings no benefit to divers, hypothetically banning potting and gillnetting at all sites would increase aggregate values by 8-14m, and banning anchoring and mooring would add 10-20 million to the English total.

For Scottish sites, mean annual TC individual WTP (£67) is considerably higher than for English sites. Aggregate WTP for all Scottish pMPAs is 33-56 million, 1.7-2.8 million per site on average. The total value would increase by 2-3 million if potting and gillnetting was prohibited and 3-5 million if anchoring and mooring was banned across sites.

Mean individual TC WTP was highest for Welsh sites at £78. The mean value per site to divers was almost the same as for the Scottish sites: 1.6-2.7 million. The aggregate annual value of the Welsh marine SACs was 11.3-18.8 million. Potting and gillnetting restrictions add 0.5-0.9 million, anchoring and mooring restrictions add 0.7-1.3 million.

In general, divers had a preference for rocky coastal sites, while estuaries and offshore sites were less valuable.

Despite the different valuation and aggregation methods, contingent valuation results for divers were correlated with the travel cost outcomes (rank correlation of lower bound aggregate value, no restrictions scenario: Spearman $\rho=0.49$, $p<0.001$). Mean individual one-off WTP per site (taking distance decay into account) was £5.81 for England, £6.56 for Scotland and £9.22 for Wales.

Indeed, for Wales, all seven sites were in the top third highest ranked across the UK in terms of their aggregate CVM values. This can be attributed to both the quality of the site, and their relative proximity to large populations of divers. The mean CVM value for the Welsh sites to divers was 1.4-2.3 million pounds and the aggregate 9.7-16.1 million. This increases by 1.2-2.1 million under a no dredging/trawling management regime. This would increase 0.3-0.5 million by banning potting and gillnetting and decrease by a similar amount by banning anchoring and mooring.

For Scotland, mean CVM values were 1.0-1.6 million and aggregate values 25-41 million, increasing by 3.3-5.5 million for no dredging/trawling, an additional 0.8-1.3 million for no potting/gillnetting and a decrease of 0.8-1.3 million for no anchoring/mooring.

For England, mean value per site is 0.9-1.5 million, with little difference between the site averages for the 31 sites being considered for designation in 2013 and those not being considered. Aggregate value is 102-167 million before taking restrictions into account; 26-43 million for the 31 sites and 76-127 million for the rest. The total would increase by 14-23 million with no dredging/trawling and further 3.7-5.5 million for no potting/gillnetting. It would decrease by 3.7-5.6 million if anchoring/mooring were banned across sites.

Under the contingent valuation model the Balanced seas sites (excluding estuarine areas) become relatively more important, as a result of the proximity of the high population densities of the Southeast. However, the variation of aggregate value per site as a whole is considerably lower compared to the travel cost results (which vary more strongly on the basis of visitor numbers).

3.5.2 Anglers

Individual travel cost WTP was lower for anglers than for divers and also showed a different geographic trend, with anglers willing to travel more for English sites (England: £39; Scotland: £28; Wales: £27).

Mean per site TC value for English sites was 15-27 million pounds with only little difference between the 31 sites being considered for designation in 2013 and those not being considered. Total current value per annum was 1.77-3.22 billion (31 sites: 0.50-0.90 bln; sites not being considered in 2013 tranche: 1.27-2.31 bln). Blanket restrictions on potting/gillnetting would add 187-340 million; banning dredging, trawling, anchoring or mooring would not add to recreational values. In terms of regions, the Southeast harbours the most valuable sites as a result of the highest visitor numbers and many Finding Sanctuary sites also rank within the top third. Irish Sea and Net Gain sites are more mixed.

There is no obvious preference for particular types of coastal sites, while offshore sites are mostly less popular.

Scottish sites have overall less recreational value than English sites to anglers (as a result of lower visitor numbers, and less recreational value per visitor). For Scotland mean TC recreational use value is 3.0-5.6 million per site per annum. Aggregate value is 37-61 million. Potting/gillnetting restrictions across sites would add 7-13 million.

The TC value of Welsh marine SACs is on average 8-15 million per site; hence Welsh sites fall between the Scottish and English sites in terms of their recreational use values to sea anglers. Aggregate value is 57-103 million per annum. No potting/gillnetting would add 6-10 million.

Again, we can see a clear correlation if we rank sites according to their travel cost against CVM aggregate values (lower bound aggregate value, no restrictions scenario: Spearman ρ=0.56, p<0.001).

The CVM results for anglers give an individual mean value per site of £4.89 for England and £4.77 for Scotland. As with the divers, individual values for Wales are higher with an estimated one-off WTP of £6.91.

All the Welsh sites were ranked in the top third of sites in terms of their value based on the CVM results. Mean CVM site value for anglers for Wales came to 7.6-13.8 million pounds and aggregate value was 56-97 million. No dredging/trawling measures would generate 4-13 million additional value, no potting and gillnetting would add a further 2-3 million. A blanket anchoring/mooring ban would reduce the value by the same amount.

For Scotland mean CVM site value was 5.3-9.5 million, aggregate value 105-191 million. No dredging/trawling added 15-27 million, no potting/gillnetting added a further 4-6 million, no anchoring/mooring would reduce the figure by 4-7 million. Anglers' most valuable Scottish sites were mostly on the west coast, and also the ones that tended to be scored high in the travel cost results. However, various sites that we could not assess using the travel cost method due to lack of data on visitor numbers, such as East Caithness Cliffs and Fetlar to Haroldswick, still had considerable values in the CVM outcomes (Table 16).

Finally, angler CVM results for England indicated a mean value of 5.4-9.8 million per site and an aggregate value of 0.63-1.14 bln. The majority of this value, 470-855 million, lay with the sites not being considered for designation in the 2013 tranche, with 159-289 million attributable to the 31 sites being considered. A dredging/trawling ban would increase the total by 89-162 million, a further increase could be achieved by a potting gillnetting ban, which would add 21-38 million. No anchoring/mooring would reduce aggregate value by 21-39 million. A blanket management scenario with a ban on dredging, trawling, potting and gillnetting, but allowing anchoring and mooring, would achieve maximum value to anglers: 0.74-1.34 bln.

Table 16 Mean individual WTP, estimated visitor numbers and aggregate monetary values with totals for rMCZs/rRAs in England, pMPAs in Scotland and marine SACs in Wales for divers and anglers. Colours indicate the upper (bright green), middle (pale green) and lower (yellow) third of of site rankings across UK sites.[28]

LB: lower bound UB: upper bound D: dredging T: trawling A: anchoring M: mooring P: potting G: gillnetting All figures in £1000s except indiv. WTP in £1, and where indicated m: £millions. - : no visitor estimate.		Visitor estimates		Travel cost											Contingent valuation								
				Mean indiv WTP	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*		*Mean indiv WTP*	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*	
		LB	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*
DIVERS																							
England: Sites nominated for designation in 2013																							
Balanced Seas																							
BS11.4	Folkestone Pomerania	16	26	95	1,502	2,503	1,502	2,503	1,569	2,615	1,598	2,663	8.09	1,213	2,022	1,373	2,289	1,411	2,352	1,335	2,225
BS13.2	Beachy Head West	21	35	73	1,546	2,577	1,546	2,577	1,636	2,727	1,675	2,792	8.32	1,248	2,080	1,412	2,354	1,451	2,419	1,373	2,288
BS16	Kingmere	17	29	25	426	710	426	710	499	832	531	885	4.69	703	1,171	803	1,338	827	1,378	779	1,298
BS2	Stour and Orwell Estuaries	-	-	112	-	-	-	-	-	-	-	-	7.54	1,130	1,884	1,281	2,134	1,316	2,194	1,244	2,074
BS25.1	Pagham Harbour	7	11	72	480	799	480	799	508	847	521	868	7.06	1,060	1,766	1,202	2,003	1,235	2,059	1,167	1,946
BS26	Hythe Bay	2	3	58	103	172	103	172	111	185	114	191	5.95	892	1,487	1,015	1,691	1,044	1,739	985	1,642
BS3	Blackwater, Crouch, Roach and Colne Estuaries	1	2	60	68	113	68	113	73	121	75	125	6.38	957	1,594	1,087	1,811	1,117	1,862	1,055	1,759
BS6	Medway Estuary	14	24	59	852	1,421	852	1,421	914	1,523	941	1,568	6.28	943	1,571	1,071	1,785	1,101	1,836	1,040	1,733
BS7	Thanet Coast	7	12	76	558	930	558	930	590	983	603	1,006	6.85	1,027	1,712	1,166	1,943	1,198	1,997	1,132	1,887
Finding Sanctuary																							
FS14	Poole Rocks	34	56	32	1,100	1,834	1,100	1,834	1,245	2,075	1,308	2,179	5.60	841	1,401	957	1,595	984	1,641	929	1,548
FS16	South Dorset	116	194	38	4,405	7,341	4,405	7,341	4,902	8,171	5,116	8,527	5.05	758	1,263	865	1,441	890	1,483	839	1,398
FS19	Chesil Beach and Stennis Ledges	61	102	58	3,586	5,977	3,586	5,977	3,849	6,415	3,962	6,603	7.86	1,178	1,964	1,334	2,224	1,371	2,286	1,297	2,161
FS22	Torbay	68	113	73	4,909	8,181	4,909	8,181	5,198	8,663	5,322	8,870	6.80	1,020	1,699	1,157	1,928	1,189	1,982	1,124	1,873
FS24	Skerries Bank and Surrounds	28	47	54	1,514	2,523	1,514	2,523	1,634	2,724	1,686	2,810	7.04	1,056	1,759	1,197	1,995	1,231	2,051	1,163	1,938
FS27	Tamar Estuary Sites	73	122	27	1,950	3,250	1,950	3,250	2,265	3,775	2,400	4,000	4.44	666	1,110	762	1,270	785	1,308	739	1,231
FS28	Whitsand and Looe Bay	123	205	81	9,954	16,589	9,954	16,589	10,481	17,468	10,708	17,846	7.96	1,194	1,991	1,352	2,254	1,390	2,316	1,314	2,191
FS29	Upper Fowey and Pont Pill	7	12	33	230	384	230	384	260	433	273	455	4.29	644	1,073	737	1,229	759	1,266	715	1,191
FS32	The Manacles	46	76	76	3,462	5,769	3,462	5,769	3,657	6,094	3,740	6,234	7.31	1,096	1,826	1,242	2,070	1,277	2,128	1,207	2,012
FS35	Isles of Scily	28	47	148	4,152	6,920	4,152	6,920	4,273	7,121	4,324	7,207	10.32	1,548	2,580	1,747	2,912	1,794	2,990	1,699	2,832
FS38	Padstow Bay and Surrounds	78	130	39	3,040	5,066	3,040	5,066	3,375	5,625	3,519	5,865	5.97	896	1,494	1,019	1,698	1,048	1,747	989	1,649
FS41	Lundy	17	29	66	1,153	1,921	1,153	1,921	1,227	2,045	1,259	2,098	7.67	1,151	1,918	1,304	2,173	1,340	2,233	1,267	2,111
FS7	East of Haig Fras	0	1	19	9	15	9	15	11	18	12	20	3.82	573	954	658	1,096	678	1,129	637	1,062
Irish Sea																							
ISCZ11	Cumbria Coast	1	2	28	27	44	27	44	31	51	33	54	4.44	665	1,109	761	1,269	784	1,307	738	1,230
ISCZ14	Hilbre Island Group	6	9	38	210	350	210	350	233	389	244	406	5.49	823	1,372	937	1,562	964	1,607	910	1,516
ISCZ5	North of Celtic Deep	1	1	28	19	32	19	32	22	37	23	39	4.22	633	1,055	725	1,208	747	1,244	703	1,171
ISCZ8	Fylde Offshore	5	8	42	210	350	210	350	232	386	241	401	5.90	885	1,476	1,007	1,678	1,036	1,726	978	1,630
Net Gain																							
NG13a	Aln Estuary	2	3	34	52	86	52	86	58	97	61	101	4.17	626	1,043	717	1,195	738	1,231	695	1,158
NG15	Rock Unique	1	2	27	32	54	32	54	37	62	40	66	4.07	611	1,018	700	1,167	722	1,203	679	1,132
Sites nominated for designation in 2013: TOTAL		**781**	**1,301**		**45.5m**	**75.9m**	**45.5m**	**75.9m**	**48.9m**	**81.5m**	**50.3m**	**83.9m**		**26.0m**	**43.4m**	**29.6m**	**49.3m**	**30.4m**	**50.7m**	**28.7m**	**47.9m**
Sites nominated designation in 2013: MEAN		**28**	**46**	**56**	**1,627**	**2,711**	**1,627**	**2,711**	**1,746**	**2,910**	**1,797**	**2,996**	**6.20**	**930**	**1,550**	**1,057**	**1,761**	**1,087**	**1,811**	**1,026**	**1,710**
England: Sites not nominated for designation in 2013																							
Balanced Seas																							
BS10	The Swale Estuary	5	9	78	419	699	419	699	442	737	452	753	7.65	1,147	1,912	1,299	2,166	1,335	2,226	1,263	2,105
BS11.1	Dover to Deal	19	31	68	1,280	2,133	1,280	2,133	1,360	2,267	1,394	2,324	7.62	1,142	1,904	1,294	2,157	1,330	2,217	1,258	2,096
BS11.2	Dover to Folkestone	37	62	83	3,111	5,184	3,111	5,184	3,270	5,451	3,339	5,565	8.03	1,204	2,007	1,363	2,272	1,401	2,335	1,325	2,208

[28] Four Scottish search areas that were included in the survey and our original analysis but that will not be put forward for consultation at least initially have been moved to Annex 1. Their values are not included in aggregate totals.

LB: lower bound UB: upper bound D: dredging T: trawling A: anchoring M: mooring P: potting G: gillnetting All figures in £1000s except indiv. WTP in £1, and where indicated m: £millions. - : no visitor estimate.		Visitor estimates		Travel cost											Contingent valuation									
				Mean indiv WTP	No restrictions		No DT		No DTPG		No DTAM		Mean indiv WTP	No restrictions		No DT		No DTPG		No DTAM	
		LB	UB		LB	UB	LB	UB	LB	UB	LB	UB		LB	UB	LB	UB	LB	UB	LB	UB
BS13.1	Beachy Head East (Roral Sovereign Shoals)	17	28	76	1,264	2,107	1,264	2,107	1,335	2,226	1,366	2,277	8.20	1,230	2,050	1,392	2,320	1,430	2,384	1,353	2,255
BS14	Offshore Brighton	26	44	38	990	1,651	990	1,651	1,102	1,837	1,151	1,918	4.33	650	1,083	744	1,239	766	1,276	721	1,202
BS17	Offshore Overfalls	8	14	44	358	596	358	596	393	655	408	680	5.66	849	1,416	967	1,611	995	1,658	939	1,564
BS19	Norris to Ryde	4	6	67	238	396	238	396	253	422	260	433	6.81	1,022	1,704	1,160	1,933	1,192	1,987	1,127	1,878
BS20	The Needles	15	25	72	1,074	1,790	1,074	1,790	1,138	1,897	1,166	1,943	7.34	1,101	1,836	1,248	2,081	1,283	2,138	1,213	2,022
BS21	Wight-Barfleur Extension	2	4	57	124	207	124	207	133	222	137	229	5.91	887	1,478	1,008	1,681	1,037	1,729	979	1,632
BS22	Bembridge	10	17	90	909	1,515	909	1,515	952	1,587	971	1,618	8.61	1,292	2,153	1,461	2,435	1,501	2,502	1,420	2,367
BS23	Yarmouth to Cowes	5	9	105	560	934	560	934	583	972	593	988	8.31	1,246	2,077	1,411	2,351	1,449	2,416	1,371	2,285
BS24.2	Fareham Creek	-	-	50	-	-	-	-	-	-	-	-	6.20	930	1,550	1,057	1,761	1,087	1,811	1,026	1,710
BS25.2	Selsey Bill and the Hounds	28	46	57	1,599	2,665	1,599	2,665	1,718	2,864	1,770	2,950	7.31	1,096	1,827	1,242	2,071	1,277	2,128	1,207	2,012
BS28	Utopia	9	14	72	620	1,034	620	1,034	657	1,095	673	1,122	8.65	1,298	2,163	1,468	2,447	1,508	2,514	1,427	2,378
BS29	East Meridian	14	23	57	772	1,286	772	1,286	830	1,383	855	1,425	5.74	860	1,434	979	1,632	1,007	1,678	950	1,584
BS30	Kentish Knock East	0	1	49	17	29	17	29	19	31	19	32	5.68	852	1,420	969	1,616	997	1,662	941	1,568
BS31	Inner Bank	3	5	50	150	250	150	250	163	271	168	280	5.72	858	1,429	976	1,627	1,004	1,673	947	1,579
BS5	Thames Estuary	4	6	53	191	318	191	318	206	344	213	355	6.70	1,005	1,676	1,141	1,902	1,173	1,955	1,108	1,847
BS8	Goodwin Sands	1	2	56	75	126	75	126	81	135	84	139	5.99	899	1,498	1,022	1,703	1,051	1,752	992	1,654
BS9	Offshore Foreland	7	12	19	141	234	141	234	172	286	185	308	4.26	639	1,065	731	1,219	753	1,256	709	1,182
BSra18	Blakeney Seagrass	9	16	57	540	900	540	900	581	968	598	997	6.07	910	1,517	1,035	1,725	1,064	1,774	1,005	1,675
Finding Sanctuary																					
FS10	Celtic Deep	4	7	19	83	139	83	139	102	170	110	184	3.95	592	987	680	1,133	700	1,167	659	1,098
FS11	East of Celtic Deep	16	27	19	304	507	304	507	373	622	403	672	4.10	615	1,025	705	1,175	726	1,210	683	1,139
FS12	Western Channel	6	10	19	114	191	114	191	140	234	151	252	3.92	588	979	674	1,124	695	1,158	653	1,089
FS13	South of the Isles of Scilly	22	37	19	415	691	415	691	508	847	549	914	3.71	557	928	640	1,066	659	1,099	620	1,033
FS15	Studland Bay	44	74	61	2,694	4,490	2,694	4,490	2,884	4,807	2,966	4,943	6.52	978	1,631	1,111	1,852	1,142	1,904	1,079	1,798
FS17	Broad Beach to Kimmeridge Bay	65	108	25	1,606	2,676	1,606	2,676	1,883	3,138	2,001	3,336	4.84	726	1,209	828	1,381	853	1,421	804	1,340
FS18	South of Portland	53	88	19	1,004	1,674	1,004	1,674	1,232	2,053	1,329	2,215	4.35	652	1,087	746	1,244	768	1,281	723	1,206
FS20	Axe Estuary	8	14	19	157	262	157	262	192	319	207	344	4.38	657	1,095	752	1,253	774	1,291	729	1,215
FS21	Otter Estuary	4	6	20	72	121	72	121	88	147	95	158	4.36	655	1,091	749	1,248	771	1,286	726	1,210
FS23	Dart Estuary	16	26	53	820	1,367	820	1,367	887	1,478	916	1,526	5.43	815	1,358	928	1,547	955	1,592	901	1,502
FS25	Devon Avon Estuary	27	46	20	543	905	543	905	660	1,101	711	1,185	4.22	633	1,055	725	1,209	747	1,245	703	1,172
FS26	Erme Estuary	27	45	46	1,234	2,056	1,234	2,056	1,349	2,248	1,398	2,330	5.11	766	1,276	873	1,456	899	1,498	847	1,412
FS30	South-East of Falmouth	39	65	19	742	1,237	742	1,237	910	1,516	982	1,637	3.98	597	996	685	1,142	706	1,177	664	1,107
FS31	South of Falmouth	57	95	19	1,073	1,789	1,073	1,789	1,316	2,194	1,421	2,368	3.93	589	982	676	1,127	697	1,161	655	1,092
FS33	Mounts Bay	16	27	74	1,186	1,977	1,186	1,977	1,255	2,091	1,284	2,140	6.87	1,030	1,717	1,169	1,948	1,201	2,002	1,135	1,892
FS34	Lands' End	15	26	53	817	1,361	817	1,361	882	1,470	910	1,517	6.34	951	1,585	1,080	1,800	1,111	1,851	1,049	1,748
FS36	Cape Bank	1	2	43	61	102	61	102	67	112	70	116	4.98	747	1,246	853	1,421	878	1,463	827	1,379
FS37	Newquay and The Gannel	12	20	47	573	955	573	955	625	1,042	648	1,080	6.39	959	1,598	1,089	1,815	1,120	1,866	1,058	1,763
FS39	Camel Estuary	21	35	33	691	1,152	691	1,152	780	1,301	819	1,364	4.29	644	1,073	737	1,229	759	1,265	715	1,191
FS40	Hartland Point to Tintagel	14	24	92	1,299	2,166	1,299	2,166	1,360	2,267	1,386	2,311	9.80	1,471	2,451	1,661	2,768	1,706	2,843	1,615	2,692
FS42	Taw Torridge Estuary	1	2	38	51	85	51	85	57	95	59	99	5.28	792	1,321	903	1,505	929	1,549	876	1,461
FS43	Bideford to Foreland Point	15	24	86	1,255	2,092	1,255	2,092	1,318	2,197	1,345	2,242	8.95	1,342	2,236	1,517	2,529	1,559	2,598	1,475	2,458
FS44	Morte Platform	2	4	43	101	168	101	168	111	184	115	192	5.47	821	1,368	935	1,558	962	1,603	907	1,512
FS45	North of Lundy (Atlantic Array area)	7	12	46	320	534	320	534	350	584	363	605	6.05	907	1,512	1,032	1,719	1,061	1,768	1,002	1,669
FS8	North-East of Haig Fras	-	-	19	-	-	-	-	-	-	-	-	3.80	570	950	654	1,091	674	1,124	634	1,057
FS9	South of Celtic Deep	1	2	19	17	29	17	29	21	35	23	38	3.90	584	974	671	1,118	691	1,152	650	1,083
Fsra	The Fleet	26	43	71	1,828	3,047	1,828	3,047	1,939	3,231	1,986	3,311	6.06	909	1,515	1,033	1,722	1,063	1,771	1,003	1,672
FSra10	The Fal	64	106	82	5,206	8,676	5,206	8,676	5,478	9,130	5,595	9,325	5.73	860	1,433	978	1,630	1,006	1,677	950	1,583

LB: lower bound UB: upper bound D: dredging T: trawling A: anchoring M: mooring P: potting G: gillnetting All figures in £1000s except indiv. WTP in £1, and where indicated m: £millions. - : no visitor estimate.		Visitor estimates		Travel cost									Contingent valuation								
				Mean indiv WTP	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*		*Mean indiv WTP*	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*	
		LB	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*
FSra11	Swanpool	11	18	50	536	893	536	893	582	970	602	1,003	5.51	827	1,379	942	1,570	969	1,615	914	1,524
FSra5	South-east of Portland	77	128	49	3,793	6,321	3,793	6,321	4,122	6,871	4,264	7,107	5.78	867	1,446	987	1,645	1,015	1,692	958	1,597
FSra7	Lyme Bay	51	85	61	3,110	5,183	3,110	5,183	3,328	5,547	3,422	5,704	6.07	911	1,518	1,036	1,726	1,065	1,775	1,006	1,676
FSra9	Mouth of the Yealm	39	65	71	2,769	4,615	2,769	4,615	2,937	4,895	3,009	5,015	5.72	858	1,429	976	1,627	1,004	1,673	948	1,579
Irish Sea																					
ISCZ1	Mud Hole	0	0	28	6	10	6	10	7	12	8	13	4.33	649	1,082	743	1,238	765	1,275	720	1,201
ISCZ10	Allonby Bay	0	0	37	9	14	9	14	10	16	10	17	4.26	639	1,065	732	1,219	754	1,256	709	1,182
ISCZ13	Sefton Coast	0	0	39	9	15	9	15	10	16	10	17	5.56	834	1,389	949	1,582	976	1,627	921	1,535
ISCZ15	Solway Firth	2	4	46	107	178	107	178	117	194	121	201	5.99	898	1,497	1,022	1,703	1,051	1,751	992	1,653
ISCZ16	St Catherine's Point	0	0	46	11	18	11	18	12	20	12	20	-	-	-	-	-	-	-	-	-
ISCZ17	Ribble	1	1	39	27	44	27	44	30	49	31	51	5.58	836	1,394	952	1,587	980	1,633	924	1,540
ISCZ2	West of Walney	1	2	55	75	125	75	125	81	135	83	139	6.20	929	1,549	1,056	1,760	1,086	1,810	1,026	1,709
ISCZ3	North St George's Channel	3	6	67	228	380	228	380	243	405	249	415	4.91	736	1,227	841	1,401	865	1,442	815	1,359
ISCZ4	Mid St George's Channel	3	6	27	89	149	89	149	104	173	110	183	4.30	645	1,075	738	1,231	761	1,268	716	1,193
ISCZ6	South Rigg	-	-	28	-	-	-	-	-	-	-	-	4.17	626	1,043	717	1,195	739	1,231	695	1,159
ISCZ7	Slieve Na Griddle	0	1	19	9	15	9	15	11	19	12	20	4.15	623	1,038	714	1,190	735	1,226	692	1,153
ISCZRAk	Tarn Point	0	0	75	18	29	18	29	19	31	19	32	6.00	900	1,499	1,023	1,705	1,052	1,754	993	1,655
ISCZRAt	Cunning Point	0	0	57	13	22	13	22	14	24	15	25	5.91	886	1,477	1,008	1,680	1,036	1,727	978	1,631
ISCZRAw	Barrow South	-	-	70	-	-	-	-	-	-	-	-	6.07	910	1,517	1,035	1,724	1,064	1,773	1,005	1,674
ISCZRAy	Barrow North	-	-	49	-	-	-	-	-	-	-	-	6.05	908	1,513	1,032	1,720	1,062	1,769	1,002	1,670
Net Gain																					
NG01c	Alde Ore Estuary	-	-	76	-	-	-	-	-	-	-	-	7.47	1,120	1,867	1,270	2,116	1,305	2,175	1,234	2,056
NG10	Castle Ground	7	12	52	372	620	372	620	403	671	416	693	6.36	955	1,591	1,084	1,807	1,115	1,858	1,053	1,755
NG11	Runswick Bay	4	6	45	170	284	170	284	186	311	193	322	6.03	905	1,508	1,029	1,715	1,058	1,764	999	1,665
NG12	Compass Rose	3	5	19	55	92	55	92	68	113	73	122	4.32	648	1,079	741	1,236	764	1,273	719	1,198
NG13	Coquet to St Mary's	21	36	79	1,695	2,825	1,695	2,825	1,787	2,978	1,826	3,043	9.35	1,402	2,336	1,584	2,640	1,627	2,712	1,540	2,567
NG14	Farnes East	37	62	24	890	1,484	890	1,484	1,049	1,749	1,118	1,863	4.34	651	1,086	745	1,242	768	1,280	723	1,205
NG1b	Orford Inshore	-	-	46	-	-	-	-	-	-	-	-	6.04	906	1,510	1,030	1,716	1,059	1,765	1,000	1,666
NG2	Cromer Shoal Chalk Beds	28	46	57	1,587	2,645	1,587	2,645	1,707	2,844	1,758	2,930	7.20	1,080	1,800	1,225	2,041	1,259	2,098	1,190	1,983
NG4	Wash Approach	2	3	53	80	134	80	134	87	145	90	150	6.20	930	1,550	1,057	1,761	1,087	1,811	1,026	1,710
NG5	Lincs Belt	4	7	38	151	252	151	252	168	280	175	292	5.47	821	1,368	935	1,558	962	1,603	907	1,512
NG6	Silver Pit	2	3	27	48	80	48	80	56	93	59	99	4.43	664	1,107	759	1,266	782	1,304	736	1,227
NG8	Holderness Inshore	10	17	57	583	972	583	972	627	1,046	646	1,077	6.56	984	1,639	1,117	1,861	1,148	1,914	1,085	1,808
NG9	Holderness Offshore	7	12	46	321	536	321	536	352	586	365	608	6.21	931	1,552	1,058	1,764	1,088	1,814	1,028	1,713
NGra11	Berwick Coast	30	51	57	1,729	2,882	1,729	2,882	1,859	3,099	1,915	3,192	5.62	844	1,406	960	1,601	988	1,647	932	1,554
NGra2a	Seahorse Lagoon and Arnold's Marsh	3	6	50	168	280	168	280	182	304	188	314	6.09	913	1,522	1,038	1,730	1,068	1,779	1,008	1,680
NGra3	Glaven Reedbed	2	3	49	83	138	83	138	90	150	93	155	6.06	908	1,514	1,033	1,721	1,062	1,770	1,003	1,671
NGra4	Blakeney Marsh	3	6	49	164	273	164	273	178	297	184	307	6.07	910	1,517	1,035	1,724	1,064	1,773	1,005	1,674
NGra5	Lune and Wyre	-	-	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NGra6	Dogs Head Sandbanks	-	-	75	-	-	-	-	-	-	-	-	5.95	892	1,487	1,014	1,691	1,043	1,739	985	1,641
NGra7	Seahenge Peat and Clay	1	1	49	28	47	28	47	31	52	32	53	6.15	923	1,539	1,049	1,749	1,079	1,798	1,019	1,698
NGra9	Flamborough Head No Take Zone	12	21	49	612	1,020	612	1,020	665	1,108	688	1,146	6.04	906	1,511	1,030	1,717	1,060	1,766	1,001	1,668
Sites not nominated for designation in 2013: TOTAL		**1.2m**	**2.0m**		**58.2m**	**97.1m**	**58.2m**	**97.1m**	**63.3m**	**105.5m**	**65.4m**	**109.1m**		**75.9m**	**126.5m**	**86.3**	**143.9m**	**88.8m**	**148.0m**	**83.8m**	**139.7m**
Sites not nominated for designation in 2013: MEAN		**13**	**22**	**49.34**	**654**	**1,091**	**654**	**1,091**	**711**	**1,185**	**735**	**1,225**	**5.69**	**853**	**1,421**	**970**	**1,617**	**998**	**1,663**	**942**	**1,570**
England: TOTAL		**2.0m**	**3.3m**		**103.8m**	**173.0m**	**103.8m**	**173.0m**	**112.2m**	**186.9m**	**115.8m**	**192.9m**		**101.9m**	**169.9m**	**115.9m**	**193.2m**	**119.2m**	**198.7m**	**112.6m**	**187.6m**
England: MEAN		**17**	**28**	**50.95**	**887**	**1,479**	**887**	**1,479**	**959**	**1,598**	**989**	**1,649**	**5.81**	**871**	**1,452**	**991**	**1,652**	**1,019**	**1,699**	**962**	**1,603**

LB: lower bound UB: upper bound D: dredging T: trawling A: anchoring M: mooring P: potting G: gillnetting All figures in £1000s except indiv. WTP in £1, and where indicated m: £millions. - : no visitor estimate.		Visitor estimates		Travel cost											Contingent valuation										
				Mean indiv WTP	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*		*Mean indiv WTP*	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*	
		LB	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*
Scotland																							
ARR	South Arran	5	8	79	375	624	375	624	395	658	404	673	8.75	1,312	2,187	1,484	2,473	1,524	2,540	1,442	2,404
CSS	Clyde Sea sill	15	26	87	1,335	2,224	1,335	2,224	1,401	2,335	1,429	2,382	8.73	1,310	2,183	1,482	2,469	1,522	2,537	1,440	2,400
DLA	Lochs Duich, Long and Alsh	46	76	81	3,687	6,144	3,687	6,144	3,882	6,470	3,966	6,610	7.88	1,183	1,971	1,339	2,232	1,376	2,293	1,301	2,169
ECC	East Caithness Cliffs SPA	5	8	66	325	542	325	542	346	577	356	593	6.51	977	1,628	1,109	1,849	1,141	1,901	1,077	1,796
FOF	Firth of Forth Banks Complex	31	52	50	1,548	2,580	1,548	2,580	1,681	2,802	1,738	2,897	5.38	807	1,345	919	1,532	946	1,576	892	1,487
FTH	Fetlar to Haroldswick	2	4	79	168	280	168	280	177	295	181	301	6.18	928	1,546	1,054	1,757	1,084	1,807	1,024	1,706
LCR	Loch Creran	62	103	56	3,471	5,785	3,471	5,785	3,735	6,226	3,849	6,415	5.82	873	1,455	993	1,655	1,022	1,703	964	1,607
LFG	Upper Loch Fyne and Loch Goil	123	205	66	8,062	13,436	8,062	13,436	8,587	14,312	8,813	14,688	7.36	1,104	1,841	1,252	2,086	1,287	2,144	1,216	2,027
LSU	Loch Sunart	16	26	65	1,024	1,706	1,024	1,706	1,091	1,818	1,120	1,866	6.95	1,042	1,737	1,183	1,971	1,216	2,026	1,149	1,915
LSW	Loch Sween	7	12	65	473	789	473	789	504	840	518	863	7.24	1,086	1,811	1,232	2,053	1,266	2,110	1,197	1,994
MOI	Monach Islands	1	2	56	60	101	60	101	65	108	67	112	5.15	772	1,287	880	1,467	906	1,510	854	1,424
MTB	Mousa to Boddam	2	4	72	156	260	156	260	166	276	170	283	5.78	867	1,444	986	1,644	1,014	1,691	957	1,596
NOH	Noss Head	4	7	50	212	353	212	353	230	384	238	397	4.62	693	1,155	792	1,320	815	1,359	768	1,280
NWO	North-west Orkney	8	14	50	417	695	417	695	453	754	468	780	4.22	633	1,056	725	1,209	747	1,245	703	1,172
NWS	North-west sea lochs and Summer Isles	43	71	82	3,494	5,824	3,494	5,824	3,678	6,129	3,756	6,260	7.69	1,154	1,923	1,307	2,178	1,343	2,239	1,270	2,117
PWY	Papa Westray	1	2	57	77	128	77	128	83	138	85	142	4.87	730	1,216	833	1,389	858	1,429	808	1,347
SJU	Loch Sunart to the Sound of Jura	79	132	97	7,695	12,825	7,695	12,825	8,033	13,389	8,179	13,632	10.14	1,521	2,535	1,717	2,862	1,764	2,940	1,670	2,783
SMI	Small Isles	8	14	85	716	1,193	716	1,193	752	1,253	768	1,279	8.27	1,241	2,069	1,405	2,341	1,443	2,405	1,365	2,275
TBB	Turbot Bank	2	3	50	93	155	93	155	101	168	104	174	4.84	726	1,210	829	1,382	854	1,423	804	1,341
WYR	Wyre and Rousay Sounds	2	3	56	106	176	106	176	114	190	117	195	4.92	738	1,231	843	1,405	867	1,446	818	1,363
Scotland: TOTAL		**462**	**772**		**33.5m**	**55.8m**	**33.5m**	**55.8m**	**35.5m**	**59.1m**	**36.3m**	**60.5m**		**19.7m**	**32.8m**	**22.4m**	**37.3m**	**23.0m**	**38.3m**	**21.7m**	**36.2m**
Scotland: MEAN		**23**	**39**	**67.45**	**1,675**	**2,791**	**1,675**	**2,791**	**1,774**	**2,956**	**1,816**	**3,027**	**6.57**	**985**	**1,642**	**1,118**	**1,864**	**1,150**	**1,916**	**1,086**	**1,810**
Wales																					
W1	Cardigan Bay / Bae Ceredigion	17	29	71	1,223	2,038	1,223	2,038	1,297	2,161	1,329	2,215	8.06	1,208	2,014	1,368	2,280	1,406	2,343	1,329	2,216
W2	Pembrokeshire Marine / Sir Benfro Forol	41	69	106	4,380	7,300	4,380	7,300	4,557	7,594	4,633	7,721	11.48	1,722	2,870	1,942	3,237	1,994	3,323	1,889	3,148
W3	Pen Llyn ar Sarnau	23	38	95	2,151	3,585	2,151	3,585	2,247	3,746	2,289	3,815	11.53	1,730	2,883	1,950	3,250	2,002	3,337	1,897	3,162
W4	Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd	10	17	70	695	1,158	695	1,158	737	1,229	756	1,259	8.00	1,200	2,000	1,358	2,264	1,396	2,326	1,320	2,200
W5	Dee Estuary / Aber Dyfrdwy (Wales)	1	2	57	52	86	52	86	56	93	57	96	7.12	1,068	1,779	1,211	2,018	1,244	2,074	1,176	1,960
W6	Severn Estuary	2	3	65	120	201	120	201	128	214	132	220	8.61	1,291	2,152	1,460	2,434	1,500	2,501	1,420	2,366
W7	Conwy Bay	34	56	79	2,669	4,448	2,669	4,448	2,814	4,689	2,876	4,793	9.73	1,459	2,432	1,648	2,747	1,693	2,821	1,602	2,671
Wales: TOTAL		**128**	**213**		**11.3m**	**18.8m**	**11.3m**	**18.8m**	**11.8m**	**19.7m**	**12.0m**	**20.1m**		**9.7m**	**16.1m**	**10.9m**	**18.2m**	**11.2m**	**18.7m**	**10.6m**	**17.7m**
Wales: MEAN		**18**	**30**	**77.56**	**1,613**	**2,688**	**1,613**	**2,688**	**1,691**	**2,818**	**1,724**	**2,874**	**9.22**	**1,382**	**2,304**	**1,562**	**2,604**	**1,605**	**2,675**	**1,519**	**2,532**
ANGLERS																					
England: Sites nominated designation in 2013																					
Balanced Seas																					
BS11.4	Folkestone Pomerania	486	883	157	76,402	138,913	76,402	138,913	78,711	143,111	76,402	138,913	5.02	5,526	10,047	6,304	11,462	6,488	11,797	6,116	11,121
BS13.2	Beachy Head West	761	1,383	40	30,371	55,220	30,371	55,220	33,988	61,797	30,371	55,220	7.41	8,156	14,830	9,243	16,806	9,501	17,274	8,981	16,330
BS16	Kingmere	349	635	11	3,771	6,857	3,771	6,857	5,432	9,876	3,771	6,857	3.84	4,225	7,682	4,850	8,819	4,998	9,088	4,700	8,545
BS2	Stour and Orwell Estuaries	317	576	120	38,162	69,385	38,162	69,385	39,669	72,125	38,162	69,385	6.00	6,598	11,996	7,502	13,639	7,716	14,028	7,284	13,243
BS25.1	Pagham Harbour	496	902	39	19,304	35,099	19,304	35,099	21,663	39,388	19,304	35,099	6.31	6,937	12,612	7,881	14,328	8,104	14,734	7,653	13,915
BS26	Hythe Bay	297	540	26	7,695	13,991	7,695	13,991	9,108	16,560	7,695	13,991	5.23	5,749	10,452	6,553	11,915	6,743	12,261	6,359	11,563
BS3	Blackwater, Crouch, Roach and Colne Estuaries	392	712	15	5,953	10,824	5,953	10,824	7,815	14,209	5,953	10,824	6.31	6,937	12,612	7,881	14,329	8,104	14,735	7,653	13,915

LB: lower bound UB: upper bound D: dredging T: trawling A: anchoring M: mooring P: potting G: gillnetting All figures in £1000s except indiv. WTP in £1, and where indicated m: £millions. - : no visitor estimate.		Visitor estimates		Travel cost											Contingent valuation								
				Mean indiv WTP	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*		*Mean indiv WTP*	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*	
		LB	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*
BS6	Medway Estuary	303	552	15	4,596	8,356	4,596	8,356	6,039	10,979	4,596	8,356	6.13	6,741	12,257	7,662	13,931	7,880	14,327	7,440	13,528
BS7	Thanet Coast	742	1,348	78	57,835	105,155	57,835	105,155	61,362	111,567	57,835	105,155	6.00	6,595	11,991	7,499	13,635	7,713	14,024	7,281	13,239
Finding Sanctuary																					
FS14	Poole Rocks	744	1,353	35	26,207	47,650	26,207	47,650	29,747	54,085	26,207	47,650	4.13	4,545	8,263	5,208	9,469	5,365	9,754	5,048	9,178
FS16	South Dorset	926	1,684	19	17,231	31,329	17,231	31,329	21,636	39,338	17,231	31,329	4.18	4,601	8,366	5,271	9,583	5,429	9,871	5,110	9,290
FS19	Chesil Beach and Stennis Ledges	1,482	2,695	39	58,110	105,655	58,110	105,655	65,158	118,469	58,110	105,655	6.23	6,857	12,467	7,791	14,166	8,012	14,568	7,566	13,756
FS22	Torbay	561	1,021	97	54,302	98,730	54,302	98,730	56,971	103,584	54,302	98,730	6.12	6,729	12,234	7,648	13,906	7,866	14,301	7,427	13,503
FS24	Skerries Bank and Surrounds	540	982	39	20,997	38,176	20,997	38,176	23,566	42,847	20,997	38,176	6.23	6,853	12,460	7,787	14,158	8,008	14,560	7,562	13,749
FS27	Tamar Estuary Sites	479	871	11	5,504	10,008	5,504	10,008	7,783	14,150	5,504	10,008	4.44	4,888	8,887	5,591	10,165	5,757	10,468	5,421	9,857
FS28	Whitsand and Looe Bay	386	702	62	24,100	43,819	24,100	43,819	25,936	47,156	24,100	43,819	7.18	7,897	14,358	8,953	16,279	9,203	16,733	8,699	15,816
FS29	Upper Fowey and Pont Pill	93	168	12	1,069	1,943	1,069	1,943	1,509	2,744	1,069	1,943	4.29	4,724	8,590	5,409	9,834	5,570	10,128	5,244	9,534
FS32	The Manacles	386	702	56	21,471	39,038	21,471	39,038	23,306	42,375	21,471	39,038	5.79	6,372	11,585	7,249	13,180	7,457	13,558	7,038	12,796
FS35	Isles of Scily	-	-	114	-	-	-	-	-	-	-	-	7.05	7,753	14,096	8,792	15,986	9,038	16,433	8,542	15,531
FS38	Padstow Bay and Surrounds	299	543	33	9,858	17,923	9,858	17,923	11,279	20,507	9,858	17,923	5.23	5,758	10,468	6,563	11,933	6,754	12,279	6,369	11,580
FS41	Lundy	86	156	14	1,169	2,125	1,169	2,125	1,577	2,867	1,169	2,125	5.32	5,855	10,646	6,672	12,131	6,865	12,482	6,475	11,773
FS7	East of Haig Fras	77	140	9	732	1,330	732	1,330	1,099	1,998	732	1,330	3.28	3,613	6,570	4,167	7,576	4,298	7,814	4,034	7,334
Irish Sea																					
ISCZ11	Cumbria Coast	210	382	11	2,404	4,371	2,404	4,371	3,403	6,187	2,404	4,371	3.55	3,900	7,091	4,487	8,158	4,626	8,411	4,346	7,901
ISCZ14	Hilbre Island Group	120	218	20	2,381	4,329	2,381	4,329	2,952	5,367	2,381	4,329	4.51	4,961	9,020	5,673	10,314	5,841	10,621	5,501	10,003
ISCZ5	North of Celtic Deep	-	-	30	-	-	-	-	-	-	-	-	3.55	3,909	7,107	4,497	8,176	4,636	8,429	4,355	7,918
ISCZ8	Fylde Offshore	58	106	49	2,856	5,193	2,856	5,193	3,133	5,696	2,856	5,193	4.55	5,008	9,105	5,725	10,409	5,895	10,718	5,552	10,095
Net Gain																					
NG13a	Aln Estuary	186	338	31	5,782	10,513	5,782	10,513	6,666	12,119	5,782	10,513	3.25	3,580	6,508	4,129	7,508	4,259	7,744	3,997	7,267
NG15	Rock Unique	-	-	29	-	-	-	-	-	-	-	-	3.17	3,486	6,338	4,024	7,317	4,152	7,548	3,894	7,081
Sites nominated for designation in 2013: TOTAL		**10.7m**	**19.6m**		**498.3m**	**905.9m**	**498.3m**	**905.9m**	**549.5m**	**999.1m**	**498.3m**	**905.9m**		**158.7m**	**288.6m**	**181.0m**	**329.1m**	**186.3m**	**338.7m**	**175.6m**	**319.4m**
Sites nominated for designation in 2013: MEAN		**385**	**700**	**43.27**	**17,795**	**32,355**	**17,795**	**32,355**	**19,625**	**35,682**	**17,795**	**32,355**	**5.15**	**5,670**	**10,308**	**6,465**	**11,754**	**6,653**	**12,096**	**6,273**	**11,406**
England: Sites not nominated for designation in 2013:																					
Balanced Seas																					
BS10	The Swale Estuary	380	692	102	38,656	70,283	38,656	70,283	40,464	73,572	38,656	70,283	7.46	8,208	14,924	9,302	16,912	9,560	17,382	9,038	16,433
BS11.1	Dover to Deal	971	1,766	82	79,525	144,591	79,525	144,591	84,143	152,987	79,525	144,591	5.90	6,494	11,808	7,386	13,430	7,597	13,813	7,171	13,039
BS11.2	Dover to Folkestone	597	1,086	102	60,871	110,674	60,871	110,674	63,710	115,836	60,871	110,674	7.08	7,789	14,162	8,833	16,060	9,080	16,509	8,582	15,603
BS13.1	Beachy Head East (Roral Sovereign Shoals)	392	712	82	32,016	58,212	32,016	58,212	33,878	61,597	32,016	58,212	7.30	8,026	14,592	9,098	16,541	9,351	17,002	8,839	16,071
BS14	Offshore Brighton	582	1,058	72	41,937	76,249	41,937	76,249	44,705	81,282	41,937	76,249	3.78	4,161	7,566	4,779	8,689	4,925	8,955	4,630	8,418
BS17	Offshore Overfalls	546	993	19	10,272	18,677	10,272	18,677	12,870	23,400	10,272	18,677	4.17	4,591	8,347	5,259	9,563	5,417	9,850	5,098	9,270
BS19	Norris to Ryde	728	1,324	65	47,639	86,616	47,639	86,616	51,102	92,913	47,639	86,616	6.79	7,474	13,589	8,481	15,420	8,719	15,853	8,238	14,979
BS20	The Needles	815	1,482	66	53,474	97,225	53,474	97,225	57,349	104,271	53,474	97,225	6.59	7,249	13,180	8,230	14,963	8,462	15,385	7,993	14,534
BS21	Wight-Barfleur Extension	112	203	39	4,312	7,840	4,312	7,840	4,844	8,808	4,312	7,840	5.32	5,848	10,632	6,664	12,116	6,857	12,467	6,467	11,758
BS22	Bembridge	778	1,414	90	69,735	126,791	69,735	126,791	73,434	133,517	69,735	126,791	7.73	8,506	15,466	9,634	17,517	9,901	18,002	9,363	17,023
BS23	Yarmouth to Cowes	615	1,119	104	64,090	116,527	64,090	116,527	67,015	121,846	64,090	116,527	7.46	8,211	14,929	9,304	16,917	9,563	17,388	9,041	16,438
BS24.2	Fareham Creek	496	902	20	10,022	18,221	10,022	18,221	12,381	22,511	10,022	18,221	5.52	6,077	11,049	6,920	12,582	7,120	12,945	6,717	12,213
BS25.2	Selsey Bill and the Hounds	1,275	2,317	43	55,314	100,570	55,314	100,570	61,374	111,589	55,314	100,570	6.53	7,186	13,065	8,159	14,835	8,389	15,253	7,925	14,408
BS28	Utopia	519	943	53	27,382	49,785	27,382	49,785	29,848	54,269	27,382	49,785	6.23	6,858	12,468	7,792	14,168	8,013	14,570	7,567	13,758
BS29	East Meridian	194	354	58	11,296	20,539	11,296	20,539	12,221	22,220	11,296	20,539	4.81	5,293	9,624	6,044	10,990	6,222	11,313	5,863	10,661
BS30	Kentish Knock East	285	519	19	5,374	9,772	5,374	9,772	6,731	12,238	5,374	9,772	4.64	5,099	9,271	5,827	10,595	6,000	10,908	5,652	10,276
BS31	Inner Bank	186	338	20	3,682	6,695	3,682	6,695	4,567	8,303	3,682	6,695	4.76	5,241	9,529	5,986	10,883	6,162	11,203	5,806	10,557

LB: lower bound UB: upper bound D: dredging T: trawling A: anchoring M: mooring P: potting G: gillnetting All figures in £1000s except indiv. WTP in £1, and where indicated m: £millions. - : no visitor estimate.		Visitor estimates		Travel cost									Contingent valuation								
				Mean indiv WTP	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*		*Mean indiv WTP*	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*	
		LB	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*
BS5	Thames Estuary	425	772	15	6,582	11,967	6,582	11,967	8,602	15,640	6,582	11,967	6.53	7,186	13,066	8,160	14,836	8,390	15,254	7,925	14,409
BS8	Goodwin Sands	372	676	85	31,596	57,448	31,596	57,448	33,365	60,665	31,596	57,448	4.85	5,334	9,698	6,089	11,072	6,268	11,397	5,907	10,741
BS9	Offshore Foreland	349	635	10	3,469	6,307	3,469	6,307	5,130	9,327	3,469	6,307	3.63	3,995	7,263	4,593	8,351	4,734	8,608	4,449	8,089
BSra18	Blakeney Seagrass	466	847	39	18,255	33,191	18,255	33,191	20,469	37,217	18,255	33,191	5.13	5,644	10,263	6,437	11,703	6,624	12,044	6,246	11,356
Finding Sanctuary																					
FS10	Celtic Deep	145	263	10	1,379	2,507	1,379	2,507	2,067	3,758	1,379	2,507	3.36	3,701	6,729	4,265	7,755	4,398	7,997	4,129	7,507
FS11	East of Celtic Deep	224	407	10	2,235	4,063	2,235	4,063	3,300	6,001	2,235	4,063	3.49	3,844	6,990	4,425	8,045	4,562	8,295	4,285	7,791
FS12	Western Channel	496	902	9	4,464	8,117	4,464	8,117	6,824	12,407	4,464	8,117	3.44	3,781	6,874	4,354	7,916	4,490	8,163	4,216	7,665
FS13	South of the Isles of Scilly	77	140	10	761	1,384	761	1,384	1,128	2,051	761	1,384	3.22	3,545	6,445	4,090	7,437	4,220	7,672	3,959	7,198
FS15	Studland Bay	579	1,053	66	38,349	69,726	38,349	69,726	41,102	74,731	38,349	69,726	5.74	6,314	11,481	7,185	13,064	7,391	13,439	6,975	12,683
FS17	Broad Beach to Kimmeridge Bay	695	1,263	12	8,351	15,184	8,351	15,184	11,655	21,191	8,351	15,184	3.83	4,216	7,666	4,840	8,801	4,988	9,069	4,690	8,527
FS18	South of Portland	1,019	1,853	11	10,739	19,525	10,739	19,525	15,584	28,335	10,739	19,525	3.80	4,180	7,600	4,800	8,727	4,947	8,994	4,651	8,456
FS20	Axe Estuary	534	972	12	6,266	11,393	6,266	11,393	8,807	16,013	6,266	11,393	3.82	4,200	7,636	4,822	8,768	4,970	9,036	4,672	8,495
FS21	Otter Estuary	278	505	12	3,341	6,074	3,341	6,074	4,662	8,476	3,341	6,074	3.81	4,188	7,615	4,809	8,744	4,956	9,011	4,660	8,472
FS23	Dart Estuary	632	1,148	20	12,902	23,458	12,902	23,458	15,905	28,918	12,902	23,458	5.45	5,994	10,898	6,827	12,412	7,024	12,771	6,626	12,047
FS25	Devon Avon Estuary	331	602	12	3,915	7,118	3,915	7,118	5,488	9,979	3,915	7,118	3.69	4,063	7,388	4,670	8,490	4,813	8,751	4,524	8,225
FS26	Erme Estuary	80	145	21	1,645	2,991	1,645	2,991	2,025	3,681	1,645	2,991	4.49	4,934	8,971	5,643	10,260	5,811	10,565	5,472	9,950
FS30	South-East of Falmouth	77	140	10	805	1,464	805	1,464	1,172	2,131	805	1,464	3.48	3,828	6,961	4,407	8,013	4,544	8,262	4,268	7,760
FS31	South of Falmouth	165	301	10	1,725	3,136	1,725	3,136	2,511	4,566	1,725	3,136	3.43	3,773	6,860	4,345	7,901	4,481	8,147	4,208	7,650
FS33	Mounts Bay	75	136	62	4,638	8,432	4,638	8,432	4,993	9,078	4,638	8,432	6.87	7,557	13,740	8,574	15,588	8,814	16,026	8,329	15,143
FS34	Lands' End	463	842	45	20,728	37,687	20,728	37,687	22,930	41,692	20,728	37,687	4.99	5,489	9,980	6,263	11,387	6,446	11,720	6,077	11,048
FS36	Cape Bank	154	281	19	2,870	5,218	2,870	5,218	3,604	6,553	2,870	5,218	3.64	4,003	7,278	4,602	8,367	4,744	8,625	4,458	8,105
FS37	Newquay and The Gannel	178	324	32	5,648	10,269	5,648	10,269	6,495	11,810	5,648	10,269	5.72	6,296	11,447	7,164	13,026	7,370	13,399	6,955	12,645
FS39	Camel Estuary	374	679	12	4,310	7,836	4,310	7,836	6,086	11,065	4,310	7,836	4.28	4,713	8,570	5,396	9,811	5,558	10,105	5,232	9,512
FS40	Hartland Point to Tintagel	185	337	91	16,829	30,599	16,829	30,599	17,710	32,201	16,829	30,599	7.48	8,232	14,967	9,328	16,960	9,587	17,432	9,064	16,480
FS42	Taw Torridge Estuary	201	366	20	4,054	7,371	4,054	7,371	5,012	9,112	4,054	7,371	4.59	5,048	9,178	5,770	10,491	5,941	10,801	5,596	10,175
FS43	Bideford to Foreland Point	445	810	79	35,055	63,736	35,055	63,736	37,173	67,587	35,055	63,736	7.89	8,677	15,776	9,825	17,864	10,097	18,358	9,548	17,361
FS44	Morte Platform	165	301	19	3,193	5,805	3,193	5,805	3,979	7,235	3,193	5,805	3.98	4,377	7,957	5,020	9,127	5,172	9,404	4,865	8,845
FS45	North of Lundy (Atlantic Array area)	149	272	42	6,272	11,404	6,272	11,404	6,983	12,696	6,272	11,404	4.94	5,437	9,886	6,205	11,282	6,387	11,612	6,020	10,945
FS8	North-East of Haig Fras	-	-	9	-	-	-	-	-	-	-	-	3.25	3,578	6,506	4,128	7,505	4,258	7,741	3,995	7,264
FS9	South of Celtic Deep	-	-	9	-	-	-	-	-	-	-	-	3.34	3,671	6,674	4,231	7,693	4,364	7,934	4,096	7,447
Fsra	The Fleet	1,158	2,105	50	57,883	105,241	57,883	105,241	63,389	115,252	57,883	105,241	5.43	5,973	10,861	6,804	12,371	7,001	12,728	6,604	12,007
FSra10	The Fal	534	972	59	31,384	57,061	31,384	57,061	33,925	61,682	31,384	57,061	5.14	5,650	10,274	6,443	11,715	6,631	12,056	6,252	11,368
FSra11	Swanpool	154	281	21	3,180	5,782	3,180	5,782	3,914	7,117	3,180	5,782	4.94	5,434	9,880	6,202	11,275	6,383	11,606	6,017	10,939
FSra5	South-east of Portland	860	1,564	20	17,464	31,752	17,464	31,752	21,554	39,189	17,464	31,752	4.89	5,377	9,776	6,138	11,159	6,317	11,486	5,954	10,826
FSra7	Lyme Bay	1,118	2,033	64	71,338	129,706	71,338	129,706	76,654	139,372	71,338	129,706	5.44	5,979	10,871	6,811	12,383	7,007	12,740	6,610	12,019
FSra9	Mouth of the Yealm	371	674	42	15,623	28,406	15,623	28,406	17,385	31,609	15,623	28,406	5.13	5,646	10,265	6,438	11,705	6,625	12,046	6,247	11,358
Irish Sea																					
ISCZ1	Mud Hole	33	60	17	557	1,014	557	1,014	715	1,300	557	1,014	3.47	3,814	6,934	4,391	7,983	4,527	8,232	4,252	7,730
ISCZ10	Allonby Bay	128	233	53	6,799	12,362	6,799	12,362	7,408	13,469	6,799	12,362	3.37	3,708	6,743	4,273	7,769	4,407	8,012	4,137	7,522
ISCZ13	Sefton Coast	96	175	20	1,931	3,512	1,931	3,512	2,388	4,342	1,931	3,512	4.55	5,007	9,103	5,724	10,408	5,894	10,716	5,551	10,093
ISCZ15	Solway Firth	213	388	16	3,383	6,151	3,383	6,151	4,398	7,996	3,383	6,151	4.79	5,271	9,584	6,020	10,945	6,197	11,267	5,839	10,617
ISCZ16	St Catherine's Point	248	451	15	3,797	6,903	3,797	6,903	4,975	9,045	3,797	6,903	-	-	-	-	-	-	-	-	-
ISCZ17	Ribble	171	312	20	3,449	6,271	3,449	6,271	4,264	7,753	3,449	6,271	4.55	5,001	9,092	5,717	10,395	5,887	10,703	5,545	10,081
ISCZ2	West of Walney	132	241	49	6,533	11,878	6,533	11,878	7,163	13,023	6,533	11,878	4.76	5,238	9,523	5,982	10,877	6,158	11,197	5,803	10,551
ISCZ3	North St George's Channel	160	291	68	10,835	19,700	10,835	19,700	11,596	21,083	10,835	19,700	3.55	3,909	7,107	4,497	8,176	4,636	8,429	4,355	7,919
ISCZ4	Mid St George's Channel	90	164	29	2,607	4,739	2,607	4,739	3,035	5,518	2,607	4,739	3.59	3,944	7,171	4,536	8,248	4,676	8,503	4,394	7,988

LB: lower bound UB: upper bound D: dredging T: trawling A: anchoring M: mooring P: potting G: gillnetting All figures in £1000s except indiv. WTP in £1, and where indicated m: £millions. - : no visitor estimate.		Visitor estimates		Travel cost										Contingent valuation										
				Mean indiv WTP	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*		*Mean indiv WTP*	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*	
		LB	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*
ISCZ6	South Rigg	-	-	17	-	-	-	-	-	-	-	-	3.35	3,680	6,691	4,242	7,712	4,374	7,954	4,106	7,466
ISCZ7	Slieve Na Griddle	-	-	10	-	-	-	-	-	-	-	-	3.35	3,685	6,700	4,247	7,722	4,380	7,963	4,111	7,475
ISCZRAk	Tarn Point	64	116	83	5,303	9,641	5,303	9,641	5,607	10,195	5,303	9,641	4.96	5,452	9,912	6,221	11,311	6,403	11,642	6,036	10,974
ISCZRAt	Cunning Point	132	241	40	5,298	9,633	5,298	9,633	5,928	10,778	5,298	9,633	4.85	5,339	9,708	6,095	11,083	6,274	11,408	5,913	10,751
ISCZRAw	Barrow South	160	291	50	7,983	14,514	7,983	14,514	8,744	15,897	7,983	14,514	5.03	5,532	10,059	6,311	11,475	6,495	11,810	6,123	11,134
ISCZRAy	Barrow North	90	164	20	1,828	3,323	1,828	3,323	2,256	4,101	1,828	3,323	5.01	5,516	10,029	6,293	11,441	6,477	11,776	6,106	11,101
Net Gain																					
NG01c	Alde Ore Estuary	103	187	16	1,645	2,992	1,645	2,992	2,134	3,880	1,645	2,992	5.93	6,525	11,864	7,421	13,492	7,633	13,877	7,205	13,100
NG10	Castle Ground	280	509	16	4,584	8,334	4,584	8,334	5,915	10,754	4,584	8,334	5.86	6,446	11,720	7,332	13,332	7,542	13,713	7,119	12,943
NG11	Runswick Bay	439	798	15	6,642	12,077	6,642	12,077	8,730	15,873	6,642	12,077	4.85	5,330	9,691	6,086	11,065	6,264	11,389	5,904	10,734
NG12	Compass Rose	-	-	9	-	-	-	-	-	-	-	-	3.43	3,777	6,868	4,350	7,909	4,486	8,156	4,212	7,658
NG13	Coquet to St Mary's	210	382	35	7,361	13,384	7,361	13,384	8,359	15,199	7,361	13,384	6.82	7,500	13,637	8,510	15,474	8,749	15,908	8,267	15,031
NG14	Farnes East	124	225	9	1,137	2,067	1,137	2,067	1,726	3,138	1,137	2,067	3.23	3,556	6,466	4,103	7,461	4,233	7,696	3,972	7,221
NG1b	Orford Inshore	34	61	43	1,436	2,611	1,436	2,611	1,596	2,901	1,436	2,611	4.81	5,291	9,620	6,042	10,985	6,219	11,308	5,861	10,656
NG2	Cromer Shoal Chalk Beds	402	732	42	16,909	30,743	16,909	30,743	18,822	34,222	16,909	30,743	6.12	6,728	12,233	7,648	13,905	7,865	14,301	7,426	13,502
NG4	Wash Approach	129	234	61	7,911	14,384	7,911	14,384	8,524	15,497	7,911	14,384	4.83	5,308	9,652	6,061	11,020	6,239	11,344	5,880	10,691
NG5	Lincs Belt	280	509	19	5,217	9,485	5,217	9,485	6,548	11,905	5,217	9,485	4.48	4,923	8,951	5,631	10,237	5,798	10,542	5,460	9,927
NG6	Silver Pit	-	-	50	-	-	-	-	-	-	-	-	3.59	3,951	7,184	4,544	8,262	4,685	8,517	4,401	8,002
NG8	Holderness Inshore	537	976	85	45,686	83,065	45,686	83,065	48,238	87,705	45,686	83,065	5.36	5,892	10,713	6,713	12,206	6,908	12,560	6,516	11,846
NG9	Holderness Offshore	310	563	42	12,866	23,394	12,866	23,394	14,339	26,070	12,866	23,394	4.77	5,250	9,545	5,996	10,901	6,172	11,222	5,816	10,574
NGra11	Berwick Coast	258	468	40	10,304	18,734	10,304	18,734	11,529	20,961	10,304	18,734	4.51	4,963	9,023	5,675	10,318	5,843	10,624	5,503	10,006
NGra2a	Seahorse Lagoon and Arnold's Marsh	60	108	21	1,228	2,233	1,228	2,233	1,512	2,748	1,228	2,233	5.15	5,665	10,299	6,459	11,744	6,647	12,086	6,268	11,396
NGra3	Glaven Reedbed	73	133	20	1,486	2,701	1,486	2,701	1,834	3,334	1,486	2,701	5.12	5,635	10,246	6,426	11,684	6,614	12,025	6,236	11,338
NGra4	Blakeney Marsh	129	234	20	2,615	4,754	2,615	4,754	3,227	5,867	2,615	4,754	5.13	5,644	10,262	6,436	11,702	6,623	12,043	6,245	11,355
NGra5	Lune and Wyre	67	122	42	2,828	5,142	2,828	5,142	3,147	5,722	2,828	5,142	-	-	-	-	-	-	-	-	-
NGra6	Dogs Head Sandbanks	-	-	82	-	-	-	-	-	-	-	-	4.72	5,196	9,448	5,936	10,792	6,111	11,110	5,757	10,468
NGra7	Seahenge Peat and Clay	193	351	20	3,922	7,131	3,922	7,131	4,841	8,801	3,922	7,131	5.20	5,718	10,396	6,519	11,852	6,708	12,197	6,326	11,501
NGra9	Flamborough Head No Take Zone	210	382	20	4,263	7,751	4,263	7,751	5,261	9,566	4,263	7,751	4.99	5,490	9,981	6,264	11,388	6,447	11,721	6,077	11,049
Sites not nominated for designation in 2013: TOTAL		**28.6m**	**51.9m**		**1,271m**	**2,311m**	**1,271m**	**2,311m**	**1,407m**	**2,558m**	**1,271m**	**2,311m**		**470m**	**854m**	**536m**	**975m**	**552m**	**1,004m**	**520m**	**946m**
Sites not nominated for designation in 2013: MEAN		**321**	**583**	**37.29**	**14,283**	**25,969**	**14,283**	**25,969**	**15,809**	**28,743**	**14,283**	**25,969**	**4.80**	**5,282**	**9,603**	**6,028**	**10,960**	**6,205**	**11,281**	**5,848**	**10,633**
England: TOTAL		**39.3m**	**71.5m**		**1,769m**	**3,217m**	**1,769m**	**3,217m**	**1,956m**	**3,557m**	**1,769m**	**3,217m**		**628m**	**1,143m**	**717m**	**1,305m**	**738m**	**1,343m**	**696m**	**1,266m**
England: MEAN		**336**	**611**	**38.72**	**15,123**	**27,497**	**15,123**	**27,497**	**16,722**	**30,404**	**15,123**	**27,497**	**4.89**	**5,374**	**9,772**	**6,133**	**11,150**	**6,312**	**11,476**	**5,950**	**10,818**
Scotland																					
ARR	South Arran	-	-	43	-	-	-	-	-	-	-	-	6.39	7,032	12,786	7,987	14,522	8,213	14,933	7,757	14,104
CSS	Clyde Sea sill	191	348	11	2,122	3,859	2,122	3,859	3,032	5,512	2,122	3,859	5.29	5,819	10,580	6,632	12,058	6,824	12,407	6,436	11,702
DLA	Lochs Duich, Long and Alsh	155	282	30	4,730	8,599	4,730	8,599	5,468	9,942	4,730	8,599	5.23	5,752	10,458	6,557	11,921	6,747	12,268	6,363	11,569
ECC	East Caithness Cliffs SPA	-	-	40	-	-	-	-	-	-	-	-	5.18	5,702	10,368	6,501	11,821	6,690	12,164	6,309	11,471
FOF	Firth of Forth Banks Complex	104	188	18	1,908	3,469	1,908	3,469	2,401	4,365	1,908	3,469	4.04	4,441	8,074	5,092	9,257	5,246	9,537	4,935	8,972
FTH	Fetlar to Haroldswick	-	-	43	-	-	-	-	-	-	-	-	4.33	4,763	8,660	5,452	9,912	5,615	10,209	5,286	9,611
LCR	Loch Creran	104	188	17	1,713	3,115	1,713	3,115	2,206	4,010	1,713	3,115	4.67	5,136	9,339	5,869	10,670	6,042	10,985	5,692	10,349
LFG	Upper Loch Fyne and Loch Goil	37	66	40	1,466	2,666	1,466	2,666	1,640	2,982	1,466	2,666	5.97	6,565	11,936	7,465	13,573	7,678	13,961	7,248	13,179
LSU	Loch Sunart	133	242	40	5,330	9,691	5,330	9,691	5,963	10,843	5,330	9,691	5.61	6,170	11,218	7,023	12,770	7,225	13,137	6,818	12,396
LSW	Loch Sween	39	71	31	1,203	2,188	1,203	2,188	1,388	2,524	1,203	2,188	5.90	6,489	11,799	7,381	13,419	7,592	13,803	7,166	13,029
MOI	Monach Islands	-	-	15	-	-	-	-	-	-	-	-	4.12	4,528	8,232	5,189	9,434	5,345	9,719	5,030	9,145
MTB	Mousa to Boddam	41	75	40	1,669	3,034	1,669	3,034	1,866	3,392	1,669	3,034	4.03	4,432	8,058	5,082	9,240	5,236	9,519	4,925	8,955

LB: lower bound; UB: upper bound; D: dredging; T: trawling; A: anchoring; M: mooring; P: potting; G: gillnetting
All figures in £1000s except indiv. WTP in £1, and where indicated m: £millions. - : no visitor estimate.

		Visitor estimates		Travel cost									Contingent valuation								
				Mean indiv WTP	No restrictions		No DT		No DTPG		No DTAM		Mean indiv WTP	No restrictions		No DT		No DTPG		No DTAM	
		LB	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*
NOH	Noss Head	-	-	21	-	-	-	-	-	-	-	-	3.62	3,984	7,244	4,581	8,330	4,723	8,587	4,438	8,068
NWO	North-west Orkney	-	-	19	-	-	-	-	-	-	-	-	3.09	3,400	6,181	3,928	7,142	4,053	7,369	3,801	6,910
NWS	North-west sea lochs and Summer Isles	96	174	31	2,917	5,305	2,917	5,305	3,372	6,131	2,917	5,305	5.08	5,583	10,152	6,368	11,579	6,554	11,916	6,179	11,235
PWY	Papa Westray	-	-	16	-	-	-	-	-	-	-	-	3.82	4,203	7,643	4,826	8,775	4,974	9,043	4,676	8,502
SJU	Loch Sunart to the Sound of Jura	194	353	37	7,124	12,953	7,124	12,953	8,048	14,632	7,124	12,953	6.11	6,723	12,224	7,642	13,894	7,859	14,290	7,420	13,492
SMI	Small Isles	83	151	41	3,433	6,242	3,433	6,242	3,827	6,959	3,433	6,242	5.53	6,082	11,059	6,926	12,592	7,125	12,955	6,723	12,223
TBB	Turbot Bank	-	-	20	-	-	-	-	-	-	-	-	3.60	3,957	7,194	4,550	8,274	4,691	8,529	4,407	8,013
WYR	Wyre and Rousay Sounds	-	-	16	-	-	-	-	-	-	-	-	3.87	4,256	7,738	4,885	8,882	5,034	9,153	4,733	8,606
Scotland: TOTAL		**1,177**	**2,138**		**33.6m**	**61.1m**	**33.6m**	**61.1m**	**39.2m**	**71.3m**	**33.6m**	**61.1m**		**105.0m**	**190.9m**	**119.9m**	**218.1m**	**123.5m**	**224.5m**	**116.3m**	**211.5m**
Scotland: MEAN		**107**	**194**	**28.45**	**3,056**	**5,556**	**3,056**	**5,556**	**3,565**	**6,481**	**3,056**	**5,556**	**4.77**	**5,251**	**9,547**	**5,997**	**10,903**	**6,173**	**11,224**	**5,817**	**10,577**
Wales																					
W1	Cardigan Bay / Bae Ceredigion	403	732	10	4,164	7,571	4,164	7,571	6,079	11,052	4,164	7,571	6.22	6,847	12,450	7,781	14,147	8,002	14,549	7,556	13,738
W2	Pembrokeshire Marine / Sir Benfro Forol	436	794	45	19,470	35,400	19,470	35,400	21,546	39,174	19,470	35,400	7.53	8,278	15,050	9,379	17,053	9,640	17,526	9,114	16,570
W3	Pen Llyn ar Sarnau	349	635	35	12,104	22,008	12,104	22,008	13,765	25,027	12,104	22,008	7.40	8,138	14,796	9,223	16,769	9,480	17,235	8,961	16,293
W4	Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd	265	482	10	2,695	4,899	2,695	4,899	3,954	7,190	2,695	4,899	6.26	6,889	12,525	7,827	14,231	8,049	14,635	7,601	13,820
W5	Dee Estuary / Aber Dyfrdwy (Wales)	124	225	15	1,839	3,343	1,839	3,343	2,428	4,414	1,839	3,343	6.01	6,610	12,018	7,516	13,665	7,730	14,054	7,297	13,268
W6	Severn Estuary	99	181	38	3,793	6,897	3,793	6,897	4,266	7,756	3,793	6,897	7.58	8,339	15,161	9,447	17,177	9,710	17,654	9,180	16,691
W7	Conwy Bay	364	662	35	12,733	23,150	12,733	23,150	14,465	26,299	12,733	23,150	7.39	8,134	14,789	9,219	16,761	9,475	17,228	8,957	16,286
Wales: TOTAL		**2.04m**	**3,71m**		**56.8m**	**103.3m**	**56.8m**	**103.3m**	**66.5m**	**120.9m**	**56.8m**	**103.3m**		**56.2m**	**96.8m**	**60.4m**	**109.8m**	**62.1m**	**112.9m**	**58.7m**	**106.7m**
Wales: MEAN		**292**	**530**	**26.82**	**8,114**	**14,753**	**8,114**	**14,753**	**9,500**	**17,273**	**8,114**	**14,753**	**6.91**	**7,605**	**13,827**	**8,627**	**15,686**	**8,869**	**16,126**	**8,381**	**15,238**

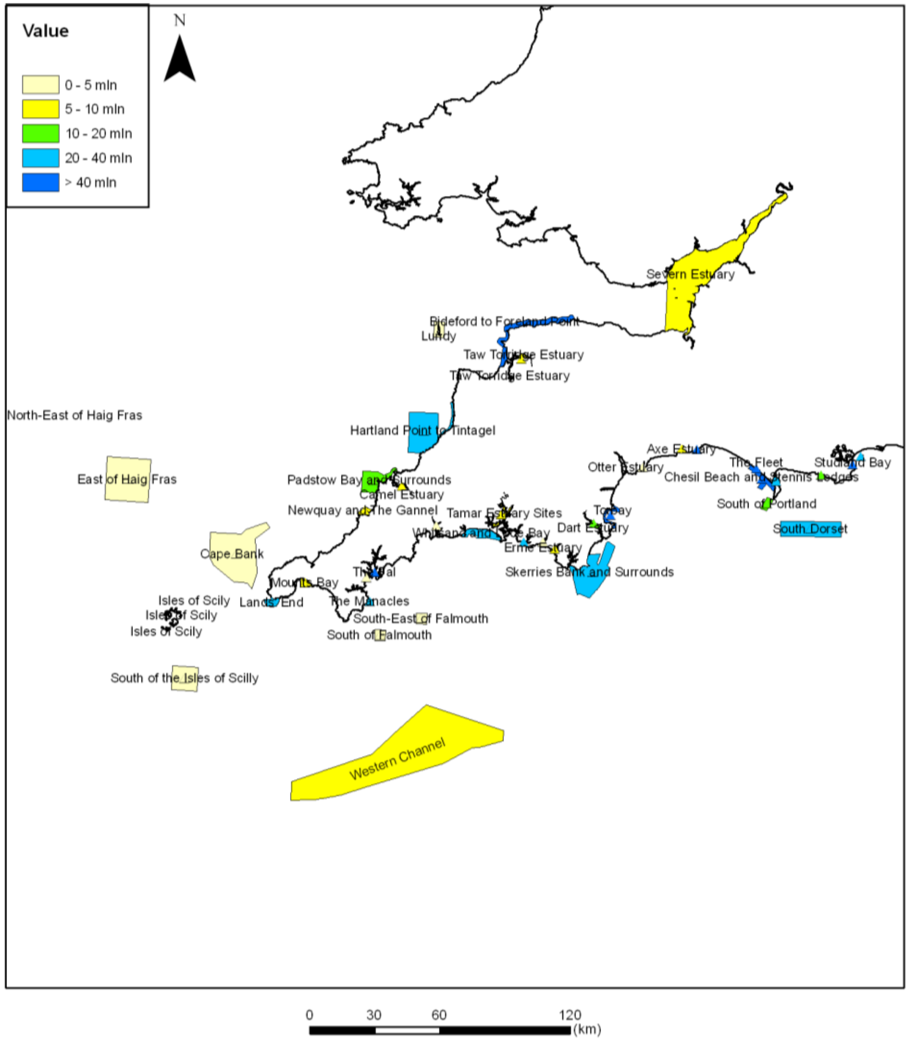


Figure 17 Southwest England: Anglers' current aggregate recreatonal use value (mln £) per site based on a central estimate of total population of UK anglers.

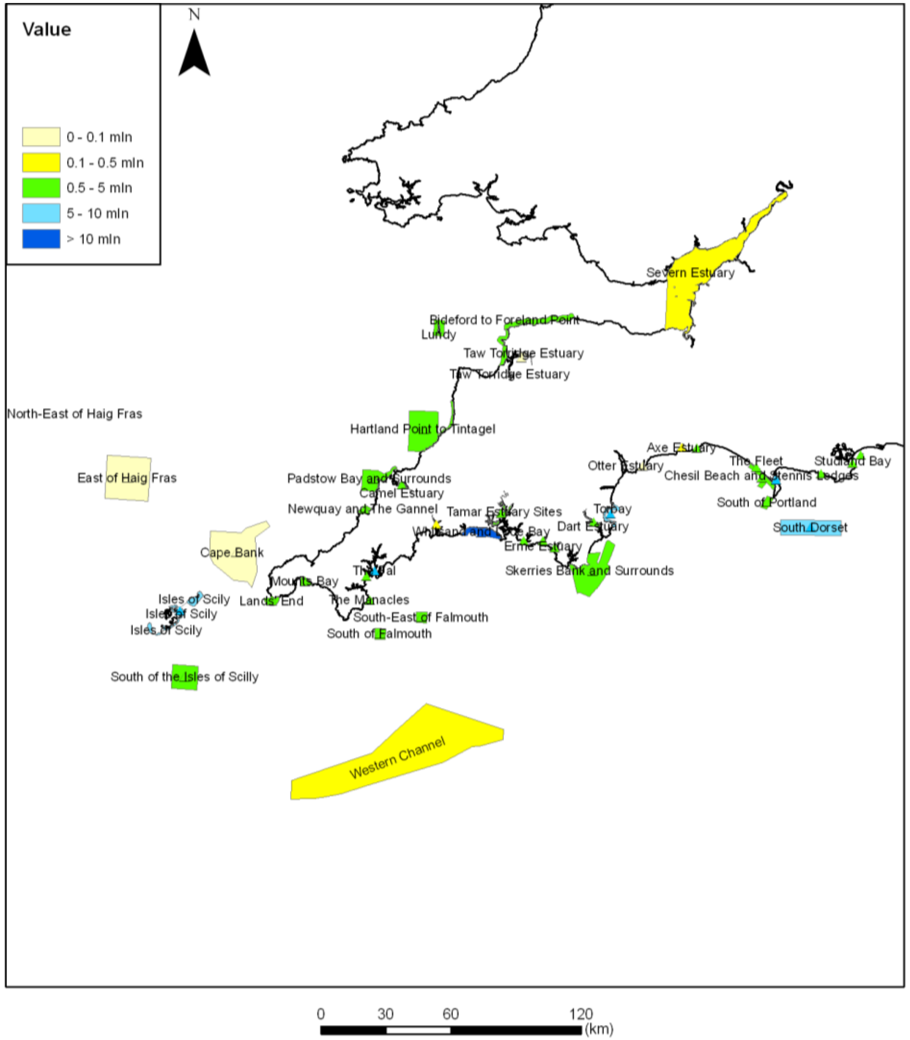


Figure 18 Southwest England: Divers' current aggregate recreatonal use value (mln £) per site based on a central estimate of total population of UK divers.

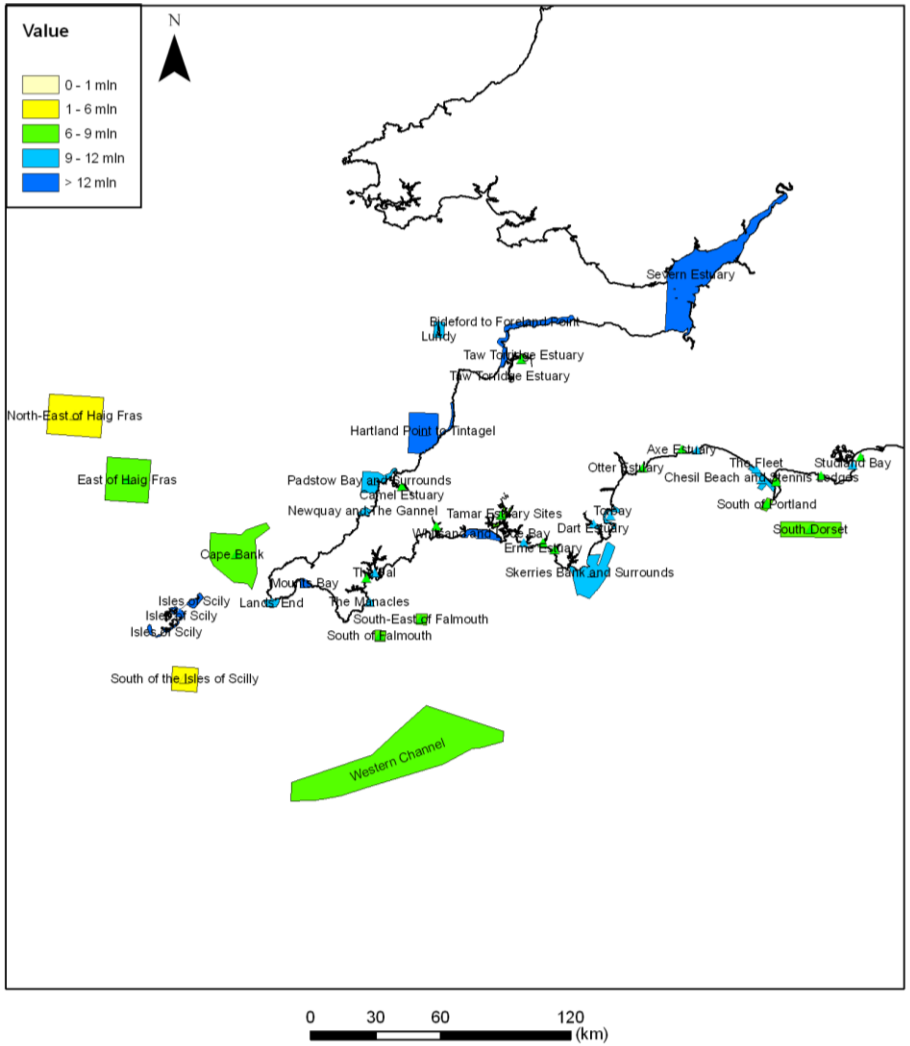


Figure 19 Southwest England: Anglers' aggregate willingness to pay (mln £) for protection of sites with no dredging, trawling, potting and gillnetting (highest value restrictions) based on a central estimate of total population of UK anglers.

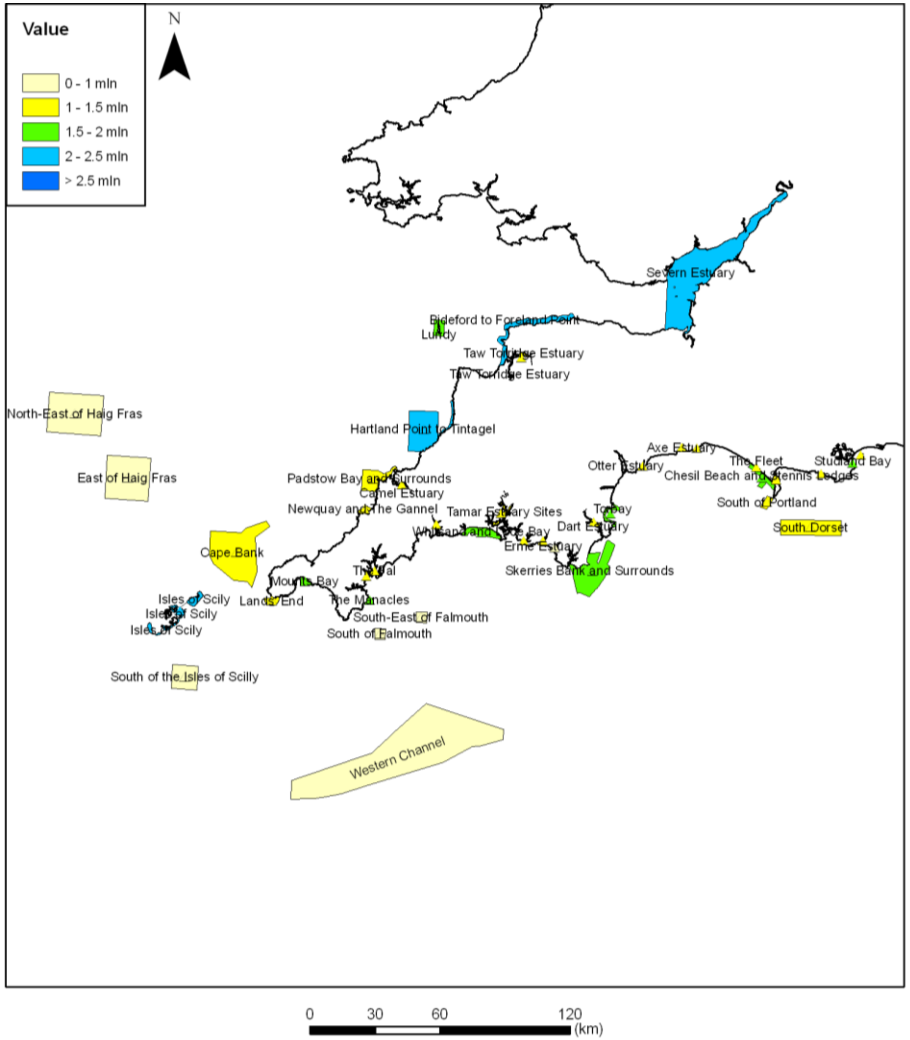


Figure 20 Southwest England: Divers' aggregate willingness to pay (mln £) for protection of sites with no dredging, trawling, potting and gillnetting (highest value restrictions) based on a central estimate of total population of UK divers.

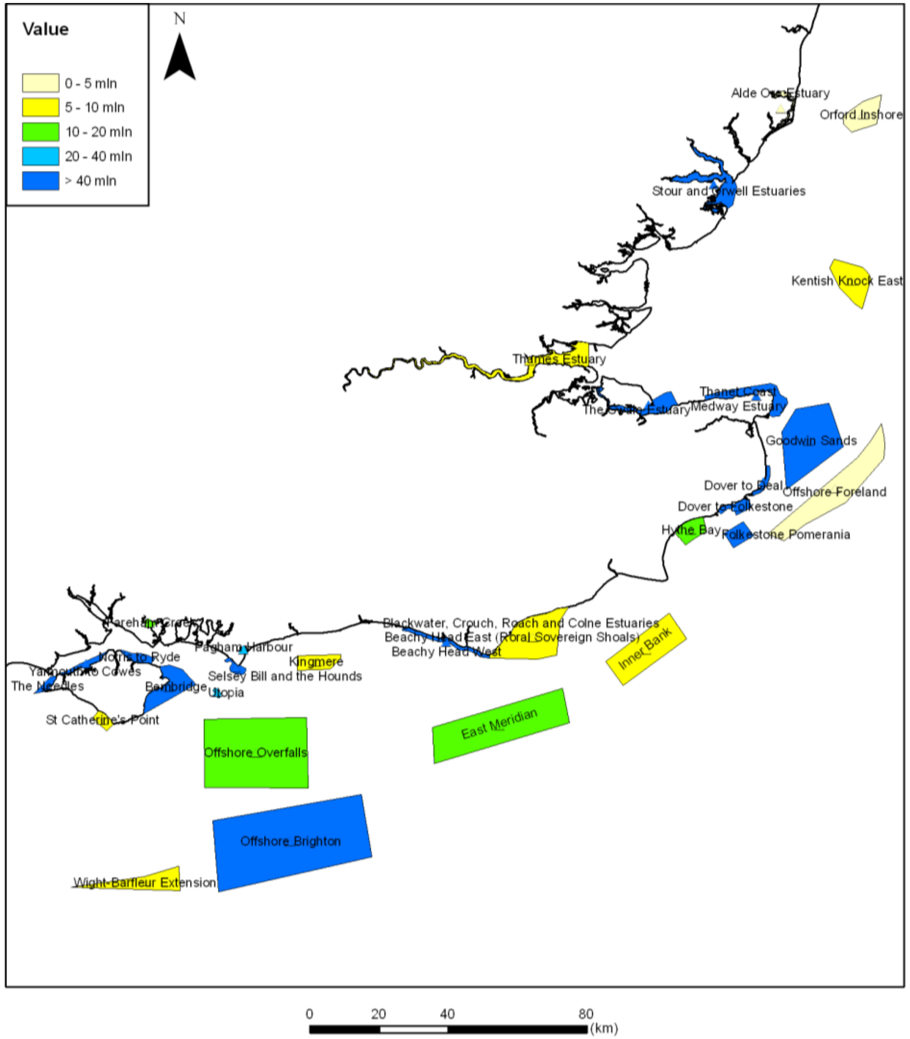


Figure 21 Southeast England: Anglers' current aggregate recreatonal use value (mln £) per site based on a central estimate of total population of UK anglers.

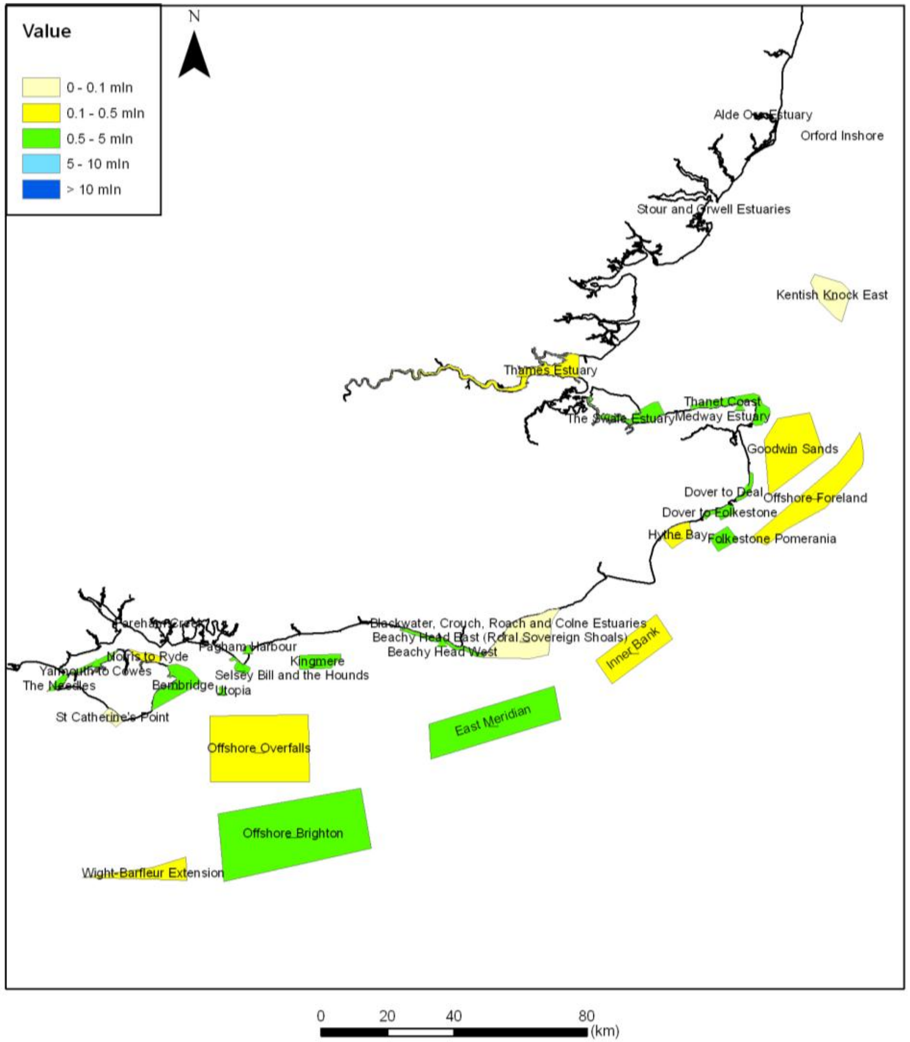


Figure 22 Southeast England: Divers' current aggregate recreatonal use value (mln £) per site based on a central estimate of total population of UK divers.

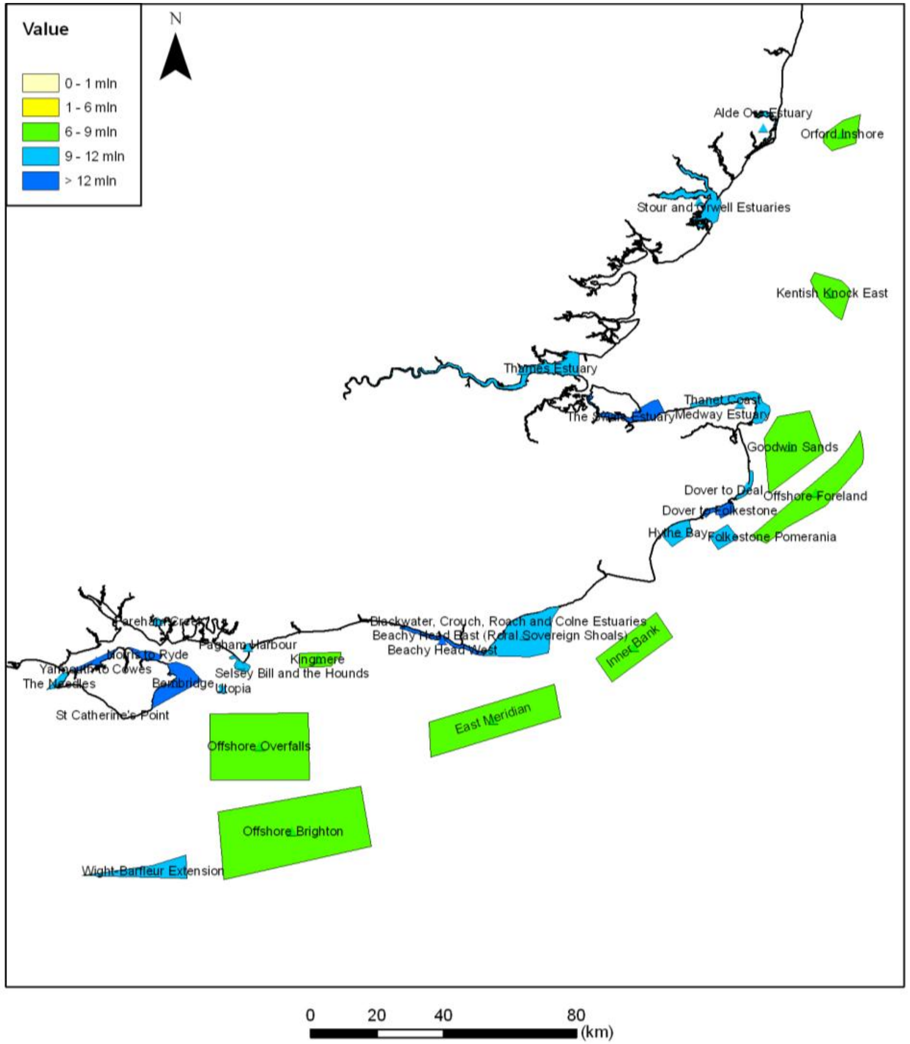


Figure 23 Southeast England: Anglers' aggregate willingness to pay (mln £) for protection of sites with no dredging, trawling, potting and gillnetting (highest value restrictions) based on a central estimate of total population of UK anglers.

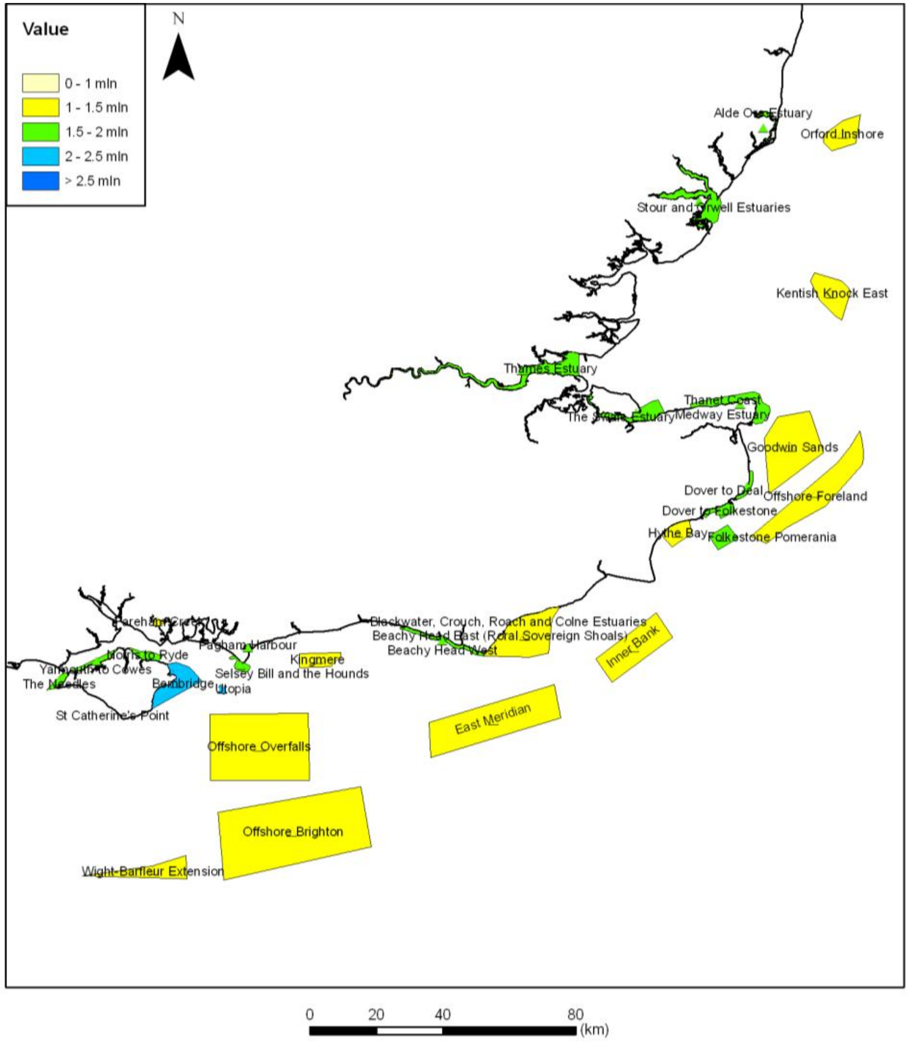


Figure 24 Southeast England: Divers' aggregate willingness to pay (mln £) for protection of sites with no dredging, trawling, potting and gillnetting (highest value restrictions) based on a central estimate of total population of UK divers.

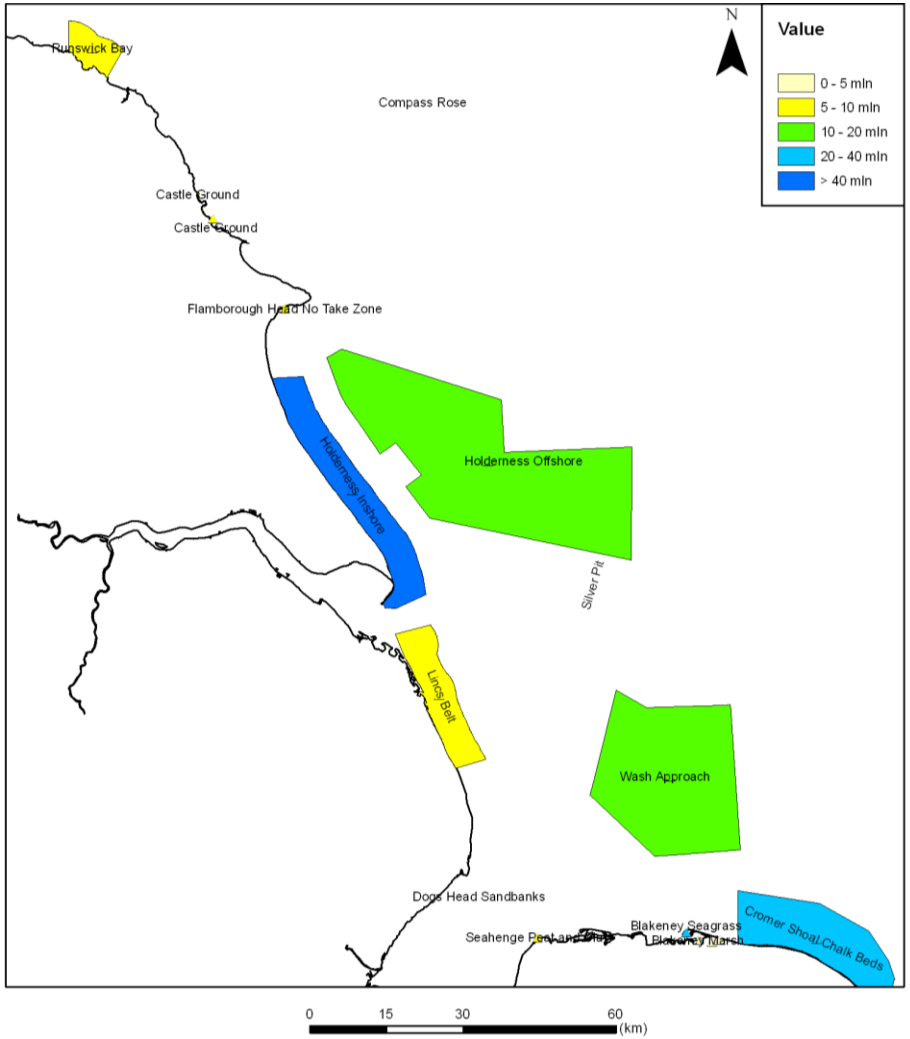


Figure 25 Northeast England: Anglers' current aggregate recreatonal use value (mln £) per site based on a central estimate of total population of UK anglers.

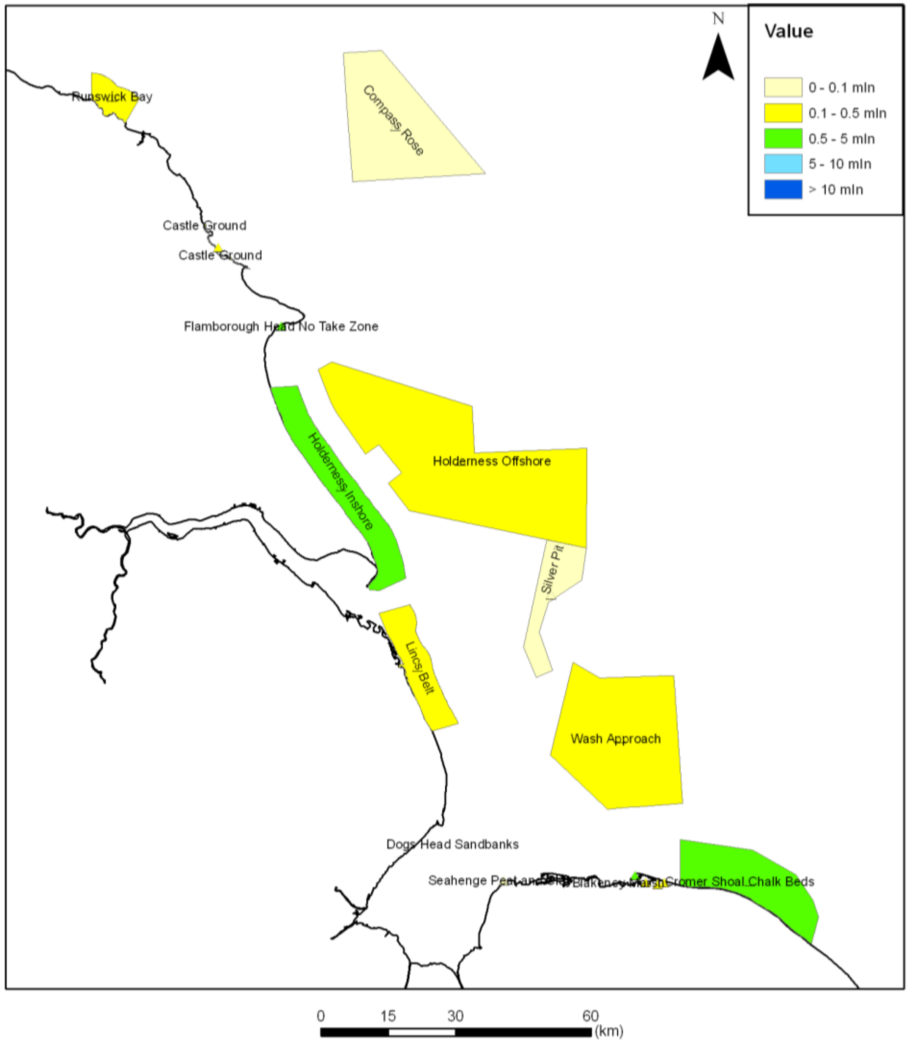


Figure 26 Northeast England: Divers' current aggregate recreatonal use value per site (mln £) based on a central estimate of total population of UK divers.

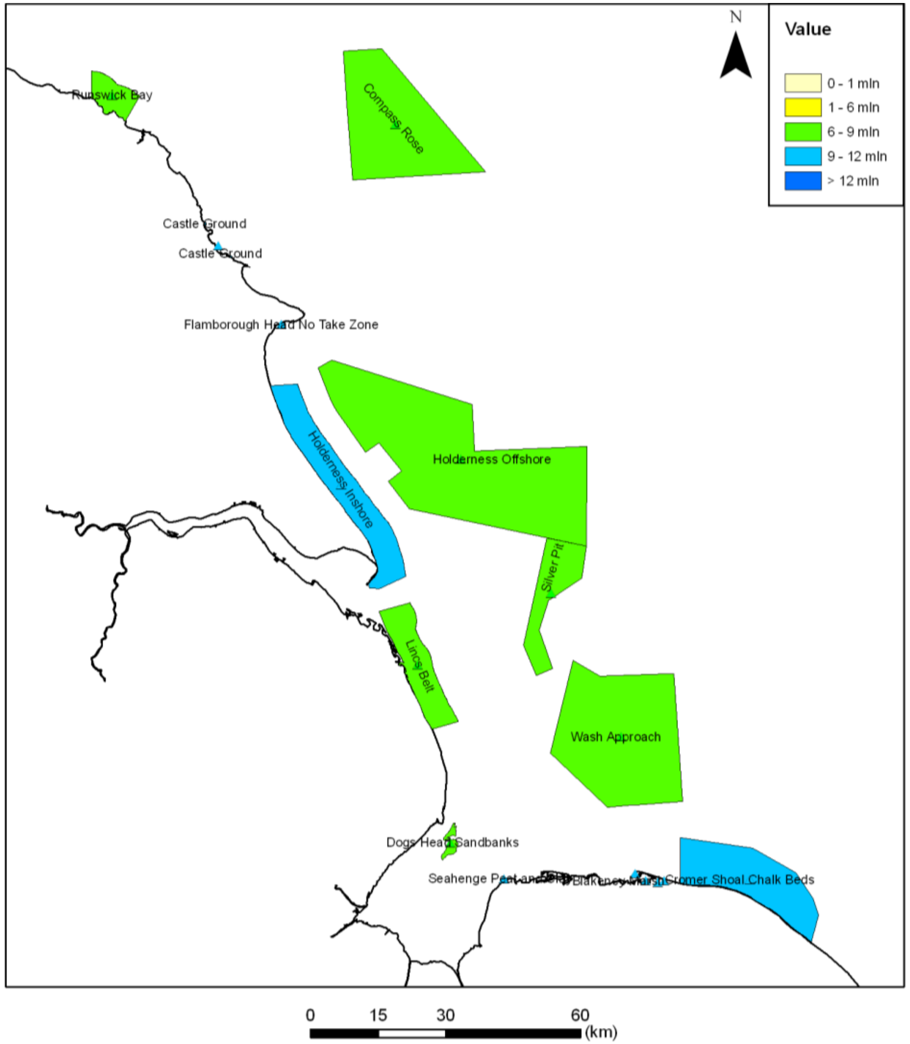


Figure 27 Northeast England: Anglers' aggregate willingness to pay (mln £) for protection of sites with no dredging, trawling, potting and gillnetting (highest value restrictions) based on a central estimate of total population of UK anglers.

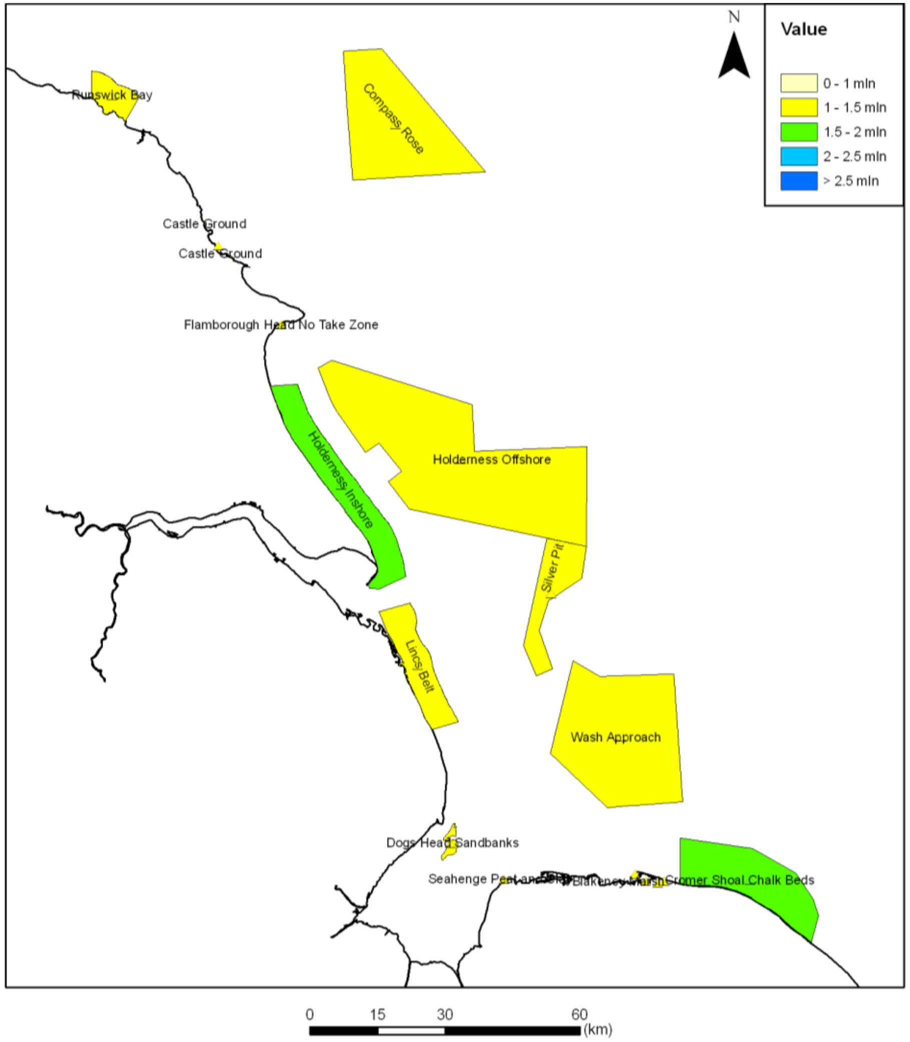


Figure 28 Northeast England: Divers' aggregate willingness to pay (mln £) for protection of sites with no dredging, trawling, potting and gillnetting (highest value scenario) based on a central estimate of total population of UK divers.

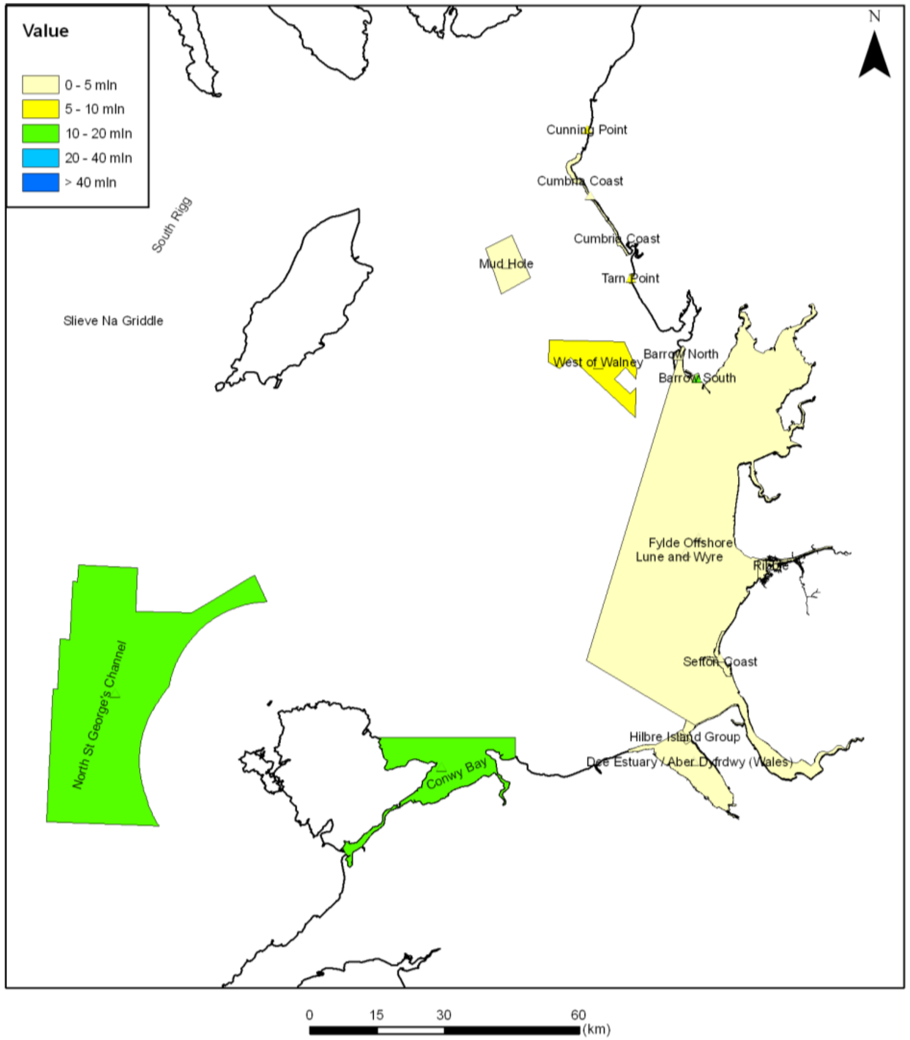


Figure 29 Northwest England: Anglers' current aggregate recreatonal use value (mln £) per site based on a central estimate of total population of UK anglers.

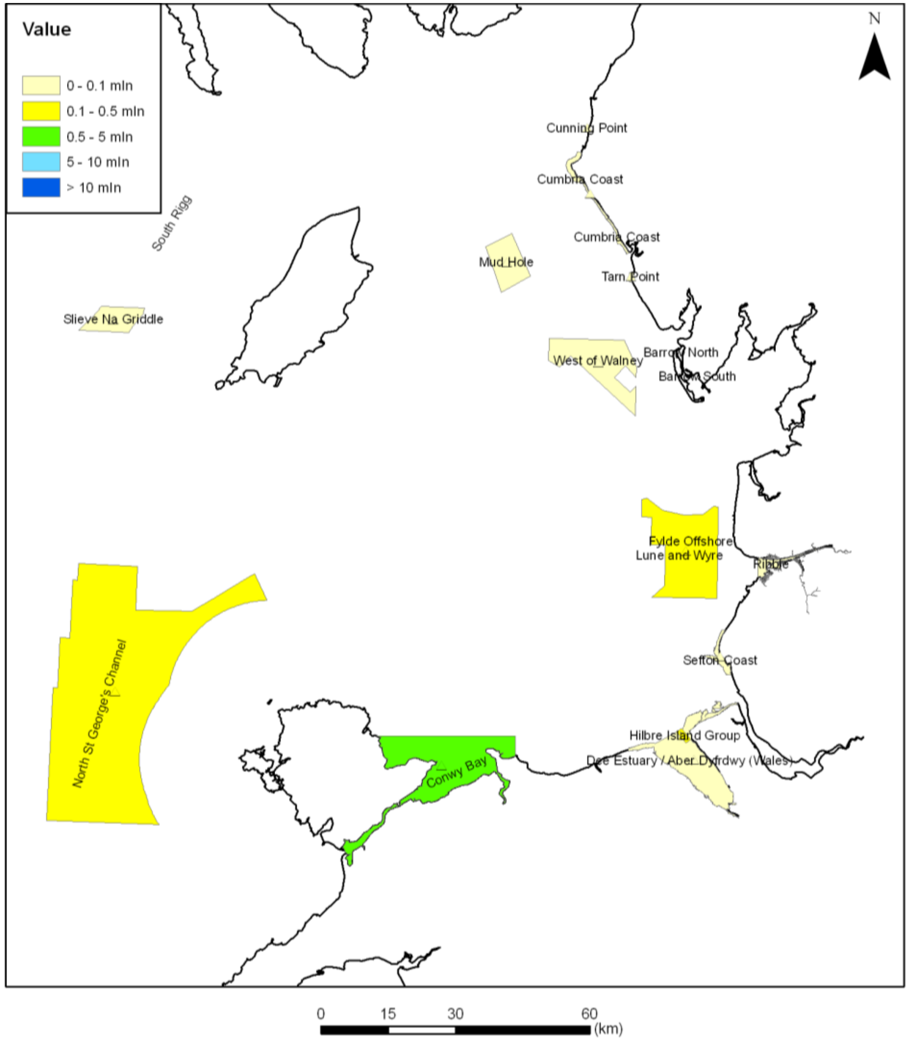


Figure 30 Northwest England: Divers' current aggregate recreatonal use value (mln £) per site based on a central estimate of total population of UK divers.

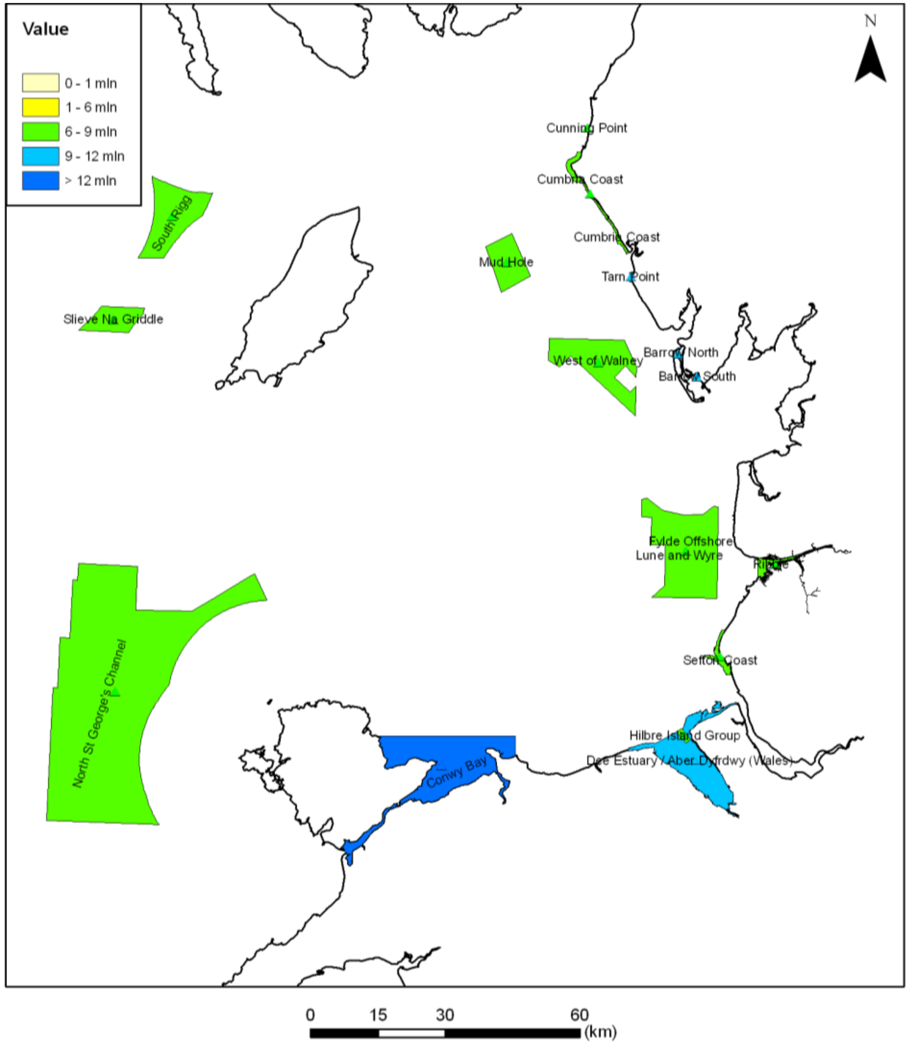


Figure 31 Northwest England: Anglers' aggregate willingness to pay (mln £) for protection of sites with no dredging, trawling, potting and gillnetting (highest value restrictions) based on a central estimate of total population of UK anglers.

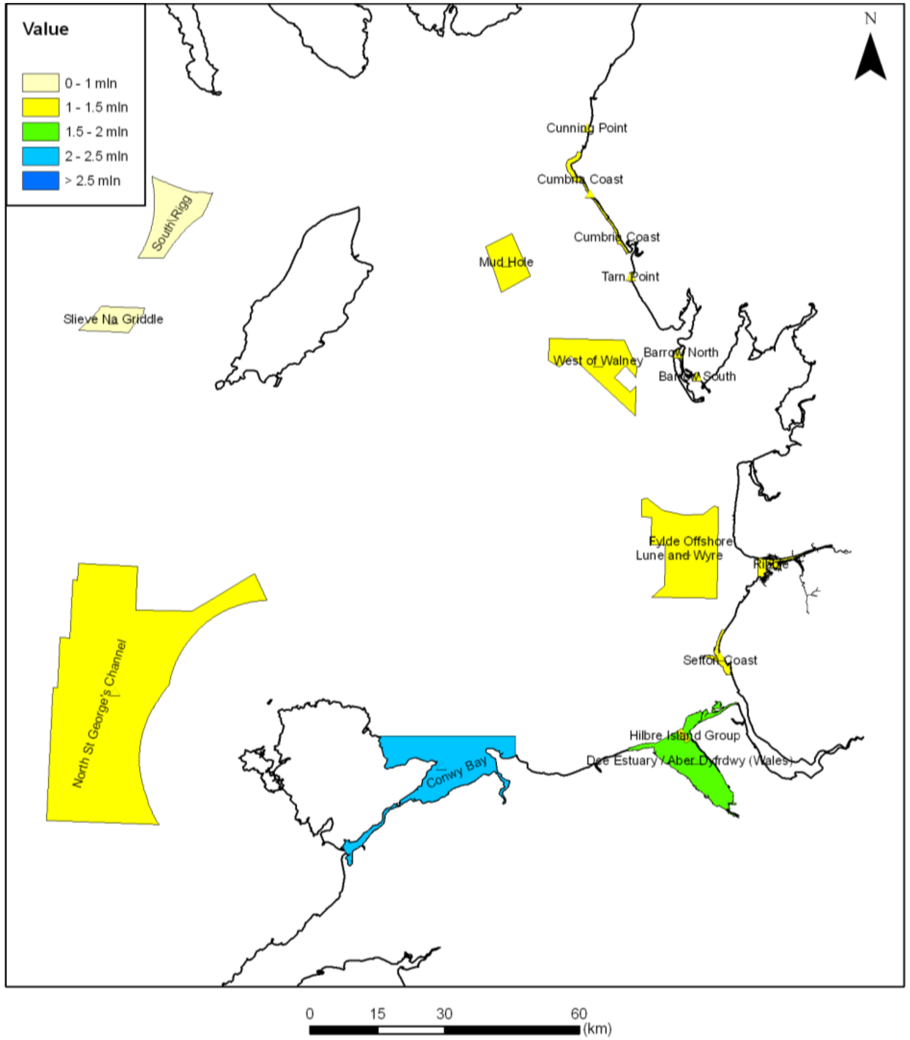


Figure 32 Northwest England: Divers' aggregate willingness to pay (mln £) for protection of sites with no dredging, trawling, potting and gillnetting (highest value restrictions) based on a central estimate of total population of UK divers.

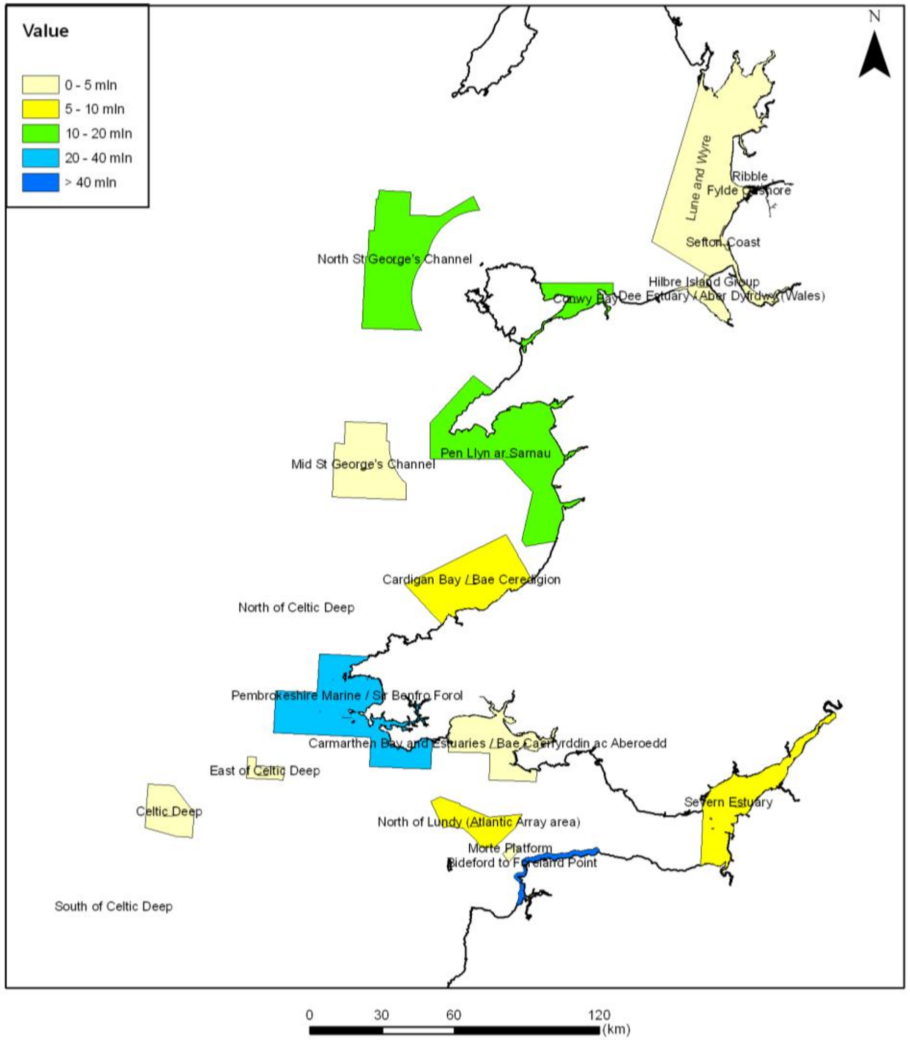


Figure 33 Wales and southern Irish Sea: Anglers' current aggregate recreatonal use value (mln £) per site based on a central estimate of total population of UK anglers.

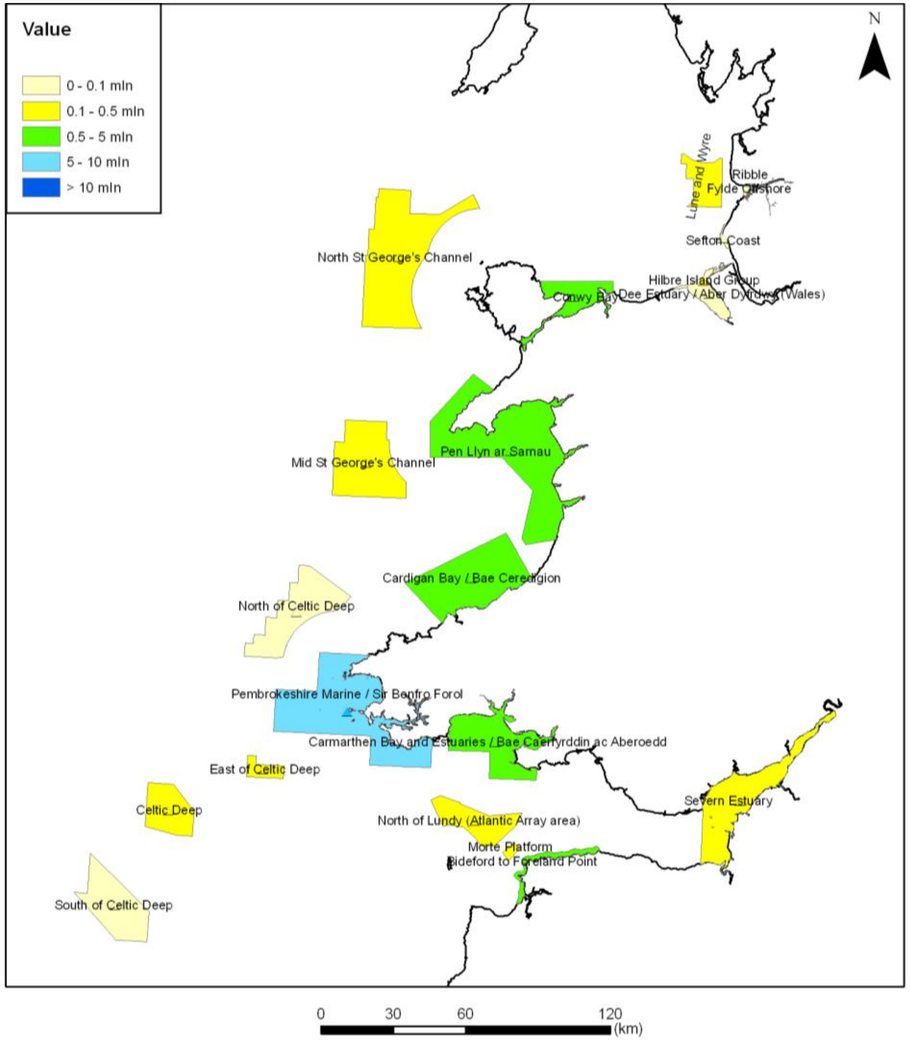


Figure 34 Wales and southern Irish Sea: Divers' current aggregate recreatonal use value (mln £) per site based on a central estimate of total population of UK divers.

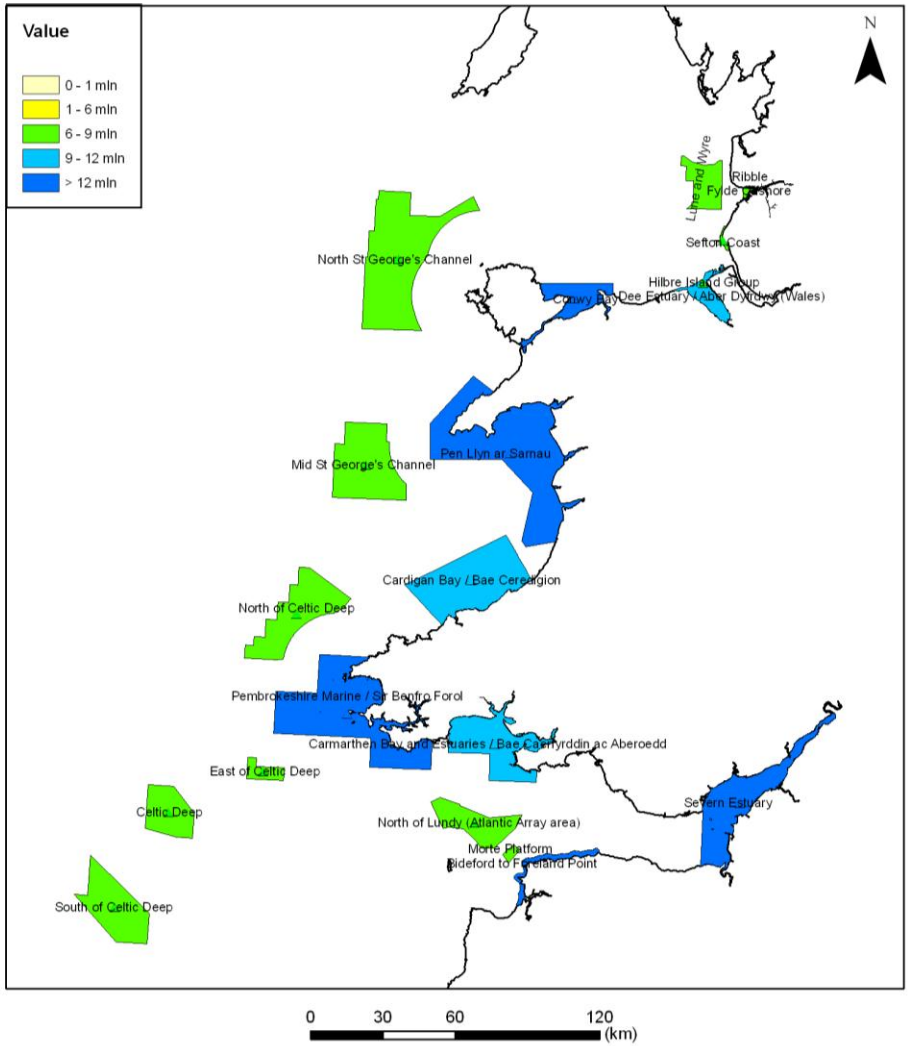


Figure 35 Wales and southern Irish Sea: Anglers' aggregate willingness to pay (mln £) for protection of sites with no dredging, trawling, potting and gillnetting (highest value scenario) based on a central estimate of total population of UK anglers.

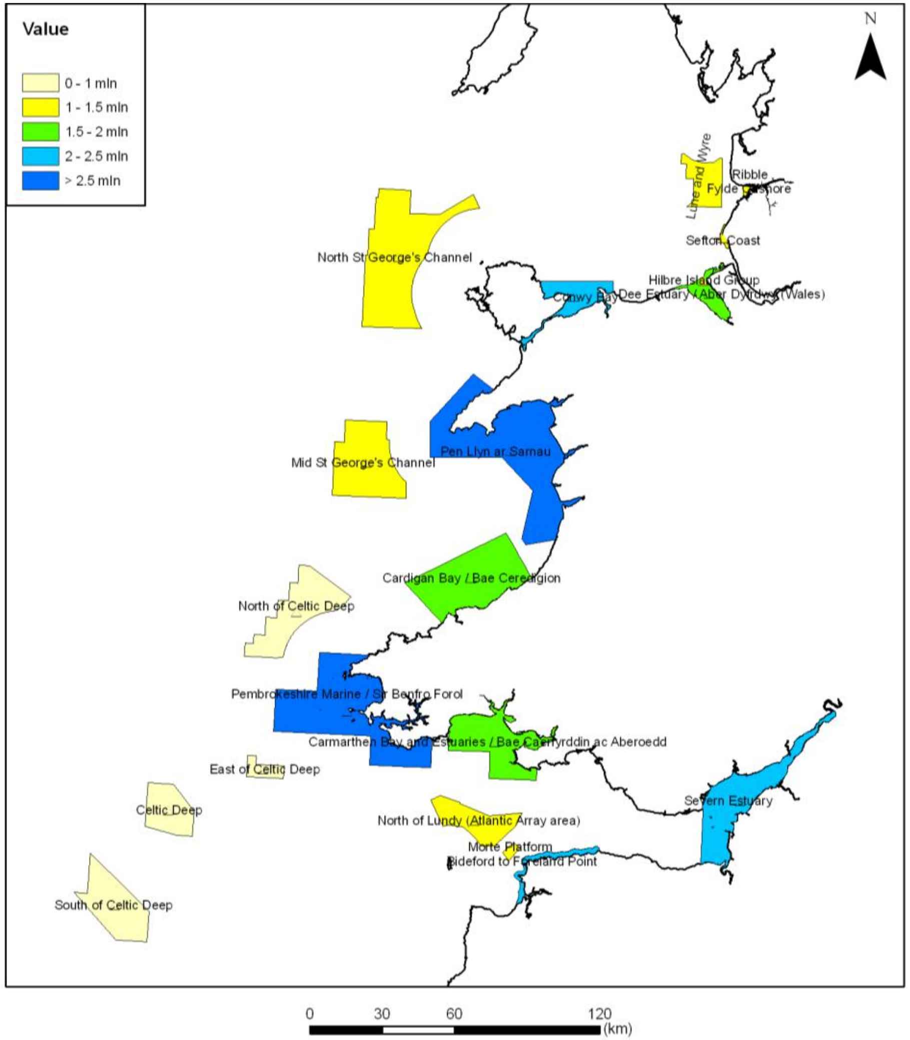


Figure 36 Wales and southern Irish Sea: Divers' aggregate willingness to pay (mln £) for protection of sites with no dredging, trawling, potting and gillnetting (highest value restrictions) based on a central estimate of total population of UK divers.

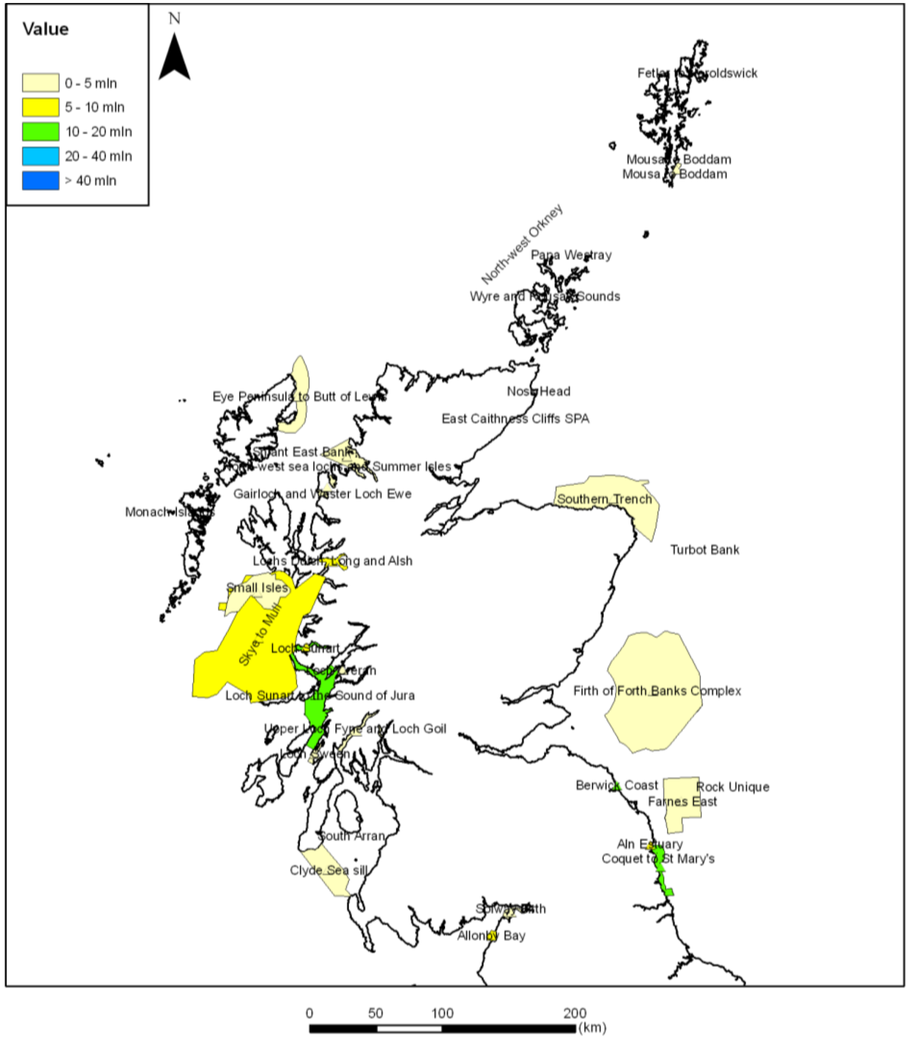


Figure 37 Scotland: Anglers' current aggregate recreatonal use value per site (mln £) based on a central estimate of total population of UK anglers[29]

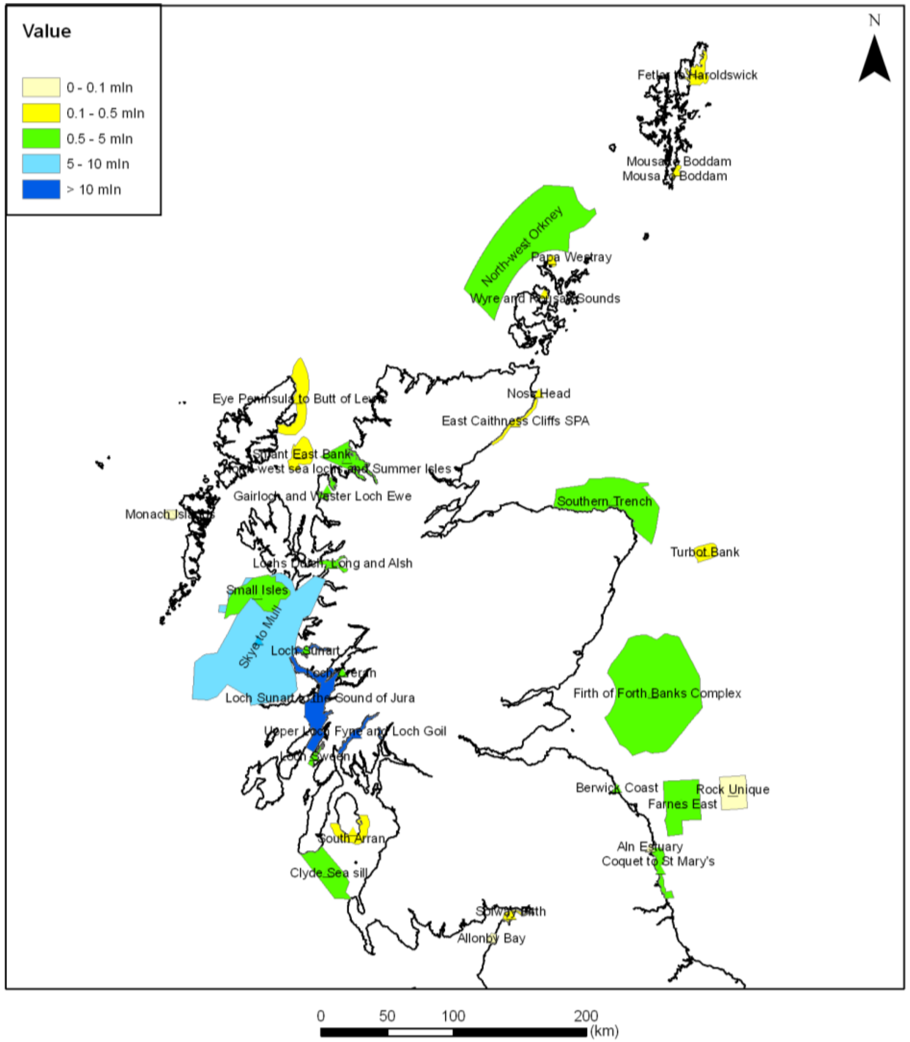


Figure 38 Scotland: Divers' current aggregate recreatonal use value per site (mln £) based on a central estimate of total population of UK anglers

[29] Figures 37-40 include four areas (Gairloch and Wester Loch Ewe, Eye Peninsula to Butt of Lewis, Shiant East Bank, Skye to Mull and Southern Trench) that were included in our survey and our original analysis but that will not be put forward for consultation initially. Their values are not included in aggregate totals but reported separately in Annex 1.

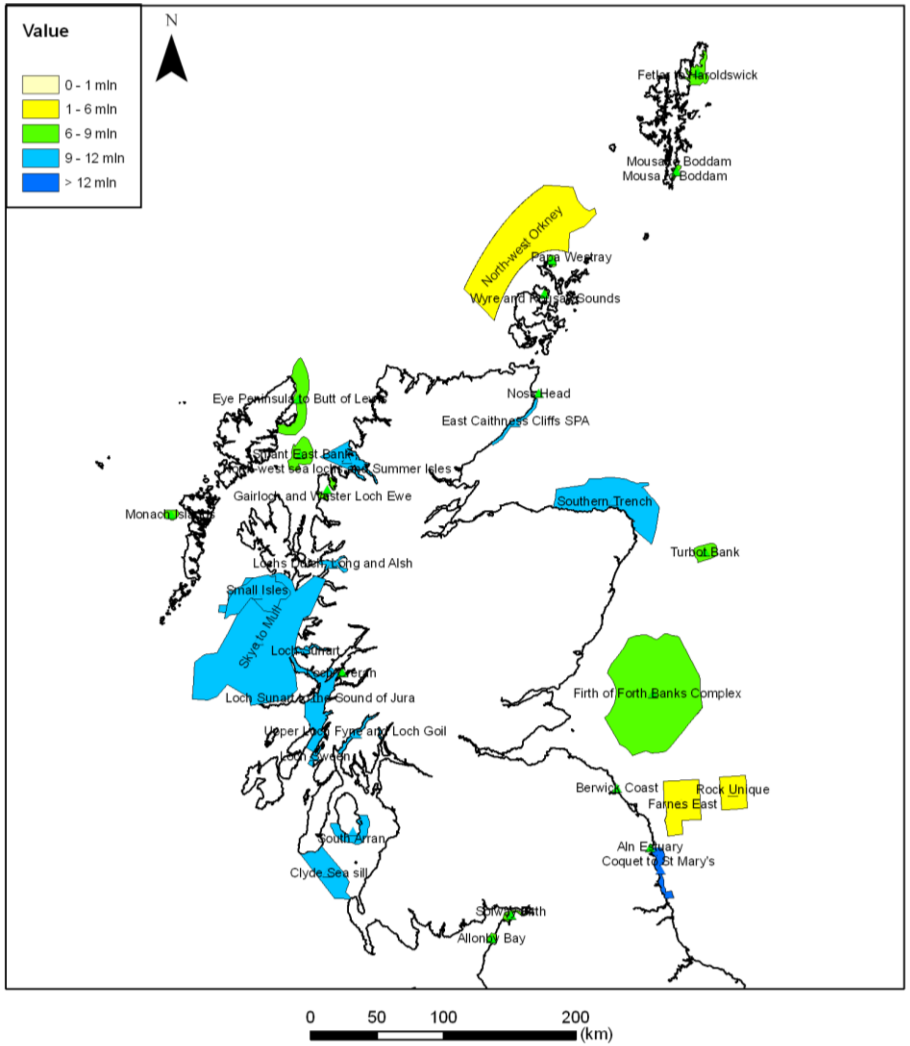


Figure 39 Scotland: Anglers' aggregate willingness to pay (mln £) for protection of sites with no dredging, trawling, potting and gillnetting (highest value scenario) based on a central estimate of total population of UK anglers.

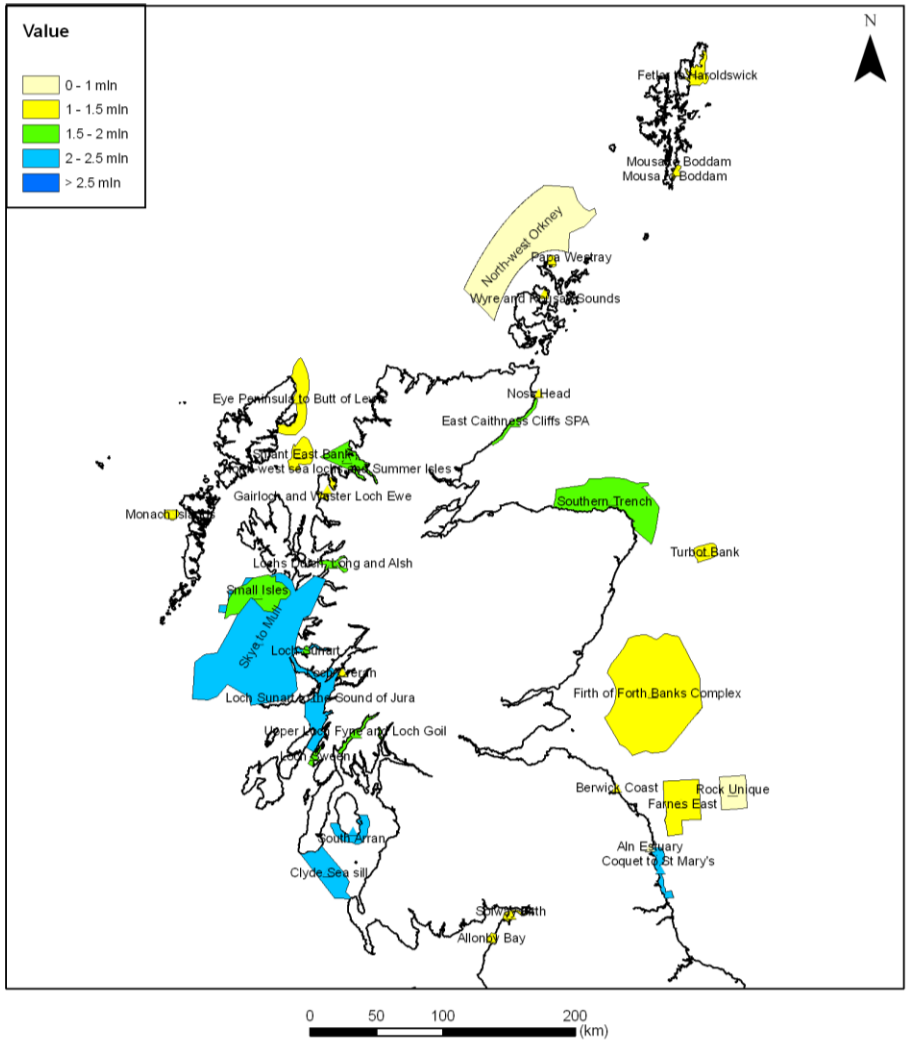


Figure 40 Scotland: Divers' aggregate willingness (mln £) to pay for protection of sites with no dredging, trawling, potting and gillnetting (highest value scenario) based on a central estimate of total population of UK divers.

3.6 Subjective wellbeing values

Strongly positive responses for each individual wellbeing indicator suggested that sites have considerable non-monetary value for recreational users. There was a similar positive skewness across individual items and we proceeded with conventional inter-indicator correlations. The 15 indicator statements loaded onto three principal factors, which we were able to thematically summarise as *engagement and interaction with nature*, *place identity* and *therapeutic value* (Table 17). The factor engagement and interaction with nature' explained the highest amount of variation (23%) in the data set followed by 'place identity' (18%) and 'therapeutic value' (health and mental wellbeing) (17%). Cronbach's alpha scores were all >0.7, indicating reliability of the measures (Table 17). Separate analyses for divers and anglers generated less interpretable 2-factor models. As this was likely an artefact of reduced individual variation, subsequent analyses used the joint model. The 3-item place identity construct to emerge from our exploratory factor analysis corresponded well with our *a priori* construct of place identity, with only one indicator not loading. The other two factors described distinct components of wellbeing, but at a broader level than our *a priori* constructs (Table 1). Four indicators did not load on any of the factors. Three of these related to distinct a priori constructs with no other indicators: social bonding, spiritual value and transformative value; hence we have taken them forward in further analyses as single-item constructs. We dropped item 2: 'I gain perspective on life during my visits to these sites'.

Cluster analysis results (Figure 41) gave an indication of which indicators scored highest, grouping indicators on the basis of scores rather than variation. This nonetheless resulted in a similar grouping of indicators as did the factor analysis, with the indicators on the first axis (engagement and interaction) scoring highest, followed by transformative and social values; these benefits therefore give divers and anglers the greatest sense of wellbeing from marine settings.

Comparing indicator means between divers and anglers shows some differences between the groups (Table 17). Divers are more struck by the beauty of sites than anglers, whereas for anglers the place identity indicators score higher on average. However, overall differences were remarkably small.

In terms of assessment on a site-to-site basis (across both divers and anglers), three sites had zero visitor numbers (North-East of Haig Fras, South Rigg and Dogs Head Sandbanks) and were excluded. Results are depicted in per country and region, with results for England separate for the 31 sites being considered for designation in 2013 and those not being considered for designation in this tranche (Table 18). There are clear regional differences between wellbeing values. Scotland showed higher values compared to England and Wales in terms of engagement with nature, transformative and social values. Within England, perhaps surprisingly the East coast scored highest, particularly in terms of broad therapeutic benefits and place identity. The Southeast consistently had the lowest scores for all types of benefits compared to other regions. However, these are relative rankings; actual mean factor scores for all sites across regions are all positive.

Finally, we analysed correlations between monetary and non-monetary results of the survey. While there were highly significant correlations between the TC and CVM monetary results (previous section), correlations between per-site mean wellbeing scores and individual TC and CVM per-site results were all insignificant ($p>0.10$). However, there was a highly significant negative rank correlation between non-monetary values and aggregated anglers recreational (TC) values ($\rho=-0.41$, $p<0.0001$), so sites with the highest aggregate recreational use values for anglers tended to rank lowest in terms of their individual non-monetary value. A similar pattern for divers was absent, and there were no significant correlations between aggregate CVM non-use values and non-monetary values ($p<0.0001$).

Table 17 Ranked loadings of 5-pt indicators in Factor Analysis

Factor	*Factor theme*	*Factor mean & standard deviation*	*Cronbach's alpha*	*A priori construct*	*Indicator*	*Loading*	*Mean score (divers)*	*Mean score (anglers)*
1	Engagement and interaction with nature *23% variation*	*4.04±0.6*	*0.87*	Knowledge	Visiting these sites has made me learn more about nature (9)	0.86	4.18	4.05
				Wholeness & reflection	Visiting these sites makes me feel more connected to nature (3)	0.71	4.16	4.09
				Aesthetics	I have felt touched by the beauty of these sites (12)	0.60	4.17	3.87
				Participation	I feel like I can contribute to taking care of these sites (11)	0.49	3.82	4.03
				Inspiration	These sites inspire me (13)	0.48	3.99	4.04
2	Place Identity *18% variation*	*3.63±0.81*	*0.83*	Place identity	These sites feel almost like a part of me (5)	0.92	3.33	3.65
				Place identity	I feel a sense of belonging in these sites (6)	0.68	3.62	3.85
				Place identity	I miss these sites when I have been away from them for a long time (8)	0.46	3.74	4.04
3	Therapeutic value *17% variation*	*4.02±0.74*	*0.83*	Reflection	Visiting these sites clears my head (1)	0.84	3.93	4.05
				Freedom	Visiting these sites gives me a sense of freedom (15)	0.58	4.12	3.85
				Health	Visiting these sites leaves me feeling more healthy (14)	0.52	3.93	4.20
-	Spiritual value	3.85±*0.95*		Wholeness & reflection, spiritual value	At these sites I feel part of something that is greater than myself (4)	na	3.86	3.83
	Social bonds	3.95±*0.88*		Social bonds	I have made or strengthened bonds with others through visiting these sites (10)	na	4.00	3.82
	Transformative value	4.26±*0.76*		Wholeness & reflection, transformative value	I've had a lot of memorable experiences in these sites (7)	na	4.28	4.17
	Not taken forward Mean=3.79±*0.89*			Wholeness & reflection	I gain perspective on life during my visits to these sites (2)	na	3.75	3.88

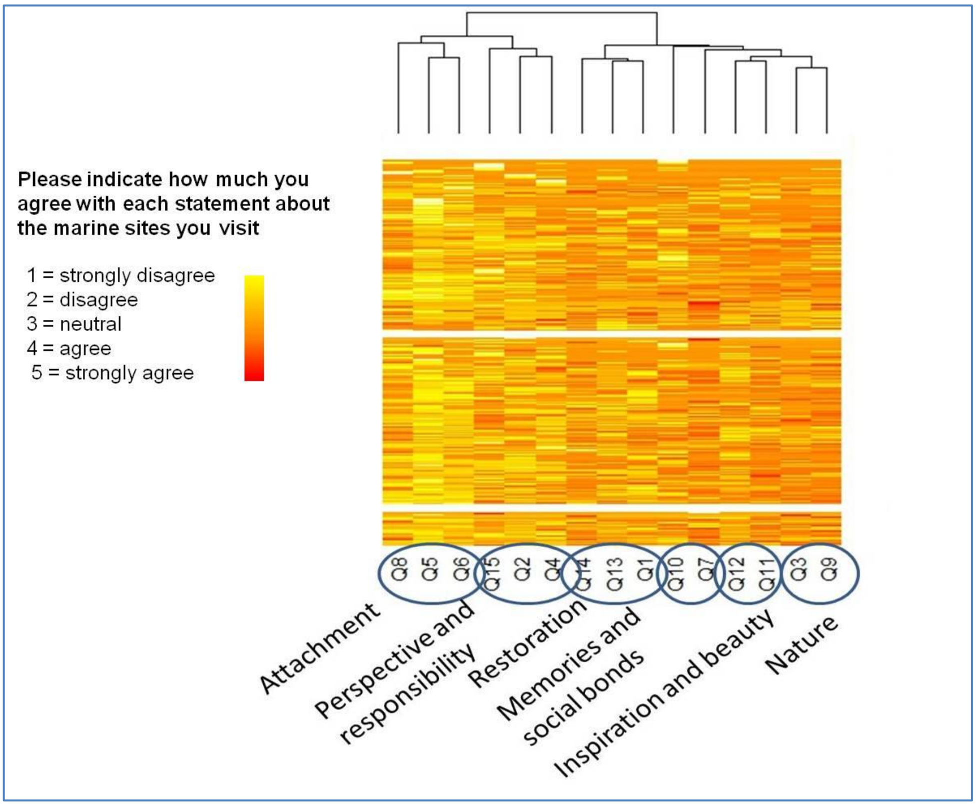


Figure 41 Cluster analysis of wellbeing scores. The scores given by all participants are shown for each wellbeing indicator. The dendrogram represents the degree of similarity between indicator scores. For question/indicator numberering see Table 17.

Table 18 Absolute and relative subjective wellbeing value of rMCZs in England, pMPAs in Scotland and Welsh existing marine SACs. Numbers represent smoothed mean scores on 5-point Likert scale where >3 is positive and <3 is negative. Colours indicate the upper (bright green), middle (pale green) and lower (yellow) third of site rankings across UK sites.[30]

Identifier	*Name*	*Engagement*	*Identity*	*Therapeutic*	*Spiritual*	*Transfor-mative*	*Social*
England: Sites being considered for designation in 2013							
Balanced Seas							
BS11.4	Folkestone Pomerania	4.00	3.80	4.15	3.91	4.45	4.05
BS13.2	Beachy Head West	4.02	3.70	4.15	3.91	4.31	4.00
BS16	Kingmere	4.02	3.56	4.26	3.96	4.29	3.92
BS2	Stour & Orwell Estuaries	3.87	3.72	3.94	3.50	3.67	4.00
BS25.1	Pagham Harbour	3.96	3.59	4.14	3.76	4.06	3.76
BS26	Hythe Bay	4.04	3.77	4.13	4.00	4.40	4.20
BS3	Blackwater, Crouch, Roach and Colne Estuary	4.07	3.96	4.41	4.00	4.44	4.44
BS6	Medway Estuary	3.90	3.70	4.10	3.90	4.40	3.40
BS7	Thanet Coast	3.84	3.68	4.02	3.55	4.27	3.77

30 Four Scottish search areas that were included in the survey and our original analysis but that will not be put forward for consultation, at least initially, have been moved to Annex 1.

Identifier	Name	Engagement	Identity	Therapeutic	Spiritual	Transfor-mative	Social
Finding Sanctuary							
FS14	Poole Rocks	4.02	3.62	4.01	3.93	4.21	4.07
FS16	South Dorset	3.99	3.60	4.10	3.78	4.28	4.12
FS19	Chesil Beach and Stennis Ledges	3.95	3.58	4.02	3.68	4.25	3.97
FS22	Torbay	4.13	3.63	4.13	3.97	4.39	3.92
FS24	Skerries Bank and surrounds	4.14	3.67	4.16	3.86	4.23	3.93
FS27	Tamar Estuary	4.00	3.72	4.03	3.91	4.33	4.12
FS28	Whitsand and Looe Bay	4.02	3.53	3.93	3.93	4.36	3.91
FS29	Upper Fowey & Pont Pill	4.43	4.44	4.33	4.17	4.67	4.50
FS32	The Manacles	4.04	3.48	4.06	3.86	4.36	4.07
FS35	Isles of Scilly	3.98	3.65	4.04	3.89	4.30	3.93
FS38	Padstow Bay and surrounds	4.56	4.20	4.63	4.28	4.56	4.44
FS41	Lundy	4.25	3.55	4.03	4.14	4.41	4.00
FS7	East of Haig Fras	3.80	3.67	4.33	4.50	4.50	4.00
Irish Sea							
ISCZ11	Cumbria Coast	4.25	3.97	4.39	4.17	4.33	4.00
ISCZ14	Hilbre Island Group	3.63	2.76	3.76	3.29	4.43	3.29
ISCZ5	North of Celtic Deep	3.93	3.44	3.67	3.33	4.00	4.00
ISCZ8	Fylde Offshore	4.13	4.56	4.22	4.67	5.00	4.33
Net Gain							
NG13a	Aln Estuary	4.17	3.38	3.86	3.86	4.43	4.00
NG15	Rock Unique	4.27	3.33	4.44	4.00	4.67	4.33
England: Sites not being considered for designation in 2013							
Balanced Seas							
BS10	The Swale Estuary	4.14	3.80	4.50	4.10	4.50	4.10
BS11.1	Dover to Deal	4.03	3.88	4.24	4.06	4.31	4.00
BS11.2	Dover to Folkestone	3.78	3.60	4.00	3.62	4.08	4.04
BS13.1	Beachy Head East	4.02	3.61	4.20	4.00	4.36	4.16
BS14	Offshore Brighton	3.81	3.48	3.89	3.69	4.14	3.86
BS17	Offshore Overfalls	3.94	3.73	4.06	3.81	4.33	4.05
BS19	Norris to Ryde	3.84	3.71	3.86	3.35	4.18	3.59
BS20	The Needles	3.97	3.73	4.04	3.59	4.09	4.00
BS21	Wight-Barfleur Extension	3.40	3.22	3.50	3.33	3.67	3.67
BS22	Bembridge	3.73	3.27	3.81	3.29	4.06	3.71
BS23	Yarmouth to Cowes	4.07	4.07	4.17	3.89	4.22	4.06
BS24.2	Fareham Creek	3.42	3.33	3.67	3.00	3.67	3.67
BS25.2	Selsey Bill and the Hounds	3.90	3.54	3.96	3.61	4.12	3.94
BS28	Utopia	3.57	3.18	3.71	3.47	4.07	3.47
BS29	East Meridian	3.71	3.35	3.80	3.72	4.06	3.72
BS30	Kentish Knock East	4.00	4.00	4.39	4.33	4.17	4.00
BS31	Inner Bank	3.71	3.37	3.93	3.67	4.00	3.44
BS5	Thames Estuary	3.88	3.95	4.33	4.00	4.31	4.00
BS8	Goodwin Sands	3.84	3.87	4.03	3.60	4.40	4.00
BS9	Offshore Foreland	4.07	3.78	4.11	4.00	4.27	3.93
BSra18	St Catherine's Point West	4.00	3.67	4.05	3.50	4.30	3.80
Finding Sanctuary							
FS10	Celtic Deep	4.40	4.27	4.40	4.40	4.80	4.20
FS11	East of Celtic Deep	4.44	4.15	4.19	4.00	4.56	4.33
FS12	Western Channel	3.81	3.46	3.71	3.75	4.00	3.69

Identifier	*Name*	*Engagement*	*Identity*	*Therapeutic*	*Spiritual*	*Transfor-mative*	*Social*
FS13	South of the Isles of Scilly	4.15	3.64	3.95	3.85	4.46	3.77
FS15	Studland Bay	4.16	3.82	4.15	4.02	4.39	4.12
FS17	Broad Bench to Kimmeridge Bay	4.10	3.56	4.05	3.80	4.29	4.02
FS18	South of Portland	3.89	3.52	4.01	3.67	4.31	4.02
FS20	Axe Estuary	4.28	3.78	4.24	3.73	4.40	4.20
FS21	Otter Estuary	4.16	3.87	4.23	3.90	4.50	4.20
FS23	Dart Estuary	4.30	3.99	4.29	4.21	4.46	4.17
FS25	Devon Avon Estuary	4.06	3.52	3.99	3.90	4.29	4.10
FS26	Erme Estuary	4.15	3.77	4.13	3.85	4.54	4.04
FS30	South-East of Falmouth	4.09	3.54	3.99	3.79	4.21	4.08
FS31	South of Falmouth	4.14	3.55	4.04	3.79	4.23	4.08
FS33	Mounts Bay	4.13	3.76	3.96	4.04	4.50	3.96
FS34	Land's End	4.33	3.86	4.27	4.23	4.45	4.00
FS36	Cape Bank	4.30	4.06	4.50	4.00	4.83	4.00
FS37	Newquay and the Gannel	4.19	3.70	4.26	4.00	4.33	4.00
FS39	Camel Estuary	4.35	4.00	4.03	4.17	4.33	3.67
FS40	Hartland Point to Tintagel	4.43	4.05	4.28	4.46	4.31	4.31
FS42	Taw Torridge Estuary	4.00	3.27	3.73	3.40	4.40	3.60
FS43	Bideford to Foreland Point	3.86	3.37	3.82	3.41	4.24	3.65
FS44	Morte Platform	3.88	3.40	4.27	3.80	4.60	4.40
FS45	North of Lundy (Atlantic Array area)	4.06	3.83	4.02	3.79	4.36	4.14
FS9	South of Celtic Deep	5.00	5.00	5.00	5.00	5.00	5.00
Fsra	The Fleet	4.11	3.88	4.34	4.08	4.44	4.06
FSra10	The Fal	4.23	3.92	4.25	4.16	4.29	4.35
FSra11	Swanpool	3.96	3.65	4.17	3.69	4.25	4.13
FSra5	South-East of Portland Bill	3.95	3.53	4.05	3.76	4.35	4.13
FSra7	Lyme Bay	3.99	3.60	4.02	3.94	4.23	3.90
FSra9	Mouth of the Yealm	4.01	3.64	3.98	3.85	4.32	3.98
Irish Sea							
ISCZ1	Mud Hole	3.93	4.22	4.00	4.33	4.67	4.33
ISCZ10	Allonby Bay	4.08	4.40	4.27	4.60	4.60	4.40
ISCZ13	Sefton Coast	4.15	4.33	4.33	4.25	4.75	4.75
ISCZ15	Solway Firth	4.02	4.03	4.20	4.10	4.40	4.10
ISCZ16	Wyre-Lune	3.95	3.79	3.91	3.82	4.27	3.73
ISCZ17	Ribble	3.97	4.00	4.19	3.86	4.43	4.00
ISCZ2	West of Walney co-location zone	3.89	3.71	3.95	3.86	4.57	4.00
ISCZ3	North St George's Channel	3.80	3.29	3.81	3.71	4.14	4.07
ISCZ4	Mid St George's Channel	3.86	3.52	4.05	3.71	4.14	3.86
ISCZ7	Slieve Na Griddle	3.70	4.17	3.67	4.50	4.00	4.00
ISCZRAk	Tarn Point	4.00	4.00	4.17	4.25	4.25	4.00
ISCZRAt	Cunning Point	4.12	4.40	4.27	4.60	4.60	4.40
ISCZRAw	Barrow South	4.30	3.94	4.56	4.00	4.33	4.17
ISCZRAy	Barrow North	4.13	3.89	4.33	3.33	4.00	4.00
Net Gain							
NG01c	Alde Ore Estuary	4.05	3.58	4.17	3.50	4.25	4.50
NG10	Castle Ground	4.09	3.77	4.00	4.00	4.46	3.85
NG11	Runswick Bay / Boulby	4.05	3.64	4.00	3.80	4.27	4.00
NG12	Compass Rose	3.73	3.61	3.83	4.00	4.33	4.00
NG13	Coquet to St Mary's	4.02	3.79	4.15	3.81	4.50	3.85
NG14	Farnes East	4.09	3.69	4.15	3.92	4.50	4.17

Identifier	*Name*	*Engagement*	*Identity*	*Therapeutic*	*Spiritual*	*Transfor-mative*	*Social*
NG1b	Orford Inshore	4.30	4.17	5.00	4.00	4.50	5.00
NG2	Cromer Shoal Chalk Beds	4.19	3.81	4.06	3.87	4.09	4.13
NG4	Wash Approach	4.00	3.80	4.00	4.00	4.40	3.80
NG5	Lincs Belt	4.05	4.13	4.29	4.13	4.50	4.00
NG6	Silver Pit	4.10	4.33	4.17	4.50	5.00	4.50
NG8	Holderness Inshore	4.12	3.94	4.20	4.06	4.47	4.06
NG9	Holderness Offshore	4.00	4.00	4.21	3.82	4.36	4.18
NGra11	Berwick Coast	4.10	3.82	4.15	4.03	4.53	4.00
NGra2a	Seahorse Lagoon and Arnold's Marsh	4.36	4.40	4.60	4.40	4.40	4.20
NGra3	Glaven Reedbed	4.50	4.33	4.50	4.50	4.50	4.50
NGra4	Blakeney Marsh	4.40	4.25	4.50	4.50	4.75	4.50
NGra5	Blakeney Seagrass	4.80	4.00	4.67	5.00	5.00	5.00
NGra7	Seahenge Peat and Clay	4.32	4.33	4.53	4.40	4.40	3.80
NGra9	Flamborough Head No Take Zone	3.97	3.52	3.97	3.87	4.30	3.83
Scotland							
ARR	South Arran	4.31	3.62	4.03	4.23	4.46	4.08
CSS	Clyde Sea Sill	4.13	3.70	4.06	4.04	4.61	4.00
DLA	Lochs Duich, Long and Alsh	4.28	3.81	4.15	4.09	4.51	4.26
ECC	East Caithness Cliffs	4.22	3.83	4.17	3.70	4.40	4.20
FOF	Firth of Forth Banks Complex	3.98	3.80	3.97	3.83	4.50	4.17
FTH	Fetlar to Haroldswick	4.07	3.63	4.11	4.00	4.33	3.44
LCR	Loch Creran	4.31	3.87	4.12	4.15	4.67	4.27
LFG	Upper Loch Fyne and Loch Goil	4.21	3.82	4.05	4.11	4.53	4.08
LSU	Loch Sunart	4.23	3.84	4.26	4.00	4.47	4.19
LSW	Loch Sween	4.36	3.74	4.24	4.00	4.67	4.17
MOI	Monach Isles	4.23	4.22	4.44	4.33	4.67	4.00
MTB	Mousa to Boddam	3.95	3.54	4.13	4.13	4.38	3.88
NOH	Noss Head	4.00	3.56	3.89	4.00	4.33	3.67
NWO	North-west Orkney	4.24	3.88	4.10	4.30	4.55	4.10
NWS	North-west sea lochs and Summer Isles	4.21	3.69	4.06	4.08	4.46	4.14
PWY	Papa Westray	4.17	3.89	3.94	4.50	4.33	3.83
SJU	Loch Sunart to the Sound of Jura	4.18	3.79	3.99	4.01	4.57	4.13
SMI	Small Isles	4.24	3.74	4.06	4.27	4.58	4.23
TBB	Turbot Bank	3.88	3.47	3.87	3.80	4.20	3.60
WYR	Wyre and Rousay Sounds	4.08	3.79	3.92	4.38	4.25	3.38
Wales							
W1	Cardigan Bay/ Bae Ceredigion	4.16	3.91	4.26	4.00	4.40	4.23
W2	Pembrokeshire Marine/ Sir Benfro Forol	4.08	3.77	4.12	3.83	4.38	4.12
W3	Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau	4.25	3.77	4.15	3.86	4.44	3.94
W4	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd	4.06	3.67	4.13	3.65	4.35	4.00
W5	Dee Estuary/ Aber Dyfrdwy	4.49	4.30	4.48	4.33	4.67	4.22
W6	Severn Estuary/ Môr Hafren	3.84	3.80	3.93	3.80	4.30	3.80
W7	Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay	4.16	3.81	4.09	3.80	4.49	4.07

4 Discussion

The current designation and implementation process of the MPA network in UK waters bears yet many unknown parameters, such as when and how many sites will be protected, management measures that will be put in place, and the degree to which these will restrict activities such as diving and angling. We developed our stated preferences approach to estimate the marginal values of marine users for various policy and management scenarios in the context of such uncertainties, which allows policy makers to adapt the survey outcomes to their information needs (McVittie & Moran 2010). The outcomes of this survey provide a range of monetary and non-monetary values for the cultural ecosystem services provided by an extensive list of currently proposed sites, but the flexible value functions from the travel cost and contingent valuation models can equally be adapted to future contexts.

Initially, we will discuss the outcomes of the choice experiment and contingent valuation models and aggregated monetary outcomes. Then, we will discuss individual and aggregated non-monetary values. Limitations of the different components of the study will be discussed per section. In a concluding discussion, we will bring the different streams of results together.

4.1 Monetary values

4.1.1 Anglers and divers' individual WTP

Our travel cost based choice experiment showed that, even using a relatively conservative approach for estimating mileage costs (Section 2.2.2), divers and anglers showed considerable WTP for recreational benefits. The most valuable benefits were large/specimen fish, wrecks, and for divers rock formations and charismatic species. There was a clear joint preference for areas where rare/protected species were present, while preferences for different habitats diverged between the two user groups.

In respect to sea life, underwater landscape and underwater objects, wrecks were highly valued by divers as well as anglers in both sets of models. For divers the structure of the shipwreck alone has a high scenic value, but in addition to that the surface of the wreck provides an artificial reef for marine life to grow on, which increases its scenic value further. The artificial reef character of a wreck also aggregates fish and is therefore an attractive angling ground. Finally, wrecks provide cultural heritage value. Divers and anglers had opposing preferences for rock formations and the occurrence of seals, with both being slightly negative for anglers in the CVM, whereas divers highly value them. Anglers' negative utility for these features could be explained by the possibility of angling gear getting caught in rock formations and seals being seen as a potential threat to local fish stocks.

The soft water corals, sponges and anemones habitat was seen as positive in both the TC and the CVM models. In terms of use values for anglers, these habitats may be thought of as fish breeding grounds and for divers they are highly scenic. However, given that this is the only habitat that made a consistent appeal in our CVM model, it may also have particular non-use value constituting a 'charismatic' habitat.

Other highly valued habitats in the TC models were honeycomb/rossworm reefs and tide-swept channels. Currents within the latter habitat are associated with a high productivity and abundance of life, while the currents themselves also have an appeal: "It's like watching a screen with everything moving past," as one diver put it in one of our discussion groups. For anglers, tide-swept channels act as fish funnels. Divers' appeared to have more developed preferences than anglers for other habitats, which is not surprising, given their more direct experience with and benefit from diverse underwater landscapes. Moreover, for divers, underwater habitats may help generate a sense of place. For anglers, habitat benefits are mainly indirect through fish refuge or nursery areas, while familiarity with different underwater landscapes is likely to be lower. This accords with other studies that have shown that increased exposure to marine habitats is associated with stronger values (Jobstvogt *et al.* 2013).

Nonetheless, both groups showed considerable WTP for the protection of vulnerable species within the proposed MPAs, even though the experimental framing made it clear that no recreational benefit would arise for either of the groups, i.e. neither increased fish catches nor increased chances of encountering marine life. This suggests attribution of existence value to these species, at least for the CVM results. However, it needs to be considered why existence values of species would encourage travel to a site. Value associated with the mere knowledge that species exist is perhaps not just an expression of moral conviction or a generalised *warm glow* (Carson, Flores & Meade 2001; Nunes & Schokkaert 2003). In this case it may also express what we call *place-based warm glow*, where being in the same place as rare species provides a satisfying emotional experience, which might have an *aesthetic* as much as a moral ground. Overall increasing environmental awareness among the general public has promoted the search for naturalness and authenticity in wildlife experiences (Smith 2012). The willingness of anglers and divers to pay for species protection without use value might come from the perspective that experiencing 'real' wilderness is a goal to strive for (Cronon 1996); while wilderness might be associated with the existence of high numbers of rare species at the recreational site. Participants might have also associated a generally improved ecosystem health with a higher number of rare species and might have inferred improvements to future recreational use; expressions of willingness to pay tend to include non-use as well as use-based considerations (Carson 2000). Regardless of motivation, species protection increases the chance of divers and anglers visiting an area.

The size of the protected area did not have an effect on how divers made their choices for travel or, against our *a priori* expectation, how much they were willing to donate. For anglers, protected area size had a small but significant negative effect on travel choice. Ongoing discussions with anglers and divers suggest that larger sites do not necessarily create additional benefit for pursuing the activity. In addition, anglers, who in discussions appear more concerned about restrictions to their access than divers, may fear that large protected areas have a greater chance of limiting access than smaller ones. While participants were not sensitive to scope in terms of size, they were sensitive to scope in terms of features and species present. Thus results reflect that both user groups do not primarily depend on large areas to enjoy their activity, as long as the site provides them with the site characteristics they desire. Focus group participants stated that one of the most important pre-conditions for their activity is access to a diverse range of sites, whether small or large. An artefact of our experimental framing was that, for sake of simplicity, participants were only confronted with one set of characteristics for each site, whereas large sites may have multiple. However, we believe that in the aggregate models this shortcoming of our framing was counterbalanced by the fact that larger areas have a higher likelihood of being frequented more often, and are more likely to have a wider range of attractive characteristics, more habitats and protected species, etc.

As to restrictions and access, preferences between divers and anglers diverged. In the TC model, access via the shore only as a result of prohibition of boat use was seen as negative by divers but positive by anglers. Conversely, divers preferred sites with restrictions on anchoring and mooring, whereas for anglers this made no difference to their travel choices. Divers apparently were, on the one hand, interested in flexible access for themselves, while on the other they appear to be in favour of restrictions on others. In our focus groups, in relation to other users, divers mainly expressed safety concerns, and restrictions on anchoring, mooring, potting and gillnetting might reduce the likelihood of ropes, anchor lines and nets in the water.

In terms of restrictions on commercial fisheries, results were more straightforward, illustrating the different framing of the TC and CVM exercises. In the TC model, both groups were indifferent to dredging and trawling restrictions, indicating that these would not influence whether or not they would visit a site. However, these restrictions strongly influenced how much respondents wished to donate in the CVM exercise, showing that survey participants were strongly in favour of protecting sites from damaging impacts of commercial fisheriesfisheries.

4.1.2 Internal validity and interpretation of value outcomes

In terms of significant individual characteristics: income, age, experience, education, support for an environmental organisation, and support for MPAs, these were all highly significant in their respective models and had the expected signs, providing a measure of internal validity (Arrow *et al.* 1993; Chambers, Chambers & Whitehead 1998). Significant distance decay in the CVM model reveals a preference to donate for sites that are closer by. This is not unexpected, given that our valuation involves users, and these users will be keener to protect the sites that they actually use from harm and degradation. This accords with other outcomes of the CVM model, which suggest that site evaluation generally took place from the perspective of protecting sites for potential or future use. However, distance decay appears too weak to make it feasible that the entirety of the CVM values are based on option-use values; indeed aggregation results (Section 2.4.3) showed that remote sites far from the main centres of human inheritance still carry significant value, and existence and bequest values also featured as consistent arguments for protection in focus groups. Thus anglers and divers have plural motivations for WTP to protect the marine environment; protecting sites for diving and angling specifically, but also protecting biodiversity for its own sake regardless of whether this would bring any recreational benefits.

Support for MPAs as a parameter did not significantly influence travel decisions, but it was one of the strongest predictors of WTP in the CVM. This suggests that the values expressed in the CE were clearly different from those in the CVM. Nonetheless, after transferring benefits, there were highly significant correlations between the rank orders of sites in terms of their CE/TC against CVM values. These results provide convergent validity to our results and also confirm our theoretical expectation of the type or components of value that the different instruments and framings elicited (see Section 2.1). Our travel cost based CE elicited current recreational values, which included use values but also, as we argued above, 'place-based' existence value. Our contingent valuation model adds an insurance value consisting of option and bequest values, plus generalised existence values.

4.1.3 Aggregate monetary values

The aggregated annual recreational use values elicited through the travel cost approach, and the willingness to pay for marine protection elicited through contingent valuation indicated the tremendous value that marine sites and their protection have to both divers and anglers. Maintaining or improving annual use values, and the option-use value that is one of the components of the value of protection, are naturally contingent on designation not significantly restricting diving and angling.

Values are not equal across sites; they depend on visitor numbers and geographical remoteness on the one hand, and also the features of the sites, including habitats, number of protected species, presence of charismatic species and underwater features. It also depends on the management of the sites: for example, the aggregate willingness to pay for protection for the 31 sites being proposed for designation in 2013 in England is 26-44 million for divers without specific restrictions put in place, but this increases to 30-51 million in the hypothetical scenario that dredging and trawling, potting and gillnetting are banned across sites.

For England, the mean current recreational value of the sites being proposed for designation in 2013 for divers (between 1.6-2.7 million) was considerably higher than that of the sites not being considered for designation in this tranche (0.7-1.1 million), possibly reflecting that these have outstanding ecological features, which add value for divers in particular, and that some of the most popular dive sites were included, particularly in the Finding Sanctuary region (Southwest England). For anglers sites being proposed for designation in 2013 did not have more value on average than those not being considered. Nonetheless, if 31 of 127 rMCZs are designated only (at least initially), a considerable amount of value would go unprotected: 58-97 million annually for divers and 1.27-3.31 billion for anglers (reflecting that there are 5-10x more sea anglers than divers).

Designation is also likely to lead to considerable additional benefits. These can be split into the increase in annual use recreational value to divers and anglers if certain restrictions are put in place on other users, and the non-use value of protection, which includes option-use, bequest and existence values. We have discussed that the latter can be considered as an insurance premium that divers and anglers are willing-to-pay to protect against a risk of harm and degradation to the sites, with both the risk and the degree of potential harm uncertain (as is often the case with different types of insurance; Section 2.2). The increase in annual use value from protection measures would depend on the measures in place, reaching a maximum of 187-340 million for anglers and 20-34 million for divers[31] for England, if all recommended sites are eventually designated, with substantially lower amounts if only 31 sites are designated (Table 1 and Table 16).

The non-use value of protection for divers would be 26-51 million for the 31 sites and 102-199 million for all sites depending on protection measures in place, and for anglers 159-339 million and 628 million -1.34 billion respectively (Table 1 and Table 16). For Scotland, use values for anglers are considerably lower as a result of considerably lower visitor numbers for anglers, though not divers. However, non-use values, which are not a function of visits, are substantial.

4.1.4 Comparison to other studies

The various indicators of internal validity that we have discussed above suggest that results can be considered robust. External validity can be examined through comparison with other studies.

Only a very limited number of studies on WTP by divers and anglers for marine recreation and conservation is currently available. Current UK and European studies are mostly based on market values and do not provide measures of individual WTP, while our approach focused on estimating non market values of divers & anglers, beyond what they pay for their leisure in terms of accommodation, food, equipment, etc. Non-market valuation studies for divers mainly exist for low latitude destinations, such as the Caribbean Sea, Indian Ocean, Australia, or South-east Asia, and mainly involve international tourists (Carr & Mendelsohn 2003), whereas in the UK diving is mainly pursued by UK residents. Examples using a travel cost approach show $790 per person per trip for the Phi Phi Island Marine National Park, Thailand (Seenprachawong 2003) and $350-800 per person per visit to the Great Barrier Reef, Australia (Carr & Mendelsohn 2003). The high values express the increased costs for such international dive trips and are not easily compared to our UK survey, also because it is more problematic to assume that the whole cost of the trip can be attributed to diving activity alone. They do indicate however the high WTP of divers to pay for trips to excellent dive sites such as the Great Barrier Reef. In terms of aggregate amounts, high visit counts for UK sites indicate that divers (like anglers) spend considerable amounts of time on their activities. Nonetheless, the magnitude of aggregate recreational values of the English rMCZs network (£103-173 million current value for divers excluding additional value of management scenarios; 1.8-3.3 million diver visits) is almost a magnitude lower than the $0.7-1.3 billion for the Great Barrier Reef for about the same visitor count (2 million per annum).

As for angling, US sea anglers were willing to pay $15 - $97 per day in travel costs, amounting to $0.31 - 1.83 billion per year for California alone (2.7 million anglers) (Pendleton, Rooke & North

[31] Note that this does not account for potential increases in use value and potential increased visitor numbers from ecological improvements that may result from designation (Section 4.2).

2007). These results are of a very similar magnitude to UK figures; in England mean TC WTP was £50.95 and aggregate value came to £1.77-3.22 bln (noting that cost of driving is considerably lower in the US than the UK). In the California study, daily expenditure beyond travel cost ranged between $21 - $564.

In terms of marine contingent valuation studies, the use of entrance fees as a payment vehicle to protect sites and maintain or increase site quality has been the most common approach across studies (though this would not have been a credible approach within our context). International divers were WTP between $27 and $63 per person per year for one of Thailand's marine national parks (Asafu-Adjaye & Tapsuwan 2008). Other CVM diver surveys elicited values of more or less the same magnitude. The following values are per diver per year: for the Florida Keys, USA $50 (Park, Bowker & Leeworthy 2002), for Bonaire Marine Park, Caribbean $17 (Dixon, Scura & Hof 1994), Phi Phi Island, Thailand $7 (Seenprachawong 2003). A Scandinavian CV survey found non-use values for sea-angling ranging between $56 (Sweden) and $140 (Iceland) per angler per year (Toivonen *et al.* 2004). An angler CV survey for England and Wales showed that the value which sea anglers were WTP for their overall angling experience per annum in addition to their trip expenditure (including travel cost) ranged between £381 for shore anglers and £886 for boat owners (Drew Associates 2004). These values are of a similar magnitude to our aggregate values per angler. If we take the aggregate CVM value for all sites that we assessed and divide this by the estimated population of anglers, we would come to a central estimate of £739 per angler, although apart from the seven Welsh SACs we did not consider sites that were not pMPAs.

A choice experiment survey asking UK residents for their willingness to pay to halt biodiversity loss in a UK network of MCZs estimated an aggregate value of £1714 million for the whole of UK, with England accounting for £1510 million alone (McVittie & Moran 2010). The study supports the high non-use values found within our study, showing that participants were willing to pay considerable amounts of money for marine protection, without direct use benefits to them personally. Comparing the aggregated value for the English part of the MPA network by McVittie & Moran with our estimate of £102-196 million for divers and £630-1343 million for anglers, values are of the same magnitude. Hence, as individuals, divers and anglers, as users, are willing to pay considerably more than the general public for marine conservation, considering that our results are based on 0.15 - 0.25 million divers and 1.1 - 2 million sea anglers (Section 1) vs. 25.95 million households in the UK (McVittie & Moran 2010). This difference was to be expected. First, most importantly, our values were based on a one-off donation payment vehicle, whereas McVittie & Moran used annual tax. Second, outcomes for users will have included option-use values, whereas this will not have been relevant for most members of the public who are non-users. Third, divers and anglers are more familiar with marine habitats and this may lead to increased WTP for their protection.

We can also briefly compare non-marketed ecosystem service values for divers and sea anglers with marketed values of recreation. For the UK, Pugh and Skinner (2002) and Beaumont *et al.* (2008) reviewed the economic value of the marine environment, not considering the values of the recreational ecosystem service benefits themselves, but rather considered the direct economic benefit to the tourism sector. Results suggested that the value for recreational marine activities (including diving and sea angling) would be worth £11.77 billion per annum. In terms of the direct expenditure of sea angling, Drew Associates (2004) estimated a direct contribution of £1.3 bln to the UK economy; similar estimates for UK diving are, to our knowledge, not available.

As to overall values of marine conservation measures beyond cultural services; Moran *et al.* (2007), assessing the impacts of the UK Marine Bill, estimated annual marginal benefits of three hypothetical MCZ networks of £0.9 - £1.9 bln for a wide range of ecosystem services (but not including non-use values), with value over 20 years summing to between £10.3 and £22.7 bln depending on the network scenario. Indurot (2012) estimated annual benefits of Scottish pMPAs between £566 - £758 million with net present value over 20 years coming to £6.3 – 10 bln, including non-use values derived from

McVittie and Moran (2010). In comparison, our estimates of one-off non-use value for conservation measures of £125-155 million for divers and anglers for Scotland appear modest.

In conclusion, comparison with the literature existing on marine user values, while limited in extent and mostly not directly comparable, at least suggests that the *magnitudes* of our individual WTP and aggregate value estimates fall within the range that might be expected.

4.2 Limitations of monetary estimates

While the magnitude of the study results appears realistic, nonetheless there are substantial limitations to the results, which relate to framing and sampling.

4.2.1 Sampling issues

In terms of sampling, there is considerable uncertainty about the real number of divers and anglers in the UK and their geographical distribution. Divers are organised in large-scale membership organisations, which allowed for comparison against member statistics. For sea anglers it is more challenging to evaluate representativeness of our sample as only competitive anglers tend to be organised on a national level. Compared to the Drew Associates (2004) sample, our sample is somewhat older, though income and education statistics are comparable. Anecdotal evidence (through comments on online forums, emails, and from stakeholders) suggests that anglers are hesitant to participate in and mistrusting of research in general, let alone around marine conservation, for fears of the introduction of license fees and restrictions. It is difficult to establish whether our sample, where 53% of our sample strongly supported extension of the MPA network (Section 3.1), is representative of their views on conservation. Nonetheless, anglers in general do appear to be highly aware of environmental issues. For example, the recent National Angling Survey shows that anglers are strongly concerned about commercial overfishing and habitat destruction, and see pollution and depletion of fish stocks as major issues (Brown 2012). Unfortunately, due to the timescale of this project, it was not possible to do sensitivity analysis of our results to sample composition.

A further limitation of the study was the impact of the sample size for anglers on the accuracy of visitor number estimates. 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. While survey respondents expressed high levels of certainty in terms of which sites they indicated they visited, the limited size of the angler sample meant that a smoothing method was needed for this user group to avoid random individual extremes from influencing site counts unduly (Section 2.2.4). As a result visits at highly popular sites might have been underestimated while visits at less popular sites might have been overestimated. As to total UK pMPA site visits (42 – 77 million for anglers and 2.7-4.4 million for divers), these may appear high. However, when we consider these figures per individual (17 visits per UK diver and 39 per sea angler), estimates look feasible, at least for divers. For divers, figures also match up well with 'days out' scores (Section 3.1). For anglers, the individual site visit mean exceeds the mean number of angling days out per sea angler, while we would expect the latter to be higher, as non pMPA sites are also included in the days out figure. However, many anglers make visits to multiple angling marks on a single day, which increases mean visits vs. mean days out. Also, the 'broken down' way that we asked respondents to state numbers of visits might generate more accurate results than an overall days out question framing, because it is easier to accurately state how often one visited a specific site over the last year. However, for small sites, particularly when they are named after a larger geographical unit (e.g. Lyme Bay) estimates may be overstated using this approach, because some participants may have responded to the larger geographical unit rather than the MPA area only, despite the explicit map provided. Compared to the National Angling Survey, which came to 34 *days out* across the UK for anglers in general, our estimates look high. However, this survey did not specifically look at days out for sea anglers. Sea angling may be considered a more intensive activity, which means there is probably a smaller tail of ocassional sea anglers than there is of occasional anglers, making it likely that the mean for sea anglers will be higher than that for anglers.

For Scotland, our *visit numbers* for sea anglers (1.2 - 2.1 million) appear high compared to a Scottish Government report (2009) that estimated 1.6 million *days out* (17 per individual). However, the two figures are not exactly comparable, and the Scottish Government study, like ours, suffered from considerable uncertainty as a result of a small sample size of sea anglers. Also, in that study, participants were unable to indicate when they spent more than 50 days out angling per annum, while our results and discussions with anglers suggest a considerable proportion of anglers do go out this often. Thus it is difficult to judge which study is more accurate. In hindsight, our survey could have included more questions to internally validate visitor numbers, and it is clear that more data needs to be gathered on diver and angler visits across the UK to get more accurate estimates of aggregate values. Aggregate recreational use values are proportional to visit numbers; hence they are highly sensitive to changes in visit estimates: if the latter would be reduced by half, the recreational use value would be reduced by the same degree. E.g. if anglers in reality visit pMPAs only 70% as much as they stated in this survey, aggregate annual recreational values in England would shift from 1.8-3.2. billion to 1.2-2.3 billion.

In conclusion, given our large sample size of divers and the face validity of the results, diver visit estimates and the recreational use values that depend on them appear robust, at least at the aggregate level. For anglers, the smaller sample gives rise to greater uncertainty. While estimates appear to be high compared to the very small number of existing studies, these also have their own significant limitations and more research is clearly needed to establish more certainty on anglers' recreation activity in relation to pMPAs. Angler visits to sites need to be read as *relative trends*, allowing us to distinguish popular from less popular sites, with considerable uncertainty about exact numbers. Angler aggregate recreational values need to be read as *indicative.* It is important to note that issues around visitor numbers did not affect estimates for the non-use value of protection, nor values at an individual level.

4.2.2 Framing issues

In terms of framing, there are further limitations to the study results, which overall suggest that our results were conservative estimates of the true value of these sites to divers and sea anglers.

First, in terms of the CVM framing, we used a voluntary contribution payment vehicle, which, although commonly used, is considered not fully 'incentive compatible', meaning that it does not fully reveal individual values (Arrow *et al.* 1993). In particular, voluntary donations may be reduced because of free rider concerns; respondents donate less because they do not trust others to donate because of the voluntary nature of the payments (Bush *et al.* 2012). 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. However, strategic bidding was effectively removed through control questions (Section 2.4.2).

Second, by not providing a local context, we omitted the added value of local features and benefits that were particular to specific sites and added to their specialness, an issue common to benefits transfer (e.g. Spash & Vatn 2006). This was mitigated to some degree, as a considerable number of divers responded to the valuation tasks by comparing the hypothetical sites in their mind to with local sites familiar to them. Also, by linking an innovative interactive mapping application and a novel subjective wellbeing instrument for assessing a holistic suite of cultural ES benefits, we combined monetary values with non-monetary values directly associated with real sites, which are at least as revealing as monetary measures and might be considered more appropriate for capturing specific intangible benefits of cultural ES.

Third, our estimates were based on an assumption of a set of natural features present; the set used was the selection of English FOCI and Scottish search features that underpinned recommendation of particular sites as an rMCZ or pMPA. On the one hand there is uncertainty about the presence of these features. Hence features might be valued that are not actually there, leading to overestimation of value. On the other, for some sites, there will be features of interest present, but the site wasn't necessarily designated for those specific features, as other sites in the network were used to meet target levels of those features. As we only accounted for features associated with recommendation, this suggests a downward bias. Moreover, a considerable knowledge exists (in particular in the UK National Biodiversity Gateway) for species that might be present and valued by divers and anglers that were not taken into account by the recommendation process or our analysis, again suggesting underestimation. A further note on features is that we were not able to establish data on the distribution of rock formations in Scotland, which provides a downward bias for divers' values for that country.

Fourth, we only investigated the value of protecting existing natural capital and did not account for potential environmental improvements in the state of MPAs, which might have increased their recreational value. Also, our aggregation method did not take into account the added value of the whole over the sum of parts, particularly the biodiversity benefits of designating an integrated ecological network. However, there is insufficient evidence available to estimate benefits in biodiversity terms and relate ecological improvements to ecosystem services and benefits enjoyed by divers and anglers.

Fifth, an artefact of our visit mapping system is that participants were restricted to providing visit numbers for sites in a single UK country or region of their choice (Scotland, East of England, Southeast England, Southwest England, and Northwest England and Wales). This meant that visits outside of the chosen region were not counted. In addition, visits by foreign tourists are not counted.

Six, our travel cost estimates were not only based on a conservative estimate of actual travel costs (Section 2.2.2), but also did not take boat use into account. Boat per mile costs are considerably higher than car costs, and rise steeply when boats are chartered (Pendleton, Rooke & North 2007). Also, travel cost by definition is a lower bound in terms of WTP for recreation as it does not account for additional expenditure in terms of accommodation, equipment etc. This will, however, be mitigated to some degree by the fact that multiple visits may take place in a day and that visits may take place partly outside and partly inside an MPA; both of these factors would reduce travel cost associated with the MPA.

As most of these issues suggest *underestimation* of values, we expect individual and aggregate estimates to represent a *lower bound* of willingness to pay for both the TC use values and CVM non-use values, at least for divers. For anglers, there is significant *uncertainty* around recreational values as a result of implications of the size of the sample for accuracy of visit numbers (although the latter affects TC-based use values only, as non-use values do not depend on visit counts).

A final limitation is that monetary results for Scotland are based on a preliminary configuration of sites. Our assessment utilised map layers from the 5th Scottish MPA stakeholder workshop[32], which was the latest state of Scottish network configuration available at the time of survey design. This means that, for some sites, boundaries have shifted, in some cases (e.g. Firth of Forth Banks) significantly. Our initial assessment included one site that has now been dropped (Gairloch and Wester Loch Ewe, although we recognise Northwest Scotland sea lochs has been extended to include Loch Ewe) and four sites in our assessment remained as search areas (Eye Peninsula to Butt of Lewis; Shiant East Bank; Skye to Mull; Southern Trench). These four search areas and Gairloch and Wester Loch Ewe have been removed from aggregate results but are presented in Annex 1. Targeted species and

[32] http://www.scotland.gov.uk/Resource/0039/00396098.doc

habitat features were updated on the basis of the *Report to Scottish parliament on progress to identify a Scottish network*[33]. Nonetheless, Scottish site and aggregate values are preliminary. Aggregate recreational use values at least give an indication of magnitude of value that is unlikely to change with the final network configuration. The non-use value estimates based on contingent valuation do not depend on visitor numbers, which means that value differences between the assessed and the final sites will be minor.

4.3 Subjective wellbeing values

Non-monetary results show that recreational users of the marine environment readily relate to a range of less tangible wellbeing benefits that can be measured and used to operationalise cultural ecosystem services and include them in discussions over marine protection.

The three factors that emerged from the analysis of subjective wellbeing indicators represented recognisable dimensions of wellbeing derived from environmental settings. *Engagement and interaction with nature* comprised benefits derived from the particular nature and aesthetic appeal of sites and a desire to get to know them and protect them. These indicators appear to be closely linked in the minds of divers and anglers, whose recreational activities are directly bound to the natural characteristics of the sites they visit. Indeed indicators representing nature, inspiration and beauty received consistently high scores from both divers and anglers. The indicators that load on this facto all are *relational* in some way. The dimension *place identity* largely overlapped with similar constructs from the literature conveying sense of identity and sense of place. Place identity describes the significance that certain places have for people where, through attachment and a sense of belonging, place becomes a part of individual identity. This aspect of one's place-related wellbeing may develop and strengthen over time and thus is linked to a sense of belonging and a sense of continuity in peoples' lives (Proshansky, Fabian & Kaminoff 1983; Twigger-Ross & Uzzell 1996; Horwitz, Lindsay & O'connor 2001; Manzo 2003). The third factor, *therapeutic value*, included indicators describing the value of sites for personal reflection and providing a sense of freedom, mental clarity and health. The indicators all referred to being in contact with nature *resulting* in a particular benefit. Together these indicate the therapeutic benefits provided by sites, mirroring those identified in greenspace literature (e.g. Irvine *et al.* 2013). Indeed, the pursuit of maritime recreational activities are recognised to have positive effects on physical and mental health (Lloret 2010) and waterside habitats have been shown to be particularly effective in lifting the mood of visitors (Barton & Pretty 2010). These three factors explained 58% of the variation in the data suggesting that they captured the main elements of wellbeing experienced at marine sites. The degree of unexplained variation is not surprising, given that three out of four indicators that did not load onto the three factors had face validity as separate dimensions. These individual indicators representing other aspects of wellbeing deemed to be important for divers and anglers described spiritual and transformative/memorable experiences and social connections and were analysed separately to ensure that we could accurately reflect the range of non-monetary values associated with sites. On average divers scored sites most highly in terms of the memorable experiences they have had there. This was also very important to anglers; second only to the therapeutic benefits felt by visiting sites. Although there were differences between divers and anglers, more notable is the high degree of similarity between the two groups, both in terms of value structure and value scores. For example, the highest scores for both groups were found with indicators related to engagement with nature (Table 17). Sea anglers and divers thus clearly share place-based values around marine sites, and as such may have many common interests.

The results identified clear differences in the levels of wellbeing experienced at sites in different regions of the UK. The high ranks given to sites in Scotland for engagement with nature are perhaps unsurprising, given the widely perceived scenic beauty of the Scottish coastal landscape. The North

[33] http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork/MPAParliamentReport

of England received the highest ranks within England although those of the South West were only slightly lower. Sites in the South East of England received the lowest ranks across all categories. In the most a densely populated area of the UK, the relative busyness of sites may be less beneficial for individual wellbeing. This appears to be confirmed by the negative correlation between individual non-monetary wellbeing scores and aggregate recreational use value, (which is strongly dependent on visitor numbers), at least for anglers. However, scores for place identity were similar across all regions suggesting that people broadly have similar feelings of identity from sites local to them across the country.

In terms of the set of 31 English rMCZs being put forward for designation in 2013, most score average or below average, with a small number of exceptions: Flyde Offshore in the Irish Sea, Padstow Bay in the Southwest and Rock Unique in the NorthEast of England. In contrast, none of the five highest ranked English sites: South of Celtic Deep, Blackeney Seagrass, Orford inshore, Blackeny Marsh or Glaven Reedbed (all with at least 5 of 6 factor scores in top third; Table 18), are being proposed for designation in 2013. However, apart from the Blakeney sites, these sites have low visitor numbers, which give them low recreational values, and WTP for protection is also relatively low (Table 16), illustrating that these sites on the one hand are of relatively low monetary value but bring very high subjective wellbeing benefits to those that do visit them.

It is important to bear in mind that despite the existence of regional trends, marine sites across the UK were consistently beneficial for a range of well-being measures. A further consideration for evaluating the overall non-monetary or wellbeing benefits of marine sites is the number of visitors they receive. While the Southeast England sites may provide lower levels of wellbeing per person than other regions, the number of people enjoying the benefits is far higher: approximately twice as many divers and anglers visited pMPAs in England as in Scotland (Table 16).

The main limitations of the non-monetary study are twofold. First, the anglers' sample was relatively small and difficult to evaluate in terms of representativeness (see Section 4.2.1, above). Second, due to time constraints, we used a relatively simplistic approach to establishing site scores by taking site means rather than using a statistical model to deduct the relative contribution of each site to individual participants' scores (as participants were asked to score taking more than one site in mind; Section 2.2.5). As such we cannot rank sites using a probability-based method and estimate with what degree of certainty one site ranks over another. Nonetheless, the colour-coded ranking in thirds is likely to provide a realistic representation of trends, and the highly significant negative correlation between aggregate recreational value as a function of visitor counts and individual subjective wellbeing provides convergent validity to the overall ranking.

The subjective wellbeing indicators used in this study provided a useful range for assessing a wide range of non-tangible ecosystem benefits. However, the development of standardised closed-ended self-report measures around cultural ES remains a fruitful area for future research.

4.4 Conclusions

This study has shown the importance of accounting for the non-market values of beneficiaries of marine conservation, which are wide-ranging. The value of marine sites and their conservation is considerable for the user groups considered, with both use and non-use values into the billions of pounds. Comparison of the monetary results with other sites and measures of internal and convergent validity of the travel cost and contingent valuation estimates suggest individual and aggregate results are robust overall and within a range that might be expected from the literature, though as a result of the framing of the design likely represent a lower bound of value (with further uncertainty around use values of anglers). Moreover, this research only considered the values of two user groups, whereas there are many other water users (e.g. surfers and yachters), and non-users in the general public, whose values are not accounted for. Hence, if we are to fully account for the benefits of the marine environment, much more valuation research is needed. Moreover, it may be difficult for respondents to fully articulate some aspects of the value they place on marine environments in surveys of this type, and more participatory and deliberative methods may be needed to help understand these values (also see Box 1, p.27).

Values reflect the engagement and concerns of marine users. For example, in the National Angling Survey, involvement in environmental work was the most popular option for those anglers who were interested in new services and skills. Over-fishing by the commercial fleet was cited as the biggest threat to angling by 73% and tighter controls and protected areas were the two most highly ranked response options (Brown 2012). For divers, we are unaware of studies that consider their values or concerns about the marine environment, but the publications, guidelines and stances of large-scale membership organisations such as BSAC and ScotSAC suggest UK divers reflect similar sentiments.

The assessed monetary benefits of the two marine user groups are likely to outweigh best estimates of the cost of designation, as far as they are known[34]. The English MCZ impact assessment[35] estimated aggregate costs at present value over a 20 year time scale for all 127 rMCZs at £227 - 821 million including costs to the renewable energy sector, the fisheries sector, oil and gas, commercial shipping, recreation, and implementation, management and enforcement costs. The baseline, one-off *non-use value of protecting the sites* to divers and anglers alone would be worth £730 – 1,310 million, 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. Only taking these non-use values into account indicates a benefit - cost ratio for designation of -1.1 (lower bound of minimum benefits vs. highest estimate costs) to 5.8 (upper bound of minimum benefits vs. lowest estimate costs). Comparing the impact assessment best estimate costs scenario (£331 million) to a central estimate of the mimimum benefits expected (£957 million) leads to a benefit - cost ratio of 3.1. Although these figures come with a number of limitations (Section 4.2), designation of 127 sites is most likely efficient, even without accounting for the benefits of restrictions on others to divers and anglers, potential inceases in use values resulting from designation, or the values of other user groups and the non-use values of the general public.

For Wales, designation of the seven marine SACs already supports a current annual recreational value of £68 – 122 million and generates a one-off non-use value of £66-129 million.

For Scotland, the areas assessed currently provide an estimated £67 – 117 million in annual recreational benefits. Their protection would generate a total one-off non-use value of £125 – 255 million[36].

However, there are significant limitations to these figures. Estimates of non-use value of protection may be considered *underestimates*. Total recreational use estimates need to be read as *indicative only* (Section 4.2).

The study suggests that, where there are significant visitor numbers, if sites would carry access restrictions to divers and anglers, this could result in significant reduction of cultural ecosystem service benefits[37]. Of further interest is the apparent negative correlation between aggregate recreational values and visitor numbers on the one hand, and individual wellbeing scores on the other. Although the non-monetary valuation utilised for assessing cultural ecosystem service benefits

[34] Both costs and benefits depend on site-specific management regimes that are still uncertain. The low-cost scenario assumes that there are only very limited management restrictions at sites following designation; the high cost scenario assumes intensive management and heavy restrictions are put in place across most sites.

[35] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/82721/mcz-designate-ia-20121213.pdf

[36] Excluding the areas listed in Annex 1 (four currently remaining Search Areas and Gairloch – Loch Ewe).

[37] Quantification of this is beyond the scope of this report. On a site-by-site basis it would be a considerable undertaking as it would require modeling of the flow of values to substitute sites under different management scenarios.

requires considerable further development and reliability testing, and there are significant limitation in terms of it application to individual sites, results suggest that more wild, remote or quiet sites provide the greatest individual benefits in terms of subjective experience, even though highly popular site provide the greatest aggregatemonetary value, though this effect is more visible for anglers than for divers. To increase subjective wellbeing from sites, site managers might wish to explore these issues. Further research in this area would be useful to gain further understanding on how divers' and anglers' subjective wellbeing experience could be increased through appropriate management.

Finally, it is relevant to note that sea anglers, though one of the largest groups of marine recreational users, are poorly organised and hence very limited in terms of the capacity to represent their values and interests. Additionally, UK sea anglers appear to have considerable mistrust around marine management, marine conservation and research in this area. As to divers, while there is much more organisation, there is very little research available on their values and needs in relation to the marine environment. Altogether, this makes it likely that the interests and values of these groups are under-represented in terms of their influence on decision-making, even while the monetary and non-monetary benefits of marine sites to these user groups are substantial. More research and engagement is needed with these groups to ensure that the value of nature to these groups is adequately taken into account.

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Annex 1: Scottish search areas

Monetary results for Scotland are based on a preliminary configuration of sites. Our assessment utilised map layers from the 5th Scottish MPA stakeholder workshop[38], which was the latest state of Scottish network configuration available at the time of survey design. Our initial assessment included one site that has now been dropped in the format of the third party proposal as submitted (Gairloch and Wester Loch Ewe) and four sites in our assessment remain as search areas (Eye Peninsula to Butt of Lewis; Shiant East Bank; Skye to Mull; Southern Trench). These four search areas and Gairloch – Wester Loch Ewe have been removed from aggregate results and from individual site results in Table 14 (p. 56) and Table 18 (p. 83), as they will not individually be consulted on as part of the consultation package scheduled to start July 2013 in Scotland. However, the Loch Ewe component of the Gairloch and Wester Loch Ewe third party proposal will form part of the Northwest Scotland sea lochs MPA proposal for the consultation, and the four MPA search locations are being assessed against potential future MPA status, so they are all presented below.

Table 19 Mean individual WTP, estimated visitor numbers and aggregate monetary values with totals for Scottish search areas and Gairloch and Wester Loch Ewe. Colours indicate the upper (bright green), middle (pale green) and lower (yellow) third of site rankings across UK sites.

LB: lower bound UB: upper bound D: dredging T: trawling A: anchoring M: mooring P: potting G: gillnetting All figures in £1000s except indiv. WTP in £1, and where indicated m: £millions. - : no visitor estimate.		**Visitor estimates**		**Travel cost**									**Contingent valuation**								
				Mean indiv WTP	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*		*Mean indiv WTP*	*No restrictions*		*No DT*		*No DTPG*		*No DTAM*	
		LB	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*		*LB*	*UB*	*LB*	*UB*	*LB*	*UB*	*LB*	*UB*
DIVERS																					
GLE	Gairloch and Wester Loch Ewe	7	12	51	381	635	381	635	413	689	427	712	4.82	723	1,205	826	1,376	850	1,416	801	1,335
EPL	Eye Peninsula to Butt of Lewis	7	11	50	328	547	328	547	356	593	368	613	4.57	685	1,141	783	1,305	806	1,343	759	1,265
SEB	Shiant East Bank	1	2	57	78	129	78	129	83	139	86	143	5.32	799	1,331	910	1,517	936	1,561	883	1,472
STM	Skye to Mull	52	87	97	5,105	8,508	5,105	8,508	5,329	8,882	5,426	9,043	9.87	1,480	2,467	1,672	2,786	1,717	2,862	1,626	2,709
STR	Southern Trench	22	37	79	1,747	2,911	1,747	2,911	1,841	3,068	1,882	3,136	8.01	1,201	2,002	1,360	2,267	1,398	2,330	1,322	2,203
ANGLERS																					
GLE	Gairloch and Wester Loch Ewe	124	226	21	2,593	4,714	2,593	4,714	3,184	5,788	2,593	4,714	3.81	4,195	7,627	4,817	8,758	4,964	9,026	4,667	8,486
EPL	Eye Peninsula to Butt of Lewis	89	161	19	1,728	3,142	1,728	3,142	2,150	3,910	1,728	3,142	3.6	3,961	7,202	4,555	8,283	4,696	8,538	4,412	8,022
SEB	Shiant East Bank	-	-	43	-	-	-	-	-	-	-	-	3.98	4,382	7,967	5,026	9,137	5,178	9,414	4,870	8,855
STM	Skye to Mull	143	261	36	5,164	9,390	5,164	9,390	5,846	10,629	5,164	9,390	5.93	6,518	11,851	7,413	13,478	7,625	13,863	7,197	13,086
STR	Southern Trench	44	81	35	1,550	2,819	1,550	2,819	1,761	3,202	1,550	2,819	5.7	6,272	11,403	7,138	12,978	7,343	13,350	6,929	12,598

[38] http://www.scotland.gov.uk/Resource/0039/00396098.doc

Table 20 Absolute and relative subjective wellbeing value of for Scottish search areas and Gairloch and Wester Loch Ewe. Numbers represent smoothed mean scores on 5-point Likert scale where >3 is positive and <3 is negative. Colours indicate the upper (bright green), middle (pale green) and lower (yellow) third of site rankings across UK sites.

Identifier	*Name*	*Engagement*	*Identity*	*Therapeutic*	*Spiritual*	*Transfor-mative*	*Social*
EPL	Eye Peninsula to Butt of Lewis	4.06	3.81	3.76	4.43	4.57	3.86
SEB	Shiant East Bank	4.13	3.83	4.13	4.25	4.63	4.13
STM	Skye to Mull	4.30	3.87	4.12	4.07	4.59	4.23
STR	Southern Trench	4.31	3.78	4.16	3.73	4.67	4.27
GLE	Gairloch and Wester Loch Ewe	3.69	3.22	3.58	3.80	4.20	3.67

Annex 2: Questionnaire

Dsample. **Passed through link. This is so we can create two separate urls for divers and anglers.**

1. DIVERS
2. ANGLERS

ASK ALL. Infonode. Hyperlinks open in separate page

Introduction

Welcome to this University of Aberdeen survey on the value of the marine environment. We would greatly appreciate your help with some research that we are conducting in conjunction with the Marine Conservation Society (MCS), the British Sub Aqua Club (BSAC) and the Angling Trust (AT).

We are interested in UK sea divers' and sea anglers' views about the diving and angling sites that they visit and how they feel about protecting these sites to conserve nature. The answers you provide will help inform decisions about the establishment of marine protected areas in the UK and will inform the responses of BSAC, AT and MCS in public consultations on these areas. The results of this survey will also be used in in the UK National Ecosystem Assessment, which is a national programme to understand the state of UK natural environments and the ways in which people benefit from these.

While we are working with others, the University of Aberdeen is an independent organisation and does not have a position in relation to the introduction of marine protected areas.

If you provide any information that could be used to identify you individually (such as your email address), we will separate this information from the survey results to ensure that your contribution and views remain anonymous in any of the reports or publications that we will produce. We will not share any of your personal details with any third party. Data will be stored on secure servers managed in accordance with the Data Protection Act 1998.

If you have any further questions about the survey, please contact the University of Aberdeen team at nea@abdn.ac.uk.

Thank you very much for your time.

Jasper Kenter
Project Manager

ASK ALL
Infonode (same page as Q1.2)
I1
Section 1 – About you
So that we can better understand your answers to the survey, we would like to ask you a few questions about yourself.
ASK ALL
MC
Q1.2 Which activities are you involved in?
Tick all that apply.

1. Freshwater angling **SCREENOUT if only 1 or 2 selected**
2. Freshwater snorkelling or diving **SCREENOUT if only 1 or 2 selected**
3. Sea snorkelling
4. Seashore angling
5. Diving from the sea shore
6. Boat angling at sea
7. Diving by boat, at sea

If screened out at Q1.2 show the following text and close survey automatically after 10 sec. Record status before showing this message.
We are currently only seeking input from sea anglers and divers who have gone out diving or angling in the last year not in freshwater only. Thank you for your time.

DSAMPLE2
This dummy re-punches sample type based on the answers given at Q1.2.

This re-punch is done because there may be divers (from dsample=1) who had answered 4 or 6 only and not any of the other options at q1.2 then they would seem to be an angler who had come in through the wrong URL

1. DIVERS If [dsample = 1] or [if dsample=2 and selected code 5 or 7 and no others at Q1.2]
2. ANGLERS IF [DSAMPLE = 2] OR [DSAMPLE=1 & coded 4 OR 6 and no others at Q1.2]

Show if [dsample=1 and dsample2=2] or if [dsample=2 and dsample2=1]
Infonode
Isample.
We have now redirected you to the survey for <DSAMPLE2> based on the answers given so far about the activities you are mainly involved in.
Please click "Next" to continue.

Changed position
ASK ALL
SC
Q1.1 How many days, approximately, have you gone <if dsample2=2 "sea angling" If dsample2=1 "diving or snorkelling"> in UK waters during the last 12 months?

1. I haven't gone **<if dsample2=1 "**sea angling**" If dsample2=2 "**diving or snorkelling**">** in UK waters over the last 12 months **SCREEN OUT**
2. 1 or 2 days
3. More than 2 but less than 7 days
4. More than 7 but less than 14 days
5. More than 14 days but less than 21 days

98. More than 21 days, namely: OE NUM min 22, max 999

SCREEN OUT IF Q1.1 = 1
If screened out at Q1.1 show the following text and close survey automatically after 10 sec. Record status before showing this message.
We are currently only seeking input from sea anglers and divers who have gone out diving or angling in the last year. Thank you for your time.

ASK IF DSAMPLE2=1 AND Q1x2=(5 OR 7) (only divers, not snorkelers or anglers)
SC
Q1.3a How many dives have you completed in your lifetime?

1. 1-19
2. 20-49
3. 50-199
4. 200-499
5. 500-999
6. 1000 or more

ASK IF [DSAMPLE = 2] OR [DSAMPLE=1 & coded 3 AND NOT 5 or 7 at Q1.2]
OE NUM. min 1, max=99

Q1.3b How many years, approximately, have you been sea <if DSAMPLE=2 show "angling" if DSAMPLE=1 show "snorkelling"

Please insert a number in the box below.
ASK ALL
OE NUM. min 0, max = 9999
Q1.4 How far do you live from the nearest coastline, in miles, approximately?
Please insert a number in the box below.

OE NUM BOX	miles

ASK ALL, OE POSTCODE
Q.1.4b What is your postcode?
96. Prefer not to say

ASK ALL
Screenout if age <16
Q1.5 What is your age?

If screened out at Q1.5 show the following text and close survey automatically after 10 sec. Record status before showing this message.
We are sorry, but we are only able to include participants that are 16 years old or more. Thank you for your time.

ASK ALL
SC
Q1.6 Are you male or female?

1. Male
2. Female

Dage
This dummy groups age into bands
1. **1-15**
2. **16-24**
3. **25-34**
4. **35-44**
5. **45-54**
6. **55-64**
7. **65+**

ASK ALL
SC
Q1.7 What is the highest level of education you have achieved?

1 - Standard or Intermediate grades, SVQ 1-2, GSCEs, O levels or equivalent
2 - Higher or Advanced Higher, National Diploma, SVQ 3-4, A levels or equivalent
3 - Undergraduate degree, HND, Foundation degree or equivalent
4 - Postgraduate qualification or postgraduate Masters degree
5 - Doctorate
98 - Other

ASK ALL
SC
Q1.8 What is your household income in £ per year, after tax and including benefits?

1 - Less than 15,000
2 - More than 15,000 but less than 25,000
3 - More than 25,000 but less than 35,000
4 - More than 35,000 but less than 50,000
5 - More than 50,000 but less than 80,000
6 - Over 80,000
96 - Prefer not to say

ASK ALL
SC
Q1.9 Have you donated or paid a membership fee to any environmental organisation over the last 12 months (e.g. RSPB, WWF, Greenpeace, MCS or other)?
1. Yes, I did.
2. No, not in the last 12 months.
96. Prefer not to say

ASK ALL
Infonode
I2
Section 2 - Marine Protected Areas

The seas around the UK are home to over 8000 species. They also provide major contributions to our lives, including food, recreation, climate regulation and cultural, spiritual and aesthetic values.

Human activities affect many marine environments and the species that live there. To protect these species and environments, there are already over 100 marine sites under some kind of management for nature conservation in the UK. The UK, Scottish and Welsh governments propose that these sites should be extended with a further 127 sites in England and a yet to be confirmed number of sites in Wales and Scotland. These governments believe that this is necessary to form a more coherent network that can effectively protect the diversity of marine species, habitats and seabed features for the future.

To inform the designation of these sites, research projects and public consultations are being carried out to understand the range of values that users place on the marine environment, and the likely positive and negative impacts of designating proposed new protected areas on different users.

Most of the new marine protected areas 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. 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 designated using further information on the impacts of activities. It may include restrictions on development, restrictions on trawling and dredging for commercial fisheries where they are damaging habitats, and restrictions on dropping anchor (except in emergencies). In the vast majority of cases, angling and diving, and other activities that do not damage the environment, could continue.

A number of highly protected sites (in England called ‘Reference Areas’) are also being proposed. These areas will be no take zones, where nothing can be taken out or deposited and where all activities that may damage or disturb the area will be prohibited.

Please click next to continue.

ASK ALL
Q2.1 Please indicate the degree to which you support plans to extend the network of marine protected areas in the UK:

Please click on one of the boxes below to select your answer.

1. Strongly oppose
2. Mildly oppose
3. Unsure
4. Mildly support
5. Strongly support

ASK ALL
Q2.2 Would you agree or disagree that, in general, it is necessary to increase the level of protection for the marine environment, compared to the current situation?

Please click on one of the boxes below to select your answer.

1. Strongly disagree
2. Mildly disagree
3. Unsure
4. Mildly agree
5. Strongly agree

ASK ALL
Infonode
I3
Section 3. Choices between different <if dsample2=2 "angling" If dsample2=1 "diving or snorkelling"> sites

In this section we will ask you to make a number of choices between <if dsample2=2 "angling" If dsample2=1 "diving/snorkelling"> sites that we will present to you and which could be protected. Each site is described in terms of its characteristics. These characteristics are: marine landscape and underwater objects present, fish and other sea life present in the area, restricted activities, access, number of species found at the site that would be protected, size of the protected area, and travel distance to the site.

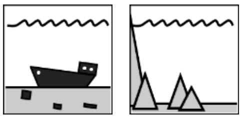
We would like you to imagine the sites, and consider whether they would be worth you visiting, and whether they would be worth protecting. The sites may be similar to ones that you would usually visit, or there may be differences. All of the sites we are presenting are hypothetical; they don't exist in reality. The aim of these questions is to get an idea of what things are most important about the marine environment from the perspective of **<if dsample2=2 "**anglers**" If dsample2=1 "**divers**">**.

Now have a look at an example on the next page, and please move your pointer over any of the items to read more about what they mean.

Please click next to continue.

Show this table above Q3.1 and Q3.2
Implement pop up on each row of the table.

If necessary, please scroll down to see the rest of the question.

EXAMPLE	**Site A**
Marine landscape:	Mostly muddy seafloor with sea pens, burrowing animals and fireworks anemones
Underwater objects:	 Shipwreck, Rock formation
Sea life:	 Large/specimen fish
Access:	Access by shore, boat and pier 
Other restrictions:	 No dredging & trawling, No potting & gillnetting
Vulnerable species protected:	5 (of 40)
Size of protected area:	10 km^2
Travel distance:	<Insert value from Q1.4 + 50> miles

ASL ALL
SC
Q3.1 Would you be willing to go diving or snorkelling/angling at this site, given that it is <Insert value from Q1.4 + 50> **miles away from your home?**

1. Yes
2. No

ASKALL
SC
Q3.2 If this was a real protected area, do you think you could afford to, and would be willing to give a one-off donation of £<insert number to be randomly drawn from: 1, 2, 3, 4, 5, 6, 10, 15, 20, 30, 40>? Your donation would be used to set up a local management trust to maintain this site as it is shown above, and protect its natural features against the risk of future harm and degradation.

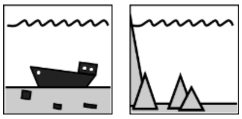
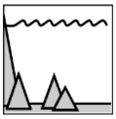
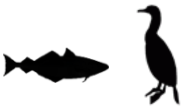
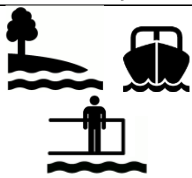
In this question and questions that follow, it is really important for our analysis that you consider travel distances and financial amounts as if they were real. Thus, you need to consider your household income and expenditures, and what you might need to give up to be able to afford a donation, or the cost of travelling to a site.

1. Yes
2. No

ASK ALL
Allow min 0 max 5 in each numeric box. The sum of the values inserted in all three boxes must be 5. Implement pop up on each row of the table.
Q3.3 Below are two sites, A and B. Move your pointer over any of the items for more details and pictures.

If you had to choose between sites A and B, out of your next five <if dsample2=2 "angling" If dsample2=1 "diving or snorkelling"> opportunities within the next year, how many times would you visit site A, how many times site B, and how many times would you stay at home? Please imagine that these are the only options available to choose from.

------Insert choice 1 – example of layout below-------

CHOICE 1	**Site A**	**Site B**	
Marine landscape:	<take text from POP UP INFO file, table 2 (description column)> Ex: Mostly muddy seafloor with sea pens, burrowing animals and fireworks anemones	<take text from POP UP INFO file, table 2 (description column)> Ex: Mostly sandy or gravelly seafloor with oyster, mussel or flame shell beds	
Underwater objects:	 Shipwreck, Rock formation	 Rock formation	
Sea life:	 Large/specimen fish & bird colony	 Large/specimen fish	**Stay at home**
Access:	 Shore, boat and pier	 Shore only, boat use prohibited	
Other restrictions:	 No dredging & trawling No potting & gillnetting	 No dredging & trawling No anchoring & mooring	
Number of vulnerable species under protection:	5 (of 40)	20 (of 40)	

Size of protected area:	10 km^2	100 km^2	
Travel distance:	<Insert value from Q1.4 + 50> miles	<Insert value from Q1.4 + 5> miles	
Number of opportunities out of 5:	**[OE NUM]**	**[OE NUM]**	**[OE NUM]**

ASK ALL
SC
Pick one site from A and B at random.
Show this text above site: ***If necessary, please scroll down to see the rest of the question.***
If you were asked to make a one-off donation to support protection of site *<insert A or B according to site show>* into the future, how much would you be willing to donate? Please carefully consider the characteristics of site *<insert A or B according to site show>*. Your donation would be used to set up a local management trust to maintain this site as it is shown below, and protect its natural features against the risk of future harm and degradation.

ASK RANDOM HALF OF THE SAMPLE:

1. £0
2. £1
3. £2
4. £3
5. £5
6. £10
7. £15
8. £20

95. More than £20, namely OE NUM min 21, max 999

ASK OTHER HALF OF THE SAMPLE:

1. £0
2. £2
3. £4
4. £6
5. £10
6. £20
7. £30
8. £40

98. More than £40, namely OE NUM min 21, max 999

ASK ALL
Allow min 0 max 5 in each numeric box. The sum of the values inserted in all three boxes must be 5.
Q3.4 A and B have now changed. Now please imagine that these new sites are the only options available to choose from. Move your pointer over any of the items for more details.

If you had to choose between sites A and B, out of your next five <if dsample2=2 "angling" If dsample2=1 "diving or snorkelling"> opportunities within the next year, how many times would you visit site A, how many times site B, and how many times would you stay at home?
--------------Insert choice 2-------------

ASK ALL
SC
Pick one site at random.
Shoe this text above site: ***If necessary, please scroll down to see the rest of the question.***
Qtask2_iter2
If you had to choose between sites A and B, out of your next five <if dsample2=2 "angling" If dsample2=1 "diving or snorkelling"> opportunities within the next year, how many times would you visit site A, how many times site B, and how many times would you stay at home? Please imagine that these are the only options available to choose from.

ASK RANDOM HALF OF THE SAMPLE:

1. £0
2. £1
3. £2
4. £3
5. £5
6. £10
7. £15
8. £20

95. More than £20, namely OE NUM min 21, max 999

ASK OTHER HALF OF THE SAMPLE:

1. £0
2. £2
3. £4
4. £6
5. £10
6. £20
7. £30
8. £40

98. More than £40, namely OE NUM min 21, max 999

ASK ALL
Allow min 0 max 5 in each numeric box. The sum of the values inserted in all three boxes must be 5.
Q3.5. A and B have changed again. Now please imagine that these two sites are the only options available. Move your pointer over any of the items for more details.

If you had to choose between sites A and B, out of your next five <if dsample2=2 "angling" If dsample2=1 "diving or snorkelling"> opportunities within the next year, how many times would you visit site A, how many times site B, and how many times would you stay at home?
--------------Insert choice 3-------------

ASK ALL
SC
Pick one site at random.
Shoe this text above site: ***If necessary, please scroll down to see the rest of the question.***
Qtask2_iter3
If you had to choose between sites A and B, out of your next five <if dsample2=2 "angling" If dsample2=1 "diving or snorkelling"> opportunities within the next year, how many times would you visit site A, how many times site B, and how many times would you stay at home? Please imagine that these are the only options available to choose from.

ASK RANDOM HALF OF THE SAMPLE:

1. £0
2. £1
3. £2
4. £3
5. £5
6. £10
7. £15
8. £20

95. More than £20, namely OE NUM min 21, max 999

ASK OTHER HALF OF THE SAMPLE:

1. £0
2. £2
3. £4
4. £6
5. £10
6. £20
7. £30
8. £40

98. More than £40, namely OE NUM min 21, max 999

ASK ALL
Allow min 0 max 5 in each numeric box. The sum of the values inserted in all three boxes must be 5.
Q3.6 A and B have changed one more time. Again, please imagine that these would be the only options available to choose from. Move your pointer over any of the items for more details.

If you had to choose between sites A and B, out of your next five <if dsample2=2 "angling" If dsample2=1 "diving or snorkelling"> opportunities within the next year, how many times would you visit site A, how many times site B, and how many times would you stay at home?
-------------Insert choice 4-------------

ASK ALL
SC
Pick one site at random.
Shoe this text above site: ***If necessary, please scroll down to see the rest of the question.***
Qtask2_iter4
If you had to choose between sites A and B, out of your next five <if dsample2=2 "angling" If dsample2=1 "diving or snorkelling"> opportunities within the next year, how many times would you visit site A, how many times site B, and how many times would you stay at home? Please imagine that these are the only options available to choose from.

ASK RANDOM HALF OF THE SAMPLE:
1. £0
2. £1
3. £2
4. £3
5. £5
6. £10
7. £15
8. £20

95. More than £20, namely OE NUM min 21, max 999

ASK OTHER HALF OF THE SAMPLE:
1. £0
2. £2
3. £4
4. £6
5. £10
6. £20
7. £30
8. £40

98. More than £40, namely OE NUM min 21, max 999

END OF CONJOINT

ASK ALL
MC
Q3.7 Which statements best describe how you picked the sites you preferred?
You can pick more than one answer.

1. I chose **randomly**.
2. I picked the site that **reminded me most of my favourite <if dsample2=2 "angling" If dsample2=1 "diving/snorkelling"> sites in reality**.
3. I usually or always chose **the nearest site out of A and B**.
4. I mostly chose sites that were **below a certain maximum distance** that I was willing to travel.
5. I chose the sites that I **liked most relative to the distance**.
6. I chose the sites that I **liked most regardless of the distance**.
7. **I picked one or two types of benefits** of the site and mostly based my choices on that
8. I usually or always chose **'Stay at home'** because I **could not really imagine any of these sites**

98. **Other:** OE CHA

ASK ALL
MC
Q3.8 Which statements best describe how you decided the amounts you were willing to donate?
You can pick more than one answer.

10. I picked zero or low amounts because **I wanted the average that comes out of the survey to go down**.
11. I picked high amounts because **I wanted the average that comes out of the survey to go up**.
12. I considered my household budget, and **how much I could spare**.
13. I considered **how much I would pay, if I was really asked** to donate.
14. I thought about **what others would donate**.
15. I picked high amounts because I thought it was **the right thing to do**.
16. I picked zero or low amounts because I thought money needed for managing this site **should come from another source,** such as taxes.
17. I picked zero or low amounts because **I do not agree with proposed policies** around marine protected areas.
18. I picked an amount depending on **what I thought protecting a specific site was worth**.
98. **Other:** OE CHA

ASK ALL
Infodode
Ipart2
Thank you for your time so far! Just a few more questions and we are done. You are about 10 minutes away from the end of the survey.

Q4 MOVED DOWN

ASK ALL
SC
Q5. Where do you go sea <if dsample2=2 “**angling**” If dsample2=1 “**diving or snorkelling**”> **most, in Scotland, England, or Wales?**

1. Scotland
2. England and Wales

ASK if Q5 = 2 (England and Wales ask)
SC
Q5.1 Where in England and Wales do you go sea <if dsample2=2 “**angling**” If dsample2=1 “**diving or snorkelling**”> **most?**

1 East coast north of Felixstowe
2 South east coast, between Felixstowe and Bournemouth
3 South west coast, between Bournemouth and the Severn Estuary
4 West coast, north of the Severn Estuary, and Wales

ASK ALL
PRESENT INTERACTIVE MAP OF POTENTIAL MPA SITES
RANDOMLY SELECT 15 SITES FROM REGIONAL LIST
Q5.2 <ALL>**Please now have a look at the location of these areas in your region, which have been randomly selected from the current list of candidate protected areas.** <IF WALES/NW ONLY (dMapReg=3)> **For Wales we are asking about existing protected areas, because the Welsh Government hasn’t established a current list of proposed new protected areas yet.**

<ALL>**Can you tick for each marker whether you have gone** <if dsample2=2 “**angling**” If dsample2=1 “**diving or snorkelling**”> **in this area over the last 12 months? Move your pointer over the names or click on the markers on the map for more details.**

		1	2	97
		Yes	No	Unsure
1	Site 1			
2	Site 2			
3	Site ...			
15	Site 15			

ASK ALL
OE CHA
Keep the map on screen and refresh the list of sites and show only sites that have been ticked Yes, and provide textbox to enter number
Q5.3 How often, approximately, have you visited these sites over the last 12 months?

1 Site 1 [oe cha] times
2 Site 2 [oe cha] times
3 Etc.

ASK ALL
Subjective wellbeing indicators
Randomised item order
Q6. <If Q5.2 = 2 or 97 for all options > **The following questions are about the many ways in which marine sites might be important to you. Please indicate how much you agree with each statement about the sites you visit (regardless of whether they appeared in the last question)**.
<Else, all others see this> **The following questions are about the many ways in which the sites that you indicated you visited might be important to you. Please indicate how much you agree with each statement in relation to these sites.**

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

1 Visiting these sites clears my head.
2 I gain perspective on life during my visits to these sites.
3 Visiting these sites makes me feel more connected to nature.
4 At these sites I feel part of something that is greater than myself.
5 These sites feel almost like a part of me.
6 I feel a sense of belonging in these sites.
7 I’ve had a lot of memorable experiences in these sites.
8 I miss these sites when I have been away from them for a long time.
9 Visiting these sites has made me learn more about nature.
10 I have made or strengthened bonds with others through visiting these sites.
11 I have felt touched by the beauty of these sites.
12 These sites inspire me.
13 Visiting these sites leaves me feeling more healthy.
14 Visiting these sites gives me a sense of freedom.
15 I feel like I can contribute to taking care of these sites.

ASK ALL
Infonode
I7. Questions about your values and beliefs

The next set of questions will give us an indication of what your values and beliefs are in relation to the environment. Please make sure to answer only in correspondence with your own, personal, beliefs.
Don’t think about the questions for too long; just use your first feeling to answer the questions.

Please click next to continue.

ASK ALL
Randomise
Q7a Listed below are statements about the relationship between humans and the environment. For each one, please indicate whether you *strongly disagree*, *mildly disagree*, are *unsure*, *mildly agree* or *strongly agree* with it.

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

1. Humans have the right to modify the natural environment to suit their needs.

2. When humans interfere with nature it often produces disastrous consequences.

3. Humans are severely abusing the environment.

4. The earth has plenty of natural resources if we just learn how to develop them.

5. Plants and animals have as much right as humans to exist.

6. The balance of nature is strong enough to cope with the impacts of modern industrial nations.

7. Despite our special abilities humans are still subject to the laws of nature.

8. The so-called “ecological crisis” facing humankind has been greatly exaggerated.

9. The earth is like a spaceship with very limited room and resources.

10. Humans will eventually learn enough about how nature works to be able to control it.

ASK ALL
Randomise
Q7bListed below are statements about the relationship between humans and the environment. For each one, please indicate whether you *strongly disagree*, *mildly disagree*, are *unsure*, *mildly agree* or *strongly agree* with it.

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

11. Many forms of life in our seas are under a real threat from human activities.

12. If the diversity of life in the seas would be diminished, it would not significantly impact on our economy.

13. I feel responsible for the plight of rare or endangered species of plants and animals.

14. I don’t feel personally responsible for environmental issues, as they are the responsibility of government and industry.

15. We should protect spaces for other species to live and thrive in our marine environment.

16. We should think about the economic importance of the seas first, and only then about environment and conservation issues.

17. Most people important to me support taking action to protect the marine environment.

18. Most people important to me think I should support conservation of sea life.

19. It is easy to take action to support protection of the marine environment.

20. It is difficult for me to do anything significant that would help conservation of sea life.

ASK ALL
Randomise
Q7.2 How important are the following values as a guiding principle in your life? For each one, please tick one of the boxes, from *opposed to this value* to *of supreme importance*.

	Opposed to this value	Not important			Important			Very important	Of supreme importance
1. Authority, the right to lead or command	-1	0	1	2	3	4	5	6	7
2. Wealth, material possessions, money									
3. Influence, having an impact on people and events									
4. Social justice, correcting injustice, care for the weak									
5. Equality, equal opportunity for all									
6. A world at peace, free of war and conflict									
7. Protecting the environment, preserving nature									
8. Respecting the earth, harmony with other species									
9. Unity with nature, fitting into nature									

Q4 (MOVED DOWN FROM ABOVE)
ASK ALL
Q4. We are planning a workshop with divers and anglers in your region during February-May 2013. Would you, in principle, be interested in participating?
Note that you are not making any commitment.

1. Yes, please provide me with further information in 2013.
2. No, I am not interested.

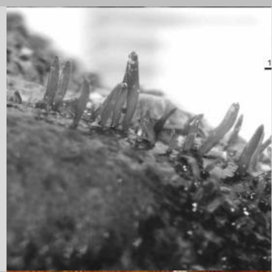
ASK IF Q4 = 1 (YES)
If not selected 96, respondent must insert an answer in either box 1 or 2, 3 and 4
Q4.1 Please now leave us your email or postal address so that we can get in touch with you. We can't guarantee a space on one of our workshops, but we will include as many participants as we can. Your contact details will not be passed on to anyone other than the University of Aberdeen.

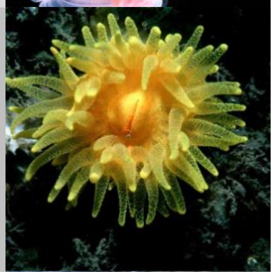
5. Name: OE CHA
1. Email: OE CHA (email address validation)
2. Address: OE CHA
3. Postcode: OE CHA (postcode validation) [if given in 1.4b pipe through]
4. Town: OE CHA

96. I prefer not to give my details. Exclusive

Recode as complete and then show infonode below
IEnd
This is the end of the survey. Thank you very much for your participation.
If you have any questions, please contact the University of Aberdeen at nea@abdn.ac.uk

Annex 3: Vulnerable species list provided to participants

1. Burgundy maerl paint weed (*Cruoria cruoriaeformis)*	No image available
2. Common maerl *(Phymatolithon calcareum)* Image: © Keith Hiscock, MarLIN	
3. Coral maerl *(Lithothamnion corallioides)*	No image available
4. Grateloup's little-lobed weed *(Grateloupia montagnei)* Image: © R.J. Wilkes, L.M. McIvor & M.D. Guiry (2005).	
5. Peacock's tail *(Padina pavonica)* Image: © Matthieu Sontag, Wikipedia Commons	
6. Pink sea-fan *(Eunicella verrucosa)* Image: © Paul Kay	
7. Northern feather star *(Leptometra celtica)* Image: © Paul Kay	
8. Sea-fan anemone *(Amphianthus dohrnii)* Image: ©Keith Hiscock, MarLIN	

9. Stalked jellyfish/ Kaleidoscope jellyfish (*Haliclystus auricular)* Image: © Paul Kay	
10. Stalked jellyfish (*Lucernariopsis campanulata)* Image: ©Keith Hiscock, MarLIN	
11. Stalked jellyfish/ St John's jellyfish (*Lucernariopsis cruxmelitensis)* Image: © David Fenwick, www.aphotomarine.com	
12. Starlet sea anemone (*Nematostella vectensis)* Image: © U.S. Department of Energy Joint Genome Institute, http://www.jgi.doe.gov	
13. Sunset cup coral *(Leptopsammia pruvoti)* Image: ©Keith Hiscock, MarLIN	
14. Black guillemot *(Cepphus grille)* Image: © D. Gordon E. Robertson, Wikipedia Commons	
15. Amphipod shrimp (*Gitanopsis bispinosa)*	No image available

16. Gooseneck barnacle (*Pollicipes pollicipes)*
Image: ©Keith Hiscock, MarLIN

17. Lagoon sand shrimp (*Gammarus insensibilis)*
Image: ©Marine Conservation Society

18. Spiny lobster (*Palinurus elephas)*
Image: © Georges Jansoone, Wikipedia Commons

19. Minke whale *(Balaenoptera acutorostrata)*
Image: © Brocken Inaglory, Wikipedia Commons

20. Risso's dolphin *(Grampus griseus)*
Image: © Mike Baird, Wikipedia Commons

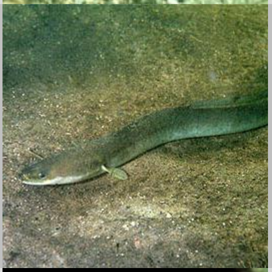
21. White-beaked dolphin *(Lagenorhynchus albirostris)*
Image: © Andreas Tille, Wikipedia Commons

22. Basking shark *(Cetorhinus maximus)*
Image: © Chris Gotschalk, Wikipedia Commons

23. Common skate *(Dipturus batis)*
Image: © Wikipedia Commons

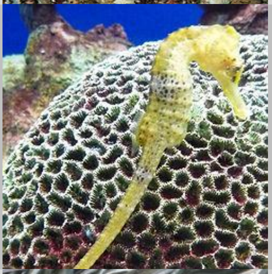
24. Couch's goby (*Gobius couchi)*
Image: © Wikipedia Commons

25. European Eel (*Anguilla anguilla)*
Image: © Ron Offermans, Wikipedia Commons



26. Giant goby *(Gobius cobitis)*
Image: © Wikipedia Commons

27. Long snouted seahorse (*Hippocampus guttulatus)*
Image: © Wikipedia Commons



28. Sandeel *(Ammodytes marinus)*
Image: © Rod Allday, Wikipedia Commons

29. Short snouted seahorse (*Hippocampus hippocampus)*
Image: © Hans Hillewaert, Wikipedia Commons

30. Smelt (*Osmerus eperlanus)*
Image: © W. Hell, Wikipedia Commons

31. Undulate ray *(Raja undulate)*
Image: © J. Merelo, Wikipedia Commons

32. Defolin's lagoon snail *(Caecum armoricum)*
Image: © Natural History Museum Rotterdam

33. Fan mussel (*Atrina pectinata)*
Image: ©Keith Hiscock, MarLIN

34. Lagoon sea slug (*Tenellia adspersa)*
Image © USGS, Wikipedia Commons

35. Native oyster (*Ostrea edulis)*
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36. Ocean quahog (*Arctica islandica)*
Image: © H. Hillewaert, Wikipedia Commons

37. Sea snail (*Paludinella littorina*) Image: © Natural History Museum Rotterdam	
38. Trembling sea mat (*Victorella pavida*) Image: ©Keith Hiscock, MarLIN	
39. Lagoon sandworm *(Armandia cirrhosa)*	No image available
40. Tentacled lagoon-worm *(Alkmaria romijni)*	No image available

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