Natural England Commissioned Report NECR344

Financial Mapping in the North Devon Landscape Pioneer

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Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

This project was initiated at the beginning of the North Devon Landscape Pioneer in early 2017. The Pioneer was one of four partnership initiatives, tasked by Defra to explore new approaches set out in the 25 Year Environment Plan (HM Government 2018). The Pioneers had four aims:

a. Explore tools, analysis and trial applying a natural capital approach in practice
b. Demonstrate a joined-up, integrated approach to planning and delivery
c. Develop new funding opportunities for the environment
d. Grow our understanding of 'what works', sharing lessons and best practice

This project aimed to provide an understanding of the quantity and spatial distribution of investment used to manage natural capital within the Pioneer boundary, to progress thinking across all four aims. Pioneer partner organisations provided their natural capital investment data, for investments within the Pioneer boundary. This was analysed to provide a partnership-wide overview of how much was invested in natural capital management, where, within which broad natural asset type and how much investment was spent collaboratively amongst partners.

A heat map was produced to show variation of investment across the landscape. As well as analysis of investment, the report also sets out a number of recommendations to improve the method used for others to learn from and repeat in their own place.

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Further information
This report can be downloaded from the Natural England Access to Evidence Catalogue: **http://publications.naturalengland.org.uk/** . For information on Natural England publications contact the Natural England Enquiry Service on 0300 060 3900 or e-mail **enquiries@naturalengland.org.uk**.

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SUMMARY

This project aimed to support implementation of the natural capital approach within the North Devon Landscape Pioneer, by providing an understanding of the quantity and spatial distribution of the resources used to manage natural capital within the Pioneer boundary (or 'Pioneer area' which corresponds to the North Devon Biosphere Reserve). Currently the Biosphere has a well-developed understanding of its natural assets, their ecosystem benefits, and a draft vision for their management. Understanding of how resources are spent collectively across the environment sector to manage the natural capital of the Biosphere is less well developed.

This project applied an innovative method in analysing the spatial distribution of 'natural capital' (or broad environment-related) spending in the North Devon Pioneer area. Most organisations engaged positively with this project and there was considerable buy-in to the project aims. There was a wide spread recognition that an understanding of the pattern of expenditures in the area is key to the future targeting of investment and for improving efficiency.

Given the short timescale of the project (approximately three months) the approach was to produce a high level estimate of resources and expenditure along with a spatial view of that spend. Data was gathered through engagement with the main organisations managing natural capital assets within the North Devon Pioneer Area through the stakeholder network of the Biosphere Reserve. Caution should be exercised in analysing the data and interpreting the results too precisely, as the data used was dependent on submissions from these stakeholders, was not audited, and there are likely some unknown gaps - the extent of potential omissions has not been assessed.

An in-person launch meeting helped initiate the project by:

- Promoting dialogue and common commitment to the project aims across invited local stakeholders from government agencies, local authorities, private businesses and NGOs (eight organisations represented).
- Discuss the most feasible and useful mapping of resource use that could be established within the project timescale.
- Establish stakeholders' strong common interest in attracting investment and targeting it more effectively within the Biosphere.
- Generating a general understanding of the need for greater efficiency and the inevitable drive for value for money.
- Resolve confidentiality concerns within the stakeholder group, facilitating progress with data collection.

Requests for data were sent to a wide range of organisations (20 in total) with the majority (13) providing workable cost data. For the few key organisations that did not respond in time, the project team used publically available data to estimate expenditure wherever possible.

Findings

The broad approach in this project to collate data on the amount and location of expenditures on natural capital has proved feasible. A process lasting around three months has been able to identify £53 million per year of total expenditure. Rather than identifying this expenditure specifically as money used to support or improve natural capital, this amount should be interpreted as a measure of the resources that society chooses to spend on managing the natural environment (or natural capital). The project included broad environment-related spending. It did not evaluate the effect of

spending on the environment, whether positive or negative. Although in many cases data is available to analyse this question, it was outside the scope of the project.

There was a wide variation in the levels of expenditure with four organisations representing 90% of the total expenditure, the largest of which was the Pillar 1 Basic Payment Scheme (BPS) being almost half the overall total. The next most significant items of expenditure were the water company's water treatment costs, Natural England's Environmental Stewardship (agri-environment) payments and Environment Agency's Flood and Coastal Erosion Risk Management (FCERM) projects. The remaining organisations spent around £1 million per year or less, and many of these expenditures were in collaborations between organisations.

It is important to interpret this spending in the context of:

- Other public expenditures in the area - £53m represents just 3% of the total, and is dwarfed by social care and education spending, and
- The benefits provided by natural capital in the area – a rapid analysis of such benefits shows natural capital supporting visitor expenditure of around £450m/yr, value added in agriculture of around £120m/yr in North Devon, and other services (such as water supplies and supporting healthy lifestyles) that are of considerable benefit to society.

Using a variety of different assumptions and mapping approaches, more than 85% of the spending analysed was possible to link to a spatial location. An accurate spatial location of expenditure was possible for 12 organisations, this represented 37% of total spend (or £19.7 million). If more time and resource were available to map Rural Payments Agency (RPA) BPS payments more precisely, this figure could rise to around 90%. However, as BPS is distributed across the majority of land in the area at a flat rate (around 75% of the area is enclosed farmland), this would not change the pattern in the heatmap significantly. Mapping was undertaken at a 1km cell level for the purpose of analysis. However, for reasons of confidentiality, data is presented in 5km square cell maps as shown in the heatmap of spending in Figure S1.

Analysis of the spatial distribution of expenditures per 1km cell and other spatial data identified that:

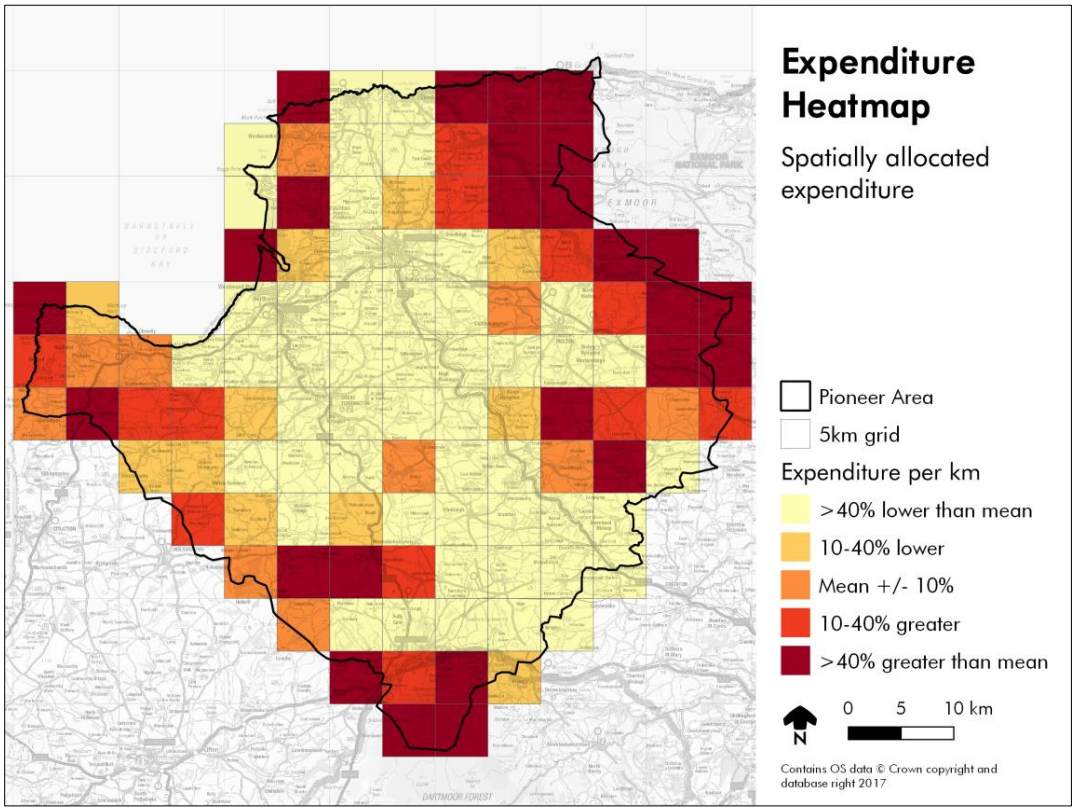
- For the £19.7m of expenditure that was mapped in detail to a spatial area, the spending per cell has uneven distribution – skewed towards a small number of grids that receive a disproportionately high spend. This is shown by mean spending per km^2 being £7,768 per year, while the median was £2,170 per year. In fact, just over 6% of the 1km cells receive more than £50,000/yr and account for 48% (£9.45m) of the spending mapped in detail. However, this only applies to 37% of spending analysed in this project so may not be applicable to all spending across the Pioneer area.
- Using the dominant broad habitat type, as defined by the Natural Capital Committee,[1] shows the highest spending is in urban areas – with average spend more than double that for other habitats. This is likely to be due to certain spending types (water company treatment works and flood risk management spending) being closely associated with settlements. Allocated on average across the whole area, the RPA BPS spending would be a further £10,000 per km^2 on average and will be concentrated in the approximately 88% of cells where the dominant habitat is lowland agricultural use. If RPA BPS spending was included in the analysis, urban

[1] The NCC use the eight Broad Habitat types from the UK National Ecosystem Assessment (2011) as land-use categories but recognise that some of these categories may need disaggregating into 'component habitats' for analytical purposes. These are: Arable/horticulture; Blanket bog; Broadleaved, mixed and yew woodland; Built up areas and gardens; Coniferous woodland; Improved grassland; Intertidal rock; Intertidal sediment; Mountains, Moorlands and Upland Heaths (including inland rock and montane habitats); Saltmarsh; Semi-natural grassland (including acid grassland and rough low productivity grassland); Transitional and coastal waters.

would still have the highest average spend, but the difference to some other habitats would be significantly lower.

- Across the 25 Devon Character Areas present in the Pioneer area boundary, as identified in the Devon Landscape Character Assessment[2], there was only moderate variation in spending (again excluding the BPS). A minority (23%) of the land within the Pioneer area boundary is part of designated landscapes (the North Devon Coast AONB and the Exmoor and Dartmoor National Parks). Spending in 1km cells in these landscapes was 50% higher than the average.
- Approximately one fifth of 1km cells contained some area that is designated as SSSI. The average spending in these cells was £11,494 per km^2 per year – approximately 50% above the average. A broader measure of biodiversity is the presence of habitats that are in the Natural England priority habitat inventory[3]. The vast majority of 1km cells have a small proportion (less than 10%) that is a priority habitat, and for these cells, the proportion of priority habitat made no difference to the level of expenditure. In 30% of 1km cells where the proportion of priority habitat was over 20%, spending levels rise significantly to over £10,000 per km^2.

Figure S1: Spatially Allocated Spend (excluding BPS spending)



Finally, the project was considered beneficial in stimulating dialogue, collaboration and trust amongst the stakeholders involved over how resources are used to manage natural capital including green infrastructure and land use planning more widely. The overall process relied on the environmental management functions in an organisation engaging with their finance and management information functions. Closer internal relationships between organisational functions are a key enabler of the effective use of resources (i.e. achieving value for money) in the management of natural capital.

[2] https://new.devon.gov.uk/planning/planning-policies/landscape/devons-landscape-character-assessment

[3] See: https://data.gov.uk/dataset/priority-habitat-inventory-england2

Integrating spatial data into financial systems in the environment sector could lead to major improvements in understanding how society uses its resources to manage the environment. These improvements would result from facilitating spatial analysis of spend, and making this data available to a wider number of professionals. This in turn could lead to considerable efficiencies in expenditures, for example making identification of spending gaps and overlaps a simpler process for organisations with the sector.

Gaps and Recommendations

The main gaps in the data gathered for this project were:

- **Private farm spending** was considered to be the most important gap - due to its potentially significant scale, and because, excluding farming spending risks alienating farmers by failing to recognise their positive environmental management. However, it would be important to carefully account for farm spending, as farmers do receive agri-environment payments, which have been included in this study.
- **Public sector overheads and central services** in the Defra family – this could be efficiently tackled centrally/nationally.
- **Volunteer time and effort** (particularly from the NGOs).
- **Private sector expenditure**, other than by water companies, is a potentially significant unknown in this area.

Finally, while outside the scope of the study, further work could consider the relationship between expenditure and other ways resources are used to manage the environment, such as tax exemptions (e.g. the lower tax rate on red diesel), and the costs of complying with regulations.

Recommendations based on this project's work are that:

- For a project of this nature, which requires a deep understanding of the key aims and concepts and local knowledge, and commitment and cooperation by stakeholders, a launch meeting of all stakeholders is essential. This face to face meeting can secure buy-in, identify the key organisations and individuals within them to provide data, and address uneasiness about the purpose of a financial mapping exercise and use of confidential data (fears that the project could be a blunt instrument to cut funding).
- A great deal of useful and relevant information can be obtained in a short space of time if direct contact is made with the right individuals within an organisation. This is particularly the case with the larger organisations (esp. public sector).
- A narrow definition of 'spending on natural capital' is difficult to provide, and can be too difficult to link to financial classifications. A broad interpretation can be used, allowing consideration of the linkages between the organisations' activities and environmental outcomes. The use of a variety of examples may assist organisations to think more broadly about the activities that use or have an impact on natural capital. It was seen as better to collate the data and then potentially remove it from analysis, rather than not gather the data at all and potentially influence the results due to such omissions.
- It is easier to map resources to the location at which they are spent, rather than where expenditure influences natural capital, or where the benefits are realised.
- Caution should be exercised in analysis at a fine level of detail as the data gathered is not audited, and there are likely some unknown gaps. Therefore to generate more detailed analysis, additional resources would be needed not only for that analysis, but also to quality-assure the data obtained. This could gather greater detail, for example to analyse the location of expenditures in different spending streams, rather than just by organisation. It

could also consider where the benefits of spending are realised (which can be different to the location of spending examined in this study).

- The results from this analysis could help with objectives to engage other public bodies and businesses (outside the environment sector) and the public, on the state of the natural environment, and the way resources are used to manage it.
- It is clear from the process that financial data and spatial data is rarely fully integrated and that a flexible and adaptive approach is needed for mapping expenditure data spatially. A change in culture within organisations in the environment sector is needed to systematically bring financial management and environmental delivery data together to enable automatic spatial tagging of expenditure where relevant. This can make use of relatively new IT and GIS capabilities.

1 INTRODUCTION

This is the Final Report of the project on '*Financial Mapping in the North Devon Pioneer*' to establish an understanding of the amount and spatial distribution of the resources used to manage natural capital within the North Devon Landscape Pioneer boundary. This was an input to the first year of work in the Pioneer. The report supports consideration of how different organisations use resources for natural capital management.

The remainder of this report is structured as follows:

- Section 2: presents an outline of the approach.
- Section 3: sets out the results from the data collection and analysis.
- Section 4: provides discussion, conclusions and recommendations.

Annex 1 shows the data request sent to project partners. A confidential annex of data and maps for each organisation's expenditure has been provided to Natural England.

2 APPROACH

The project was designed to support implementation of the natural capital approach within the North Devon Biosphere, in its role as a Natural Capital Pioneer. The Biosphere has a well-developed understanding of its environmental assets (including their spatial distribution), the benefits people obtain from ecosystem services, and a draft vision for their management. Understanding of how resources are spent collectively across the environment sector, broadly defined, to manage the Biosphere, is less well developed.

The approach to managing the Biosphere remains adaptable, to respond to new evidence developed through the Pioneer. This report is innovative in trying to bring together headline figures for natural capital spending and to disaggregate spending data spatially across the Biosphere. It has potential to inform the way the area's different spatial management boundaries, and spending and policy instruments, are used to achieve environmental objectives in future. The data layers containing the results of the spatial analysis are provided for further analysis by Natural England in agreement with the project partners.

It should be noted that, given the short timescale of the project (approximately three months) the approach was to produce a high level estimate of resources and expenditure along with a spatial view of that spend. Data was gathered through engagement with the main organisations managing natural capital assets within the Pioneer area through the stakeholder network of the Biosphere Reserve. Caution should be exercised in analysing the data and interpreting the results too precisely, as the data used was dependent on submissions from these stakeholders, was not audited, and there are likely some unknown gaps.

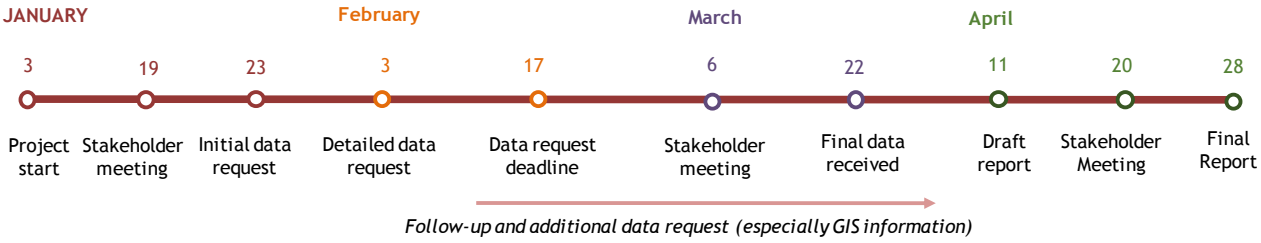
2.1 Overview

The project ran from 3rd January to 27th March 2017, covering three stages of work:

1. **Scoping stage:** understanding the data availability and feasibility of the study;
2. **Main stage:** compiling the data and reporting the results; and
3. **Final stage:** communicating the results.

Figure 2.1 outlines the key milestones at each stage.

Figure 2.1: Project timeline



The scoping stage aimed to gain understanding of two important factors: the availability of spatially-explicit natural capital spending data; and the technical feasibility of the project. An initial meeting with stakeholders on 19th January 2017 was useful in assessing these two factors:

- Data availability – After clarifying the scope of this project and the types of resources/costs to be included, feedback indicated that resource and financial expenditure data would be readily available; either for the Pioneer area itself or for a relevant local area from which related expenditure could be estimated.

- Technical Feasibility - Assessment indicated that this project was feasible, but that given the short time scale the level of information was not expected to be highly detailed, (particularly on GIS information). It was recognised that some methods for apportioning expenditure to the Pioneer area may need to be based on assumptions and approximations. This was considered be acceptable to meet the objectives of the project to gain at least a broad understanding of expenditure across the North Devon Pioneer. There was also some discussion on the methodology for attributing expenditure spatially, which is described in Section 2.5.

The main project work involved the collection, analysis and collation of data, which is described in the following Sections. As part of this work, a number of other important aspects of the project were:

- To ensure buy-in by stakeholders within the North Devon Landscape Pioneer area;

- Develop a matrix with the different aspects and features of natural capital spending to be captured within the Pioneer area; and

- Develop a heat map of this spending.

2.2 Objective

The objective of the project was to establish an understanding of the amount and spatial distribution of the expenditure used to manage natural capital within the Pioneer boundary. To do this, the project aimed to account for an average (or indicative) year of spending on the natural environment by the main organisations managing natural capital within the North Devon Landscape Pioneer.

Spending on natural capital refers to spending to maintain (or enhance) the natural environment within the Pioneer boundary; in line with the natural capital accounting principles developed by eftec and others for Defra and the Natural Capital Committee (eftec et al., 2015)[4].

Given the short project timescale (less than three months), and its innovative nature, the objective of the project was to establish a rough order of magnitude of spending to provide a big picture view of the pattern of expenditure in the Pioneer area. Consequently the data collection exercise did not attempt to audit financial data, but rather utilised the most expedient means for estimating annual spending that was indicative of the medium-term average on an organisation by organisation basis. The spatial distribution of the expenditure is also linked to the location of the spending, and not the location of the benefits realised through this spending.

2.3 Data Collection

After being discussed at the stakeholder meeting, an initial data request was sent out to partners on 23rd January 2017 in order to gain an understanding of the types of activities and amounts spent on

[4] eftec, RSPB and PwC, 2015. Developing Corporate Natural Capital Accounts. For the Natural Capital Committee. [online] Available at: https://nebula.wsimg.com/fded24fcf05ff18ecaf8ddafc776532f?AccessKeyId=68F83A8E994328D64D3D&disposition=0&alloworigin=1

the natural environment within the Pioneer. This request was for a rough estimate of resources spent, split by whatever categories the respondent deemed appropriate. This information was used to design the detailed information request which was sent out on 3rd February 2017.

One key issue that emerged, both from the initial meeting with stakeholders and through the responses to the initial data request, was the importance of confidentiality. There were several sensitivities around this issue, including:

- Sensitivities about disclosing partnership funding contributions and potentially harming collaborative relationships; and
- Concern that the exercise may be used by central or local government as a device to make cost savings and cut future funding (particularly a concern for NGO funding).

Consequently, an important part of the subsequent data collection process was to provide assurance on confidentiality. This was done through:

i. Specifying appropriately secure data transfer and storage processes;
ii. A commitment for all involved to share results amongst only those who had provided data, and discuss use of the findings – with publication of the overall results[5] being dependent on agreement within that group, and
iii. Agree suitable levels of aggregation for presentation of the results, such that expenditure by most individual organisations, and on most privately owned/managed land (except the very largest estates) was not separately identifiable.

2.4 Defining Natural Capital Spending

A broad range of environmental spending was collated in this project. To categorise the information, the detailed data request asked for recent and typical expenditure of resources tagged by the following categories. These groupings emerged as the important categories of interest from the initial stakeholder meeting:

- Type of activity (e.g. natural capital maintenance, restoration, enhancement, monitoring etc.);
- Habitat type (using the UK National Ecosystem Assessment (UKNEA, 2011) broad habitat types);
- Whether the activity was a legal requirement or discretionary, and
- Type of resource or expenditure (e.g. own staff time (full time equivalent – FTE), volunteer FTE, revenue spend, capital expenditure etc.)

The information request had the aim to analyse the environment spending in North Devon and requested spending on natural capital defined through the activities listed in Table 2.1. Reference was made to the Natural Capital Committee's definition of natural capital[6], but often applying it required discussion between the project team and the organisation providing data.

[5] In the absence of such an agreement it is expected that a subset of the results, relating to public sector expenditures, would be published.
[6] Natural capital – the elements of nature that directly or indirectly produce value to people, including ecosystems, species, freshwater, land, minerals, the air and oceans, as well as natural processes and functions. When we talk about natural capital, we talk in terms of assets. Any capital asset has the important capacity to produce various goods and services. Natural capital is simply those assets provided by nature which has the capacity to generate goods and services. In fact, natural capital can be regarded as the source of all other types of capital: whether manufactured, financial, human or social. (Source: Natural Capital Workbook, NCC (2017)).

In addition the template asked for details of the most appropriate spatial framework for the activity (i.e. catchment, administrative area, or parcel of land), and whether the activity was funded in collaboration with other partners. For the full data collation template, see Annex 1.

Table 2.1: Categories of Natural Capital Spending.

Term	Definition
Maintenance	Activity to sustain natural capital condition and benefits at existing levels
Enhancement	Activity that seeks to improve natural capital condition or benefits beyond existing levels
Restoration	Remedial action to restore natural capital to a pre-existing state
Change of use	Project activity that aims to change the use, function or nature of a particular habitat or element of natural capital
Investigation	Research and other investigative work into natural capital
Planning	Time and expense incurred in planning future natural capital related activity such as applying for funding
Monitoring	Activity that monitors the condition or benefits of natural capital
Other	Activity that could not be classified under other activity types
Unknown	Unknown

The main data input was the most recent annual figure; however the request asked organisations to confirm that the most recent data was representative of expenditure over a longer period (i.e. several years). If not there was a separate sheet to capture time series data, either prior year's expenditure or forward budget and investment plans if these were available. This was done to enable a medium-term average to be calculated and used to give a more representative estimate of annual expenditure.

2.5 Stakeholder Responses

Most stakeholders found the template straightforward to use, perhaps because many of them attended the initial meeting and discussion. An important part of the communication process was to explain what was meant by natural capital, and to provide definitions of the types of activity (i.e. 'natural capital spending') under consideration. There is no precise answer to this question, and so its interpretation is partly a result of what is practical for an organisation, and what they classify as environmental expenditure. The project aimed to collate as much data as possible, so very little spending was ruled out of the analysis at an early stage – it was seen as better to collate the data and then potentially remove it from analysis, rather than not gather the data at all and potentially influence the results due to such omissions.

Some participants did not complete the template, but did provide information in other forms to enable the collation of the data in the required form. Once stakeholders were clear about the type of activity that was within the scope of the project, most found it relatively easy to access the appropriate financial information.

Attributing expenditure to spatial location was much more difficult with less than half of the respondents being able to attribute any expenditure to location within the project timescales. There were several reasons for data not being mapped in detail, including:

- Some activity was for the entire North Devon Landscape Pioneer area (such as the Environment Agency's monitoring and planning teams), with its location being unpredictable

year to year (for example, because it responds to project needs). In this case it was appropriate to spread expenditure evenly across the entire area.

- Activity which could be attributed to location, but it would either take considerable time and effort to do so, or the resources to do this were not available to the organisation at the time. Examples of this included specific interventions in catchment-based projects which could potentially be mapped to specific locations rather than spread across the entire catchment, or the RPA's Basic Payment Scheme (BPS) payments which could potentially be mapped to individual farm plots.
- Activity which could be identified with a particular location, but for which the beneficial impacts covered a broad area. Examples include expenditure on farm improvement schemes to improve water body quality. The way such data is held by different organisations varied.

Building on the final point, it was decided that the project would map expenditure based on where the resources were expended (rather than the area over which the activity or investment has, or aims to have, beneficial impact). An example is the investment in waste water treatment plant, the expenditure is high and focused on an asset at a specific location, but the benefits may be delivered to a wide area.

As set out in Table 2.2, 20 organisations were identified as spending funds to manage the natural capital in the area, covering a spectrum of organisations from the public, private and third sectors. Although this does not include many small/private land owners/managers (particular farmers), this is believed to be representative of the organisations operating within the area.

As seen on the far right column, data was received from the majority of these organisations. Where no data was received, in some cases the project team was able to use other publically available data to estimate likely expenditure in the Pioneer area, and this was allocated evenly across the relevant spatial area.

The most significant gaps in the data collected were:

- Public sector overhead costs – mainly related to the Defra family, covering centralised services, such as legal support and technical research;
- Farmer spending – although this is hard to distinguish from actions required to comply with the Good Agricultural and Environmental Conditions to qualify for Pillar 1 payments, and those which are funded via agri-environment payments. Therefore there is a risk of double-counting if this activity was captured, but a risk of missing a potentially important aspect of resource use if it is omitted. Farmers spend additional money to produce food, which is a natural capital benefit, but this was not included either,
- Spending which could not be defined as natural capital maintenance, but would lead to improvements in the environment (for example spending on public transport which could reduce overall emitted pollution) and,
- Other private sector activity (other than the water sector) such as in infrastructure provision and business site management.

In many cases, even where spatial data could be provided to the project, it seems that financial and spatial data are not held in synchronised systems in the organisations contacted (with some exceptions for agricultural payments and flood data). Some organisations could readily combine these data, whereas for others this took some effort. The overall impression is that the culture within the environment sector does not prioritise holding financial and spatial data in a unified manner, even when both are known in organisation's data sets. The sector is therefore not making best use of the opportunities offered by the power of modern information technologies and GIS software. Experience

suggests that this disconnection between spatial and financial data is common, and is not confined to the environmental sector.

Table 2.2: Organisations operating within the North Devon Pioneer

Type of organisation	Name	Engagement
Government bodies	Natural England	Data provided
	Environment Agency (EA)	Data provided
	Forestry Commission	Data provided
	Rural Payments Agency (RPA)	Data provided
	Ministry of Defence (MoD)	Data provided
Local authorities and associated bodies	Devon County Council (DCC)	Data provided
	North Devon District Council	Data provided
	Torridge District Council	No response
	North Devon Biosphere	Data provided
	North Devon Coast AONB	Data provided
National Parks	Exmoor National Park	Some discussion and data taken from Annual Reports
	Dartmoor National Park	
NGOs	Devon Wildlife Trust (DWT)	Data provided
	RSPB	No response
	Westcountry Rivers Trust	Data provided
	South West Lakes Trust	Data provided
	National Trust	Some data provided
Farmers' representatives	National Farmers Union (NFU)	Provided qualitative information
	Linking Environment And Farming (LEAF)	
Utility companies	South West Water (SWW)	Data provided

2.6 Data Collation

Each organisation's resource and expenditure data was checked and consolidated into a single overall spread sheet. This consolidated spread sheet was used to summarise and capture the different items of expenditure by organisation and by the various tags listed in Section 2.4. This summary database was used to provide all summary data for subsequent cost, activity and spatial analysis. In terms of the process for creating the database:

- Checking involved clarifying unclear items and issuing further enquiries for any omissions. In some cases the project team had to create the data entries in the spreadsheet from the responses provided in the form of spreadsheet extracts and resource information summarised in emails.
- The consolidation process for each organisation involved aggregating smaller and similar expenditure items into a single line item. Checks were also performed to ensure that long run spending activities (such as capital projects) were assessed to ensure that the consolidated figure was representative of long run expenditure (e.g. if three years of capital data was provided, a three year average check was calculated and this was used if it was considered more representative than the most recent year's figure).

During the process of collating data, several important points of definition and measurement emerged:

1. **Issues around the determination of what activity to include as expenditure on natural capital.**

There were several examples of data provided that tested the definition of investment in natural capital. The most significant was the inclusion of Pillar 1 BPS expenditure by the RPA. Even though pillar 1 payments are not strongly aligned to the maintenance of natural capital, they were included as they are intended to support farmers in the utilisation of natural assets, and payments may be withheld if such assets are not properly managed. Furthermore there is significant potential for these payment schemes to be adjusted to deliver more for natural capital management objectives. Consequently it was decided to include this expenditure in order to provide a fuller picture of expenditure on the natural environment. Basic payment spending may help farmers to maintain assets for food production, but in many cases this can impact on the provision of other services. Analyses are presented with and without basic payment spend to enable comparison of the data.

Expenditure on recreational assets such as cycle-ways was also included. On a narrow basis, this expenditure may be on built capital (e.g. a tarmac surface) and is for the primary purpose of producing recreational benefits. However, the investment also allows for a greater enjoyment of the natural environment and enables the recreational benefit of natural capital to be experienced. Therefore it was included.

Other activities have multiple objectives and outcomes. For example the North Devon AONB plays an important role in the local planning process, with the aim of enhancing the natural environment, benefiting tourism, promoting local business and other amenity benefits. Segregating the cost of planning into these separate outcomes is problematic and academic. Consequently all AONB costs associated with planning and management were included in the analysis.

Another example is expenditure on waste water treatment works. Although expenditure is on built capital, and is required to treat wastes produced from human activity, its purpose is to protect natural capital (the water bodies) and has been included.

2. **Deciding on the resources and costs to attribute to the North Devon Pioneer area from different parts of large organisations.**

Secondly, issues around the resources to attribute to the area emerged for several organisations. For example, EA performs tasks at varying geographical/hierarchical levels across which it is organised. There are various teams that are dedicated to differing geographical areas; the North Devon area, the county of Devon, the whole region of Devon & Cornwall, and nationwide services such as legal advice and permitting. Much of their activity is often of a support nature, responding to demands as required. Consequently the most pragmatic approach adopted was to apportion the costs of these teams to the pioneer area on an appropriate area-based pro-rata allocation. In the case of EA, a simple rule of thumb was used to apportion costs to the North Devon Pioneer area, based largely on rough areas:

- North Devon Teams - allocated 100%
- Devon teams - one third apportioned
- Regional teams - one sixth apportioned
- National services - were not allocated as there was insufficient data, this has been identified as an area for further work.

In so far as was possible, a reasonable share of the costs of all levels of the organisations were allocated to the Pioneer area.

3. **Questions around the approach to estimating costs of activity (marginal costing through to a fully absorbed costing of resources).**

Organisations raised questions about the most suitable methodology to estimate costs. Some provided data based on fully absorbed costs (i.e. evaluating resources with an allowance for the recovery of a fair share of all organisational overheads), whilst others provided direct costs only (i.e. the costs of staff directly related to the activity and any other direct costs incurred, excluding overheads). For some activity, only the Full Time Equivalent (FTE) staff figures were provided. In the case of own staff, this was converted to a financial cost figure at a per capita rate that the project team deemed reasonable. Some FTE figures were provided for volunteers, but the resource involved was small and not evaluated financially. It is likely that the information received on volunteer inputs was a substantial underestimate of its true size, and therefore the importance of volunteers, as an environmental management resource or as a benefit to society (e.g. for health or community reasons) is not captured in the analysis.

2.7 Spatial Analysis Process

Due to the diverse nature of activities and spending patterns, the spatial mapping process varied with each organisation, evolving to utilise the most expedient and effective means for mapping expenditure within the required timescales. Expert contacts, such as GIS mapping specialists, were requested as part of the detailed data request, and discussion with these contacts was used to establish the most appropriate method for that particular organisation.

In order to bring data into a consistent spatial framework to allow expenditure heatmaps to be produced, it was allocated to 1km grids. Due to the range of different spatial datasets received, several different methods were applied to allocate the expenditure data:

- **Detailed area features**. For example, the Natural England stewardship agreement data was available by farm holding and the annual value of each agreement was allocated to 1km squares based on the proportion of the area of the holding that falls within each square. A similar approach was taken for Forestry Commission Woodland Grant Scheme data. In some cases this meant that some expenditure was attributed to portions of holdings that fell just outside the Pioneer area.
- **Linear features**. For example, for the Coastal Path a total expenditure figure for the path within the area was allocated according to the proportion of the length of the path found within each 1km square.
- **Point features**. For example, expenditure on water treatment works was allocated to the 1km square in which the works is situated.
- **Spread evenly across a broader area** where more specific location data was not available. For example by linking expenditure to specific geographical areas such as catchments, designated landscapes or local authority areas. This was allocated evenly to most of the 1km squares apart from those at the edge of the area where the allocation was made according to the proportion of the 1km square covered by the area.

Some mapping exercises seemed feasible but could not be pursued further in the available timescales. The two most significant examples were the allocation of Pillar 1 BPS payments to holding, and flooding and coastal risk management FCRM expenditures to target flood risk areas.

All data was mapped at the 1km x 1km level and then presented at 5km x 5km level in order that individual property expenditure could not be identified. Adjustments were required to remove 'edge effects' in the mapping. If only spending within the Pioneer area was used to assess the total spending

in each 5km^2 grid cell, then cells partially in the Pioneer area would have a lower total expenditure than similar cells entirely within it. This would give a misleading impression of low expenditure around the periphery of the Pioneer area.

Therefore the mapping was based on the average expenditure per 1km^2 for each 5km square. This means that some areas just outside the Pioneer area boundary are marked as having the same expenditure as inside, which may not be the case. However, since the focus of the work is on understanding expenditure within the Pioneer area, this was judged to be a less serious potential inaccuracy. 5km cells with less than 25% of their area within the Biosphere were excluded.

3 DATA AND EVIDENCE

In line with the key purposes of the project (Section 2.2), the following subsections outline the approach. Initial results were presented at the meeting in Exeter on 6th March 2017. Subsequently, more information was compiled and developed to produce the final results reported here.

3.1 Summary of Data Responses

Table 3.1 provides a more detailed summary of the scope of the information and the data compiled from the organisations approached in this project. 'Organisations engaged' denotes that they gave a constructive response that assisted with the project's objectives.

Table 3.1: Summary of results

Total organisations identified in Pioneer	Total organisations engaged	Organisations providing detailed spending data	Organisations for which some data allocated spatially
20	17	13	12

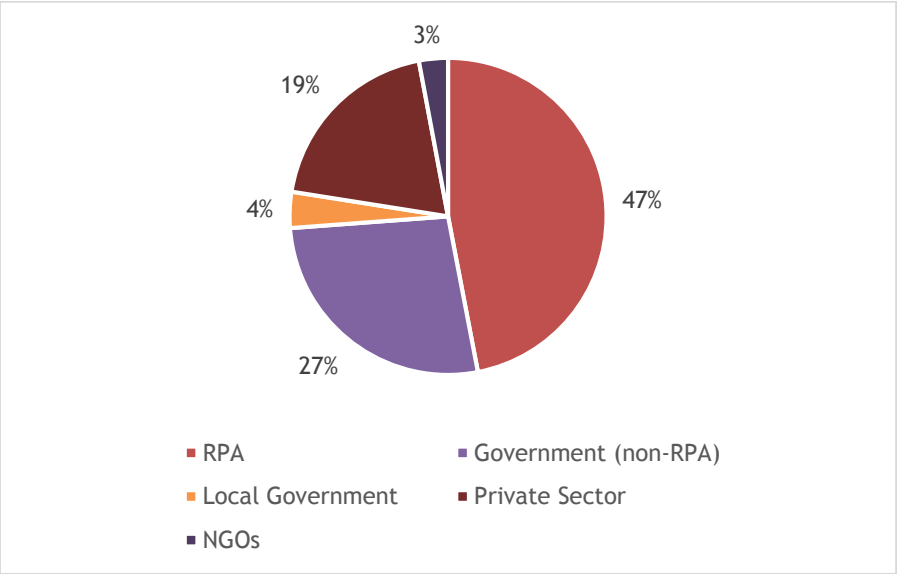
Most organisations were willing to engage in a constructive dialogue about the Natural Capital Pioneer -17 out of 20 responded in some way, most of them (12) with a good level of information. Most were interested to learn more about the project or to contribute their thoughts to the process. Of the 12 organisations whose data was allocated spatially, seven provided spatially tagged spending data, and for five assumptions were used to enable spatial allocation. Some organisations were short on time and resource, which was the main reason for any absence of detailed data (rather than any reluctance to engage in the project purpose). In three cases high level expenditure data was estimated from public sources. If there were more time/capacity, it is possible that at least six organisations could provide more expenditure data linked to spatial location.

3.2 Spending Results

Over £53m of annual expenditure was identified by the project based on the data gathered. Nearly half of this was pillar 1 spending (Basic Payment Scheme only) via the Rural Payments Agency (RPA) – see Figure 3.1, which indicates the relative importance of these payments to rural land management. Central government expenditure (excluding RPA) was the second largest category, covering expenditure by the Environment Agency, Natural England, Forestry Commission and Ministry of Defence and a proportion of the annual expenditure of the two National Parks.

Private sector expenditure was substantial at approximately 1/5th of the total, although this figure is likely to be understated as no robust data on private farm spending (additional to pillar 1 requirements) was obtained. The major element of the private sector expenditure data sent to the project was on waste water treatment works, by South West Water (SWW).

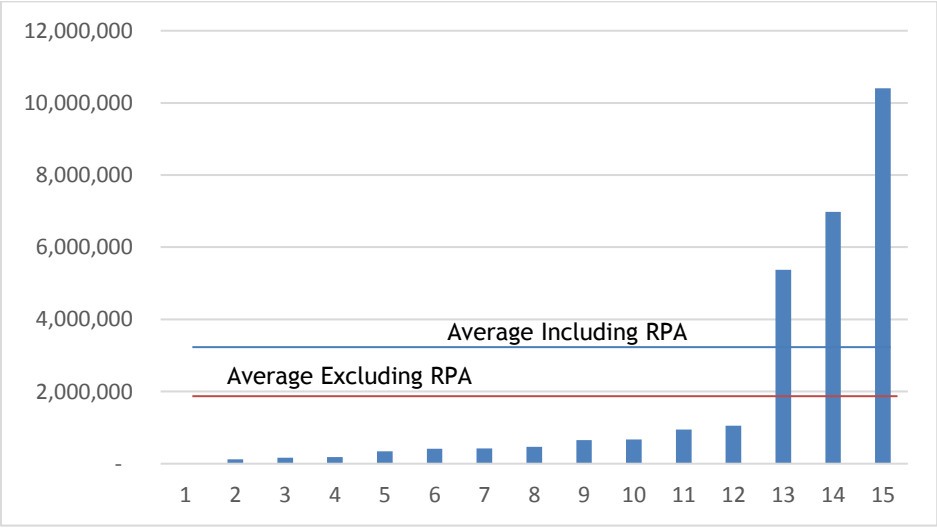
Figure 3.1 – Expenditure on Natural Capital by Type of Organisation



Local government spend included expenditure on parks/open spaces, nature reserves and conservation, public rights of way and recreational assets such as cycle ways. The data was submitted by Devon County Council, North Devon District Council, and the North Devon Biosphere and AONB organisations. Finally, the non-government organisations (NGO) grouping included Devon Wildlife Trust, Westcountry Rivers Trust, the National Trust, and the South West Lakes Trust. There were several other NGOs who operate in the area but that did not provide cost data within the project timescales. However, none of these NGOs are believed to have significantly large expenditures in the area, so while this figure may be understated, it is likely that the more significant expenditures made have been captured.

There was a distinct division in the level of spending by organisation, with a small number of key organisations accounting for a large majority of spending. The average expenditure per organisation, including the RPA, was £3.3 million per year. The average excluding the RPA was £1.9 million per year, and shown in Figure 3.2 shows the ranked levels of annual expenditure by organisation (anonymous) excluding RPA. Three organisations spent more than £5 million per year whilst the remainder spent around £1 million per year or less.

Figure 3.2. Ranked Annual Expenditure by Organisation (Anonymous)



The NGOs tended to be the smaller spenders and many of these organisations pooled expenditure in collaborative programmes (see Section 3.2.3).

3.2.1 Link to spatial information

Many items of expenditure were difficult to assign to a spatial location within the project timescale (see Table 3.2). However, a total of £19.7 million per year was mapped in detail to a spatial area using location data, and the spatial distribution of a further £29 million per year is adequately understood so as to be mapped using assumptions. In particular, the biggest item not to be mapped in fine detail was RPA farm (BPS) payments which could in principle be mapped to individual farm plots. However, the expenditure by RPA is linked to farm holders, which is the dominant land use in the Pioneer boundary (with approximately ¾ of the land area being recorded as 'enclosed farmland' in Land Cover Map 2007). Therefore, distributing this spending evenly across the land area, pro-rata, is considered a reasonable proxy for the actual spatial distribution of this spending at the 5km^2 level. This is described in more detail in Section 3.3.

Some expenditure was of a non-spatial nature and could not be assigned to location – such as regional planning and management costs. These types of activity were a relatively small proportion (less than 10%) of the total, and it is understood that the majority of outlays could be mapped to geographic location if more time were available. Other significant items that could be mapped in more detail included flood risk prevention schemes and improvements or maintenance to cycle-ways and Public Rights of Way.

Table 3.2: Spatial breakdown of spending (per year)

TOTAL all spend	Not spatially targeted	Spatially distributed using assumptions	Mapped using spatial location data
£53.3m	c.£ 4.6m	c.£29m	£19.7m

Of the items of cost that were mapped in detail, the largest included waste water treatment works, stewardship payments and forestry grants. The payments/spending were readily identifiable by plot and given the availability of the appropriate GIS files, the maps were quickly produced. Some other items had to be mapped by means of workable assumptions. For example, expenditure on specific sites had to be mapped to proxy GIS entities.

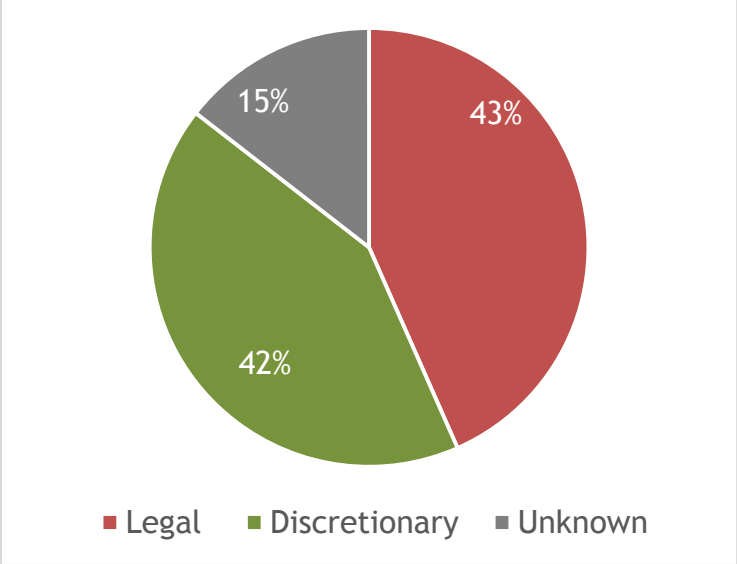
3.2.2 Legal versus discretionary spending

The Corporate Natural Capital Accounting (CNCA) framework (eftec et al, 2015) requires separate disclosure of the costs of legally required and other natural capital maintenance activities. Within the context of this study it was thought useful to understand the proportion of expenditure on natural capital that was due to a legal duty rather than discretionary choice.

Some activities were readily categorised as legal or discretionary, however some were more difficult to classify. These included requirements that may have some element of legal requirement (such as environmental monitoring), but that the extent of the activity and the level of expense was a discretionary decision. The figures should be treated with caution as some expert judgement has been applied to categorising the data supplied.

The magnitude of the RPA BPS expenditure has a significant impact on the figures, and is one of the items that is particularly difficult to classify as either legal or discretionary. For these reasons it has been excluded from the analysis in Figure 3.3.

Figure 3.3 Proportion of Legal vs Discretionary Spend

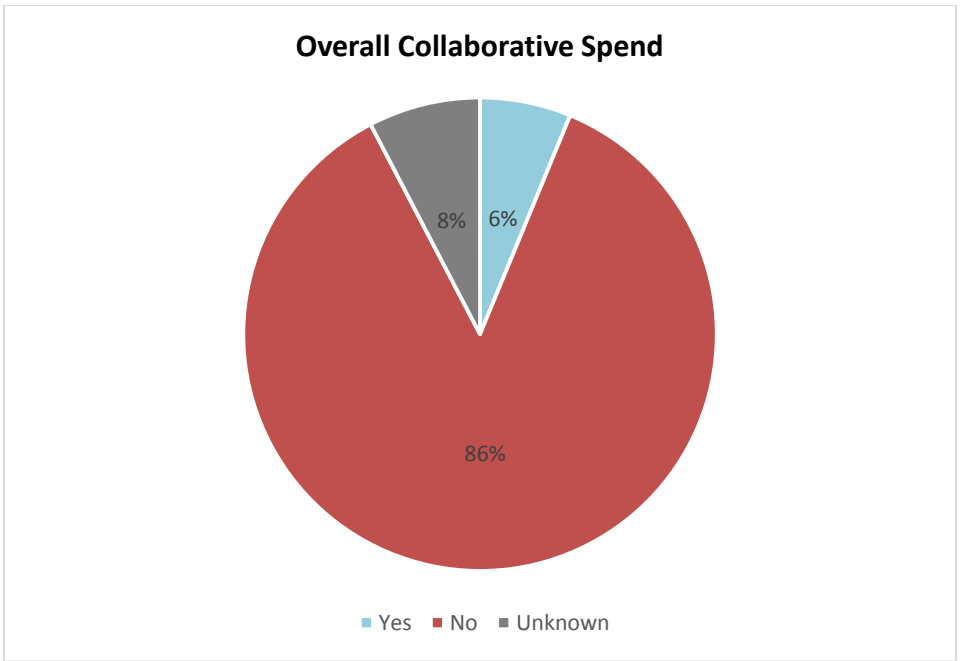


There was a fairly even split between activities that were classified as legal and discretionary, but this is dependent on assumptions: FCRM investments and an estimate of expenditure in the two National Parks were the main items left as 'unknown', while water company spending was entirely classified as legal obligation (an assumption to which the results were sensitive).

3.2.3 Collaborative spending

Overall limited spending was identified as collaborative, i.e. where different organisations contribute to the spend. This is largely driven by the substantial proportion of government spending classified in this way (Figure 3.4). However within the NGO sector this was the dominant type of spending.

Figure 3.4 - Collaborative Expenditure (Inc. RPA)



3.2.4 Other dimensions

The vast majority of spending was classified as natural capital maintenance, with only a few activities being categorised as, enhancement, restoration, planning and monitoring. Although many projects have elements of these activities within them, the majority of natural capital related expenditure was considered to be under the primary objective of maintenance.

In terms of expenditure by habitat, only a small percentage (less than 4%) could be attributed to one of the NEA broad habitat types in the information supplied by stakeholders. This was largely because most activities involved more than one habitat type. At a lower level of granularity it may be possible to isolate more expenditure by habitat type, but the high level nature of this project meant it was not feasible for this exercise.

In terms of type of resources and spend, some data was provided on human resources (measured in FTE), highlighting own employees and volunteers. It has not been possible to establish the total human resource picture, as some organisations provided a total expenditure figure without indicating the labour component of spend. Others provide external expenditure figures only (e.g. RPA) and did not include the human resources for local management. Finally around 15% of expenditure was classified as capital spend, largely around South West Water investments in Waste Water Treatment and Environment Agency investments in Flood Risk Management.

3.3 Spatial Results

The spatial scale of the Pioneer area is set out in Figure 3.5.

For reasons of individual landowner and organisation confidentiality, the resolution for the published heat maps is 5km^2. These cells are placed in categories as follows:

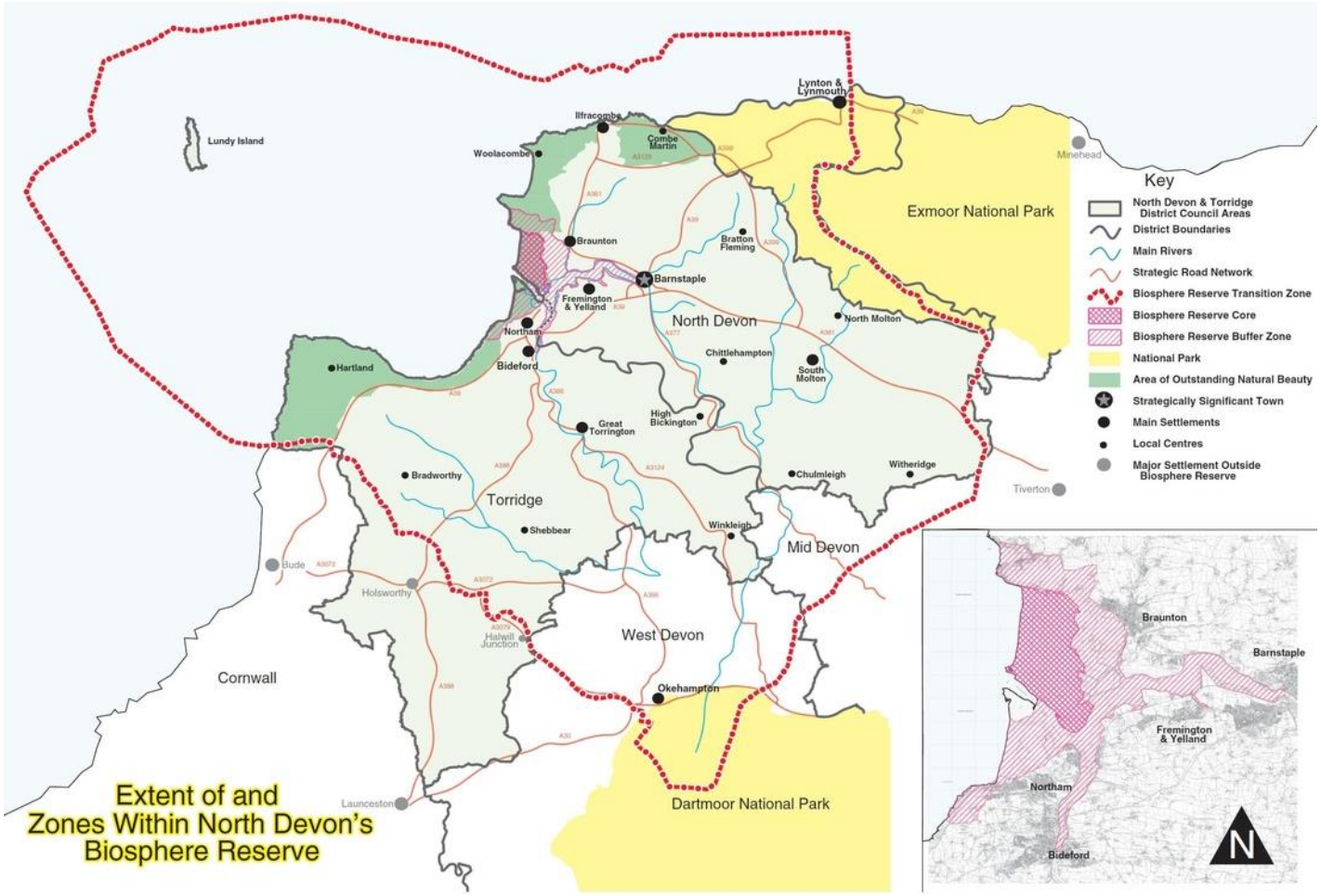
- 40% lower than mean spending
- 10 - 40% lower than mean spending
- +/- 10% mean spending
- 10 - 40% greater than mean spending
- 40% greater than mean spending

Figure 3.6 shows the heat map for Environmental Stewardship payments, and Figure 3.7 for the £19.7 million per year expenditure that was mapped in detail to a spatial area using location data. Including all spatial expenditure (i.e. also the expenditure mapped using assumptions) would give the same visual pattern, but would reduce the size of the percentages defining the five bands in the map legend.

The analysis in the following sub-sections relates to the £19.7 million per year of expenditure that was mapped in detail to a spatial area using location data.

Figure 3.5: Spatial information

North Devon Biosphere reserve



Total area: 3,300 km² Mainland: 2,340 km²;Map taken from Braunton Countryside Centre website © Unknown.

Figure 3.6 Natural England – Environmental Stewardship Expenditure

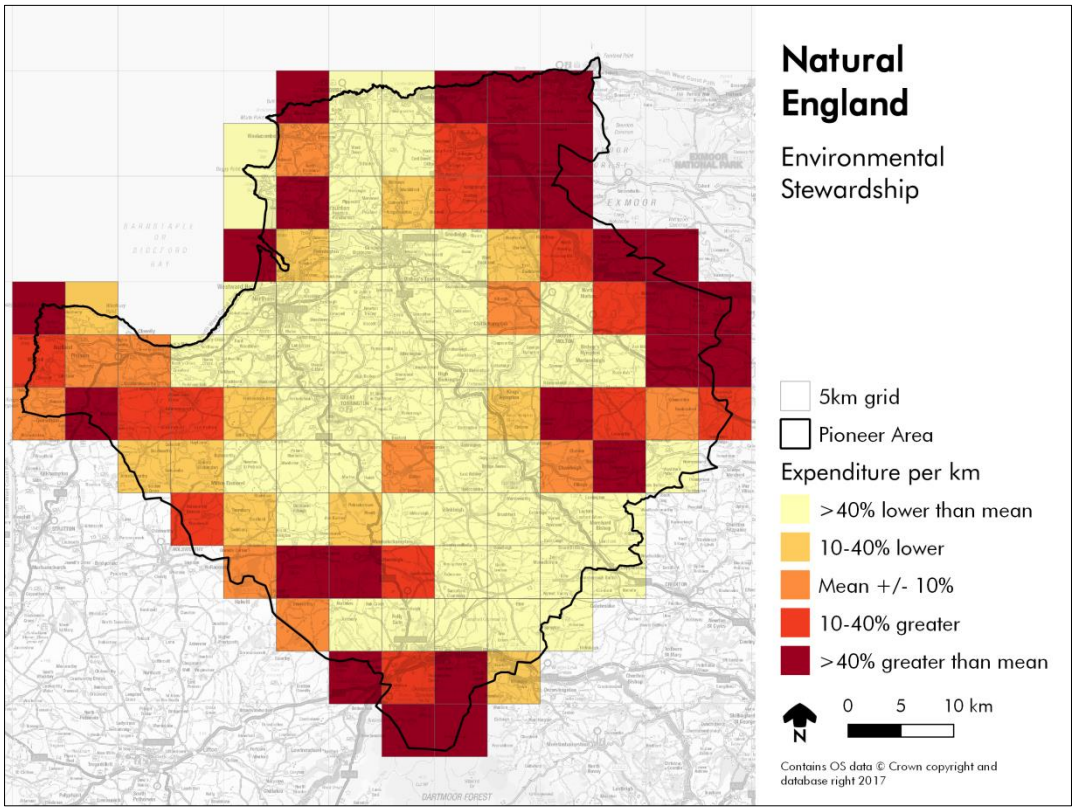
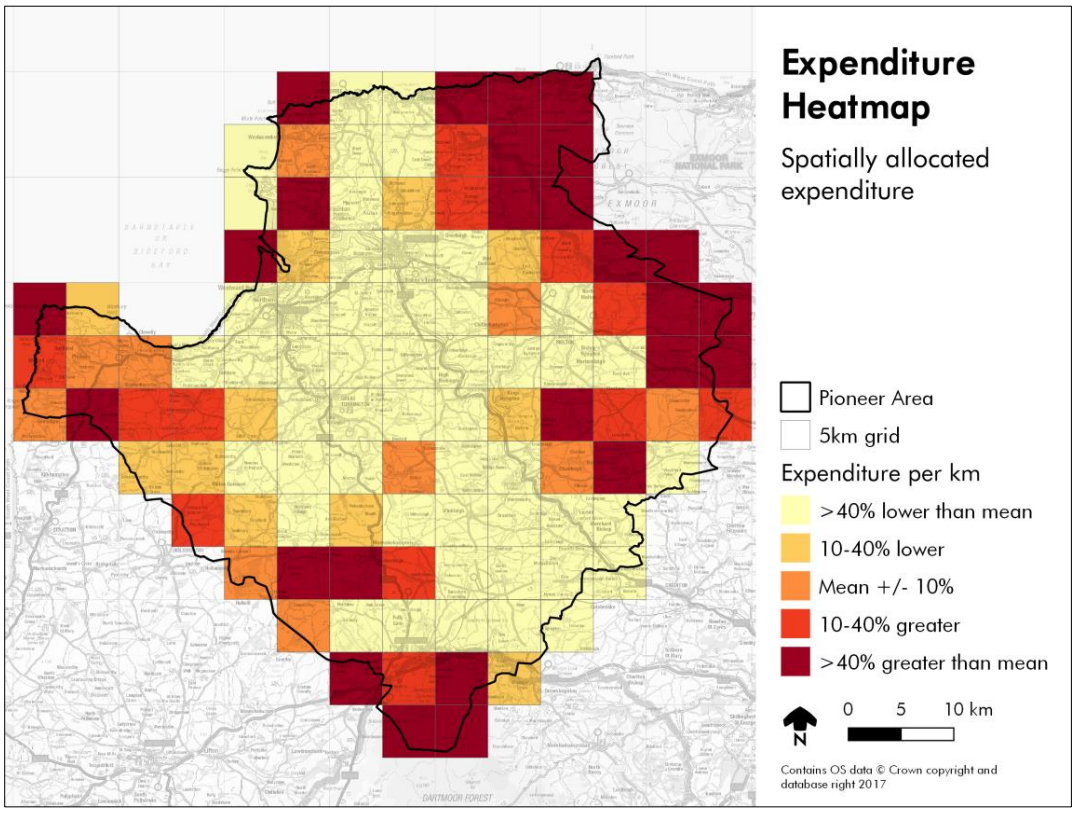


Figure 3.7 Total Spatially Allocated Spend



3.3.1 Level of Spatial Variation

For the £19.7 million per year expenditure that was mapped in detail to a spatial area using location data, the spending per cell varied enormously across the 2,427 km^2 cells analysed, from £106 - £161,000 per km^2 per year. Although these figures reflect outliers, there was an uneven spending distribution. Mean spending per km^2 was £7,768 per year, whereas the median was £2,170 per year. The 6.3% of km^2 cells that receive more than £50,000 per year account for 48% (£9.45m) of the spending mapped in detail.

3.3.2 Broad Habitats

Table 3.3 shows the variation in spending across the grid cells according to their dominant broad habitat type, as defined by the Natural Capital Committee[7]. The dominant habitat was assigned to each grid using the Land Cover Map 2007: 1km dominant target class, GB v1.2[8]. It should be noted that most cells contain a mixture of habitats.

Table 3.3: Spending by Broad Habitat Type

Broad Habitat	Component habitat	Total Spend (£ per year)	No. km^2 Cells	Average (£ per km^2 per year)
Urban	Built up areas and gardens	538,004	23	23,391
Mountains, Moorlands and Upland Heaths		444,091	36	13,776
	Blanket bog	264,998	23	11,522
Semi-natural grassland		1,089,934	96	11,353
Woodland	Broadleaved, mixed and yew woodland	515,609	46	11,209
	Coniferous woodland	103,180	30	3,439
Coastal Margins	Intertidal & coastal	512,712	53	9,674
Enclosed Farmland	Improved grassland	11,723,401	1,544	7,593
	Arable/horticulture	4,291,507	644	6,664
Note: Due to small numbers of cells, intertidal, saltmarsh and transitional waters were merged into the 'Coastal Margins' habitat. There are no cells where the dominant habitat type is freshwater.				

The figures in Table 3.3 show the highest spending in urban areas. This may be due to certain spending types (e.g. water company treatment works and flood risk management spending) being closely associated with settlements. Otherwise there is little variation across the less common habitats, and the numbers of cells involved are rather small. Intertidal and coastal habitats have lower spend, which may be due to inclusion of some habitats below the low water mark that receive lower spending.

It should be noted that Pillar 1 spending by the RPA gives an average of a further £10,000 per km^2 per year across the Pioneer area. For approximately 88% of cells (improved grassland and arable/ horticultural) the dominant land use is lowland agricultural. However, this does not mean that all of the cell is agricultural land - if a cell is entirely under such land use, the BPS spending by the RPA gives an average of a further £14,900 per km^2 per year. For severely disadvantaged areas (closely associated with Mountain, Moor and Heath habitats) these payments are worth £3,900 per km^2 per

[7] The NCC use the eight Broad Habitat types from the UKNEA as land-use categories but recognise that some of these categories may need disaggregating into 'component habitats' for analytical purposes.
[8] Morton, R.D.; Rowland, C.S.; Wood, C.M.; Meek, L.; Marston, C.G.; Smith, G.M. (2014). Land Cover Map 2007 (1km dominant target class, GB) v1.2. NERC Environmental Information Data Centre. https://doi.org/10.5285/6cffd348-dad7-46f9-9c5b-8d904dd5b2a2

year. Adding this spending to the average from other sources of spending for improved grassland and arable/horticultural habitats would put the total spending they receive well above that of other habitats that do not receive BPS spending (e.g. broadleaved woodland).

3.3.3 Landscape Features

Variation in spending was analysed across the 25 Devon Landscape Character Areas present in the Pioneer area, as identified in the Devon Landscape Character Assessment[9]. The assessment covers the whole of the Biosphere area outside Exmoor National Park. Across the Character Areas, there was some moderate variation in spending: four had an average of less than £5,000 per km^2 per year and six had an average of more than £10,000 per km^2 per year. Therefore in 15 cells (60%) spending was between £5,000 and £10,000 per km^2 per year (i.e. within approximately a third of the average).

The majority of the ten landscape character types with spending above £10,000 per km^2 per year or below £5,000 per km^2 per year accounted for a small number of cells. Overall, although representing 40% of the 25 types, they accounted for only 25% of all the cells.

A minority of the land within the Pioneer area is part of designated landscapes (the North Devon Coast AONB and the Exmoor and Dartmoor National Parks). These cells account for 23% of the km^2 cells in the Pioneer area. The average spending in the designated landscapes was 50% higher than the average across the Pioneer area (at £11,610 per km^2 per year against an average of £7,768).

While there is clearly higher spend in the designated landscapes, there are no other clear patterns of spend across landscape features.

3.3.4 Biodiversity

Some 464 1km cells, or around one fifth of the Pioneer area, contained some area that is designated as SSSI. The average spending in these cells was £11,494 per km^2 per year – approximately 50% above the average. When the proportion of the cell that is designated is above 33%, this rises to £13,135 per km^2 per year, but where it is more than 50% or more than 75%, the average is less than £12,000 per km^2 per year.

Thus the presence of SSSI is associated with higher spend, but spending does not increase proportionally when more of a cell is designated. This suggests that SSSI may be in areas that receive greater expenditure in general, rather than being targeted with significant expenditures.

Since areas of SSSI are relatively restricted in the study area, the presence of priority habitats were analysed to give a further insight into biodiversity. The proportion of each 1km cell that is in the Natural England priority habitat inventory was used to reflect the presence of higher biodiversity value habitats more widely than those designated as SSSIs. The vast majority of 1km cells has some priority habitat within them, although for most (60% of cells) this was a low proportion (less than 10%). For these cells, the proportion of priority habitat made no difference to the level of expenditure recorded – it averaged just under £7,000 per km^2 per year.

In 30% of 1km cells the proportion of priority habitat was over 20% of the cell. The average expenditure recorded in these cells was around £10,000 per km^2 per year. For the 10% of cells with the highest proportion of priority habitat (making up around 30% of the cell) expenditure was higher still, at around £12,300 per km^2 per year. Thus in a minority of cells with a significant proportion of priority habitat, spending levels rise significantly.

[9] https://new.devon.gov.uk/planning/planning-policies/landscape/devons-landscape-character-assessment

It should be noted that the broad patterns examined may hide more specific issues, such as the lower spending on some higher biodiversity value habitats in intertidal areas, which may reduce the average for terrestrial habitats. Furthermore, major changes to agri-environment schemes to fund actions on smaller areas of land are changing the pattern of expenditure being examined.

3.3.5 Numbers of Organisations Spending

The number of organisations making expenditures into each cell was also analysed, giving the distribution shown in Table 3.4. It should be noted that this does not mean an organisation was making a separate expenditure into each of these cells: single spending decisions can cover multiple cells, so having multiple funders into a single cell is not necessarily inefficient. However, only 14% of cells have three or less organisations spending in them, and nearly 20% of cells have six or more, suggesting further analysis is justified to identify whether there are spending overlaps that offer opportunities for more efficient systems.

This efficiency may arise with the organisations making the spending, and with the recipients of the spend. If a single actor is the recipient of funds from several spending routes, this will mean they are likely to be engaging with several different administrative systems to receive that spending.

Table 3.4: Number of organisations spending in each km^{2}cell

No. Organisations spending in a given cell	No. of km^2 such cells
1	1
2	65
3	288
4	834
5	820
6	355
7	78
8	27
9	5
10	1

3.4 Putting Spending in Context

The total expenditure captured, at £53 million per year represents around £300 per capita per year[10] for the North Devon pioneer area. In the context of government spending, this is approximately 3% of all government expenditure (c.£1,670 million per year) in the local area[11], and compares with around £275 million per year on health, £630 million per year on social security services/payments and £92 million per year on education. In fact, once the BPS for agriculture is taken out, the spending on the natural capital is even lower (at (1.6%).

[10] North Devon population census (2011) 169,665, Source: North Devon Biosphere Periodic Review 2015
[11] Source: ESPRESSO tool for government expenditure for year 2014/15 and comprises the local districts of North Devon and Torridge as an approximation to the North Devon Biosphere area.

In terms of contribution to the local economy, the natural environment supports[12] an estimated 6 million annual visits to North Devon and Torridge, which generate a total of £464 million per year total visitor spend[13].

Estimates of the annual Gross Value Added (GVA)[14] for the agricultural industry in Devon are shown in Table 3.4. This includes a 5-year average calculated for the period 2008 to 2012 of £332 million per year.

Table 3.4: Estimates of the annual Gross Value Added (GVA)[15] for the agricultural industry in Devon

GVA of Devon Agriculture	Unit	Year
£354m	£m/year	2008
£290m		2009
£343m		2010
£319m		2011
£353m		2012
£332m	£m/year	5-year average
Source: ONS (2014) GVA UKK4 Devon Agriculture Raw total £m https://www.ons.gov.uk/economy/grossvalueaddedgva/timeseries/r53k		

An indicative estimate of agricultural GVA from the North Devon terrestrial Biosphere area can be developed by taking a proportional approach based on total land area, assuming that agricultural productivity is evenly distributed across Devon, as follows:

i) Total Devon land area is 670,700 ha (Google maps) and total North Devon Biosphere land area is 234,845 ha, making the Biosphere 35% of the total Devon land area;
ii) Total Agricultural GVA in Devon is estimated to be £332 million per year (ONS, 2014), 35% of which is £116 million per year.

Therefore based on these assumptions, the estimated Agricultural GVA for the North Devon Biosphere is £116 million per year. The area also has a woodland economy valued at £13 million per year, and local fisheries industry worth £6 million per year.

[12] Source: North Devon Biosphere periodic Review 2015
[13] The North Devon Marketing Bureau (2015)
[14] GVA measures, over time, the value of output less the value of inputs used in the production process, for any producing unit in the economy (agriculture in this case).
[15] GVA measures, over time, the value of output less the value of inputs used in the production process, for any producing unit in the economy (agriculture in this case).

4 DISCUSSION OF PROCESS, CONCLUSIONS AND RECOMMENDATIONS

4.1 The Project Process

This project applied an innovative method in analysing the spatial distribution of 'natural capital' (or broad environment-related) spending in the North Devon Biosphere Reserve for the Landscape Pioneer. Most organisations engaged positively with this project and there was considerable buy-in to the project aims. The launch meeting was particularly effective in promoting dialogue and common commitment across the stakeholders. From the meeting it was apparent that there was a strong common interest in attracting investment and targeting it more effectively within the Biosphere and a general understanding of the need for greater efficiency and the inevitable drive for value for money.

Set against this motivation, there was also some uneasiness about the purpose of the exercise, with fears expressed that the project could be used as a blunt instrument to cut budgets and funding (particularly government funding), and that some partners may be uncomfortable about funding arrangements being made public. The key learning point here was that some level of appropriate assurance around use of data and confidentiality needs to be given at the very start of the exercise if stakeholders are to fully engage with the work.

Overall the project is considered beneficial in stimulating dialogue, collaboration and trust amongst the stakeholders involved over how resources are used to manage natural capital including green infrastructure and land use planning more widely. This is a very positive outcome which is helped by understanding that it's not just the total budget spent by different organisations that is important, but also how these resources are used to create value added and what value for money looks like.

The overall process relied on the environmental management functions in an organisation engaging with their finance and management information functions. The depth and effectiveness of the relationship between these two groups varied significantly across organisations, and the project stimulated co-working within organisations that is viewed as beneficial.

One interesting general observation is that smaller organisations had a far better grip of their finances than the large ones, knowing more clearly where money was being spent and for what purpose. Closer internal relationships between organisational functions are a key enabler of the effective use of resources (i.e. achieving value for money) in the management of natural capital and facilitates the integration of natural capital management objectives into wider organisational objectives. The larger organisations are often governed by specific financial reporting requirements (e.g. in the public sector) which may dominate their finance function's work.

It was also apparent that a great deal of useful and relevant information could be obtained in a short space of time if direct contact was made with the right individuals within an organisation. This was particularly the case with the larger organisations (esp. public sector) and the launch meeting was a useful forum for flushing out the most effective contacts. The data gaps arose in cases where the appropriate contact was identified too late in the project.

It was clear from the process that financial data and spatial data are rarely fully integrated and that a flexible and adaptive approach is needed for mapping expenditure data spatially. Given the variety of organisations and their activities, it is likely that this kind of exercise will need to be developed on a case by case basis, often relying on the collaboration of GIS in with finance staff and environmental managers.

More broadly, a change in culture within organisations in the environment sector is needed. To develop a shared understanding of value for money, there is a need to bring data for financial management and environmental delivery together to enable automatic spatial tagging of financial data and, wherever possible, comparing this with environmental outcome data. This can make use of relatively new IT and GIS capabilities, and would be beneficial.

Another key learning point is that it is easier to map resources to the point/location at which they are spent, rather than where the benefits are realised. This is because the point of expenditure is usually clearer (e.g. to reduce diffuse pollution from management of a parcel of land) than the area over which the outcomes and benefits will be realised (e.g. how far downstream the pollution reduction benefit went). Some organisations tried to consider the area of impact for particular investments/activities, but for the sake of consistency and practicality the project team opted to map expenditure by location of spend.

Discussions with stakeholders also highlighted the desire for some clearer definition of spending on natural capital. In this project a broad interpretation of expenditure was used (described in Section 2.4) and this worked well as it encouraged broader thinking and the linkage between the organisation's activities and environmental outcomes. Furthermore a precise definition seemed too difficult to link to existing spending classifications and hence being inappropriate. The use of a variety of examples may assist organisations to think more broadly about the activities that have an impact on natural capital

Of course, understanding expenditure is only one part of the picture. The natural capital approach also involves understanding the major benefits of natural capital and the key assets that underpin those benefits. The natural capital approach will enable the targeting of investment to those priority areas that maximise and maintain key benefits. This plays strongly into the current drive for value for money and will facilitate the synergy, targeting and coordination of multiple benefits across the many important organisations within the Biosphere.

4.2 Conclusions

The broad approach in this project to collate data on the amount and location of expenditures on natural capital has proved feasible. A process lasting around three months has been able to identify £53 million per year of total expenditure. Around half of the total is through the Basic Payment Scheme (BPS) of farm subsidies, with agri-environment, flood defence and water company spending making up around 40% of the total.

Using a variety of different assumptions and mapping approaches, more than 85% of the spending analysed was given a spatial location so that it could be mapped. An accurate spatial location of expenditure was possible for 12 organisations' spend, representing 37% of total spend. If more time and resource were available to map RPA BPS payments and the FCRM investments for EA more precisely, this figure could rise to around 90%. Aside from the BPS, the majority of the expenditure (some £19.7 m/yr) can be mapped to help understand its distribution and observe whether there are general patterns in relation to landscape, habitat or biodiversity, and consider the numbers of organisations making expenditures. The broad pattern observed confirms the existing local stakeholder view that expenditures are focussed on the upland areas and coastal zone within the Biosphere Reserve, and that there is lower expenditure on the land between the moors.

Rather than a precise measure of the amount of investment being used for 'natural capital maintenance', this data should be interpreted as a measure of the resources that society chooses to spend on managing the natural environment (or natural capital). Because, this project has not

distinguished whether this spend is spent well – whether it leads to an enhancement or in fact a degradation of natural capital assets, or is sustainable is any other sense.

Further analysis of the data can be carried out, but caution should be exercised in analysis at a fine level of detail. The data gathered was not audited, and although the figures are understood to have captured a large majority of spending, the extent of potential omissions has not been assessed. Therefore to generate more detailed analysis, additional resources would not only be needed for that analysis, but also to quality assure the data obtained. This could also gather greater detail, for example to allow analysis of the location of expenditures in different spending streams, rather than just by organisation. It could also consider the natural capital assets and/or benefits to people, that expenditure is targeted towards (which can be different to the location of spending, which this study examined).

4.3 Recommendations

For a project of this nature, which requires commitment and a deeper understanding of the key aims and concepts involved, it is essential that a launch meeting of all stakeholders is run at an early stage in the project. The key aims of this face to face meeting are to secure buy-in and facilitate the identification of the key experts and resources that can supply the relevant data.

Another factor critical to the success of the project is to ensure suitable links between finance staff and environmental managers. The primary benefit is to ensure that the finance data is relevant to the project, but a secondary benefit is that it fosters greater linkages between the organisations business goals and environmental outcomes. This is an educational investment that enables better integration of environmental and organisational goals.

The project was also focused on the location of expenditure within the Pioneer area. For this, the linkage between financial data and spatial location was often difficult to establish as these data sets were not automatically integrated in most of the organisations who contributed to the project. Currently most environmental organisations do not organise their financial data spatially, and are not utilising IT capabilities, which could automatically integrate expenditure and location data for analysis. This includes expenditure on the environment made from a number of area based and national funding streams, many of which are highly spatial in their objectives.

Integrating spatial data into financial systems in the environment sector could lead to major improvements in understanding of how society uses it resources to manage the environment. These improvements would result from facilitating spatial analysis of spend, and making this data available to a wider number of professionals. This in turn could lead to considerable efficiencies in expenditures, for example making identification of spending overlaps and simpler process of organisations with the sector.

More broadly, a change in culture within organisations in the environment sector is needed. To develop a shared understanding of value for money, there is a need to bring data for financial management and environmental delivery together to enable automatic spatial tagging of financial data wherever possible. This can make use of relatively new IT and geographical information system capabilities.

The suggested approach to collecting expenditure data, at least in a project of this scale, is to keep it broad and flexible. Organisations differ in management systems and understanding of natural capital, and so a rigid approach to data collection runs the risk of missing important information. It is also helpful to allow flexibility for multiple breakdowns of information. The project aimed to collate as much data as possible, so very little spending was ruled out of the analysis at an early stage

– it was seen as better to collate the data and then potentially remove it from analysis, rather than not gather the data at all and potentially influence the results due to such omissions. For example, this project used RPA BPS expenditure in the £53m/yr total figure, but excludes it from analysis of spending patterns.

In terms of spatial analysis it is far more practical to analyse where expenditure takes place. The point of resource consumption/expenditure is usually clear. Analysing where expenditure influences natural capital, or where the benefits are realised, is significantly more complicated, dependent on assumptions and sometimes hampered by incomplete understanding. This is because the point of expenditure is clearer (e.g. to reduce diffuse pollution from management of a parcel of land) than the area of outcome and benefit (e.g. how far downstream the pollution reduction benefit went). Some organisations tried to consider the area of impact for particular investments/activities, but for the sake of consistency and practicality the project team opted to map expenditure by location of spend.

Finally, it may be worth considering whether the results from this analysis could help with objectives to engage other public bodies and businesses (outside the environment sector) and the public, on the state of the natural environment, as described in the Government's Natural Environment White Paper.

4.4 Gaps

The main gaps in the data gathered for this project were the following. They should be borne in mind when interpreting the results and considered for further work.

- **Private farm spending** is considered to be the most important gap in the expenditure data collated for this exercise. This importance is due to its potentially significant scale, and because farmers are key stakeholders in management of natural capital. However, given the diffuse and private nature of this expenditure it is a particular challenge to derive a reliable estimate of this. The National Farmers Union and Linking Environment and Farming (LEAF) were engaged as part of this project, and working with such representative bodies seems the best means of developing data on this important aspect of natural capital management. In reality, it may be hard to distinguish what farmers spend voluntarily to protect / enhance natural capital from what they spend to comply with conditions on Pillar 1 payments. However, excluding private farming spending risks alienating farmers by failing to recognise the positive environmental management (a proportion of which is voluntary) that they undertake.

- Cost information for significant elements of **public sector overheads and central services** were not obtained in this study. The most notable gaps included regional RPA management and administration costs, and central services and overheads for the Environment Agency, Natural England and Forestry Commission. This is an area that Defra can readily address centrally/nationally, and providing a common framework of evaluation and analysis should not only save time and resource, but enhance accuracy and consistency across the natural capital Pioneer projects.

- Although there were some estimates of **volunteer time and effort** (particularly from the NGOs) this remains an area likely to be underestimated in this study. No monetary estimates of the value of volunteer time was made to represent this element of resource that's important for the success of some high value habitat projects, but also for community and health reasons. This may have impacted the results of this study because some areas have a large number of regular volunteers.

- Finally, **private sector expenditure**, other than by water companies and farmers, is a potentially significant unknown in this area. Many organisations may be contributing funding to important natural capital projects and some may be funding environmental management in the area. Within the project timescale, it was not possible to investigate this area of funding/ expenditure.

Finally, two areas that were outside the scope of the study could be considered in further work. The first is the relationship between expenditure and other ways resources are used to manage the environment. For example, there are other significant subsidies involved, such as the lower tax rate paid on red diesel in the farming and fishing sectors. There are also costs, often in the private sector and spread across large numbers of businesses, of complying with regulations that indirectly protect natural capital such in relation to waste management. The second is the relationship between expenditure and outcomes/ benefits at the level of the whole area and spatially disaggregated. Gathering both the spending and benefit data will take the pioneer further along the Corporate Natural Capital Accounting path.

ANNEX 1 – DATA REQUEST

The embedded file below includes the latest version of the data collection template:

N Devon Data collection template_