

Wales Activity Mapping: Economic Valuation of Marine Recreation Activity FINAL REPORT

**A project commissioned by Welsh Government's Sustainable
Development Fund and Port of Milford Haven**



Port of Milford Haven



Ariennir gan
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Completed by Marine Planning Consultants in partnership with Atkins and
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Non-Technical Executive Summary

Introduction

This pilot study was designed to place a monetary value on the individual marine recreation activities previously set out in the Wales Activity Mapping project (WAM) in Pembrokeshire. Carried out 2008-2010, WAM is the only known project in the UK to provide consistent spatial coverage and participant usage for all known marine recreation activities within the region. WAM therefore provides an ideal platform to formulate an approach to valuing marine recreation.

Carried out by a consortium comprising Marine Planning Consultants (MPC), Atkins and Pembrokeshire Coastal Forum (PCF), the pilot valuation of WAM was funded equally through the Welsh Government's Sustainable Development Fund administered by Pembrokeshire Coast National Park Authority; and Port of Milford Haven. The study has received review from the WAM Working Group, comprising of a number of private and public sector bodies, either local, or national with a local interest.

Objectives

The overall objective of the project was to source an individual expenditure per person per day for each activity and to apply this to the number of participant days per year for a given location where the activity takes place, as defined by WAM. This therefore provides the total value of an area per year for each activity; and by combining all activities, the total recreation value for any unique location can be calculated.

As this scale of marine recreation valuation has not been carried out to date in the UK, the project was intended as a pilot study, focusing on two case studies in southwest Wales: the St David's area and Dale. The intention was that the methodology developed may help enable relatively rapid recreation valuations across broad areas for multiple activities in the future. This will aid the rapid developments being made in policy and commerce alike, particularly to inform marine planning and the designation of Marine Protected Areas, allowing the recreation sector to be better represented (and therefore considered) in future plans.

The project objectives were defined through four principal strands:

- i. Review of approaches adopted to date through a literature review and development of a detailed methodology, informed through analysis of the existing WAM data
- ii. Sourcing of value data from literature and a business survey in each case study
- iii. Case study valuation of St David's and Dale
- iv. Recommendations for potential wider scale use

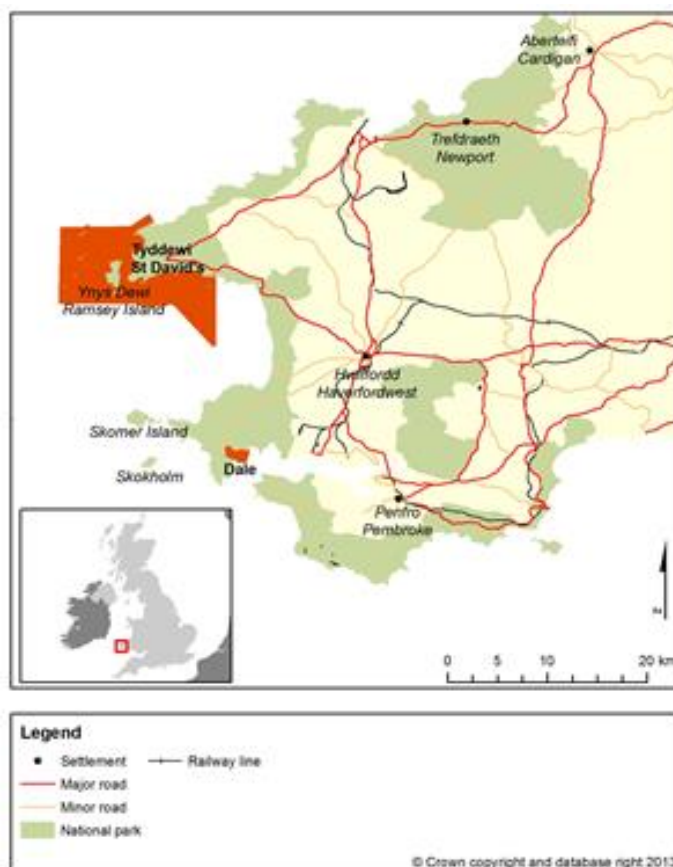
Geographical scope

The case study boundaries, as shown in Figure A, were defined as:

- St David's: All WAM areas from Penllechwen (headland north of Whitesands Bay beyond St David's Head) to Solva Harbour (southeast of St David's) and Ramsey Island, including 92km²
- Dale: the Highly Protected Marine Conservation Zone (HPMCZ) proposed in 2012 to be designated under the Marine and Coastal Access Act 2009 in Wales, with a landward boundary running from Dale Point in the south to Watch House Point in the north east, following the lower shore boundary of the Dale bay

Whilst the maps in the report fit to inshore boundaries as noted above, the actual values quoted per case study in the text have been calculated from up to 600m inshore of the coastline. This allows for the coarser scale used in previously developing the WAM GIS layers, ensuring all activities that waiver between below and above high mean water (whether artificially or in reality) are captured.

Figure A: Case study locations



Approaches adopted to date

To date, the economic valuation of marine and coastal recreation activities has often focussed on the tourism sector as a whole, rather than costs associated directly with carrying out individual activities. Notably some activities, such as sea angling have been the subject of a number of individual studies. There is a small but growing number of studies that have sought to generate spatially explicit estimates of the value of particular marine recreation activities in specific areas. Methods employed to generate values are typically one of more of the following: primary survey of participants, primary surveys of businesses, and/or application of an 'expenditure per person' value from existing studies, i.e. 'value transfer'.

Of the studies which have sought to estimate the value of specific marine and coastal recreation activities, the most common calculation undertaken is to multiply an estimate of the number of activity days per annum by the average daily expenditure of an activity participant. This is then presented as the value of the activity to the economy per annum. Such studies have focussed on a small number (up to four) activity types, and undertaken primary surveys of users to elicit expenditure data for their particular case study area.

Other studies have used a 'value transfer' approach, adopting values from other studies which can be appropriately applied to their study area e.g. Fletcher *et al* (2012). There is one key data source which generates expenditure data for a broad range of individual activities in Wales: the Great Britain Tourism and Day Visitor Surveys (GBTS and GBDVS, published for Wales by VisitWales). These two surveys are carried out annually and since 2011 provide consistent data for a long list of individual recreation activities. Bryan *et al* (2011) used data from these surveys to calculate the economic impact of walking in Wales.

Business surveys have been used to develop estimates of the revenues and employment generated in local economies by recreation and tourism activities, as well as to understand supply chains. For studies which are focussed on specific activities, rather than tourism as a whole, business surveys typically focus on just the activity providers rather than all businesses that the activity participant may use (i.e. recreation hire shops, not accommodation providers). This is largely due to the difficulty in asking general tourism-related businesses to answer detailed questions about a subset of their customers which they may not be able to adequately identify i.e. a hotel owner is unlikely to know how many of their guests undertook kite-surfing and in which locations.

Business survey

Recreation activity businesses are defined as those that provide core recreation services such as equipment hire and purchase, lessons, guides and other infrastructure which are used for undertaking any given activity and sold to activity participants. The survey of recreation activity businesses was aimed to inform the direct local economic impact of activities in each case study as a whole; and the actual cost per person per day where data was available. This focused on three areas: i) revenue, profit and customers, ii) employees and wages and iii) activity services. Following a pilot of two businesses, a form was sent out to 12 operating businesses in Dale and

32 in the St David's region, identified through local knowledge and an online search of businesses operating within 5km of the case study area.

Surveys were completed by individuals (business owners/managers) to allow them time to source and calculate the relevant business data. It is hoped that this resulted in more accurate data than if the immediate response had been required through an 'interview' approach. However it meant that a period of four months, significantly longer than anticipated, was ultimately necessary to collect adequate responses. The response rate was 42% in Dale and 50% in St David's. However the content of the forms received varied in number of fields completed. Where financial the results for which were all converted to the financial year 2012/13.

The results from the business survey are detailed in the following sections: calculation of business revenue (participant cost) per person per day; and case study economic impacts in terms of sector revenue, GVA and employment. However some overarching findings from both case studies combined included:

- Revenue was highest for wildlife boat trips, cruiser sailing and coasteering at £50 – 300k, followed by kite surfing, power boating, canoe/kayaking and snorkelling at £20-40k
- The average business revenue (participant cost) per customer per day was highest for diving and sea angling charter at <£450, followed by windsurfing tours and lessons at £150, with the remainder at <£120, generally in the region of £50 – 100

Calculation of expenditure per person per day

The expenditure per person per day was primarily sourced from existing literature. These values are then termed 'transfer values' as they are applied outside of the study they were designed for.

The business survey was used to adjust the expenditure values of coasteering and wildlife boat trips so that they include local 'price' information. These are the only two activities where this was possible because (i) these two are the only activities that are almost entirely carried out through service providers; and (ii) in most instances it is not possible to adjust the secondary source expenditure data as no breakdown by expenditure category is provided.

The expenditure per person per day for all other activities was sourced from the literature. The resulting values are presented below, including an average and upper/lower bound value, as well as confidence scores. The upper/lower bound values represent the range of values seen in the literature; and the confidence for each expenditure value, scored from a range of 1 (no confidence) to 5 (absolute confidence), informs on the suitability of the underlying source study (or studies) and the extent to which transfer values for a given activity from the source studies support each other (i.e. are similar in magnitude).

It is important to note that the final expenditure values in Table A and subsequently applied in the WAM pilot valuation are for both local resident and visiting activity participants, include all types of expenditure associated with the trip and take non-paying participants into account.

Table A: Expenditure per day per participant

Activity	Average (£)	Lower Bound (£)	Upper Bound (£)	Confidence
Beach activities	34	25	43	4
Body boarding	23	17	30	3
Canoeing/kayaking	27	23	30	4
Climbing	21	9	32	2
Coasteering	62	45	80	3
Cruiser sailing (£ per person)	38	28	49	2
Dingy sailing	41	23	62	1
Diving	72	69	93	4
Dog walking	3	2	3	2
Horse riding	137	100	175	2
Jet skiing PWC (£ per boat)	153	112	196	1
Kite boarding	23	17	30	4
Kite surfing	23	17	30	3
Land yachting	23	17	30	3
Power boats (£ per person)	38	28	49	1
Power kite flying	23	17	30	3
Rowing	23	17	30	3
Sea angling	55	44	68	4
Snorkelling	23	17	30	2
Surfing	23	17	30	3
Swimming	25	23	26	2
Walking	23	14	32	3
Wildlife boat tours	48	35	62	4
Wildlife watching	26	19	31	3
Windsurfing	23	17	30	3

Values are for both local resident and visiting activity participants, include all types of expenditure associated with the trip and take non-paying participants into account

The data in Table A are all presented to 2012 prices (with source data adjusted using a GDP deflator where necessary), though it should be noted that the WAM activity data was collected in 2009. The report present values in or close to the present financial climate to allow consideration in current management decisions.

A number of assumptions were made in finalising the values which are important to state.

- All secondary expenditure, e.g. food, accommodation and travel, are captured for each activity value, however some of these expenses will be duplicated where a participant is carrying out more than one activity
- The expenditure per person is an average that is weighted by the mix of day and overnight participants included in their sample for that particular study
- Where exact activity type matches could not be made between WAM and the available literature, values for more generic or similar activity types have been used: e.g. windsurfing use a value for 'watersports'
- Where values were provided per vessel (sailing and motor boats), an assumption of 4 people per vessel has been adopted from the assumptions made in the WAM data previously collected

A number of the allocated values, e.g. beach activities, climbing, kite boarding and horse riding, are sourced from the Great Britain Tourism and Great Britain Day Visit Surveys which provide specific values for Wales. Other notable sources include Ruiz-Frau *et al* (2012), MENE, the project business survey, as well as other more activity specific studies.

Processing of WAM GIS layers

The expenditure values detailed in Table A above were applied to a processed version of the WAM GIS. Firstly, a total number of participants per year were calculated based on the generic daily participant number for any given location; and the frequency of use throughout each season.

Secondly, the GIS layers, originally supplied as a series of point, lines and areas, were prepared into a uniform 100 x 100m gridded cell structure. This had two purposes: i) to allow a non biased map where each value represented is attributed to the same area; and ii) to allow combination of multiple data within a cell, e.g. multiple activities to give a total combined value.

Through a combined ArcGIS and Spreadsheet series of processes, the total number of participants per year for any given activity area was evenly proportioned to each grid cell, which could then be multiplied up by the cost per person per day to give the value per activity. By totalling up the values from each activity the combined value of each grid cell was also calculated. Similarly, the lower and upper bound values presented above were applied to this formulae to show the range in value for any one area, as a form of sensitivity testing.

Finally, the spatial variance in the valuation confidence was mapped based on the confidence scores presented above. (As the confidence is uniform for any one activity, this is only relevant to the combined activity valuation.) The confidence has been weighted by the individual activity value in any given grid cell to ensure that the final confidence represents the greatest value.

Note that the original WAM GIS layers also contain confidence values. However it was considered inappropriate to use these as the combination of multiple confidence scores would result in loss of detail to a point of being not useful / misinterpreted.

St David's valuation

A predominantly rural and scenic area, the St David's local area provides marine recreation participants with plenty of locations with good sport conditions, ecological interest and reasonable access, both on the mainland and in relation to the six predominantly uninhabited islands. National databases show that there is a permanent resident population of over 3,700¹ in the local area, and that the economy supports 1,240 jobs², with the proportion of jobs linked to tourism and leisure³ being over three times the Wales average. The business survey indicates that the area directly sustains approximately 65 FTEs in the marine and coastal recreation activity related services, approximately 7% of all FTEs in the local area⁴.

The WAM database records 23 individual marine and coastal activities across the whole case study area resulting in ~1.8 million participant days per year in the case study area, each of which have been mapped individually. Figure B presents the annual expenditure of participants relating to each location of activity use, for all activities combined. This clearly demonstrates the high value associated with beaches and the access that they provide to the sea with the highest value in Whitesand's Bay and Caerfai Bay. Other high value areas occur similarly in other areas with good accessibility, such as the estuary at Solva, other small bays along the coastline and the ferry landing points on Ramsey Island and at St Justinians. The areas further offshore typically hold lower value, with a more limited range of activities occurring with relatively low frequency.

Total expenditure associated with activities taking place in the case study area is estimated at £51.4m per annum (only some of this value will be captured in the local area). In GVA⁵ terms, this equates to a contribution to the Welsh economy of approximately £24.5m. These figures are likely to be overestimates as they may include some double counting for individuals who undertake more than one activity in a day. A more conservative estimate that utilises the lower bound expenditure per person estimates (and thereby could be considered an arbitrary sensitivity test for double counting) is of £37.2m and £17.8m, for total expenditure and GVA respectively.

The business survey, which captures a subset of total expenditure (i.e. excluding food, accommodation, travel etc) indicates that activities in the case study area generate

¹ ONS (2013). Census 2011

² ONS (2013). Business Register and Employment Survey. Data for 2011

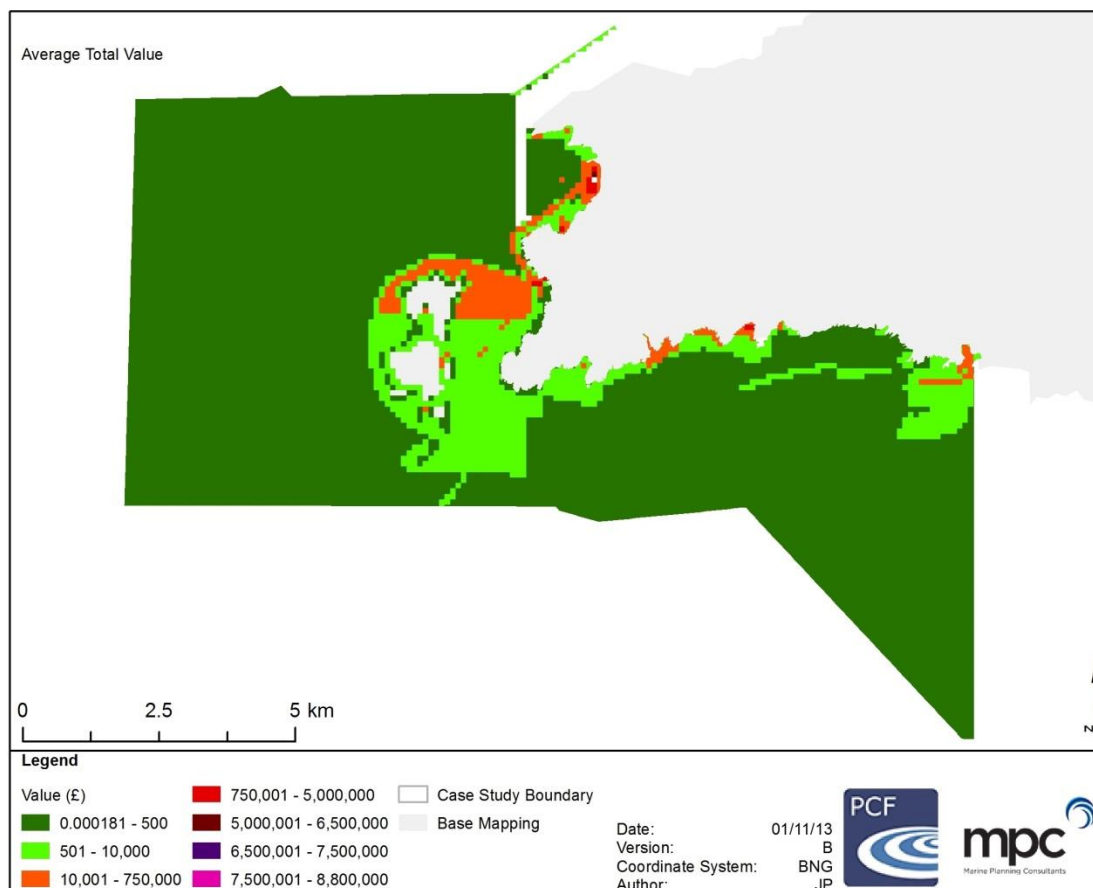
³ Defined by 5-digit SIC code in line with the ONS Tourism Intelligence Unit methodology.

⁴ Local area FTEs calculated using BRES data assuming that 1 PT job = 0.5 FTE

⁵ GVA is a measure of the contribution that an activity makes to the economy. It measures just the 'additional' value of that activity i.e. the value of the output, less the value of any goods and services that contributed to the production process.

approximately £3.2m of revenue per annum for recreation service businesses located in the local area, equivalent to a direct impact on the local economy of approximately £1.6m of GVA.

Figure B: St David's Combined Activities Value (Expenditure) Map



The majority of activities show total expenditure per annum reaching the upper categories of >£10k per annum at any one point (grid cell). Those that are always <£10k include climbing, cruiser sailing, kite boarding, kite surfing, walking, windsurfing and wildlife watching. The highest values are all found close to the shore, apart from wildlife boat trips to Ramsey island. The three activities with the highest value include i) beach activities which generate an estimated £17.7m per annum of expenditure / £8.5m per annum of GVA from 500,000 activity days; followed by walking at £11.4m / £5.4m respectively at 500,000 activity days; and wildlife boat trips at £9.7m / £4.6m respectively from 200,000 activity days. These three activities account for nearly three quarters (75%) of the value generated by activities in the case study area. These are followed, in decreasing value, by swimming, surfing, sea angling, coasteering, dinghy sailing and dog walking, all ranging from £4.8 to 0.5m per annum of expenditure.

Using the upper/lower bound values (sensitivity testing) does not significantly affect the relative economic importance of each activity type, although it does significantly change the total value

estimate. Notably, for 'beach activities' the difference between the upper and lower estimates is £9.3m.

Dale valuation

Whilst the Dale case study is also relatively rural, represented by the small village of Dale, it is located within the Port of Milford Haven jurisdiction on the entrance to the Milford Haven estuary, a focal point of the UK's oil and gas industry. However the industry and leisure sectors happily co-exist, with the area known primarily for sailing and windsurfing in Dale bay. These activities are carried out in the recommended Highly Protected Marine Conservation Zones (HPMCZ) proposed to be designated under the Marine and Coastal Access Act 2009 in Wales (since withdrawn).

National databases show that there is a permanent resident population of over 1,400⁶ in the local area, and that the economy supports 188 jobs⁷ (excluding Port of Milford Haven, located upstream). The proportion of jobs linked to tourism and leisure (nearly half)⁸ are over four times the Wales average. The business survey indicates that the area directly sustains approximately 15 FTEs in the marine and coastal recreation activity related services (excluding Port of Milford Haven), approximately 10% of all FTEs in the local area⁹.

The WAM database records 14 individual marine and coastal activities across the whole case study area resulting in ~0.2 million participant days per year in the case study area, each of which have been mapped individually. Figure C below presents the annual expenditure of participants relating to each location of activity use, for all activities combined. This clearly demonstrates the high value associated with the beach and its access to the sea, directly adjacent to Dale at the head of the bay. Not surprisingly, much of this expenditure is due to beach activities. Three other areas stand out as being of relatively high value: the inside of the bay, north-west of Black Rock (primarily kayaking, sea angling and dinghy sailing in the area); Monk Haven, on the north side of the bay (primarily sea angling, diving and kayaking); and the area close to the coast running south-east from Dale (primarily diving, jet skiing and sea angling).

Total expenditure associated with activities taking place in the case study area is estimated at £7.2m per annum (only some of this value will be captured in the local area). In GVA¹⁰ terms,

⁶ ONSc(2012). Census 2011

⁷ ONS (2012). BRES (2011 data)

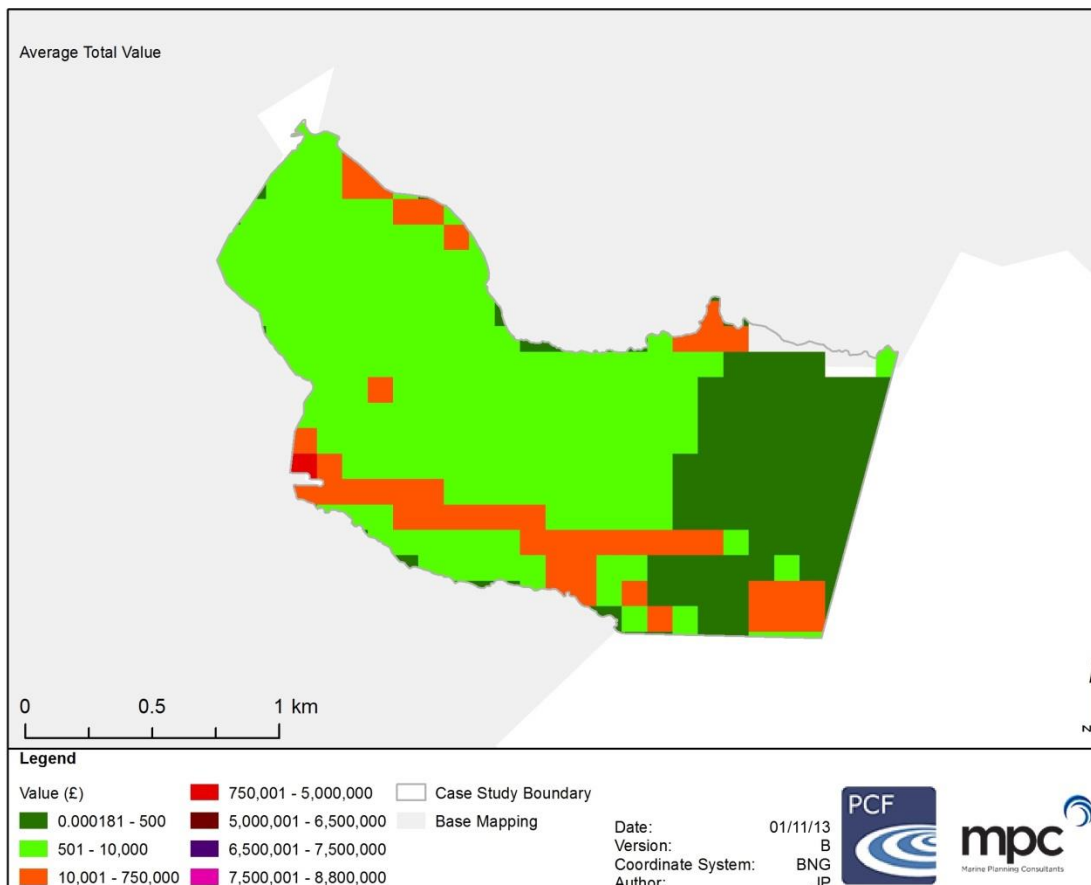
⁸ Defined by 5-digit SIC code in line with the ONS Tourism Intelligence Unit methodology.

⁹ Local area FTEs calculated using BRES data assuming that 1 PT job = 0.5 FTE

¹⁰ GVA is a measure of the contribution that an activity makes to the economy. It measures just the 'additional' value of that activity i.e. the value of the output, less the value of any goods and services that contributed to the production process.

this equates to a contribution to the Welsh economy of approximately £3.5m. These figures are likely to be overestimates as they may include some double counting for individuals who undertake more than one activity in a day. A more conservative estimate that utilises the lower bound expenditure per person estimates (and thereby could be considered an arbitrary sensitivity test for double counting) is of £5.5m and £2.6m, for total expenditure and GVA respectively.

Figure C: Dale Combined Activities Value (Expenditure) Map



The business survey indicates that activities in the case study area generate approximately £0.8m of revenue per annum for recreation service businesses located in the local area, equivalent to a direct impact on the local economy of approximately £0.4m of GVA.

Five activities – beach activities, dinghy sailing, diving, walking, and sea angling – account for the vast majority of all marine and coastal recreation in the Dale case study area, in terms of both the number of activity days (87% of the total) and participant expenditure (94% of the total). These as well as other activities including jet skiing and windsurfing all show areas with total expenditure per annum in the upper categories of >£10k per annum. The three activities with the highest value include i) beach activities which generate an estimated £2.1m per annum of expenditure / £1.0m per annum of GVA from 61,300 activity days; followed by diving at £1.8m /

£0.9m respectively at 25,400 activity days; and walking at £1.3m / £0.6m respectively from 54,500 activity days. These three activities account for nearly three quarters (72%) of the value generated by activities in the case study area. These are followed, in decreasing value, by sea angling, dinghy sailing, kayaking, windsurfing, jet skiing, dog walking, wildlife boat trips, cruiser sailing, power boating, climbing and rowing, all ranging from less than £0.1m to 1.1m per annum of expenditure.

Using the upper/lower bound values (sensitivity testing) results in a slight change in the order of the top 3 activities with up to $\pm 40\%$ change in values.

Recommendations

Extension of pilot methodology beyond case studies

- 1) Extension of pilot methodology to WAM (Cardigan to Bridgend): Repeat spreadsheet and GIS calculations using existing WAM and expenditure per participant data.
- 2) Extension of pilot methodology to Wales: Extension of WAM and application of valuation with consideration of the factors detailed below.
- 3) Extension of pilot methodology beyond Wales: To consider factors detailed below.

Amendments to WAM

- 4) Update to WAM participant usage: Various refinements including: spatial delineation, mitigation of double counting, application of usage to each season, differentiation of confidence for each of usage and frequency, division of relevant activities, e.g. angling (shore / offshore). Also consideration to grouping of activities, grid assignment of spatial footprint and, lastly, hotspots instead of complete coverage.

Improvements to expenditure values

- 5) Enhance use of GBTS/GBDVS expenditure data: Update calculated expenditure per participant values using each new year of GBDVS and GBTS data, in order to incorporate a longer, 3-year run of data.
- 6) Primary survey of participant expenditure at a national scale: A Wales-level survey focussed on activities for which a higher level of confidence is desired, or for which no data is currently available.
- 7) Research into spatially varying expenditure indexes: A national or UK wide research project into how to apply national expenditure per person values to 'types' of coastal areas and to define typologies in Wales in a similar fashion to MMO (2011).

Gaining understanding of the local economy

- 8) Business survey for bespoke case study analysis: Future surveys should be condensed to total annual revenue, customers, employees, wages (each split by inside / outside case study); as well as considering broadening the sectoral base.

Improvements to participant usage

- 9) Improvements to spatial participant usage through national recreation bodies: Collation of participant activity locations, numbers and expenditure at a national scale through survey, coordinated through national bodies; and completion of analyses, maps and reporting.
- 10) Improvements to spatially disaggregated data from GBTS/GBDVS surveys: Engage VisitWales and other relevant organisations to discuss the potential for increasing the Wales sample size.

Assess timescales

- 11) Conclude the period of update required to inform methods: Engage the Welsh Government, Visit Wales and National Park to assess requirements for the data.

1. Introduction

1.1. Overview

In November 2012, the project: “Wales Activity Mapping: Economic Valuation of Marine Recreation Activity” was awarded to a consortium comprising Marine Planning Consultants (MPC), Pembrokeshire Coastal Forum (PCF) and Atkins. This study places a monetary value on individual recreation activities set out in the Wales Activity Mapping project (WAM), focused on two case studies in the Pembrokeshire, southwest Wales: St David’s and Dale.

The project was funded equally through the Welsh Government’s Sustainable Development Fund administered by Pembrokeshire Coast National Park Authority; and Port of Milford Haven. It was also supported through a Steering Group comprising of Countryside Council for Wales; Pembrokeshire Coast National Park Authority (PCNPA); Pembrokeshire Marine Code/Outdoor Charter Group; Environment Agency Wales; National Trust; Pembrokeshire Marine Special Area of Conservation; South West Wales Regional Tourism Partnership; Port of Milford Haven; and Local Authorities. Letters of support were submitted from the Marine Team at Welsh Government; Marine Planning Officer; Visit Wales; Countryside Council for Wales; Pembrokeshire Marine SAC officer; and Pembrokeshire Outdoor Charter Group. The views in this document do not necessary represent those of PCNPA, Port of Milford Haven or the Steering Group.

A glossary with all economic terms used within this document is provided in Appendix A.

1.2. Objectives and Approach

This project was designed to provide an economic value to all WAM marine recreation activities within two case study areas in Pembrokeshire, South West Wales: St David’s and Dale. This has built on the outputs of WAM, including the associated GIS layers and attribute data that detail data collected during surveys of usage by participants in 2008-2010¹¹.

The project has addressed the four key objectives below. The tasks detailed by the project team during the study, in response to each of these objectives, are provided below each objective (a, b, c), shown with the corresponding section of the report this is reported on, to the right.

¹¹ www.walesactivitymapping.org.uk/

Objective

Report
Section

Objective 1: Review of existing literature and local data and development of a detailed methodology

- | | |
|--|------|
| a) Review of literature on valuation of marine recreation activities, including both methods used and values calculated for individual activities. | 2 |
| b) Development of a detailed methodology to apply in this project that can potentially be applied in the future to a wider geographical area, e.g. all of WAM or Wales | 4, 5 |
| c) Review of the Wales Activity Mapping (WAM) GIS and database, which will form the basis of the case study valuation | 5 |

Objective 2: Sourcing of value data

- | | |
|---|---|
| a) Primary survey of local activity providers to determine value of marine recreation industry to the local economy and to extract specific values of individual activities | 3 |
| b) Sourcing of value data from previous studies as identified in literature | 4 |
| c) Identification and adjustment of values to apply to WAM activities, with consideration of both survey results and value data from other studies | 4 |

Objective 3: Case study valuation

- | | |
|--|------|
| a) Specific valuation of activity areas, including development of GIS layers | 5, 6 |
| b) Summary of local economy relative to activities | 6 |

Objective 4: Recommendations

- | | |
|--|---|
| a) Relevance of the study to expansion to an extended or other geographic area | 7 |
| b) The requirements for future studies intending to adopt a similar approach | 7 |

Through review of literature and data, this project has sought to develop a detailed and transparent methodology to determine how much individual activities are worth to the local economy. Through testing the method on the two case studies, the aim is that the method can then be applied to additional areas in the future, particularly in Wales but potentially also further afield.

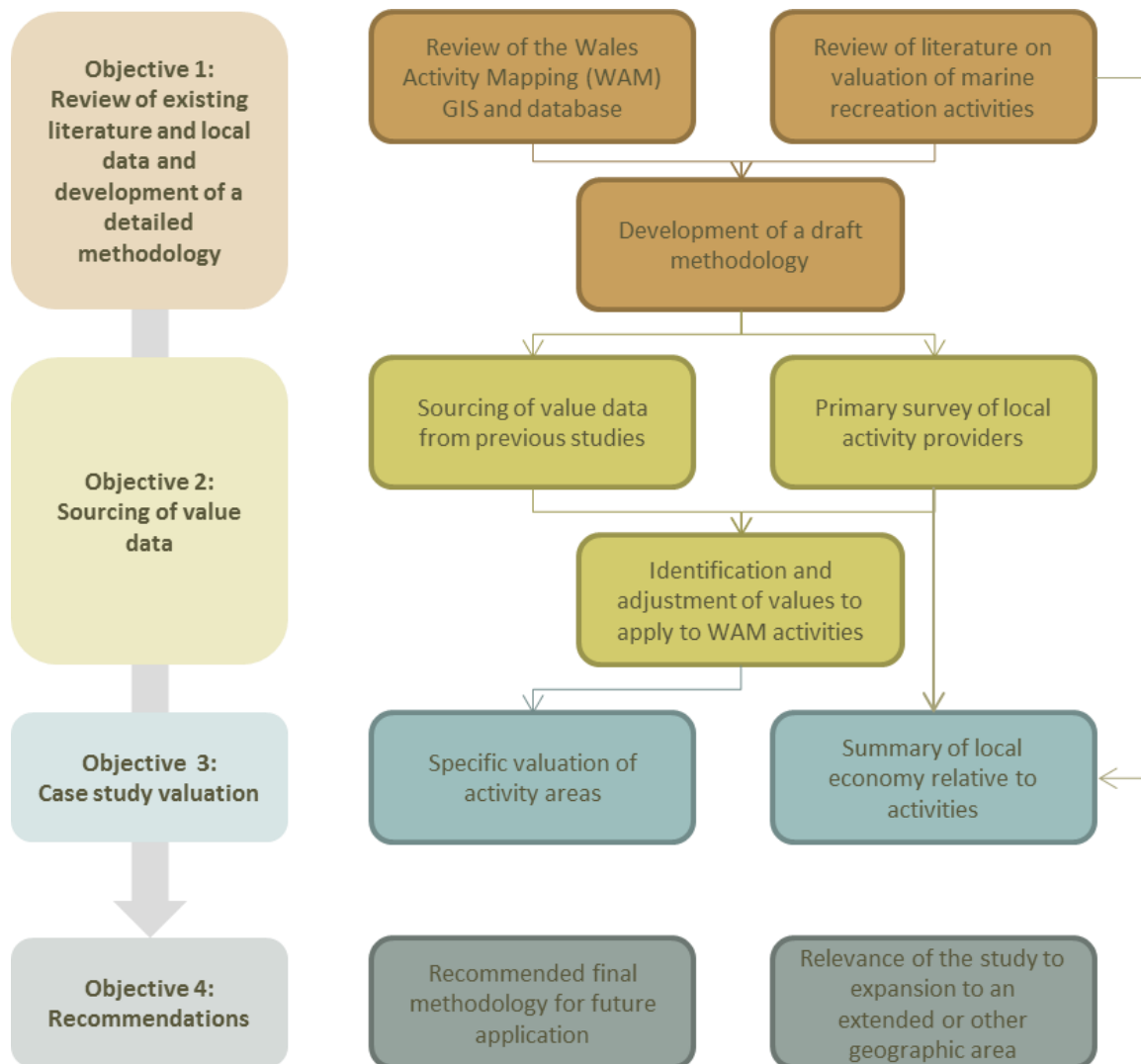
The project utilised secondary data sources, combined with some local data from activity providers, to identify economic values of marine and coastal recreation activities. These values, participant expenditure, could then be appropriately adopted for activities in the WAM project area using what is known as a value transfer approach. Key reasons for adopting this approach were:

- There is reasonable Wales-level expenditure data already available for the majority of WAM activities. Utilising this data (as opposed to collecting new data for all WAM activities) will result in significant cost savings for the WAM project
- Improving upon the existing Wales-level data to generate new locally-specific expenditure data would result in values being generated that could not be utilised in any WAM roll-out to other areas
- The project survey period was during the winter when individuals may be particularly hard to identify and contact outside of the activity area and season in which they participate in that activity
- The value transfer approach is recognised as a suitable methodology in the HM Treasury Green Book

This provided a total value estimate for individual activities in each discrete marine area identified on the WAM database. This was combined with a primary survey of local marine and coastal recreation activity provider businesses in order to establish local area business activity that is directly reliant on the occurrence of marine and coastal recreation in the case study areas.

A schematic of the objectives and associated approaches developed are shown in Figure 1.

Figure 1: Project objectives and associated tasks



1.3. Clarifications on Scope

Recreation Data

All information on recreation activity location and total participation numbers / frequency was obtained from the WAM database. As a whole, WAM includes 31 activities:

Beach activities	Horse riding	Shooting*
Body boarding	Jet skiing PWC	Snorkelling
Canoeing/kayaking	Kite boarding	Surfing
Caving/potholing*	Kite surfing	Swimming
Climbing	Land yachting*	Wake boarding/water
Coasteering	Mountain biking*	skiing*
Cruiser sailing	Power boats	Walking
Cycling*	Power kite flying	Wildlife boat tours
Dingy sailing	Quad biking*	Wildlife watching
Diving	Rowing	Windsurfing
Dog walking	Sea angling	

(In addition there is one further category for 'other activities'.)

Within the case studies there are 14 activities for Dale and 23 for St David's area. These activities are detailed in Sections 5 and 6. Only those activities falling within the case study boundaries have been valued within the maps themselves. Those not outside the mapped values are noted by * above.

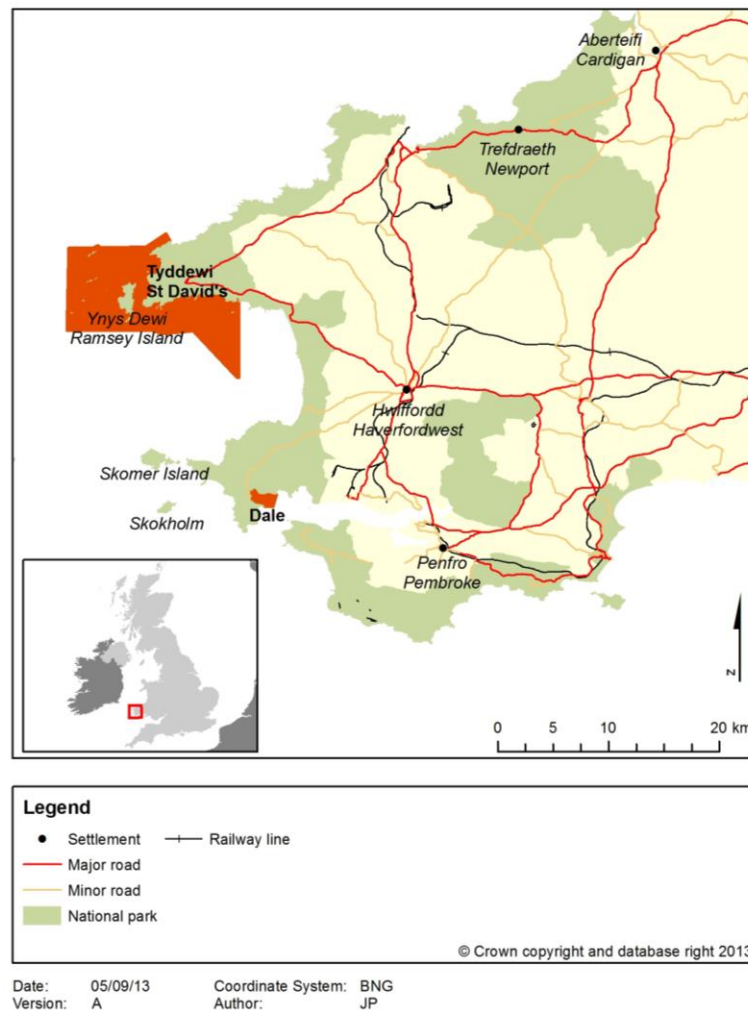
This study takes the WAM data as given. It does not seek to verify the data within WAM and does not seek to collect additional information on variables already included in WAM.

Marine and Coastal

The terms 'marine' and 'coastal' recreation have been used within this document. 'Marine' refers to activities that take place on the foreshore and below high water, e.g. surfing, beach activities. 'Coastal' refers to all activities that take place predominantly landward of this mark, e.g. cycling. To clarify, this study aimed to value marine recreation as a priority, but coastal activities have been valued wherever data was easily obtained.

Case Studies

The economic valuation has been based on two case studies contained within the WAM area: Dale and St David's Peninsula. These are shown in Figure 2.

Figure 2: Case study locations

Dale was one of ten potential Highly Protected Marine Conservation Zones (HPMCZ) proposed in 2012 to be designated under the Marine and Coastal Access Act 2009 in Wales. The boundary of Dale follows that of the Dale Highly Protected Marine Conservation Zone.

St David's Peninsula has a high range and number of activities and is also of national strategic importance for marine energy as highlighted in the Marine Renewable Energy Strategic Framework (MRESF) and the recent Crown Estate UK Wave and Tidal Key Resource Areas

Project¹². The boundary of St David's includes all WAM areas from Penllechwen (headland north of Whitesands Bay beyond St David's Head) to Solva Harbour (southeast of St David's) and Ramsey Island.

1.4. Drivers

1.4.1. Environment and Sustainability

To meet needs of localised marine plans and existing and potential Marine Protected Areas, there is now a need for recreation to be valued at a more detailed level, considering the individual areas in which activities take place within the marine environment (as opposed to allocating marine activities to the nearest land location); and to consider the full range of activities taking place. An improved and detailed valuation of recreation will inform the planning of marine activities across all sectors and to give recreation the strong credence and consideration it deserves, to the maximum benefit of all potential users.

The consultation process on Highly Protected Marine Conservation Zones (HPMCZs) in which PCF coordinated two stakeholder events during Stage 4 of the HPMCZ process¹³ raised real community concern that a) socio-economic factors had not yet been considered in the MCZ process; and b) that any negative impact of MCZ status on certain recreational activities would have serious implications for coastal communities in Pembrokeshire, particularly Dale. However the Welsh Government has now withdrawn all 10 proposed HPMCZs following in the consultation process and is currently reviewing the extent to which the existing network of Marine Protected Areas (MPAs) in Wales meet the requirements for an ecologically coherent network. It is expected that this study can make a contribution to this process and other developments in marine management such as the introduction of marine plans.

More recently, national attempts to value ecosystem services, such as the UK national ecosystem assessment¹⁴ and themes in the recent 'Living Wales' consultation process¹⁵ have noted the importance of ecosystem services in providing economic benefits. For example, marine and coastal ecosystems provide cultural services, including recreation, the value of which is increasingly being considered in policy decisions.

(Further information on marine policies is provided in Appendix C.)

¹² <http://www.thecrownestate.co.uk/energy-infrastructure/wave-and-tidal/publications/>

¹³ <http://www.pembrokeshirecoastalforum.org.uk/marine-spatial-planning/marine-conservation-zones/>

¹⁴ <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>

¹⁵ <http://wales.gov.uk/docs/desh/consultation/120210nefgreenpaperen.pdf>

1.4.2. National Economy

On a Wales scale the wider economic benefits and linkages to the tourism sector from marine recreation are only understood in relation to household income, as provided through the Wales Outdoor Recreation Survey¹⁶ carried out jointly by the CCW and Forestry Commission. There have been a significant number of studies however that look at socio-economic characteristics and typologies of coastal communities, e.g. the MMO report “Maximising the socio-economic benefits of marine planning for English coastal communities” (MMO, 2011). There have also been a large number of tourism sector led studies analysing the value of the coast to the tourism and recreation industry, though not explicitly defining the marine recreation activities in any quantitative form. For example, Natural England’s “Monitor of Engagement with the Natural Environment” (MENE) study (ref). The MENE study includes information on visits to the natural environment, with coastal visits identified. This includes length of visit time at the coast; number of visits less than 5 miles or greater than 60 miles; and density of visits per 5km². In addition, studies such as that carried out by Brighton University have assessed water sports generally (both marine and freshwater) in the Strategic Planning of Water Related Sports and Recreation in England and Wales¹⁷.

1.4.3. Local Economy

In addition, and in some cases in relation to, the national drivers noted above, there are a number of key benefits to the local area and stakeholders.

Pembrokeshire Coast National Park, which extends to the whole of the coastline for both case studies, has an overriding interest in the sustainable development of commercial activities in Pembrokeshire, ensuring effective protection of the environment; prudent use of natural resources; and maintenance of sustainable levels of economic growth and a high and stable level of employment. Information from the WAM project has already been used by PCNPA as the evidence base for PCNPA Recreation Plan. Information from the project has also assisted in providing data for the PCNPA Enjoy Website¹⁸ where management issues and knowledge of capacity have proved a useful tool in drawing up messages for best practice. By providing an evidence based approach to the economic importance of the Pembrokeshire Coast National Park to recreation and tourism, this will now build on the points raised in Section 4.2 of the PCNPA Recreation Plan: The economic importance of the PCNP to recreation and tourism (PCNPA, 2011). By linking the environment closely with recreation, one can aim to encourage more people to enjoy the National Park and safeguard the environment at the same time, as

¹⁶ <http://www.ccg.gov.uk/enjoying-the-country/welsh-outdoor-recreation-survey.aspx>

¹⁷ <http://www.brighton.ac.uk/waterrecreation/>

¹⁸ <http://enjoy.pcnpa.org.uk/>

well as highlighting the dependence of the tourism and recreation industry on the environment of Pembrokeshire as a whole.

The local area is also significantly used by the Port of Milford Haven (POMH), manages 22 miles of the Waterway including the Dale case study. Whilst one of the largest oil and gas ports in Northern Europe, the port operates alongside recreation activities, which are carried within the majority of the port's jurisdiction. The port therefore operates its own Recreation Plan (MHPA^a, 2011), covering the wide range of activities that take place, from sailing to angling and canoeing. This focuses on a number of tools in management of recreation activity including byelaws, 'General' and 'Special Directions', Notice to Mariners, policing and enforcement, water range services and various information dissemination services such as a leisure guide and signage. The plan serves as a useful and necessary management of activities, amidst recent growth in monitored activities. For example in 2010, there were 1160 registered moorings, an increase of approximately 10% from the previous year (in addition there were 748 marina berths, at Milford Marine and Neyland Yacht Haven, in 2010. This high increase is considered to be for the same reasons identified earlier by the British Marine Federation Audit (BMG, 2004): increased affluence, demand and development/regeneration; and due to local impacts. These recreational activities are carried out alongside the busy port which supports 5000 jobs in Wales, equivalent to £316.3 million GVA (Gross Value Added) (MHPA, 2011^b). 11% of these jobs are attributed to tourism-facing services (e.g. accommodation and restaurants); public administration and health; and tourist attractions and nature reserve activities. In future years the port expects a continued increase in marine recreation activities and therefore has prioritised more facilities. Future developments will be addressed in the forthcoming port master plan which specifically details marine and coastal recreation.

The recreation and tourism sector in Pembrokeshire as a whole is one of the key economic generators providing jobs and income for local coastal communities. The findings of this project will help inform these organisations of effective marketing, supporting infrastructure projects and funding in relation to marine activities. Similarly, the final deliverables of this project may identify opportunities in locations where there is potential to increase value associated with marine recreation. The project will also assist local stakeholders to engage with upcoming policy and consultation.

Through PCF the outputs and findings of the project have been disseminated on a local and Welsh National level through the forum's extensive membership (>1000 members). This includes local community/town and county council members and community stakeholders in the pilot areas. Other PCF networks including the WAM working group, Pembrokeshire Outdoor Charter Group, Marine Code members and PCNPA recreation plan consultation list have also been used to disseminate project findings. Lastly, national UK networks have been notified, e.g. Welsh Government and the CMS emailing list.

1.5. Recreation Data Availability

This detailed valuation relies on the availability of up to date spatial mapping of activities together with frequency of their occurrence. To date marine recreation data has been collated from existing sources of data to inform national audits and marine planning, as carried out in England (MMO, 2012), Scotland (LUC, 2007) and Wales (LUC, 2004). Regional data has also been collated to inform informal marine planning and tourism in Dorset (e.g. Dorset Coast Forum, 2012).

Whilst these have made significant progress in data collation of recreation activities, none provide a consistent full coverage spatial dataset that also includes participant activity information, essentially numbers of participants and frequency of use per activity.

Consistent coverage at a regional scale is however provided through the Wales Activity Mapping (WAM) GIS system. Compiled by Pembrokeshire Coastal Forum to assist in the sustainable management of the coastal area to the maximum benefit of all potential users, WAM was created in partnership with a wide range of organisations across South West Wales, including the Welsh Government, Countryside Council for Wales, Pembrokeshire Coast National Park and Milford Port Haven Authority.

WAM was carried out between 2008 and 2010 (and continues to be updated to some extent) and provides full coverage over the Pembrokeshire region, showing where coastal and offshore activities are carried out, information on user numbers, seasonality, data and map confidence, and activity trends. WAM therefore provides an ideal platform to formulate an approach to valuing marine recreation as provided in this project.

Previous recommendations of the WAM project were to extend the project beyond the south west Wales. Therefore the approaches applied in this valuation project within the two Pembrokeshire case studies could potentially be applied in the future to both the wider WAM database and to a national scale should WAM be extended.

2. Methods used to date in Economic Valuation of Recreation

A review of both relevant UK and international material has been carried out, in order to assess approaches and methodologies employed in other similar recreation economic impact valuation projects. The literature review has assessed methods applied to date in valuation of recreation activity areas to inform our approach in valuation of the WAM case studies. In addition, it has identified studies that provide relevant data that can be used to undertake a desk-based assessment of the two case study sites, in particular transfer values. Transfer values extracted from the studies are reported separately in Section 4, whilst this section provides an overview of the different methods applied.

2.1. Overview

The literature on the value of marine and coastal recreation activities is often focussed on the tourism sector as a whole. Specific marine and coastal recreation activities, from scuba diving to beach activities to coastal path walking, are typically grouped together as 'coastal tourism'. Notably some activities, such as sea angling have been the subject of individual studies.

Whilst some studies are interested in just marine activities, i.e. recreation that occurs in the marine area, others are more interested in the wider sector of coastal and marine tourism and recreation. The former are often driven by the desire to contribute specifically to marine spatial planning e.g. decisions on the location of MPAs in the marine area. For example, Rees *et al* (2010) specifically research the value of marine recreation activities: sub-aqua diving, sea angling and wildlife watching trips, with the purpose of informing a long term cost benefit analysis of the Lyme Bay closed area.

With the increasing interest in marine spatial planning, biodiversity and ecosystem services, a small but growing number of studies have sought to generate spatially explicit estimates of the value of particular marine recreation activities in specific areas, presented using mapped outputs. This review considers the methodological approaches adopted by these studies.

2.2. Expenditure of Participants

Of the studies which have sought to estimate the value of specific marine and coastal recreation activities, the most common calculation undertaken is to multiply an estimate of the number of activity days per annum by the average daily expenditure of an activity participant. This is then presented as the value of the activity to the economy per annum.

The source of the data used for the calculation differs from study to study. A common approach is to elicit information on activity participation rates by location and activity participant expenditure through the use of primary field work surveys. These surveys may have requested information from participants, businesses or a combination of both. Some studies, such as Rees *et al* (2010) collected spatial activity data and expenditure data through the same survey process.

Others however have used secondary data or a combination of the two. For example, Ruiz-Frau *et al* (2011) used primary survey data on expenditure and secondary data to estimate spatial activity participation rates, whilst other such as Homarus (2007) used primary survey data on spatial activity participation rates and secondary data sources for expenditure.

As the WAM project has already collected data on spatial activity participation rates, into which this study will feed, no further detailed discussion on this side of the equation is included in this review. Our focus instead lies in the collation of expenditure data.

2.2.1. Primary data collation

Primary field surveys have been successfully employed to establish estimates of activity-specific expenditure through the targeting of activity participants. Studies have used a variety of techniques, including on-site visitor surveys during the summer months (e.g. Morrissey, 2012). On-site visitor surveys provide easy access to the relevant activity population; however they can be time-consuming and are not usefully carried out during winter months when many activities are not practised.

Other studies have targeted participants through the use of on-line forum, email and postal surveys. Rees *et al* (2010) surveyed local anglers and divers using on-line forum and email, targeting them through local angling and dive clubs. Similarly, Drew Associates (2004) undertook a postal survey of anglers using angling club memberships. Other studies have taken a more open approach. Ruiz-Frau *et al* (2012) surveyed divers, kayakers and bird watchers, targeting individuals across England and Wales by promoting the survey through a variety of clubs, associations, watersport retailers and magazines.

Ultimately most studies employ a mix of techniques, using multiple survey methods to target any one population of activity participants, or using different methods to target different activity participant populations, all of which have benefits and drawbacks in collecting data. Postal surveys tend to have low rates of return, targeting clubs omits those participants that do not belong and general promotion of surveys leads to self-selection of respondents.

2.2.2. Secondary Data: Expert Opinion

Expert opinion can also be used as a readily available method for obtaining estimates of average daily expenditure, although the confidence in the accuracy of such estimates is likely to be low. Nautilus Consultants (2000) establish estimates of average daily expenditure by anglers in Wales based on conversations with two local sea angling specialists.

2.2.3. Secondary Data: Regional / National Economy

A common use of secondary data as adopted by Homarus (2007), Bryan *et al* (2011) and Fletcher *et al* (2012) includes the transfer of values from other studies or tourism data sets in order to obtain appropriate expenditure estimates. Fletcher *et al* (2012) uses activity-specific expenditure data from Rees *et al* (2010) to transfer expenditure values for the activities that take place in Lyme Bay, Dorset, to matching activities in Torbay, Devon. Bryan *et al* (2011), which

looked at the value of rural walking in Wales, utilise Wales-specific expenditure data on walking activities from a number of sources including the United Kingdom Tourism Survey (UKTS) and the Great Britain Day Visits Survey.

In the above examples, the areas and local economies from which values have been taken, have been similar to those to which they have been applied, e.g. in adjoining counties. A number of studies including Fletcher *et al* (2012), Homarus (2007) and Midmore (2000) transfer expenditure data from studies focussed on areas outside their particular study area. Studies such as these demonstrate the ability to utilise and manipulate secondary sources of expenditure data for the purposes of value transfer in economic studies, however, they rely on the accuracy / validity of the original study in valuing the activity.

2.3. Activity Expenditure Considerations

2.3.1. Alternate Activity

Another source of secondary expenditure data is from an alternate activity to that activity in question. For example, Homarus (2007), which looked at the value of diving and angling in Lyme Bay, Dorset, utilise average expenditure data for anglers taken from Drew Associates (2004), and apply it to both anglers and divers. Homarus (2007) justify the application of angler average expenditure to divers as they consider the activities to have similar characteristics with regards to equipment, boats and associated trip expenditure.

2.3.2. Constant Average Participant Expenditure

Whilst transferring value data from secondary sources enables assessments to be made for a wide range of activities and areas without the need for often time-consuming and time-constrained primary survey work, a reduced level of accuracy of the data for the activity/location is likely. However it should be noted for studies which seek to value discrete activity areas, such as Rees *et al* (2010) and Ruiz-Frau *et al* (2012) and collect average expenditure data through primary research, the average expenditure applied is not usually specific to each discrete activity area considered. That is, there is an assumption that average expenditure per activity participant is constant across individual activity areas throughout the study area.

Rees *et al* (2010) collected activity-specific expenditure data for activities occurring in Lyme Bay. For each of the discrete area in which a given activity occurs within Lyme Bay, they assumed that average expenditure per participant was the same. Therefore total expenditure associated with each specific activity area varied only as a result of differing activity participation rates. Similarly, Ruiz-Frau *et al* (2012) collected activity-specific expenditure for activities that take place in Wales. They then applied constant average expenditure values to all cells in their analysis along the Welsh coastline.

Both of these studies (Rees *et al*, 2010; Ruiz-Frau *et al*, 2012), along with those that attached values to discrete spatial areas though without primary survey (e.g. Drew Associates, 2004; Capell and Lawrence, 2005), ensure that the survey sample/source is representative of the participant population of their study area.

2.3.3. Varied Participant Expenditure

The 'constant average' assumption means that expenditure is assumed to be constant across the wider study area for any given activity. The volume of activity is assumed to be the only differentiator of value between different activity areas. In reality, value may be affected by a range of factors. For example, participant skill level (beginner, expert) may influence expenditure in situations where beginners hire equipment, but experts use their own equipment, and the mix of beginner-to-expert participants may differ across different activity areas and seasons (e.g. due to marine conditions). Ruiz-Frau *et al* (2012) demonstrated that participant expenditure was affected by the frequency with which the participant undertook the activity, but were unable to incorporate this into the spatial value analysis due to the coarseness of the activity data used. For some activities, such as angling, a basic breakdown of the activity is typically made. For example, Nautilus Consultants (2000), Drew Associates (2004), Rees *et al* (2010) and Ruiz-Frau *et al* (2012) all break angling down into three categories: shore based anglers, charter boat anglers, and own boat anglers.

2.3.4. Types of Expenditure

For specific marine based activities, participant expenditure typically includes both the expenditure directly associated with undertaking the activity e.g. payment to an activity provider, as well as other expenditure associated with a participant's trip to the area e.g. travel or accommodation. Studies such as Bryan *et al* (2011) acknowledge that all 'other expenditure' associated with an activity participant's trip cannot necessarily be attributed to the activity in question. This is particularly the case for multiple night visitors to an area. Where an activity is not the primary purpose of a trip, it is generally considered that only a proportion of any associated expenditure can be attributed to the occurrence of the activity. A number of other studies assume that for any given activity being assessed, the activity is the primary purpose of the participant's trip (e.g. Rees *et al*, 2010; Ruiz-Frau *et al*, 2012). In many cases the type of activity being undertaken and the nature of the underlying participant questionnaire appear to allow this assumption to be made implicitly.

2.3.5. Double Counting

Where estimates of total expenditure (calculated based on average daily expenditure) for individual activities are summed, there is a risk of double counting if there is a chance that participants may undertake more than one activity in a day. Studies such as Rees *et al* (2010) and Ruiz-Frau *et al* (2012) do not discuss this issue, most probably because for the small set of activities that they are considering it is unlikely that individual's undertake more than one of them in a day. In addition, as tourism costs are included in the expenditure costs, there may also be double counting for these, e.g. where a participant does one activity on one day and a different one the next.

2.4. Business Data and Surveys

Data collected from businesses is used in a number of different ways, including demonstrating the value of local area tourism (e.g. Eftec, 2010), establishing local business revenues generated directly through the provision of specific marine activities (e.g. Rees *et al*, 2010), and to understand local supply chain linkages (e.g. Hyde, 2006).

Studies that aim to estimate the value of specific marine recreation activities in specific areas (e.g. Rees *et al*, 2010 and Ruiz-Frau *et al*, 2012) appear to focus on the narrow channel of revenue generated by activity provision (e.g. price of one day of diving from a charter boat). Other studies that have are interested in understanding the value of the broader recreation or tourism sector, without the need to establish estimates for specific activities or specific areas, often capture a broader range of revenues and businesses. For example, revenue associated with local hotels and restaurants.

2.4.1. Non-activity associated businesses

Those studies which obtain information on the broader set of revenues and businesses note the risk of asking businesses to define what area their revenues are dependent upon e.g. a hotel attributing a proportion of its business revenue to guests who primarily use/visit a particular area. For example, Eftec (2010) note that businesses may overestimate the extent to which their turnover depends on visitors to a certain area; and businesses may overestimate the proportion of a visitor's expenditure that is dependent on a particular area. The scope for error associated with this sort of question would likely be accentuated the more specific the area, or if businesses were asked only about individuals undertaking specific activities e.g. asking a hotel how many of its guests undertook a particular activity in a particular area, and whether this was the primary purpose of their trip. Wider business revenues associated with activity trips are generally not captured for studies interested in activity-specific values (e.g. Rees *et al*, 2010 and Ruiz-Frau *et al*, 2012), preferring only to focus on businesses that directly provide activity services to participants.

2.4.2. Business data collation

A number of approaches have been used to undertake business surveys, including face-to-face interviews and telephone surveys. Notably some studies e.g. Rees *et al* (2010) have found less direct communication mediums, such as post or email, less effective and have often changed their approach to a more direct medium in order to obtain sufficient responses.

Methods used to establish the population of relevant local businesses typically include either a combination of local knowledge (both at the outset and through interviewed businesses identifying further relevant businesses) and internet searches, or through the purchase of a local business database. In general, it is those studies which are interested in understanding the value of the broader recreation or tourism sector that purchase business databases (e.g. Eftec, 2010). This is likely to be due to the wider range of sectors and larger number of businesses that need to be identified. Studies focussing in on specific activities, and smaller number of

potentially readily identifiable businesses, are more likely to use local knowledge/internet (e.g. Rees *et al*, 2010). This is the case in the WAM recreation valuation.

When utilising data from both participants and businesses, there is a need to ensure that total expenditure data is not summed with revenue data when presenting total value estimates due to double counting of the price of the activity (as noted in Rees *et al*, 2010). Notably however a number of studies that utilise primary research rely solely on participant expenditure data, and did not collect information from businesses e.g. Morrissey, 2012; Ruiz-Frau *et al*, 2012.

2.5. Other Approaches

2.5.1. Local Economic Impact

In general, most studies are interested in establishing the economic value of tourism or specific activities occurring in a particular area. A large number of studies therefore do not seek to explicitly define and establish the value to the local economy. Rees *et al* (2010) and Ruiz-Frau *et al* (2012) both seek to capture all expenditure associated with a trip. However, one might assume that as expenditure is associated with a trip to a particular area, a vast majority of that expenditure may be captured within the local economy when defined, for example, at District level. Eftec (2010) specifically estimate the value of tourism within 8 miles of an estuary in south England. In order to do this the visitor survey data that they use explicitly asks respondents to identify their level of expenditure within an 8 mile radius of that estuary. Hyde (2006), who uses ABI employment data as a starting point, rather than visitor expenditure, is able to identify employment within a defined area by utilising local area statistics that are published by the ABI.

2.5.2. Employment

Establishing economic value through the use of participant expenditure is not the only approach for estimating economic value. Employment data from sources such as the Annual Business Inquiry (ABI) have been used to make estimates of the economic impact of tourism and recreation activities. Hyde (2006) and Beatty *et al* (2010) filter local area ABI data by Standard Industrial Classification (SIC) code as the basis for estimating tourism related employment. Both note the difficulty in trying to define the tourism sector through the use of SIC codes. In response to this difficulty, Hyde (2006) applies arbitrary assumptions to apportion employment within certain SIC codes to tourism and non-tourism sectors. Notably both these studies are seeking to establish estimates for the broad 'tourism' sector, not for individual activities (for which identifying SIC codes would result in a greater level of uncertainty and/or need for arbitrary assumptions), and neither is concerned with the specific micro location of where an individual activity takes place. Incorporating greater activity and location specific disaggregation would likely add significant complexity and uncertainty to the process.

2.5.3. Environmental Valuation of Recreation

Ecosystem Services

Ecosystem services are a preferred framework for assessing the anthropogenic costs and benefits associated with environmental change, as recommended in the HM Treasury Green Book (HM Treasury, 2012). Recreation is a category of ecosystem service, although some recreation activities have stronger links with ecosystem processes than others. Fletcher *et al* (2012) note that there is little published evidence on the link between tourism and marine ecological processes, but that in many instances the quality of the surrounding environment influences tourist activity. Some activities, such as scuba diving, clearly have a close relationship with marine ecosystems. The majority of literature identified does not explicitly set their discussion of recreation value in the context of ecosystem services. However this largely depends on the purpose of the study and the debate that it is being used to inform. In the studies reviewed, use of ecosystem service language does not appear to have any direct bearing on the approach used.

Total Economic Value

A comparatively small number of studies have sought to estimate the full welfare value (Total Economic Value) of specific marine and coastal recreation activities by capturing both market and non-market values. Drew Associates (2004) estimate the consumer surplus per day of recreational angling in England and Wales, whilst Cappell and Lawrence (2005) estimate the willingness to pay of recreation anglers to catch more and bigger fish. Chae *et al* (2011) use a travel cost method to estimate the recreation value of Lundy Island, Devon.

In a number of instances studies have recognised that recreation activities have a non-market value and have sought to demonstrate this through the use of indicators rather than valuation. For example, Rees *et al* (2010) and Roncin *et al* (2008) both demonstrate the non-market value through the level of participation as a comparison of specific sites in their study area. This implies that value is purely a function of participation and does not take into account differences in the per visit value that may be obtained from alternative sites.

Marine Protected Areas

There has been a recent focus on the value of MPAs, One recently published study (Kenter *et al*, 2013) uses a travel cost method to establish the current value of angling and diving in recommended Marine Conservation Zones (MCZs) through a detailed primary survey of over

1,600 individuals. Another study (Defra ERG 1204¹⁹), yet to be published, utilises secondary source data to establish estimates of the recreation value of MCZs. It purposefully uses secondary data sources to ensure that the methodology can be repeatable for other MPAs.

¹⁹ Work in progress (not yet published): Value of the impact of Marine Protected Areas on recreation and tourism services, commissioned by Defra to Risk & Policy Analysts Limited, October 2013

3. Business Survey

3.1. Objective

There were two initial aims of the business survey:

1. To provide information with which to make an assessment of the direct local (the immediate locality of the case study area) economic impact of activities.
2. To obtain information on the cost of undertaking an activity e.g. the cost of charter boat hire, which can be used to adjust values being used for value transfer to improve their relevance and accuracy for the local area.

The assessment of the local economic impact of activities helps to put the case study in context against the valuation maps. This will provide only a partial indication as it will only identify expenditure directly associated with the activity being undertaken and those providing that activity, and will exclude all associated expenditure e.g. food, drink, accommodation etc.

The cost of undertaking an activity was assessed through manipulation of revenue against customer numbers as well as direct questions on cost of services per person. Note, again, that whilst the survey examines cost per paying participant, the values extracted from the literature are an average cost per participant, where some pay for a service and some do not. Also the values extracted from literature are for total expenditure, including travel, accommodation and food and drink, as well as direct activity costs. The business survey is aimed at direct activity costs only.

3.2. Our Approach

A business survey was designed to gather data economic data on marine recreation activity services to inform each of the two case study area valuations. This focused on three areas: 1) revenue, profit and customers, 2) employees and wages and 3) activity services.

3.2.1. Survey Design

A survey form to provide to operators within the case study areas was drawn up in Excel and piloted to two selected businesses. This requested some general textual information as well as core values specific to the case study and each of the activities or services provided. IN particular, questions on revenue, profit, customers, employees and wages were asked to be broken down into individual activities. Also these were requested in regard to activities taking place within the case study only. Throughout this section the 'inside' and 'outside' values are quoted and this refers to inside and outside the case study area.

The pilot informed some changes as well as a preference for interviewees completing the form themselves rather than be guided through the questions by PCF as previously planned. The survey form was revised as a result and is shown in Appendix G.

3.2.2. Identification of Operators

The survey was aimed to target both direct providers of activities and providers of activity-related infrastructure e.g. charter boat operators. The survey was issued to every such known business operating within one of the WAM activities within 5km of the case study area. In a few cases, additional operators >5km were included where they were considered of local interest. The operators list was drawn up from both an internet business search (GoogleMaps and general web search); and from local knowledge from PCF. In total, 12 operators in Dale and 32 in St David's were asked to complete the survey (St David's being a much larger case study area). A further two were identified but these were found not to be in business.

3.2.3. Survey Management

Despite the warm up given to operators of the survey, 3+ weeks ahead of its release, feedback was slow owing to the preferred email format rather than direct interview; the holiday period at the time; as well as the additional operators identified within the business search who were not warned previously. Many operators needed to review the survey and then find the necessary information within their business. An extended survey period was allowed, with frequent contact with operators to encourage feedback and check progress.

3.3. Survey Results

3.3.1. Response Profile

As shown in Table 1, the response rates for completed forms, 44% of survey forms were completed in both cases. Whilst the rate is above the typical for emailed forms, it was lower than anticipated, with an expectation that local knowledge and engagement would have increased this. As a result of the low response rate, it has been necessary to scale up results to account for the case studies as a whole.

Table 1: Business responses

	Total Issued	Received	Not received	Business no longer operating	Response Rate*
DALE	12	5	7	0	42%
ST DAVID'S	34	16	16	2	50%

* Calculation assesses against those number of businesses operating today (as 2 were found not to exist)

Most operators provided more than one activity, as shown in Table 2, and therefore their responses have been divided up into 'activity responses'. This allows a certain overview of the confidence gained in values per activity type, with canoeing / kayaking, coasteering and surfing being the greatest responses.

Table 2: Activity responses

WAM Activity ID	WAM Activity	Number of Responses in Dale	Number of Responses in St David's	Total activity responses*
11	Canoeing/kayaking	1	7	8
19	Climbing	N/A	4	4
20	Coasteering	0	7	7
8	Cruiser sailing	2	1	3
6	Diving	4	0	4
13	Kite surfing	N/A	1	1
2	Power boats	3	1	4
30	Sea angling	3	0	3
7	Snorkelling	N/A	1	1
15	Surfing	N/A	6	6
29	Walking	0	1	1
4	Wildlife boat tours	2	1	3
16	Windsurfing	1	N/A	1
23	Beach activities	0	0	0
10	Body boarding	N/A	0	0
9	Dingy sailing	0	0	0
26	Dog walking	0	0	0
27	Horse riding	N/A	0	0
1	Jet skiing PWC	0	N/A	0
12	Kite boarding	N/A	0	0
17	Land yachting	N/A	0	0
21	Power kite flying	N/A	0	0
14	Rowing	N/A	0	0
31	Shooting	0	0	0
28	Swimming	N/A	0	0
5	Wildlife watching	N/A	0	0
32	Other non-listed activity	N/A	0	0
18	Caving/potholing	N/A	N/A	N/A
3	Wake boarding / water skiing	N/A	N/A	N/A
22	Quad biking	N/A	N/A	N/A
24	Mountain biking	N/A	N/A	N/A
25	Cycling	N/A	N/A (1)	N/A

* One response is equal to one activity per business, therefore one business may have 3 activity responses if they provide services n e.g. surfing, kite surfing and kayaking.

Note N/A is stated where WAM does not hold data on the case study activity.

3.3.2. Financial year

Values provided in the business survey were for full financial years. In most instances data was provided for the financial year 2011/12, as the business survey was carried out in early 2013. In order to ensure that the values presented from the business survey are comparable to any policy decisions occurring today, the survey values have been rebased into financial year 2012/13 prices using HM Treasury GDP deflator index²⁰. This index adjusts values based on a broad measure of inflation in the UK economy. Calculations were originally made in 2011-2012 values, then final values adjusted.

It should be noted that values presented in the 'value transfer' section are for calendar year 2012, rather than financial year 2012/13.

3.3.3. Revenue

The revenue for all businesses was summed for values relating to inside the case study area. On average 80% of revenue was attributed to inside the case study in both case studies. Therefore where revenue for inside the case study was missing, 80% of the total revenue for any one business was used instead.

The revenue values were then scaled up to 100% as shown in Table 3 to give a very approximate indication to the local case study as a total. These are discussed in more detail in Section 6.

There were not enough responses per activity to grant a scaling up of revenue to the case study per activity. However the range of responses is shown for reference in Figure 3, with the minimum, maximum and average revenue per activity.

In broad terms, this results in four categories of average business revenue by activity type:

- High (£40,000-300,000) = wildlife boat trips, sailing and coasteering
- Medium (£20,000-40,000) = kite surfing, power boating, canoe/kayaking, snorkelling
- Low (£10,000-£20,000) = climbing, dinghy sailing, surfing, windsurfing, diving
- Very low (<£10,000) = cycling, sea angling, walking and paddleboarding²¹

²⁰ <https://www.gov.uk/government/publications/gdp-deflators-at-market-prices-and-money-gdp-march-2013>

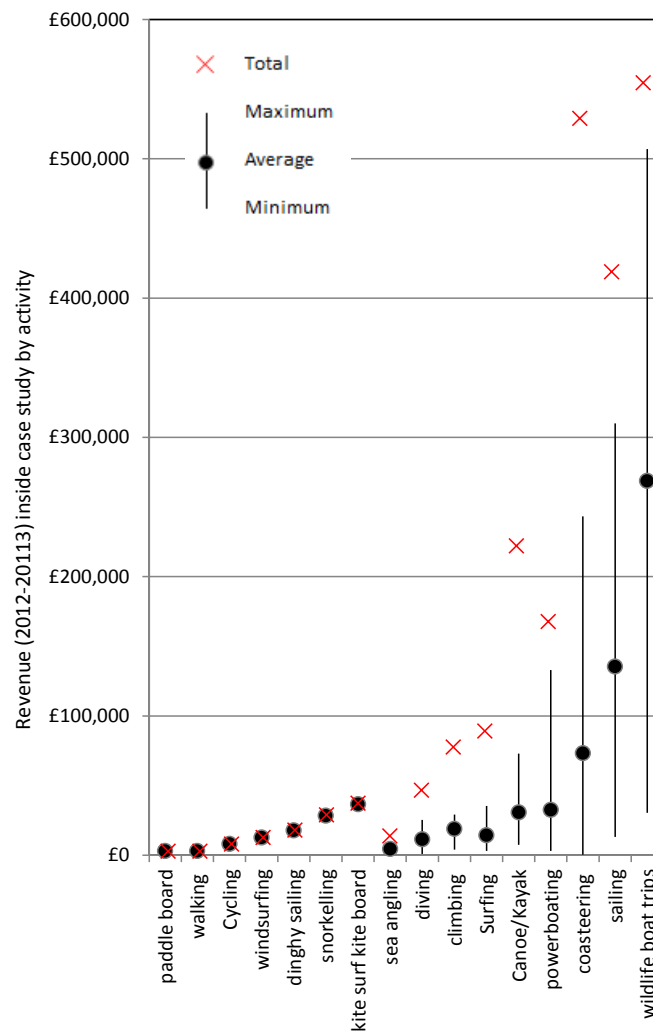
²¹ Note paddle boarding is not a WAM activity but was recorded in a survey

Table 3: Revenue from all businesses combined

	Dale	St David's
Annual revenue (£) - Inside & outside case study total (2011-2012 values)*	£167,188	£2,195,259
Annual revenue (£) - Inside only (2011-2012 values)*	£142,188	£1,609,159
Number of responses that had data on revenue*	4 of 11*	16 of 32
Percentage of responses, that had data on revenue, of all operators in case study*	36%	50%
Milford Marina - Annual revenue (£) - Inside & outside case study total (2011-2012 values)*	£546,000	N/A
Milford Marina - Annual revenue (£) - Inside only (2011-2012 values)*	£436,800	N/A
Revenue scaled up to all operators in case study - Inside & outside case study total (2011-2012 values)**	£1,005,767.00	£4,390,517
Revenue scaled up to all operators in case study - Inside only (2011-2012 values)**	£827,817	£3,218,317
Revenue scaled up to all operators in case study - Inside & outside case study total (2012-2013 values)	£1,020,907	£4,456,609
Revenue scaled up to all operators in case study - Inside only (2012-2013 values)	£840,278	£3,266,763
GVA - Inside only (2012-2013 values)	£401,653	£1,561,513

* For Dale, excluding Milford Marina, ** For Dale, with Milford Marina added on

Figure 3: Range of revenue inside case studies per activity



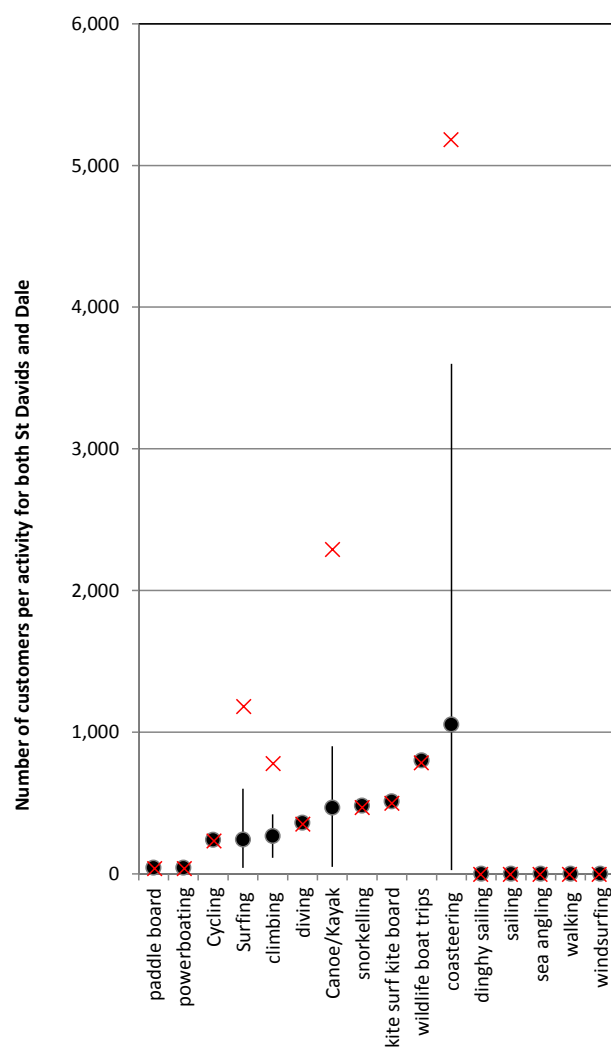
3.3.4. Customers

There was not enough information to scale up the number of customers in Dale to all businesses. However an approximation for St David's was possible, indicating the scale of WAM participants paying for direct activity services.

Table 4: Customers from all business combined

	Dale	St David's
Annual number of customers - Inside & outside case study total	N/A	30,917
Number of responses that had data on no. customers	N/A	12 of 32
Percentage of responses, that had data on customers, of all operators in case study	N/A	38%
Customers scaled up to all operators in case study	N/A	82,445

The range of customers per activity is shown in Figure 4, with the minimum, maximum and average customers per activity.

Figure 4: Range of paying customers inside case studies per activity provided

3.3.5. Employment

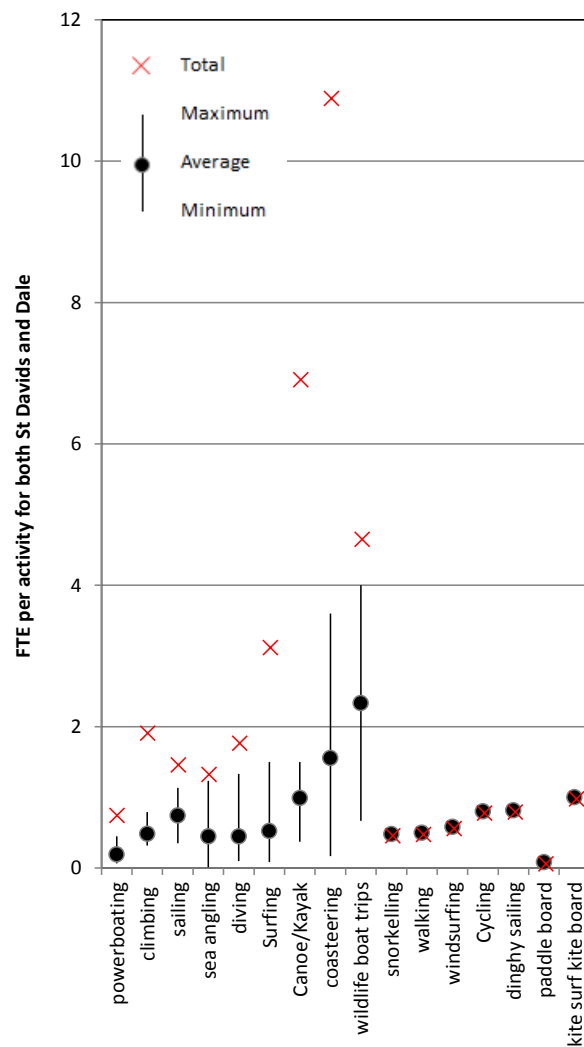
Full time equivalents (FTEs) is a standardised measure of employment that allows different types of jobs (i.e. full time, part time and seasonal) to be combined to provide one single figure. It refers to the number of hours worked that add up to one full-time worker.

The number of employees per business as shown in Table 5 was calculated based on some assumptions / rules, where: part time = half a full time equivalent (FTE), full time seasonal = one third of an FTE and part time seasonal = half x a third of an FTE. Figure 5 also shows the breakdown of FTEs per activity for both case studies. Due to the lack of response to wages with this same split, it was not possible to scale up wages to the case study area.

Table 5: Employees from all business combined

	Dale	St David's
TOTAL FTE employees inside and outside case study*	20.1	43
TOTAL FTE employees inside case study*	16.1	30
TOTAL FTE employees outside case study*	4.0	10
Number of responses that had data on employment*	4 of 11*	15 of 32
Percentage of responses that had data on employment*	36%	47%
Of which Milford Marina FTE employees inside and outside case study	13.5	N/A
Of which Milford Marina FTE employees inside case study	10.8	N/A
Of which Milford Marina FTE employees outside case study	2.7	N/A
TOTAL inside and outside employees - scaled up to all operators in case study **	32	92
TOTAL inside employees - scaled up to all operators in case study **	25	65
TOTAL outside employees - scaled up to all operators in case study **	6	22
GVA per FTE	£15,829	£24,058

* For Dale, excluding Milford Marina, ** For Dale, with Milford Marina added on

Figure 5: Range of FTEs inside case studies per activity provided

3.3.6. Value per customer

Revenue per customer

There was very limited data returned with which to calculate revenue per customer, as shown in Figure 6. The same minimum and maximum values for climbing, coasteering, canoe / kayaking and surfing and due to one operator providing all services as an equal split of their revenue, with both the maximum and minimum compared to other businesses.

Cost per customer

Businesses were also asked to provide cost per customer for each of their services provided, the results for which are shown in **Figure 7**.

3.4. Application of survey results

The business survey provides data on revenue and jobs that have been used to demonstrate the local economic impact of recreation through activity providers. It has been used to adjust the expenditure values of coasteering and wildlife boat trips so that they include local 'price' information. These are the only two activities because (i) these two are the only activities that are almost entirely carried out through service providers; and (ii) in most instances it is not possible to adjust the secondary source expenditure data as no breakdown is provided.

Figure 6: Range of revenue per customer inside case studies per activity provided

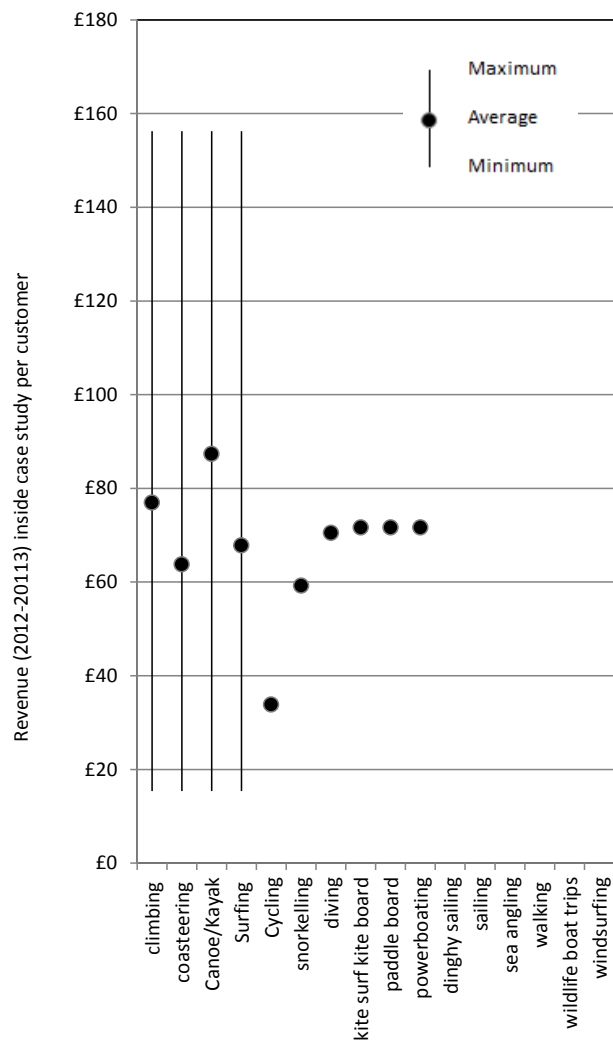
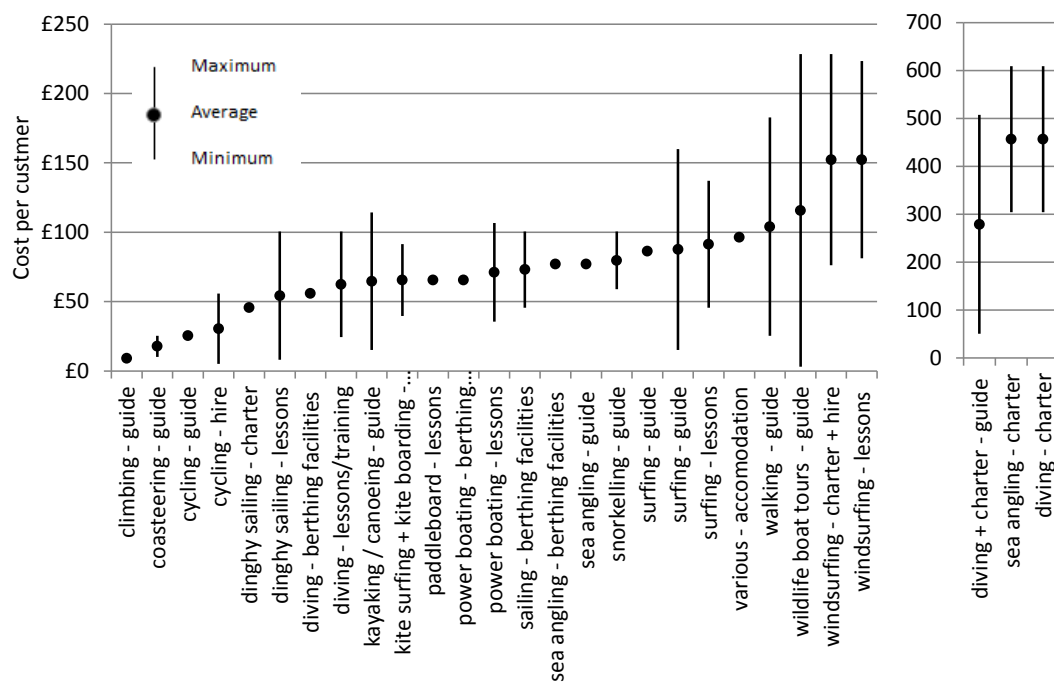


Figure 7: Range of cost per customer for each activity service provided



4. Activity Expenditure Values

4.1. Overview

As noted in Section 2, the literature review assessed both the methods used to value marine recreation areas, as well as the values produced by these studies, i.e. transfer values for expenditure per person per day. Transfer values are existing economic valuation evidence found in previous studies that can, given suitable consideration, be applied in new appraisal context (i.e. the values from one study are transferred across to another). The transfer values that were of direct interest to this study were average expenditure costs per participant.

By using transfer values, a primary survey is not necessarily required, enabling a quicker assessment with a potentially much wider remit. Therefore this study assessed a set of expenditure values from source studies that could be applied to WAM. However the business survey (Section 3) has allowed some review of these transfer values and adjustment where relevant.

This section sets out how the values have been calculated for each activity. These transfer values of expenditure per participant per day were then applied to the spatial data in WAM, from which a total number of participants was calculated (Section 5), therefore simply allowing a multiplication of participant numbers by the expenditure per participant per day to give a total economic value to each area.

4.2. Our Approach

4.2.1. Literature Review

Transfer values for specific WAM activities that occur in the case study areas were collated, assessed and prioritised from the literature. This also considered the availability of evidence on other activities listed in the WAM database where easily obtained.

A search for usable secondary data sources was undertaken through three channels:

- Collation of data and studies from the project Steering Group members
- Search of online academic journals
- A general Google search for academic and grey literature

4.2.2. Suitability of Secondary Sources to Case Studies

Suitability of Source Study

Initially, each study of significance as sourced during the literature review in Section 2 was assessed for its suitability for value transfer. The following were identified as the key characteristics against which the appropriateness of the original studies for use in value transfer could be considered:

- Relevance / Activity: Match of recreation activity to the activities in WAM
- Relevance / Location: Similarity of location
- Relevance / Users: Inclusion of all user types (overnight visitor, day visitor and local resident), whether paying or not (i.e. to create values for the 'average' user for the area)
- Value: Direct use value of marine and coastal recreation market goods and services, on an expenditure per person per day basis
- Research quality i.e. peer reviewed; survey or other data collection method

These criteria have been assessed against each study with scores ranging from poor to moderate then good, as detailed in Appendix D. However as it is the suitability of the actual expenditure values from these studies that is of direct relevance, these are broken down below in detail.

Confidence in Final Adopted Values

The expenditure per person per day value has on the whole been taken (transferred) from previous studies (some were adjusted using evidence from the business survey). The final values adopted for each WAM activity are based on a single source or multiple sources (depending on the number of appropriate studies available). A confidence level was assigned to each final adopted value which takes into account the suitability of the underlying source study and the extent to which values in the source studies support each other (i.e. are similar in magnitude). Confidence scores range from 1 (none) to 5 (good) (in line with the confidence scores used for the WAM activity data) as detailed below:

- 5 = absolute confidence: value data is sourced through a credible primary survey of users in the case study area
- 4 = data for the activity available from more than one appropriate secondary source, with similar magnitudes of value provided by each source.
- 3 = data for the activity available from a single appropriate secondary source; data for a closely related activity available from one or more appropriate sources with similar magnitudes of values
- 2 = data for the activity only available from less appropriate sources, or for only partially related activities from an appropriate source
- 1 = no confidence: no data for the activities in question or similar activities available from any source. Note that best practice would be to have 0 = no confidence. However 1 = no confidence to align with the previous WAM study

It is noted that the majority of sources used in this report are from secondary sources, none of which are specifically focussed on the individual case study area(s). As such there will always be a level of uncertainty around the average expenditure values and therefore a confidence score of 5 has not been assigned to any of the values.

Lower and upper bound expenditure estimates

Where multiple studies have been used to calculate the average expenditure/day, a lower bound estimate of participant expenditure per day is taken to be the lowest average figure provided by an individual study figure. The converse is true for the upper bound estimate. Where a single study is used (e.g. the GBTS/GBDVS) that does not provide any upper or lower estimates, then a lower and upper bound estimate is generated by applying the average % difference between the average and lower/upper bounds for those activities where multiple source data was available. These values, equal to -27% and +28% respectively, are only shown in the summary Table 6.

The upper/lower bound estimates are frequently termed minimum/maximum in the mapping though the reader is referred to the original definition set in this section.

4.2.3. Data Adjustments

Inflation

All of the transfer values are provided here in 2012 prices. As the values from most of the original studies are from years prior to 2012, the values were adjusted to bring them into line with 2012 prices. That is, the values have been inflated to allow for the effects of price inflation over the period from the original study price year to 2012. The UK GDP deflator index²² (as advised in HM Treasury guidance) has been used as the basis for adjustment calculations. This assumes that changes in unit values occurred as a result of inflation.

It should be noted that the WAM activity data, to which the values (as detailed in this section) have been applied, was collected in 2009. However the report needs to present values in or close to the present financial climate to allow consideration in current management decisions. Activity rates are in fact unlikely to have changed significantly since 2009. Coasteering is one of the few activities that may have changed notably, i.e. a new / fashionable activity with growing trends in participation.

(Note also that values from the business survey refer to the financial year 2012/13 rather than the calendar year of 2012.)

Uniform units

Where value data is not presented as expenditure per participant per day in the original studies, calculations have been made using the original study data in order to transform values into this format. In most instances this required simply dividing total expenditure by total activity days. In

²² HM Treasury: http://www.hm-treasury.gov.uk/data_gdp_index.htm

some instances alternative calculations were required, for example The Great Britain Day Visit Survey (GBDVS) and Great Britain Tourism Survey (GBTS).

The Great Britain Day Visit Survey and Great Britain Tourism Survey

GBDVS and GBTS cover two discrete recreation participant segments: day visitors and overnight visitors. In order to estimate the average per day expenditure of a participant, the total expenditure for a given activity from both surveys was summed and divided by the sum of visit days from the GBDVS and visit nights from the GBTS. By combining both surveys prior to calculating average per day expenditure, the day visit/overnight visit profile of participants is incorporated into the calculation. As a result of this, the two data sources are discussed as a single data source throughout this report.

For GBTS overnight trips, daily expenditure is calculated by averaging total trip expenditure by the number of nights. See the following section for additional detail on 'Expenditure components: day versus overnight participants'.

4.2.4. Other Assumptions

Beyond the basic assumption that data can be transferred from the original studies to the case studies, the following assumptions underpin the analysis.

Main activity

All expenditure data taken from the original studies is associated with a visit to a location in order to carry out a particular activity. As such, all expenditure associated with that visit is attributed to that activity. For GBDVS and GBTS, which surveys people who may be undertaking more than one activity in a day, the dataset distributed by 'main activity' has been utilised.

Each activity person day in the WAM database is assumed to be a 'main activity' and the main activity average expenditure data is therefore applied. As in reality an individual may undertake more than one activity in a day e.g. visit a beach in the morning, walk along the coastal path in the afternoon, the values calculated for the WAM database are likely to be an overestimate. This has been addressed through sensitivity testing as detailed in Sections 5 and 6.

Expenditure components

The source studies capture information about a wide range of expenditure components, including direct expenditure on the activity and associated expenditure such as food and drink and accommodation. The studies used in our analysis have sought to capture all expenditure associated with an individual's trip. This includes:

- Expenditure associated with carrying out the activity e.g. equipment hire
- Other non-activity specific expenditure associated with the trip e.g. food and drink
- Expenditure on travel associated with the trip
- Expenditure on overnight accommodation (for overnight visitors)

Average expenditure data includes that of both day participants and overnight stay participants. Most studies sought to capture data from both types of participants and did not analyse the two groups separately. As such the average expenditure data that they set out represents an average that is weighted based on the mix of day and overnight participants included in their sample. It can be assumed that the mix of day and overnight visitors in the samples reflect that of the relevant populations.

The exceptions to this are the GBTS and the GBTVS which specifically target overnight participants and day participants respectively. As the two surveys target different participant populations, a weighted average combining the two surveys can be calculated by combining average expenditure and number of activity day's data from each. This produces a weighted average that combines overnight and day participants and is therefore comparable to the values presented by other studies.

It is assumed that the mix of day and overnight participants in the focus areas of the source studies is similar to that of the case study area. This is a necessary assumption as the WAM database on activity numbers provides no indication of the split between day and overnight participants.

Level of detail in defining activity type

The availability of secondary source value data varies significantly between the 31 WAM activities. Some activities, such as angling, have had good, recent studies carried out which provide good sources of information for transfer to the WAM project area. For other studies, such as windsurfing, there is a less developed evidence base. In many instances values for more generic activities need to be applied to individual WAM activities. For example, values for 'watersports' could be applied to an activity such as 'windsurfing'.

4.2.5. Significant Large Surveys

There is a very limited literature base that establishes values by individual activities. In general there are three types of source: large scale multi-activity survey, local area multi-activity studies, and single activity studies.

The large scale multi-activity surveys provide data on a broad range of activities and therefore allow a good coverage of WAM activities. As mentioned previously, the two major surveys identified are the annual GBTS/GBDVS and Natural England's 'Monitor of Engagement with the Natural Environment' (MENE). The GBTS/GBDVS has been adopted as the preferred source of information to the MENE for two main reasons: (i) data can be extracted for Wales only, whereas MENE is focussed on England only; (ii) GBTS/GBDVS provides a more detailed breakdown of activities thereby providing a better fit with the WAM activities than MENE.

For some activities e.g. visiting a beach, the two surveys provide very similar expenditure estimates. For others, the estimates are notably different. With the exception of watersports, where the GBTS/GBDVS value is significantly greater than the MENE value, MENE tends to produce lower value estimates.

Where multiple studies are available for any given activity they are included in the calculations of average expenditure along with the GBTS/GBDVS (and MENE in some instances).

4.3. Allocated Values and Confidence

4.3.1. Overview

The methodology (Section 4, 5) gives details of how values were extracted and combined from the identified data sources in order to estimate a final per person per day expenditure value. Where a single source is used, the final value is taken from the original source with any necessary adjustments/calculations, and where multiple sources are used the final value is a simple average (mean) of the values from each source.

Each original source was assessed to ascertain its appropriateness for use in value transfer. Further details on this assessment can be found in the values assessment (Section 4) and the outputs in Appendix D. The following sections now detail how these values have been calculated, identifying the source data for each activity in turn. However first there are some guideline notes that the reader should be aware of. Many of these are discussed above but are provided here for referral.

As described above in detail, these values are based on the following:

- i. All values presented and discussed in the following sections are presented in 2012 prices (therefore the values presented in the original source documents may differ from the values presented here if not from 2012)
- ii. Values relate to the expenditure of both local resident and visiting activity participants
- iii. Types of expenditure include all those associated with the recreation trip
- iv. Unless otherwise stated, value (£) is expenditure per person per day
- v. Where GBTS and GBDVS survey data are referred to these are for Wales data only and have been combined to ensure coverage of both day trip participants and overnight visitor participants (see above)
- vi. Minimum and maximum values are the lower/upper bounds from transfer values (if only a single source then these are only provided in the summary Table 6)
- vii. 5 is 'absolute confidence' and 1 is 'no confidence' in the final adopted value for each activity
- viii. Average expenditure values take both paying and non-paying individuals into account
- ix. Cruiser sailing and motor boating values are per boat and subsequent calculations therefore assume WAM usage values are number of boats
- x. The business survey has only informed values conclusively where number of customers has been provided together with associated costs, which was very limited

4.3.2. Beach activities

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Beach activities	£34/day (n/a)	GBTS (2012) & GBDVS (2012) [Visited beach]	4

Discussion

The average GBTS (2012) and GBDVS (2012) Wales value provides an average expenditure of £34/day per person. This is very similar to that provided in MENE (£31/day), though the MENE survey is for activity in England (and was therefore not used in the value transfer).

Final value

A final value of £34/day is adopted, based on the average from GBTS (2012) and GBDVS (2012) Wales data.

Confidence

Given the similarity of the values from the two data sources - GBTS (2012) and GBDVS (2012), and MENE (2013); and the relevance of GBTS/GBDVS to Wales - we assume a confidence score of '4'.

4.3.3. Climbing

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Climbing	£21/day (£9, £32)	GBTS (2012) & GBDVS (2012) [Organised adventure sports: whitewater rafting / sphering / canyoning / gorge walking] GBTS (2012) & GBDVS (2012) [Non-motorised watersports: Canoe, kayak w/surf, surf, b/board] MENE, 2012 [Any other outdoor activity e.g. climbing]	2

Discussion

There are no suitable matches in the existing literature for climbing. The following is a discussion of relevant but low suitability matched data sources.

A previous UK Tourism Survey (UKTS) (data for 3 years to 2002, Wales) provided an average expenditure figure of £124/day for overnight visitors for activities including rock climbing, abseiling, caving and potholing ('petrocentric' activities).

Organised adventure sports included in GBTS (2012) and GBDVS (2012) provides a possible loose match. Whilst there is organised climbing (e.g. guides and lessons) provided in the case study area, climbing is not predominantly an organised sport, and is not listed in the activity examples provided in the GBTS/GBDVS surveys (sports included are canyoning and gorge walking). The overnight participant expenditure figure of organised adventure sports (£135), however, is similar to that for the UKTS petrocentric activities of £124 discussed previously, possibly supporting a link.

However the average expenditure for all Wales participants of organised adventure sports from GBTS (2012) and GBDVS (2012) is markedly lower at £31/day with a large differential between day participants (£16) and overnight (£135). The GBTS (2012) and GBDVS (2012) value for non-motorised watersports may be a more appropriate value to adopt. Whilst climbing is not a watersport, non-motorised watersports are likely to have equipment costs of a similar magnitude to climbing as well as a closer match in the ratio of independent/organised group participants than 'organised adventure sports'. The non-motorised watersports value is £23/day.

MENE (2013) includes a figure of £9/day for 'any other outdoor activities e.g. climbing'. The figure is not specifically for climbing, but for any other outdoor activity not already included in other MENE activity categories.

Final Value

Ultimately none of the above provide a good match. An average of the GBTS (2012) and GBDVS (2012) data for organised adventure sports and non-motorised water sports, and the MENE (2013) value for 'any other outdoor activity (e.g. climbing)' is taken.

Confidence

Due to climbing not being specifically targeted in the source data, a confidence score of '2' has been assigned.

4.3.4. Coasteering

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Coast-eering	£62/day (n/a)	Project business survey-based calculation	3

Discussion

The average GBTS (2012) and GBDVS (2012) value of £32/day is for 'organised adventure sport'. Organised adventure sport does not explicitly include coasteering, but includes similar activities of canyoning and gorge walking.

Coasteering is considered primarily to be a form of organised group sport (Rogers, 2011); and is one of the only activities Pembrokeshire National Park where PCNP actually recommend going with a guide. Whilst not conclusive data (due to the number of returned forms), the business survey accounted for ~5,300 paying coasteering participants whereas WAM estimates the total number of participants to be ~ 11,300, i.e. around double. Due to lack of responses and uncertainty in WAM values, it is not possible to state only half pay for this service and it is likely that it is much more than half. Non-local providers may account for additional participants, along with some margin for error in the estimates made by both the business survey respondents and the WAM database informants.

Evidence from the business survey also indicates that the average price of coasteering offered by providers in the case study areas is £65 per person. This figure is notably higher than the value extracted from GBTS (2012) and GBDVS (2012). Using a weighted average (i.e. an average that takes account of both the price and number of customers on each individual tariff) the average activity cost per person on organised coasteering in the case study areas is calculated to be £42. This is still above the GBTS (2012) and GBDVS (2012) value, despite not including any other associated expenditure not included in the provider's price of the activity (e.g. travel).

No other appropriate sources were identified to test this value against.

Final Value

The average cost per person in the case study area of £42 has been taken as the base activity cost. An arbitrary £20 has been added to this to account for other related expenditure. (This arbitrary estimate is made based on an adjusted expenditure figure for walking, which is assumed to have a low value associated with expenditure on service providers). Therefore the final value adopted is £62.

Confidence

Use of the business survey data provides for very strong confidence (score of '5') in the estimate of the activity cost. However the number of paying participants is not known with much certainty; and the need to add on an arbitrary cost for related expenditure significantly reduces confidence in the estimate. Therefore a confidence score of '3' is assigned.

4.3.5. Cruiser sailing

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Cruiser sailing	£38/day (n/a)	TSE (2009) [Visiting yachts]	2

Discussion

The GBTS (2012) Wales value provides an average expenditure figure of £13/day/person for overnight participants. The sample size is very small for this activity, and the figure of £13 seems particularly low for what is considered a relatively high cost activity. No data is provided through the GBDVS (2012) meaning no values for day participants is available.

Tourism South East (2009) indicates a value of £153/day/boat and £50/day/person. This is significantly higher, and is more in line with expectations and is therefore the preferred estimate, although the study is focussed on visiting yachts in south-east England. As the WAM 'usage' data is provided per person and not per boat, and given that usage for cruiser sailing was made on an assumption of 4 people per boat, the £153/day/boat has been modified to a quarter of this value: £38/day/person.

Final Value

£38/day/person has been adapted from Tourism South East (2009) as the preferred value.

Confidence

As a result of the lack of Wale-specific data and the focus on 'visiting' yachts, the confidence score assigned to this estimate is '2'.

4.3.6. Dinghy sailing

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Dinghy sailing	£41/day (£23, £62)	GBTS (2012) & GBDVS (2012) [Coasteering] TSE (2009) [Visiting yachts]. GBTS (2012) & GBDVS (2012) [Non-motorised watersports: Canoe, kayak w/surf, surf, b/board]	1

Discussion

No appropriate sources were identified for the value of dinghy sailing. Evidence from the business survey shows that boat hire costs from approximately £15/hour to £65/half day for lessons. (No data on the number of customers was captured by the business survey so it was not possible to ascertain the number of paying participants compared to all WAM participants recorded.) When carried out through an activity provider, the costs per half day are similar to those for 'coasteering'. For private users, where larger dinghies are kept on moorings, expenditure may be more closely aligned with those for cruiser sailing. For smaller dinghy private users costs may be more closely aligned with those for other 'non-motorised watersports', although it is noted that dinghy maintenance costs can be high.

Final Value

The final value of £41 is based on an average of the coasteering, non-motorised water sports, and cruiser sailing per person expenditure values.

Confidence

There is significant uncertainty in the appropriateness of the match of the three source activities with dinghy sailing, as well as uncertainty over the distribution of activity days across the three identified potential categories of user (boat hire, small boat private, large boat private) for which the expenditure source data is matched. Due to these issues, a confidence score of '1' is assigned.

4.3.7. Diving

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Diving	£72/day (£69, £93)	Ruiz-Frau <i>et al</i> (2012) [diving]	4

Discussion

Ruiz-Frau *et al* (2012) provides Wales-based data for diving, with an estimated per person expenditure value of £78/day. Rees *et al* (2011) provides data for a case study area in south England, with an estimated per person expenditure estimate of £67/day.

Kenter *et al* (2013) uses a travel cost model to estimate WTP for diving in potential marine conservation zones (MCZs) in Wales. This established an estimate of £108 for Pembrokeshire (marine areas). The figure excludes any non-travel costs (e.g. expenditure on food and drink and equipment) and one would therefore expect the value to be lower than that presented in the other two sources. However it is markedly higher.

Expenditure data for diving is not provided in the GBTS (2012) and GBDVS (2012). Data from UKTS (2008) does provide data for diving, with an average expenditure value of £63/day. This supports the values provided in Ruiz-Frau *et al* (2012) and Rees *et al* (2011).

Evidence from the business survey indicates that dive courses in the case study area cost an average of approximately £86/day/person, with some providers including associated costs (e.g. accommodation, food) in this price. This is only slightly higher than the Ruiz-Frau value of £78, which is to be expected as the Ruiz-Frau estimate will include private users, whose per day costs are likely to be lower than for those undertaking the activity through a provider. (No value on the number of customers was captured by the business survey so it was not possible to ascertain the number of paying participants compared to all WAM participants recorded.)

Final Value

Ruiz-Frau *et al* (2012) provides the most appropriate data source, whilst Rees *et al* (2011) is also appropriate. The unexpected ordering of the value levels between the Kenter *et al* (2013) study and the Ruiz-Frau *et al* (2012) and Rees *et al* (2011) has meant that only the Ruiz-Frau and Rees values have been used in the best estimate value. This source has been combined with GBTS to generate the lower estimate and with Kenter *et al* (2013) to generate an upper estimate.

Confidence

Ruiz-Frau *et al* (2012) provides a particularly suitable data source. Evidence from the business survey provides some support to the Ruiz-Frau and Rees value, although some uncertainty is

caused by the size of the Kenter *et al* value and the unknown number of paying participants. Overall the Ruiz-Frau value is thought to be a good match and is supported by the Rees value. A confidence score of 4 is assigned to the estimate.

4.3.8. Dog walking

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Dog walking	£3/day (n/a)	MENE (2013) [walking with a dog - including short walks / rambling / hill walking]	2

Discussion

The only source identified that separates out walking with a dog from walking without a dog is MENE (2013). The MENE activity is specified as 'walking with a dog - including short walks / rambling / hill walking'. In WAM the activity is defined as 'dog walking'.

An interpretation of 'dog walking' is that the purpose of the walk is to 'give the dog a walk'. Whereas 'walking with a dog' implies that the purpose is for the person to go walking, and take the dog with them. Whilst this is a subtle difference, it may have implications for the make-up of the participant group, with a higher proportion of local participants in the 'dog walking' group than the 'going walking with a dog' group.

However the MENE value is low at £3/day. This compares to a value of £9/day estimated in MENE (2013) for 'walking without a dog'. This lower value implies that a higher proportion of lower spenders, which would conform to an assumption that 'dog walking' will have a higher proportion of local participants for whom the activity is inexpensive / at no cost.

The 'walking' values from the GBTS and GBDVS surveys are not considered an appropriate source for use here. The data relates to activities that last for three hours or more (including any travel time) and therefore many locally-originated dog walks are likely to fall outside of this definition.

Final Value

The MENE (2013) value of £3/day for 'walking with a dog' is taken as the preferred value.

Confidence

MENE (2013) provides a reasonable match in terms of activity, although there are some subtle definition issues, and the survey is focussed on England rather than Wales. As such, a confidence score of '2' is assigned to the estimate value.

4.3.9. Horse riding

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Horse riding	£137/day (n/a)	GBTS (2012) and GBDVS (2012 [Horse riding])	2

Discussion

The GBTS (2012) and GBDVS (2012) Wales value is £135/day for horseriding. The only other source is MENE (2013), which provides a value of £11/day for horseriding. There is a significant difference between the two values but no other reliable sources were found.

Organised treks are undertaken in St David's case study area with prices between £42 (half day) and £75 (full day) (this has been sourced from a local company website in absence of business survey results). Excluding these costs, the residual expenditure associated with the trip (e.g. food and drink, travel, other equipment) is between £90 and £60. This is notably higher than that for most other activities. No supporting information is available to test the potential expenditure of independent activity participants.

Final Value

The average GBTS (2012) and GBDVS (2012) Wales value of £135/day for horseriding has been adopted.

Confidence

Whilst GBTS/GBDVS information carried relatively high confidence, there is notable variation between the sources; therefore the confidence score assigned to this estimate is '2'.

4.3.10. Power boats & PWC

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Power boats	£38/day (n/a)	TSE (2009) [Visiting yachts]	1
PWC	£153/day (per boat) (n/a)*	TSE (2009) [Visiting yachts]	1

* Assumes one person per PWC

Discussion

The GBTS (2012) and GBDVS (2012) Wales value for 'other watersports – motorised' is £14/day. The GBTS and GBDVS sample sizes are very small for this activity. GBDVS reports a total of less than £1,000 expenditure despite estimating a total of 23,000 activity days, which is clearly incorrect. GBTS provides for a value of £14/day for overnight participants for what is a relatively high cost activity, which seems unrealistic. The GBTS and GBDVS data for this activity type is therefore not considered to be appropriate.

The business survey showed that a power boating course of two days costs £190 (also £220 assuming this is for 2 days also); and berthing of 15m per meter at peak season of £220 per meter annually, or £55 per mooring (no meterage provided) plus license of £21 to give £76. Therefore a daily average cost per boat is ~£80 for courses, ~£76 for berthing/licence. However these costs exclude associated secondary costs e.g. food, drink, accommodation, travel.

No other appropriate sources were identified.

Anecdotal evidence indicates that PWC hire can cost upwards of £50-£100, and fuel for one hour of jet skiing around £50. Therefore total trip expenditure is likely to be relatively high for these activities. As such, average expenditure per day can be expected to be upwards of £100.

Final Value

No appropriate data sources were identified for these activities. The value estimate presented for 'cruiser sailing' of £38/day/person (which also incorporates associated expenditure of e.g. food, drink, accommodation) is adopted as the per day value for power boats. For PWC, the value estimate presented for 'cruiser sailing' of £153/day/craft, on the assumption that there is one person per craft.

Confidence

Given lack of appropriate data sources, and the confidence score assigned for the cruiser sailing estimate, the confidence score assigned to this estimate is '1'.

4.3.11. Sea angling

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Sea angling	Shore-based: £30/day (£27; £33) Boat (hire/own): £80/day (£61; £99) All anglers (shore-based and boat): £55/day (£44; £68)	GBTS (2012) [Fishing – sea] GBDVS (2012) [Sea angling, coarse fishing, game fishing] Rees et al (2011) [sea angling]; Drew Associates (2004) [sea angling]	4

Discussion

Sea angling studies typically provide data broken down by different types of sea angling (shore-based, charter boat and own boat), from which a simple average daily expenditure figure can be calculated of each angling type. The exception to this is GBTS and GBDVS, which are more general surveys and provide an average figure for sea-angling, without any distinction between the type of sea angling undertaken.

The WAM database provides some evidence of whether the activity is shore-based or boat-based through short descriptions provided under the 'distribution detail' header, as well as location information on whether a particular angling site can be accessed by land or by boat only. However in most instances it is not possible to distinguish the likely proportion of each type. Therefore, an overall average daily expenditure figure is required as well as average values by type of angling.

Values used in the calculation of sea angling (all types combined) range from £44 to £68/day, based on three sources: GBTS (2012) and GBDVS (2012); Rees *et al* (2011); and Drew Associates (2004). Based on these three sources, the average expenditure per angling visit is £55/day. Only Rees *et al* (2011) and Drew Associates (2004) provide data broken down by shore-based and boat-based angling. For shore-based angling the average expenditure value is estimated to be £30/day. This is broadly in line with that of other shore-based activities, where average expenditure typically ranges from low £20s to low £30s. Boat-based angling is higher, as one would expect, at £68/day.

Kenter *et al* (2013) uses a travel cost model to estimate willingness to pay (WTP) for angling in MCZs in Wales. This established an estimate of £45 for Pembrokeshire (marine areas). The figure excludes any boat costs and associated costs (e.g. expenditure on food and drink and equipment) and one would therefore expect our total expenditure value of £55 to be greater than the Kenter *et al* value

Notably, the cost of undertaking angling from a boat can be significantly greater than the average when using charter boats. Data from the business survey (see **Section 3**) indicates an average angling charter boat cost of approximately £500/day/boat. In addition, mooring and licence costs together are £76 per boat; or a 2 hour trip is ~£12.50.

Final value

A final value of £55/day (all types of angling) is based on the average of GBTS (2012) and GBDVS (2012); Rees *et al* (2011); and Drew Associates (2004).

Average expenditure for sea angling (all types) was calculated by summing visit numbers and expenditure data for each angling type and then calculating an overall average for each data source, so that the angling type profile of all participants was captured. A simple average of these values from each source was then taken as the transferred final value.

As GBTS and GBDVS do not provide data broken down by type of activity, the value on shore-based and boat-based angling were calculated using just the other two data sources.

Confidence

Given the use of multiple sources, and the similarity of the values in the three sources used, as well as the position of the calculated average for shore-based angling broadly in line with other shore-based activities we assign a confidence score of '4'.

4.3.12. Small craft / equipment (non-motorised) activities

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Body boarding	£23/day (n/a)	GBTS (2012) & GBDVS (2012) [Non-motorised watersports: Canoe, kayak w/surf, surf, b/board]	3
Canoeing/ kayaking	£27/day (£23, 30)	GBTS (2012) & GBDVS (2012) [Non-motorised watersports: Canoe, kayak w/surf, surf, b/board] Ruiz-Frau <i>et al</i> (2012) [kayaking]	4
Kite boarding	£23/day (n/a)	GBTS (2012) & GBDVS (2012) [Non-motorised watersports: Canoe, kayak w/surf, surf, b/board]	3
Land yachting / kite bugging	£23/day (n/a)	GBTS (2012) & GBDVS (2012) [Non-motorised watersports: Canoe, kayak w/surf, surf, b/board]	3
Power kites	£23/day (n/a)	GBTS (2012) & GBDVS (2012) [Non-motorised watersports: Canoe, kayak w/surf, surf, b/board]	3

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Rowing	£23/day (n/a)	GBTS (2012) & GBDVS (2012) [Non-motorised watersports: Canoe, kayak w/surf, surf, b/board]	3
Surfing	£23/day (n/a)	GBTS (2012) & GBDVS (2012) [Non-motorised watersports: Canoe, kayak w/surf, surf, b/board]	3
Windsurfing	£23/day (n/a)	GBTS (2012) & GBDVS (2012) [Non-motorised watersports: Canoe, kayak w/surf, surf, b/board]	3

Discussion

Small craft / equipment activities assessed here include Group (1): body boarding, canoeing / kayaking, surfing and windsurfing; and Group (2): kite boarding, land yachting / kite buggying, power kites and rowing. The activities in Group (1) are specified in the GBTS and GBDVS under a combined 'non-motorised watersports' category. As the activity type includes a bundle of activities, an exact WAM activity match is not possible.

Other data sources for Group (1) include Ruiz-Frau *et al* (2012), which provides a value of £30/day for kayaking, and MENE (2013), which provides a value of £33/day for watersports. Both of these are higher than the GBTS (2012) and GBDVS (2012) value of £23/day. Values from Ruiz-Frau *et al* (2012) may be higher as kayaking may be a more expensive activity than the other activities included in Group (1). The MENE data may be higher as it includes data for all watersport activities. This may include more expensive activities, such as use of PWC. Further, the MENE data is for England rather than Wales, and the difference between Wales-based values (GBTS and GBDVS and Ruiz Frau) and MENE may reflect differences in the cost of undertaking activities in England and Wales.

The activities in Group (2) are not specific in the GBTS and GBDVS. It is considered that Group (2) activities are a close match to Group (1) activities and that it is therefore appropriate to use the GBTS (2012) and GBDVS (2012) data for Group (2) activities. No other data source that specifically identifies Group (2) activities was identified.

Final value

The average GBTS (2012) and GBDVS (2012) Wales value of £23/day is applied to all activities within this category i.e. the Group (1) activities of body boarding, canoeing / kayaking, surfing and windsurfing; and Group (2) activities of kite boarding, land yachting / kite buggying, power kites and rowing. The exception is canoeing/kayaking, for which the GBTS (2012) and GBDVS (2012) data has been combined with Ruiz-Fra *et al* (2012).

Confidence

Due to the bundled nature of the activities in GBTS/GBDVS we assign a confidence score of '3' to those activities specified in the non motorised watersports category (body boarding, surfing and windsurfing); a score of '3' is also assigned to those not specified but considered to be similar activities: kite boarding, land yachting / kite buggying, power kites and rowing, and a score of '4' for canoeing/kayaking which utilises two sources.

4.3.13. Snorkelling

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Snorkelling	£23/day (n/a)	GBTS (2012) & GBDVS (2012) [Non-motorised watersports: Canoe, kayak w/surf, surf, b/board]	2

Discussion

Evidence from the business survey suggested that snorkelling with a guide in the case study areas can cost upwards of £18/person.

No appropriate data sources were identified for this activity. It is considered that snorkelling is likely to be most closely related to 'non-motorised water sports' in terms of activity cost.

Final Value

The value of £23 from 'non-motorised water sports' has been adopted for this activity. .

Confidence

The data source activity is considered to provide a weak match with the snorkelling activity category. As such a confidence score of '2' is assigned.

4.3.14. Swimming

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Swimming	£25/day (n/a)	MENE (2013) [Swimming outdoors]	2

Discussion

GBTS (2012) and GBDVS (2012) Wales provide an average expenditure value of £59/day. Notably this includes all forms of swimming i.e. in the sea (free) and in indoor and outdoor pools (paid for majority). The value is markedly higher for other similar activities reported in GBTS and GBDVS. The average values for 'visiting a beach' and 'non-motorised water sports' are £31/day and £23/day respectively.

The only other data source identified is the MENE survey. The MENE activity is outdoor swimming, which is a closer fit to the WAM activity, although still includes paid-for swimming in outdoor swimming pools. MENE (2013) provides a value of £26/day. This is more closely aligned with the 'visiting a beach' and 'non-motorised water sport' values than the GBTS and GBDVS value for 'swimming'.

Given these values, it is considered that the £59/day value is likely to be an overestimate. Whilst the MENE survey is focussed on England not Wales, the 'outdoor swimming' value is supported by the 'visiting a beach' and 'non-motorised water sports' values being of a similar magnitude. .

Final Value

A value of £25/day sourced from the MENE (2013) survey is adopted.

Confidence

Whilst the MENE value is considered to provide the best estimate, the survey's activity category is not an exact match to the WAM activity and the survey is focussed on England only. Therefore a confidence score of '2' is assigned.

4.3.15. Walking

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Walking	£23/day (£14, £32)	GBTS (2012) & GBDVS (2012) [Long walks; short walks] Welsh Economy Research Unit (2012) [Coastal path visitors]	3

Discussion

There are two preferred sources for this activity type. The GBTS (2012) and GBDVS (2012) provides a value of £32/day for long walk/short walks in Wales; and the Welsh Economy Research Unit (2012) a value of £14/day for visitors to the Wales coastal path. The difference between the two values is relatively large, particularly in percentage terms.

The only other source identified is MENE (2013), which provides a value of £10/day for 'walking (without a dog) including short walks / rambling / hill walking'. This value lends support to the lower of the two other values.

An average of the GBTS (2012) and GBDVS (2012) and the Welsh Economy Research Unit (2012) data give a value of £23/day. This is similar to the value estimates for a number of the other coastal activity types calculated for this study.

Final Value

An average of the GBTS (2012) and GBDVS (2012) and the Welsh Economy Research Unit (2012) data has been taken providing an estimate of £23/day.

Confidence

The value used sources considered to be appropriate for the activity, both in terms of geographic location and activity type. There is some deviation in the two values, although they are the same order of magnitude. Therefore a confidence score of '3' is assigned to the calculated value.

4.3.16. Wildlife boat tours

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Wildlife boat tours	£48/day (n/a)	Ruiz-Frau <i>et al</i> (2012) [wildlife boat tours]	4

Discussion

Ruiz-Frau *et al* (2012) is the only source identified that provides a good match for the activity type. It provides an average expenditure figure of £48/day with the average cost of the boat trip at £12 per person. Excluding the boat trip cost, expenditure is therefore £36/day. This is slightly higher than the similar activity of 'wildlife watching' (presented in this report). Evidence from the business survey indicates that the average cost of a wildlife watching boat tour in the case study areas is £30 per person.

Final Value

The value of £36/day (i.e. value excluding cost of boat tour) is taken from Ruiz-Frau *et al* (2012). The average cost of a boat tour is taken from the business survey. The final value is estimated at £66/day (i.e. 36 + 30).

Confidence

The value is taken from a single appropriate source that provides a good fit to the activity. It has been adjusted based on locally-specific activity cost data. The confidence score assigned to this estimate is '4'.

4.3.17. Wildlife watching

WAM Activity	Av. expenditure per person (& upper bound, lower bound)	Source [specific activity]	Confidence
Wildlife watching	£26/day (19, 31)	GBTS (2012) & GBDSVS (2012) [Visiting a wildlife attraction/nature reserve; watching wildlife, bird watching] Ruiz-Frau <i>et al</i> (2012) [seabird watchers] RSPB (2009) [RSPB reserve visitors]	3

Discussion

The GBTS (2012) and GBDSVS (2012) Wales value and Ruiz-Frau *et al* (2012) value are very similar at £29/day and £28/day respectively. These values are broadly in line with the previously calculated value of £24/day for the related activity of 'walking'.

RSPB (2009) provides lower estimates, of £18/day (day visit) and £19/day (overnight visit). The study provides a moderate fit for value transfer to the case studies. Most notably however, only non-resident visitors are included in the survey. One would expect this to result in an overestimate in the expenditure/day and for the average expenditure value from RSPB (2009) to therefore be greater than that presented in the earlier sources, but it is not. MENE (2013) supports this lower estimate, as it provides a value of £11/day.

Final Value

The final value of £26/day is calculated by taking an average of the three Wales-based sources: GBDS (2012) and GBDSVS (2012), Ruiz-Frau *et al* (2012) and RSPB (2009).

Confidence

The three sources were all used as considered to be appropriate for use. The values from the three studies are reasonably similar, and the final value is the same as that for walking, which is considered to be the closest similar activity. Therefore a confidence score of '3' is applied.

4.4. Summary Values

The preceding section has detailed how each value of expenditure per person per day has been calculated, whether from previous studies and surveys; and/or from the business survey. These values are summarised in **Table 1** together with the associated confidence values.

Table 6: Average expenditure per person per day (£)

The reader is referred to the previous Section 4.3 for a full justification of each value.

Activity	Average (£)	Lower Bound (£)	Upper Bound (£)	Confidence
Beach activities	34	25	43	4
Body boarding	23	17	30	3
Canoeing/kayaking	27	23	30	4
Climbing	21	9	32	2
Coasteering	62	45	80	3
Cruiser sailing (£ per person)	38	28	49	2
Dingy sailing	41	23	62	1
Diving	72	69	93	4
Dog walking	3	2	3	2
Horse riding	137	100	175	2
Jet skiing PWC (£ per boat)	153	112	196	1
Kite boarding	23	17	30	4
Kite surfing	23	17	30	3
Land yachting	23	17	30	3
Power boats (£ per person)	38	28	49	1
Power kite flying	23	17	30	3
Rowing	23	17	30	3
Sea angling	55	44	68	4
Snorkelling	23	17	30	2
Surfing	23	17	30	3
Swimming	25	23	26	2
Walking	23	14	32	3
Wildlife boat tours	48	35	62	4
Wildlife watching	26	19	31	3
Windsurfing	23	17	30	3

5. WAM Data and Value Calculations

5.1. WAM Data

5.1.1. Overview

Information on coastal and marine recreation activity location and total participation numbers / frequency relevant to this valuation project has been obtained from the Wales Activity Mapping project (WAM) database. The purpose of this section is to describe the origin of this data and method of manipulation to inform the valuation as presented in the case studies, Section 6.

5.1.2. Relevance to this study

The aim of this valuation study was to attach activity value data to discrete activity areas, as defined in the WAM database. A review of the database characteristics was therefore undertaken in order to provide an understanding of the data held within it and to identify any activity-specific variables that may be utilised to adjust values used in the value transfer process, to improve their applicability to local conditions.

This study takes the WAM data as given. It does not seek to verify or modify the data within WAM and does not seek to collect additional information on variables already included in WAM.

5.1.3. Activities

The marine recreation activities identified by WAM within the two case studies, St David's and Dale, are shown in Table 7. These include activities that take place in the marine area, tidal zone, and coastal terrestrial area. Of the 31 WAM activities listed (i.e. activities assessed throughout the WAM region), Dale contains 14 activities, whilst St David's contains 23. (Note this refers to activities within the extended case study area as detailed in Section 5; and excludes the 'other activities' category.)

Whilst the reader is referred to the WAM web GIS²³ to view individual activity areas, Figures 8 and 9 provide a quick view of the complexity of these for each case study. A legend is not provided for each activity due to this complexity and overlapping nature; however it is clear that the areas are used widely by different activity users. More detailed individual activity maps relating to the valuation are provided in Appendix F, though these may also be used as a general guide to where activities occur on an individual basis as well.

²³ <http://www.walesactivitymapping.org.uk/gis-mapping/>

Table 7: WAM activities and their inclusion in the case study economic valuations

WAM ID	WAM Activity	Data in Dale	Data in St David's
23	Beach activities	✓	✓
10	Body boarding	✗	✓
11	Canoeing/kayaking	✓	✓
18	Caving/potholing	✗	✗
19	Climbing	✓	✓
20	Coasteering	✗	✓
8	Cruiser sailing	✓	✓
25	Cycling	✗	✗
9	Dingy sailing	✓	✓
6	Diving	✓	✓
26	Dog walking	✓	✓
27	Horse riding	✗	✓
1	Jet skiing PWC	✓	✗
12	Kite boarding	✗	✓
13	Kite surfing	✗	✓
17	Land yachting	✗	✗

WAM ID	WAM Activity	Data in Dale	Data in St David's
24	Mountain biking	✗	✗
2	Power boats	✓	✓
21	Power kite flying	✗	✓
22	Quad biking	✗	✗
14	Rowing	✓	✓
30	Sea angling	✓	✓
31	Shooting	✗	✗
7	Snorkelling	✗	✓
15	Surfing	✗	✓
28	Swimming	✗	✓
3	Wake boarding / water skiing	✗	✗
29	Walking	✓	✓
4	Wildlife boat tours*	✓	✓
5	Wildlife watching	✗	✓
16	Windsurfing	✓	✓

5.1.4. Associated data

The data associated with the WAM GIS layers provide a large array of information, with fields categorised to allow quick comparison between sites. This includes number of participants, frequency of participation in activity for each of four periods of the year, repeat visits, frequency to undertake activity in each season, amongst other information. This is summarised in Appendix E. An explanation of each data type or parameter is provided together with the range of different categories or information types assigned to each of these. A second summary of those values found within the case studies is provided in Appendix E to give a snapshot of what is otherwise a large complex database that cannot easily be represented in a report. This aims to inform what data was available for manipulation.

5.1.5. Confidence in data

In addition, the data is provided with confidence scores for the data supplied (non-spatial elements) and for spatial definition. These have been used to inform the overall confidence of the valuation as detailed below.

Figure 8: Dale case study, showing the wide range of activities provided by the Wales Activity Mapping project

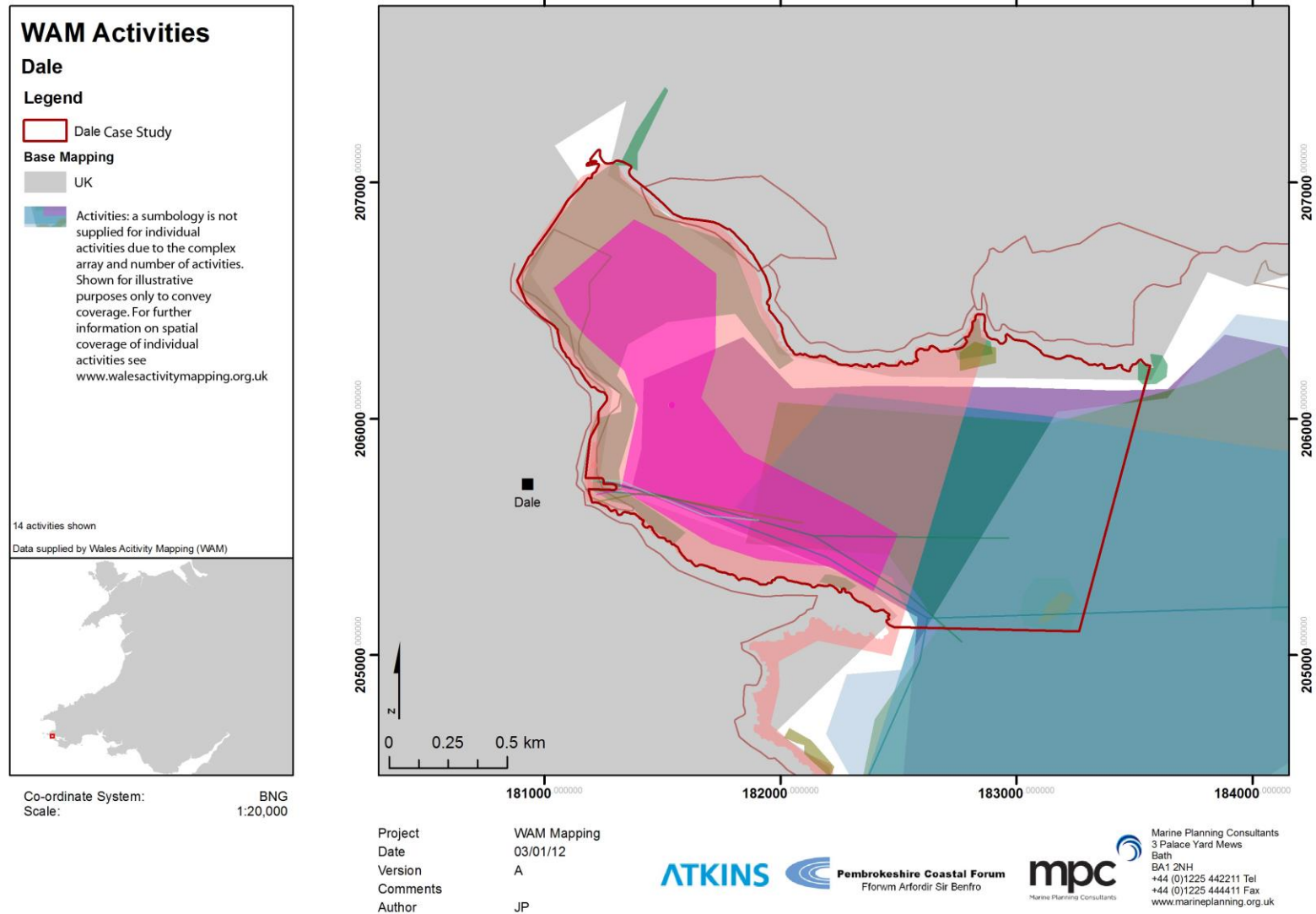
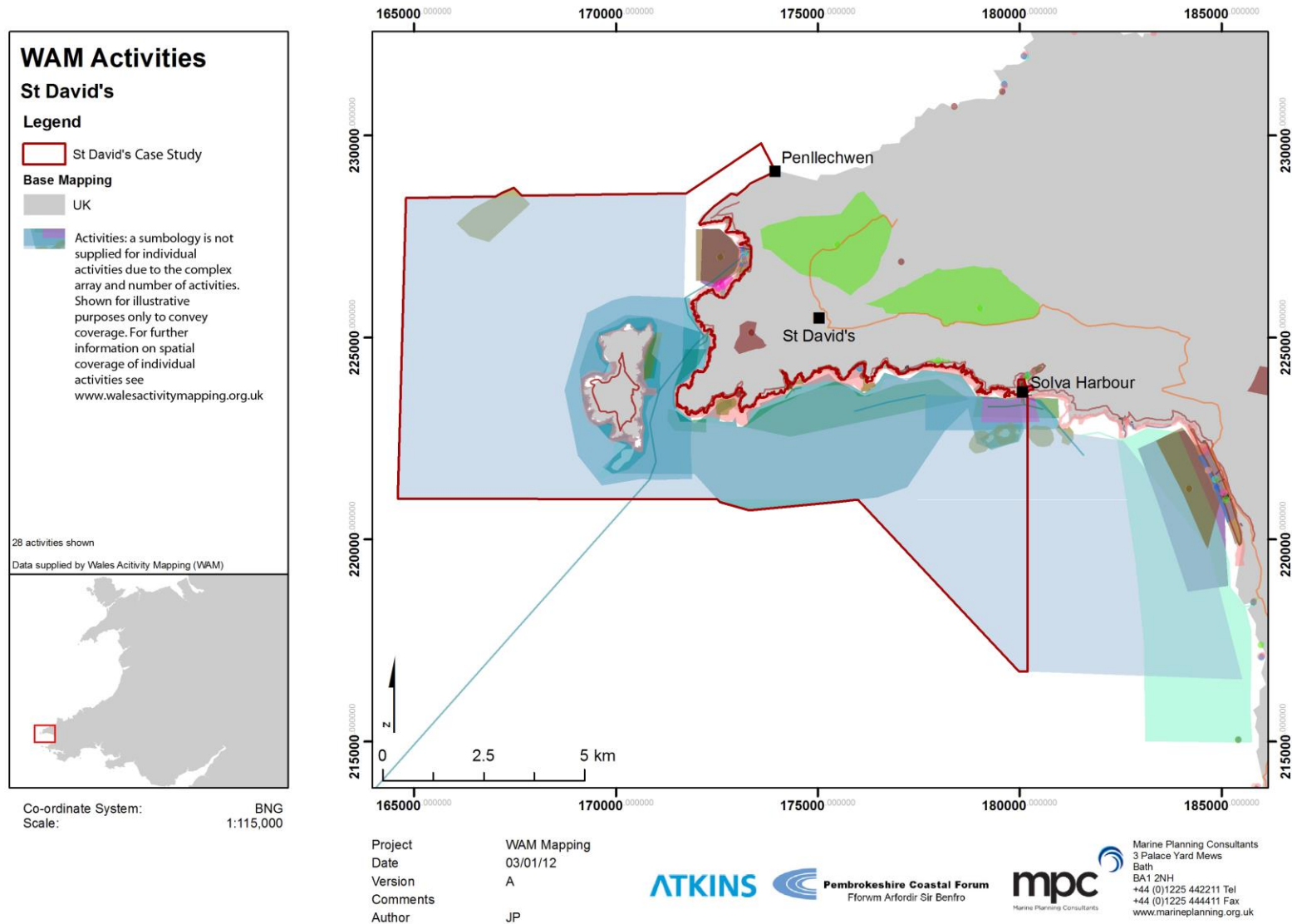


Figure 9: St David's case study, showing the wide range of activities provided by the Wales Activity Mapping project.



5.2. Data Manipulation and Calculations

5.2.1. Overview

Section 5 detailed how the average daily expenditure per participant values were calculated. In order to map out the annual expenditure of all participants at any one location, it is necessary to combine these values with the total number of participant days per year, as presented here. This requires some processing of both the WAM attribute (tabular) data, as well as spatial processing.

The analysis was carried out through a combination of GIS and spreadsheet processing / formula. This section does not break it down into the minute detail of each of these processes but are available on request and the GIS / spreadsheets will be made available at the end of the project.

5.2.2. Calculation of participant days per year

WAM provides information that can be used to calculate the total number of participant days through three types of data. Firstly, the usage scale defines the average number (provided as a numeric category) of participants using the site on a given day, regardless of time of year. This has been converted for use in the valuation as the average between the upper and lower limits of the category, rounded to the nearest whole number, e.g. 25-50 = 38.

Secondly, WAM provides a frequency of use by these, e.g. 38 participants, in each season. This enables the usage number to be multiplied up to an annual figure. The frequency was defined by WAM as daily, frequent or infrequent. For use in the valuation, these have been converted to an index where daily = 1, frequent = 0.3 (i.e. 0.3 out of every 1 day, or 3 in 10 days within each period of the year) and infrequent = 0.05.

Thirdly, the seasons were defined in WAM to fall into five periods to cover the whole year. These are based on moveable dates such as school holidays and Easter and as such vary from year to year. However the days have been calculated as approximately:

- Easter holidays = 14 days
- Late spring / early summer = 91 days
- Summer holidays = 62 days
- Autumn = 91 days
- Winter = 107 days

Therefore it was possible to calculate the number of days an activity area is used for any one season by multiplying the number of days for that season by the index, e.g. 14 days in Easter at a daily frequency = $14 \times 1 = 14$ days; or if infrequent then = $14 \times 0.05 = 0.7$ days. By calculating the number of actual participant days per season, these can then be summed to give a total number of days per year the area is used. This value (number of days) multiplied by the usage (participants per day) provides the total number of participant days per year. In summary:

Total participation days per season, $p = u \times f \times d$

Where u = usage

f = participation frequency index

d = number of days in each period of the year

And the total participant days per year $P = p(\text{season1}) + p(\text{season2})$ etc

5.2.3. Calculations and processing

Extraction from WAM

The WAM data was supplied by PCF to cover the case studies. As agreed at the interim report stage the GIS were cut to the case studies as defined in the project scope: the boundary of Dale follows that of the then proposed Dale Highly Protected Marine Conservation Zone (HPMCZ) (Figure 8), which has now been withdrawn as a potential HPMCZ; and the boundary of St David's is defined with an inshore limit of the coastline between Penllechwen (headland north of Whitesands Bay beyond St David's Head) to Solva Harbour (southeast of St David's), and an offshore limit that captures the islands (Figure 9).

Participant days

The WAM spatial data provides a set of discrete areas, lines and points for each activity (i.e. vector format, provided as ArcGIS shapefiles). Each of these contain within it information on the usage and frequency as described above. Therefore a total number of participant days per original WAM activity location was calculated. The size of these original WAM locations, i.e. length for lines, area for polygons (not relevant for points), that these participant days referred to was also calculated for future calculations.

Grid

The spatial WAM data were then converted into a consistent 100x100m grid format. By calculating the total area or length of the original WAM locations in the previous step, the proportion of that which fell within each grid cell (either totally or in part) could then be calculated. For example, if an activity completely covered a grid cell, therefore with an area of 10,000m², and the area of the whole activity area was 100,000m², then the grid cell was contributing 10% to the whole activity area and therefore was allocated 10% of the participant days. Therefore this proportion was multiplied by the total participant days to give the participant days per grid cell for each activity.

Combining multiple layers per activity

As the WAM data originally comprised of areas, lines and points, the total participant days within a cell were calculated for each activity by summing these three constituent parts for any one given activity type. For example, diving may contain both a line and an area within any one grid cell.

Whilst this was the approach adopted, i.e. to assume that all layers for any one given activity contributed to the total and did not repeat the same usage data, this may not have been the case. Therefore tests were carried out to assess the scale of this type of potential double counting. Generally, only <10 grid cells contained overlaps within any one activity per case study, though St David's contained 54 cells with overlaps for wildlife watching. However as any one activity in a case study contains thousands of 100m grid cells, this does not appear to be of great significance to the results.

Single activity expenditure valuation

Using the expenditure per person per day as described in Section 5, the participant days per cell were multiplied by the expenditure per day to give a total expenditure for the cell for any one given activity. It is these values that form the final output maps in Appendix F for each case study as discussed in Section 6.

Combined activities total value maps

A combined total expenditure for all activities within any one cell was also calculated by summing the expenditure for individual activities per cell. These values are presented in the case studies in Section 6.

Sensitivity testing

The expenditure value of participant per day was also provided with a possible minimum and maximum value as detailed in Section 4. This allowed sensitivity testing in the calculations and mapping by simply applying these values in the above steps.

Seasonal values

As the data was first broken into participant days per season, it was possible to extract the total expenditure per season for both individual and combined activities (total) per cell.

Confidence

As detailed in Section 4, the daily expenditure values per person were assigned a confidence value; and as covered in Section 5.1, the WAM data also has confidence values for each of the spatial delineation and the data itself. Therefore at any one location, i.e. grid cell, there were three confidence values available from the source data.

On further consideration, it was considered inappropriate to use the WAM confidence to inform a final confidence valuation map, those who use the results may misinterpret them. In effect by combining all three confidence scores, the detail is lost and whether an area is high or low, it cannot be understood why.

Therefore it was considered more relevant to have two separate confidence levels for each grid cell, one for WAM and one for the economic valuation. However as the purpose of this project was to map the valuation, only the expenditure confidence maps are presented.

There is no spatial variation in the confidence of expenditure for single activities and so the reader is referred back to Section 4 for these values. So the final mapped confidence outputs are for combined activity maps, i.e. the confidence in the expenditure value for all activities at any one location.

In the combined activity maps, at any one grid cell there may be a series of activities with different economic value and confidence value. Therefore to simply average the confidence values would not lead to a representative value, e.g. if there were economic values of £10k, 2k and 1k and confidence of 1 (low), 4 and 5 (high), then averaging would result in a high confidence, even though the majority of the economic value is provided by low confidence.

Therefore, a weighted confidence has been calculated for each activity contributing to any one cell, equal to the economic value multiplied by the confidence. The final confidence is then the average of these weighted confidences, normalised to the same scale of 1 to 5.

For example if the confidence of a £10k diving, £2k sailing and £1k kayaking expenditure in any one cell has associated confidences of 1, 4 and 5, then each component expenditure would be multiplied by the confidence, i.e. $10 \times 1 + 2 \times 4 + 1 \times 5 = 23$. The total possible score here would be if all confidence values were 5, i.e. $10 \times 5 + 2 \times 5 + 1 \times 5 = 65$. Therefore by dividing the summed weighted score of 23 by the total possible score of 65 provides a measure of total confidence, i.e. $23 \div 65 = 0.35$ or 35%. As the confidence scores have all been in the range of 1 to 5, this percentage was then normalised back to the same range, i.e. $0.35 \times 5 = 1.25$; and rounded to the nearest integer = 1.

As such, the combined activity map could therefore be provided parallel to a confidence map of the expenditure value, where this relates directly to confidence in the expenditure per person per day value.

5.2.4. Revised case study boundary for tabular values only

Upon completion of the mapping tasks and calculation of total expenditure per activity, it was evident that some activities were misrepresented due to their exclusion from the agreed case study boundaries. This occurred due to the coarser resolution of the WAM data relevant to the coastline boundary used. Therefore walking and climbing, activities that typically take place at the coast, both seaward and landward of the coastline, were particularly affected. However there were also occurrences of 'wet' activities plotted that were in fact on land and vice versa. Note that this problem can occur in GIS when bringing together data as a result of their different map projections, i.e. as an actual error. However all data was mapped at the same projection supplied by WAM; and the coastline data was sourced from Ordnance Survey at the same projection.

Due to the issues noted above, it was deemed necessary to repeat the analysis for output of the expenditure values to provide overarching case study values in Section 6, so that total expenditure could be compared between activities without bias. The mapped products remain with the original case study boundary.

A revised case study boundary was created that captured all coastal activities in addition to the original case studies, through visual assessment. This resulted in extending the Dale boundary inshore of the coastline by 600m and for St David's 250m (beyond this distance there was generally a gap before other WAM activities were plotted which were clearly inland).

It is important to note that these additional analyses were only carried out to provide total values per case study to inform Section 6. Therefore the maps provide information with the original case study boundary to the coastline, whilst the values quoted relate to the revised case study boundary, to avoid any bias when comparing activities / case studies etc.

Therefore, a similar process was carried out to the above steps based purely on the original shapefiles (and not cut up into a grid). This followed steps to calculate: participant days per original WAM spatial footprint, the proportion of these once cut to the revised case study boundary, the allocation of participant expenditure values, seasonal and annual expenditure per activity, the same for all activities combined and sensitivity testing. Due to the considerable GIS processing required to repeat the mapping, these values are only summed for the case study as a whole (not mapped).

Table 8 below shows the difference by participant days between the original and revised case study boundaries for comparison.

Table 8: Difference in participant days following revised case study boundaries

Activity	Participant days: extended boundary	Participant days: original boundary	Original as percentage of revised
<i>Dale</i>			
Climbing	237	0	0.0%
Walking	54473	5721	10.5%
Dog Walking	13870	11829	85.3%
Beach Activities	61326	530256	86.5%
Windsurfing	3506	3040	86.7%
PWC - Jet Ski	484	449	92.7%
Sea Angling	19167	18784	98.0%
Kayaking	6832	6726	98.5%
Wildlife Boat Trips	486	483	99.3%
Dinghy Sailing	13984	13983	100.0%
Diving	25356	25357	100.0%
Rowing	109	109	100.0%
Power Boating	207	207	100.1%
Cruiser Sailing	303	304	100.2%
<i>St David's</i>			
Walking	494346	7214	1.5%
Climbing	13265	2868	21.6%
Dog Walking	175639	46954	26.7%
Horse Riding	1418	541	38.1%
Coasteering	11317	5028	44.4%
Dinghy Sailing	14097	9135	64.8%
Power Boating	3143	2545	81.0%
Sea Angling	27841	24142	86.7%
Beach Activities	520366	455999	87.6%
Wildlife Watching	8617	7587	88.0%
Snorkelling	6101	5664	92.8%
Diving	4069	3856	94.8%
Kayaking	38482	37083	96.4%
Swimming	191891	187594	97.8%
Rowing	1282	1264	98.6%
Wildlife Boat Trips	201676	199192	98.8%
Windsurfing	474	471	99.3%
Power Kite Flying	879	878	99.9%
Cruiser Sailing	5822	5821	100.0%
Body Boarding	13927	13926	100.0%
Surfing	67922	67920	100.0%
Kite Surfing	473	474	100.2%
Kite Boarding	473	474	100.2%

6. Valuation of Pembrokeshire Case Studies

6.1. Introduction

Approach

This section provides short case study assessments of the economic value of coastal and marine recreation activities in the St David's and Dale case study areas. It primarily draws on data from the WAM database, a business survey and per participant expenditure data²⁴. These have been compiled together to produce area specific valuations as described in Section 5 and are also referenced in this section individually where relevant.

Where average participant expenditure data is presented, this includes all expenditure associated with undertaking the trip to carry out the activity, including the activity cost and associated expenditure (e.g. travel, food & drink, and accommodation). Whilst this expenditure occurs as a result of an individual undertaking an activity in a particular location, that expenditure does not necessarily occur in or near the activity location, although a large proportion is likely to be captured in the broader sub-regional area i.e. Pembrokeshire. (A full account of how expenditure data is presented in Section 4.)

Data from the business survey provides information on the economic activity of marine and coastal recreation in the local economy immediately adjacent (within 5km) to the case study area. It focuses on the direct economic impact, capturing the economic value sustained through the recreation activity provider sector. Differing to the average participant data, the business survey values do not capture information on related sectors e.g. food and drink and accommodation. (Full details of the business survey are provided in Section 3.)

Mapping

The value maps shown in this section and associated Appendices are for the case study areas which are defined inshore by the coastline. As WAM includes activity areas that extend slightly further inshore of the coastline, the value of these activities are not shown on the maps; instead the location of activities only are shown in grey where the grid didn't cover. However the calculation of values and tables shown below include all inland WAM activities up to 600m inshore. This resolves the issue that some activities in WAM have been plotted at a coarser scale than the mapping in this valuation study and therefore fall on the land when they are in fact 'wet' activities, e.g. diving; or vice versa. The activities of most relevance to this issue are climbing, coasteering and walking (and to a lesser extent dog walking), though there are very

²⁴ From multiple secondary sources, see Section 4

small amounts of data lost in the maps for a number of activities. (See Section 5 for more detail.)

Note that the WAM valuation provides lower, upper and what has been commonly referred to as an 'average' value. This average value is used for all values unless otherwise stated. The average value is derived from the most 'reasonable' participant expenditure costs per day, not strictly an average of the minimum and maximum values.

GVA

Lastly of note, total participant expenditure data has been converted into an estimate of Gross Value Added (GVA²⁵) using a simple GVA ratio, i.e. the percentage of expenditure that is GVA. The GVA ratio has been calculated from data presented in the Wales Tourism Satellite Accounts (TSA) (Wales Economy Research Unit, 2010). GVA is a measure of the contribution to GDP (Gross Domestic Product or market value) made by a particular industry. It measures the value of outputs, less the value of intermediate consumption: i.e. the value of the output, less the value of any goods and services that contributed to the production process. In this sense, it measures just the additional value of the industry to the economy.

6.2. The Pembrokeshire Region

The two case study areas considered in this study, St David's and Dale, are located on the coast of Pembrokeshire as shown previously in Figure 2. Pembrokeshire is a predominantly rural county in south-west Wales with a population of 122,400²⁶. The County's environment holds high conservation value, with the Pembrokeshire Coast National Park covering one third of the County. The coastline, in particular the beaches, forms an especially popular and accessible recreation resource for residents and visitors to the area²⁷. Pembrokeshire is the most popular coastal holiday destination in Wales²⁸ and is an important factor in the County's economy.

Industry in the region has a particular concentration on the Milford Haven Waterway, one of the largest oil and gas ports in Northern Europe and the UK's Energy Capital. The waterway services two refineries, tank storage depots and recent Liquefied Natural Gas (LNG) developments²⁹. However leisure users happily co-exist with the commercial traffic of the Waterway. The region's economy has in fact undergone significant structural change over the

²⁵ Gross value added (GVA) is the value of goods and services produced.

²⁶ ONS (2012). Census 2011

²⁷ Pembrokeshire County Council (2008). Pembrokeshire Economic Profile.

²⁸ Destination Pembrokeshire Partnership (2013). Pembrokeshire Destination Management Plan (2013-2018)

²⁹ Pembrokeshire County Council (2008). Pembrokeshire Economic Profile.

past 30 years, and is now dominated by the agricultural, public services and tourism sectors³⁰. The public services sector is the largest sector, accounting for approximately 26% of total employment, followed by tourism³¹ which accounts for approximately 19%³². The importance of tourism in Pembrokeshire is notably higher than for Wales as a whole, where the sector accounts for 11% of employment. The Port of Milford Haven is responsible for 22 miles of the Waterway, generating nearly 9% of Pembrokeshire's total employment.

6.3. Valuation of St David's Case Study

6.3.1. Context

The St David's case study area covers 92km² of marine and coastal area. Its landward boundary runs around the exposed Peninsula on which the City of St David's is located, extending overall from the Solva estuary (west of St David's and Newgale Sands), to Penllechwen, northeast of St David's and Whitesands Bay. This coastline, plus those of the islands within the case study, account for 42km in length.

The area is rural with a predominantly rocky coastline, with one major sandy beach at Whitesands Bay and a smaller beach at Caerfai Bay; in addition there are a number of small coves. The coastline is directly exposed to the North Atlantic. In addition there are six predominantly uninhabited islands, including Ramsey Island and important habitats for wildlife including gannets, puffins and seals, the offshore seabed contains rocky reefs, underwater cliffs and the straits undergo fast tidal currents.

Access to the coast by road is provided on the mainland at ten points throughout the case study where roads extend to the coastline, whether this is a cliff top, beach or slipway etc. The nearest railway station is at Haverfordwest, 13-19 miles from these access points. This connects direct to Swansea, Cardiff, Hereford and Manchester. There is one ferry landing point on the mainland at St Justinians and one on Ramsey Island; and three slipways at Solva, PorthClais and Whitesands. In addition there are five public car parks evenly distributed around the coast at Solva, Cerfai Bay, Porth Clais and St Justinians.

The adjoining local terrestrial area (hereon referred to as "the local area") of the case study area has been defined as within 5km inland³³. St David's, famed as the smallest city in Wales, is situated 1km inshore from the Peninsula's coast and is the main settlement in the local area.

³⁰ Pembrokeshire County Council (2008). Pembrokeshire Economic Profile.

³¹ Defined by 5-digit SIC code in line with the ONS Tourism Intelligence Unit methodology (ONS, 2010).

³² ONS (2013). Business Register and Employment Survey. Data for 2011

³³ For secondary source statistical data purposes this is taken as the 2011 Wards of St David's and Solva.

Solva is the other settlement of note close to the case study area, a small village situated on an estuary on the north side of St Bride's Bay. The local area has a permanent resident population of over 3,700³⁴, although the population is thought to double during the summer season with the influx of tourists.

The number of jobs supported in the local area was approximately 1,240 in 2011³⁵. This estimate is likely to exclude a significant proportion of seasonal summer employment as they are based on an ONS survey undertaken during the month of September. The peak summer season employment can be expected to be in excess of this number. Census data indicates that the number of employed people living in the local area (but not necessarily working there) was approximately 1,850 in 2011³⁶. The difference implies a pattern of net out-commuting from the local area for employment purposes.

Over one third (36%) of jobs in the local area are in sectors linked to tourism and leisure³⁷. This proportion is likely to be higher were all summer seasonal jobs included in the total. This compares to Pembrokeshire and Wales averages of 19% and 11% respectively.

A broad range of marine and coastal recreation activities occur along the edge of the peninsula, on the beaches and in the marine area of the case study. The WAM database records 23 individual marine and coastal activities across the whole case study area (excluding those inland greater than 250m from the coastline). This results in ~1.8 million participant days per year in the case study area.

6.3.2. WAM Economic Valuation

This section presents a valuation of marine and coastal recreation activities in the case study as measured by participant expenditure. This captures all expenditure associated with the trip e.g. activity cost, food & drink, travel, accommodation. As such it does not represent the value that is captured within the local area, which will only be a proportion of the total. .

Combined Activities Total Valuation

Figures 10 and 11 present maps of the values generated by marine and coastal recreation activities in terms of the expenditure of participants, using the Methodology detailed in Section 5. In addition the map in Appendix F shows the confidence of these values in terms of the expenditure per participant values. The maps present value per 100x100m square grid cell.

³⁴ ONS (2013). Census 2011

³⁵ ONS (2013). Business Register and Employment Survey. Data for 2011

³⁶ ONS (2012). 2011 Census

³⁷ Defined by 5-digit SIC code in line with the ONS Tourism Intelligence Unit methodology.

Figure 10, showing the average total expenditure, clearly demonstrates the high value associated with beaches and the access that they provide to the sea. The highest value areas can be found close inshore in Whitesand's Bay and Caerfai Bay, which are the two beaches of note in the case study area. Other high value areas occur in other areas with good accessibility, such as the estuary at Solva, other small bays along the coastline and the ferry landing points on Ramsey Island and at St Justinians.

The areas further offshore typically hold lower value, with a more limited range of activities occurring with relatively low frequency.

Changing the underlying expenditure per participant assumptions to the lower and upper bound estimates changes the overall level of value but does not significantly change the overall pattern of the value distribution. (See Figure 11 for upper and lower bound estimate maps).

Figure 10: Activity Value (Expenditure) Map: Average in St David's case study

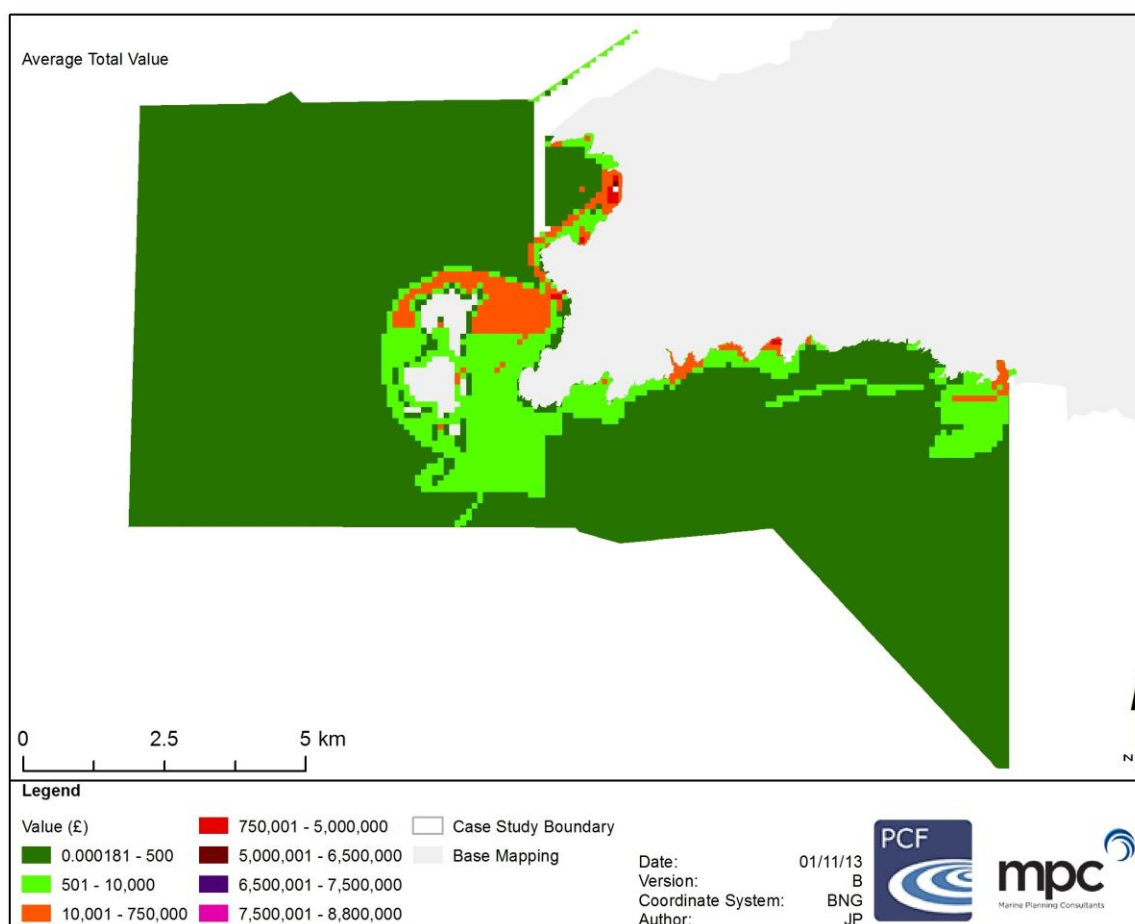
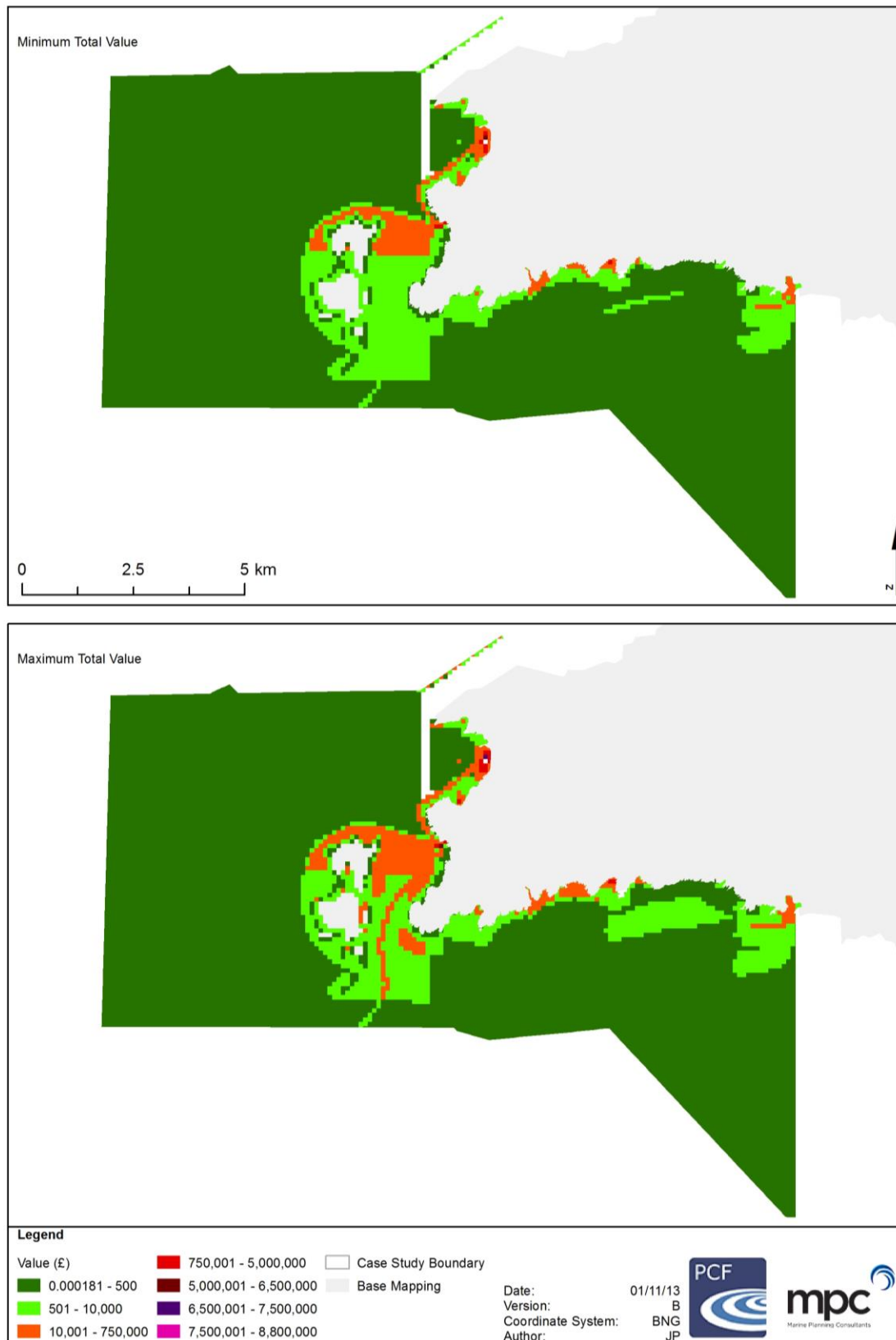


Figure 11: Activity Value (Expenditure) Map: Minimum and Maximum



Total expenditure associated with activities taking place in the case study area is estimated at £51.4m per annum. In GVA terms, this equates to a contribution to the Welsh economy of approximately £24.5m per annum. Due to expected double counting of some participants potentially undertaking multiple activities in a single day, this figure is considered to be an overestimate. For example if all swimming and body boarding was already accounted for in beach activities, this total expenditure value would decrease by 10%, e.g. to £46.2m total expenditure and £22.1 GVA per annum, a difference of £5.2m and £2.4m respectively. Whether the value should be attributed to 'beach activities' or 'swimming' depends on which activity is thought to be the principal reason for the visit. Ultimately, the extent of double counting and therefore the degree of overestimation in the beach activity and/or swimming valuations is not clear.

Using the lower bound expenditure per participant assumptions as another way of arbitrarily allowing for some double counting (and sharing of expenditure between activity types), estimates for all WAM activities are £37.2m and £17.8m respectively for expenditure and GVA per annum.

Individual Activity Valuation

Maps of individual activity expenditure are also shown in Appendix F. The majority of activities show total expenditure per annum reaching the upper categories of >£10k per annum at any one point (grid cell). Those that are always <£10k include climbing, cruiser sailing, kite boarding, kite surfing, power boating, walking, windsurfing and wildlife watching. With the exception of cruiser sailing, which covers the majority of the area, all activities show unique characteristics in location and valuation. The highest values are all associated close to the shore, apart from wildlife boat trips to Ramsey island.

Figure 12 presents an estimate of the proportion of total participant expenditure (left) and total participant activity days (right) accounted for by each activity type (actual data by activity can be found in Appendix F).

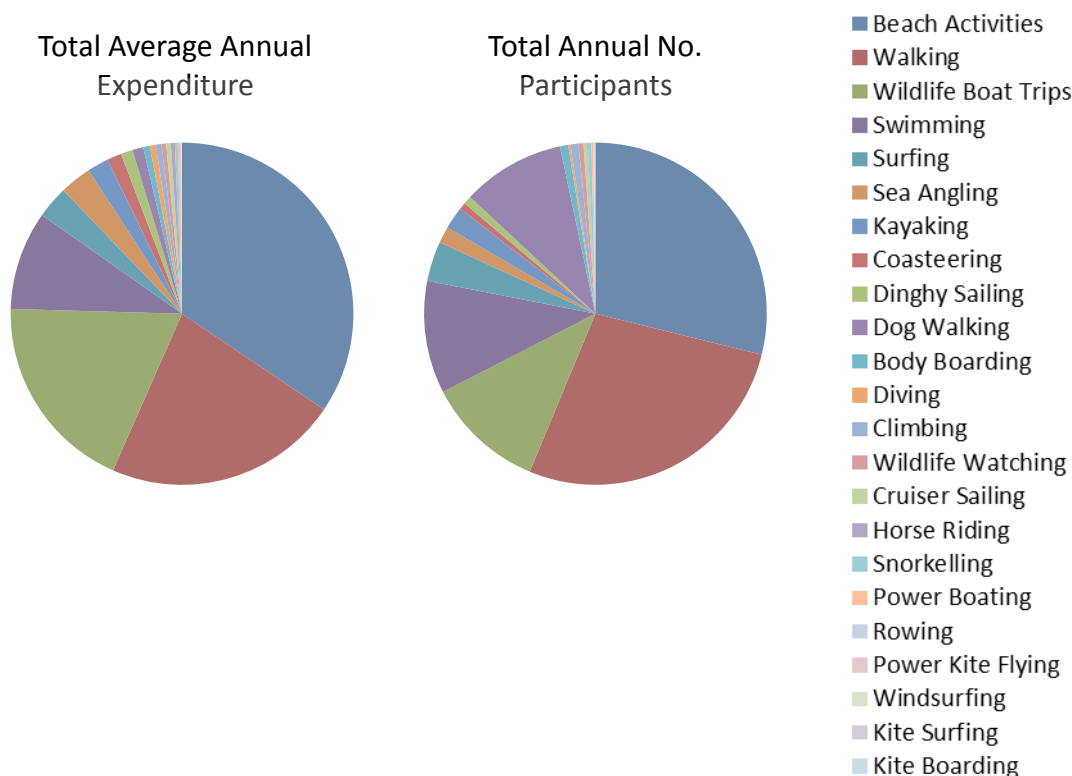
Beach activities is both the most popular activity and the highest value activity in the case study area, with over 500,000 activity days generating an estimated £17.7m per annum of expenditure, equivalent to approximately £8.5m per annum of GVA to the Welsh economy. Walking is the second most popular activity, and generates just under 500,000 activity days, and £11.4m and £5.4m respectively of expenditure and GVA per annum.

Wildlife boat trips generate far fewer activity days, at approximately 200,000, than do walking and beach activities. However, due to the relatively high cost of boat trips, the value generated per activity day is notably higher than for walking and beach activities. The activity generates an estimated £9.7m and £4.6m respectively of expenditure and GVA per annum.

Between them, the three activities account for nearly three quarters (75%) of the value generated by activities in the case study area. The significance of the three activities is in keeping with expectations. Whitesand's Bay is one of the best beaches in south-west Wales and is therefore likely to attract high numbers of people. St David's is well known for the quality

of its environment and wildlife watching is a key draw for the area. As the smallest City in Wales, and with historical significance as the birth place of St David, the area has a strong non-marine/coastal tourism offer. Notably all three activities (beach activities, walking and wildlife boat tours) are easily accessible to the general visitor, unlike some more specialist activities which require a certain level of skill, fitness or equipment.

Figure 12: Pie charts showing relative value (total expenditure per annum) and number of participants by activity type in St David's case study

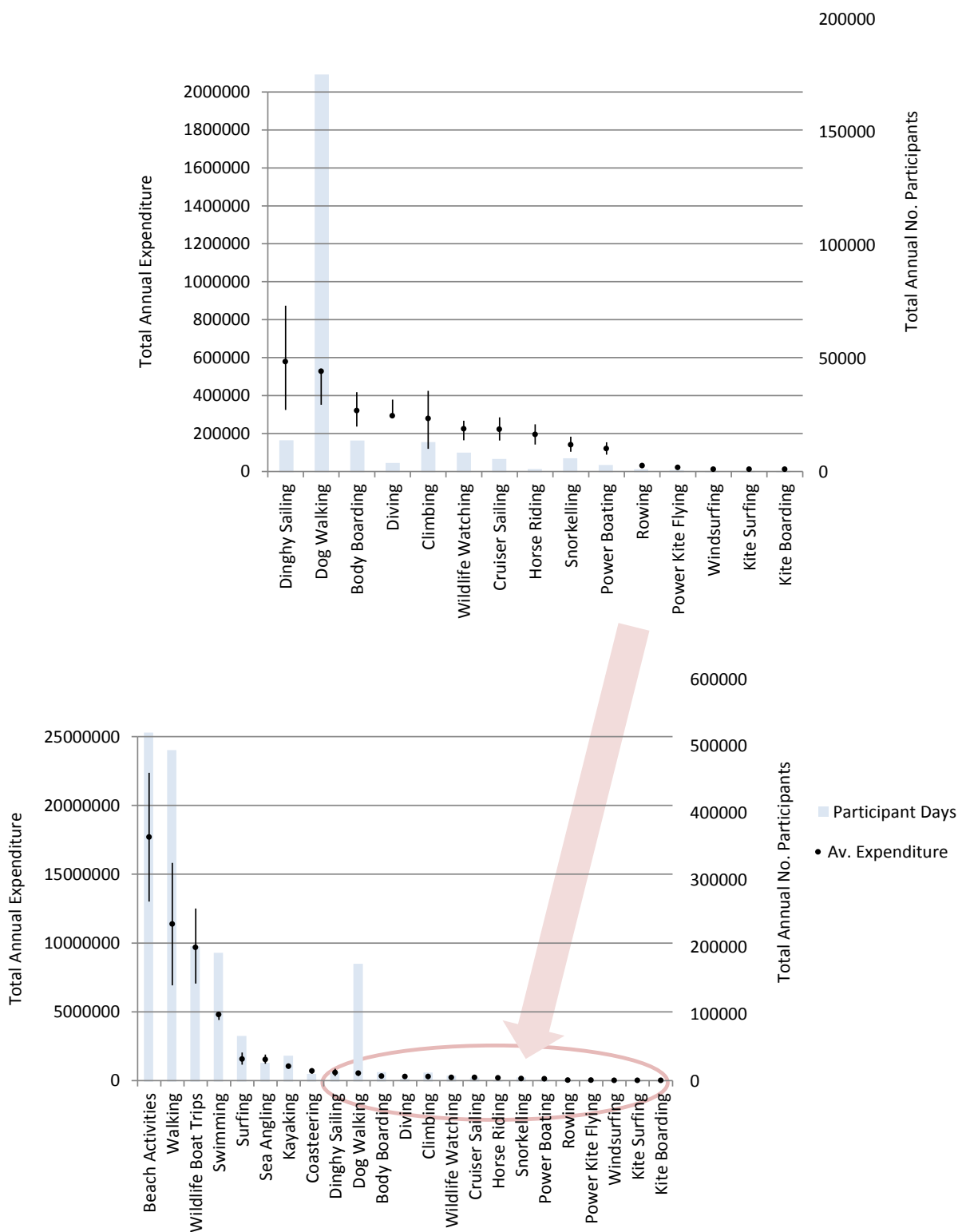


There is a high level of swimming activity in the case study area, which has been estimated to generate approximately £4.8m of expenditure per annum, making it the fourth most valuable activity in the case study area. This is a direct reflection of the number of people who go swimming in the case study area as opposed to the activity being of particularly high value participant. However, it is likely that a relatively high proportion of those 'swimming' participant days are the same people that generate the participant days for 'beach activities' i.e. the same individual undertakes both activities in one visit (as noted above).

Figure 13 below shows the total expenditure per case study activity. The 'dot' shows the best estimate for each activity type, whilst the ends of the lines show the lower and upper estimates using the lower and upper bound expenditure per participant assumptions. The grey bar shows the number of participant days.

Changing the expenditure per participant per day assumption doesn't make a significant difference in terms of the relative economic importance of each activity type. However, changes to these underlying assumptions do have a significant effect on the total value estimate for each activity, reflecting the uncertainty in the per participant expenditure data. Notably, for 'beach activities' the difference between the upper and lower estimates is £9.3m.

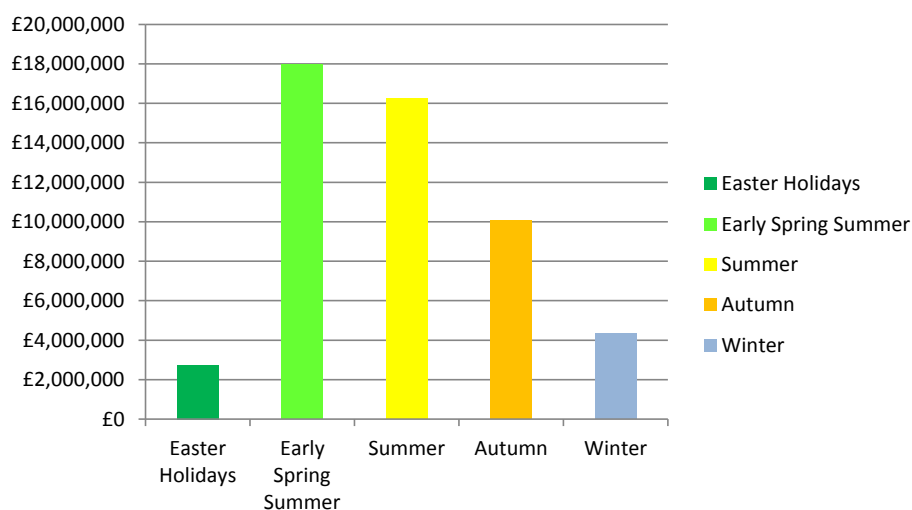
Figure 13: Bar charts showing relative value (total expenditure per annum) and number of participants by activity type in St David's case study



Seasonal Variation

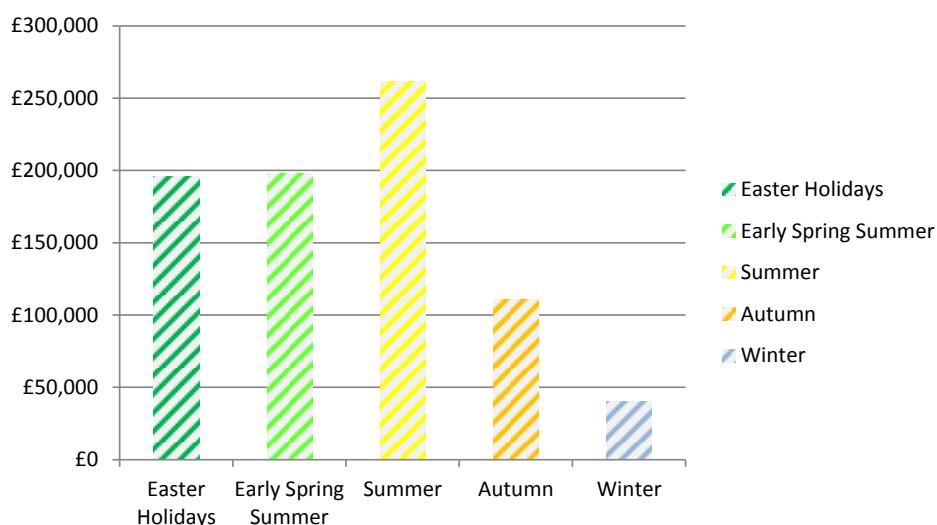
As shown in Figure 14, St David's has an extended season with high levels of activity in both the early spring and summer periods. Overall the early spring period is estimated to generate the highest number of marine and coastal recreation activity days and the highest level of participant expenditure.

Figure 14: Seasonal Variation in the Total Expenditure per Annum



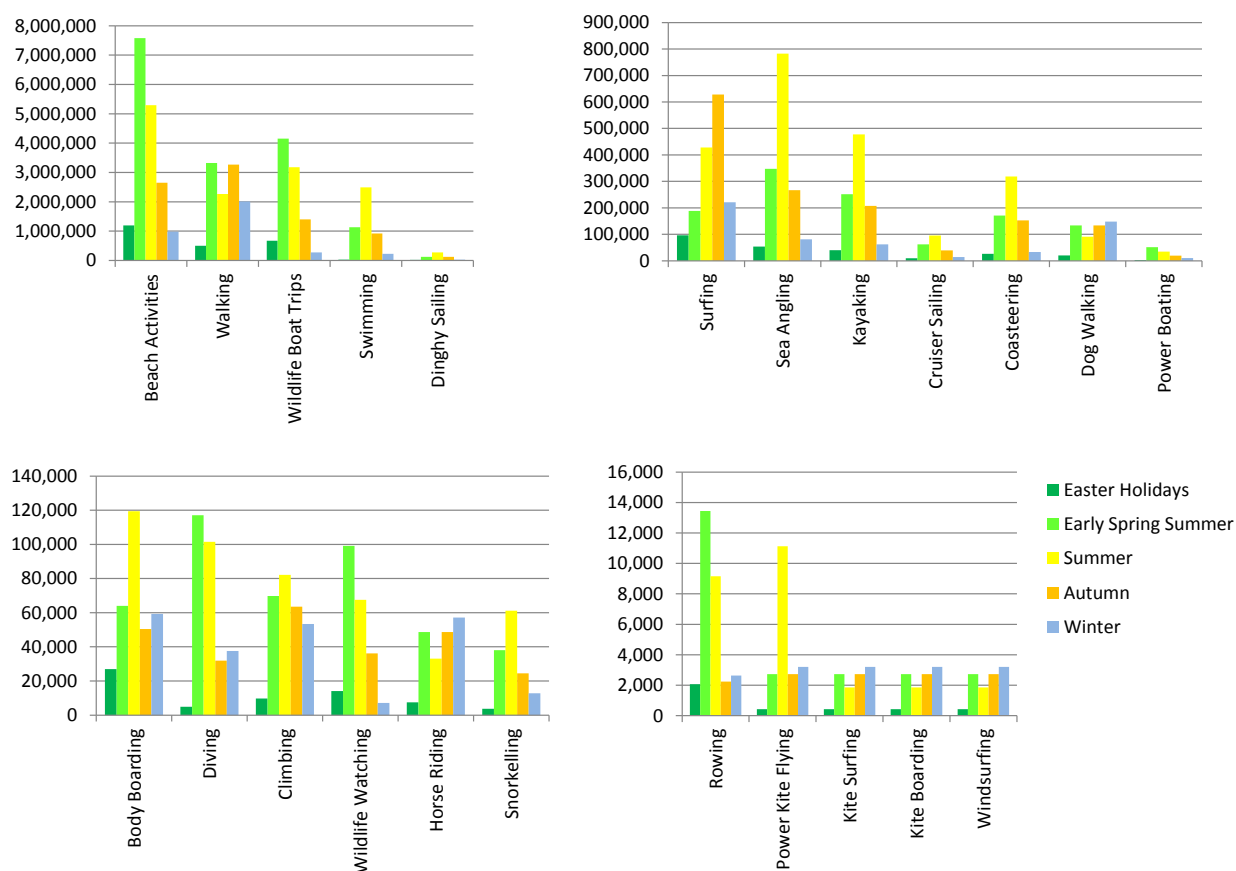
Allowing for the number of days per season however, Figure 15 shows that the actual total expenditure per day from all activities / participants peaks in summer as would be expected. It also highlights that whilst the Easter Holidays generate relatively little value overall, due to their relatively short duration, they are a key part of the year, generating a high level of total expenditure per day.

Figure 15: Seasonal Variation in the Expenditure per Day in St David's case study



Seasonality varies markedly between activities. The overall seasonal pattern shown in **Figure 16** is driven by the seasonal pattern of the three primary activities: beach activities, walking and wildlife boat tours, for which summer is not the highest value season.

Figure 16: Seasonal Variation in the Total Annual Expenditure per Activity in St David's case study



This pattern is perhaps surprising for beach activities, for which summer accounts for 32% of the total value, but early Spring is 35%. One would primarily associate beach activities with the summer months when the weather is typically better and the school holidays permit high numbers of family visits. However this Spring peak may be explained partly due to the length of season as noted above. To a lesser extent the same may apply for wildlife boat tours, for which the summer accounts for 33% but the early Spring 43% of the total value.

Walking shows little variation between the early spring, summer and autumn seasons, although the summer period showing the lowest level of activity of the three. This may reflect a shift in individual participant activity preferences during colder seasons (i.e. away from 'wet' activities'), as well as a preference of individuals undertaking less weather dependent activities (such as walking) to do so during quieter periods rather than peak summer season. Importantly it

indicates the importance of walking in providing economic stimulus outside of the core summer season.

For most of the activities that involve getting wet e.g. swimming, body boarding, snorkelling, the summer period is the peak season. Exceptions include diving, surfing and windsurf/kiteboarding. Diving activity is focussed on the early spring and summer periods. Surfing is focused on the summer and autumn periods (which may be a reflection of the warmer waters during these periods), whilst windsurf/kiteboarding has a limited differentiation between the seasons.

6.3.3. Economic Impact of Recreation Activity Businesses

Recreation activity businesses are defined as those that provide core recreation services such as equipment hire and purchase, lessons, guides and other infrastructure which are used for undertaking any given activity and sold to activity participants. It is estimated that there are 32 businesses located within 5km of the local case study area that provide for one or more of the activities identified within WAM..

Surveyed businesses in the local area estimated that the case study area generated approximately £1.6m of revenue per annum, providing for three quarters (72%) of their overall turnover, and sustaining a range of full time, part time and seasonal jobs), equivalent to 30 FTEs.

Grossing these figures up based on the 'average business' to apply to all 32 relevant businesses identified in the local area provide the following estimates. It is estimated that the case study area generates approximately £3.2m per annum in revenues for these businesses; equivalent to a direct impact on the economy of approximately £1.6m of GVA. It has been estimated that this economic activity sustains approximately 65 FTEs. This represents approximately 7% of all FTEs in the local area³⁸.

It should be noted that these figures relate only to the providers of marine and coastal recreation activities. They do not include the broader industry support by the tourism and leisure sector, such as hotels and food and drink establishments.

³⁸ Local area FTEs calculated using BRES data assuming that 1 PT job = 0.5 FTE

6.4. Valuation of Dale Case Study

6.4.1. Context

Dale was one of ten potential Highly Protected Marine Conservation Zones (HPMCZ) proposed to be designated under the Marine and Coastal Access Act 2009 in Wales. However the Welsh Government has now withdrawn all 10 proposed HPMCZs following in the consultation process and is currently reviewing the extent to which the existing network of Marine Protected Areas (MPAs) in Wales meet the requirements for an ecologically coherent network.

The Dale HPMCZ case study area covers 2.9km² of marine and coastal area, a far smaller area than St David's. Its landward boundary runs from Dale Point in the south to Watch House Point in the north east, following the lower shore boundary of the Dale bay. This includes the whole of the beach, including the intertidal area³⁹. This coastline accounts for 6.5km in length. The offshore extent is defined by a line running east of Dale Point and approximately south from Watch House Point.

The immediate area is rural with a predominantly rocky coastline and shingle beach exposed to sand at low tide. In addition to the main beach that occupies a large area of the head of the bay, there is a small beach at Townsend in the west and a small cove at Monk Haven in the northeast. Situated at the mouth of the Milford Haven, the Dale coastline is sheltered from the North Atlantic, though it does receive suitable conditions for marine recreation activities in terms of both swell and wind strength.

Access to the coast is provided on the mainland by road at six points throughout the case study where roads extend to the coastline, whether this is a cliff top, beach or slipway etc. The nearest railway station is at Milford Haven, up to 10 miles from these access points. This connects direct to Manchester, Swansea, Cardiff Central, Hereford, Shrewsbury, Crewe and Stockport. There is no ferry landing point (though ferries frequent along the Milford Haven within ~1km distance); and one slipway at Townsend (where the yacht club is). In addition there is one public car park, also at Townsend.

The local area of the case study area is defined as within 5km inland⁴⁰. There are four main settlements situated within 5km of the case study area. The closest, Dale, is a small village situated to the western boundary of the case study. Three other villages are situated a few km

³⁹ Welsh Government 2012

⁴⁰ For secondary source statistical data purposes this is taken as the 2011 Ward of St. Ishmael's

from the case study boundary: St Ishmael's (the largest of the four), Marloes and St. Brides. This local area has a combined population of just over 1,400⁴¹.

The western edge of Milford Haven overlaps the eastern edge of the 5km local area boundary. However, due to the significant difference in anticipated level economic dependence on the case study area, this part of Milford Haven has not been included in the case study. The exception to this is Milford Haven Marina, which has direct ties to the case study area as a yachting location, and the Marina has therefore been included in the local area business survey.

The number of jobs supported in the Dale local area (excluding Milford Haven Marina) was 188 in 2011⁴². This estimate is likely to exclude an element of seasonal summer employment as they are based on an ONS survey undertaken during the month of September. The peak summer season employment level can be expected to be in excess of this number. Census data indicates that the number of employed people living in the Dale case study area (but not necessarily working there) was 476 in 2011⁴³. The difference between the employment sustained inside the case study area and the number of employed people resident in the case study area implies a pattern of net out-commuting for employment purposes from the case study area.

Close to half (46%) of all jobs provided in the case study area are in sectors linked to tourism and leisure⁴⁴, in particular in the 'accommodation and food and drink' sector (30%). This proportion may be higher were all summer seasonal jobs included in the total. This compares to Pembrokeshire and Wales averages of 19% and 11% respectively.

A broad range of marine and coastal recreation activities occur within the bay and along the coastal edge. The WAM database records 14 individual marine and coastal activities across the whole case study area (excluding those inland greater than 600m from the coastline). This results in 0.2 million participant days per year in the case study area.

6.4.2. WAM Economic Valuation

This section presents a valuation of marine and coastal recreation activities in the case study as measured by participant expenditure. This captures all expenditure associated with the trip (e.g. travel costs, accommodation etc), and as such does not solely represent the value captured locally to the case study area, However one could assume that the majority is captured in the broader Pembrokeshire region.

⁴¹ ONSc(2012). Census 2011

⁴² ONS (2012). BRES (2011 data)

⁴³ ONS (2012). 2011 Census

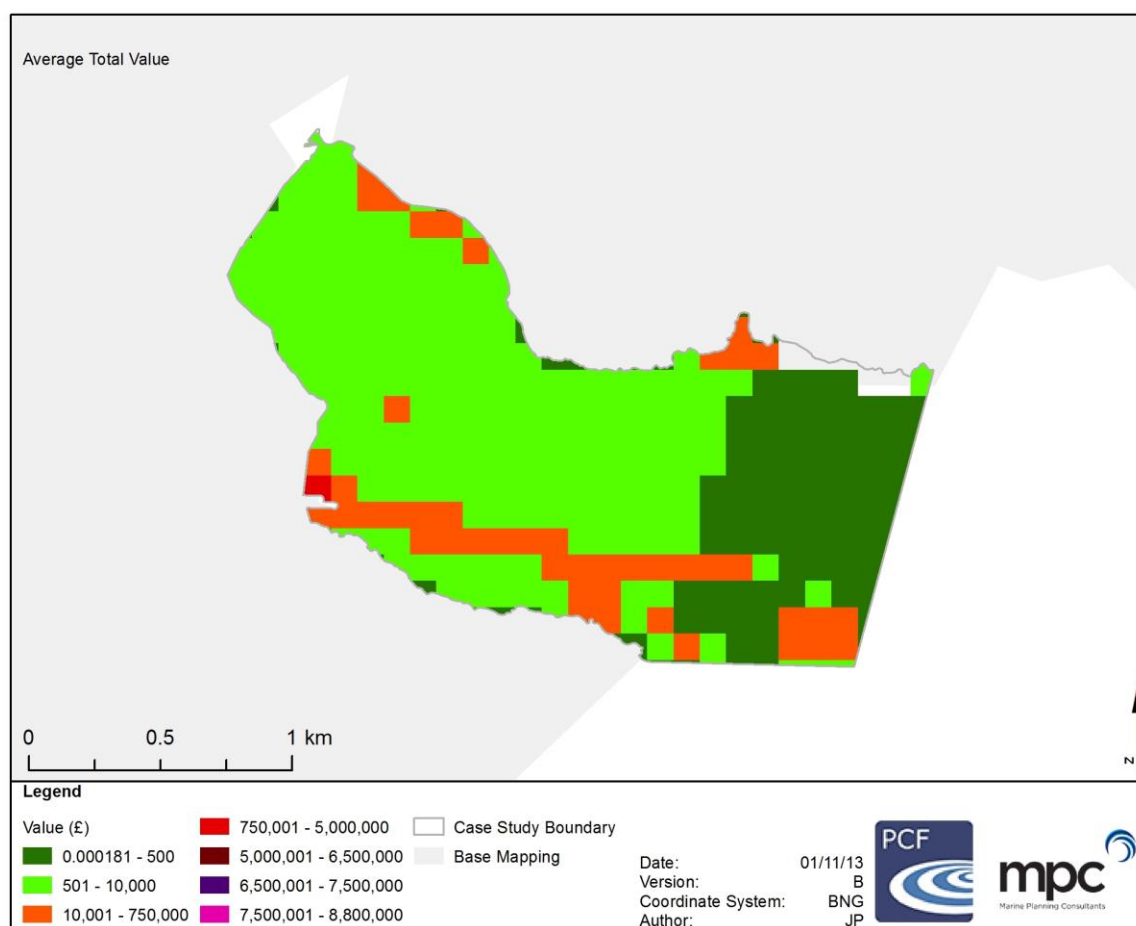
⁴⁴ Defined by 5-digit SIC code in line with the ONS Tourism Intelligence Unit methodology.

Combined Activities Total Valuation

Figures 17 and 18 present maps of the values generated by marine and coastal recreation activities in terms of the expenditure of participants, using the Methodology detailed in Section 5. In addition the map in Appendix F shows the confidence of these values in terms of the expenditure per participant values. The maps present value per 100x100m square grid cell.

As shown in Figure 17, the highest value area identified in the case study area, in terms of average expenditure per annum, is situated immediately off from the town of Dale overlapping with Dale beach. This point is the primary access point for the bay and as such there is a high concentration of activities utilising this small area. In particular it is 'beach activities' that contributes to the value. Nearly all 'beach activities' for the case study area are carried out on Dale beach.

Figure 17: Activity Value (Expenditure) Map: Average



Three other areas stand out as being of relatively high value: the inside of the bay, north-west of Black Rock (primarily kayaking, sea angling and dinghy sailing in the area); Monk Haven, on the north side of the bay (primarily sea angling, diving and kayaking); and the area close to the coast running south-east from Dale (primarily diving, jet skiing and sea angling).

As shown in Figure 18, changing the underlying expenditure per participant assumptions to the lower and upper bound estimates changes the overall level of value but does not significantly change the overall pattern of the value distribution.

Total expenditure associated with activities taking place in the case study area is estimated to be £7.2m per annum. In GVA terms, this equates to a contribution to the Welsh economy of approximately £3.5m. Due to potential double counting of some participants potentially undertaking multiple activities in a single day, this figure is considered to be an overestimate. Using the lower bound expenditure per participant assumptions as another way of arbitrarily allowing for some double counting, estimates for all WAM activities are £5.5m and £2.6m of expenditure and GVA respectively.

There are no activities of note which may duplicate expenditure (e.g. swimming and beach activities) for the Dale case study (an issue discussed for St David's). However double counting may occur from other sources such as participants taking part in more than one activity per day, therefore showing the secondary tourism costs (accommodation, expenses, travel etc.) more than once.

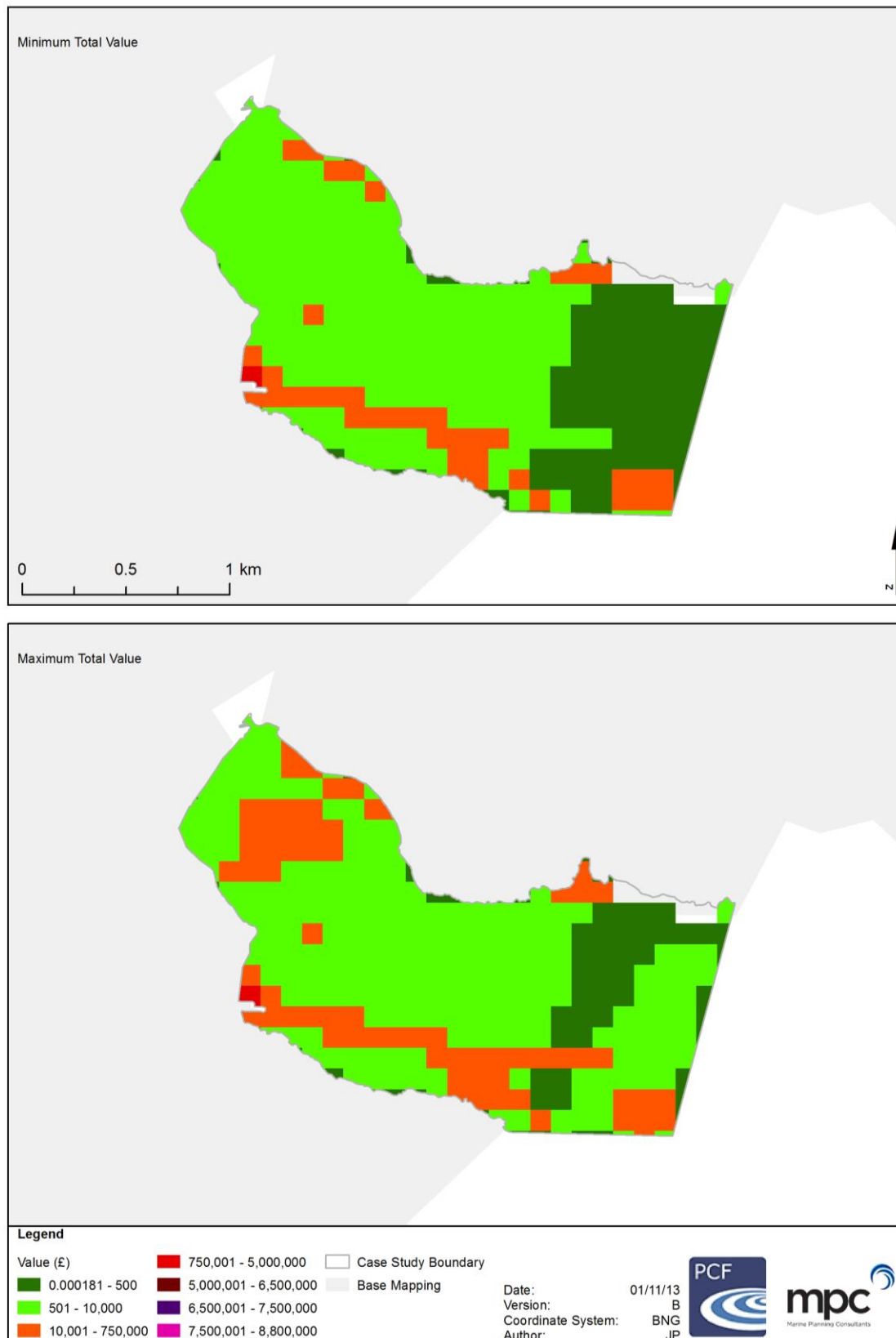
Individual Activity Valuation

Maps of individual activity expenditure are shown in Appendix F. Those activities showing total expenditure per annum in the upper categories of >£10k per annum includes: beach activities, dinghy sailing, diving, jet skiing, sea angling, walking and windsurfing. Those that are always <£10k include cruiser sailing, dog walking, kayaking, power boating, rowing and wildlife boat trips. With the exception of windsurfing and kayaking, which both cover the majority of the area, all activities show unique characteristics in location and valuation. The high values are all associated close to the shore, apart from diving and sea angling which both have high value in the southeast extent of the boundary.

Figure 19 presents an estimate of the proportion of total participant expenditure (left) and total participant activity days (right) accounted for by each activity type (actual data by activity can be found in Appendix F).

Five activities – beach activities, dinghy sailing, diving, walking, and sea angling – account for the vast majority of all marine and coastal recreation in the Dale case study area, in terms of both the number of activity days (87% of the total) and participant expenditure (94% of the total).

Figure 18: Activity Value (Expenditure) Map: Minimum and Maximum



The two most popular activities are those most closely associated with the general tourism market. Beach activities and walking are both highly accessible to all types of visitor. Beach activities account for both the largest number of participants (over 61,000 activity days representing 31% the total) and the highest value (£2.1m of expenditure representing 29% of the total). Walking accounts for the second largest number of participants but is of slightly lower importance economically.

Dinghy sailing and diving generate a relatively high proportion of economic value compared to the volume of activity days that they account for. This reflects the relatively high value (cost) nature of these activities compared to other activities. Both activities are supported by the infrastructure provided at Dale Yacht Club.

Using the lower and upper bound estimates of expenditure per participant per day assumptions doesn't make a significant difference in terms of the relative economic importance of each activity type. Using the upper bound value results in a slight change in the order of the top 3.

Figure 19: Pie charts showing relative value (total expenditure per annum) and number of participants by activity type in Dale case study

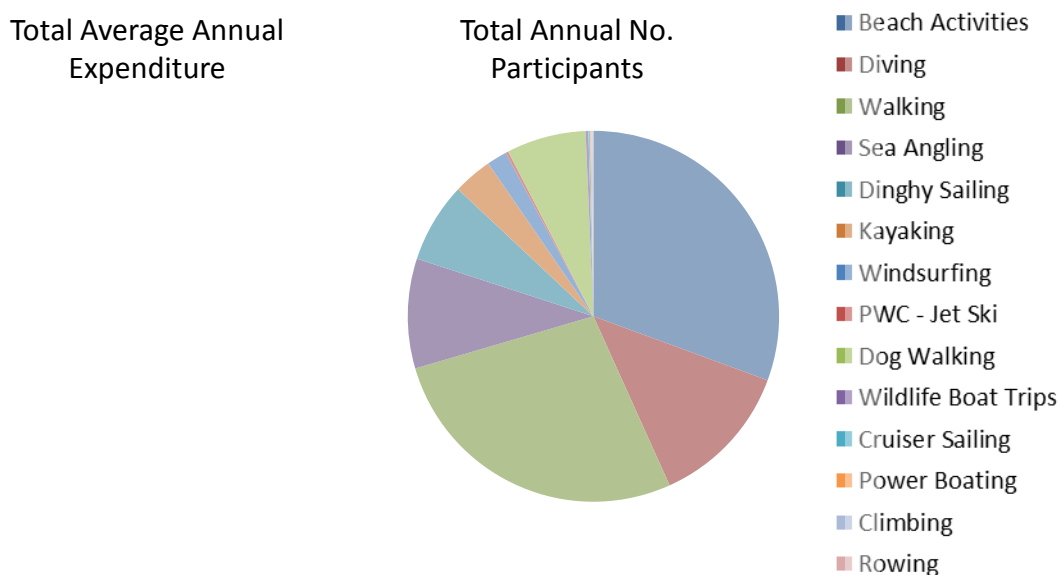
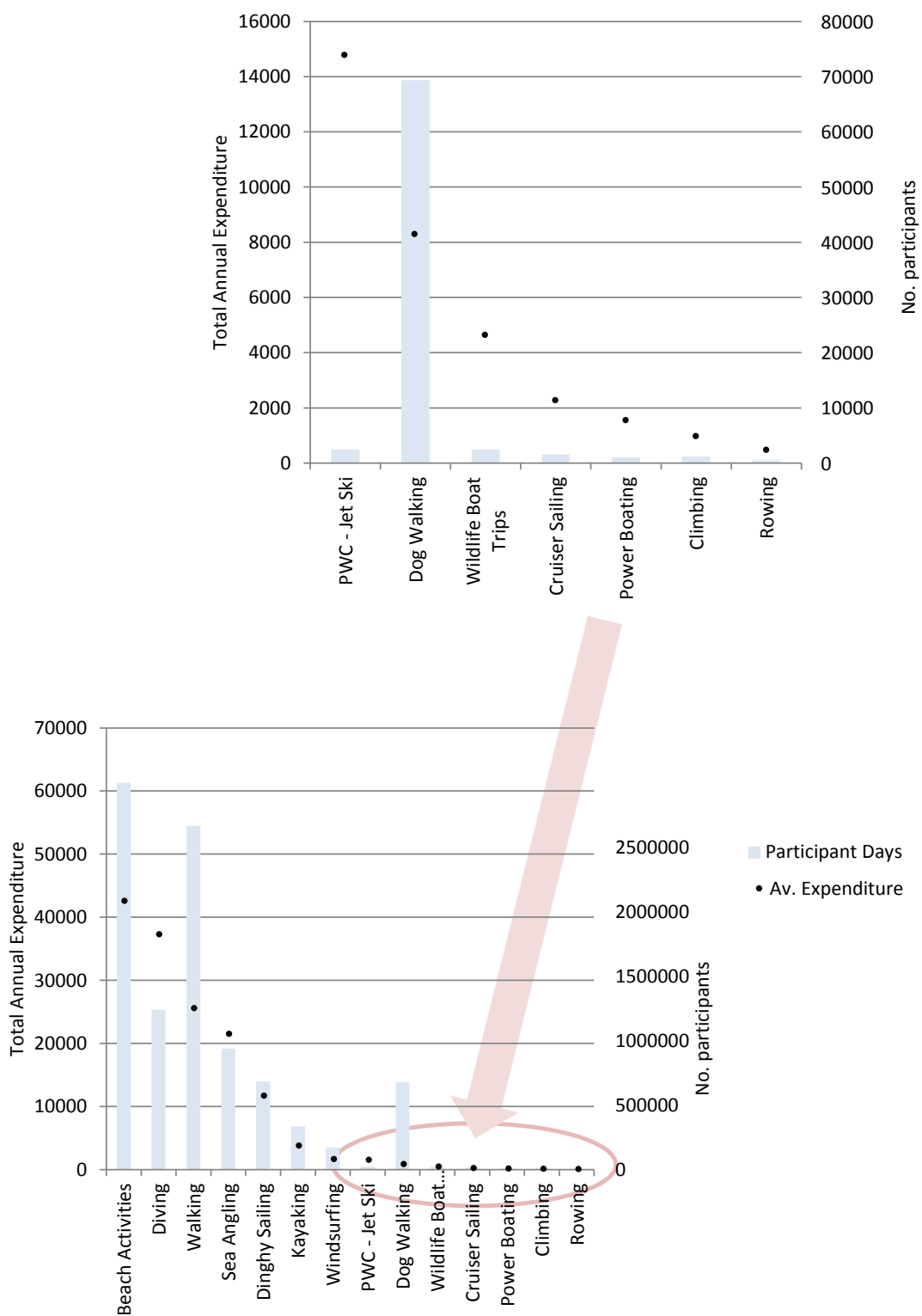


Figure 20: Bar charts showing relative value (total expenditure per annum) and number of participants by activity type in Dale case study



Seasonal Variation

As shown in Figure 21, there is a strong seasonal pattern to marine and coastal recreation activity in the Dale case study area. Close to half of all activity and associated expenditure (40% and 44% respectively) occurs during the summer season. The shoulder season (early spring and autumn) account for the majority of remaining activity (50% of activity days and 48% of value). A similar pattern is seen in the seasonal variation of expenditure per day (Figure 22), though with a stronger accentuation of the summer maximum.

Figure 21: Seasonal Variation in the Total Expenditure per Annum in Dale case study

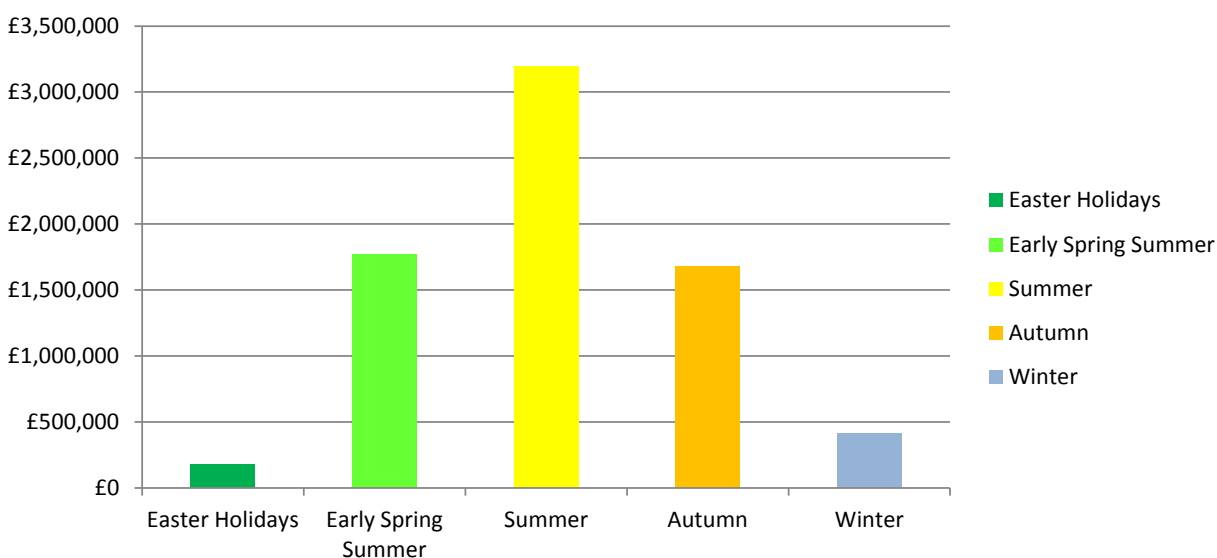
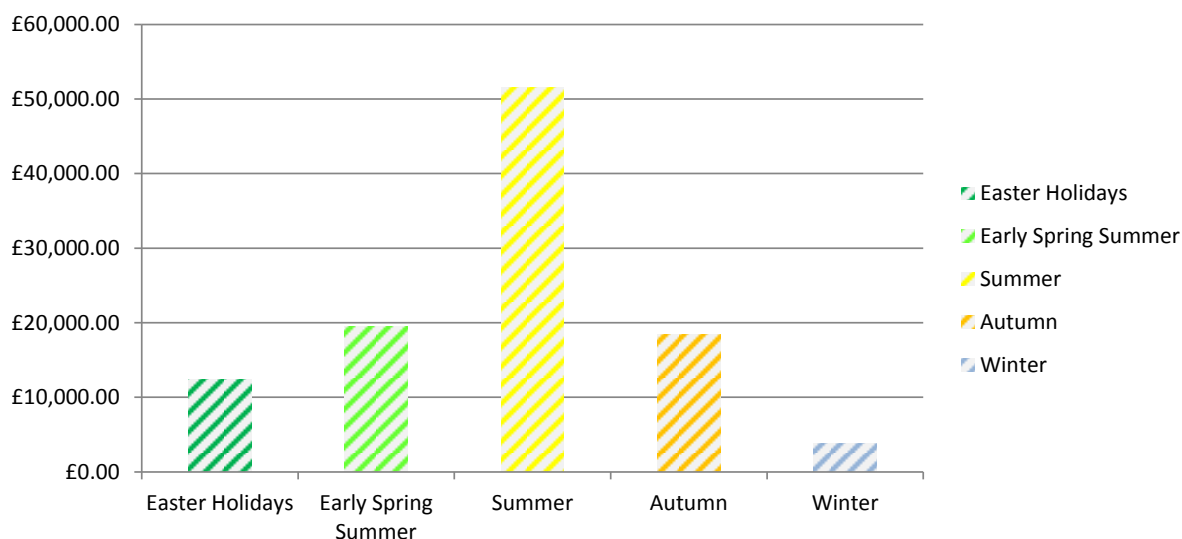
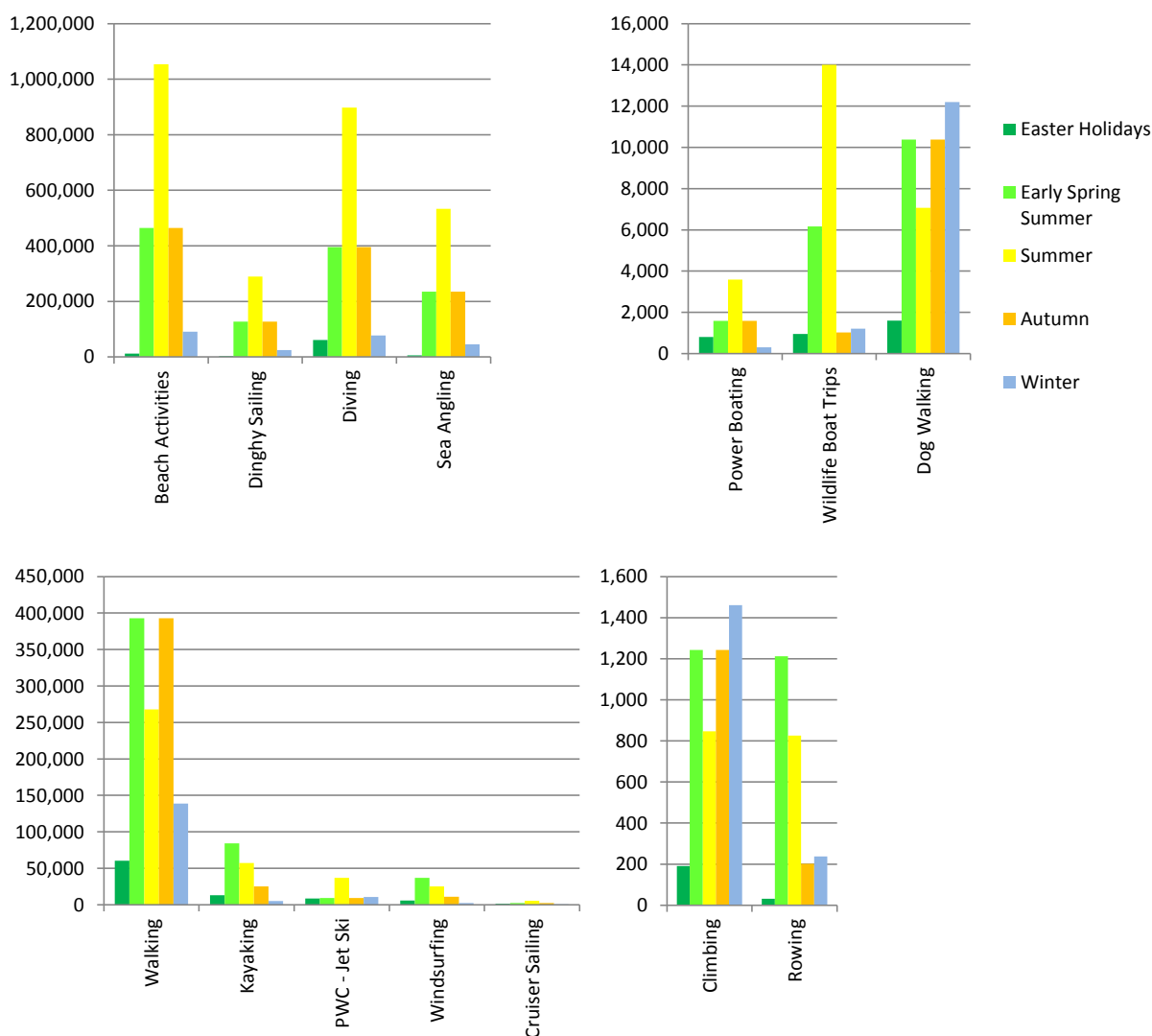


Figure 22: Seasonal Variation in the Total Expenditure per Day



The seasonal pattern of individual activities closely mirrors the overall pattern, as shown in Figure 23. The exception is walking, for which the two shoulder seasons see a higher level of activity than the summer months. This may reflect a shift in individual participant activity preferences during colder seasons (away from wet activities), as well as a preference of individuals undertaking less weather dependent activities (such as walking) to do so during quieter periods rather than peak summer season. Importantly it indicates the importance of walking in providing economic stimulus outside of the core summer season. Whilst of lower economic value, like walking, both kayaking and climbing also have less distinction between the seasons. In particular climbing has a relatively consistent level of activity throughout the year, as does dog walking.

Figure 23: Seasonal Variation in the Total Expenditure per Annum by Activity in Dale case study



6.4.3. Economic Impact of Recreation Activity Businesses

Recreation activity businesses are defined as those that provide core recreation services such as equipment hire and purchase, lessons, guides and other infrastructure which are used for undertaking any given activity and sold to activity participants. It is estimated that there are 11 businesses located within ~5km of the case study area that provide for one or more of the activities identified within WAM. In addition, Milford Haven Marina, at ~6km, has also been included (to give a total of 12 businesses) as it provides marina services to participants of activities occurring in the case study area, most notably cruiser sailing and power boating.

Surveyed businesses in the local area estimated that the case study area generated approximately £0.7m of revenue per annum, providing for 85%⁴⁵ of their overall turnover, and sustained a mix of full time, part time and seasonal jobs, equivalent to 16 FTEs.

Grossing these figures up based on the 'average business'⁴⁶ to apply to all 12 relevant businesses identified in the local area provide the following estimates. It is estimated that the case study area generates approximately £0.8m per annum in revenues for these businesses; equivalent to a direct impact on the economy of approximately £0.4m of GVA. The case study area is of particular importance to the service provider businesses active in it, providing on nearly 90% of their business revenue (this figure excludes Milford Haven Marina).

It has been estimated that this economic activity sustains approximately 25 FTEs. Excluding Milford Haven Marina, which is outside the local area, it is estimated that 15 FTEs are sustained. This represents approximately 10% of all FTEs in the local area⁴⁷.

It should be noted that these figures relate only to the providers of marine and coastal recreation activities. They do not include the broader industry support by the tourism and leisure sector, such as hotels and food and drink establishments.

6.5. Further discussion

The St David's case study area includes a wider range of activities than does the Dale case study area. It attracts a far higher number of participant days which generate significantly more expenditure than for Dale. Notably however the average expenditure per participant in Dale is nearly one third greater than that of St David's, at £36 per participant per day compared to £28.

Both case study areas are dominated by beach activities, both in terms of participant numbers and value. Whilst this is unsurprising for St David's, which includes Whitesand's Beach, it is

⁴⁵ This figure does not apply for Milford Haven Marina

⁴⁶ Milford Haven Marina is not included in the calculation of the 'average business'.

⁴⁷ Local area FTEs calculated using BRES data assuming that 1 PT job = 0.5 FTE

more surprising for Dale, where the beach activities occur in a very small area in front of the village of Dale. A proportion of these beach activities includes crabbing from the pontoon, which is thought to be an important attraction for tourists coming to the local area (pers. comm. PCF 01/10/03). Walking is the second most popular activity in both case study areas (although not in terms of value generation).

The seasonal pattern of the two case study areas differs. Dale has a very strong summer season peak in activity, with a rapid drop off on either side. St David's however has a more even spread of activity through the year, with a joint peak season running through early Spring and summer, and a reasonable contribution made during the autumn season. The longevity of the St David's season may be a reflection of the broader range of marine and coastal recreation activities on offer, as well as the strong general tourism offer provided by its city status and history.

Despite the higher average expenditure associated with activities in Dale compared to St David's, GVA per activity provider worker is lower in Dale; at £16,000, compared to £24,000 in St David's. Both are below the Wales average for the tourism industries of approximately £28,000^[1].

^[1] GVA per FTE from Welsh Economy Research Unit (2010) rebased to 2012 prices using HM Treasury GDP deflator index.

7. Conclusions & Recommendations

7.1. Conclusions

7.1.1. Relevance of studies to date

To date, the majority of academic and grey literature studies focus on a small number of recreation activities, typically in focused case study areas. The available literature primarily addresses expenditure by activity participants and focuses on presenting the total expenditure associated with a given recreation activity trip. This includes both expenditure directly associated with the given activity (e.g. equipment hire), and other expenditure associated with the recreation trip (e.g. travel, food and drink, accommodation). As such, the economic value outputs from this study represent total expenditure by participants.

Only a limited few of these have specifically provided spatial expenditure maps, e.g. Rees *et al* (2010), whose study informed a long term cost benefit analysis of the Lyme Bay closed area; and Ruiz-Frau *et al* (2012) who provide per activity expenditure estimates at a coarse resolution Wales level. However, both cover only a few activities, i.e. they do not address the complete profile of marine recreation activities that take place.

For the above mentioned valuation studies, local project specific surveys have been imperative to the process. However national surveys are also key when developing valuation of the full spectrum of activities and the most comprehensive data for Wales on expenditure by activity participants is in the Great Britain Tourism Survey (GBTS) and Great Britain Day Visits Surveys (GBDVS). The surveys are underlain at the GB level, but disaggregated data outputs are produced at a Wales level (no finer detail is available for individual activity data). Another comprehensive survey is MENE, undertaken by Natural England. However this provides data for England only.

As the basis for any valuation, the actual activity footprint and usage for marine recreation is very rarely produced. In fact WAM is the only known example in the UK where both the footprint and usage are provided. Other notable projects that have collated spatial data on marine recreation activities include MMO1013 and MMO1043: 'Compilation of spatial data on marine recreational activities phase 1 & 2'; iCoast which provides a tourism based website of activity locations through the marine policy steered project CSCOPE; national audits in Wales and Scotland (Land Use Consultants, 2004 and 2007 respectively); and Stakmap: the regional Marine Conservation Zone project in England (2011) which obtained coarse resolution data on both footprints and usage for multiple activities.

In addition, usage numbers have been collected by various national surveys including the Wales Outdoor Recreation Survey (WORS); the UK wide GBTS / GBDVS surveys; and the UK wide Watersport Participant Survey⁴⁸. The WORS and GBTS/GBDVS do not collect any information on specific places where people go to take part in a marine activity. For example in WORS this is generalised instead to collect the 'type of place', e.g. beach (generically across Wales). In the case of the Watersports Participation Survey, the MMO have led a bespoke survey in 2011 to gather spatial data on activity areas but this has used a very coarse resolution and is of limited use at a scale used in this project / case studies. However this is useful in understanding the profile of participants in a region as a whole, e.g. whether from within, outside the area.

7.1.2. Project approach and outputs

Summary

As demonstrated above, a key current issue that has arisen in both a marine spatial planning and marine protected area planning context, is a lack of very basic knowledge on recreation activities. This is true of the usage of activity areas in terms of the spatial/temporal scales and participant volume, as well as the economic value. The outputs produced in this pilot valuation of Pembrokeshire case studies, in association with WAM, provide data of an appropriate scale and confidence to be able to fill this knowledge gap across two case studies in Pembrokeshire in a relatively short time period. This study provides a repeatable methodology that will allow valuation of the marine recreation sector at a larger, potentially national scale. This will help inform the significance of the recreation sector in future marine and coastal planning (and other) discussions.

The study used the existing WAM activity location and participant data to create value layers for all activities in the two case study areas, although for some activities the confidence in these values is notably low owing to the separate confidences assigned to each of WAM and the valuation. When using the data for planning and decision-making purposes, due consideration should be given to the methods used and the confidence scores ascribed to the outputs.

The valuation exercise was based on a value transfer approach (combined with WAM business survey data for some activities). This provided a daily average expenditure value per person with which to apply to WAM. The process has developed a methodology that is relatively quick and a low cost way of producing detailed spatial mapping for a broad number of activities across a relatively large area. In this regard it has significant advantages over previous spatial mapping exercises for marine and coastal recreation. Other notable spatial value mapping projects have not successfully provided full estimates of participant numbers and value across such a large

⁴⁸ Carried out by Arkenford, BMF, RYA, MCA, BCU and MMO, e.g. 2012:
http://www.dft.gov.uk/mca/watersports_participation_survey_2012_-_executive_summary.pdf

area and at such a fine scale. Also these former projects do not enable extension to the national scale as easily as with WAM.

Business Survey

The business survey was undertaken to isolate the value of economic activity generated in the local economy of the case study areas that is directly associated with undertaking the recreation activity. The survey provided data on which estimates of:

- the level of business revenue
- GVA and employment that is sustained by recreation activities in the local economies of the two case study areas
- the dependence of those businesses on the activities occurring within the case study areas

More detailed data sought through the business survey to inform the valuation was only partially completed by businesses, in particular customer numbers. This was partly because some data is better sought from recreation participants than businesses. Most notably, businesses were not able to provide a breakdown of which specific activity areas customers used (i.e. each case study area consisted of multiple activity areas where an individual activity occurred). Also businesses weren't able to provide neat breakdowns of certain aspects of their business, in particular the average costs for activity services was hard to provide due the vast array of different packages that businesses provide, which often incorporate multiple activities.

With the exception of a few WAM activities, e.g. coasteering and wildlife boat tours, it was not possible to tailor the per participant expenditure data to incorporate local case study activity costs. In part this was because expenditure data available in secondary data sources is normally provided at a total level, not broken down by expenditure type; and also because a comprehensive activity cost dataset could not be established through the business survey. Therefore, the values applied in the WAM mapping have been sourced from previous studies and are discussed in context of the data acquired on the local businesses.

Case Studies

The valuation was trialled on two case studies: St David's from the Solva estuary (west of St David's and Newgale Sands), to Penllechwen, northeast of St David's and Whitesands Bay and offshore; and Dale: the previously proposed Highly Protected Marine Conservation Zone. Maps of each case study activity have been produced for each activity as well as a total combined activity valuation map.

Total expenditure associated with activities taking place in the St David's case study area is estimated at £51.4m per annum. In GVA terms, this equates to a contribution to the Welsh economy of approximately £24.5m per annum. The largest contributor to this value is beach activities at £17.7m per annum (£8.5m GVA), equal to ~ a third of the total, followed by walking and wildlife boat trips.

Total expenditure associated with activities taking place in the Dale case study area is estimated to be £7.2m per annum. In GVA terms, this equates to a contribution to the Welsh economy of approximately £3.5m. Five activities: beach activities, dinghy sailing, diving, walking, and sea angling account for the vast majority of all marine and coastal recreation in the Dale case study area, in terms of participant expenditure (94% of the total). Beach activities contribute 29% of total expenditure at £2.1m, with a similar proportion (25%) from diving.

Confidence

The economic value outputs generated through this study reflect the quality of the available data, both for WAM and expenditure. A weakness to the approach is the lower level of confidence that can be placed on these outputs. This is a result of the methods used to collect the data.

The original WAM data depends on the knowledge of sources that provided expert judgement on the definition / scale of activity areas through their own judgement (as opposed to specific surveys). The other notable spatial mapping projects all sought activity data directly from a survey of the users; which is likely to provide a greater level of accuracy in the areas and numbers estimates, although this comes with its own set of methodological challenges and problems. However confidence data on WAM activity areas was made available and therefore used to inform the final valuation confidence. However, there is some uncertainty over double counting where expenditure may be accounted more than once for activities that are carried out on the same day by participants; and where the GIS repeats activity areas for any one activity through different spatial definitions (e.g. area as well as point or line).

In terms of the economic data, this varies significantly from activity to activity. Higher confidence scores were achieved for activities where good data is available from multiple sources; lower confidence scores were necessary for activities for which appropriate source data matches (location, activity type, and quality) could not be identified.

Mapping outputs of the two case studies have been provided for each case study based on the economic data confidence alone to avoid any misinterpretations of the maps (i.e. had they been combined with WAM confidence).

7.2. Detailed Recommendations

Extension of pilot methodology beyond case studies

Recommendation 1: Extension of pilot methodology to WAM (Cardigan to Bridgend)

WAM extends from Cardigan, just north of St David's on the southern part of the west Wales coastline, to Bridgend which is half way along the south Wales coastline between Cardiff and Swansea. To scale up the value transfer approach taken in this pilot study to the rest of WAM, it is recommended that the same methodology to create the final outputs within this pilot study is adopted. A relatively straight forward process is now established, using spreadsheet tools developed with formulae to easily extract values; and a set of GIS processing rules. This

approach will deliver a set of spatial value outputs that are appropriate for use in marine and coastal planning across the region. This is currently a notable data gap.

It is not essential to repeat the business survey for other areas to inform the spatial products; however the surveys can be seen as optional to help inform the wider context of each area in terms of revenue, employment and activity services.

Extension of pilot methodology to WAM:

- Repeat spreadsheet and GIS calculations using existing WAM and expenditure per participant data, ~£5-10k.

As noted the level of confidence is affected by the WAM and expenditure per participant data. Improvements to these are discussed separately below. However this will require a relatively significant amount of time and resources and is not a reason to hold back any roll-out of the WAM valuation exercise.

Recommendation 2: Extension of pilot methodology to Wales

The scaling up of this method to all of Wales' marine recreation depends on 1) the potential extension of WAM to cover Wales; 2) consideration of an alternate approach to gaining participant data; and 3) potential improvement of participant expenditure values.

The potential extension of WAM to cover Wales would require extensive survey across the west and north coasts, and Anglesey. It took the equivalent of 4 months for the South Wales audit; and so purely by approximate length of coastline, this can reasonably be scaled up to a further ~8-10 months to produce the same outputs as WAM for the rest of Wales. However the duration of the extended project would be longer owing to the nature of survey work and availability for interviews; and would depend on the number of organisations / staff involved in coordinating data gathering in each area. Specifically, the tasks involved in scaling up to Wales include:

Extension of pilot methodology to Wales:

- Extension of WAM, ~£50-80k
- Application of valuation, ~£10k

Recommendation 3: Extension of pilot methodology beyond Wales

It would be feasible to adopt this methodology in other areas of the UK, although the resource and data update issues identified at the Wales level would be magnified. Further, the value data applied in this approach has been selected to be appropriate for Wales. This data would need to incorporate different sources were the approach to be used in other parts of the UK. Further, it would also require consideration of the factors detailed below.

Amendments to WAM

Recommendation 4: Update to WAM participant usage

Whilst it is recommended that the WAM approach is appropriate to be rolled-out across a wider spatial area, there are some areas where the methodology could be improved in order to enable more accurate and useful information to be collected (as noted in previous sections). In summary, the tasks involved in enhancing the current approach to WAM is:

Update to WAM participant usage:

- Refine activity locations (areas, lines and points) using a finer spatial scale to ensure all fall in the correct marine, intertidal or coastal domain. All work within this pilot study has been carried out in the same projection as WAM and it is recommended that all future work continues to use this: Ordnance Survey (OSGB36). OSGB36 is most relevant to terrestrial areas however as the Welsh marine area is relatively inshore, this is deemed sufficient.
- Refine activity location and usage to avoid double counting of participants where the same individual may a) go to multiple activity areas in any one activity day (e.g. kayaking); or b) may undertake multiple activities in one visit (e.g. beach activities and swimming).
- Provide a usage figure for each season as it is almost certain that the usage in summer is not the same as winter.
- Provide a specific confidence category to usage and frequency values.
- Differentiate between subtypes of activities where important for valuation e.g. shore-based angling versus boat-based angling.
- Consider whether all activities are required singularly to inform intended purpose, e.g. marine planning. This may result in activities being grouped together, e.g. small craft sports dependant on wind conditions; or potentially dropped all together, e.g. an activity that occurs above the mean high water (MHW) line.
- Consider whether identification of spatial location can be simplified by assignment to a grid.
- Consider whether identification of detailed spatial location and activity characteristics is only required for certain areas of significance, e.g. hot spots⁴⁹, or if a complete coverage is of more value.

The scale of carrying out these tasks will depend on whether it is applied to Pembrokeshire alone or all of Wales.

⁴⁹ The reason for mapping an area of marine recreation activity is explored fully by the guidance produced by MMO1043: Mapping Marine Recreation, How to supply data.

Improvements to expenditure values

Whilst it is recommended that the expenditure per participant data provided in this report is used to produce spatial value layers for the remainder of the WAM database and for any future roll-out of WAM to the rest of Wales in the short term, a longer term programme is recommended to improve these values for future use. In fact the two may be carried out concurrently as the final valuation comes in late in the mapping process and values can be changed easily. This may have significant impacts on the resources required to carry out future data collection on usage and analysis across larger spatial areas.

Recommendation 5: Enhance use of GBTS/GBDVS expenditure data

One simple enhancement that can be undertaken to improve the confidence associated with the expenditure assumptions and final value estimates is to update the per participant assumptions with new data from the GBTS/GBDVS when it becomes available. GBTS/GBDVS is a key source of Wales-specific information and is the primary source used in this report. The data is robust, being undertaken with adherence to the Code of Practice for Official Statistics, and there is commitment to continue the dataset (at least in the short term). Changes to the methodology for the 2011 GBTS/GBDVS surveys provided a long list of activities matching to WAM, that weren't available previously. VisitWales⁵⁰ recommend that 3-year averages of survey data are taken when using the data for specific-activities due to relatively low sample sizes that may affect the accuracy of the data. As 2011 was the first year that the detailed set of activities has been available for both GBTS and GBDVS, the values presented in this report are based on survey results for a single year. As data for future years is released, the calculated value transfer data should be updated to incorporate a run of data (to include up to 3 years of data). Specifically, the recommended tasks involved in validating GBTS/GBDVS include:

Enhance use of GBTS/GBDVS data:

- Update calculated expenditure per participant values using each new year of GBDVS and GBTS data, in order to incorporate a longer, 3-year run of data.

Recommendation 6: Primary survey of participant expenditure at a national scale

It may be appropriate to consider undertaking new primary survey work to generate improved expenditure data if a higher level of confidence is desired for certain activities. It is anticipated that this would only include activities for which the current level of confidence is not considered to be commensurate to the perceived significance and prominence of that activity in current policy and marine management questions/decision-making. It is recommended that the survey

⁵⁰ Who hold the Wales-specific data and are the point of contact for the survey in Wales

is carried out at the national scale in order to ensure that the data can be used in the roll-out of WAM across Wales. Specifically, the recommended tasks include:

Primary survey of participant expenditure:

- A Wales-level survey focussed on activities for which a higher level of confidence is desired, or for which no data is currently available. It is recommended that this is considered for activities which are deemed to be of high importance or are highly contentious in terms of current marine policy/management decision making.

Recommendation 7: Research into spatially varying expenditure indexes

Average expenditure per participant for any given activity is unlikely to be uniform across all of the activities in different locations in Wales. Locally-specific factors may be effected by, e.g. the ratio of own equipment users to hire equipment user, mix of local and non-local users or the local economy. This is likely to occur at very low spatial scales, e.g. even for different activity areas that are accessed from the same land point / settlement. Attaining data at this spatial scale would require an enormous level of survey input that would be very hard to justify. It is not recommended that this is taken forward.

From the very local inter-activity area differences, the next scale to consider is inter-region expenditure differences. This may benefit from a more generic economic evaluation of socio-economic typologies which is not specific to any one sector or place. This could then be used to apply an index to the national values. For example, in England coastal typologies have been developed to characterise each coastal cell (delineated by socio-economic type) in terms of an overall type (MMO 2011). This splits regions into two sets of types, firstly into 'coastal retreats' 'coastal challenges', 'cosmopolitan coast' or 'coastal fringe'. Secondly these types are broken down further, e.g. silver seaside, working countryside, rural chic, striving communities, working hard. In addition, it compares regions by population, education, employment, economy, health, housing, crime, access and transport and deprivation/inequality.

There is currently no direct way of connecting values in this study to a marine recreation expenditure index; however this is an area that could be explored more in the future. I.e. by forming expenditure values per coastal typology, the values could be applied nationally very easily. However this may benefit from values of tourism alone (which could then be added onto activity costs); and would have to consider significant economy regions where the values would not be interchangeable. In addition (or alternately) this could consider the dependency of coastal settlements on the marine environment i.e. activities that (i) take place in the marine area; and (ii) interact with the environment. Specifically, the recommended tasks include:

Research into inter-region expenditure indexes:

- A national or UK wide research project into how to apply national expenditure per person values to 'types' of coastal areas.
- A national project to define typologies in Wales in a similar fashion to MMO (2011).

Gaining understanding of the local economy

Recommendation 8: Business survey for bespoke case study analysis

The key benefit of using the business survey was to provide an understanding of the direct economic impact of activities on small local economies. This was appropriate in context of the WAM pilot case studies evaluations, for which businesses can be relatively easily identified and can answer questions about the activities that they supply in the case study area reasonably accurately. Any future case study analysis would benefit from a business survey, e.g. a coastal town or area related to another MCZ. However following the analysis undertaken during the pilot studies, some update to the approach would be of benefit.

Firstly, many businesses operate with multiple activity types and with multiple pricing structures. As such, they were generally not able to provide overly detailed data at a per activity and per activity area (i.e. where the activity takes place) scale. Any future business survey should seek only core data to ensure both timely survey completion and good response rates.

Secondly, the business survey undertaken in the pilot studies focussed on activity providers only, as they provide the most direct link to activity participants and are likely to have good knowledge of the extent to which their customers use the case study areas. A survey of other related business i.e. across a broader 'tourism industry', was not undertaken as such business are very unlikely to know what activities and where each of their customers are likely to be undertaking, thereby making their data unsuitable for use in the case study analysis.

However a weakness of the approach adopted in the pilot case studies is that it therefore only captures part of the local economic activity associated with activity participants. It may be appropriate to broaden the sectoral base considered in the business survey, with the aim of identifying data at the simplest scale i.e. the level of business activity sustained by the case study area, with no attempt to collect data by activity type.

Business survey for bespoke case study analysis:

- The format used in this project should be condensed to the core components provided separately for business activity inside the case study area and outside it:
 - Total annual revenue
 - Total number of customers for this service per year inside and outside the case study area
 - Number of employees by full time and part time employees for both permanent and seasonal employees to inform Full Time Equivalent (FTE) employees
 - Typical wage rates by job type
- Consider broadening the sectoral base considered in the business survey and simplify data required with no attempt to collect data by activity type

Such a case study approach should not be undertaken as a matter of course as part of WAM roll-out. It should only be undertaken where such further information is required to inform a particular policy or management question. As such the survey should be used to gain further information of relevance to the question beyond simply establishing baseline values.

Improvements to participant usage

Recommendation 9: Improvements to spatially disaggregated data from GBTS/GBDVS surveys participant usage through national surveys 'piggyback':

Spatial data and associated participant numbers may potentially be collected at a large scale through the use of national bodies that operate within just one or a few activities, e.g. the British Kitesurfing Association, British Coasteering Federation. This clearly requires a coordinated approach of 20-30 organisations to cover all activities. However the benefits are access to members, or survey respondents, covering a very large spatial footprint, with the scope to repeat in future years. The process would involve design of an information gathering approach, consultation with and coordination of national bodies, processing of data and presentation of this to allow participants to feedback. Data capture could take the form of a survey form or online portal in which users could upload information (and at the same time use it as a one stop shop to view activity locations to their own benefit). The benefit of this approach is setting up a repeatable method of obtaining not only expenditure data but also activity locations. However undertaking comprehensive surveys for all activities included in the WAM database would be a significant undertaking unless supported by national activity associations' time or if there was an automatic portal with which users could upload information. Such an approach has already been recommended in MMO1043 'Compilation of spatial data on marine recreational activities phase 2' for a UK scale. Also it may be hard to reach participants of certain activities where they are not members etc. or it is generally a tourism activity, e.g. beach activities. This could potentially be addressed by working with national tourism bodies and surveys. Again, such an approach has been recommended in MMO1043. These issues would need to be addressed before proceeding any further.

Improvements to spatial participant usage through national recreation bodies:

- Collation of participant activity locations, numbers and expenditure at a national scale through survey, coordinated through national bodies; and completion of analyses, maps and reporting: £75-150k (dependant on financial ability / desire for collaboration of national bodies).

Recommendation 10: Improvements to spatial participant usage through national surveys 'piggyback'

Spatial data and associated participant numbers may potentially be collected at a large scale through / in association with existing surveys, e.g. national tourism boards. There are only two existing large scale survey run on an annual basis of interest here: GBTS /GBDVS and MENE.

GBTS/GBDVS: From a WAM perspective it would be advantageous if the GBTS and GBDVS could (i) include a more detailed and comprehensive breakdown of recreation activities so that more WAM activities are specifically covered; (ii) could have a larger Wales sample so that activity-specific data could be extracted at a lower level geography e.g. by County.

Given the significant issues with altering the questions of an ongoing large-scale survey such as GBTS/GBDVS it is considered unlikely that any new activities or altered activities could be added into the survey. However it may be possible, by providing additional funding to the survey, for a larger Wales sample to be collected, allowing an improved spatial breakdown of activity data, and improved confidence in the Wales activity data.

MENE: The same points apply as are discussed above for GBTS/GBDVS. However as MENE is focussed only on England, the whole Wales-focussed sample would need to be funded. There may be opportunities to make this happen, particularly if the Welsh Government, Visit England or Natural Resources Wales could be persuaded that MENE would be useful for Wales. However unless there is already discussions of this sort, it is unlikely that this could be made to happen in the short term. Also, the costs of funding a full Wales sample could be prohibitively high.

In addition, the Visit Wales survey is planned to assess the value of the outdoor activity sector across Wales using two online surveys (pers. comms. PCF, Miller Research). They are currently undertaking an economic impact assessment of outdoor recreation in Wales, with research based on primary survey work (due to report to Visit Wales towards the end of 2013). The report will include analysis of the economic impact of watersports in Wales. This is not expected to be disaggregated by individual watersports (unlike the WAM data), and notably does not include recreational angling. The report will provide an interesting comparator for the WAM aggregated expenditure value. It is not clear whether activity-specific data may be able to be obtained from the report in the future for use in any expansion of improvement to the WAM valuation exercise.

Improvements to main secondary data source for expenditure

- Engage VisitWales and other relevant organisations to discuss the potential for increasing the Wales sample size.

Assess timescales

Recommendation 11: Conclude the period of update required to inform methods

Data collected by WAM and its associated valuation is not likely to fall significantly out of date in the short to medium future. This is due to the fixed or limited change to its assets (beach, tide, water quality, fish) and participants. However, patterns in location and participant activity in marine recreation do change on a timescale of >2 years, e.g. with change in new activities such as coasteering (MMO, 2013). Therefore consideration should be given to the timescale over which this information needs to be updated and therefore the method by which the data is gathered/processed.

Conclude the period of update required to inform methods

- Engage the Welsh Government, Visit Wales and National Park to assess requirements for the data.

7.3. Summary of Recommendations

- 1) Extension of pilot methodology to WAM (Cardigan to Bridgend): Repeat spreadsheet and GIS calculations using existing WAM and expenditure per participant data
- 2) Extension of pilot methodology to Wales: Extension of WAM and application of valuation with consideration of the factors detailed below
- 3) Extension of pilot methodology beyond Wales: To consider factors detailed below.
- 4) Update to WAM participant usage: Various refinements including: spatial delineation, mitigation of double counting, application of usage to each season, differentiation of confidence for each of usage and frequency, division of relevant activities, e.g. angling (shore / offshore). Also consideration to grouping of activities, grid assignment of spatial footprint and, lastly, hotspots instead of complete coverage.
- 5) Enhance use of GBTS/GBDVS expenditure data: Update calculated expenditure per participant values using each new year of GBDVS and GBTS data, in order to incorporate a longer, 3-year run of data
- 6) Primary survey of participant expenditure at a national scale: A Wales-level survey focussed on activities for which a higher level of confidence is desired, or for which no data is currently available.
- 7) Research into spatially varying expenditure indexes: A national or UK wide research project into how to apply national expenditure per person values to 'types' of coastal areas and to define typologies in Wales in a similar fashion to MMO (2011).
- 8) Business survey for bespoke case study analysis: Future surveys should be condensed to total annual revenue, customers, employees, wages (each split by inside / outside case study); as well as considering broadening the sectoral base.
- 9) Improvements to spatial participant usage through national recreation bodies: Collation of participant activity locations, numbers and expenditure at a national scale through survey, coordinated through national bodies; and completion of analyses, maps and reporting.
- 10) Improvements to spatially disaggregated data from GBTS/GBDVS surveys: Engage VisitWales and other relevant organisations to discuss the potential for increasing the Wales sample size.
- 11) Conclude the period of update required to inform methods: Engage the Welsh Government, Visit Wales and National Park to assess requirements for the data.

Appendix A. Economic Definitions

Gross Value Added (GVA)	A measure of the contribution to GDP (Gross Domestic Product) made by a particular industry. It measures the value of outputs, less the value of any goods and services that contributed to the production process. Thereby it measures just the additional value of the industry to the economy.
Ecosystem services	Services provided by the natural environment that benefit people. There are 4 commonly used classifications: provisioning, regulating, cultural and supporting. Recreation is considered to be a cultural ecosystem service.
Full time equivalent (FTE)	A standardised measure of employment that allows different types of jobs (i.e. full time, part time and seasonal) to be combined to provide one single figure. It refers to the number of hours worked that add up to one full-time worker.
Travel cost method	A method used to estimate economic use values of ecosystems / sites that are used for recreation, taking the time and travel cost expenses that people incur to visit a site as being representative of the “price” of recreating at the site.
Value transfer approach	Refers to the use of existing economic valuation evidence in a new appraisal context.
Willingness to pay (WTP)	The maximum amount a person would be willing to pay in order to receive a good

Appendix B. References

Transfer Values

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Appendix C. Marine Policy Context to Study

Marine Planning

The UK government and devolved administrations are seeking to achieve clean, healthy, safe, productive and biologically diverse oceans and seas. A key step towards realising this vision is the introduction of new systems of marine planning across the UK, including policies for sustainable development and marine conservation. These will be implemented through the Marine and Coastal Access Act 2009 in England and Wales, with the Welsh Government responsible for implementation of many of the provisions within the Act in Wales.

Marine planning will contribute to the effective management of marine activities and more sustainable use of our marine resources, creating the framework for consistent and evidence-based decision-making. This will be achieved through a new marine management system comprising of the Marine Policy Statement, Marine Plans and Marine Licensing.

The Government has stated that the new system will include an aim to ensure that all coastal areas, the activities within them and the problems they face are managed in an integrated and holistic way. Following adoption of the UK Marine Policy Statement by UK Administrations, the Marine Management Organisation (MMO) has begun marine planning in England and the Welsh Government will shortly follow in Wales.

Marine Protected Areas

As part of this process, the UK is currently undergoing a rapid expansion of Marine Protected Areas (MPAs) which may have socio-economic impacts, including both positive (and sometimes negative) impacts on coastal communities, industry, tourism or conservation. In the UK, MPAs are currently dominated by Special Areas of Conservation and Special Protected Areas, designated under the Conservation and Habitats and Species Regulations (2010); and will soon contain a number of new sites, Marine Conservation Zones (MCZs) or in the case of Wales Highly Protected Marine Conservation Zones (HPMCZ), which are to be designated under the Marine and Coastal Access Act 2009.

The Welsh Government originally consulted on a number of HPMCZs from which a selection of 3 or 4 sites were expected to be designated. Three of the proposed sites are in Pembrokeshire: Site 8 – South West of Strumble Head; Site 9 Skomer; and Site 10 Dale. Site 10 is one of the proposed two case studies in this recreation valuation project. The Welsh Government has now withdrawn all sites from consideration pending a review.

Appendix D. Value Data Sourced from Literature

The following tables provide a short assessment of the appropriateness of the most relevant studies and surveys identified.

Ruiz-Frau et al, 2012

Criteria	Detail	Appropriateness
Relevance of study	Activity: kayaking, diving; wildlife watching Location: Wales coast Users: all participants	Good
Value component	Expenditure: all expenditure associated with the trip, including overnight	Good
Research quality	Peer reviewed primary survey	Good
Conclusion	Data from the study provides a good match to the case studies and is appropriate for value transfer. The activity expenditure data has been used in all calculations for the activities presented.	

GBDVS, 2012 and GBTS, 2012

Criteria	Detail	Appropriateness
Relevance of study	Activity: various individual activities Location: Wales (data is available for more rural areas (lower tier geographies), however the sample sizes become too small when considering individual activities) Users: all participants	Good (or moderate depending on individual activity considered)
Value component	GBDVS - Expenditure: all expenditure associated with day visit trips only (no overnight) GBTS - Expenditure: all expenditure associated with the trip, including overnight	Individually: Moderate Combined: Good
Research quality	Official Statistics	Good
Conclusion	Data from the study provides a moderate-good match to the case studies and is appropriate for value transfer. When combined with data from the GBTS, it provides a good match (i.e. expenditure for both day visits and overnight visits included). The activity expenditure data has been used in most calculations for which there are closely matching activities.	

Drew Associates, 2004

Criteria	Detail	Appropriateness
Relevance of study	Activity: sea angling (by type) Location: England and Wales Users: all participants	Good
Value component	Expenditure: all expenditure associated with trip, including overnight	Good
Research quality	Defra commissioned and reviewed primary survey (sample: >900)	Good

Conclusion	Data from the study provides a good match to the case studies and is appropriate for value transfer. The activity expenditure data has been used in calculations for sea angling.	
Cappell and Lawrence, 2005		
Criteria	Detail	Appropriateness
Relevance of study	Activity: angling (by type) Location: south-west England Users: south-west residents	Poor-Moderate
Value component	Expenditure: all expenditure by south-west England residents associated with trips in the south-west, including overnight	Moderate
Research quality	Peer-review primary survey (see Lawrence, 2005)	Good
Conclusion	Data from the study provides a moderate match to the case studies and could be appropriate for value transfer if other more closely matched studies are not available. The activity expenditure data has not been used in the calculations.	
Rees, 2011		
Criteria	Detail	Appropriateness
Relevance of study	Activity: diving, sea angling Location: Dorset, England Users: all participants	Moderate
Value component	Expenditure: all expenditure associated with trip, including overnight	Good
Research quality	Primary survey (sample: 40 anglers; number of divers not reported); peer-reviewed	Moderate
Conclusion	Data from the study provides a moderate-to-good match to the case studies and is appropriate for value transfer. The activity expenditure data has been used in calculations for sea angling and diving.	
MENE, 2012		
Criteria	Detail	Appropriateness
Relevance of study	Activity: various individual activities Location: England (also available by county, although with small sample sizes) Users: all participants	Moderate
Value component	Expenditure: all expenditure associated with trip, including overnight	Good
Research quality	Large-scale survey; compliant with official statistics Act	Good
Conclusion	Data from the study provides a moderate-to-good match to the case studies and could be appropriate for value transfer where more appropriate sources are not available. The survey data is similar in both methodology and output to the GBTS/GBDVS, however provides data for England only (as opposed to Wales). Therefore data from GBTS/GBDVS is preferred where both provide data for similar activities. MENE activity expenditure data has been used in calculations for dog walking (as there is no GBTS/GBDVS data for this activity), and for swimming (where the value is considered more realistic than that provided by GBTS/GBDVS).	

Nautilus Consultants, 2000

Criteria	Detail	Appropriateness
Relevance of study	Activity: sea angling (by type) Location: Wales coast Users: all participants	Good
Value component	Expenditure: all expenditure associated with trip, including overnight	Good
Research quality	Expert opinion, grey literature	Poor
Conclusion	Data from the study provides a good match to the case studies but is poor with regards to research quality. There are a number of other sources of angling data which are therefore preferred.	

Tourism South East, 2005

Criteria	Detail	Appropriateness
Relevance of study good	Activity: yachting Location: Hampshire & Isle of White, England Users: visiting yachts	Moderate
Value component	Expenditure: all expenditure associated with trip, including overnight	Good
Research quality	Survey (sample: 1,437); grey literature	Moderate
Conclusion	Data from the study provides a moderate match with the case studies	

Welsh Economy Research Unit, 2012

Criteria	Detail	Appropriateness
Relevance of study	Activity: visit to the coastal path Location: Welsh coast Users: day and overnight visitors	Good
Value component	Expenditure: all expenditure associated with trip, including overnight	Good
Research quality	Primary survey (sample: 784 responses); grey literature	Good
Conclusion	Data from the study provides a good match to the case studies and is of good quality. It is therefore used in the calculations for coastal path walking.	

RSPB, 2009

Criteria	Detail	Appropriateness
Relevance of study	Activity: visits to a nature reserve Location: visits to South Stack Cliffs RSPB Nature Reserve, Anglesey Users: non-resident visitors	Moderate
Value component	Expenditure: all expenditure associated with trip, including overnight	Good
Research quality	Primary survey (sample: 174 responses representing 534 visitors); grey literature	Moderate

Conclusion	The study provides a moderate fit for value transfer to the case studies. Most notably, only non-resident visitors are included in the survey. One would expect this to result in an overestimate in the expenditure/day for the average participant (when residents included). However the £/day figure is lower than that provided in GBTS/GBDVS. The RSPB value is therefore included in the calculation of the average expenditure.	
Kenter et al, 2013		
Criteria	Detail	Appropriateness
Relevance of study	Activity: sea angling; diving Location: Pembrokeshire Users: all	Good
Value component	Willingness to pay: travel cost model only (i.e. no non travel expenses)	Moderate
Research quality	Primary survey (sample: 422 anglers and 1,261 divers across UK, not just for Pembrokeshire); peer reviewed	Poor (angling); Moderate (diving)
Conclusion	The study provides a moderate fit for value transfer. Most notably as the survey was a national survey, not just focussed on Pembrokeshire (Pembrokeshire was one possible angling location being considered), the sample size is considered to be small, particularly for angling (this is also acknowledged in the original study). Due to the relatively small sample sizes and the utilisation of a travel cost model to establish willingness to pay, the study is not considered to be appropriate for value transfer.	

Appendix E. WAM Data Analysed

Table E1: Summary of parameters and categories contained within WAM.

Parameter	Title as supplied in WAM GIS attribute Table	Categories assigned in WAM	
Number of participants	scale	Categories: 0-25, 26-50, 51-100, 101-200, 201-300, 301-400*, 401-500, 501-750, 751-1000, 1501-2000 Note: Where absolute numbers could be obtained they have been recorded e.g. details on recreational Ministry Of Defence permits	
Frequency of activity participation in Easter holidays	easterholidays	Categories: – Daily = 28 plus days per month – Frequent = 9-27 days per month – Infrequent = 8 days or less per month.	
Frequency of activity participation in Easter holidays late spring / early summer	latespring / earllysummer		
Frequency of activity participation in Easter holidays late spring / early summer holidays	summerholidays		
Frequency of activity participation in Easter holidays late spring / early autumn	autumn		
Frequency of activity participation in Easter holidays late spring / early winter	winter		
Return visits made site / activity	repeat	Categories: Yes, not known, nk	
Percentage of repeat visitors in Easter holidays	easterholidaysrepeat	Categories: – not known, nk, nr – 40, 50, 60, 70, 80, 90	
Percentage of repeat visitors in early spring/ late summer	latespringearlysummerrepeat		
Percentage of repeat visitors in summer holidays	summerholidaysrepeat		
Percentage of repeat visitors in autumn	autumnrepeat		
Percentage of repeat visitors in winter	winterrepeat		
Type of participants	participantprofile	Categories: – individuals – groups – individuals / groups	
Organisation data supplied by	organisation	– independent – independent / activity centre – independent / club – independent / other recreation provider – activity centre	– independent / activity centre – independent / activity centre / club – independent / other recreation provider – independent / activity centre club – independent / other recreation provider guided walks
Activity trend on a National level	activitytrend / nationallevel	A 5 point scale is used to gauge usage over the last 5 years for each activity where: – 1*=falling rapidly – 2=falling steadily – 3=steady – 4=rising steadily	

Parameter	Title as supplied in WAM GIS attribute Table	Categories assigned in WAM
		– 5=rising rapidly
Activity trend at the location	sitespecificactivitytrend	<p>A 5 point scale is used to gauge usage over the last 5 years for each site specific activity where:</p> <ul style="list-style-type: none"> – 1*=falling rapidly – 2=falling steadily – 3=steady – 4=rising steadily – 5=rising rapidly – 0, 1*, 2, 3, 4, 5
Confidence score of data supplied (non-spatial elements)	dataconfidencetag	<p>The confidence score is based on a five point scale ranging from 1= no confidence to 5 = absolute confidence. The final score considered a number of factors (Table 5 below).</p> <p>Categories:</p> <ul style="list-style-type: none"> – 0*, 1*, 2*, 3, 4, 5
Confidence score of spatial definition	map area confidence tag	<p>Data coverage is scored on a 5 point scale where 1 = no/poor recreational data for the location to 5 = excellent recreational data for the location has also been added to the database providing users to make better judgements on the potentially subjective data.</p> <ul style="list-style-type: none"> – 0*, 1*, 2, 3, 4, 5
Date data sourced	datesourced	Various dates in 2008 and 2009 (9 individual days)
Method of data acquisition	researchmethods	<ul style="list-style-type: none"> – interview – site report – interview and survey results – interview and site report – interview and user surveys
Staff responsible for data collection	inputby	All by DJ, PCF.

* Not assigned in St David's variables

Table E2: A selection of the variables assigned in the Dale case study WAM dataset

Note that the first column uses parameter names as extracted from the GIS shapefile. For reference to full descriptions see **Table 1**.

scale	101-200	26-50	0-25	201-300	51-100				
easterholidays	daily	frequent	infrequent						
latespring/earlysummer	daily	frequent	infrequent						
summerholidays	daily	infrequent		frequent					
autumn	daily	frequent	infrequent						
winter	frequent	infrequent	not recorded	daily					
repeat	yes	not known							
easterholidaysrepeat	20		50		70		90	not known	nk
latespringearlysummerrepeat	20		50		70	80		not known	nk
summerholidaysrepeat	20	40		60	70	80	90		
autumnrepeat	20		50		70	80	90	not known	nk
winterrepeat	20			60	70	80	90	not known	nk
participantprofile	individuals	individuals /groups	individuals/groups	groups					
organisation	independent	independent/club/other recreation provider	other recreation provider dale sea safari	independent/activity centre	independent/activity centre/club	other recreation provider	independent/club	activity centre	
activitytrend/nationallevel	2	3							
activitytrendatite	2	3	4						
dataconfidencetag		3	4						
map area confidence tag		3	4						
rdrandom1									
OLE Object1									
datesourced	14/07/2008	30/07/2008	24/11/2010						
researchmethods	interview and user surveys	interview							
inputby	DJ								

Table E3: A selection of the variables assigned in the St David's case study WAM dataset

Note that the first column uses parameter names as extracted from the GIS shapefile. For reference to full descriptions see **Table 1**.

scale	0-25	26-50	51-100	101-200	201-300	401-500	501-750	751-1000	1501-2000		
easterholidays	infrequent	frequent	daily								
latespring / earllysummer	infrequent	frequent	daily								
summerholidays	infrequent	frequent	daily								
autumn	infrequent	frequent	daily								
winter	infrequent	frequent	daily	not recorded							
repeat	Yes	not known	nk								
easterholidaysrepeat	not known	nk	-	50	-	70	80	90			
latespringearllysummerrepeat	not known	nk	40	50	60	70	80	90			
summerholidaysrepeat	not known	nk	40	50	60	70	80	90			
autumnrepeat	not known	nk	-	-	-	70	80	90			
winterrepeat	not known	not recorded	-	50	60	70	80	90	nk	nr	
participantprofile	individuals	groups	individuals / groups								
organisation	independent	independent / activity centre	independent / club	independent / other recreation provider	activity centre	independent / activity centre	independent / activity centre / club	independent / other recreation provider	independent / activity centre	club	independent / other recreation provider guided walks
activitytrend / nationallevel	0	-	2	3	4						
activitytrendatite	0	-	2	3	4						
dataconfidencetag	-	-	-	3	4						
map area confidence tag	-	-	2	3	4						
datesourced	30/07/2008	14/07/2008	17/03/2009	04/06/2008	03/09/2008	11/09/2008	23/02/2009	18/12/2008	09/10/2008		
researchmethods	interview	site report	interview and survey results	interview and site report	interview and user surveys						
inputby	DJ										

Table E4: WAM Data confidence tags

Confidence Score	Factors considered	No of factors required
1 = No confidence	1. No familiarity with activity and/or location.	
2	1. Knowledge of anecdotal evidence. 2. Not familiar with particular activity at the location	
3	1. Knowledge of anecdotal evidence. 2. Familiar with particular activity at the location 3. Personal experience of viewing/recording activity at the location	2
4	1. Knowledge of anecdotal evidence. 2. Familiar with particular activity at the location 3. Personal experience of viewing/recording activity at the location 4. Other data providers providing similar information 5. Repeat visits due to occupation/activity interest	4
5 = Complete confidence	1. Knowledge of anecdotal evidence. 2. Familiar with particular activity at the location 3. Personal experience of viewing/recording activity at the location 4. Other data providers providing similar information 5. Repeat visits due to occupation/activity interest 6. Absolute numbers known e.g. Climbers signing into MOD range	5 with point 6 essential

Appendix F. Case Study Valuation

Table F1: Per Annum Expenditure by Activity – St David's

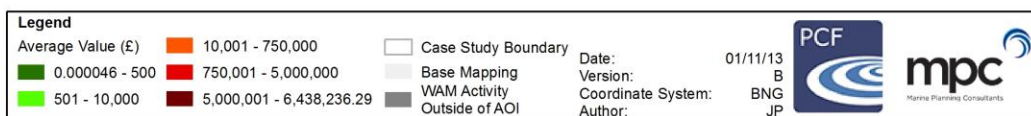
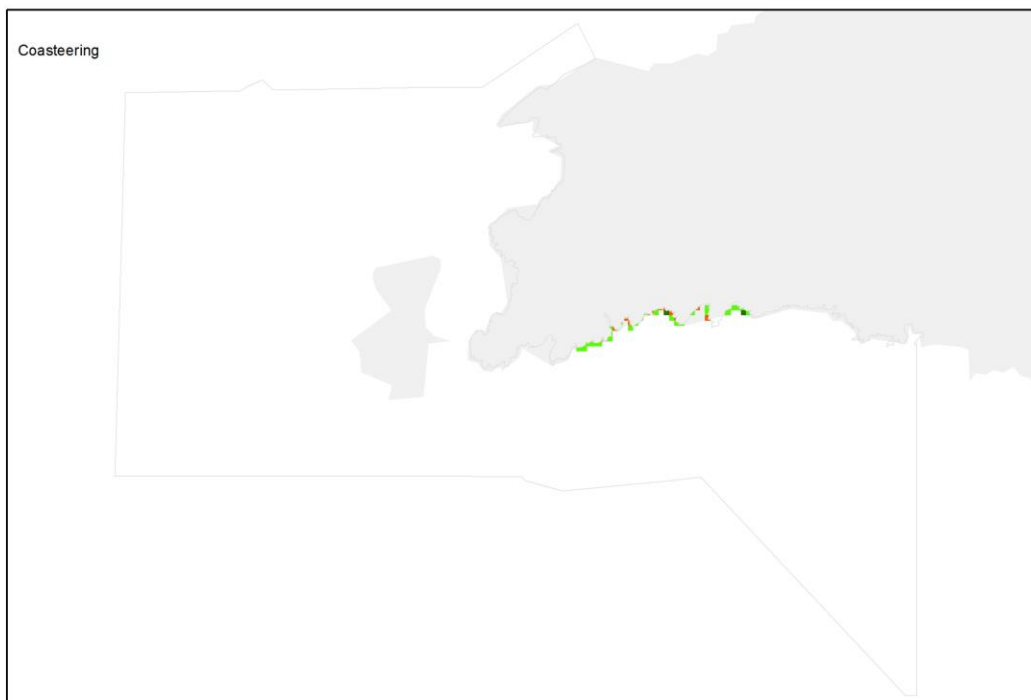
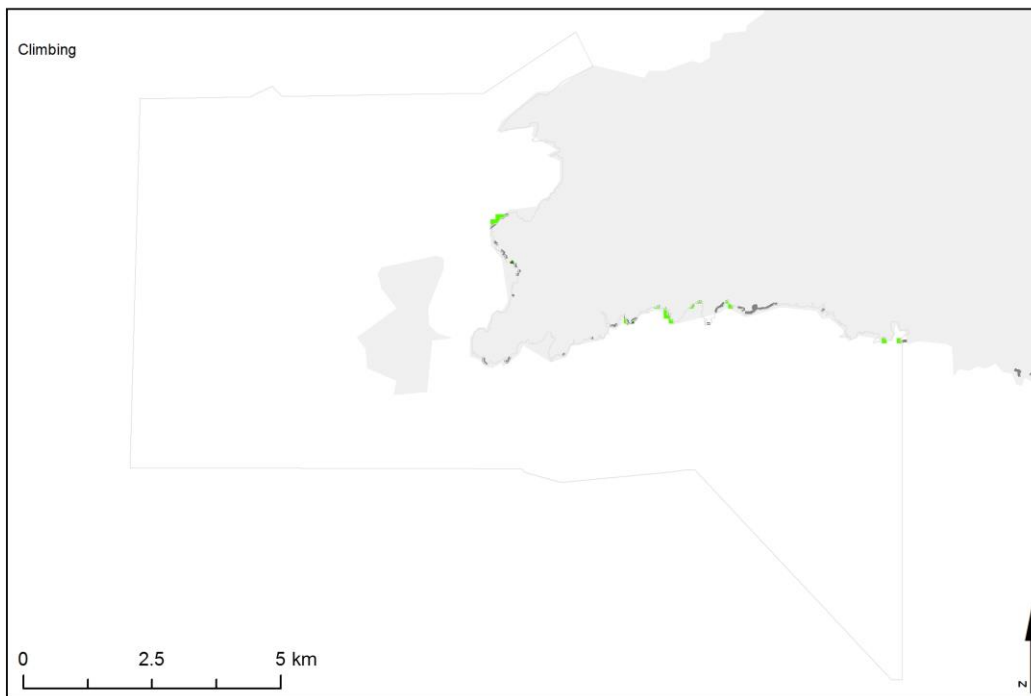
Activity	Participant Days	Total Expenditure (million £)		
		Mean	Lower	Upper
Beach Activities	520,366	17.69	13.01	22.38
Body Boarding	13,927	0.32	0.24	0.42
Climbing	13,265	0.28	0.12	0.42
Coasteering	11,317	0.70	0.51	0.91
Cruiser Sailing	5,822	0.22	0.16	0.29
Dinghy Sailing	14,097	0.58	0.32	0.87
Diving	4,069	0.29	0.28	0.38
Dog Walking	175,639	0.53	0.35	0.53
Horse Riding	1,418	0.19	0.14	0.25
Kayaking	38,482	1.04	0.89	1.15
Kite Boarding	473	0.01	0.01	0.01
Kite Surfing	473	0.01	0.01	0.01
Power Boating	3,143	0.12	0.09	0.15
Power Kite Flying	879	0.02	0.01	0.03
Rowing	1,282	0.03	0.02	0.04
Sea Angling	27,841	1.53	1.23	1.89
Snorkelling	6,101	0.14	0.10	0.18
Surfing	67,922	1.56	1.15	2.04
Swimming	191,891	4.80	4.41	4.99
Walking	494,346	11.37	6.92	15.82
Wildlife Boat Trips	201,676	9.68	7.06	12.50
Wildlife Watching	8,617	0.22	0.16	0.27
Windsurfing	474	0.01	0.01	0.01

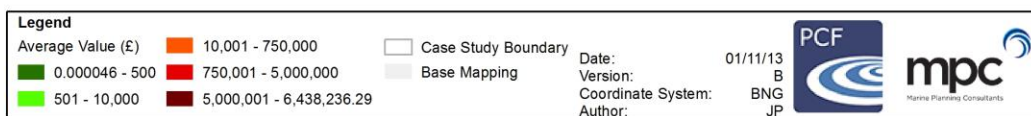
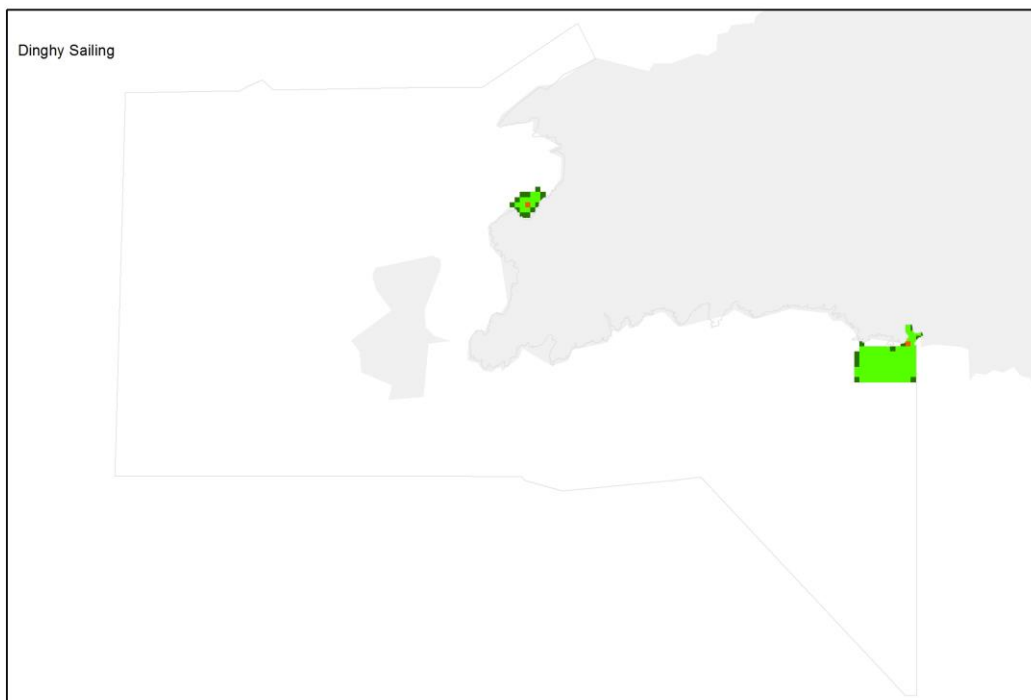
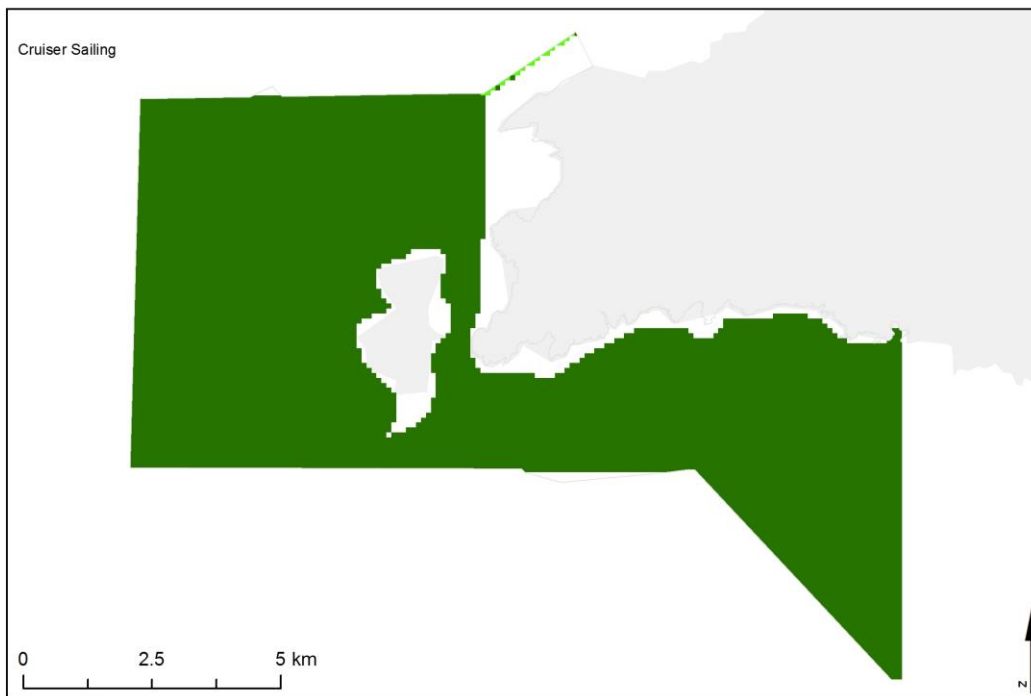
Table F2: Per Annum Expenditure by Activity – Dale

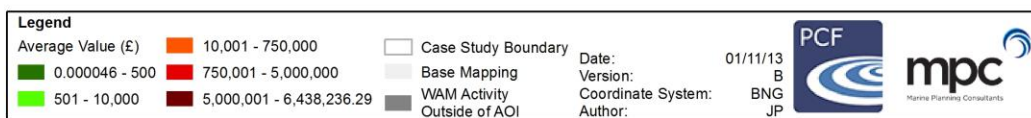
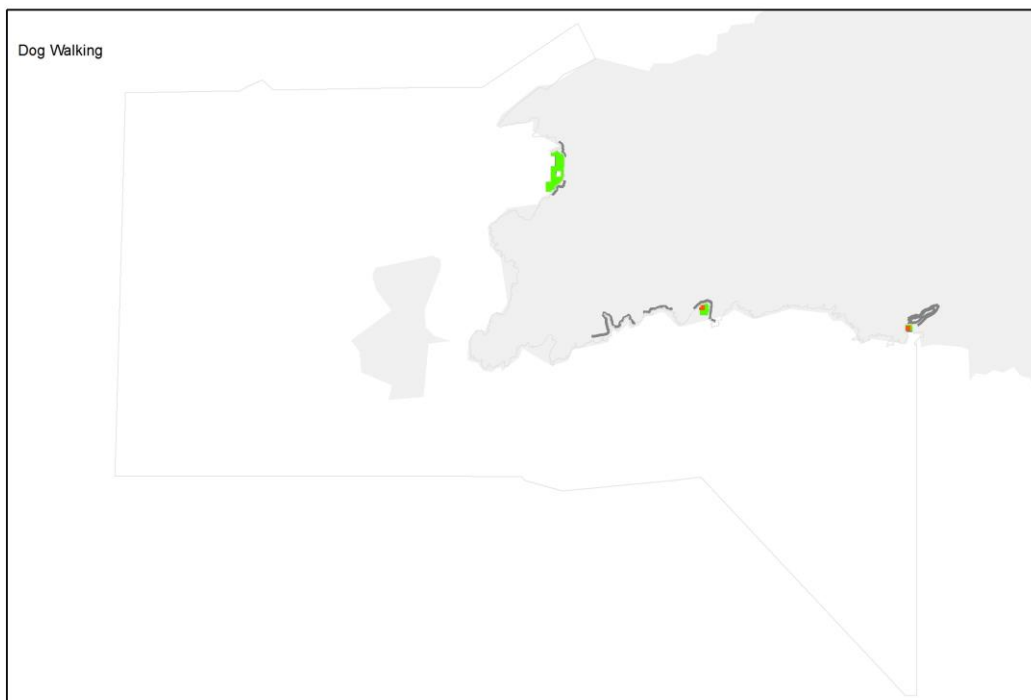
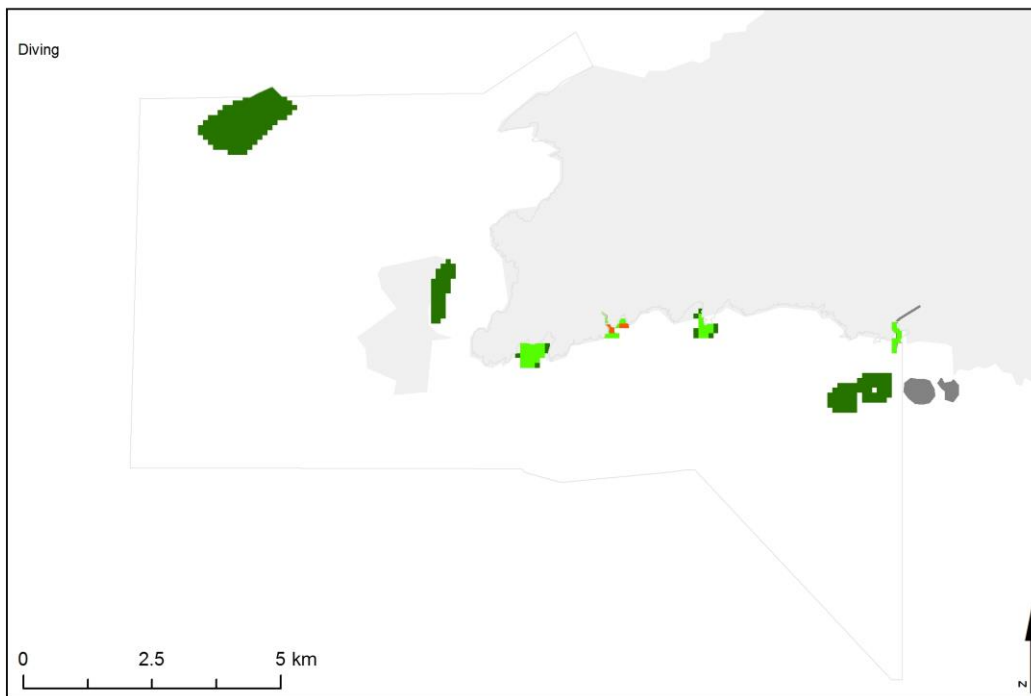
Activity	Participant Days	Total Expenditure (million £)		
		Mean	Lower	Upper
Beach Activities	61,326	2.09	1.53	2.64
Climbing	237	0.00	0.00	0.01
Cruiser Sailing	303	0.01	0.01	0.01
Dinghy Sailing	13,984	0.57	0.32	0.87
Diving	25,356	1.83	1.75	2.36
Dog Walking	13,870	0.04	0.03	0.04
Kayaking	6,832	0.18	0.16	0.20
Power Boating	207	0.01	0.01	0.01
PWC - Jet Ski	484	0.07	0.05	0.09
Rowing	109	0.00	0.00	0.00
Sea Angling	19,167	1.05	0.84	1.30
Walking	54,473	1.25	0.76	1.74
Wildlife Boat Trips	486	0.02	0.02	0.03
Windsurfing	3,506	0.08	0.06	0.11

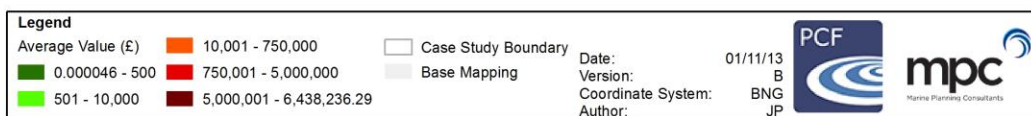
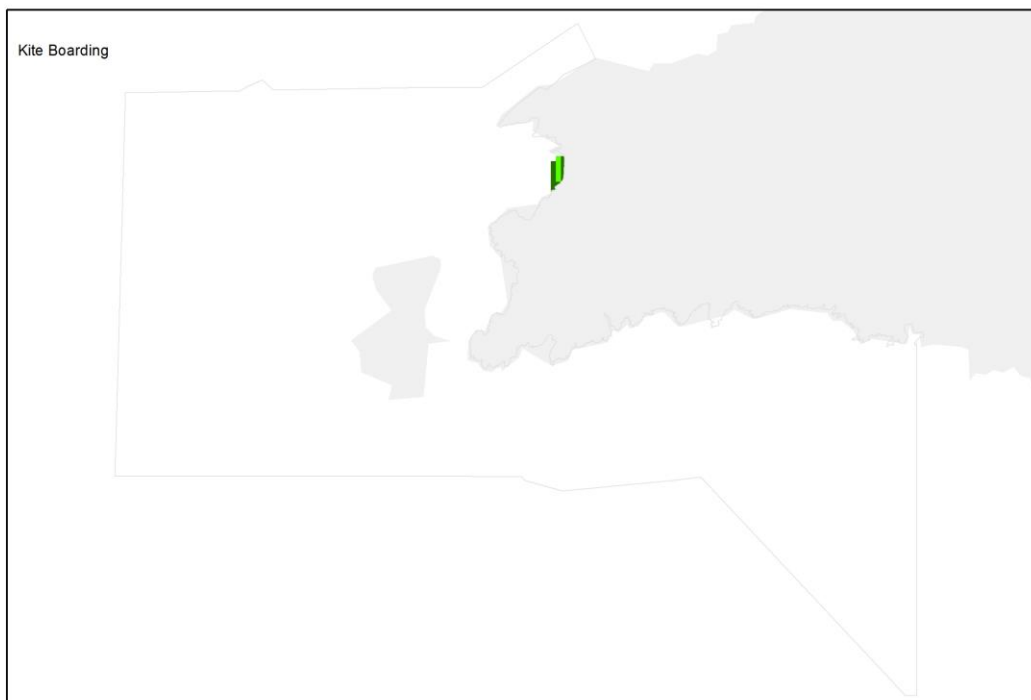
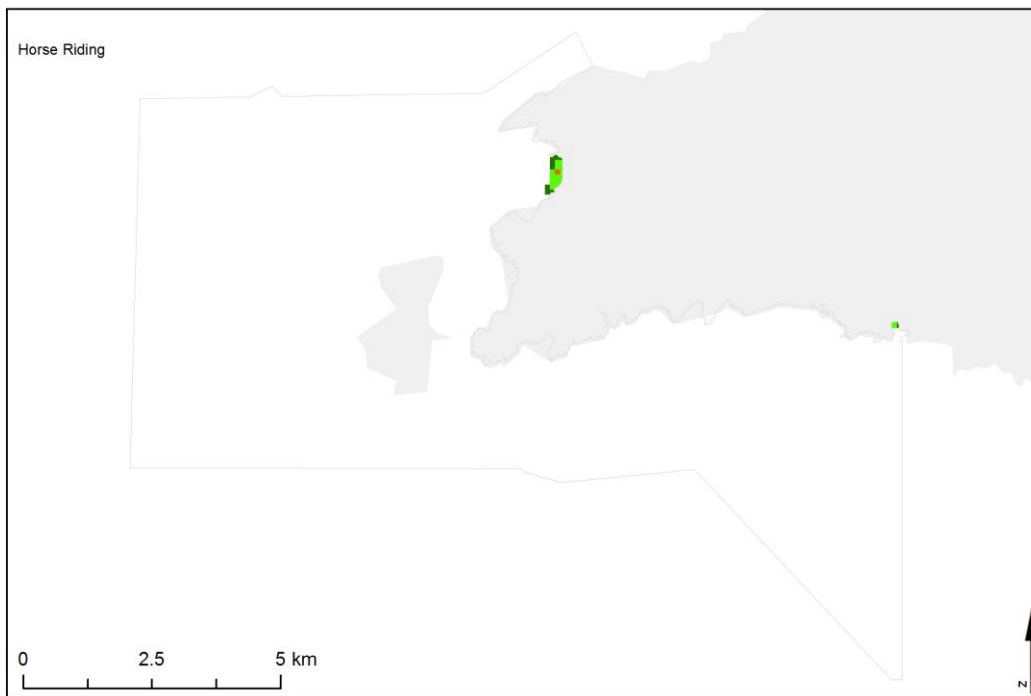
Figure Set F1: Individual activities valuation, St David's

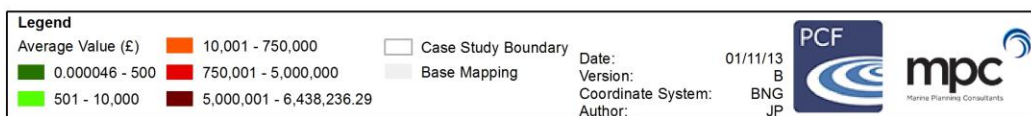
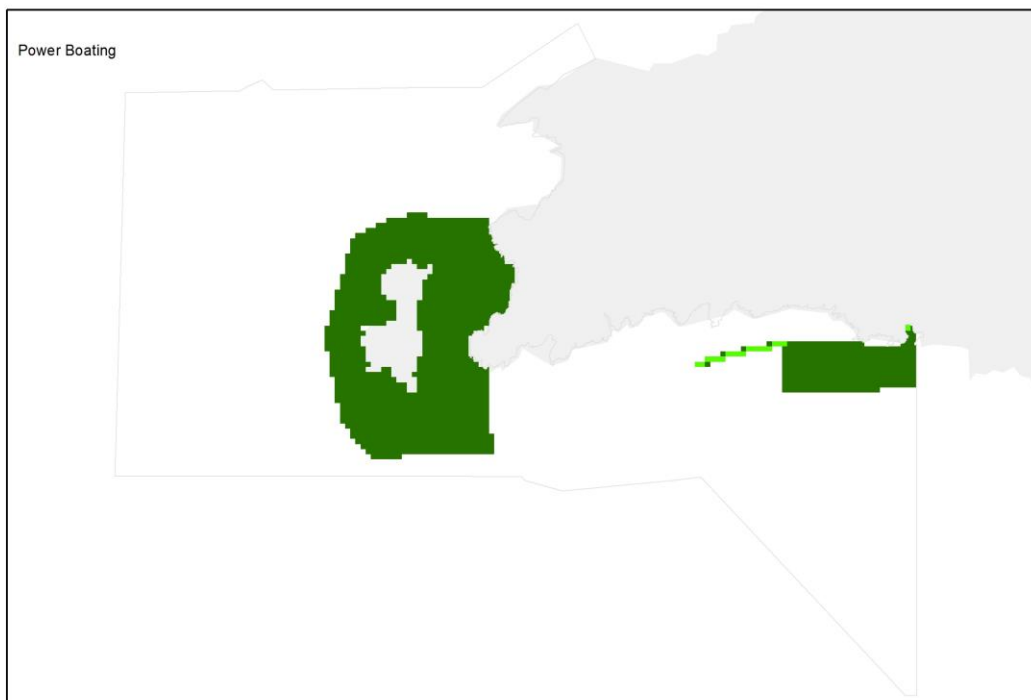
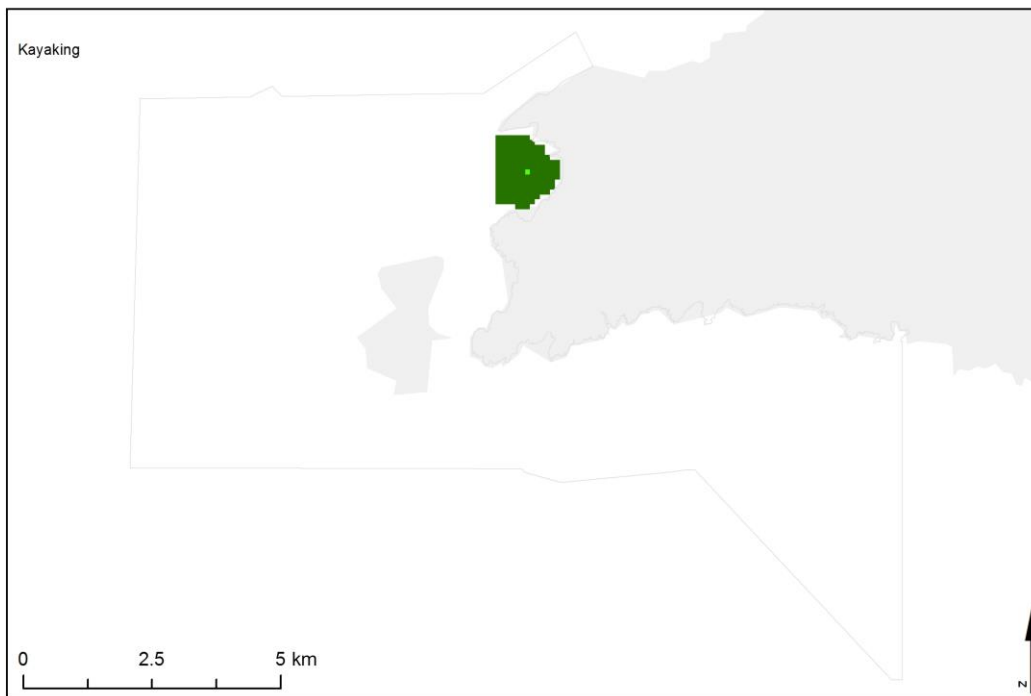


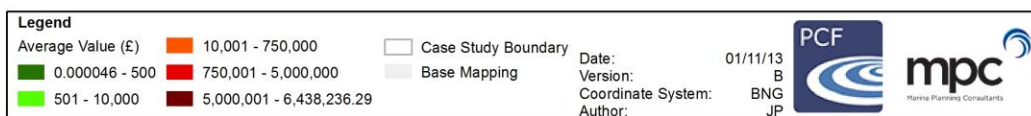
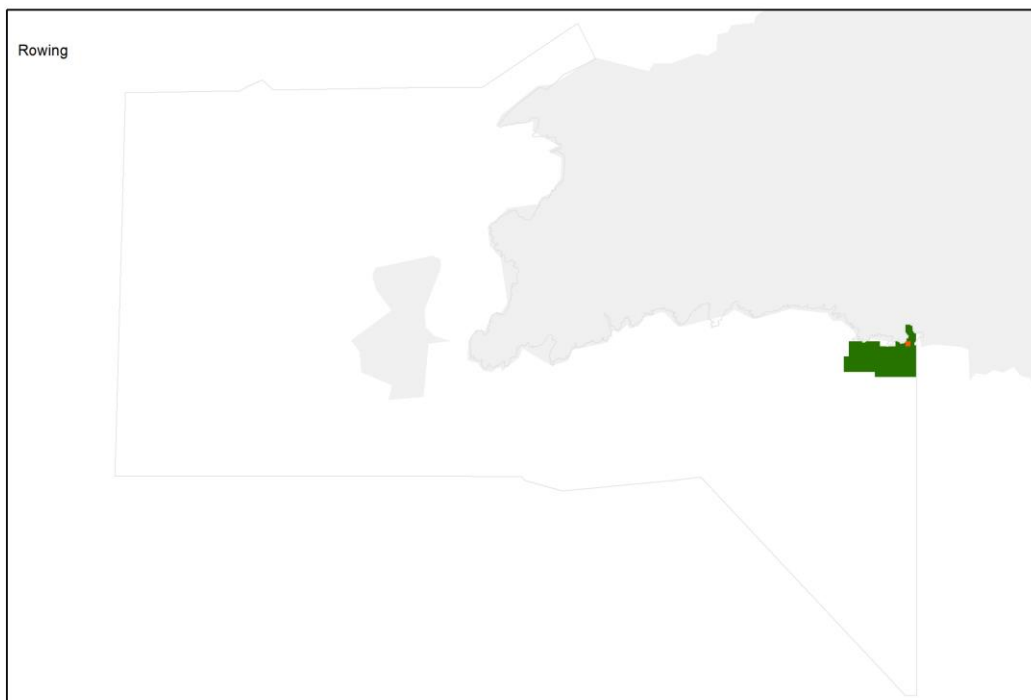
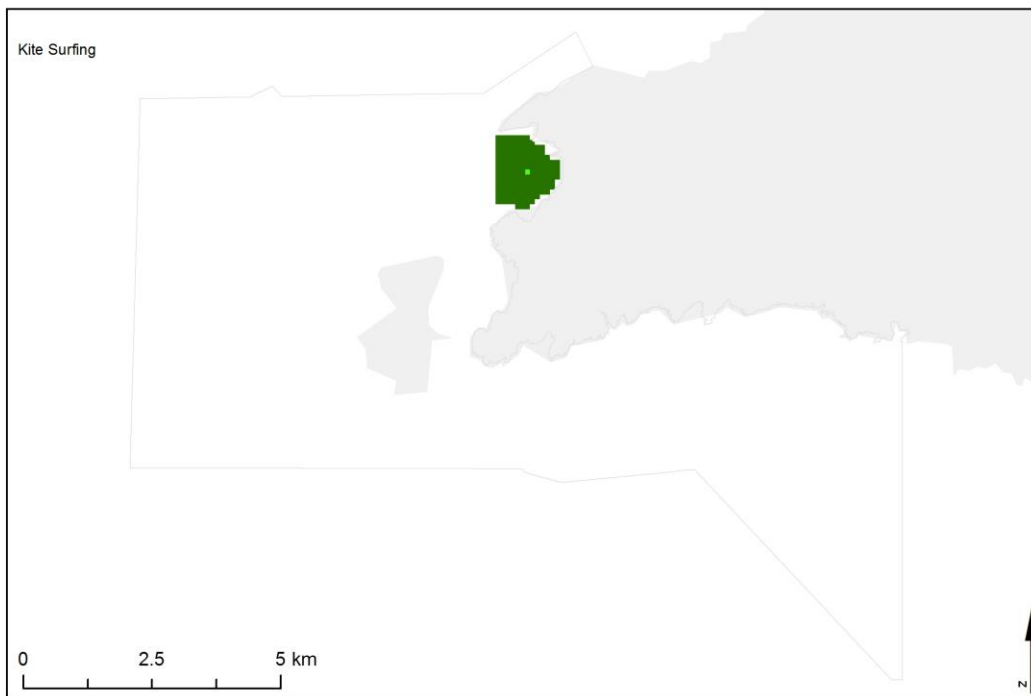


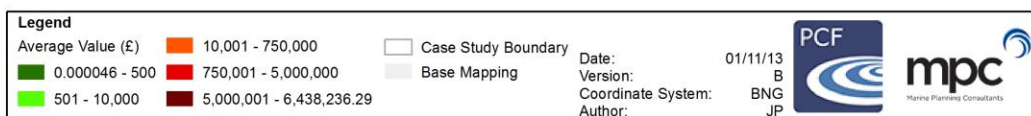
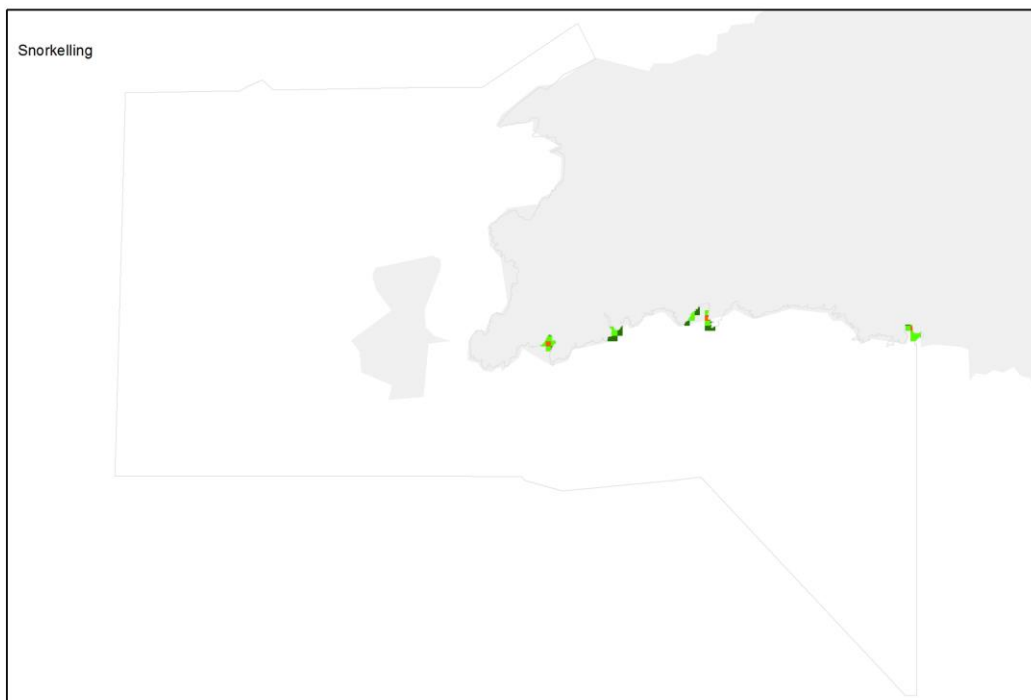
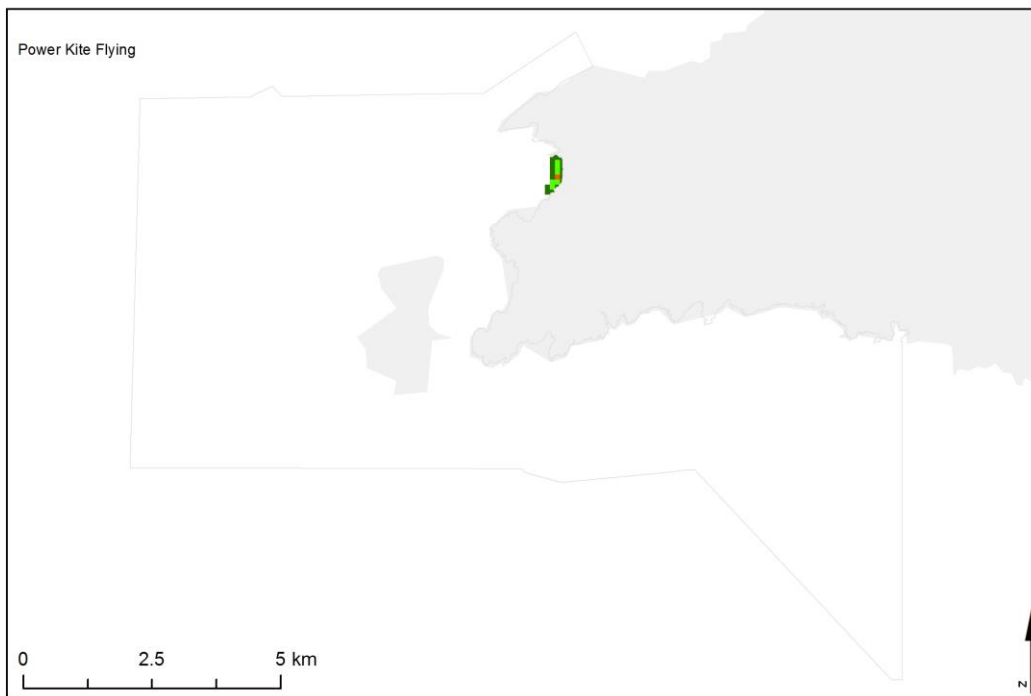


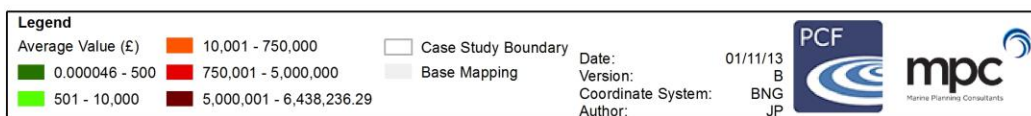
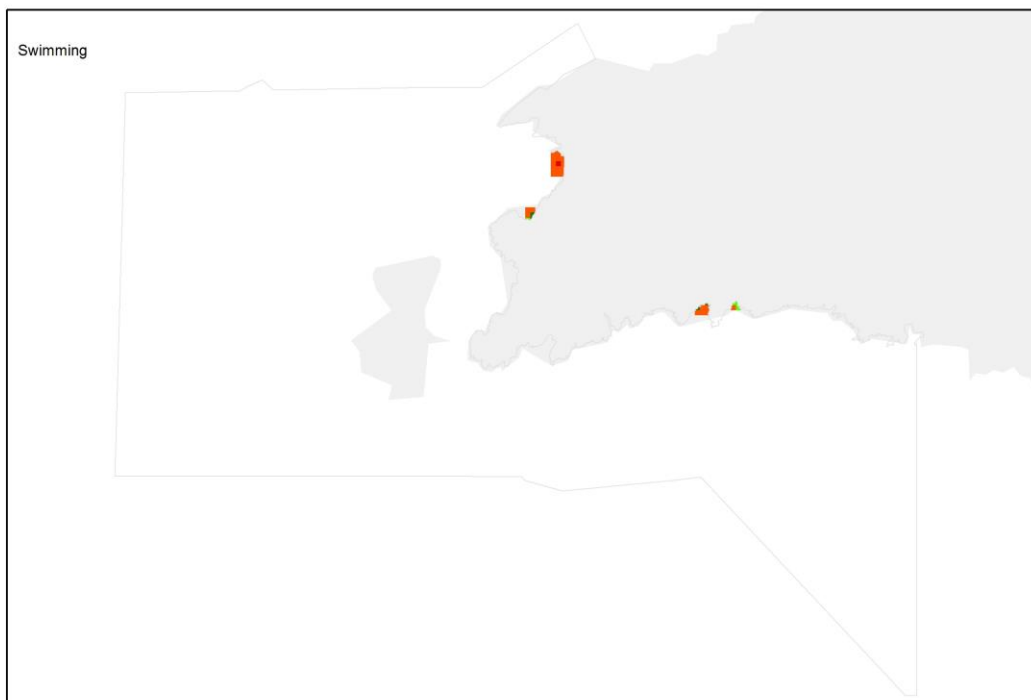
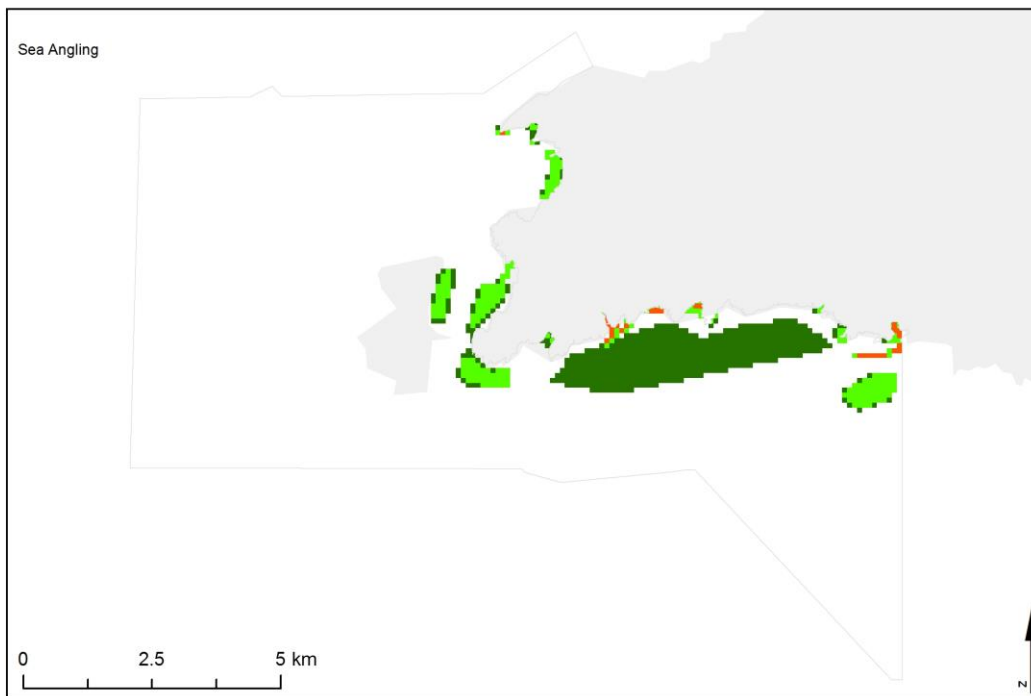


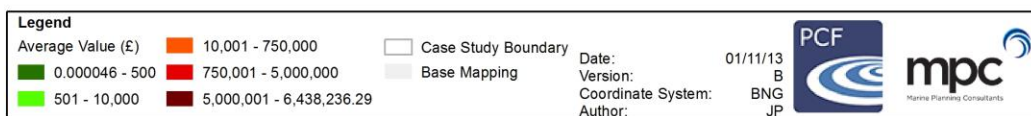
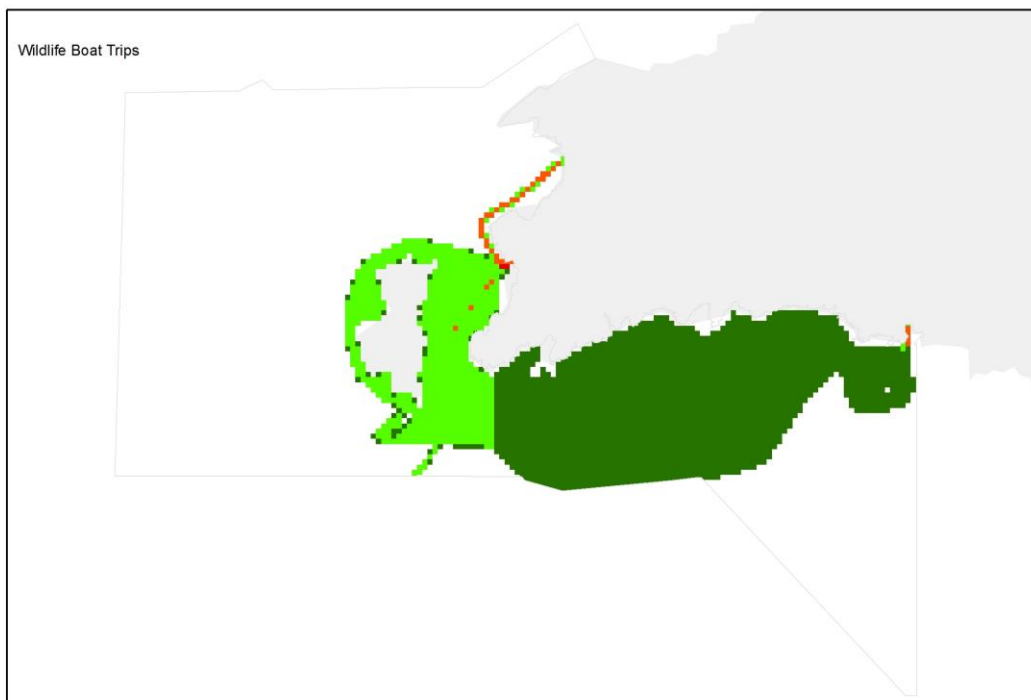
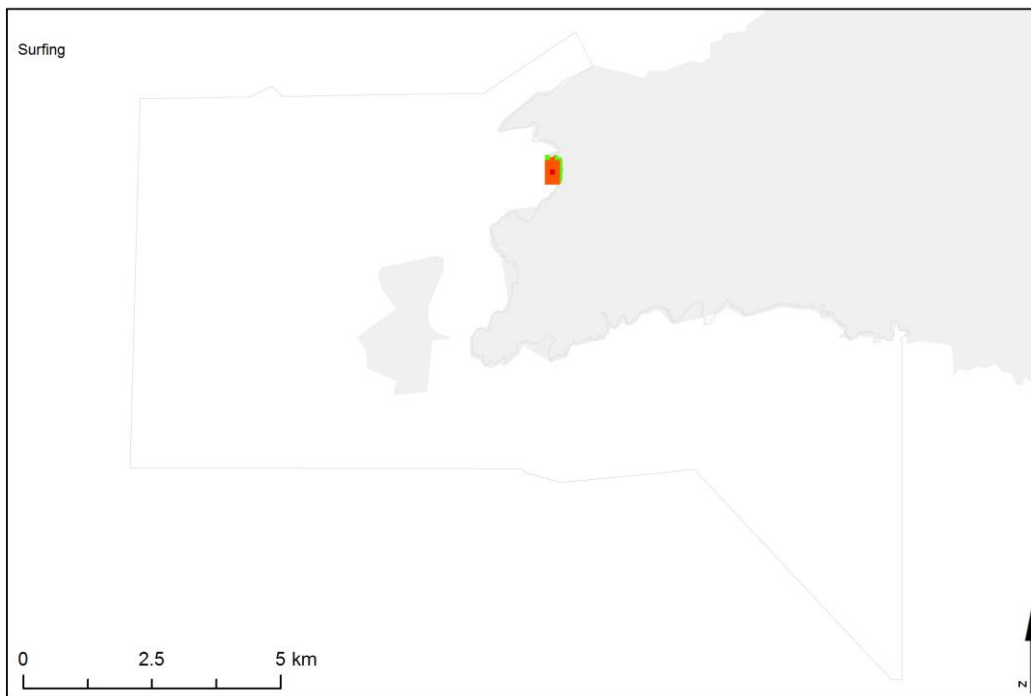


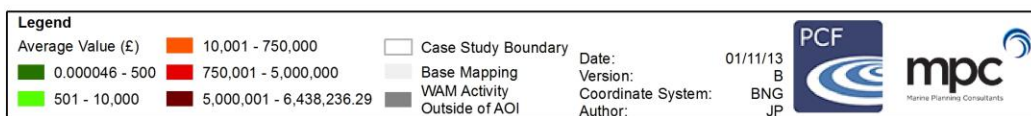
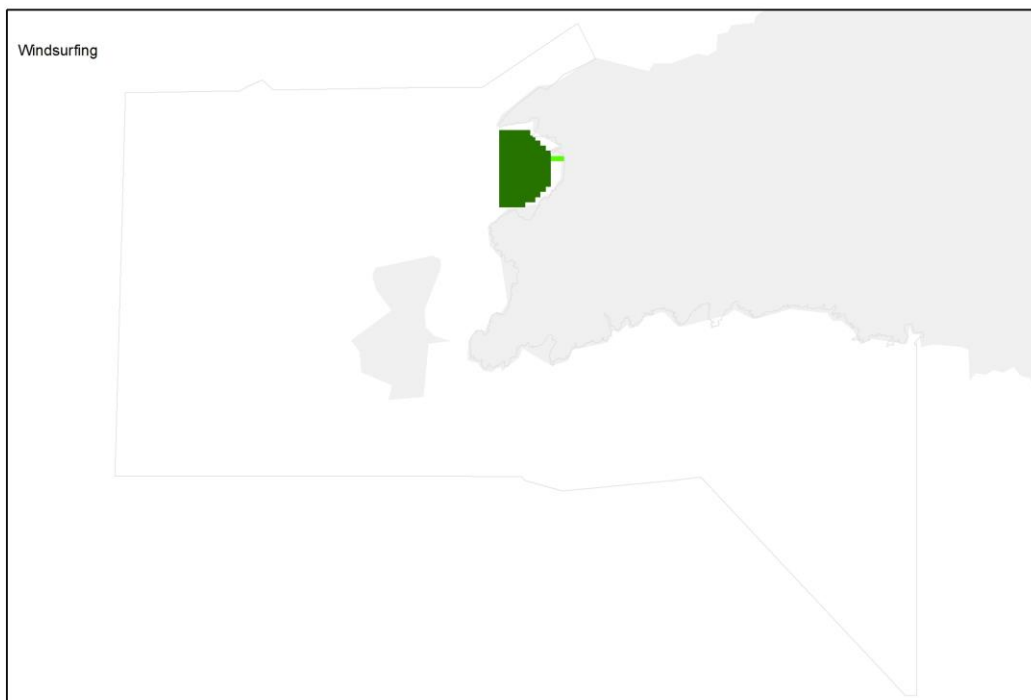
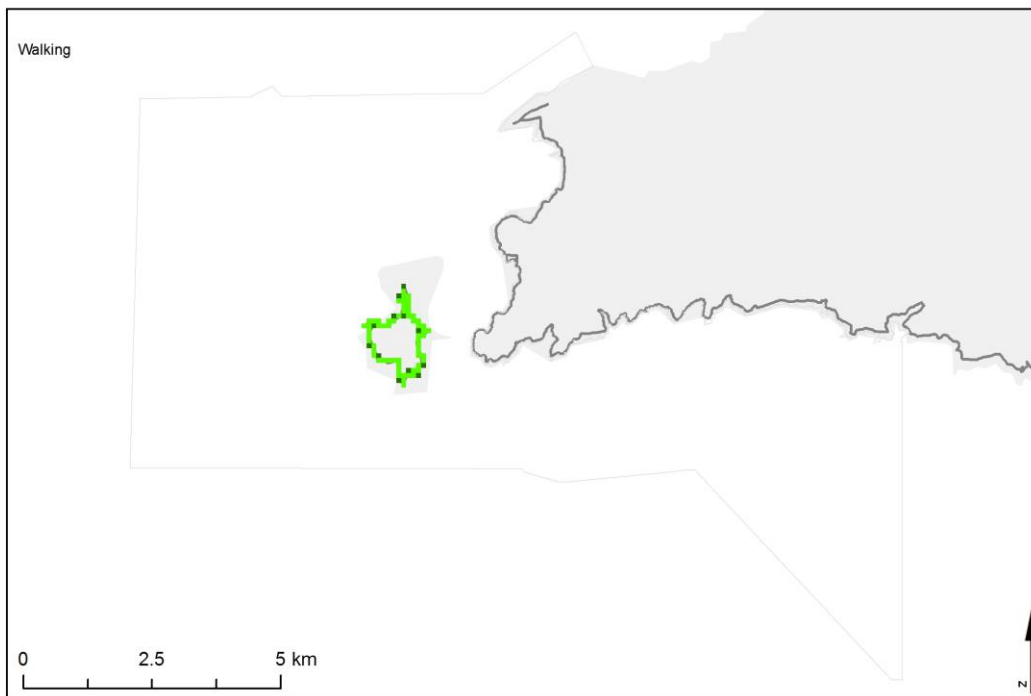












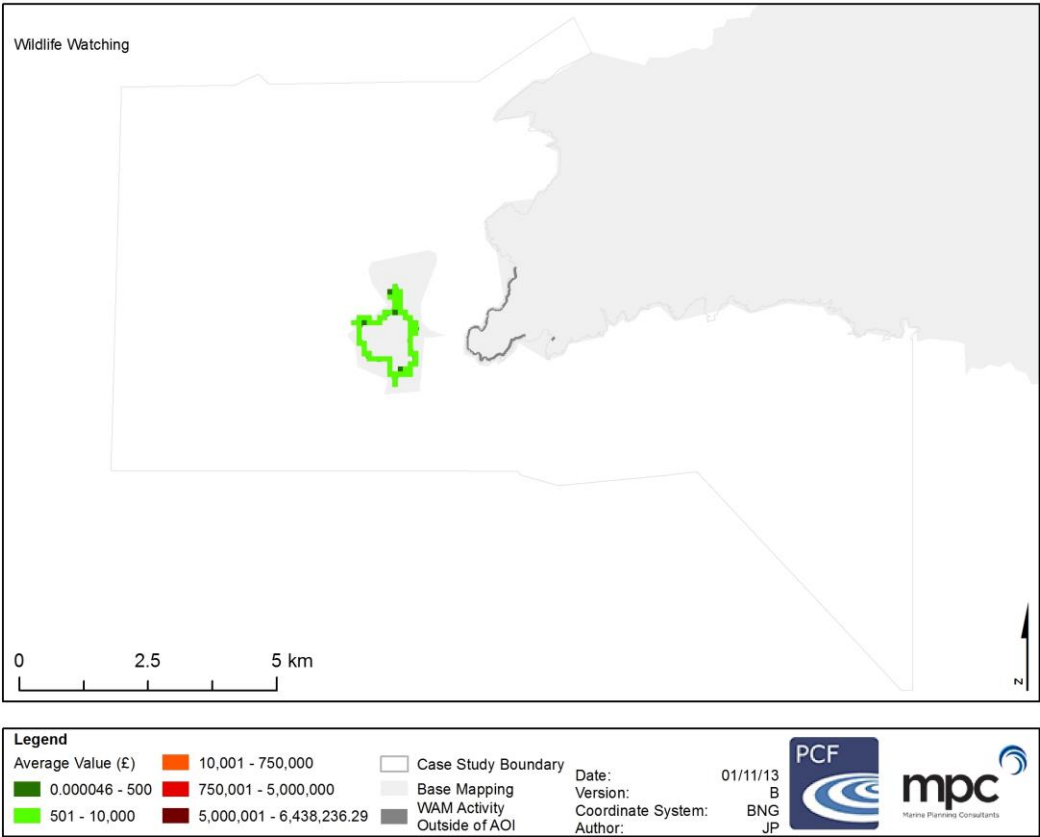
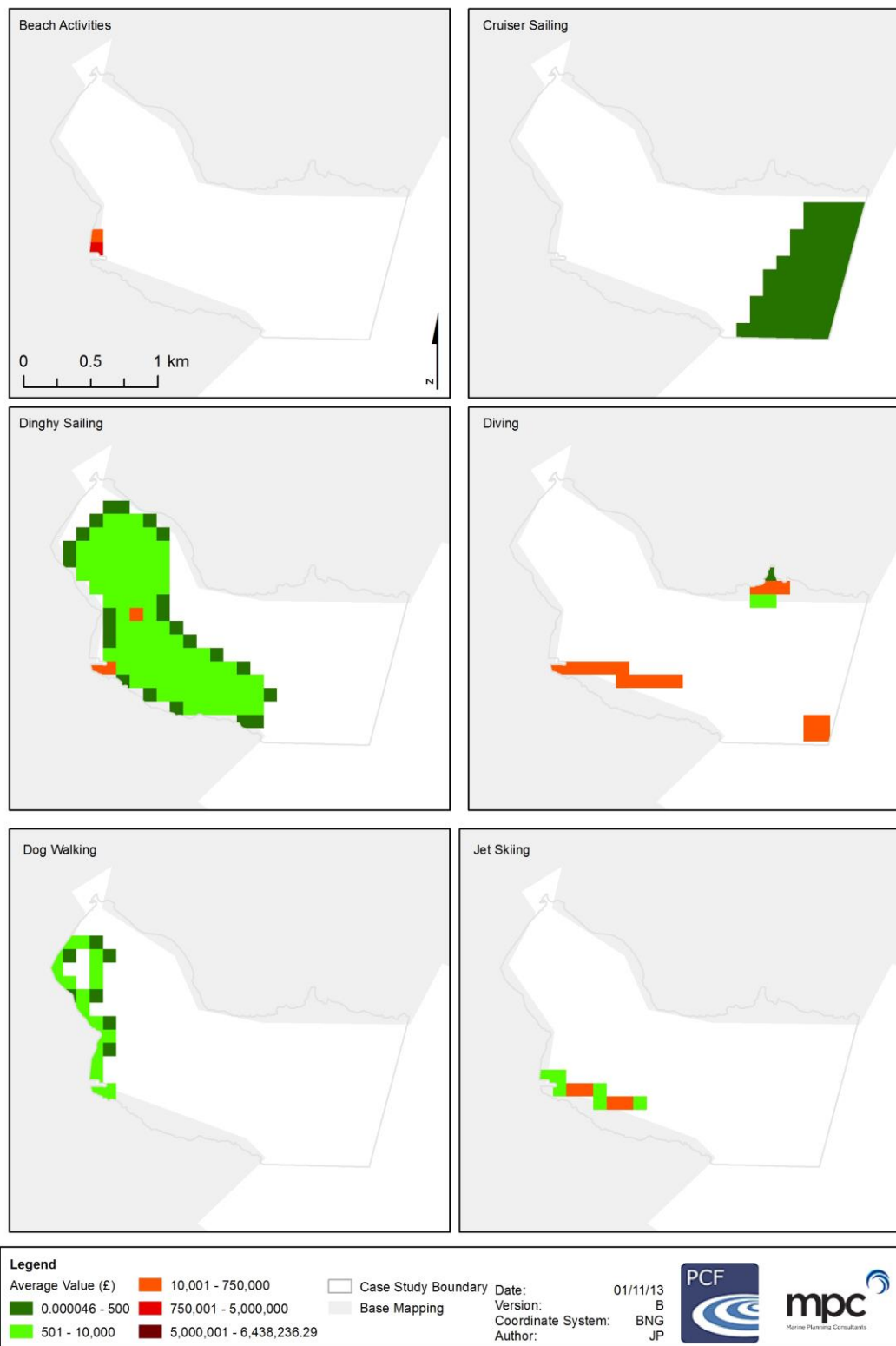
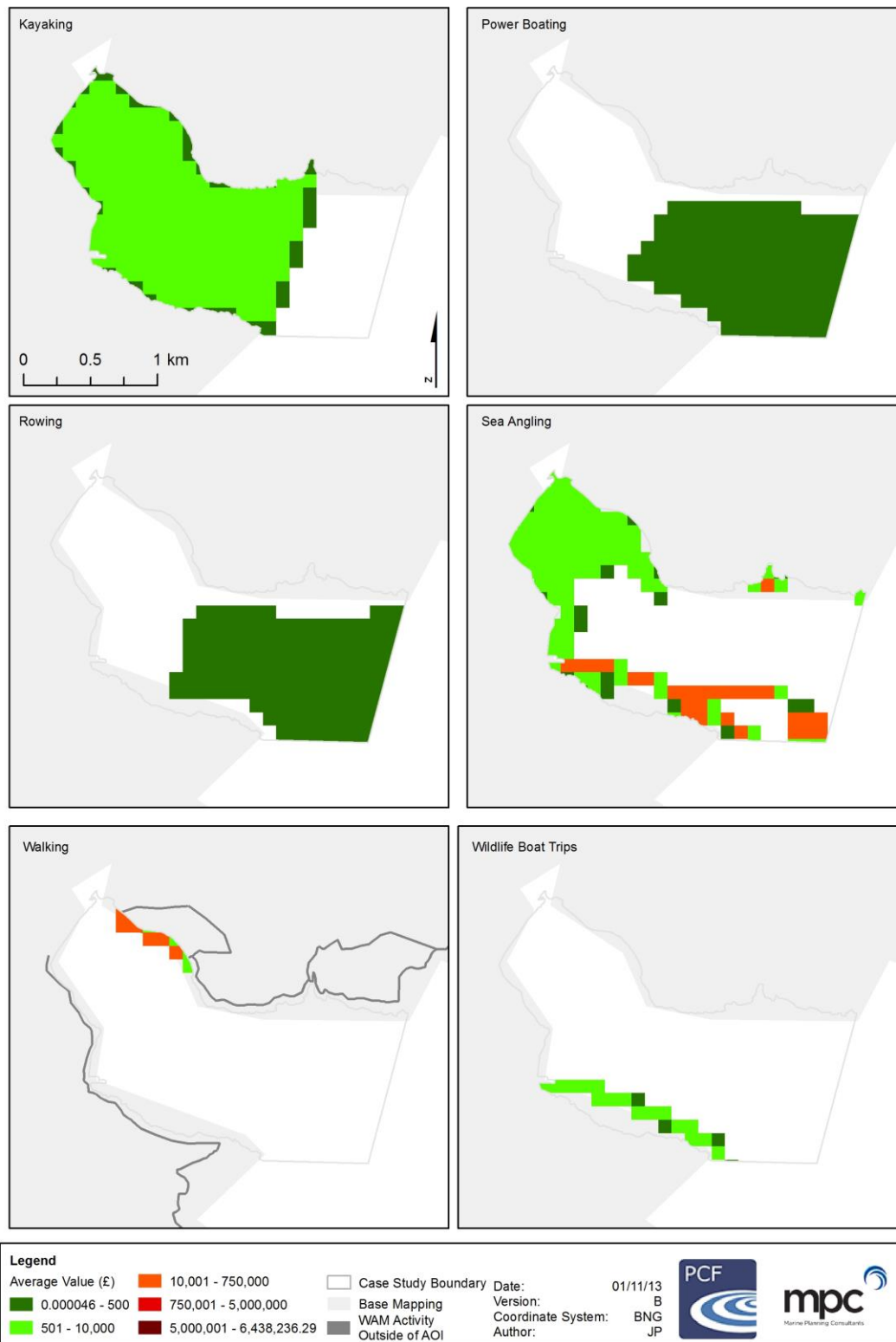


Figure Set F2: Individual activities valuation, Dale





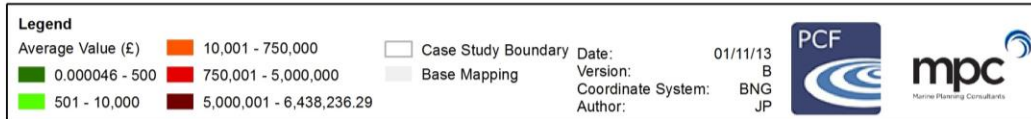
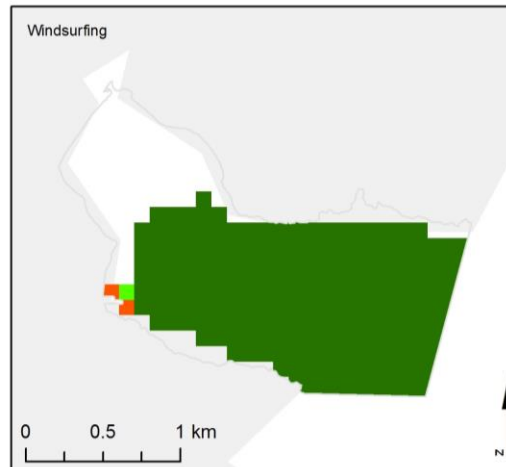
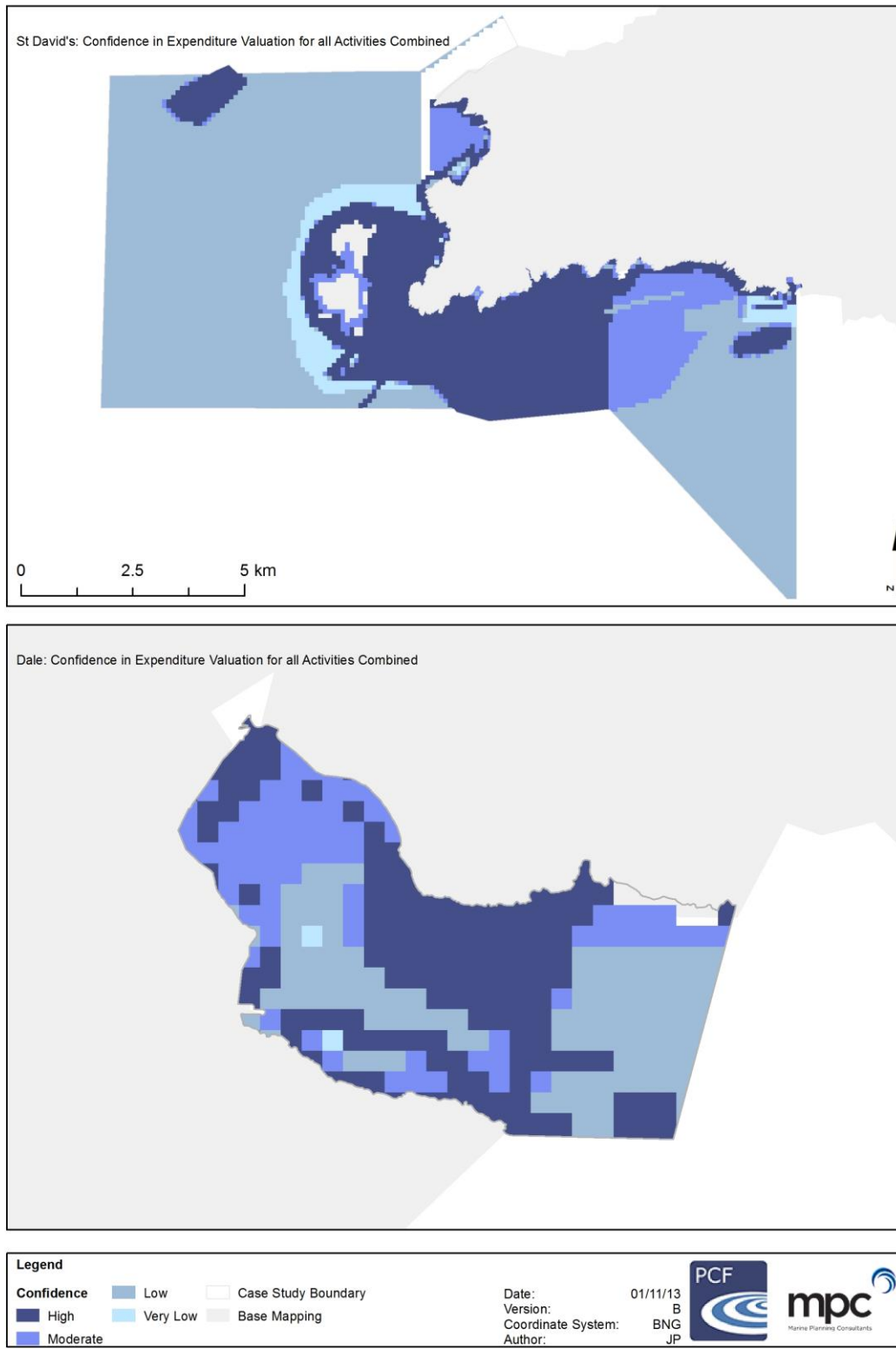


Figure F3: Confidence of combined activities valuation, St David's and Dale



Appendix G. Business Survey

WAM Valuation Project 2013



BUSINESS SURVEY: 1. Overarching Business

1a. General Information

Business / Organisation name

Business location (address)

Name of interviewee

Interviewed by (leave blank if filled in by interviewee alone)

Date

1b. Business Overview

Which of these marine recreation activities does your organisation provide services for? Please delete those not applicable (or if printed out circle those applicable).

beach activities	canoeing/kayaking	coasteering	cruiser sailing	dinghy sailing	diving	dog walking
PWC	power boats	angling	walking	wildlife boat tours	windsurfing	

Does your business provide direct services to these activities (e.g. hire) or indirect (e.g. parking)

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20 February 2013

Your business has been selected for services supplied to the Dale case study area. However if you also supply to St David's case study area then please state here. Refer to worksheets "Figure St David's" and "Figure Dale".

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WAM Valuation Project 2013



BUSINESS SURVEY: 2. Headline business data for financial year April 2011 - March 2012

Please provide data for the full **financial year April 2011 - March 2012**. (If this is not possible then please state below when the data is taken from.)

Financial year period

2a. Revenue & Customers

Annual annual revenue (£)

Annual profit (£)

Annual number of customers

Do you have any comment on the above figures? For example, seasonal variations of these values, how these values were selected and certainty, past / future annual trends.

All business (both inside and outside case study)	Inside case study: Please refer to figure on previous worksheet for the extent of the case study, depicted by a red line boundary.							Outside case study
TOTAL Value	Value within case study*	Where a value is relevant across multiple activities, please name each activity below (overwrite 'Enter activity'), then apportion the value or revenue / profit / customers to each activity as a percentage of the total value within case study* (Sum should =						Value outside case study
		Enter activity	Enter activity	Enter activity	Enter activity	Enter activity	Total (Check)	
£	£	%	%	%	%	%	0%	£
£	£	%	%	%	%	%	0%	£
		%	%	%	%	%	0%	

2b. Number of Employees

Full time employees

Part time employees

Full time seasonal employees

Part time seasonal employees

Voluntary employees

Total (check)

Any comment on above, e.g. seasonal variations

All business	Inside Case Study							Outside
TOTAL Value	Value	Where a value is relevant across multiple activities, please apportion their time to each activity as percentage (Sum should = 100%)						Value
		Enter activity	Enter activity	Enter activity	Enter activity	Enter activity	Total (Check)	
		%	%	%	%	%	0%	
		%	%	%	%	%	0%	
		%	%	%	%	%	0%	
		%	%	%	%	%	0%	
		%	%	%	%	%	0%	
0	0	%	%	%	%	%	0%	0

2c. Wages

Full time wages

Part time wages

Full time seasonal wages

Part time seasonal wages

Total (check)

All business	Inside Case Study							Outside
TOTAL Value	Value	Where a value is relevant across multiple activities, please apportion their time to each activity as percentage (Sum should = 100%)						Value
		Enter activity	Enter activity	Enter activity	Enter activity	Enter activity	Total (Check)	
£	£	%	%	%	%	%	0%	£
£	£	%	%	%	%	%	0%	£
£	£	%	%	%	%	%	0%	£
£	£	%	%	%	%	%	0%	£
£0	£0	%	%	%	%	%	0%	£0

20 February 2013

Any comment on above, e.g. seasonal variations

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WAM Valuation Project 2013

BUSINESS SURVEY: 3. Services Information

Financial year period

Please provide data for the full **financial year April 2011 - March 2012**. (If this is not possible then please state here when the data is taken from.)

The aim of this part of the survey is to separate out each unique service supplied for each unique marine recreation activity type. For example a boarding centre / shop may supply hire and lessons for both surfing and kite surfing. This business would therefore have four unique sets: Surfing hire, Surfing lessons, Kite surfing hire, Kite surfing lessons. By filling each of the boxes in (3a) you will create a unique set. If multiactivity services cannot be split out then simply state the whole suite of activities the service relates to. You may find that once you have got to this part of the survey you prefer to discuss with David Jones (PCF) to aid completion. Please use contact details on the Welcome page.

3a. Scenario

Please type in one of the WAM marine recreation activities selected in worksheet "1 Overarching Business Survey".

Choose one service type, e.g. Equipment (non-vessel) & clothing hire, Purchase of equipment and clothing, Vessel hire, Lessons / training, Vessel transport, Tour & guide, Licenses / permits, Membership or Festival entry tickets. A guide is provided in worksheet "#Services".

Is this service provided by your organisation directly (e.g. hire) or another associated organisations (e.g. parking). (Type direct or indirect.)

Which part of the case study area do participants use for this service? Please refer to the WAM mapping on <http://rawg.no-ip.org/>. Here you can select an activity type then view the areas it takes place. Please refer to these areas.

Service / Activity type 1	Service / Activity type 2	Service / Activity type 3	Service / Activity type 4

3b. Cost

What is the average payment for this service per person throughout year (for use within part of / all of a day)?

Is there any seasonal variation to the above, if so can you specify how (cost / time / peak season etc)?

What is the confidence in cost (high, medium, low)? This will depend on how you have arrived at the figure.

Please can you justify this level of confidence, i.e. reason for selected confidence level - ?

What is the annual revenue for this service?

3c. Participant Numbers

How many people buy this service each year from your company?

Is there any seasonal variations to the above, if so can you specify how (cost / time / peak season etc)?

What activity area of the case study do participants use this service? Refer to figures.

What is the confidence tag in the value chosen (high, medium, low)?

3d. Additional Notes on Associated Travel and Accommodation - OPTIONAL (i.e. NOT ESSENTIAL)

What percentage of users of this activity / location stay overnight for a given day's activity? Are there any seasonal variations to this?

What percentage of participants travel from 1) local nearby villages, b) wider Pembroekshire, c) Wales or d) elsewhere?

What are the critical factors for this activity, i.e. not operated by the business but crucial to enable the activity to occur, e.g. Slipways - ?

How are individual activity areas linked together for an individual activity (e.g. access route and main activity area)?

Has the business witnessed any trends or competitiveness i.e. increasing/decreasing; tighter margins, etc - ?

Could you continue to offer this service in absence of the case study activity area? Are there suitable alternative locations outside of the case study (suitable in terms of quality of environment to provide activity and location)?

What are the main risks and fears for future of the activity e.g. environmental degradation, restrictive legislation of activity (e.g. MCZs), competition, local capacity/room for growth/overcrowding, changing consumer preferences
