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THE UNIVERSITY OF EDINBURGH

An Assessment of the Economic Impact of Water-Related Recreation and Tourism in the Spey Catchment in 2003

Research Report

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COMMISSIONED REPORT

Summary

AN ASSESSMENT OF THE ECONOMIC IMPACT OF WATER BASED RECREATION IN THE SPEY CATCHMENT IN 2003

BACKGROUND

The River Spey Catchment Management Plan identified a need for an up to date objective assessment of the volume and economic impact of water related tourism to the local area and employment, either directly or indirectly.

MAIN FINDINGS

In 2003

- The number of **angling** activity days was estimated to be **54,746** with a total expenditure by participants of **£11.8m**. Salmon angling by visitors was the most popular sub-sector with 40,543 days (81.4%) and total expenditure of £10.7m (94.5%).

- After allowing for substitution of activity within the study area the direct impact of angling was found to be £7.2m. Indirect and Induced effects were estimated to give a total local (MBSE) annual output of **£10.9m,** an annual income to households in the MBSE of **£6m** and **367 jobs**.

- The number of **water-sports** activity days was estimated to be **38,190** with a total expenditure by participants of **£1.7m**. Placid water activity on Lochs Morlich and Insh by visitors was the most popular sub-sector with 31,246 days (82%) and total expenditure of £1.46m (87%). The main stem of the Spey had 5607days of paddler (kayaker and canoeists) activity.

- After allowing for substitution of activity within the study area the direct impact of water-sports was found to be £1.1m. Indirect and Induced effects were estimated to give a total local (MBSE) annual output of **£1.7m,** household income of **£0.8m** and **48 jobs**. The direct impact of these activities upon the environment is very small.

- Commercial development should be concentrated on adding value or exploiting under-utilised areas. “Quality” down river descents, wildlife canoe tours and promotion of non-salmon angling are suggested.

- Co-ordinated marketing and management for the whole catchment are required. The partners should determine how this could best be achieved.

Foreword

This research was undertaken by the following team:

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Caledonian Business School — Mr Alan Radford
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Estimates of indirect and induced expenditure were provide by CogentSI Ltd, Killylung, Dumfries, DG2 0RL, Scotland.

CogentSI can provide estimates of input-output and trade tables for any unitary authority or local enterprise company area in Scotland, or combinations thereof. If the distribution of expenditure is known then multipliers for any type of tourist activity in any area can be calculated. We are grateful for their cooperation.

Acknowledgements:
The study team would like acknowledge and thank James Butler, Bob Laughton, Colin Reid, Sandy Main, Dave Craig, Fran Pothecary, Keith Taylor, Andy Freshwater, the many managers of outdoor centres, fisheries proprietors, club secretaries and others who supported this work and gave freely of their time

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SECTION 1 INTRODUCTION

1.1 Background

The River Spey is a central feature of the landscape of North-east Scotland (Badenoch and Strathspey and Moray). It has been both a primary influence on the pattern of development in the area and the source of much of the economic development. Strathspey has a national and international reputation for scenic quality, salmon fishing, whisky distilling and wildlife. In recent years, the special natural heritage qualities of the river and its catchment has been recognised through a number of national and international designations; most recently under European legislation as a Special Area of Conservation. Its importance for other forms of recreation is also developing as these activities (canoeing, kayaking, rafting, and walking (on the Speyside Way)) grow in popularity. The establishment of the Cairngorms National Park and the implementation of the European Community Water Framework Directive only serve to emphasise the need for careful and integrated catchment management.

Against this background, an informal Steering Group comprising the key regulatory bodies in the Spey catchment was formed, whose remit was to produce a Catchment Management Plan (CMP) (Spey Catchment Steering Group, 2003). The group comprises the Spey Fishery Board, SportScotland, Moray Badenoch and Strathspey Enterprise Company, Scottish Natural Heritage, the Scottish Environmental Protection Agency, and the Highland and Moray Councils. Production of the CMP revealed the need for up-to-date information on the volume and value to the local economy of water-related recreation. This study was commissioned and this report to SCSG is part of an on-going wider project by SCSG to inform strategic planning and decision-making in the area.

After discussion it was agreed that, for an economic assessment of the local impact of water based recreation in the catchment, the most appropriate local economic area was that covered by Moray, Badenoch and Strathspey Enterprise. Fig 1.0.1 shows the boundaries of the MBSE study area alongside the boundaries of the catchment. For information the National Park and Local Authority boundaries are also shown, together with the key water features.

1.2 Output

Output from the project consists of two reports; this Research Report and a Summary Report. The Summary Report contains a very limited review of the literature, provides an overview of the research process and presents the principal results. This Research Report provides information on other research (including bird watching), full details of research methods and their success (or otherwise) and details on participants and their interactions with other users. Importantly this report explains in detail the economic analysis underlying the results featured in this report. It should be noted that all statistics relate to 2003 and are in 2003 prices unless otherwise stated.

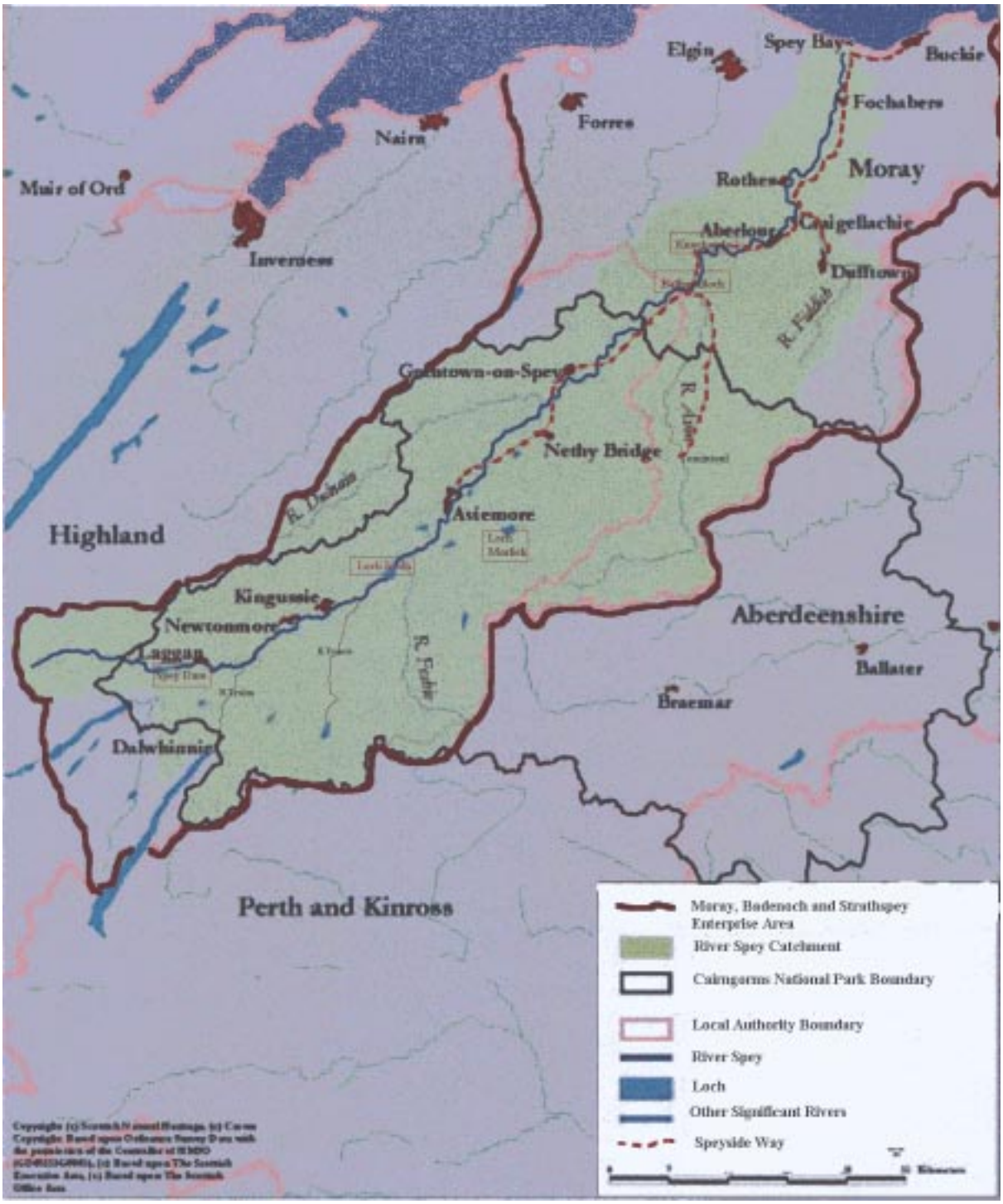

Figure 1.0.1 Map of MBSE, Catchment, National Park and Local Authorities

1.3 Aims and Objectives

The project specification identifies five objectives. The first two seek to measure the level and economic impact on the local economy of water-related tourism activities.

Discussion of other less directly related activities such as bird-watching, river side picnicking, hiking and swimming provide a context for the study.

The third objective seeks to identify the environmental impact of these activities. This involves a qualitative assessment of the impact on both the visual environment and on the ecology of the river.

The fourth objective examines the interaction between anglers and paddlers. This study aims to identify both the numbers involved and the nature of the interactions.

The final objective is to identify some possibilities for expanding water related leisure and recreation. The project aims to identify appropriate criteria for selection and also identifies a number of areas where monitoring and further research would be useful.

1.4 Structure of the Report

The remainder of this section provides a brief overview of the some general issues, as well as key issues associated with the conduct and use of economic impact assessment. Thereafter, the report is structured as follows.

Section 2:	A review of the existing body of theory and knowledge relevant to angling, paddle-sports and other water-related recreation in the Spey catchment.
Sections 3 and 4:	Estimation of activity levels and the associated economic impacts of angling and paddle-sports.
Sections 5 and 6:	Estimation of activity levels and the associated economic impacts of paddle-sports.
Section 7:	Analysis of the nature and frequency of interactions between competing users of the surface water space and riparian land.
Section 8:	Assessment of the environmental impact of recreational activity on the main stem
Section 9:	A review of development opportunities
Section 10:	Presentation of summary and conclusions including a discussion of further research and monitoring

1.5 Measures of Activity Levels and Expenditure

The key measure is the 'activity day' rather than visit or 'activity hours'. This means that if an individual participates in an activity for any part of a day then this is counted as one activity day. his could lead to significant over-estimation of effects. For example, if an individual hires a canoe for two hours for a paddle on Loch Morlich then this is counted as a water sport activity day. Similarly a two-hour visit to the Loch Garten osprey hide would constitute a bird-watching activity day. Procedures were adopted which were sensitive to his issue.

Estimated total activity days by participants are multiplied by the mean expenditure of participants in the activity to give a measure of total expenditure. It is important to recognise that for paddling this applies to 2003 only and for angling a "typical" single year based on an average from 1998 to 2003.

The total expenditure is not however the economic impact, which requires analysis of the proportion of expenditure that is spent on local products (absorption) and would remain in the area if the activity ceased (the substitution effect) and the knock-on (multiplier) effects in the local economy. These concepts are discussed further in section 1.5.

1.6 Cost–Benefit Appraisal and Economic Impact Analysis

The overall project remit refers explicitly to the local economic impact. There are a number of ways of undertaking an economic evaluation, other than assessing the impact of participants' spending on a defined local economy. An alternative approach is the Cost Benefit Analysis framework (CBA). This approach takes the welfare of individuals as its reference point and focuses, among other things, on the number of participants and their enjoyment of their recreational activity. This study offers no formal CBA type analysis and thus, in some respects, has a somewhat constrained focus. Because of this, the consultants would want to issue a strong "health warning" about use of results. It is hoped that, when assessing policy initiatives and development opportunities, policy makers would take a wider view and would not be guided solely by local economic impacts.

1.7 Economic Impact Analysis

1.7.1 Introduction

In the public domain, the magnitude of angler expenditure and its impact on income and employment is often used for advocacy purposes. Unfortunately, the findings of impact studies can be cited and used inappropriately. This might be deliberate but may also be simply misguided. Both culpable and innocent misuse is best tackled by ensuring that the scope and limitations of impact studies are made explicit. Sections 1.5.2 to 1.5.5 introduce some key issues.

1.7.2 Substitution

In assessing the current economic impact one is asking the implicit question *what would happen to income and employment in a defined area if the fishery ceased to exist?* In other words, there is a hypothetical scenario in which fishing or paddling no longer

exists, and an attempt is made to predict what would happen to angler or paddler expenditure and local income and employment. The implied response of the participants is crucial.

Substitution refers to the extent that expenditure on the activity being undertaken simply "displaces" expenditure from other activities in the area. The obvious example is a new supermarket that simply displaces expenditure from existing shops in the area, and may, in fact, have a negative impact on total jobs because of increased productivity. In our case we seek to identify how much expenditure on other activities in the area will expand if water-based activities ceased in order to remove this displaced expenditure from the analysis.

At one extreme, it is possible that all current total expenditure would be lost to the local area. This would happen if all 'recreational visitors' to the Spey catchment now participated in their sport outside the catchment and all expenditure by local participants was diverted outside the area. In these circumstances, total participants' expenditure would be lost to the catchment. This is unlikely and the assumption is often made that 'visitors' have better alternatives outside the area, whereas residents have almost perfect substitutes within the region. This assumption leads some practitioners to focus only on the expenditure that would be lost i.e. visiting participants. Rather than relying on the above traditional assumptions and separating local and visitor spending, this study has sought to identify the actual substitution possibilities available to participants in the main recreational activities, irrespective of where they come from. In this way, the local expenditure that is 'conditional' on the existence of each recreational activity is identified.

The effect of allowing for substitution is also important in remedying any over-estimation arising from the use of an 'activity day'. A casual user who hires a canoe for 2 hours would be recorded as one activity day and the whole of his daily expenditure initially included in the estimate of total expenditure. Substitution analysis results in counting only the expenditure of those are serious enough to leave the area to pursue the activity, and discounts those who would stay in the area and pursue some alternative. This approach is followed, less precisely, by VisitScotland's "Main" and "Other Purpose" categorisation of activity. We prefer the increased precision of substitution measures.

1.7.3 Direct Effects

Once the relevant expenditure change is estimated, the task is to calculate the impact on local output, local incomes and local employment. Some expenditures have a minimal initial local impact. For example, only about 5% of spending on petrol has a direct effect locally, 95% 'bounces off' through the purchasing of inputs from outside. In contrast, a larger proportion of accommodation spending has a local effect. The composition of angler expenditure is important in determining the magnitude of the initial Direct Effect. The Direct Effect is simply the initial increase in local incomes (principally wages) and any increase in locally sourced inputs (i.e. additional local output).

1.7.4 Indirect Effects

There are knock on effects from the Direct Effect. Specifically, the local impact of producing these additional locally sourced inputs is known as the first round Indirect Effect. This effect manifests itself in further increase in local incomes (wages) and further demands by firms for locally produced inputs. The local effect of producing more

local inputs creates further rounds of successively smaller Indirect Effects. The combined impact of the Direct and all the rounds of Indirect Effects is modelled by what is termed **"Type I"** multiplier analysis. Among other things, this analysis would calculate the total local output dependent on the fishery (the Type I **Total Output Effect**) and the total increase in local household income (the Type I **Gross Value Added**).

1.7.5 Induced Effects

As described, both the direct effect and every round of indirect effects increases household incomes (principally wages and income from self employment) and in each spending round a proportion of these are spent on locally produced goods, creating further local income and local output. This is the Induced Effect. **"Type II**" multiplier analysis incorporates these induced effects into the analysis, enabling the estimation of the corresponding Type II Total Output Effects and the Type II Gross Value Added.

1.7.6 Employment

Once the (Type I and/or Type II) local incomes or output impacts are calculated, (Type I and/or Type II) local employment can be estimated through known relationships between output and employment or total wages and employment.

1.7.7 Modelling the Local Economy

In this study, the local area is defined as the Moray, Badenoch and Strathspey Enterprise Area (MBSE). The magnitude of the overall effect on local output, incomes and employment depends on a number of key characteristics of the local economy. An important characteristic is the absorption rate which is the propensity to purchase locally produced goods. A heavy and homogeneous product, such as building materials, would have a high level of absorption in the local economy. If not available locally it will come from sources as close to the area as possible. On the other hand, the 'absorption rate' in financial services would be low relative to cement. The size of the area is also critical, a small economy such as MBSE is unable to supply most of the goods required and consequently the Type 1 multiplier effect is small. Conversely, for the UK as a whole the majority of goods will be sourced within the economy and the multiplier will be relatively large. Also in a small local area a large proportion of the expenditure, notably income tax, employee national insurance and mortgage payments will flow outside the region.

In this study two approaches were used to model the local economy. The first, which applies to the local (MBSE) economy only, involved a telephone survey of firms in the area. The enabled the tracking of rounds of expenditures and their impacts on local output, income and employment as they worked through the MBSE economy. Details and results are given in Appendix 1.2.

The second used an approach developed by CogentSI and utilises specific models for angling and water sports in MBSE. The model incorporates trade matrices between 53 regions for the128 individual Standard Industrial Classification categories generated by an estimated gravity (distance related) model and consistent with known published information. It also utilises the technical coefficients derived from the Scottish Input-Output Tables and again reconciled to known outputs/inputs and estimated flows. Details of the construction of these tables are given in Appendix 1.1. We report the results from the CogentSI Type II model in the main body of the report.

1.7.8 Boundaries

It is important to also recognise that the effects of a change will expand as the boundaries of the study area expand. If a hotel in the MBSE area purchases fresh food from markets in Inverness then additional income from additional customers will in part flow outside MBSE to Inverness. This money is "lost" to MBSE. If on the other hand the hotel is supplied directly from a slaughterhouse and farms in the area then the expenditure will remain in the area and flow on via local purchases by the slaughterhouse, payments to slaughter-men and payments to local farmers. If the boundaries of the area included Inverness then in both cases the money would have remained in the area, increasing any measure of impact.

However it should be noted that the substitution effect increases as the boundaries expand. For example most river canoeists will transfer from the Spey to another river in the Highlands. Hence their income will be lost to MBSE (and the impact therefore counted) but not to Highlands and Islands Enterprise (HIE) area (where it will be discounted).

1.7.9 Use of Results

It is important to realise that this impact study records the current position. The results presented need to be used sensitively in analysing the effect of changes in the current position. For example, a doubling of the returning salmon stock will not result in a doubling of the economic impact of salmon angling. Thus, whilst it is interesting to quote that a rod caught salmon currently generates on average £x in local income, the causal chain between salmon stocks and output, income and employment is complicated and is not linear. Given this, these crude averages need to be used with care. Later in the report we estimate the local income and output generated per angler day. Whilst the relationship between activity days and impact is less complicated than that between say salmon stocks and economic impact, one still cannot assume linear relationships.

It should also be noted that the current size of the economic impact cannot be directly used as an argument for additional resources to be devoted to it. It is the magnitude of the change that additional resources will induce that is important, not the overall size.

1.8 Overview of Research Methods

Details of the research methods utilised are given in the respective chapters. Table 1.6.1 summarises the various survey methods.

Table 1.6.1 Survey methods used in the Study

Data Requirement	Source	Method
Angler Days	Owners	Questionnaire
Angler Expenditure & Interaction	Anglers	Questionnaire
Angler Expenditure& Interaction	Anglers	On Site Survey
Water Sports Days 1	Centres	Survey
Water Sports Days 2	Ghillies/Proprietor	Count
Water Sports Days 3	Paddlers	Self Completion Cards
Water Sports Spend 1 & Interaction	Paddlers	Questionnaire (SCA members)
Water Sports Spend 2 & Interaction	Paddlers Sailors	On Site Survey
Gorge Walking	Centres	Interview
Owner Spend	Owners	Interview
Centre Spend	Managers	Interview
Opportunities	Elite	Interview

The rationale underlying the choice of method, the sample size, response rate (if applicable) and a discussion of the effectiveness is given in the relevant sections.

SECTION 2 REVIEW OF CURRENT KNOWLEDGE

2.1 Angling

The Spey catchment offers a wide range of angling opportunities ranging from internationally recognised salmon angling to more recently established put and take rainbow trout fisheries. The most important type of angling within the catchment is salmon and sea trout angling in the main river. From published angling guides[1] and other *ad hoc* information we estimate the number of salmon and sea trout rods to be 220-250 between Loch Insh and Spey Bay. Salmon and sea trout angling is also available on the major tributaries, Feshie, Fiddich and Avon. Salmon are also caught on Loch Insh.

There are very many waters within the Spey catchment where the keen brown trout fisherman can enjoy their sport. However, in terms of visitor numbers, the brown trout fishing within the catchment is very limited. As well as the Spey itself, brown trout fishing is available on the rivers Fiddich, Lossie, Feshie, Tromie Truim, and Avon. On still waters, brown trout fishing the catchment area is mainly owned by the estates, but are not that heavily fished. Brown trout fishing is available on a number of lochs, lochans and reservoirs. Section 3.2.2 provides a complete listing of these waters.

Rainbow trout fisheries are a popular type of fishery Scotland in terms of activity days. It has been widely recognised that there has been a huge increase in this kind of fishery over the last 10 or 20 years, mainly within the most densely populated areas of Scotland, such as Central Scotland and the North East. In the Spey catchment we have identified four main commercially operated rainbow trout fisheries. These are Rothiemurchus fishery (part of Rothiemurchus estate), Craggan Fishery, Inverlochy Trout Fishery and Glen of Rothes Trout Fishery. They are more accessible to tourists and locals than the brown trout waters situated throughout the catchment. Rainbow trout fishing is also available at Avielochan. They are also a cheaper, more cost effective alternative to salmon fishing on the Spey, not to mention the fact that the catch rate in a rainbow trout fishery would be in the order of 20 times higher than some of the Spey beats

Within the catchment, coarse angling is available at Loch Insh, Loch Einich, Loch Alvie, Loch Pityoulish with notable pike fishing on Loch Gynack, Loch Insh, Loch Dallas and Loch Morlich.

There have been four previous studies of the economic impact of angling in Scotland. Two of these had a direct focus on the salmon and sea trout fishing on the River Spey. The other two are of interest for comparative purpose. The four studies are:

- Tourism and Recreation Research Unit of Edinburgh University study of salmon and sea trout angling in Scotland
- Mackay Consultants study of salmon angling in Scotland

[1] Sandison B. (1997) Rivers and Lochs of Scotland: The Anglers Complete Guide, Merlin Unwin Books. Angling Times (2001) The Ultimate Guide to Freshwater Fisheries in the UK and Ireland, HCC Publishing Ltd 2002. Where to Fish 2002–2003. (2002) The Angling Directory: 88th Edition, Thomas Harmsworth Company 2002. John Ashley Cooper, Great Salmon Rivers of Scotland (1987) HFG Wotherby. Wightman A. (1996) Who Owns Scotland. Canongate Books

- Deloitte and Touché study of freshwater fishing in the Tweed catchment
- Fisheries Resource Management study of freshwater fisheries in the Western Isles

2.1.1 Tourism and Recreation Research Unit (1982)

The survey instruments were a combination of face-to-face interviews and self-completion questionnaires. These two instruments produced 147 observations across three areas (Kyle of Sutherland, the Tay and the Spey). The Department of Agriculture and Fisheries (DAFS) provided estimates of rod days obtained via a form sent out by DAFS to proprietors of fishing's along with the salmon and sea trout catch return form. Combining the mean expenditure with the rod days estimates produced the following expenditure figures for the three study areas[2].

Table 2.1.1.1 Expenditure Estimates TRRU 1982 (2003 prices)

Area	Rod Days	Local Expenditure	Non-Local Expenditure	Total
Kyle of Sutherland	7,053	1,134,128	416,618	1,550,747
Tay	42,018	8,031,480	1,874,783	9,906,263
Spey	**62,230**	**13,262,357**	**3,332,948**	**16,595,305**

The 62,230 salmon and sea trout angler days on the Spey seems high not only in relation to other rivers, but also as a proportion of all rod days in the Highlands (see table 2.1.2 below). For all three areas the implied daily spend is over £200.

The rod day estimates were also used to produce a figure for expenditure across the whole of Scotland. The regional rod days recorded and extrapolated from the returns is given below.

Table 2.1.2 Regional Rod Days TRRU (1981)

	Recorded rod days	Estimated rod days
Borders	15,504	22,291
Central	3,310	4,729
Dumfries and Galloway	34,741	49,630
Grampian	74,179	105,970
Highland	70,509	100,727
Strathclyde	17,934	25,620
Tayside	43,140	61,629
Western Isles	2,175	3107
Scotland Total	261,592	373,703

The total expenditure on salmon angling in Scotland in 1982 was estimated to be between £50m and £105m with the best estimate being £79m implying an average daily expenditure of £211.

2.1.2 Mackay Consultants (1989)

In the Scottish context, the study by Mackay Consultants (1989) has been singularly important as a benchmark measure of angler expenditure. This was a wide ranging study that not only sought to establish the pattern and impact of salmon and sea trout

[2] All monetary values are expressed at 2003 prices

angler expenditure, but also the economic importance of netting and the organisation and promotion of salmon and sea trout angling as a tourism asset. Sample data on angler expenditure were obtained through a mixture of on site surveys, a postal survey (names and addresses provided by hotels and fishery owners) and questionnaires left with tackle shops, hotels proprietors etc. A total of 2,364 responses were received and the calculated average daily expenditure was £124.34[3]. This was combined with an estimate of 435,000 total Scottish rod days for 1988. Regionally the best estimate of rod days distributed as follows[4]:

Table 2.1.2.1 Regional Rod Days (Mackay Consultants, 1989)

	Rod days		Rod days
Borders	28900	Highland	112600
Central	6400	Lothian	-
Dumfries and Galloway	56800	Strathclyde	33800
Fife	1300	Tayside	70300
Grampian	121600	Western Isles	3200

These figures are higher than those made by DAFS in 1982. On this basis, Mackay estimated the direct expenditure of all salmon anglers in Scotland to be £54 million. As far as substitution is concerned, no distinction was made between the impact of visiting anglers' expenditure and that of resident Scottish anglers' expenditure on the Scottish economy. This implies that if salmon angling did not exist, all domestic (and visitor) expenditure will be diverted out with Scotland. Mackay assumes a multiplier value of 1.5, and given this the total expenditure in Scotland derived from salmon angling (the sum of direct, indirect and induced expenditure) was estimated to be £81.12 million.

The Mackay study also generated descriptive sample statistics for the ten case study areas Lewis and Harris, Thurso, Conon, Orchy, **Spey**, Dee, Tay, Lomond, Nith and the Tweed. These are presented here for comparative purposes.

The information on rod days for the case study areas was believed to be better than the regional rod days (see above), though the Tweed figure seems relatively low.

Table 2.1.2.2 River Rod Days (Mackay Consultants, 1989)

	Rod days		**Rod days**
Lewis and Harris	2,400	**Dee**	56,800
Thurso	3,900	**Tay**	44,000
Conon	9,100	**Lomond**	11,100
Orchy	2,000	**Nith**	11,900
Spey	**62,100**	**Tweed**	19,400

The accuracy of the angler days is crucial since this is the scaling factor. The Mackay estimate for angler days on the Spey is very similar to the TRRU study; however it is unlikely that the Spey would have nearly three times the angler days of the River Tweed.

[3] £77.25 in 1988 prices is derived from the average of anglers across ten case study rivers and not the whole sample of 2,364 (see page 113)

[4] The angler day's estimates were derived from a survey of 95 proprietors covering 202 beats across the whole of Scotland.

The Tweed angler days may have been underestimated or the Spey overestimated or some combination of both. The corresponding daily and total expenditures are given below:

Table 2.1.2.3 Angler Expenditure (Mackay Consultants, 1989) (2003 prices)

Region	Average Daily Expenditure	Gross expenditure generated	Local expenditure generated	Expenditure Multiplier	Total
Lewis and Harris	£250	£601,579	82.4%	1.13	£560,142
Thurso	£180	£439,035	83.3%	1.28	£468,116
Conon	£156	£948,104	85%	1.19	£959,007
Orchy	£144	£166,011	88%	1.20	£175,307
Spey	**£141**	**£9,674,556**	**91.4%**	**1.28**	**£11,318,457**
Dee	£112	£8,222,619	92.5%	1.34	£10,191,937
Tay	£104	£6,235,783	91.4%	1.35	£7,694,332
Lomond	£83	£377,156	80.1%	1.26	£380,648
Nith	£75	£888,164	85.1%	1.22	£922,110
Tweed	£34	£3,499,452	91.7%	1.2	£3,850,798

The range of per capita daily expenditure is unexpected. The Tweed is by reputation one of the most expensive fisheries in terms of permit charges and the Western Isles fishery one of the cheaper. Generally, daily spending figures seem relatively low given the level of permit charges and accommodation costs. The daily expenditure figures are less than in the TRRU study and our own survey work generated larger estimates of daily spending. The Mackay estimates are based on quite large sample sizes.

In Table 2.1.2.3 above, the local expenditure adjustment percentage simply reflects that some recorded expenditure was not even spent in the case study area (principally transport). The multipliers are expenditure multipliers that include indirect and induced effects (i.e. type II multipliers), and are estimated from primary data from the owner survey and other information on the local economy. There is no detailed explanation of how they were derived. Using the ratio of £24,150 of final expenditure to each full time equivalent job (F.T.E.), it was estimated that 3,360 jobs in Scotland depended on the £81.12m expenditure generated through salmon and sea trout angling. This ratio is based on the relationship between fishery proprietors' revenue and their observed number of employees, with a 20% increase to reflect higher wages outside fishing. The Mackay study does not estimate local value added

2.1.3 Deloitte and Touché (1996)

Deloitte and Touché (1996) adopted a similar approach to Mackay in their assessment of the economic impact of freshwater fishing on the River Tweed main stem and tributaries. In addition to elite interviews and specially commissioned cross tabulations of the United Kingdom Tourism Survey data (UKTS), they also used a range of survey instruments:

- Interviews with local businesses (to establish multiplier effects)
- Interviews with proprietors or others to establish permit sale
- Postal survey of anglers to establish angler spending

They established the number of angler days for four groups of anglers:

- salmon visitors staying in the area
- salmon fishers on day trips,
- other non-salmon visitors
- other day trippers

Salmon visitors were initially estimated through a top down analysis of UK Tourism Statistics. Of the 300,000 domestic tourist trips to the Borders Region 3% to 3.5% had coarse/game fishing as the main purpose. After various adjustments, this group were estimated to account for 36,036 angler days. This was consistent with an analysis of the room stock in the area. Interviews with proprietors indicated that a further 5,400 salmon rod days would be taken by day fishers (4,500 of which are non-local day trips). This suggests a total of around **41,500** angler days. A bottom up analysis of beats and occupancy levels conducted in cooperation with James Leeming, the main Tweed letting agent suggested 39,500 salmon and sea trout rod days. It is reassuring that these figures are so similar and the figure of **40,000** salmon and sea trout angler days seems an appropriate estimate of the number of days at the river bank.

This differs substantially from the Mackay estimate of **19,400** angler days. With respect to daily expenditure, Deloitte and Touché estimate £187 for visitors and £81 for day trips. Both these estimates are substantially larger than the £34 estimated by the Mackay study.

When non-fishing companions are included and allowance made for non-fishing days by visitors, total expenditure is estimated to be £11.26m. Deloitte and Touché estimated that £8.4m of this (73%) is retained in the first round of expenditure. Most of this will be value added (wages to ghillies, hotel and restaurant workers), but some will be locally purchased inputs. £5.5m (65%) is retained in the next round. This is quite a high retention rate, given prevailing tax rates, and the small proportion of goods and services that will originate within the Borders area. Subsequent rounds are assumed to have a retention rate of 25%, producing further total retention of £1.4m. The sum of retained expenditure is thus £15.3m. Given the original direct expenditure of £11.36m this implies an (expenditure) multiplier of 1.35. The authors suggest that this implies an output multiplier of 0.34, but do not explain the logic of this.

The total 'economic impact' is stated as £15.3m. This is simply total expenditure on all goods (final and intermediate) and is not synonymous with local output or local income (i.e. value added). Employment is estimated by assuming full costs of employment of £29,025 and dividing the £15.3m turnover/expenditure by this figure. Thus, 520 jobs are estimated to be dependent on salmon and sea trout angling. If employment estimates are to be based on the wage costs per FTE, then arguably one should divide the wage bill, by £29,025.

2.1.4 Fisheries Resources Management (FRM) (2000)

In a study for the Western Isles Fisheries Trust, FRM estimated the economic contribution of recreational freshwater fisheries to the Western Isles. This is an extensive

and very detailed study that examines many dimensions of freshwater fisheries in the Western Isles. FRM used a variety of survey instruments:

- McPherson Research conducted a survey of 2004 face-to-face interviews with visitors between May and October 1999. This survey included a specific subset of questions related to angling.
- 2,000 self-completion questionnaires were distributed to anglers at designated points of exit; 320 were returned. In addition 35 face-to-face interviews were conducted using a scripted version of the self-completion questionnaire.
- A stratified telephone survey of 782 household on the Western Isles
- A survey of all known clubs and proprietors on the Western Isles. Of the 32 known 21 responded
- Additional survey work on three case study areas (Kildonan catchment, the River Creed and Valtos peninsula

This study is interesting because it used the number of visiting anglers as the scaling factor, since this control total was available from the McPherson study. In this report, the implied total salmon angler days (by visitors and residents) are over 40,000.

There are some problems in reconciling this 40,000 with other information. First, both the DAFS estimate of 3200 days for the Western Isles and the Mackay study's estimate of 2400 salmon and sea trout angler days for Lewis and Harris are completely different orders of magnitude. Second, the study's own survey of owners estimates that there are 22,000 salmon and sea trout rod days, but that only 22% are taken up. This implies a total of 4,620 rod days; much closer to the DAFS and MacKay estimates. Third, the official salmon and sea trout catch for the Western Isles for the year 1998 was 3,763 fish. The FRM study reports a catch of 0.56 salmon and sea trout per day. This suggests about 6,700 salmon and sea trout angler days. Fourth, the FRM study's survey of owners estimates a total catch of 3,563 salmon and sea trout and combining this with the catch per day of 0.56 would produce 6,400 days. In contrast, combining the 40,000 estimated angler days with the catch rate of 0.56, suggests anglers in the Western Isles would be catching 22,400 salmon and sea trout. This is much more than the Spey or the Tweed.

In estimating multiplier effects and employment dependency, the FRM study adopted a slightly different approach from both Mackay Consultants and Deloitte and Touch. Their expenditure multiplier was a Type I multiplier (induced effects ignored) derived by other research workers from input output analysis of the Western Isles. Their expenditure multiplier was 1.14. Employment was derived from known relationships between the value of output and the amount of labour required to produce it across various sectors in the Western Isles. These employment coefficients were applied only to the first round expenditure, and not the total expenditure.

2.1.5 Conclusion

In general there are some problems in reconciling the previous studies of the economic impact of angling in Scotland. The Mackay and TRRU estimates of angler days are very similar, although there are substantial differences between them in the average daily spend. The Deloitte and Touché study of the Tweed, generated an estimate of Tweed angler days that differed substantially from the MacKay estimate, but was more credible and their estimate of daily spending was a quite different order of magnitude from the

Mackay study. Overall, our knowledge of the economic impact of angling is patchy and a little confused.

2.2 Water Sports

Information on paddler numbers let alone economic impact of inland water-sports is noticeably poor. The STB visitor survey of 1989 found a total spend of £210m for water-sport based recreation by visitors. Later work suggests that this is likely to have been a substantial over-estimate. Possibly the best source is The UK Visitor Survey which identifies the origin, destination and activities undertaken by UK visitors. In 2001, UK residents who took part in water-sports holidays (where water-sports were the main reason for the holiday trips) spent £48m, undertook 200,000 trips and stayed 0.6 million nights. In addition a further 800,000 undertook water-sports whilst on holiday (as opposed to a water-sports based holiday).

Church et al (2001) carried out extensive research in England and Wales for DEFRA to establish base line facts on factors such as the length of potential navigable waters and their location, the number of participants and the legal background. They found that some 12% of the population (5m people) made some use of inland water and some 3% (1.2m) regularly participated in water based sport and recreation.

Included in the water-sports category in addition to sailing and paddle sports are power boats/water skiing and sub aqua. Mintel (1998) estimated the participation and growth in a range of water sports as in table 2.2.1

Table 2.2.1 Participation estimates for a range of water sports in the UK

	Club Members	Regulars	Occasional	Trend over Time
Dinghy Sailing	87,000			Up
Windsurfing		640,000		Down
Water-Skiing	9,000	80-100,000	400,000	Static
Canoeing	35,000	100,000	500-1,000,000	Up
Fishing	1,500,000	3,000,000		Static

Source: Mintel (1998)

The data was collected from a variety of sources with differing definitions and is partial. As Church et al (2001) state “one of the reasons for the lack of progress has been the disparate and partial nature of the data available. In terms of consumption and demand, there are few comprehensive data, with the principal one, the UK Domestic Visitor Survey, having significant shortcomings…” (Church et al 2001: 107). There has been no attempt was made to evaluate the economic impact of water sports activities in the UK.

In Scotland, in response to a parliamentary question April 2000 Visit Scotland suggested that Sailing contributed some £10m to the Scottish economy, “Activity Holidays” £240m, Fishing £80m and Walking some £440m. (Reported in *Participation in Outdoor Sports Activity* Research Digest 85, Sport Scotland, August 2001).

Higgins (2000) utilised estimates obtained from the STB and SNH to produce an overall estimate for “outdoor” recreation spend by visitors of between £600m and £800m of which some 7% was water based. The resulting range of £42m to £56m is compatible

with the latest information produced by VisitScotland (2003). These discuss Sailing and WaterSports without estimating expenditures. However the percentage of foreign visitors who take part in water activity is given (9%) together with the percentage of UK Holiday Makers who sail in Scotland (4%). After allowance for motor cruising the resulting estimate is of the order of £80m.

Higgins (2000) also employed multiplier analysis to identify the economic impact of outdoor education centres that invariably have a water-sport element. Centres such as Glenmore Lodge are shown to have an important role as an employer in relatively fragile rural economies.

The impact of paddle-sports on even the Spey Valley let alone the Scottish Economy is unknown. To the "tourist" (overnight) market must be added the unknown impact of the day-tripper market and the impact of capital purchases for water-sports. The proportion attributable to paddle-sports must then be identified.

At the Spey regional level the only information that could be found was from the Final Report of the 1998-99 Rothiemurchus and Glenmore Recreation Survey (Mather (2000)). In this study, of the 1762 people interviewed, the 'main activity' of 3% was stated as water-sports whilst 1.7% stated it as an 'other activity'. At Rothiemurchus the figures were 0.2% and 0.7% respectively. The report suggests the best estimates for the year for Glenmore is 270,000 and for Glenmore and Rothiemurchus 395,000. Taking 'main' and 'other' together and utilising the difference of 125,000 for Rothiemurchus we obtain a water sport number of 13,815 (4.7% * 270,000 + 0.9% * 125,000). As we shall see in section 5.2.2, this tallies with the results of the on-site survey conducted for this study.

We were unable to identify any material on economic value of gorge walking (a.k.a. canyoning) in any part of the UK or world.

2.3 Bird Watching

Whilst bird watching is excluded from the main brief some mention should be made of it. No survey work was carried out to support the following analysis; however several published reports were reviewed. There is no doubt that the bird-life of Strathspey is a major attraction for some visitors who may consider bird watching as the main or subsidiary purpose of their visit. Whilst many will be interested in a wide range of bird species in a number of habitats the presence of birds which live on and around water bodies (lochs and the river) are a major attraction to some visitors. Most notable amongst these is the osprey (*Pandion haliaetus*) and the associated RSPB visitor centre at Loch Garten. However the presence of internationally important wader populations, whooper swans (*Cygnus cygnus*), ducks (e.g. goldeneye (*Bucephala clangula*) and spotted crakes (*Porzana porzana*) on and around Insh Marshes (a Ramsar Site)[5] are an important attraction to birdwatchers. The fact that some species are winter visitors adds to the year-round economic significance of bird watching to the local community.

In 2002 Shiel *et al* (2002) updated an earlier (1996) RSPB report on the local economic impact of their **Abernethy reserve**. The author had full access to budgetary information and also used a range of standard economic techniques and published multipliers to

[5] An internationally conserved area of wetland

extrapolate from direct effects to indirect expenditure and employment in the community. The key results relevant to the present study are as follows:

Table 2.3. Abernethy Forest Reserve: Direct and Indirect Employment (1999/2000)

	Employment (fte)
Direct employment	15.5
Spending by employees	1.5
Direct reserve expenditures	4.5
Grazing lets/agricultural tenants	3.3
Products from reserve management	0.3
Employment due to visitor spend in local community (£1.4m)	40.0
Total Employment	**65.1**
Notes: 1 The figure of £1.4 excludes visitors who use the reserve but do not visit the Osprey Centre. 2 Between 1998 and 2001, the estimated number of visitors to the Osprey Centre averaged 33,600 p.a. compared with 72,400 in 1989. 3 It is estimated that the total annual number of visitors to the Abernethy Reserve (includes Forest Lodge and part of the Cairngorm Plateau) is 70,000. In 1994, there were 100,000 visitors	

Source Sheil *et al* (2002:23)

The average visitor spend was put at £41 which is similar to our estimates for spend by overnight visitors. This figure was then multiplied by all visitors to the centre, despite the fact that for RSPB reserves as a whole, 30% were local, and 26% were day trippers.

There might also be a problem of over-estimation, because of the failure to address the issue of substitution. The study is framed in the context of the impact of Scotland, in part because the multipliers and Input-Output tables are Scottish based. However within this large area substitution effects predominate. In an undergraduate project trying to evaluate the "economic value" of the Cairngorm plateau, MacAlinden (1998) surveyed RSPB members who visited this small area. It was found that a majority would have gone to the plateau even had there been no chance of seeing the rare bird species and that the RSPB members came to the area predominantly for the mountain environment and for walking. In the large area it is reasonable to assume that the vast majority of visitors to Abernethy would simply have moved their expenditure to something or somewhere else within Scotland. On the basis of the funding source and the arguments presented above, the economic impact for Scotland is little more than those directly employed at Abernethy and the associated induced effect of their expenditure. Even at a local level, substitution will be significant with local, day trippers and overnight visitors undertaking some other activity in the area.

There is no detailed study of the local economic impact of **Insh Marshes** However some indication of the significance of the reserve can be obtained from the 2000/2001 Annual Report (Prescott, 2001). This reserve has no visitor centre and is essentially open with several obvious access points leading to hides and marked trails etc. Consequently visitor numbers are difficult to estimate, but in 2000/2001 a total of around 12,700 were thought to visit the reserve. The employment situation at the reserve is

difficult to discern from the report, but in addition to a full-time Warden there is a part-time Field Teacher post and a variable number of volunteer staff. Figures for local expenditure are not provided in the report but the normal day-to-day management expenditure and that resulting from grants for fencing etc will all make a modest contribution to indirect local employment.

Whilst an estimate of local employment as a result of these RSPB reserves can be made it would be difficult to assess to what degree the attraction of bird species associated with the River Spey, Insh Marshes, Loch Garten and other lochs are central to this. Nonetheless, the national reputation of the Osprey Centre and the associated attraction of other species and aquatic habitats must play an important part in the choice of some visitors to come to Strathspey. The size of the substitution effect requires further and more detailed study as part of an overall assessment of recreation associated with the Spey and its associated water bodies.

Finally it should be noted that the Abernethy report claims that the figures used are conservative. One of the suggested impacts not counted is the expenditure on other activities in the area. It is suggested that this could be attributed to the reserve, as the "reserves play a role in encouraging people to stay in the area for several days". This is contentious and could lead to extensive double counting as each activity in an area claimed it was the reason visitors came. This could be indicative of an approach to economic impact analysis, which is designed to promote an agenda rather than inform policy makers.

SECTION 3 ANGLING ACTIVITY LEVELS

3.1 Research Method

At the tendering stage, the contractors were also engaged in the initial stages of a study on freshwater angling for Scottish Executive Environment and Rural Affairs Department (SEERAD study). The SEERAD angling study required the collection of extensive data from surveys of fishing proprietors and anglers. It was originally anticipated that these two studies would have significant common elements that would facilitate the two-way sharing of primary data. In the event, whilst a common research strategy was appropriate, this study required more extensive data collection.

The estimation of angler expenditure in the Spey catchment or Scotland as a whole, would be considerably easier if lists were available of all anglers' names and addresses. The availability of such lists would have three advantages; samples could be scaled because the population size is known, random or stratified samples could be drawn easily and anglers could be contacted by postal or telephone-based survey instruments. The absence of such lists meant that if the stated project aims were to be realised the following has to be obtained:

1 Mean expenditure estimates for each type of angling in the Spey catchment (E.g. expenditure per angler or per angler day or per fishing trip).

2. A scaling factor (e.g. total number of anglers or angler days or angler trips for each type of angling in the Spey catchment) that is consistent with the preferred mean expenditure estimate.

3 A breakdown of angler expenditure by angler origin (e.g. proportion of expenditure originating from within MBSE, from within Highlands, from within Scotland, from outside Scotland).

4 The substitution possibilities available to visitor and local anglers.

5 Interactions between recreational activities in the catchment.

In the Spey context, individual anglers can be contacted using various *ad hoc* approaches, such as self-completion questionnaires left with clubs and proprietors, postal questionnaires distributed by clubs, web-based questionnaires. It is therefore possible to obtain data from anglers such as mean expenditure per day/per angler for each type of angling in the catchment. In addition, displacement effects can be analysed by presenting counterfactual situations within a structured questionnaire. This kind of instrument can also reveal anglers' perspectives on interactions with other users. Thus, the survey of anglers was designed to generate the information requirements (1), (4) and (5), above.

The angler expenditure data needs to be scaled. Other than *angler days*, we could not envisage any factor that could be used to scale mean expenditure statistics. We considered and dismissed variously; anglers, angler trips, catches, acreage of surface water and length of bank. One possibility is to use salmon and sea trout catches, since

these are collected and published by the Fisheries Research Service (FRS).[6] Unfortunately catch statistics are not available for other types of angling and to be consistent with the parallel SEERAD study, as well as previous work by Mackay Consultants, it was more appropriate to use angler/activity days as the scaling factor[7]. It is generally the case that owners / estate managers / club secretaries know or can estimate the extent of fishing effort (angler days) on their waters. Indeed, such individuals are the only repository of this information. In addition, they will have some knowledge of where their anglers come from. The owner survey was therefore used to generate information on (2) and (3) above, and to provide the owners' perspective on (5).

3.2 The Survey of Owners

From the above, the survey of owners sought to establish:

- Estimates of **angler days** for each type of angling within the catchment.
- Estimates for each type of angling of the **proportion of angler days** that are respectively from MBSE, from Highlands, from within Scotland and non-Scottish visitors.
- The owner' perspective on the **interaction** with other recreational activity

3.2.1 Salmon and Sea Trout Fisheries

In the case of salmon and sea trout fisheries, the Spey Fishery Board (SFB) volunteered to disseminate questionnaires to the appropriate contact for every salmon and sea trout fishery (see Appendix 3.1 for a copy of the questionnaire) in the catchment, as well as owners of other fisheries known to SFB. The questionnaire design thus accommodated sections on other fisheries that the owner/manager may control. Indeed, sections were colour-coded according to species (salmon and sea trout, brown trout, rainbow trout, pike fishing). Assurances about confidentiality required that completed questionnaires were returned directly to Glasgow Caledonian University.

Out of 41 owners, a total of 31 returned a questionnaire (76%).Of these, 30 gave information on salmon and sea trout fisheries, nine on brown trout, three on rainbow trout and two on pike angling. Inevitably, there were some owners who did not respond and it is necessary to scale for non-response. Fortunately, FRS obtains catch returns from proprietors through an annual questionnaire sent to proprietors under the provision of section 15 of the Salmon and Freshwater Fisheries (protection) (Scotland) Act 1951, as amended by the Salmon Act 1986. The catch returns are collected on a confidential basis and the catches of individual ownerships are not revealed to the SFB. FRS makes no attempt to correct for their non-returns or gaps in the register of proprietors. For example, in 2001, 1914 forms were sent, of which 96% were returned. This was a typical non-response rate for the FRS annual survey.

The operating hypothesis was that the catch per unit of effort of those who returned our questionnaire is likely to be similar to those not responding. Given this, since the questionnaire reveals catch and effort statistics from respondents (five year average catch and angler days), we can use the known FRS catch (the Spey catchment five-year salmon and sea trout catch) to scale for non-response.

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[6] FRS statistics were used to scale for non-response from owners.

[7] The Spey Partners had a preference for replicating the approach of Mackay Consultants.

Table 3.2.2.1 gives the Spey catch for the past five years.

Table 3.2.1.1 Spey Catchment Salmon and Sea Trout Catch 1998-2002

Year	Salmon & Grilse Released	Salmon & Grilse Retained	Total Salmon Catch	Sea Trout Released	Sea Trout Retained	Total Sea Trout Catch	Total S & ST Catch
1998	419	8335	8754	56	3936	3992	12746
1999	561	5820	6381	220	2901	3121	9502
2000	1376	7392	8768	398	3564	3962	12730
2001	1724	6038	7762	317	3136	3453	11215
2002	1953	4375	6328	397	3936	4333	10661

Source: Fisheries Research Service

The first row of Table 3.2.1.2 below presents the five year averages calculated from FRS data. In the second row, the averages have been adjusted upwards by 5% to reflect the non-response element in the FRS catch returns. The sample five year average was obtained by summation of respondents individual five year salmon and sea trout catch. It can be seen that the sample captured a large proportion of the catchment's official catch of salmon and sea trout. These percentages are a proxy for the response rate. The last row is the implied adjustment factors that could be used to scale for non-response in the sample.

Table 3.2.1.2 Sample Catch as a Proportion of Official Catch

	Salmon	Sea trout	Salmon and Sea Trout
FRS Five Year Average	7599	3772	11371
Adjusted FRS Five Year Average	7979	3961	11939
Sample Five Year Average	6493	3789	10,282
Ratio of Sample to	81%	96%	86%
Adjustment Factor	1.23	1.05	1.16

If the non-response is adjusted only on the basis of the salmon catch (1.23) the presumption is that sea trout is simply a by-catch and there is no sea trout specific angler effort. It is possible that on the lower stretches of the river, sea trout is essentially a by-catch, or effort is simply switched when one is caught. It is however unreasonable to assume that sea trout is always a by-catch and we should not scale simply on the basis of the salmon catch (or the sea trout catch). The most appropriate adjustment factor is that derived from the combined catch **1.16.** This adjustment recognises that some angling effort is devoted to sea trout and is used to estimate angler activity days in Section 3.4 below.

3.2.2 Other Fisheries

Our information on the brown trout, rainbow trout and pike fishing in the Spey catchment came from two sources. First, as described above, from the owners' questionnaire distributed by SFB and second from the SEERAD study. For the SEERAD study, the consultants had established a comprehensive inventory of all non-salmon and sea trout

fisheries by principal type[8]. There are many secondary sources that provide descriptive information about Scotland's freshwater fisheries. The most comprehensive and reliable source was Sandison (1997) This is an important and extensive outline of Scotland freshwater fisheries. Other publications and information from angling web sites were similarly useful.[9]

Efforts were made to contact every proprietors / estate manager / club secretary. Some organisations provided contact details or mailed postal questionnaires on our behalf. In other instances, owners were contacted via telephone or personal visit. In others, local knowledge was used to provide the required information on angler days and origins. Whilst the aspiration was to obtain information on every fishery there is a problem of non-response which may arise because:

- Fisheries were overlooked in database construction.
- No contact details available.
- Available contact details were inaccurate.
- Contact could not be establish, either by phone, mail or personal visit.
- Contact was established but there was a refusal to respond.

For rainbow trout, brown trout and pike fisheries, there is no obvious factor to scale for non-response. If was therefore necessary to make a judgement about the number of angler days (and angler origins) on non-responding fisheries. This was based on the number of angler days typically encountered in the region for a fishery of comparable size and type.

At some locations, anglers fish for a number of species. An example is Loch Insh which has salmon and sea trout, brown trout and pike. In these cases, the fishery was entered under each species heading as a separate entry. The table below outlines the coverage of fisheries in the Spey catchment. There are two types of estimates. First there are those estimated by the owners/estate managers/club secretaries/tackle shops. In the table below, these are labelled 'given estimates' and constitute the greatest proportion of fisheries within the catchment. Given estimates may have been a return specific to an individual fishery or the proprietor might have provided an estimate that related to, say, all brown trout lochs and lochans on the estate. The second type of estimate is where we have had to make an adjustment for non-response. Estimates for non-response fisheries were derived on the basis of activity levels observed in similar fisheries in the same region. The fisheries for which we have 'derived estimates' are also given in the table below. 86% of angler days were from given estimates. Given our assurances about confidentiality, information is presented such that individual fisheries are not identifiable.

[8] In the case of salmon fisheries the District Salmon Fishery Boards have this information and assisted with the dissemination of questionnaires for river catchments. Given this, and the existence of a scaling factor for salmon and sea trout, there is no need to establish an inventory for salmon and sea trout. The inventory was restricted to brown trout, rainbow trout and coarse fishing.

[9] Angling Times (2001) The Ultimate Guide to Freshwater Fisheries in the UK and Ireland, HCC Publishing Ltd 2002. Where to Fish 2002–2003. (2002) The Angling Directory: 88th Edition, Thomas Harmsworth Company 2002. John Ashley Cooper, Great Salmon Rivers of Scotland (1987) HFG Wotherby. Wightman A. (1996) Who Owns Scotland. Canongate Books

Table 3.2.2.1 Non Salmon Fisheries

Given Brown Trout Estimates	Given Coarse Fish Estimates	Given Rainbow Trout Estimates
Avielochan Craggan Fishery Glen of Rothes Trout Fishery Jock of the Bog Loch a'Gharbh-choire Loch Alvie Loch Beag Loch Dallas Loch Garten (RSPB) Loch Gynack Loch Insh Loch Laggan Loch Mallachie Loch Morlich Loch Pityoulish Loch Vaa Lochan an t-Sluie Lochan Dubh Lochan Geal Lochan na Beinne Lochan nam Bo River Spey & Tributaries Spey Dam Uath Lochan	Loch Alvie Loch Insh Loch Morlich River Spey & Tributaries Spey Dam	Avielochan Craggan Fishery Glen of Rothes Trout Fishery Inverlochy Trout Fishery Rothiemurchus Fishery
Derived Brown Trout Estimates	**Derived Coarse Fish Estimates**	**Derived Rainbow Trout Estimates**
Loch an t-Seilach Loch Coire an Lochain Loch Einich Loch Etteridge Loch Mhic Ghille-chaoil Loch na Cnapan Loch na Stuirteag Lochan an Dabhaich Lochan Beanaidh Lochan Dubh Lochan Odhar Lochan Uaine Park Loch Phones Loch	Loch Beag Loch Pityoulish	None

3.3 The Anglers' Survey

The Anglers' Survey sought to establish:

- The average expenditure per angler day for the various categories of anglers.
- The alternatives available to anglers if their 'first choice' form of angling were not available in their preferred region.
- Anglers perception of the interaction with other recreational water users

Two survey instruments were employed. The Spey Fishery Board distributed 2,000 self completion questionnaires among fishery proprietors (see Appendix A3.2. for a copy of the questionnaire). In addition, questionnaires were administered on a face-to-face basis at various positions along the River Bank.

By itself, the angler survey is simply not designed to estimate aggregates such as the number of Spey trips, total catch or total expenditure etc. In this study, the relevant population is the number of angler days and the unit of observation is angler days. The angler questionnaire thus seeks, for each type of fishing, to collect observations on angler days, primarily to estimate expenditure per day. The angler questionnaire is sectionalised by fishing type and if an angler has engaged in salmon and brown trout angling then his/her questionnaire should generate observations on a typical angler day on two types of fishing. The table below outlines the spread of such observations across regions and fishery types.

Table 3.3.1 Observations by Fishery Type and Region

Home Region (Count)	Salmon & Sea Trout	Brown Trout	Rainbow Trout	Pike	All
MBSE	43	22	14	12	91
Rest of Highlands	8	3	7	0	18
Rest of Scotland	36	6	4	0	46
Outside Scotland	190	20	5	2	217
TOTAL	**277**	**51**	**30**	**14**	**372**

Since the unit of observation is angler days, it does not make sense quote a response rate based on the number of anglers responding. What is important is whether there are a sufficient number of observations to derive robust mean expenditure estimates for the various forms of angling. The appropriate response rate is the percentage of total angler days captured by the sample. The total number of angler days made by anglers responding is given in the Table 3.3.2 below.

Table 3.3.2 Implied Response Rate

	Total angler days from the angler survey	Total angler days from the owner survey[10]	Implied response rate
Salmon & Sea Trout	5861	40543	14.5%
Brown Trout	834	4815	17.3%
Rainbow Trout	552	8186	6.7%
Coarse Fish	177	1202	14.7%
All	**7424**	**54746**	**14.9%**

[10] Data drawn from Section 3.4

There were 222 questionnaires returned from the postal survey and 56 anglers completed the on-site face-to-face questionnaire. A t-Test was conducted to test for any significant difference between the observations generated by these survey instruments. The test was conducted on the total expenditure of anglers. The results below confirm that there was no difference between the two data sets. Tests on mean expenditure and other variables produced the same conclusion

Table 3.3.3 t-Test: Two-Sample Assuming Equal Variances

	postal	*on site*
Mean	4986.492	4156.875
Variance	38861052	20650913
Observations	222	56
Pooled Variance	35232220	
Hypothesized Mean Difference	0	
Df	276	
t Stat	0.934665	

3.4 Estimated Angler Days

3.4.1 Salmon Angler Days

The owner survey revealed that the fisheries of those responding had a total of **34,917** angler days in the latest typical season. As outlined in Section 3.2, it is necessary to scale for non-response. The scaling factor is **1.161** and this produces a total of **40,543** salmon and sea trout angler days.

This is a significantly smaller than Mackay estimate of **62,100** rod days in 1988. Our estimate is based on a very high coverage of fisheries, as reflected in the proportion of the respondents' catch as a percentage of the official catch. For this reason alone the true figure is probably closer to 40,000 than 60,000. There is other supporting evidence. Using published and other *ad hoc* information we estimated the number of salmon and sea trout rods to be 220-250 between Loch Insh to Spey Bay. Consultation with individuals with detailed local knowledge confirmed that this estimate or rods was highly plausible. It was further assumed a salmon season of 200 days and 25% non-use days through non-occupancy or poor conditions (flood conditions, hot weather). Again, those we consulted felt that 25% non-use was appropriate. On this basis the total number of salmon and sea trout days would be between 33,000 and 37,500 angler days. It would require quite radical changes to produce an estimate approaching 60,000. The figure of 40,000 for the Spey is also consistent with the estimated number of angler days for other large catchments. For example, Deloitte and Touché estimate 40,000 salmon and sea trout angler days for the Tweed.

In the tables below, the total of 40,543 is broken down by angler origin. This is based on information provided by those responding to the owner questionnaire.

Table 3.4.1.1 Salmon and Sea Trout Angler Days by Angler Origin

Scotland	North of England	Ireland	Rest UK	Europe	US	Total
14190	10136	811	12163	2433	811	40543
36%	25%	2%	31%	6%	2%	100%

Only about on third of angler days are fished by Scottish anglers with the majority fished by anglers who come from outside Scotland. Table 3.4.1.2 breaks down the 14,190 angler days by Scottish anglers. Table 3.4.1.3 breaks the 40,543 total into 4 key regions

Table 3.4.1.2 Salmon and Sea Trout Angler Days by Scottish Origins

. **Table 3.4.1.3 Salmon and Sea Trout Angler Days by Key Origins**

MBSE	Rest of Highlands	Rest of Scotland	Outside Scotland	Total
6389	2319	5483	26353	40543
16%	6%	14%	65%	100%

In terms of distribution of angler days, as expected the majority of salmon and sea trout angler days were in the middle Spey from Grantown to Spey Bay

Table 3.4.1.4 Distribution of Salmon Angler Days on the Spey

Stretch	Days	% Days
Upper Spey	2,973	7%
Middle Spey	19,033	47%
Lower Spey	15,644	39%
Avon	2,894	7%
Total	**40,544**	100%

3.4.2 Brown Trout Angler Days

Respondents reported a total of 4,009 angler days. A further 620 were estimated across non-respondents giving a total of 4,815 angler days. Based on information provided by those responding, these angler days are broken down by angler origin.

Table 3.4.2.1 Brown Trout Angler Days by Angler Origins

Scotland	North of England	Ireland	Rest UK	Europe	US	Total
3473	430	33	591	186	103	4,815
72%	9%	1%	12%	4%	2%	100%

In contrast to salmon and sea trout angling the majority is conducted by anglers resident in Scotland. Table 3.4.2.2 breaks down the 3473 angler days by Scottish anglers.

Table 3.4.2.2 Brown Trout Angler Days by Scottish Origins

BSE	Inverness and Nairn	Rest of Highlands	Dumfries and Galloway	Borders	Orkney and Shetland	Western Isles	North East	Central
910	256	284	466	91	6	0	7	453
5%	7%	8%	13%	3%	0%	0%	0%	13%

A majority of the Scottish angler days are local to MBSE.

3.4.2.3 Brown Trout Angler Days by Key Origins

MBSE	Rest of Highlands	Rest of Scotland	Outside Scotland	Total
1910	539	1023	1342	4815
40%	11%	21%	28%	100%

3.4.3 Rainbow Trout Angler Days

The total number of rainbow trout angler days was 8,186 days. There was no requirement to make adjustment for non-response as all identified fisheries responded. Based on information provided by those responding to the owner questionnaire, these angler days are broken down by angler origin. The breakdown is very similar to brown trout fisheries.

Table 3.4.3.1 Rainbow Trout Angler Days by Angler Origins

Scotland	North of England	Ireland	Rest UK	Europe	US	Total
5144	216	83	2130	330	282	8186
63%	3%	1%	26%	4%	3%	100%

Table 3.4.3.2 breaks down the 5144 angler days by Scottish anglers and Table 3.4.3.3. breaks down the 8166 total.

Table 3.4.3.2 Rainbow Trout Angler Days by Scottish Origins

MBSE	Inverness and Nairn	Rest of Highlands	Dumfries and Galloway	Borders	Orkney and Shetland	Western Isles	North East	Central
1871	982	631	762	87	12	0	99	5144
36%	19%	12%	15%	2%	0%	0%	2%	14%

Table 3.4.3.3 Rainbow Trout Angler Days by Key Origins

MBSE	Rest of Highlands	Rest of Scotland	Outside Scotland	Total
1871	1613	1660	3042	8186
23%	20%	20%	37%	100%

3.4.4 Coarse angler days

After some minor adjustment for non-response, the total number of coarse angler days was 1,202 days. Based on information provided by those responding to the owner questionnaire, these angler days are broken down by angler origin.

Table 3.4.4.1 Coarse Angler Days by Angler Origins

Scotland	North of England	Ireland	Rest UK	Europe	US	Total
903	150	12	84	23	30	1202
75%	12%	1%	7%	2%	2%	100%

Table 3.4.4.2 breaks down the 903 angler days by Scottish anglers

Table 3.4.4.2 Coarse Angler Days by Scottish Origins

MBSE	Inverness and Nairn	Rest of Highlands	Dumfries and Galloway	Borders	Orkney and Shetland	Western Isles	North East	Central
300	137	115	9	52	4	0	139	146
33%	15%	13%	1%	6%	0%	0%	15%	16.20%

Table 3.4.4.3 Coarse Angler Days by Key Origins

MBSE	Rest of Highlands	Rest of Scotland	Outside Scotland	Total
300	252	350	300	1202
25%	20%	30%	25%	100%

Compared with brown trout and rainbow trout fisheries a much smaller proportion of angling effort is local to MBSE and a surprising number of angler days are fished anglers from England.

3.5 Angler Characteristics

Table 3.5.1 Angler Type by Gender & Species

	Salmon & Sea Trout	Brown Trout	Rainbow Trout	Coarse Fish	All
Male	91.0%	86.3%	93.3%	100%	90.9%
Female	9.0%	13.7%	6.7%	0	9.1%
					Total =372

Table 3.5.2 Angler Type by Age & Species

	S & ST	Brown Trout	Rainbow Trout	Coarse Fish	All
< 18			3%		0%
18 - 25	1%	4%	7%	14%	2%
26 - 45	17%	24%	30%	29%	19%
46 - 59	42%	49%	33%	43%	42%
60+	40%	24%	27%	14%	35%
All	100%	100%	100%	100%	100%

3.6 Conclusion

This section has identified the activity levels of angling within the Spey catchment, as well as the locations and type of angling available on each site (i.e. salmon, brown trout

etc). Using the angler day as the main unit of measurement, through the survey of fishery proprietors it was possible to obtain estimates of days fished and the origins of these anglers. Table 3.6.1 summarises the data found in Tables 3.4.1.1 to 3.4.4.3 which give a detailed breakdown of visitor origins for each species

Table 3.6.1 All Species Angler Days by Key Origins

Home Region	Salmon & Sea Trout	Brown Trout	Rainbow Trout	Coarse Fish	All
MBSE	6386	1910	1871	300	10467
Rest of Highlands	2319	539	1613	253	4724
Rest of Scotland	5486	1023	1660	350	8519
Outside Scotland	26353	1342	3042	299	31037
ALL	**40543**	**4815**	**8186**	**1202**	**54746**

As one would expect, the largest activity in terms of angler days with over 40,000 is salmon angling which accounts for 75% of all Spey fishery related activity. It is also worth noting that 65% of salmon anglers originate from outside Scotland. Activity levels at rainbow trout fisheries produce the second largest activity levels in terms of angler days (over 8000) and also receive a higher proportion of visitors who are local and from within Scotland. Brown trout angling, concentrated largely on the upper Spey and the hill lochs, produces just short of 5000 activity days. Brown trout angling on the middle and lower Spey is largely incidental due to the popularity of salmon angling. As can be seen from table 3.6.1, brown trout angling is most popular with those local to the MBSE. Coarse angling takes place on a few lochs within the catchment and on the Spey itself, producing over 1000 angler says per season.

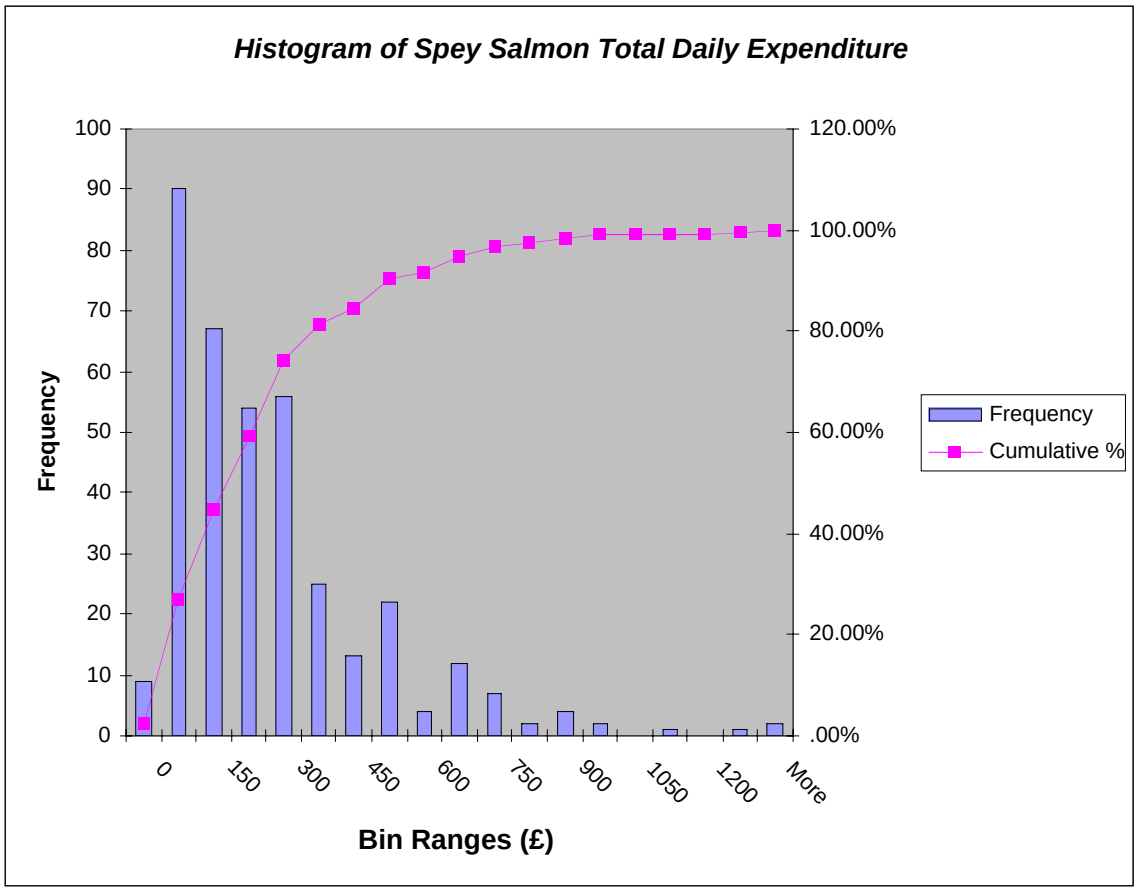
In summation, the survey of fishery proprietors has identified roughly 55,000 angling activity days within the Spey Catchment, over half of which originate from outside of Scotland. The next section will use these activity levels to establish the economic impact of angling within the Spey catchment.

SECTION 4 ECONOMIC IMPACT OF ANGLING

4.1 Expenditure per Angler Day

All the angler expenditure data comes from the angler surveys. Even after removing those respondents who obviously confused their total expenditure with typical *daily* expenditure, there was a wide range of average daily expenditure. This was particularly evident in the case of salmon and sea trout angling and was most noticeable with respect to their permit/rent expenditure. As can be seen from Figure 4.1 below, there were some salmon and sea trout anglers who appear to fish for free. These will be guests of the proprietor or recipients of corporate or other hospitality. The data also revealed some individuals paying over £1,000 per day in rents/permits, and these were probably the personal or corporate host paying the bill. We initially thought that the distribution of expenditures might be bi-modal; however from the histogram below, it is uni-modal and flat in the £50-£250 range. We conclude that we can regard our observations as coming from a single population.

Figure 4.1.1 Histogram of Spey Salmon Total Daily Expenditure



The tables below provide a comparison of daily angler expenditure by the key origin regions. As one would expect, the greatest expenditure per day is by 'visiting' salmon and sea trout anglers. Their expenditure per day exceeds local (MBSE) brown trout and rainbow trout anglers by a factor of around10. The angler survey only generated observations on coarse anglers from within MBSE and outside Scotland.

Table 4.1.1 Average Daily Spend in the Spey Catchment

Home Region	Salmon & Sea Trout	Brown Trout	Rainbow Trout	Coarse Fish	All
MBSE	£122.51	£34.84	£26.33	£37.44	£97.32
Rest of Highlands	£113.89	£73.57	£40.92	NR	£89.45
Rest of Scotland	£307.74	£82.23	£49.17	NR	£235.17
Outside Scotland	£304.10	£126.91	£156.28	£39.17	£285.16

Tables 4.1.2 and 4.1.3 break down expenditure into principal categories. The categorisation employed is consistent with categories employed in the collection and presentation of UK and Scottish tourism expenditure data. Over 60% of salmon angler expenditure is on accommodation and rents and a large proportion of these expenditures remain in the local economy in the form of payments to labour such as ghillies and hotel staff**.**

Table 4.1.2 Average Daily Spend by Category in the Spey Catchment

Category	Salmon & Sea Trout	Brown Trout	Rainbow Trout	Coarse Fish	All Species
Accom	£54.51	£13.39	£8.50	£11.53	£45.44
Meals	£22.07	£13.03	£4.07	£0.34	£19.20
Food	£10.88	£7.67	£5.06	£4.98	£9.95
Transport	£4.57	£1.36	£0.25	£0.00	£3.78
Fuel	£10.32	£10.04	£10.89	£4.10	£10.18
Rents	£91.64	£11.29	£15.46	£0.62	£74.78
Clubfees	£2.84	£4.84	£0.00	£0.00	£2.78
Clothes	£6.05	£2.30	£1.72	£2.42	£5.22
Hire	£1.73	£0.70	£0.13	£0.00	£1.46
Gifts	£4.62	£3.86	£2.68	£0.68	£4.30
Ghillie	£11.66	£0.94	£0.69	£0.79	£9.38
Tackle	£5.23	£1.89	£1.79	£9.40	£4.69
Bait	£1.09	£0.46	£0.38	£2.38	£1.00
Other	£1.24	£0.05	£0.18	£0.56	£1.01
ALL	**£228.44**	**£71.82**	**£51.80**	**£37.79**	**£193.17**

Table 4.1.3 Percentage Average Daily Spend by category in the Spey Catchment

Category	Salmon & Sea Trout	Brown Trout	Rainbow Trout	Coarse Fish	All Species
Accom	23.9%	18.6%	16.4%	30.5%	23.5%
Meals	9.7%	18.1%	7.9%	0.9%	9.9%
Food	4.8%	10.7%	9.8%	13.2%	5.2%
transport	2.0%	1.9%	0.5%	0.0%	2.0%
Fuel	4.5%	14.0%	21.0%	10.8%	5.3%
Rents	40.1%	15.7%	29.9%	1.6%	38.7%
Clubfees	1.2%	6.7%	0.0%	0.0%	1.4%
Clothes	2.6%	3.2%	3.3%	6.4%	2.7%
Hire	0.8%	1.0%	0.2%	0.0%	0.8%
Gifts	2.0%	5.4%	5.2%	1.8%	2.2%
Ghillie	5.1%	1.3%	1.3%	2.1%	4.9%
tackle	2.3%	2.6%	3.4%	24.9%	2.4%
bait	0.5%	0.6%	0.7%	6.3%	0.5%
other	0.5%	0.1%	0.3%	1.5%	0.5%
ALL	100.0%	100.0%	100.0%	100.00%	100.0%

4.2 Total Angler Expenditure

Combining Table 4.1.1 with Table 3.6.1 the following pattern of total expenditure is obtained. Although the owners' survey revealed coarse fishing by anglers from MBSE and elsewhere in Scotland, the angler survey did not capture observations on their average spending. The average spending for coarse anglers from MBSE was £37.44. This is similar to the overall average £37.79 and this is used as the average spend for coarse anglers from the rest of Scotland or the Highlands.

Table 4.2.1 Total Angler Expenditure by Fishing Type and Origin

Home Region	Salmon & Sea Trout	Brown Trout	Rainbow Trout	Coarse Fish	All
MBSE	£782,290	£66,559	£49,263	£11,219	£909,332
Rest of Highlands	£264,072	£39,681	£66,004	£9,552	£379,309
Rest of Scotland	£1,688,223	£84,129	£81,622	£13,237	£1,867,211
Outside Scotland	£8,013,932	£170,361	£475,404	£11,724	£8,671,421
ALL	**£10,748,517**	**£360,731**	**£672,293**	**£45,732**	**£11,827,273**

As expected expenditure by salmon and sea trout anglers greatly exceeds expenditure on other forms of angling. Not only are there more salmon angler days, on average more is spent on them and a greater proportion of expenditure originates from outside Scotland. The total expenditure figure for salmon £10.75m is very similar to the Mackay consultant's total of £11.4m, but this is accidental since their angler days total is higher at 62,100 days and their daily expenditure is less at £141. In Section 3.4.1 it was argued that 40,543 was a more reliable estimate. The average expenditure per day of all salmon

anglers sampled in this study was £228.44[11]. The SEERAD study, based on a much larger sample of anglers estimated that in the Highland region the average expenditure of all anglers was £186.00**.** The expectation is that average daily expenditure on the River Spey would exceed the all Highland average.

4.3 Direct Employment in Angling Provision

The questionnaires distributed by SFB requested owners to indicate the number of full-time and part time workers employed specifically in providing angling services and estate support for angling services. If these 'angling' employees were also employed to carry out work other than the provision of fishing services (e.g. general estate maintenance work), owners were asked to indicate the percentage of their total time devoted to angling services. Table 4.3.1 below summarises owners' responses. Angling equivalent is notional employment that is specific to angling. The data have been scaled for non-response.

Table 4.3.1 Direct Employment in Angling

	Full-Time	Angling Equivalent	Part-Time	Angling Equivalent
Permanent	65.0	57.4	11.6	7.5
Seasonal	22.0	19.1	7.0	4.6

Table 4.3.2 calculates the full time equivalents (FTE) on the basis that a seasonal jobs and a part-time job are 0.5 of one FTE.

Table 4.3.2 Full-Time Equivalent Employment in Salmon and Sea Trout Angling

	Full-Time Angling Equivalent	Part-Time Angling Equivalent
Permanent	57.4	3.77
Seasonal	9.57	1.16

This produces a total of **72** FTE's in salmon and sea trout provision. From our observations these occupations requiring individuals who are not only flexible but who also have high levels of knowledge and both work specific and interpersonal skills.

4.4 Angler Expenditure and Substitution

In assessing the current economic importance/contribution one is asking the implicit question *what would happen to income and employment in a defined area if the fishery ceased to exist?* In other words there is a hypothetical scenario in which the fishery no longer exists, and we trying to predict what would happen to angler expenditure, local income and employment. The implied response of anglers is crucial.

At one extreme, if all 'visitors' would now fish in Russia or Alaska and all local angling expenditure would be diverted outside the local area, then effectively all expenditure is lost. In other words, angling is currently responsible for an injection of **£11.8m** (£10.8m of which is salmon and sea trout) into the MBSE economy. **£11.8m** is the upper boundary of angling's direct contribution to the local economy, although there are, in addition, the indirect and induced effects.

[11] It should be noted that the mean from the sample of anglers is distinct from the mean calculated on the basis of the distribution of angler days obtained from the owner survey.

The assumptions are often made that visitors do not have good alternative possibilities for their expenditures within the region, whereas, residents have almost perfect substitutes within the region. This leads some practitioners to focus only on visitor angler expenditure. Using this approach means that the local (MBSE) expenditure is retained and all visitor spending is lost. From the first row of the table below this loss would be (£10.9m).

Clearly, the magnitude of the impact will depend on how the local area is defined. As the local geographical area increases, visitor expenditure declines as more "visitors" become locals. Someone visiting the Spey from Inverness, for example, would be a visitor to the MBSE but not to the Highlands. Similarly a Glaswegian is a visitor to the Highlands, the MBSE but not to Scotland. The table below presents "visiting angler" expenditure for alternative local economies.

Table 4.4.1 Visitor Angler Expenditure in Alternative Local Economies

Local Economy	Salmon & Sea Trout	Brown Trout	Rainbow Trout	Coarse Fish	All
MBSE	£9,966,227	£294,171	£623,030	£34,513	**£10,917,941**
Highlands	£9,702,155	£254,490	£557,026	£24,961	**£10,538,632**
Scotland	£8,013,932	£170,361	£475,404	£11,724	**£8,671,421**

On this rather crude basis the tentative conclusion is that angling generates between £10.9 and £11.8m in visitor spending to MBSE. Because so much of angler expenditure originates outside Scotland, angling on Spey makes almost as much a contribution to the Scottish economy as it does to the MBSE or Highland economy.

Rather than relying on the above traditional assumptions, the angler questionnaire asked anglers to identify which of the following options they would have done in a typical season if their type of fishery had not been available in the Spey catchment. The implication for the MBSE economy (and Scotland) of each is also outlined.

Substitution Options	Implications for MBSE	Implications for Scotland
1. Fished another type of fishery within Spey Catchment	No loss to MBSE	No loss to Scotland
2. Fished the same type of fishery in another Scottish region	Loss to MBSE	No loss to Scotland
3. Fished outside of Scotland	Loss to MBSE	Loss to Scotland
4. Not fished but still visited Spey Catchment	Loss dependent on differential spending	Loss dependent on differential spending
5. Not fished and not visited Spey Catchment	Loss to MBSE	Loss dependent on differential spending

Given the relatively small contribution of brown trout, rainbow trout and coarse angling, these are reported collectively. Separate results are presented for salmon and sea trout and all fisheries. Not all anglers answered the displacement question and the calculated expenditure associated with the options (1) to (5) above was scaled using the estimated total expenditure.

The following assumptions are made about the options above:

Option 1 Individuals would spend the same amount in the Spey catchment and in Scotland.

Option 2 Individuals would spend the same amount in Scotland.

Option 4 Since individuals are not fishing they do not spend as much, specifically their rental payments are lost to MBSE and Scotland.

Option 5 It is assumed that 50% of this expenditure would be lost to Scotland.

Table 4.4.2 Salmon Angler Expenditure Lost After Substitutions

Substitution Option	MBSE	Scotland
Different species Same Region	£1,375,682 No Loss	No Loss
Same Species Different Region	£4,223,219 **Loss**	No Loss
Would Fish Outside Scotland	£4,208,049 **Loss**	£4,208,049 **Loss**
Not Fish but Still Visit Spey Catchment (Loss = Rents)	£94,173 **Loss**	£94,173 **Loss**
Not Fish, not Visit Spey Catchment	£847,192 **Loss**	£423,596 **Loss**
TOTAL LOSS	**£9,372,833**	**£4,725,818**

The loss to Scotland is much less than to MBSE because a large proportion of anglers would switch and fish other salmon rivers within Scotland.

Table 4.4.3 Non Salmon Angler Expenditure Lost After Substitutions

Substitution Option	MBSE	Scotland
Different species Same Region	£260,267 No loss	No Loss
Same Species Different Region	£630,640 **Loss**	No Loss
Would Fish Outside Scotland	£142,672 **Loss**	£142,672 **Loss**
Not Fish but Still Visit Spey Catchment	£5,498 **Loss**	£5,498 **Loss**
Not Fish, not Visit Spey Catchment	£53,885 **Loss**	£26,942 **Loss**
TOTAL LOSS	**£832,697**	**£175,112**

In the above table the loss to Scotland is insignificant since very few of these anglers would be diverted to fish outside Scotland.

Table 4.4.4 Total Angler Expenditure Lost After Substitutions

Substitution Option	MBSE	Rest of Scotland
Different species Same Region	£1,523,029 No loss	No Loss
Same Species Different Region	£4,580,427 **Loss**	No Loss
Would Fish Outside Scotland	£4,288,821 **Loss**	£4,265,540 **Loss**
Not Fish but Still Visit Spey Catchment	£97,286 **Loss**	£97,078 **Loss**
Not Fish, not Visit Spey Catchment	£877,698 **Loss**	£438,849 **Loss**
TOTAL LOSS	**£9,844,232**	**£4,801,467**

We conclude that if angling were eliminated from the Spey catchment the local MBSE economy and the Scottish economy would lose as described in the table below.

Table 4.4.5 Summary of expenditure lost to MBSE and Scotland

	Salmon Expenditure Lost	Non Salmon Expenditure Lost	Total Expenditure Lost
MBSE	£9,372,833	£471,408	£9,844,232
Scotland	£4,725,818	£99,138	£4,801,467

4.5 Local Output, Income and Employment

The estimation of indirect and induced effects has been discussed in Section 1.5. Table 4.5.1 gives the results from the CogentSI Type II model without any allowance for substitution.

The column headed Total MBSE Output is the local output supported by the fishery. In producing this output, local household income has increased, principally in the form of increased wages and income from self-employment. This effect is estimated in the column headed Gross Value Added (GVA). The final column provides an estimate of the number of jobs in MBSE supported by angling measured in Full-Time Job Equivalents (FTE's)

Table 4.5.1 Total economic impact of angling without substitution

Species	Origin of anglers	Angler days	Spend per day	Total Angler Expenditure	Direct Effect	Total MBSE Output	GVA in MBSE	Total MBSE Jobs
Salmon	**MBSE**	6386	£123	£782,290	£508,577	£763,637	£450,217	13
	RHIGH	2319	£114	£264,072	£196,643	£299,094	£164,521	13
	SCOT	5486	£308	£1,688,223	£1,103,615	£1,678,599	£1,051,789	74
	RWORLD	26353	£304	£8,013,932	£5,841,334	£8,807,674	£4,686,736	301
	TOTAL	**40543**	**£228**	**£10,748,517**	**£7,650,169**	**£11,549,005**	**£6,353,263**	**401**
Brown trout	**MBSE**	1910	£35	£66,559	£42,208	£63,083	£31,879	3
	RHIGH	539	£74	£39,681	£24,115	£38,101	£18,997	1
	SCOT	1023	£82	£84,129	£61,331	£96,901	£40,277	2
	RWORLD	1342	£127	£170,361	£107,806	£165,986	£89,458	5
	TOTAL	**4815**	**£72**	**£360,731**	**£235,460**	**£364,070**	**£180,611**	**10**
Rainbow trout	**MBSE**	1871	£26	£49,275	£20,149	£30,496	£23,878	1
	RHIGH	1613	£41	£66,046	£27,008	£40,876	£27,560	0
	SCOT	1660	£49	£81,606	£55,873	£84,563	£34,053	2
	RWORLD	3042	£156	£475,622	£300,976	£467,201	£241,781	4
	TOTAL	**8186**	**£52**	**£672,549**	**£404,006**	**£623,136**	**£327,273**	**7**
Coarse	**MBSE**	300	£38	£11,219	£4,588	£8,108	£5,450	0
	RHIGH	253	£38	£9,552	£3,906	£6,097	£4,640	0
	SCOT	350	£39	£13,237	£9,063	£14,147	£6,431	1
	World	299	£39	£11,724	£8,027	£12,530	£7,216	0
	TOTAL	**1202**	**£39**	**£45,732**	**£25,584**	**£40,883**	**£23,737**	**2**
TOTAL	**MBSE**	10467	£87	£909,343	£575,522	£865,324	£511,424	16
	RHIGH	4724	£80	£379,351	£251,672	£384,168	£215,719	14
	RSCOT	8519	£219	£1,867,195	£1,229,882	£1,874,210	£1,132,550	79
	RWORLD	31036	£279	£8,671,639	£6,258,143	£9,453,391	£5,025,191	310
	TOTAL	**54746**	**£216**	**£11,827,528**	**£8,315,219**	**£12,577,093**	**£6,884,884**	**419**

Overall, the estimation procedures suggests that in angling in the Spey catchment **results in the MBSE economy producing over £12.6m worth of annual output, which support the equivalent of 419 permanent full-time jobs and generates £6.9m in wages and self-employment income to households in the MBSE area.**. As far as the Scottish economy is concerned, angling in the Spey catchment **results in the Scottish economy producing over £16.4m worth of annual output, which support the equivalent of 482 permanent full-time jobs and generates £9m in wages and self-employment income to Scottish households.** . Appendix A.4.2 provides sample results from the CogentSI model.

It is more appropriate to estimate the economic impact after substitution is taken into account. Table 4.5.2 illustrates the more likely impact of angling to MBSE.

Table 4.5.2 Economic Impact allowing for substitution

Species	Origin of anglers	Angler days	Spend per day	Total Angler Expenditure	Direct Effect	Total MBSE Output	GVA in MBSE	Total MBSE Jobs	Displacement Factor
Salmon	**MBSE**	4579	£123	£560,902	£364,650	£547,528	£322,806	9	71.70%
	RHIGH	2238	£114	£254,829	£189,760	£288,626	£158,763	13	96.50%
	SCOT	4482	£308	£1,379,278	£901,653	£1,371,415	£859,312	60	81.70%
	RWORLD	23612	£304	£7,180,483	£5,233,835	£7,891,676	£4,199,315	270	89.60%
	Total	**34911**	**£228**	**£9,386,680**	**£6,680,893**	**£10,085,746**	**£5,548,305**	**350**	**87.33%**
Brown trout	**MBSE**	1652	£35	£57,574	£36,510	£54,567	£27,575	2	86.50%
	RHIGH	418	£74	£30,753	£18,689	£29,528	£14,723	1	77.50%
	SCOT	964	£82	£79,250	£57,774	£91,281	£37,941	2	94.20%
	RWORLD	1074	£127	£136,289	£86,245	£132,789	£71,567	4	80.00%
	Total	**4107**	**£72**	**£304,601**	**£198,822**	**£307,421**	**£152,508**	**9**	**84.44%**
Rainbow trout	**MBSE**	892	£26	£23,504	£9,611	£14,547	£11,390	0	47.70%
	RHIGH	769	£41	£31,504	£12,883	£19,498	£13,146	0	47.70%
	SCOT	1365	£49	£67,080	£45,928	£69,511	£27,992	2	82.20%
	RWORLD	2358	£156	£368,607	£233,256	£362,081	£187,380	3	77.50%
	Total	**5384**	**£52**	**£489,750**	**£294,197**	**£453,768**	**£238,320**	**5**	**72.82%**
Coarse	**MBSE**	171	£38	£6,406	£2,620	£4,630	£3,112	0	57.10%
	RHIGH	144	£38	£5,454	£2,230	£3,481	£2,650	0	57.10%
	SCOT	344	£39	£13,025	£8,918	£13,921	£6,328	1	98.40%
	RWORLD	294	£39	£11,536	£7,899	£12,330	£7,100	0	98.40%
	Total	**954**	**£39**	**£38,346**	**£21,452**	**£34,280**	**£19,904**	**2**	**83.85%**
Total	**MBSE**	7295	£87	£654,181	£414,031	£622,514	£367,919	12	71.94%
	RHIGH	3569	£80	£352,758	£234,030	£357,238	£200,597	13	92.99%
	RSCOT	7155	£219	£1,538,195	£1,013,177	£1,543,974	£932,995	65	82.38%
	RWORLD	27338	£279	£7,735,969	£5,582,889	£8,433,370	£4,482,973	277	89.21%
	Total	**45356**	**£216**	**£10,276,939**	**£7,225,094**	**£10,928,236**	**£5,982,276**	**367**	**86.89%**

After substitution it is estimated that in angling in the Spey catchment **results in the MBSE economy producing over £10.9m worth of annual output, which support the equivalent of 367 permanent full-time jobs and generates £6.0m in wages and self-employment income to households in the MBSE area.**. Because much of the angling on the Spey would be replaced by angling on other Scottish rivers the economic impact on Scotland is significantly smaller and swamps the multiplier effects of the larger economy. It is estimated that if angling on the Spey ceased the Scottish economy would be worse off by some £7.4m, household income would decline by £4m and there would be 215 fewer jobs.

Table 4.5.3 examines the local income effect (GVA) of each type of angler day. It can be seen that on average each salmon angler day by a visitor from outside Scotland generates £159 of income to MBSE households. In contrast, on average the local angler who fishes for brown trout or rainbow trout, only generates £11 of local income per angler day.

Table 4.5.3 Gross Value Added per activity day

		GVA	GVA (After Substitution)	GVA per Activity Day	GVA per Activity Day (After Substitution)
Salmon	MBSE	£450,217	£322,806	£71	£51
	RHIGH	£164,521	£158,763	£71	£68
	SCOT	£1,051,789	£859,312	£192	£157
	World	£4,686,736	£4,199,315	£178	£159
	Total	**£6,353,263**	**£5,548,305**	**£157**	**£137**
Other	MBSE	£61,207	£45,113	£15	£11
	RHIGH	£51,198	£41,834	£21	£17
	SCOT	£80,761	£73,683	£27	£24
	World	£338,455	£283,658	£72	£61
	Total	**£531,621**	**£444,288**	**£37**	**£31**
Total	MBSE	£511,424	£367,919	£49	£35
	RHIGH	£215,719	£200,597	£46	£42
	SCOT	£1,132,550	£932,995	£133	£110
	World	£5,025,191	£4,482,973	£162	£144
	Total	**£6,884,884**	**£5,982,276**	**£126**	**£109**

Table 4.5.4, presents some other ratios. The first two columns relate MBSE output, and income to angler expenditure. Each pound of salmon angler expenditure creates comparatively more output, and income than other types of angling, probably because a large proportion of their spending is on permits and accommodation and a high proportion of this is local wages and income from self-employment. In the third column, the ratio of MBSE output to the direct effect (usually known as the output multiplier) suggests that the indirect and induced effects associated with coarse angler expenditures are greater than other forms of angling.

Table 4.5.4 Key Ratios

	MBSE Output to Angler Expenditure	(GVA) to Angler Expenditure	MBSE Output to Direct Effect	Local Jobs per thousand activity days
Salmon	1.07	0.59	**1.51**	9.88
Brown	1.01	0.50	**1.55**	2.17
Rainbow	0.93	0.49	**1.54**	0.86
Coarse	0.89	0.52	**1.6**	1.66

4.6 Conclusions

This section has tried to estimate the total economic impact of angling in the MBSE area and Scotland. For the assessment of indirect and induced effects we have used the model developed by CogentSI. This work suggests that, after allowing for substitution, around £11 million of local output is dependent upon the fisheries in the MBSE. To help generate this output the population receives some £6m income resulting from 367 full time jobs. **This is a significant annual impact and angling has provided this contribution for most of the last century. This proven sustainability is a key feature of angling's impact on the MBSE economy**.

SECTION 5 WATER SPORTS ACTIVITY

5.1 Paddler Counts

Paddlers operate spasmodically throughout the day (and even night) and over the whole year. Numbers can vary at a location from 80 on one day to zero the next. There are large groups of up to 30 and individuals. They move. There is therefore a substantial measurement problem.

The approach taken in assessing numbers has been based upon 3 observers at Loch Morlich, Knockando and Spey Bay and on interviews with all key suppliers. The observer at Loch Morlich recorded the numbers on the lochs by vessel type at around 11:00 and 15.00 for the period April 1st to September 30th. Cross-referencing to known commercial rentals and outdoor centre use provides estimates of private use. We have no reason to doubt the accuracy of these results. Loch Insh Water-sports provided estimates of numbers on Loch Insh and supplied data on the number of paddlers on trips organised by the centre.

The main river is much more problematic. A large number of observation points have the substantial risk of double counting. Too few would result in paddlers not being seen anywhere on a trip. Local information suggested that the vast majority of day trips would pass through the rapids at Knockando. The ghillie at Knockando was willing to record numbers when on duty and provided the most important record.

Local experts also suggested that much of the paddling on other sections of the river was by canoeists on four or five day descents of the river. These can start at a number of points but invariably finish at Spey Bay and the head ghillie on the final stretch at Castle Gordon also agreed to count paddlers whilst on duty.

Much canoeing however occurs when the ghilllies are not operating on the river for example on Sundays, on hot afternoons and late in the evening. It was recognised that the estimates obtained from the ghillies would need to be factored up to reflect off duty periods. The derived factor was based on ratios obtained from a short self- completion survey at the exit points at Knockando and Spey Bay. These surveys and the results are discussed in the following sections.

5.2 The Knockando Survey

5.2.1 Location

Three groups of users use the river at Knockando. The largest group, canoe or raft from Ballindalloch through the rapid above Blacksboat and the double rapid at Knockando where they exit. This is a safe and exciting day trip particularly popular with outdoor centres.

The second group use the rapid itself for slalom and white water training. These both enter and leave at Knockando. The third group pass Knockando on the multi-day descent of the river. Some will stop for a rest or to use the facilities at the site but some will continue down river without stopping.

The estate, in association with the Scottish Canoe Association, has built changing rooms and a toilet above the landing point and just beneath the old station/car park. Self-completion questionnaires on post cards were left at the changing rooms together with pencils and a large post box. A number of large notices requested party leaders/ drivers to complete the questionnaire every time they landed at the site.

5.2.2 Card Questionnaire Design

Fig 5.2.2.1 shows the questionnaire. It was believed that few paddlers leaving the river would be willing to complete anything but the simplest survey, and thus there was no attempt to ask questions on age, gender, expenditure, alternatives, interaction with anglers etc. The questionnaire was designed to simply provide

a) The split between user types
b) The ratio between landings when the ghillie was on or off duty.
c) The ratio between commercial/outdoor centres and other groups.

This last ratio was intended to be used along with the number of days provided at the centres, to obtain an estimate of other groups and hence a second estimate of total user days.

Figure 5.2.2.1 The Postcard Survey

Spey Paddler Survey

Please complete all sections and post in box

1. Date ……. 2. Day ……. 3. Time ……

4. Number in Party……

5 Group Type (Please Tick 1)

Outdoor Centre __ Commercial/Led __ Youth Group__

School/College __ Club __ Friends/Partner/Solo __

6.Trip Type (Please Tick 1)

Spey Descent __ (Half) Day Trip __ Playboating/Training(At site) __

5.2.3 Outcomes

Table 5.2.3.1 summarises the results by trip type. Just under 150 cards were returned, representing some 1227 user days. As expected the majority were on day trips but there were significant numbers of both “descenders” and “trainers”.

Table 5.2.3.1 Summary of Knockando Card Responses

	Responses	Percent	Number	Percent	Average Party Size
Descent	36	24.2%	239	19.5%	6.6
Day Trip	74	49.7%	722	58.8%	9.8
Training	39	26.2%	266	21.7%	6.8
Total	149	100.0%	1227	100.0%	8.2

Table 5.2.3.2 shows the frequency of different group sizes. Although 2 is actually the most common size group, almost half the paddling occurs in groups of between 4 and 8 .

Table 5.2.3.2 Group Sizes at Knockando

	Percent
Alone	3.4%
2 or 3	19.6%
4 or 5	20.9%
6 to 10	33.8%
11 to 15	11.5%
16 to 20	5.4%
More than 20	5.4%

Table 5.2.3.3 shows the number of paddlers by group type and activity. Again there is little surprise with outdoor centres using the river chiefly for day trips and descents being an activity for friends

.

Table 5.2.3.3 Activities and Group Types at Knockando

No of Paddlers	**Trip Type**			
Group Type	**Descent**	**Day Trip**	**Training**	**Grand Total**
Outdoor Centre	74	325	85	**484**
Commercial/Led	16	49	45	**110**
Youth Group	30	11	4	**45**
School/College	12	143	25	**180**
Club	37	106	25	**168**
Friends	70	73	82	**225**
Grand Total	**239**	**707**	**266**	**1212**

The χ^2 test suggests that there are significant differences between the trip types of different groups.

5.2.4 Observed and estimated paddlers numbers in 2003.

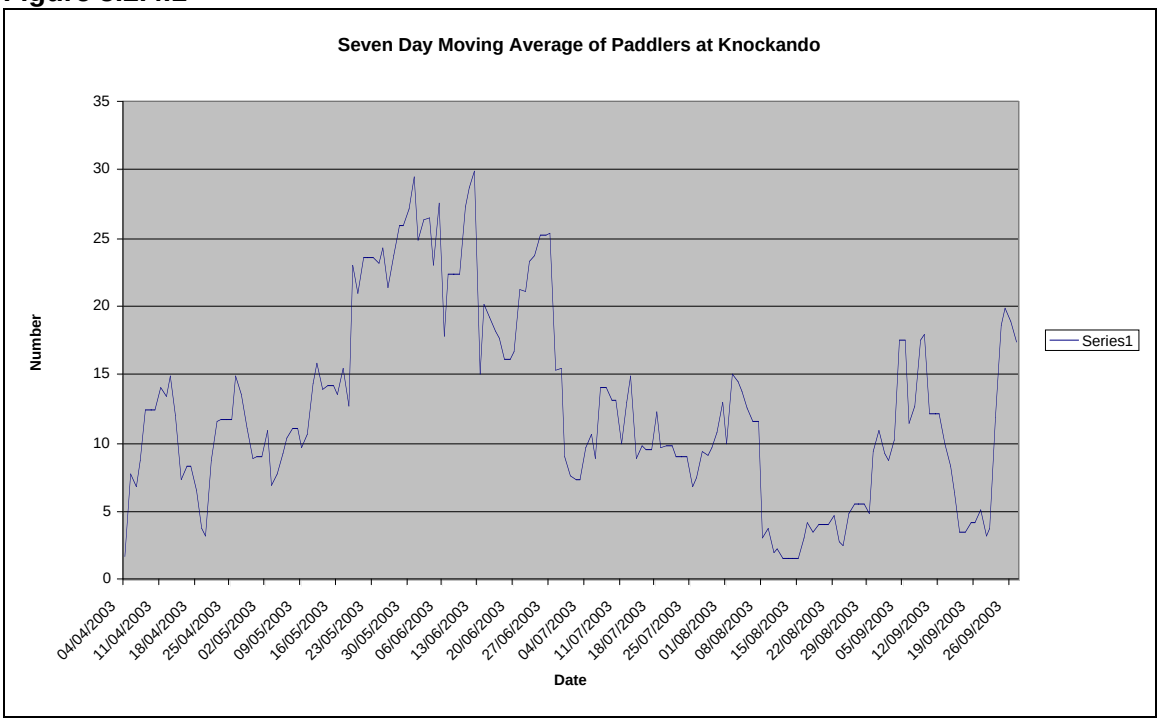
The ghillie at Knockando will be on the river whenever he can be of assistance to his clients. At the outset of the study we assumed that the core hours when the ghillie would be able to observe paddlers would be Monday to Saturday 9am to 5pm. In retrospect it would have been better to request him to record actual hours spent on-site and the times when paddlers were observed.

Our initial check was of the number of paddlers recorded on the card survey who had been at Knockando between these assumed times at the specific dates. Whilst these were generally less than the figures recorded by the ghillie (reflecting the fact that some did not complete the cards) there were a few where the cards exceeded the observations. It was assumed that these cards were completed on the odd occasions when the ghillie was not on the river at the assumed times. The first “correction” in these cases was simply to take the card figure as the observed figure. This amendment produced an observed total of 2261.

The next stage was to observe the ratio of paddlers in the cards inside and outside the stipulated periods. This suggested that just over 70% of paddlers landed at Knockando

between 9 and 5 Monday to Saturday. Applying this factor to the observed total gives an estimate of total paddlers at Knockando of **3, 230.**
It is interesting to consider the distribution of these numbers over the season. Fig 5.2.4.1 gives a seven-day moving average of the number of anglers each day for April 1st to September 30th, 2003.

Figure 5.2.4.1



This graph clearly shows an excellent early season from mid-June through July followed by a steep decline in August. This reflects the atypically dry weather and lack of water in 2003 and the simple difficulty of actually canoeing down the river. The ghillies suggested that in a more typical year we might expect an additional 20% but the figure of 3230 paddlers has been used throughout this report.

5.3 Spey Bay

5.3.1 Location

Two types of paddlers exit at Spey Bay. The first are those completing the river descent who will also have been seen at Loch Insh and Knockando. The second are organised groups either using placid water (for beginners) beneath Fochabers or on day trips from Craigellachie.

Unlike Knockando there is no obvious location for cards and a post box. Initially we utilised the shop/toilet area some 200m from the closest parking to the river. Notices were posted by the exit directing paddlers to the survey point but it became clear by early June that paddlers were not bothering to find and complete cards. A wind and watertight box and card dispenser were then built and located on the car park directly by the exit. This had the disadvantage of being easily vandalised and relatively quickly after

its establishment someone posted all the blank cards in the box. For a critical two weeks there were no cards to complete.

Despite these problems some 30 cards covering 213 paddlers, 32% of the total, were completed. However because of the gaps and size much less reliance should be placed on the results.

5.3.2 Design

The design was identical for both Spey Bay and Knockando.

5.3.3 Outcomes

Table 5.3.3.1 gives a cross-tabulation of the activity by group type

Table 5.3.3.1 Trip Type by Group Type at Spey Bay

	Trip Type		
Group Type	**Descent**	**Day Trip**	**Grand Total**
Outdoor Centre	2.8%	6.1%	**8.9%**
Commercial/Led	4.7%	0.0%	**4.7%**
Youth Group	13.6%	12.7%	**26.3%**
School College	12.2%	11.3%	**23.5%**
Club	0.0%	5.2%	**5.2%**
Friends	16.0%	15.5%	**31.5%**
Grand Total	**59.6%**	**40.4%**	**100.0%**

In contrast to the middle and upper river, over 86% of the activity on the lower Spey is led by volunteers, the most important activity being Spey descents by groups of friends. The 60:40 split between multi and single day activity might surprise many.

5.3.4 Observed and Estimated Numbers

After allowing for slightly different work patterns, the procedures developed for Knockando were applied to the paddler numbers collected by the Castle Gordon ghillie. After these adjustments the observed total of 398 gave an estimated total of 658 paddlers.

5.4 Loch Morlich

5.4.1 The Survey

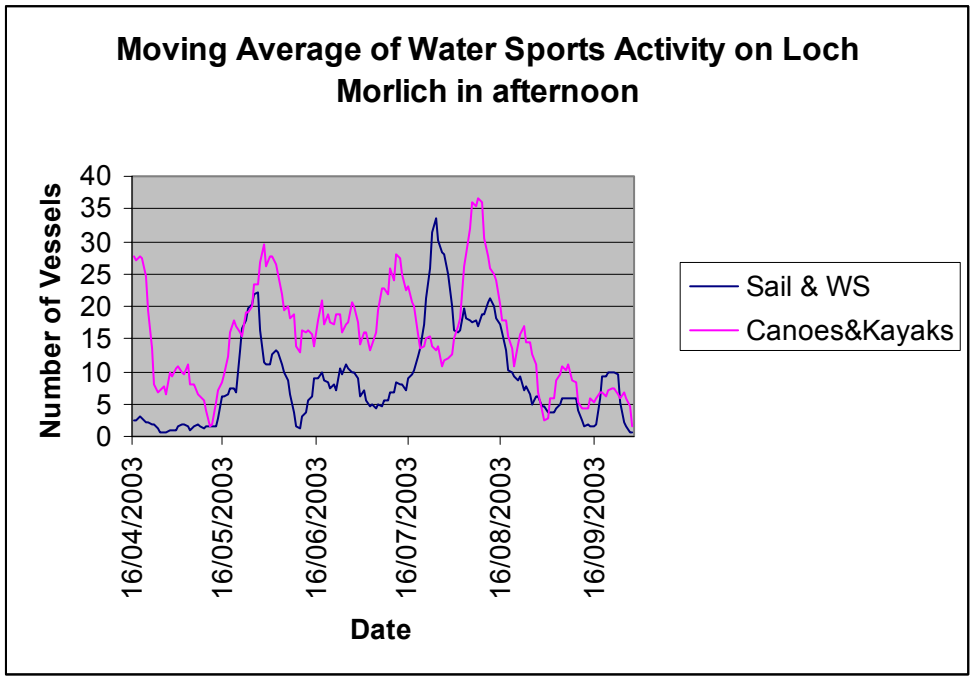
Loch Morlich is a popular area for water sports with excellent beach areas for picnicking and sunbathing.

Loch Morlich Water Sports supplies equipment and instruction both for casual hirers and for organisations such as the Youth Hostel Association. Nethy Bridge Outdoor Centre co-funded and utilises the Sailing Club, which also provides a centre for local sailors. In addition campers on the Forest Enterprise site and day-trippers at the car parks adjoining the loch bring their own wind-surfers, dinghies and canoes.

The numbers on the loch by type were collected every morning and afternoon from April 13th to September 29th. Fig 5.4.4.1 shows that unlike the main river usage is concentrated around the peak holiday periods of Easter, June, and July and August. The

peak in canoeing in early August reflects casual activity in the exceptionally warm dry summer.

Figure 5.4.4.1



1.1.1 Estimate of Activity Days

The observation data provides a snapshot of numbers of vessels on the loch at two points of time. To estimate activity days a number of assumptions have to be made on the numbers in the vessels at the time, the number of vessels that operate on the day but not at the times observed and the number of different groups in a single vessel.

A mix of multi-person canoes and single kayaks is used on the loch. Most canoes have two occupants but on occasions they may contain a family of 4. We have used a conservative 1.5 persons per vessel.

Similarly a mix of windsurfers, single and multi-person dinghies are used. The estimate of 1.5 persons per vessel is considered appropriate.

Data available divided the water-sports centre vessels from “others”. We were informed that in a day a hired canoe might be used by up to six different groups and that three groups per day was a reasonable estimate. The sum of morning and afternoon usage was thus multiplied by 1.5.

Multiple use of hired sailing equipment occurs less often. We have simply added morning and afternoon hires.

The ‘other’ category includes outdoor centres, and the sailing club and private individuals with their own equipment. The outdoor centres tend to operate on half day sessions with different groups but, because these are clearly “half” activity days we have

counted a morning and afternoon session as one day. For private equipment we have assumed that normally the same individual is observed both morning and afternoon. As a consequence we have used the maximum of the two observations as the number of vessels operating that day. This may well underestimate the number as evening use by locals will not be counted. However, as mentioned elsewhere, the expenditure of locals is not likely to have a significant economic impact as it will normally be displaced to other activities in the area.

Making these assumptions generates an estimate of 10,164 activity days for paddlers and 4188 activity days for sailing and windsurfing on the loch. The total of **14,352** can be compared with the estimate calculated in Section 2.2 of 13,185. This difference of under 10% can be attributed to the excellent summer of 2003.

5.5 The Census of Commercial Operators

5.5.1 Commercial Operations

For the purpose of this work a commercial operation was defined as any activity that involved a paid instructor/guide. Instructors and guides include all those employed at or by outdoor centres including military personnel. It does not include teachers or lecturers employed by schools or colleges, unless the courses are concerned with outdoor activity training. The list also includes an outdoor centre based in Fife that runs regular trips to the area. There may well be others that have not been identified.
For Loch Insh the number of activity days using equipment hired from the water centres but not under instruction from the centres was also counted.

Professional organisers of water sport activity in the valley can be classified as follows:

A. Outdoor Centres that have full time instructors and their own equipment. They will be AALA licensed.
B. Centres that may have some equipment may run some land based activity but will hire in instructors and equipment as required.
C. Commercial Operators with equipment (or access to equipment) based in the valley but with no or limited residential accommodation who actively market their operations.
D. Commercial operators based outside the area who offer guided descents
E. Professional guides based in the valley who are available on a part-time basis.

Appendix 5.1 identifies the participants in each group.

The market is extremely flexible, trying to meet any demands from the market and distinctions between groups are blurred. One outdoor centre has recently been taken over by a company previously based in Central Scotland that used to operate in the area using outdoor centres and hostels and also providing services for other centres. In addition qualified instructors with equipment may well market themselves as independent commercial operators but will also instruct or provide services for type A and B.

The flexibility has caused problems in enumeration. Outdoor centres appear to produce an individual programme for each group and tracing exact numbers proved more difficult for respondents than originally envisaged. In addition it has been necessary to exclude work done for others to avoid double counting. For the purposes of this research we

have attributed activity days to the providers of the equipment used, unless the job is simply guiding groups with their own equipment.

5.5.2 Research Method

The limited number of the groups, the variability and the blurring of activity necessitated a census. A number of the organisers of these groups have been identified as forming part of the "elite" whose opinions on likely and desirable developments are being sought. These were subject to a structured personal interview utilising an *aide memoire* which was posted to the interviewees before the interview. Six interviews were conducted and a further three were interviewed and provided the information required over the telephone. A further seven providers have been subject to a structured telephone interview that covered the same topics.

5.6 Loch Insh

5.6.1 Introduction

Water sports activity on Loch Insh is almost wholly confined to activities based at the water-sports centre, with some limited usage by Lagganlia Outdoor centre. A small number of paddlers will pass through the loch on river descents and some groups either start or finish placid water trips at the loch.

The centre offers residents free usage of the equipment out of peak hours but although this is an attraction and perhaps should be counted we had limited information on the actual usage and it is unlikely to have any economic impact. The figures thus reflect only those who are utilising equipment at peak hours.

5.6.2 Estimated Numbers

Numbers from the centre (the vast majority) were estimated by the management on the basis of client numbers. Usage by Lagganlia was added and finally estimates of the very limited number of independents not launching at the centre. These together constitute the Loch total.

A number of trips that start or finish at the Loch are organised by the centre who also gave us a rough estimate of the numbers of independents that might start and finish.
Paddlers passing through the loch on the descent were estimated from the total numbers on the descent lower down the river.

5.7 Paddler Surveys

5.7.1 Introduction

To establish the economic impact required an examination of the individual water sports participant. The primary objective was to establish the levels and pattern of spending. However as part of the remit the surveys also sought to establish perceptions of the relationships between other users. As a result of the surveys we are also able to comment on the age and gender characteristics of the participants.
Three broadly similar survey methods were used; on-site, self completion paper and internet. A discussion of these now follows.

5.7.2 On-Site

The objectives of the on site survey were twofold

a) To check and allow for any correction of any bias that may have occurred in self completion paddler surveys
b) To ensure adequate coverage of all sectors, specifically sailing, that may be under represented in the main questionnaire survey.
The disadvantages of this approach were significant. Firstly the number of entry and egress points are substantial and the time that paddlers are at these points is small. Hence the likelihood of finding a paddler to interview at any given point in time is very, very small. Sufficient coverage of all points to provide a sample that we were confident would be unbiased in terms of age or sex was logistically impossible.
In practice our on site efforts were concentrated on those points where we hoped to find paddlers and sailors, notably Loch Morlich, Loch Insh, Knockando, Ballindalloch and Craigellachie. We were particularly anxious to cover groups that would not be represented in any survey based upon club membership i.e. children, beginners and very occasional paddlers. The questionnaire was a cut down version of the full paper questionnaire, to make it acceptable for an individual just exiting (or entering) to complete.

Considerable time and effort resulted in a sample size of 71. The adequacy of this sample size is discussed in section 5.7.5

5.7.3 Self Completion Paper Questionnaire

The paper questionnaire, Appendix A.5.2. forms a major source of information for this study. The population targeted was anyone who had paddled on a river in Scotland. The underlying assumption was that paddlers on the River Spey would be similar to those on other rivers and that if the sample for the Spey was too small we could use data from the sample as a whole.

The only framework available to identify active paddlers was individual membership of the Scottish Canoe Association. It was recognised that this was likely to under represent children and casual, less frequent, paddlers but it was believed that expenditure patterns would be similar.

The questionnaire was distributed by the SCA along with the quarterly journal Scottish Paddler. Stamped, addressed envelopes were included in the distribution. We were heartened to receive some 291 responses, 132 of whom specified that they had paddled on the Spey.

A number of questionnaires were sent to third parties for distribution to non-members of the SCA. Members were also asked to encourage other paddlers to complete the internet questionnaire.

5.7.4 The Internet Questionnaire

In parallel with the paper questionnaire, an internet questionnaire was constructed aimed particularly at paddlers from outside Scotland. A survey of anglers conducted in this way had been very successful with some 900 responses. A survey of students in Glasgow Caledonian University on participation in outdoor activities had, however been unsuccessful, despite extensive internal publicity.

The canoeing press was circulated and, for example, *The Canoeist* gave almost half a page to the survey and encouragement to readers to complete it. We were therefore extremely disappointed to obtain only 11 useable responses.

Our conclusion is that, despite the success of the Angling survey, a request to complete an internet survey has to be on an individualised basis, which severely limits it ability to deal with the very many individuals carrying out outdoor activities who are neither club members nor regular readers of the specialist press.

5.7.5 Comparisons between Survey Instruments: Age and Sex

Tables 5.7.5.1 and 2 show the age and gender structure of the two samples

Table 5.7.5.1: Gender by Age: Questionnaire

		Age					
		Under 18	**18-25**	**26-40**	**46-60**	**>60**	**Total**
Male	**Count**	12	21	90	109	9	**241**
	%	4.0%	7.0%	30.2%	36.6%	3.0%	**80.9%**
Female	**Count**	3	11	26	16	1	**57**
	%	1.0%	3.7%	8.7%	5.4%	.3%	**19.1%**
Total	**Count**	15	32	116	125	10	**298**
	%	5.0%	10.7%	38.9%	41.9%	3.4%	**100.0%**

Table 5.7.5.2: Gender by Age: On –Site

		Age				
		Under 18	**18-25**	**26-45**	**46-59**	**Total**
Male	**Count**	8	10	14	2	**34**
	%	14.0%	17.5%	24.6%	3.5%	**59.6%**
Female	**Count**	18	2	3	0	**23**
	%	31.6%	3.5%	5.3%	0%	**40.4%**
Total	**Count**	26	12	17	2	**57**
	%	45.6%	21.1%	29.8%	3.5%	**100.0%**

These are clearly different samples with the on-site picking up far more young people and females. In essence the paper questionnaire does not cover the beginners on outdoor education/water sports courses run from outdoor centres, a key sector of the market.

It is thus clear that we cannot simply take the questionnaire to obtain a profile of the typical canoeist. However if taken in conjunction with information from the outdoor and water-sports centres profiles of users do begin to emerge.

5.7.6 Comparisons between Survey Instruments: Expenditures

What is of more direct significance to the project is expenditure patterns. It might be expected that, given the age distribution, the on site survey would suggest significantly lower daily expenditures than the questionnaire. Table 5.7.6.1 provides the mean spends for different groups from the different surveys. Unsurprisingly people staying overnight spend significantly more than day-trippers and sailors spend more than both. However the picture is confused by a relatively large proportion of the on-site sample who are on multi-activity holidays and are undertaking both paddling and sailing. These are under instruction (and in effect hiring equipment) and hence the spend is significantly higher. They also tend to be younger. The paddler mean is a weighted average of the paddler only and the “both” categories.

Because of the large variance there is no statistically significant difference between the expenditure estimates estimated from the different surveys, nor indeed between sailors and canoeists on day trips. For this project, therefore all samples are assumed to come from one population and have equal validity. For reference the resulting weighted mean is provided in the bottom line of the table.

Table 5.7.6.1 Comparison of Expenditure by Different Groups

		Overnight Spend	Day Spend
Paddler Only	**On-Site**	£35.71	£24.23
Sailor Only	**On-Site**	£52.22	£34.75
Both	**On-Site**	£56.10	£20.00
Paddler Mean	**On-Site**	£44.63	£23.58
Sailor Mean	**On-Site**	£54.93	£27.38
Spey Paddler	**Off-Site**	£51.11	£29.71
All Paddler	**Off-Site**	£53.29	£27.07
Paddler	**Both**	£48.77	£27.10

The conclusion reached is that whilst both surveys are drawn from different populations, these populations have similar spending patterns.

5.8 Paddler Numbers on the tributaries.

Respondents were asked in the off site surveys about their canoe activity on other rivers including the Avon and Feshie. Given that SCA members will tend to include a high proportion of skilled paddlers if significant numbers paddled these tributaries we might expect to see it reflected in the responses. In fact 57 respondents (19%) canoed the Feshie a total of 271 days over the three years and 42 respondents (14%) canoed the Avon a total of 155 days.

It is not possible however to assume only SCA members would paddle these rivers as they are very attractive to young paddlers who are not likely to be personal members (even if the University or local canoe club is affiliated). On the other hand non-respondents are likely to be predominantly sea or loch paddlers. Taking these factors into account we believe that we can safely assume that there are at least 250 and no more than 400 paddler days on these tributaries per year.

5.9 Total Water Activity Days

Table 5.9.1 summarises our estimates of the number of days undertaken by water-sports participants in the Spey Catchment Area in 2003 derived from the sources described above.

Table 5.9.1 Number of Activity Days in Spey Catchment Area

		Descent	Centres	Other Day	Total
Loch Morlich	**Sail**		3,049[b]	1,139[b]	4,188[b]
	Paddle		8,630[b]	1,534[b]	10,164[b]
Loch Insh	**Sail**		6,980[c]	100[h]	7,080
	Paddle		8,816[c]	100[h]	8,916
Upper Spey	**to Aviemore**	390[g]	700[c]	300[h]	1,390
Middle Spey	**to Ballindalloch**	430[g]	1396[e]	1404[e]	3230[a]
Middle Spey	**To Craigellachie**	430[g]	40[h]	250[h]	720
Lower Spey	**to Spey Bay**	394[f]	40[f]	223[f]	657[d]
Rivers Avon & Feshie			32[c]	250[i]	282
Total		1,644	29,683	5,300	36,627
Main Stem (Spey)		1,644	2,176	2,177	5,997

Sources

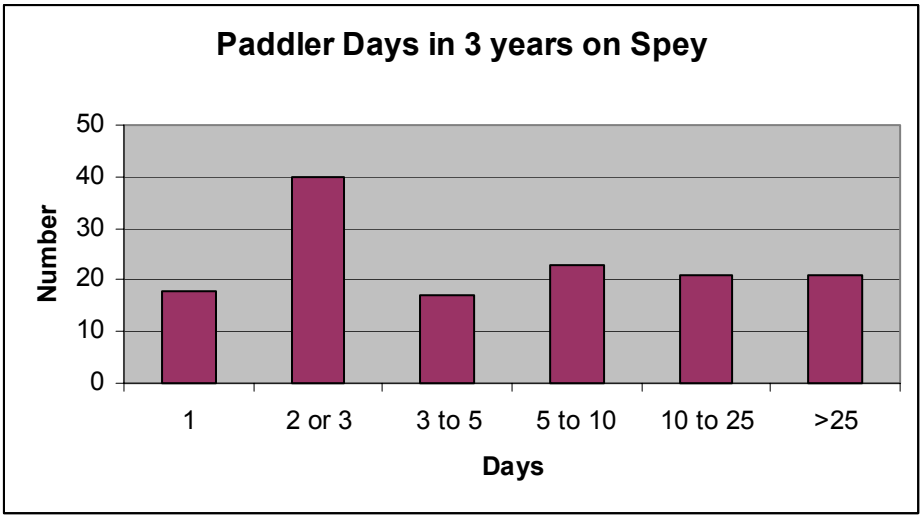
(a) Ghillie Count, Knockando, with adjustment using cards
(b) Count at Loch Morlich with adjustment. Confirmed by Rothiemurchus Study
(c) Centre return
(d) Ghillie Count, Spey Bay, with adjustment using cards
(e) Cards, Knockando
(f) Cards, Spey Bay
(g) Flow Adjustment using expert opinion
(h) Expert Opinion
(i) Expert Opinion confirmed by SCA questionnaire

What is clear from this table is the importance of placid water activity on Loch Morlich and Loch Insh. Together these represent over three quarters of all the water-sports days. Given that these also provide indoor accommodation, whilst many of the other users are either camping or on day trips, the economic importance of this sector is likely to be high. Section 6 discusses this impact.

1.1.1 Paddler Numbers

Figure 5.9.1.1 shows the distribution of days over the 3 years for paddlers on the Spey.

Figure 5.9.1.1



Although the mode is 2 or 3 days (equating to 1 per year) significant numbers canoe very regularly either for sport or as a profession. The mean number of days per annum is 3.34. This suggests that the number of users is over 10,000 per year, recognising, once again, that a significant majority are on the two lochs.

5.10 Gorge Walking

Gorge walking, also known in Europe and the USA as canyoning, involves following a river or burn along the bed down or up water made gorges. Although the water tends to be cold it is extremely popular with young people as it involves considerable excitement when jumping and sliding down waterfalls into pools.

By its nature gorge walking is potentially dangerous and outdoor centres will concentrate on walks that they know well and use regularly. There is no guidebook available for visitors and as far as can be ascertained, gorge walking in the area, is almost completely confined to organised groups and centre staff. Four centres declare gorge walking as an activity (see appendix A5b). The activity is limited by water flow and participants tend to be confined to older children in school age groups and adults. The estimated numbers are based on a ratio of 1:4 gorge to water sport ratio in the centres concerned. This gives a total figure of **1563** a not inconsiderable number.

5.11 Summary and Conclusions

Identifying the number of participants spread over a large area with a large number of entry and exit points offered a major challenge. The method devised involved a number of observers backed up with card returns when they were not on station. The card seemed to work well and provided additional information on the paddlers enabling triangulation.

Inevitably a survey such as this has some error, but the view is taken that the number of activity days is close to our estimate of 36,000

SECTION 6 ECONOMIC IMPACT OF WATER-SPORTS

6.1 Introduction

In this section we present estimates of the total expenditure of participants in water sports and subsequently the direct, indirect and induced output in the area. The main information is derived from the estimated numbers summarised in table 5.9.1 coupled with the estimated spend per person. The expenditure figures were obtained from the already surveys described in sections 5.7.2 – 4. In addition to estimate the impact it was necessary to establish the spending pattern of outdoor providers. The results are described in the next section.

6.2 Participants and Suppliers

As discussed earlier the basic method adopted to estimate expenditure of participants was to combine estimates of paddler and sailor numbers and estimates of expenditure from the paddler and sailor surveys, these estimates identify both total spend and the spend by item. The latter is important as different items will have different levels of local input and hence impact.

Some of these items will in turn have purchase patterns that are peculiar to the user types. At the national level the results of expenditure in restaurants by anglers or paddlers can be assumed to be similar to those of the general public and typical spend patterns from national statistics can be applied. The only problem for this type of spend is to identify the level of local purchasing.

A payment to an outdoor centre is classified as a payment for recreational services along with cinemas and sports stadia. In this case it is simply not possible to assume the results of this expenditure will be similar between groups and the pattern and source of the spend by category for payments for activities had to be established. The survey of outdoor centres included questions on the cost structure of the centres and the degree of local sourcing. The results of these surveys are given in tables 6.2.1

Table 6.2.1 Distribution of Costs –Outdoor Centres

	Cost	Local Proportion
Prof Staff	36.9%	100.0%
Hotel Services	23.7%	100.0%
Food & Drink	10.6%	20.0%
Property & Supply	13.3%	80.0%
Vehicles	4.2%	20.0%
Power	4.8%	10.0%
phones	0.7%	0.0%
Other	5.9%	50.0%

These tables provide the link between the estimated spending and the local direct expenditure/output or “direct impact”.

6.3 Expenditure

Table 6.3.1 gives the expenditure patterns and daily spends for 7 different categories derived from the on site, internet and paper questionnaires.

Table 6.3.1 Paddler Expenditure Patterns

	Centres	Descent	Day
Accomodation (incl campSites)	13.31%	15.42%	0.00%
Meals	15.08%	14.95%	15.23%
Drinks	10.55%	13.53%	12.51%
Food and Drink (Retail)	9.17%	14.93%	14.47%
Equipment Rental & Guides	23.57%	2.67%	1.30%
Petrol & Fuel	6.20%	27.78%	47.84%
Trip Fees	22.12%	10.72%	8.65%
Total per day	**£46.75**	**£45.99**	**£26.58**

An outdoor centre with (junior) clients would effectively provide everything except retail (approx £4.50), which corresponds with the costs reported by the centres of around £45 per day. Table 6.3.2 combines tables 5.9.1and 6.3.1. The Descent category includes placid water paddlers with equipment staying overnight in the area.

Table 6.3.2 Estimated Expenditure by Category and Water-Sports type

	Centres	Descent[12]	Day	Total
Accomodation (incl campSites)	£194,426	£11,659	£0	£206,085
Meals	£220,281	£11,303	£21,455	£253,040
Drinks	£154,109	£10,230	£17,623	£181,962
Food and Drink (Retail)	£133,951	£11,288	£20,384	£165,623
Equipment Rental & Guides	£344,299	£2,019	£1,831	£348,149
Petrol & Fuel	£90,567	£21,004	£67,394	£178,964
Trip Fees	£323,118	£8,105	£12,186	£343,409
Total per day	£1,460,751	£75,608	£140,874	£1,677,232

6.4 Substitution

As discussed in section 1.6 the level of substitution is critical to determining the net impact of the activity. The most feasible method of estimating substitution in an established activity is to ask the participants what they would do if the activity ceased. The paddler surveys suggested four alternatives. The results are given in Tables 6.4.1.

Table 6.4.1 Alternative Actions if Activity not available

	% Observations	% Total Days
Paddle a different river in the Highlands	53.8%	57.1%
Paddle in a different region	25.7%	22.6%
Do alternative activity in Spey Area	13.3%	11.0%
Do alternative activity elsewhere	5.2%	5.5%
Total	100.0%	100.0%

Only 11% would switch to an alternative activity elsewhere in the Spey area and, rather surprisingly, the on-site survey alone, which had more sailors and placid water paddlers, suggested only a 9% shift.

[12] Includes independent paddlers staying overnight in area

However the substitution effect is very marked if trying to evaluate the impact of closure of the Spey on the Highland area. In this case most of the paddling is simply displaced onto other Highland waters.

6.5 Gorge Walking

The value of gorge walking is estimated using the figures derived for paddlers from centres as given in Table 6.4.1. Using the estimated number from section 5.10 of 1563 activity days yields a total expenditure of £72,800. This has then entered the impact calculations as additional expenditure on water sports.

6.6 Indirect and Induced Effects

The model used to estimate indirect and induced effects has been discussed in Section 1 and more specifically in Section 4.5. Details of construction of the relevant I-O tables are provided in Appendices 4.1 and 4.2. The key inputs are the spend patterns of participants (Table 6.3.2), the spend patterns of the outdoor centres (Table 6.2.1) and the levels of substitution (Table 6.4.1). Table 6.6.1 summarises the results from the CogentSI MBSE model. Further results from the MBSE Survey model are given in Appendix A1.2.

Table 6.6.1 Economic Impact of Water Sports (No Substitution)

Type	Activity days	Spend per day	MBSE Expenditure	MBSE Direct Spend	MBSE Total Output	GVA in MBSE	MBSE Total Jobs
Centres	38,190[13]	£38.25	£1,460,751	£1,190,174	£1,771,868	£859,504	49
Descent	1644	£45.99	£75,608	£44,300	£67,981	£34,490	2
Day	5300	£26.58	£140,874	£58,235	£88,368	£44,569	3
Total	45134	£37.16	£1,677,232	£1,293,817	£1,928,216	£938,563	54

Disregarding substitution within the area, it is estimated that water sports in the Spey catchment **result in the MBSE economy producing over £1.9m worth of annual output, which support the equivalent of 54 permanent full-time jobs and generates £0.9m in wages and self-employment income to households in the MBSE area.**. As far as the Scottish economy is concerned, water sports in the Spey catchment **result in the Scottish economy producing over £2.5m worth of annual output, which support the equivalent of 61 permanent full-time jobs and generates £1.2m in wages and self-employment income to Scottish households**.

Substitution to other activities within MBSE is very rare. Almost all our respondents simply said they would move elsewhere in Scotland. Table 6.6.2 shows the impact after allowing for those who would stay in the MBSE and undertake some other activity.

[13] Includes gorge walking activity days

Table 6.6.2 Economic Impact at MBSE level after allowing for substitution

Type	Activity days	Spend per day	MBSE Effective Expenditure	MBSE Direct Effect	MBSE Total Output	GVA in MBSE	Total MBSE Jobs	Displace-ment Factor
Centres	33454	£38.25	£1,279,618	£1,042,592	£1,552,156	£752,926	43	0.876
Descent	1644	£45.99	£75,608	£44,300	£67,981	£34,490	2	1
Day	5300	£26.58	£140,874	£58,235	£88,368	£44,569	3	1
Total	**40398**	**£43.92**	**£1,496,100**	**£1,145,127**	**£1,708,505**	**£831,985**	**48**	**0.885**

From the above table, water sports in the Spey catchment **result in the MBSE economy producing over £1.7m worth of annual output, which support the equivalent of 48 permanent full-time jobs and generates £0.8m in wages and self-employment income to households in the MBSE area.** None of our relatively small sample would have transferred outside Scotland. Thus at a Scottish level the value of the water sports specifically in the MBSE is nil. Perhaps the appropriate estimate is minimal impact on the Scottish economy.

Tables 6.6.3 and 4 provide more detail on the Gross Value Added (Local Income) and the key ratios

Table 6.6.3 Impact of Paddling on Local Incomes (Gross Value Added)

	GVA	Net GVA (After Substitution)	GVA per Activity Day	Net GVA per Activity Day
Centres	£859,504	£752,926	£27.51	£24.10
Descent	£34,490	£34,490	£20.98	£20.98
Day	£44,569	£44,569	£8.41	£8.41
Total	**£938,563**	**£831,985**	**£24.58**	**£21.79**

What is particularly noticeable is the small contribution per day from day trippers compare to those who stay overnight.

Table 6.6.4 Some Key Ratios

Ratios	Total Output to Total Expenditure	Local Jobs per £mn spend	Income (GVA) to Expenditure	Local Jobs per thousand activity days	Output Multiplier
Centres	1.21	34	0.588	1.57	1.49
Descent	0.90	26	0.456	1.22	1.53
Day	0.63	21	0.316	0.57	1.52

What may surprise some is the difference between the expenditure and output multipliers. It must be remembered that this occurs primarily because little of the initial spend of day trippers goes into the local economy since a large element is fuel. Those

staying overnight spend on industries in the local economy such as hotels or instructors. The conventional output multiplier applies to the spend on local industries not the total spend.

6.7 Employment

It is extremely difficult to associate the employment in this sector with a set of skills because most employees are, and need to be, multi-skilled. For example a centre manager, who is largely in an administrative position, could well be called out to operate as a ski instructor, canoe instructor or mountain leader to cover for illness.

Amongst instructors full-time contracts are becoming less common. The reasons for this are the requirements for outdoor centres to minimise overheads and respond to a changing market. There is a recognised pool available who work as required for centres or companies when they are available. Nonetheless this flexible employment pattern is attractive to many who operate their own “businesses” and may be elsewhere for substantial periods of time on expedition work.

Within centres there are a significant number working in administration, with the normal skill requirements. These deal not only with activities but also the “hotel” side of centres. There are also a number of cooks, cleaners, bar staff etc some full time but probably most part time.

It is difficult to see outdoor centres as offering an attractive service without water based activity, but to then associate all centre staff with that activity would be totally incorrect. The demand in the MBSE area remains for multi-skilled and qualified instructors, and hotel type staff.

6.8 Conclusion

This section has tried to estimate the total economic impact of water sports in the MBSE area. For the assessment of indirect and induced effects we have used the model developed by CogentSI. This work suggests that **1.7m worth of annual output, 48 full-time jobs equivalents and £0.8m in wages and self-employment income to households in the MBSE area** are dependent upon water sports in the MBSE economy.

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SECTION 7 INTERACTION BETWEEN PADDLERS AND ANGLERS

7.1 Introduction and Background

This section of the report is concerned with the frequency and characteristics of the interaction between paddlers, anglers and walkers. It also considers the impact of increases in numbers of paddlers, walkers and anglers on the enjoyment of anglers and paddlers. Although the main focus is the interaction between paddlers and anglers, the interaction within each type of activity is also considered. Thus, for example we assess how additional anglers affect the enjoyment of other anglers.

It is important to recognise that, unlike paddling, angling opportunities are already 'rationed by price'. Because the stock of returning fish is limited there is a trade-off between the likelihood of catch and the numbers fishing. Similarly there is a trade-off between the number of anglers on the bank and the quiet, solitude and exclusivity experienced by each angler. Fishery owners have opted for a high quality, high price product with a significant distance between anglers on the bank. Anglers therefore expect for the price they pay to receive a reasonable chance of a fish and quiet and solitude. If owners on the main stem maintain their high price strategy significant increases in angler numbers are unlikely.

In contrast, paddle sports are currently available on a free access basis and consequently some anglers might resent canoeists who they observe freely using a resource for which they have paid significant sums. For paddlers the river is a natural resource to be utilised, with only a small percentage of it being used at any time and they experience very limited physical congestion at access/egress points and popular rapids. From this perspective, they perceive no need to regulate their activity. Furthermore, and in contrast to the views of anglers, the existence of a commercial transaction between owner and angler is not perceived by paddlers to be of relevance. With limited recognition by some of the perspective of the other, it is unsurprising that occasional conflicts occur.

Until the Land Reform (Scotland) Act the legal position of canoeists was unclear. Both legally and traditionally, while people in general had no right in law to be on land and water, they were equally committing no offence by being there. However the owner was able to require a canoeist to leave and to take out an interdict to prevent return. In the early sixties the Wills family (Knockando Estate) attempted to place such an interdict on Clive Freshwater (Wills v Cairngorm Sailing School). Eventually however in a landmark House of Lords judgement it was accepted that the River Spey was a traditional passage for humans and goods (specifically logs) and that there existed a Right of Navigation along the river. Entry and exit was however limited to the few areas where public areas adjoined the river. Somewhat later there was another court case between an owner and canoeists over the River Feshie. In this case it was argued that traditional passage was not possible because of the rocks and falls. Since this required exit from boats onto private "land" there was no right to follow the route. However the need to exit a boat to traverse shallows had already been rejected as an argument in the Spey case and consequently the Sheriff did not issue the interdict. He accepted, however, that the owner had a case that could be heard in higher courts but it was not pursued.

Unsurprisingly these cases generated a degree of hostility between the two groups of users. Representatives of both sides, however, recognised that this was destructive and set about trying to reduce conflict. The most obvious outcome was a local agreement drawn up between several 'local main user' establishments and three estates to avoid canoeing on the middle Spey on Mondays, Wednesdays and Saturdays during the fishing season in return for designation of the rapids at Knockando as a white water training area available every day. The dialogue has continued with both groups trying the others activities, assistance by the Wills estate in building a changing room at Knockando and the training of water bailiffs to enable them to use canoes in their work.

As part of the agreement the Scottish Canoe Association also undertook to provide information on how to minimise problems, which was published in a Guide to Scottish Rivers (SCA (1994)). This suggested the following instructions

a) Avoid splashing in pools immediately downstream of the angler
b) If possible cut corners and avoid the deeper water on the outside of bends
c) If possible pass behind the angler or if fishing from the bank, go as close to the bank as possible, even if this means passing under the rod.

One estate owner, however, continued to have a policy of discouraging canoeists by, for example, blocking access. The Land Reform (Scotland) Act however has changed the owner's legal position by providing a right of responsible access over land and water. The draft Scottish Outdoor Access Code produced in 2003, provides guidance on responsible behaviour for recreational users and land managers. Not only does the paddler have a right to paddle the Spey, its tributaries and all lochs but there is also a right to cross open land to join or leave the river. There is also a right to "wild camp" along the riverside or on islands, provided that the participants follow the Access Code guidelines on wild camping. The SCA produces its own code of conduct which is very similar to the relevant section of the Access Code.

7.2 Areas of Interaction

The vast majority of water sports occur on the two major lochs of the system, Morlich and Insh. The available evidence to us suggests that these lochs may be able to sustain an increase in water-based activities with limited damage to relationships between users, predominantly because of the limited angling effort. Of course, adverse impacts such as disturbance of bird and other populations, littering, damage to paths and car-parking areas is directly related to activity levels and will need to be monitored and managed. The report concentrates upon the river system where there has been a history of conflict between angling and paddle sports. It is intended to inform Section 9 on opportunities and starts with a review of the current situation.

In this report we are primarily concerned with waters navigable by canoe for significant periods of the year i.e. the main river from Newtonmore to Spey Bay, though with good water flow, passage from Laggan to Spey Bay is possible. The River Avon is paddled with good water flow conditions but the number of participants is small (see Table 5.9.1). Paddling thus normally occurs either outside the salmon angling season (11th February to 30th September) or when the river is so high it is unsuitable for angling. The lower gorge of the Feshie is less dependent upon high water and was the subject of a court case that attempted to restrict use. However the Feshie itself enters the Spey well above Aviemore and is not a prime salmon angling river although it is important for spawning.

This section of the report therefore concentrates upon the main stem of the river where there is regular canoeing i.e. from Newtonmore to the sea.

1.1 Activity Days

1.1.1 Paddlers

The estimated number of paddler days on the river is 5607. However these are heavily concentrated in the middle section of the river between Grantown on Spey and Craigellachie with around 70% of the paddler days in around one third of the river. The difference between the middle river at Knockando and the lower river at Castle Gordon is clearly shown in Figs 7.2.1.1 and 7.2.1.2.where the numbers of canoes or paddlers seen in any day are shown. After subtracting 40 'zero-days' to reflect the days when the ghillie was not on duty, there were no canoes on more than 70% of days. Conversely there were only 34% of days at Knockando without a paddler.

Figure 7.3.1.1

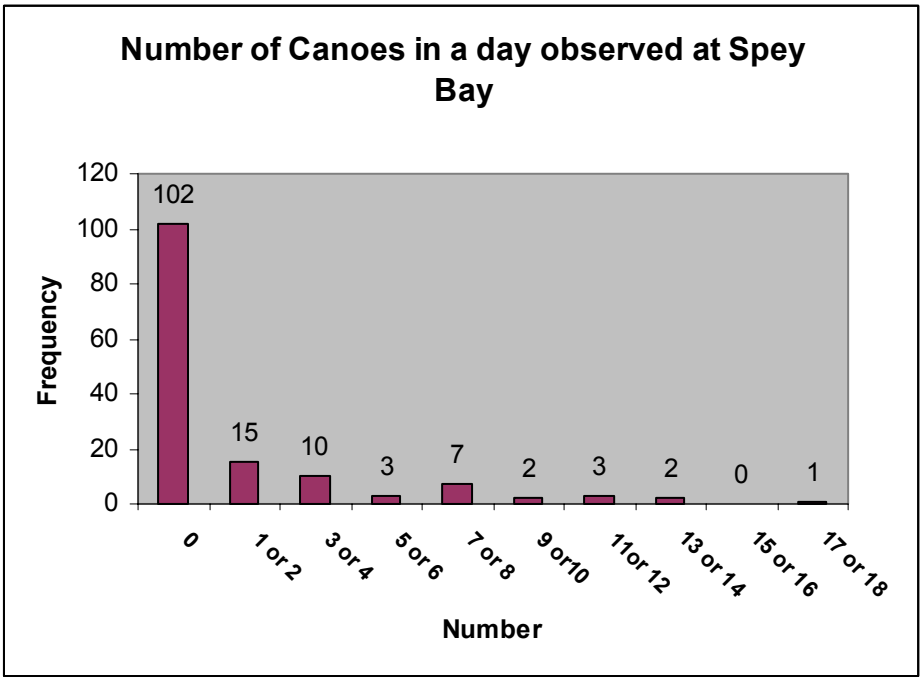
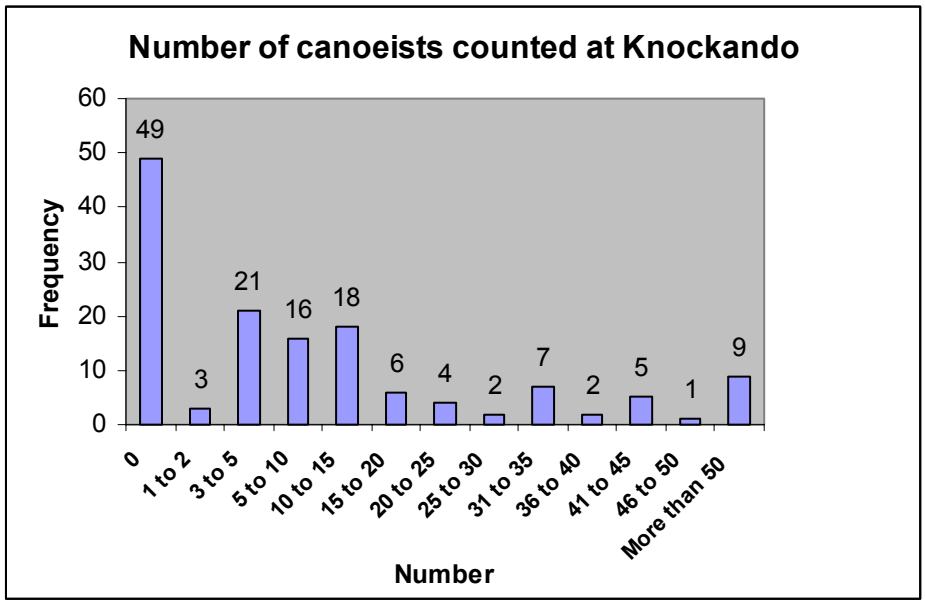


Figure 7.2.1.2



A similar picture emerges with paddler numbers. At Spey Bay (Castle Gordon) the average number of paddlers observed on any day was 0.2 with a maximum of 18, whilst at Knockando the figures are average of 10 and a maximum of 89.

1.1.2 Anglers

Table 7.2.2.1 provides estimates of the numbers of salmon angler days on the Upper Middle and Lower Spey.

Table 7.3.2.1 Angler Days by Location

Stretch	Days	% Days
Upper Spey	2973	7.33%
Middle Spey	19033	46.95%
Lower Spey	15644	38.59%
Avon	2894	7.14%
	40544	**100%**

This table together with the paddler figures in table 5.9.1 indicate quite clearly that capacity problems are unlikely to exist on the upper Spey north of Grantown on Spey and are marginal beneath Craigellachie. This imbalance must be recognised in the analysis of the survey results in the next sections, which we are unable to relate to locations.

1.1.3 Perspectives on Numbers and Group Sizes

Table 7.3.3.1 shows the frequency by which groups of paddlers are seen by **anglers**. What is clear is the rarity of big groups on the river.

Table 7.3.3.1: Frequency of observation of groups of paddlers of different sizes in a typical day

Group Size / Number of Groups	1 or 2	3 to 5	6 to 10	More than 10
None	63.6%	56.4%	72.4%	94.0%
1	32.3%	38.6%	21.6%	5.3%
2 or 3	3.4%	5.0%	4.7%	0.6%
4 or More	0.6%	0.0%	1.3%	0.0%

This is simplified in tables 7.3.3.2 and 7.3.3.3 which show the number of groups and paddlers

Table 7.3.3.2 Number of groups of paddlers seen in a typical day

Number of groups	Percentage of respondents
None	30.4%
1	32.3%
2	21.3%
3	9.1%
4	5.6%
More than 4	1.3%

Table 7.3.3.3 Number of paddlers seen in a typical day

Number of Paddlers	Percentage of respondents
0	30.8%
1 or 2	9.1%
3 or 4	13.8%
5 or 6	12.3%
7 or 8	8.8%
9 or 10	2.2%
11 to 15	9.7%
16 to 20	6.6%
More than 20	6.6%

The mean number of groups is 1.3 and over 30% of the time anglers do not see paddlers at all. 98.7% of the time anglers encounter only 4 groups or less.

The mean number of paddlers is 6.7. To counter the 30% of the time when no paddlers are observed 13.2% of the time more than 10 paddlers are seen.

Table 7.3.3.4: Frequency of observation of groups of walkers of different sizes in a typical day

Group Size	1 or 2	3 to 5	6 to 10	More than 10
Number of Groups				
None	34.6%	77.9%	97.4%	99.0%
1	43.3%	17.6%	1.0%	0.6%
2 or 3	16.3%	3.8%	1.3%	0.3%
4 or More	5.8%	0.6%	0.3%	0.0%

An Angler typically sees a single group of one or two walkers per day. This limited interaction may change as the Land Reform (Scotland) Act starts to have an impact.

Table 7.3.3.5 Number of groups of walkers seen in a typical day

Number of groups	Percentage of respondents
None	29.5%
1	37.2%
2	8.3%
3	12.2%
4	5.1%
More than 4	7.7%

Table 7.3.3.6 Number of walkers seen in a typical day

Number of Walkers	Percentage of respondents
0	29.5%
1 or 2	34.9%
3 or 4	12.2%
5 or 6	8.0%
7 or 8	4.8%
9 or 10	3.5%
11 to 15	3.5%
More than 15	3.5%

This impression is reinforced in tables 7.3.3.5 and 7.3.3.6, 85% of the time six or fewer walkers are seen in any day and 30% of the time no walkers are seen. The mean number of groups is 1.6 (mode 1) and the mean number of walkers is 3.9 (mode 1.5).

The overall impression of these results is that the level of interference with angling is very limited. However, we must emphasise again that experiences will differ between the middle Spey and other angling locations.

Table 7.3.3.7 summarises the responses to the question in the on-site survey on number of anglers and walkers observed in a typical day by **paddlers.**

Table 7.3.3.7 Number of Anglers and walkers seen by paddlers on a typical day

	Anglers	Walkers
None	15.4%	9.2%
1 or 2	30.8%	7.7%
3 or 4	10.8%	12.3%
5 or 6	15.4%	32.3%
7 or 8	4.6%	1.5%
9 or 10	6.2%	16.9%
11 to 25	6.2%	15.4%
More than 25	10.8%	4.6%

The mean numbers seen are 9.5 anglers and 8.6 walkers. The difference with the angler experience is significant. Unlike paddlers, anglers are spread along the river as individuals or with a ghillie. Thus there are effectively on average over 9 interactions throughout the day compared to typically one group of paddlers (mean 1.3) passing the angler. Whilst it could be argued that 10 paddlers strung out over 200 metres could be similar to 3 anglers spaced out over a kilometre (one interaction with successive anglers or one interaction with a succession of canoeists) the difference in "affected" time is significant. With a river running at 4 knots the total time the angler is affected for a group spread over 200 m is 2 minutes (0.6% of a typical 6 hour fishing day). For the canoeist **each** angler requires slowing and consideration and adjustment of route which will take 2 minutes or longer **each** time i.e a total of 20 mins (5.5% of a typical 6 hour paddling day).

The difference between angler and paddler experiences with walkers simply reflects the distance covered by paddlers and that, unlike anglers, they will pass through or close to habitation.

1.2 Interaction Survey Results

Tables 7.4.1 & 2 & 3 summarise the experiences of paddlers, anglers and owners when their activity is "interrupted".

Table 7.4.1 Paddlers Perceptions of Interactions

	0%	Less than 10%	10%-30%	30% to 70%	More than 70%
Pleasantaries	9%	13%	18%	36%	24%
Avoidance	19%	14%	26%	19%	23%
Conflict	45%	40%	10%	4%	1%

For paddlers the most common interaction is an "exchange of pleasantries" (when it occurs). Notably, significant numbers (22%) report this interaction never occurs or occurs less than 10% of the time. Conflict is very rare, 45% suggesting it never occurs and only 5% suggesting it happens more than 30% of the time. Avoidance action is reported as necessary 42% of the time.

The experiences of the angling community when meeting paddlers is summarised in tables 7.4.2 & 7.4.3.

Table 7.4.2 Anglers' Perceptions of Interactions

	Never	Less than 10%	10%-30%	30%-70%	More than 70%
Exchange of Pleasantries	22.9%	7.9%	12.1%	23.2%	33.9%
Visual/Noise Distraction	36.1%	26.8%	14.2%	8.1%	14.8%
Interruption of Activity	36.8%	24.6%	14.1%	6.3%	18.3%
Disruption leading to Relocation	74.5%	15.5%	4.5%	1.8%	3.6%
Personal Conflict	85.4%	12.8%	1.5%	0.3%	0.0%

Table 7.4.3 Owners' Perceptions of Interactions

	Never	Less than 10%	10%-30%	30%-70%	more than 70%
Exchange of Pleasantries	16.7%	10.0%	16.7%	26.7%	30.0%
Visual/Noise Distraction	30.8%	38.5%	23.1%	0.0%	7.7%
Interruption of Activity	31.0%	37.9%	10.3%	17.2%	3.4%
Disruption leading to Relocation	59.3%	25.9%	11.1%	3.7%	0.0%
Personal Conflict	76.9%	23.1%	0.0%	0.0%	0.0%

These are not dissimilar to those for paddlers. The most usual response is "good afternoon" although a substantial minority apparently prefer to ignore the existence of the other. Personal conflict appears to be rarer for anglers than canoeists, which possibly reflects the relative numbers.

Movement by the angler given the difficulty of movement in a fast flowing river, is quite rare. It is generally far easier for the canoeist to avoid the angler unless the angler is standing in the only deep-water channel available.

Finally our paper/internet surveys allow us to compare the views of paddlers on the Spey and on other Scottish rivers. The results are given in table 7.4.4.

Table 7.4.4 Experiences on the Spey v Scottish Rivers in general

	0%	Less than 10%	10%-30%	30% to 70%	More than 70%	Score
The Spey						
Pleasantaries	9%	13%	18%	36%	24%	42%
Avoidance	19%	14%	26%	19%	23%	34%
Conflict	45%	40%	10%	4%	1%	8%
Scottish Rivers						
Pleasantaries	7%	9%	18%	44%	22%	44%
Avoidance	10%	22%	25%	22%	22%	35%
Conflict	36%	52%	9%	2%	0%	9%

The results show no difference (confirmed at 100% confidence by the Chi Squared Test) between the Spey and other rivers.

1.3 Attitudes to Change

The final sections of the surveys sought responses to the possibility of increases in numbers. These are summarised for the different groupings in tables 7.5.1 – 3.

Table 7.5.1 Paddlers Perceptions of the effect of a doubling in numbers

	Paddlers	Walkers	Anglers
Major Negative	9.6%	2.6%	37.4%
Minor Negative	37.4%	6.1%	33.8%
No Effect	30.8%	79.1%	21.7%
Minor Positive	12.6%	10.7%	4.5%
Major Positive	9.6%	1.5%	2.5%

Table 7.5.2 Anglers Perceptions of the effect of a doubling in numbers

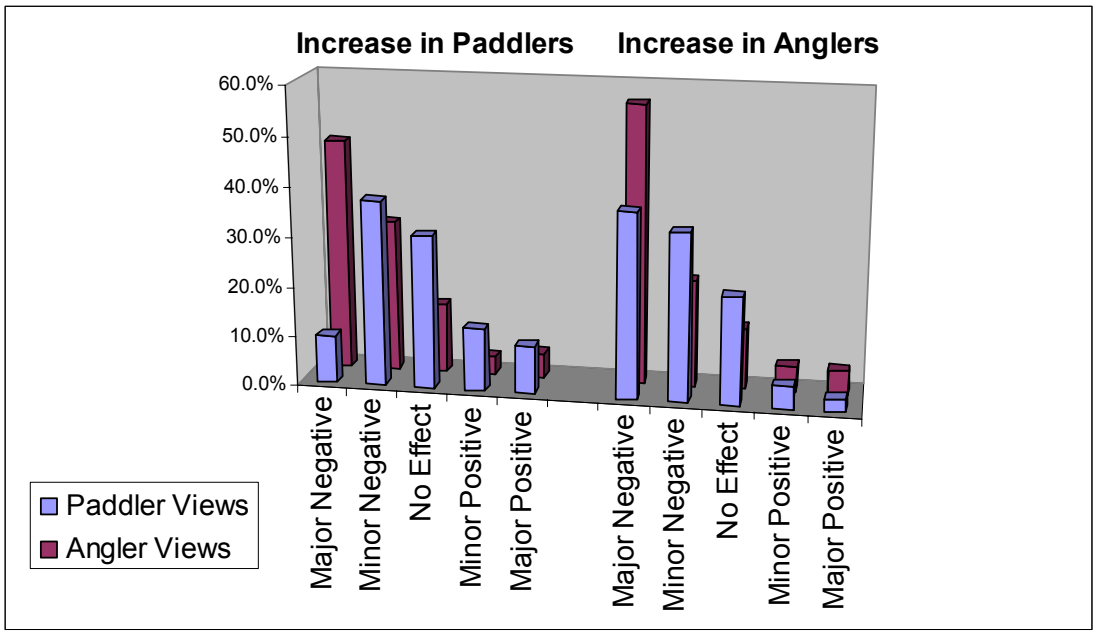
	Paddlers	Walkers	Anglers
Major Negative	47.0%	11.6%	55.4%
Minor Negative	30.1%	28.6%	22.2%
No Effect	14.4%	54.7%	12.8%
Minor Positive	3.4%	4.0%	4.7%
Major Positive	5.1%	1.1%	5.0%

Table 7.5.3 Owners Perceptions of the effects of a doubling in numbers

	Paddlers	Walkers	Anglers
Major Negative	43.3%	22.2%	64.3%
Minor Negative	36.7%	40.7%	14.3%
No Effect	10.0%	33.3%	7.1%
Minor Positive	6.7%	3.7%	10.7%
Major Positive	3.3%	0.0%	3.6%

Generally increases in walking along the riverbank are assumed to have a minor or no effect on the enjoyment of paddling or angling. As might be expected there is a belief by anglers/owners that increases in paddlers are undesirable but what is noticeable is that they are even more worried about increases in angling than the paddlers are. This is shown most clearly in figure 7.5.1.

Figure 7.5.1 Perceived Effect of Increase in Numbers



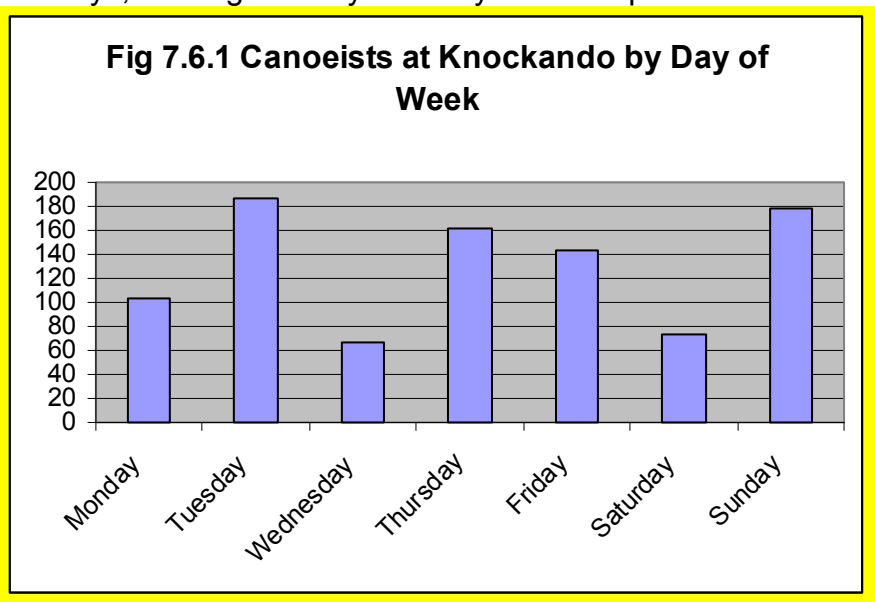
1.4 Conclusions and recommendations

In policy terms, any suggested expansion in the number of anglers would be rejected by owners, anglers and paddlers. Given the current pricing strategy, such an increase is unlikely. A policy of encouraging expansion of paddler numbers would be met with hostility by the angling community and little support amongst existing paddlers. However, as section 3.1 shows, in the placid waters of the upper Spey there are few anglers or paddlers and expansion here would, notwithstanding the acknowledged problems with overhanging trees, cause few problems and possibly reap some financial benefits.

If numbers are to be expanded on the middle and to a lesser extent, lower Spey then there must be very clear benefits. Encouraging paddlers to utilise the whole of the river on a Spey descent might offer enough benefits to the local community and the paddlers to balance any loss of amenity to the anglers. We discuss this further in the opportunities section.

Much work has been done on developing angler-paddler relationships but there is still evidence of hostility that spoils the pleasure of both groups. Locally based instructors and ghillies are both knowledgeable and very aware of the need for co-existence. A local agreement was developed before 1990 between outdoor centres and owners to not use the river between Dellefure Burn and Aberlour on Mondays, Wednesdays and Saturdays. Although this does not apply directly to private users,

clubs and commercial rafters the SCA has actively promoted adherence in its publications and guides. Fig 7.6.1 shows appreciable drops in numbers using the rivers on these days, although clearly it is very far from “paddler free”



Scrutiny of the comments section of the questionnaires suggests that there are still a number of anglers unfamiliar with Scottish Law and the rights of paddlers. Similarly there is apocryphal evidence of some paddlers who focus on personal enjoyment to the exclusion of other considerations and consideration of others. It is unclear if much can be done to quickly remedy either problem.

Whilst we did not seek to obtain evidence on the possible impact of wild camping, our discussions with ghillies suggest that wild camping might compromise the peace, solitude and exclusivity the angler is paying for. Even if wild campers adhere to the relevant sections of the Scottish Outdoor Access Code, there may be some tension. It would be appropriate to ensure that all recreational riparian users, ghillies and riparian owners are fully informed about the rights and responsibilities implied by the Land Reform (Scotland) Act and relevant sections of the Scottish Outdoor Access Codes.

SECTION 8 THE IMPACT OF WATER BASED RECREATION ON THE ENVIRONMENT

8.1 Introduction

The purpose of this section of the report is to consider the impact of recreational activity on the environment of the Spey. An observer walking along the Spey at the right time of year would see individuals or small groups of anglers and canoeists. Such an observer would be hard pressed to suggest any significant environmental effect as a direct result of the presence of either type of recreational user, other than perhaps the taking of salmon by the angler. Minor issues may be potential damage from carelessly discarded or lost fishing line or hooks, walking on the river-bed, dragging canoes over banks or littering. This desk study and the 'observational report' (Appendix A8.1) support this view. It would be tempting to leave the analysis there but there is a deeper question we believe should guide the study. What would be the perception of this observer (or indeed a freshwater ecologist) of any management activities carried out on the river to 'enhance' the recreational experience? Such activities might be the modification of the river-bed to enhance canoeing or fishing, or the river banks to facilitate access. In light of this we feel bound to consider the broader picture, whilst remaining sensitive to difference in scale between an individual impact and current or historic management activities.

Consequently the environmental impact study now has two elements. The first is a desk study that addresses the 'SAC species' of the River Spey and the effects on them of water based recreational activity. The second element is an observational report drawn from a five day Spey descent. This seeks to provide a canoeist's-eye snapshot of the current status of the river as a recreational resource subject to the effects of competing use. Its findings are summarised in Section 8.3 and the full report is found in Appendix A8.1.

8.2 Environmental Impact Desk Study

8.2.1 Limitations of Study

The primary purpose of the main study was to consider the socio-economic impact of angling and water sports on the main stem of the River Spey. Consequently the environmental impact study constitutes a minor but nonetheless significant aspect of the study. There are limitations to what can be done in a brief desk-study such as this but the consultants set out with the purpose of providing guidance on what potential impacts the recreational activities may have and their relative significance. This would allow consideration as to whether a greater and more detailed study would be justified.

It should be emphasised that **this report refers only to the main-stem of the River Spey**. Where the whole catchment or the tributaries are considered this is made clear. This is to conform to the remit of the project but is also due to limitations of practicalities and the availability of information and supporting literature.

One significant advantage to this approach lay in the fact that the River Spey had recently been surveyed and documented under both the *River Habitat Survey* (RHS) and *River Corridor Survey* (RCS) schemes. These surveys provide information on the gross physical and biological characteristics of the river and its banks and on the main

modifications to the watercourse. Whilst these surveys document riparian farming activities and engineering works such as river bank modifications for road-works, the study was limited to those recreational activities which may have an impact on the three aquatic 'SAC species'. In the present study the RHS data were used in preference to the RCS. This was for several reasons; namely that the RHS gives broader rather than locally detailed coverage, it is widely used throughout the UK and that at least one existing study (Hastie *et al.*, 2003) links RHS data with the status and distribution of an 'SAC species' (pearl mussel) in the River Spey.

Despite their significance in conservation terms (and in the case of salmon their economic importance) there is modest published literature on the effect of disturbance and habitat modification on these species. In particular there is a dearth of published material on the effects of habitat modification on the relationship between species and their food, their predators or hosts. For example one stage in the life cycle of the mussel requires juvenile salmon or trout as host.

The issue of *disturbance* (particularly of adult salmon) is an obvious candidate for consideration in this report. This is an issue which has generated a great deal of conflict between fishermen and canoeists because of the perceived impact of passing canoes and kayaks on the adult salmon the fisherman is trying to catch. Hendry and Tree (2000) examined the effects of canoeing on fish stocks and angling for the Environment Agency and concluded that canoeing is not harmful to fish populations. Therefore, the main area of conflict between anglers and canoeist centres on the actual or perceived disturbance of angling. Disturbance is in turn allied to the concept of exclusivity with its attendant financial implications for riparian interests and anglers.

Furthermore in the Spey wooden boats are used for access and fishing by fishermen and so it seems logical to question the effect of this alongside canoeing and rafting. Indeed in the case of other rivers such as the Tay, boats with outboard motors are used for identical purposes, and it is difficult to believe that such activities are insignificant compared to canoeing. What seems to be the central issue with regard to disturbance is that the perception of how impact may affect the *fishery* (i.e. the interest anglers have in fishing a given river or beat, and hence the price they are prepared to pay to fish there). Whilst the issue of *perceptions* is beyond the scope of this desk study it is an aspect of the main survey of river users and is discussed in the main section of the report.

Arguably in the River Spey system the greatest pressures on these three 'SAC species' arise as a consequence of *general habitat loss* and in the case of salmon, the *effects of fishing* (angling) on the salmon population itself. The former will only be considered in terms of the impact of management activities specifically designed to enhance the fishery (e.g. through building groynes (deflectors) etc) or for canoeing (there appear to be none of these on the Spey) whilst the latter is clearly outside the scope of the study. We would however make the point that such issues are of great importance and deserve attention to set the present study in context. There are of course other more general pressures on these species but again to maintain the context as that of the River Spey we have excluded climate change, pollution, genetic contamination, parasitism and marine stages of development.

8.2.2 Biology of River Spey 'SAC species'

The following brief accounts focus primarily on the aspects of the biology of each species which are relevant to the present study. A very readable general account of three of the species (salmon, lamprey and mussel) can be found in the SNH publication 'River Runners' (Sime, 2003). At times in their life cycle each of the three species shares a requirement for swift flowing clean fresh water and a mixed gravel and rock substrate. The following accounts are drawn from material in Sime (2003), Wheeler (1975) and Maitland (2000).

Further detailed literature reviews specifically for the Conserving Natura 2000, Rivers Ecology Series (English Nature) have been recently prepared for the Atlantic salmon (Hendry and Cragg-Hine, 2003); river, brook and sea lamprey (Maitland, 2003); pearl mussel (Skinner, Young and Hastie, 2003) and European otter (Chanin, 2003). These booklets are highly relevant to the following review and associated recommendations.

8.2.2.1 Salmon *(Salmo salar L.)*

Life cycle: The migration of adults to freshwater to spawn, the incubation of the eggs in gravel redds and the rearing of juveniles over a two or three year period prior to migration as smolts to the sea is well known. The economic significance of the River Spey as a fishery for adult salmon is documented elsewhere in this report. The conservation of juvenile salmon populations is of critical importance to the long term prospects for the stock and thereby this fishery. Whilst the adults do not feed in freshwater the juveniles depend on freshwater invertebrates and terrestrial insects which land on the water surface. Hence the quality of both the aquatic habitat and the riparian habitat are important for the availability of invertebrate prey items. In addition to demands of high water quality and specific river-bed characteristics which are similar for the pearl mussel, juvenile salmon have a preference for areas where some protection from predators can be provided by rocks, in-stream vegetation or overhanging branches. In addition to stabilising banks and reducing the input of sediment and debris, streamside vegetation is important in providing cover, maintaining acceptable temperatures and harbouring food for salmonids. The root systems of riparian vegetation may assist in the formation of pools or undercut banks favoured by juvenile salmonids. The relationship between the amount of streamside vegetation and fish production is complex and there remains some debate concerning its importance. Early work by Mundie (1969) demonstrated the importance of riparian vegetation in providing terrestrial insects as food for salmonids and leaf litter is also important for aquatic invertebrate production. More recently O'Grady (1993) compared the effects of 'heavy shade' with 'dappled shade' and found that the density of salmonids in the former was roughly 19% of that in the latter. Consequently O'Grady (1983) recommended only selective clearance of overgrown scrub to leave partial shading. In their review of literature on the conservation of Atlantic salmon Hendry and Cragg-Hine, (2003: 15) settle on the view that overhead cover is important in 'providing food and cover for juvenile salmon and other species'. They also emphasise the significance of riparian vegetation in maintaining bank integrity and as a source of woody debris which 'contributes to overall stream diversity' (Hendry and Cragg-Hine, 2003:15). Bjorn and Reiser (1991) caution that removal of vegetation may lead to increased light intensity which may raise temperatures, particularly in small streams. This may lead to an

increase in algal and invertebrate production. There is also some evidence that small fish are less affected by changes in cover than larger fish (Parkinson and Slaney, 1975).

Pressures: The migration of adults can be impeded by the construction of barriers such as dams. Whilst no significant dams exist on the main stem of the River Spey below Spey Dam, there are at least 77 man-made structures in the catchment which limit access for salmon. There are two major dams (Spey Dam and Tromie Dam), plus five major distillery off-take weirs. If removed, the accessible area of the Spey could be increased by as much as 20% (Butler, *pers comm*). Spawning requires clean gravel, well aerated by a good through-flow of water and any loss of such habitat can have a significant effect on the recruitment of juveniles to the population. In the Spey it is likely that river works carried out in the winter will lead to damage to salmon redds and that resulting particulate debris may damage fish gills. There are also issues associated with the clearance of water weed (primarily *Ranunculus* sp.) and the removal of overhanging branches (to improve access for fishing) which are considered later in the report. In some locations construction-related particulate matter may be washed out and deposited in spawning gravels reducing egg to fry survival. Similarly siltation may reduce benthic invertebrate fauna production and survival. Whilst the construction of features designed to alter flow in the river such as groynes/croys (deflectors)[14] and digging out of pools (which often subsequently fill with gravel etc) have long been held to benefit fisheries (i.e. to aid *fishing*), it seems clear that the effect on juveniles may not always be positive (Parkinson and Slaney, 1975; Higgins, 1983).

In summary, it is important to stress that the relationships between bank and stream-channel modification and salmonid production are complex. Nonetheless it seems likely that on balance extensive modifications of these types will have a local detrimental effect on juvenile recruitment, growth and survival. Whilst the impact of weed clearance and the construction of groynes would primarily be short-term, any effect of changes to the bankside vegetation may be of longer-term significance. Whilst the more substantial construction and bank modifications took place in the past and future activities will be controlled, examination of these principles sheds light on both the scale of the impacts and the significance of regulation on the main stem and the tributaries (which have recently been awarded SAC status). In the case of large rivers such as the Spey the situation is further complicated by the significance of the tributaries as important spawning and rearing areas for juvenile salmon. Consequently modification to the main stem of the river may have a less detrimental effect on recruitment than in the tributaries. Nonetheless the current state of the Spey fishery (a decline in adult salmon from about 90,000 in the early 1980's to about 50,000 now, resulting in annual rod catches below the 10 year average since 1997 (Butler, 2002)) would indicate that damage to juvenile recruitment should be avoided wherever possible and this must include the main stem[15] and the tributaries.

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[14] The term 'groyne' is used here as it is more widely used in the literature than 'croy' or 'deflector'.

[15] It should be noted however that despite the decline in adult stocks (which appears to be the result of depressed marine survival of smolts), juvenile surveys indicate that enough adults are spawning to saturate available nursery habitat, thereby maintaining the optimal smolt run from the river(Butler, 2002).

8.2.2.2 Sea lamprey *(Petromyzon marinus L.)*

Life cycle: There are three species of lamprey found in the British Isles, the river lamprey (or lampern) (*Lampetra planeri* Bloch), the brook lamprey (*Lampetra fluviatilis* L.) and the sea lamprey (*Petromyzon marinus* L.). All are thought to be close to the northern limit of their range in Scotland. Whilst all three are listed in Annex II of the Habitats Directive only the sea lamprey is included in the Spey SAC designation. All three species do not have true jaws but instead have sucking mouths with rasping teeth and all have a complex breeding biology. For two species (river and sea lampreys) this involves migration to and from the sea.

Adult sea lampreys grow up to 75 cm in length and leave the sea to spawn in freshwater and usually travel some distance to find a stony bottom where they hollow out nests by moving rocks with their sucker-like mouths. Early studies (e.g. Applegate, 1950) demonstrated the importance of gravel and sand for spawning. Spawning areas are often at the tails of pools and as lampreys have similar water flow and oxygen saturation requirements to trout they share the trout's preference for such areas (Stuart, 1953). Applegate (1950) also established that there was no relationship between cover/shade and spawning activity. The blind, toothless lamprey larvae (called ammocoetes) live in mud and sand substrate, filter feeding on plankton and detritus for several years until the metamorphose to become sighted, toothed adults prior to migration to the sea. Adult sea lampreys are parasitic on other fish, holding on to their prey with the mouth sucker whilst rasping through scales into the flesh. Death of the host fish frequently results as a direct result of parasitism or from subsequent infection.

The life cycle of the smaller (up to 40 cm) river lamprey is similar but whilst the adult sea lamprey is widely distributed through offshore coastal areas of both sides of the North Atlantic, adult river lampreys stay close to the shore and frequently feed in estuarine areas.

The brook lamprey (up to 16 cm) spends its entire life in freshwater streams and rivers. The adults are not parasitic and its life history is one of a prolonged larval stage which lasts about five years followed by metamorphosis to adult, breeding and death.

Pressures: In Canada the sea lamprey has been considered a pest species in the Great Lakes ecosystem since the opening of the Welland Canal (between Lake Ontario and Lake Erie – to bypass Niagara Falls) in 1921. Their spread in to Lake Erie and subsequently into Lake Huron and other lakes has been well documented (Edington and Edington, 1977). The impact of parasitism on brook trout populations in the Great Lakes was dramatic and the trout population collapsed catastrophically. As a consequence of the economic importance of such fisheries considerable, and generally successful, efforts have been made to control lamprey populations in the Great Lakes and other parts of North America. The most significant general threat to the lamprey seems to be industrial and agricultural pollution. In less polluted rivers of the world, such as the Spey, the greatest pressure may come from the vulnerability of juveniles to disturbance of their silt beds by management activities. However in some parts of the river the deposition of sand and silt behind groynes may provide limited additional habitat. In some parts of the UK, exploitation as bait for fishing has also led to pressure on local populations. Internationally the species is now vulnerable.

8.2.2.3 Freshwater pearl mussel *(Margaritifera margaritifera L.)*

Life cycle: Adult pearl mussels can grow to a length of 15cm and live for over 100 years in a mixed substrate of coarse sand, gravel and rocks in clean fast-flowing rivers. In spring male pearl mussels release sperm into the river water which are drawn in by females as they filter-feed. The sperm fertilise the eggs and by late summer these develop into larvae (glochidia) about 0.06 mm long. Each female produces between one and four million glochidia and upon release they drift downstream with the current. As water is drawn over the gills of young salmon and trout a tiny proportion become attached and encyst until the following spring or summer before dropping off to settle in the river-bed. If the juveniles land on suitable coarse gravel or sand they bury in, grow to mature at 12-15 years and live there for the remainder of their life. The tendency of juvenile salmon and trout to maintain a feeding station at a preferred location in the river serves to prevent the downstream loss of local mussel populations. Adults feed by filtering up to 50 litres of water per day which can have an incidental but positive effect on water quality. In a recent paper Hastie *et al.* (2003:213) demonstrate that the distribution of mussels in the Spey is positively associated with a number of habitat types(see below). These included: 'boulder/cobble river bed substrates, broken/unbroken standing waves, aquatic liverworts/mosses/lichens and broadleaf mixed woodland/bankside tree cover' (Hastie *et al.*, 2003:213). They note the importance of 'stable clean sand' which is 'often associated with cobble/boulder substrates in moderate- to fast-flowing waters' (Hastie *et al.*, 2003:220). The distribution of the mussel is also linked to the physical habitat preference of the host fish (juvenile salmon and trout), namely 'coarse substrates and riffle/pool' areas (Hastie *et al.*, 2003:221). Bankside tree cover (especially alders) is thought to benefit mussels 'by shading the channel, reducing fluctuations in water temperature and reducing algal growth on the river bed' (Hastie *et al.*, 2003:221). These authors also cite evidence from Germany where the 'removal of riparian woodland and subsequent erosion and siltation have been implicated in the decline of *M. margaritifera* populations' (Hastie *et al.*, 2003:221).

Pressures: Nationally and internationally the principal and most serious historical threats to pearl mussels have been pollution and pearl-fishing. Whilst they are still found in many Scottish rivers the fact that adults live for so many years should not be taken as an indication of a reproductively viable population. Indeed here, as in other parts of the world, populations are in decline. In a review of all known pearl mussel populations Young *et al.* (2000) estimated that only around 100 reproductively viable populations existed world-wide. In their survey Cosgrove *et al.* (2000) reported that over half of these functional populations were to be found in Scottish rivers. This points to both the vulnerability of the species to extinction and the significance of the Scottish populations. As they are filter feeders they are particularly susceptible to absorbing pollutants (effluents, fertilisers etc) and suspended sediments (e.g. from engineering works) which clog the gills. In one particularly pertinent study Cosgrove and Hastie (2001) investigated the impacts of river engineering on mussel populations in 36 Scottish rivers. They found that almost half were affected by activities directly related to fisheries management (e.g. fish pool dredging, fishing platform/groyne (deflector) construction and bank reinforcement' (Cosgrove and Hastie, 2001: 184). The other causes identified were dam construction, flood defence, road maintenance and pipe-laying. Whilst such susceptibility is clearly of importance, in parts of Scotland it may not now be as significant as the decline in populations of the host fish (young salmon and trout) on the

gills of which the glochidia encyst (Cosgrove, *pers comm*). A range of measures have been introduced to protect the pearl mussel including banning fishing for pearls which was a traditional activity on a number of Scottish rivers until 1998. Nonetheless, pearl mussels are still illegally taken and consequently the locations of mussel beds are not made public.

8.2.3 The River Habitat Survey (RHS)

The River Habitat Survey is an assessment method to characterise the physical structure and habitat quality of freshwater streams and rivers (Environment Agency, RHS Manual, 1997). The method was devised by the Environment Agency in response to the 'need for a nationally applicable classification of rivers based on their habitat quality' (Raven *et al.*, 1997: 215) and to assist in decision making in conservation management and habitat restoration along river corridors. It has been successfully tested and applied to Scottish rivers (Fozzard *et al.*, 1997). The essential feature of the method is that a number of sites on a given river are each surveyed over a 500m length. In addition to an overall assessment of specific channel and other features over the whole length, 10 spot-checks are carried out at 50m intervals along the length of the survey site. The choice of 500m was based on research which showed that this was optimum for yielding 'maximum information gain in minimum time' (Raven *et al.*, 1997: 217). The method has also been used to characterise river habitat for particular species such as the freshwater pearl mussel (Hastie *et al.*, 2003).

The main features recorded in an RHS survey are summarised by Raven *et al.* (1997). They include a range of physical features associated with the river itself, its banks, the valley floor and floodplain. Detail is collected on flow and aquatic vegetation and on bankside vegetation and trees. Artificial features and channel and bank modifications are also recorded. In addition to the site location and survey details 16 main characteristics are surveyed and each is classified in a number of subsidiary elements to provide a detailed record for each 500m site.

Table 8.2.3.1 RHS Survey Elements

A	Site location	J	Extent of trees and associated features
B	Survey details	K	Extent of channel features
C	Predominant valley form	L	Channel dimensions
D	Number of riffles, pools and point bars	M	Artificial features
E	Physical attributes	N	Evidence of recent management
F	Banktop land use and vegetation structure	O	Features of special interest
G	Channel vegetation types	P	Choked channel
H	Land use within 50m of banktop	Q	Notable nuisance plant species
I	Bank profiles	R	Overall characteristics

Raven *et al.* (1997)

Surveys may be carried out by one or more trained observers. Despite the clarity of the instruction manual and consistency of training some variability in results should be expected both within a river and between rivers. Nonetheless a large number of rivers in the UK have now been surveyed generating an extensive national database and providing researchers and managers with an invaluable resource.

8.2.4 River Spey RHS and 'SAC Species'

The survey of the River Spey was carried out in1999/2000 as part of a wider survey on freshwater pearl mussel distribution, commissioned by SNH and carried out by Aberdeen University. RHS sites were surveyed at intervals of approximately 2km throughout the length of the river from Spey Dam to Spey Bay. Each site was approximately 500m in length and an overall total of 102 sites were surveyed. To aid the present study an Excel file containing RHS data on the whole river was kindly supplied by the Environment Agency, Warrington (15 July 2003). The corollary to this is of course that a 500m survey every 2km means that a maximum of a quarter of the river has been surveyed and hence *three-quarters has not*. There is therefore a good case for *multiplying all of the assessments which follow by a factor of four* (notably the number of groynes/deflectors). A check of this was made possible during a canoe descent of the river from Loch Insh to Spey Bay in September 2003 when the actual number of groynes was counted. The results of this are presented later but did indeed show that on the main stem there are between three and four times the number surveyed in the RHS. Clearly, as the RHS was conducted on the main stem of the river it is only possible to interpolate the results *within* this area. Extrapolation to the rest of the catchment is not feasible.

This file summarises all the results in each of the RHS categories for each of the 102 locations. Each of the categories has a number of subsections and so the scale if the database is a matrix of 201 columns by 102 rows. There is also additional descriptive information included on observed biodiversity. Clearly only a small proportion of this information can be considered in this brief study.

In light of the above discussion on the life cycle and pressures on each of the 'SAC Species' it seems appropriate to consider activities recorded in the RHS database which might damage habitat recruitment or survival. For consistency these are referred to as potentially damaging activities and the damage might be categorised as *temporary/minor* or *permanent*. In addition to this the effect of activities which cause *temporary disturbance* should be acknowledged.

Before beginning an assessment of the effects of potentially damaging activities the similarity of the habitats preferred and hence the locations in the river where juvenile salmon and mussel are found should be noted. This should come as no surprise given the dependency of the mussel glochidia on juvenile salmon hosts. Such locations are characterised by swift flowing water and a boulder/cobble river-bed (Hastie *et al.,* 2003). However the lamprey prefers mud/silt areas, generally lower down the river.

8.2.5 Assessment of Potentially Damaging Activities on 'SAC Species'

It should be noted that the following assessment has been made in the absence of direct evidence of the impact of various potentially damaging activities and a paucity of relevant literature. Below, several potentially damaging activities are assessed in terms of their potential disturbance or damage to the three SAC species. Each of these is considered in relation to the literature reviewed earlier and accorded a 'degree of risk' where low, medium or high are indicated by a scale of * to ***. This is similar to the approach taken in SNH internal guidance on impacts on pearl mussels, which also

relates the degree of risk to mussel abundance. Following the assessment recommendations are provided.

8.2.6 Access and egress (on foot or with boats):

Whilst no data are available from the RHS it is obvious that such activities resulting from fishing and canoeing will have an impact. In relation to other potentially damaging activities, though it is clear that impacts will be local and minor. Whilst the disturbance effect on juvenile salmon will be temporary, damage to salmon redds during the incubation period (October to May), mussel beds and lamprey burrows may be worthy of consideration. This is particularly so where there are only localised populations (of mussels or lampreys). As a result of an enquiry by the Scottish Environmental Protection Agency (SEPA) concerning the possible effects of surveying the river by 'kick-sampling', SNH undertook an 'Appropriate Assessment'. This assessment considered the potential impact on pearl mussels of people walking on the river-bed. Following this assessment SNH concluded that walking on the river-bed would not have an adverse impact on the integrity of the site with respect to freshwater pearl mussels. Lampreys primarily select slow moving water and silty areas of rivers for their burrows. Although a similar assessment has not been conducted for the lamprey and their habitat it seems likely that SNH would similarly conclude that the integrity of the site would not be affected (Scott, *pers comm*).

Regular access for canoeing and rafting is limited to a few popular sites on the main stem of the river. The building of the water sports facility at Loch Insh has clearly made a substantial impact on that area of the loch and although this is a specific and localised business activity (primarily for sailing, windsurfing and loch canoeing) the site is used for other recreational access to the river, primarily for Spey descents. The other key access locations on the main stem of the river are at the newly provided parking area below the March Pool at Ballindalloch and Knockando. At both locations the landowner has provided facilities to aid access and egress. Some localised bank erosion is inevitable at such locations and the area below the SCA changing rooms at Knockando has lost much of the stabilising vegetation, leaving it prone to further damage. There is a less extensive area of bank erosion at the access point in Aviemore.

Recommendations: Whilst there are good data on mussel beds (see Hastie *et al*., 2003) information on locations of lamprey areas is scant. SNH has recently commissioned a sea lamprey survey and very few were found. This is perhaps unsurprising as their biology and behaviour make them notoriously difficult to survey. In the short-term important, areas of larval lamprey habitat should be mapped against the locations favoured for access for fishing (on foot) and rowing boat/canoeing/rafting. Mapping the popular canoe/raft access locations is relatively straightforward but the fishing less so. In the longer term better data is required on the locations of lamprey burrows until then the impact of access on lampreys cannot be determined. Such information would primarily be of value to SNH in discussions with fisheries managers. However, informing those who use the river for recreation of its ecology and the sensitivity of the 'SAC species' is of clear value. A general notice in the form of an informative poster (similar to the one above the bridge at Grantown on Spey) and urging care could be provided for the fishing huts on the river and displayed at popular access and egress points.

Efforts should be made to stabilise areas where erosion is extensive or increasing. At some locations different approach routes would allow areas to be

'rested' to allow re-growth of vegetation. At others (e.g. Aviemore) the access point for canoeing is so specific that building steps might be the best solution. The site at Knockando may benefit from the building of a path from the river up to the changing rooms.

8.2.7 Weed cutting

The RHS records evidence of the removal of *Ranunculus* at seven locations spread through the lower half of the main stem of the river. However, as the RHS survey is limited in area covered and in the time of year it was carried out, it seems likely that much more cutting takes place than the data suggest. To maximise efficiency such activities are often carried out by hand and at low-water. Although widely distributed throughout the UK *Ranunculus* is considered to be a non-native species in the River Spey and so there are arguments for its control and removal. Whilst aquatic weed cutting is a standard management practice in the Spey and other salmon rivers, little is known of the effects on 'SAC' or other species. Concerns have been raised that weed cutting may have a number of effects such as the release of significant amounts of silt which can clog the gills of salmon and mussels and affect cover and invertebrate production. The initial findings of a recent study by SNH (undated) indicate a more complex situation. Physical removal of *Ranunculus* had little direct effect on pearl mussel or salmon or trout fry populations but parr seemed to benefit from improved feeding opportunities associated with clumps of the plant (SNH, undated). However, deposition of sand close to the clumps appeared to be detrimental to mussels, salmon and trout (by blocking interstitial spaces in the bed substrate) (SNH, undated). On balance it seems that removal of *Ranunculus* may be of more benefit to mussels and salmon than to their detriment. There seems to be little evidence of a relationship between the plant and lamprey populations.

Recommendations: Whilst more information on the effects of weed cutting would be welcomed the initial report by SNH is a valuable addition to the literature. The report suggests that a comprehensive management plan for *Ranunculus* should be devised for the River Spey.

8.2.8 Removal of bank vegetation cover

The RHS provides an assessment of shading due to trees. In half (52) of the sites surveyed this was considered to be 'present' and at a further 20 sites it was considered 'extensive' (> 33% of total bank-length within the survey site) (Environment Agency, RHS Manual, 1997). There was no shading at 30 sites, most of which were in the lower reaches of the river. The degree of shading relates to the riparian tree cover adjacent to the river and this has important implications for bank stability, light penetration, water temperature regulation, provision of leaf litter important for aquatic invertebrate production and for terrestrial insect 'supply' (for juvenile salmonids). Whilst there may be debate about the historic extent of bank-side cover in the highest reaches of the tributaries and the lower floodplain it is clear that if the banks of the main-stem were not managed for the fishery (and for other purposes) it would be shaded throughout most of its length (Birks, 1988). Therefore, extensive shading at only 20 sites (a fifth) represents a significant reduction in natural cover. From the assessment of the requirements of juvenile salmon (see description of biology above) and in light of recent evidence on the

importance of the main stem (Loch Spey to Spey Bay) for smolt production (probably around 50% of the total for the whole catchment) (Butler, *pers comm*), further loss of bank-cover cannot be without consequences. Nonetheless, there are few reaches of the river where bank-side cover is absent for any length, and as the literature suggests that for salmon *some* cover (rather than full cover) is an advantage, it seems likely that the impact of previous removal may be more local than widespread. The positive correlation of pearl mussels with broadleaf/mixed woodland and bank-side tree cover, and the reported damage to populations where this has been removed (Hastie *et al*., 2003) suggests this to be an important factor in sustaining mussel populations. Whilst Applegate's (1950) study would indicate that there is likely to be no significant effect of removal of bankside vegetation on lamprey spawning, no evidence of other potential effects was found in this review.

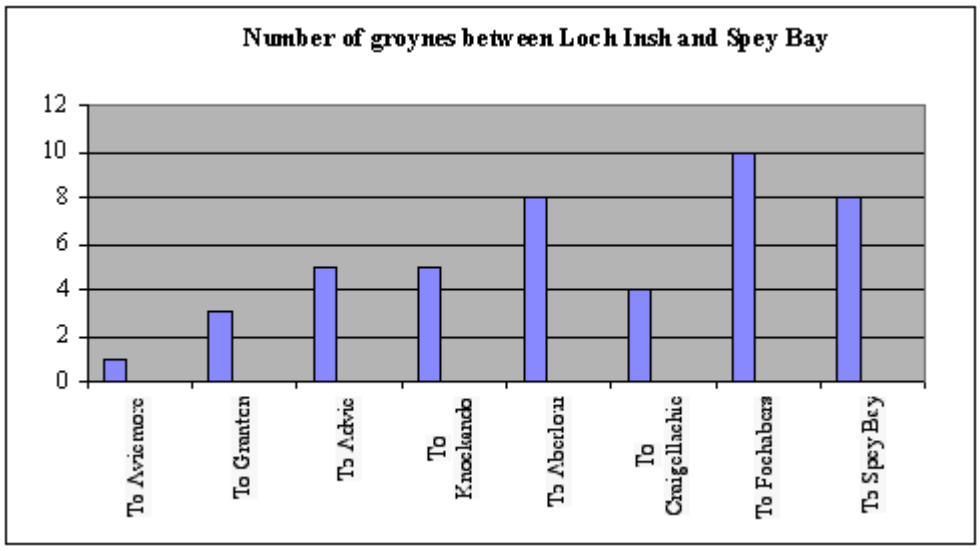
The above does not consider the effects of afforestation with conifer plantations or the removal of existing ones. With regard to the issue of *some* rather than *full* cover similar benefits are likely to pertain and so at least partial removal would seem beneficial. Similarly there seems to be no advantage to 'SAC species' through bankside afforestation with conifers. Furthermore there is a substantial body of evidence that their effect on understory flora and fauna and also the chemistry of lakes and rivers is damaging to aquatic ecology. A review of such material is beyond the scope of this report.

Recommendations: Whilst there is little prospect of wholesale replanting of riparian tree cover, any further loss, particularly in the upper and middle reaches of the main-stem of the river, should be avoided. Two recent initiatives (the Scottish Forestry Grant Scheme (SFGS) and the Forest of Spey Project) have targeted riparian woodland expansion and offered initiatives. As the main stem of the Spey is an SSSI, fishery managers are already required to consult SNH over any of the management activities listed as a Potentially Damaging Operations for which they do not have existing consent. As the tributaries are not accorded SSSI status they are not subject to the same legal requirement and so fisheries managers should be encouraged to discuss any potential bank clearing with SNH and any large scale felling of trees is likely to require a felling licence from the Forestry Commission Scotland. Any such operations should only proceed if they have passed the Natura 'tests' required by the Habitats Regulations . Efforts should be made to elicit agreement from owners to re-establish partial tree cover at sites identified as of crucial importance. This would be particularly relevant in the case of pearl mussels.

8.2.9 Existing groynes

The distribution of groynes/deflectors recorded is shown in Figure 8.2.9.1.

Figure 8.2.9.1



The distribution shows a concentration of groynes around the middle reaches of the main stem of the river. As noted earlier Cosgrove and Hastie (2001: 184) noted the adverse effect of fishing platform/groyne (deflector) construction and bank reinforcement on mussel populations. Scouring and silt deposition seem to be the most significant negative effects. Whilst impacts can be assessed when the works are under construction, the effect of a long-established structure is more difficult to discern. This is notably so in the case of mussel populations which may bear the 'footprint' of river works much longer than salmon or lamprey. Whilst it seems likely that there may be little or no negative effect on established juvenile salmon populations, scouring and deposition may have an adverse impact on both mussels and lamprey. Whilst there is some evidence that the settling of silt in the slack water behind groynes may lead to the creation of localised lamprey habitat this is not a defence for their construction. As with other species any efforts to re-establish lamprey habitat would need to be planned and take into consideration the impact of such activities on other species. The presence of existing groynes where local populations of 'SAC species' have been lost or numbers have been reduced may affect natural recolonisation but this is difficult to assess.

Recommendations: Given the nature of both the short term impact and longer term issues associated with groyne construction and repair, and with other river works there are legal responsibilities placed on owners and managers who intend to carry out such works. To aid in addressing these requirements the Spey Catchment Steering Group (2002) have published a leaflet briefly outlining these responsibilities and offering guidance as to how to proceed. Depending on a number of factors (e.g. is the location within an SSSI etc) owners and managers are required to consult with various agencies (SNH, SEPA, Spey Fisheries Board, local Council). In the case of potential disturbance to 'SAC species' SNH will take a view. Where an activity is likely to have a significant effect on the species in question, either alone or in combination with other plans or projects, an 'Appropriate Assessment' will be carried out under the Habitats Regulations and permission may be granted for an activity only if it can be ascertained that it will not have an 'adverse effect on the integrity of the site'. More work needs to be done on the sensitivity of all three species to existing groynes/deflectors. The complexity of situation

with the lamprey (where groynes may lead to benefits as well as impacts) deserves particular attention. As groynes are not natural features of the river the presumption might normally be in favour of removal. However this would lead to disturbance and uncertain outcomes for the 'SAC species' and the general aquatic ecology of the location. Clearly a specific assessment would be required for each of the groynes on the river. Forty-four were counted during the descent of the river in September (Figure 8.2.9.1). It is more likely that such features will be missed rather than over-counted, and the figure is between three and four times the number (14) observed during the RHS.

8.2.10 Building new groynes

As noted above this activity and the digging out of pools (see below) may well be the most significant potentially damaging activity associated with the main forms of outdoor recreation (fishing and canoeing). It is likely that there will be a temporary or longer-term impact of building such groynes on all three 'SAC species'.

Recommendations: It is likely that all new groynes are likely to have a significant effect on the interests of the cSAC and so an appropriate assessment is likely to be required for all such proposals. It is also clear that further study on the impacts of such construction on the 'SAC species is merited.

8.2.11 Digging-out pools

The practice of digging-out pools in the river to aid fishing has been fairly common in the past. As with groyne construction the impacts on all three 'SAC species' are likely to be substantial, perhaps more so as this activity usually involves using a mechanical digger in the river. There is almost no visual impact of such activities after they have been completed and so they are difficult to discern in surveys. The RHS does not record evidence of these and so no specific assessment of the extent of the practice can be made here. The practice of gravel extraction has the same effect but as this is not the direct result of recreational activity it is not considered further in this report.

Recommendations: As for 'Existing groynes' and 'Building new groynes' (above). Also it would be worthwhile to assess the 'historic' extent of such activities in relation to the current distribution of the 'SAC species'.

8.3 Summary and general recommendations

This desk study is necessarily limited in scope and depth. This is because of the nature of the revised brief to the consultants which specified the effects of fishing and canoeing on the 'SAC species' in the main stem of the Spey. Consequently the potentially significant agricultural activities which affect run-off (sediment and chemical) have not been considered. Nonetheless the literature review and discussions with individuals with knowledge and expertise in the ecology of the SAC species has pointed to some potentially damaging activities which are associated with recreational use of the river. These are summarised in table 8.3.1.

Table 8.3.1 Assessment of Potentially Damaging Activities on River Spey Aquatic 'SAC Species'

	Temporary Disturbance	**Temporary/Minor Damage**	**Permanent Damage**
Access and egress (on foot or by boats)	Salmon (juvenile & adult)* Mussel beds (siltation)*	Mussel beds* Lamprey*	Mussel beds* Lamprey*
Weed cutting	Salmon (juvenile & adult)* Mussel beds (siltation)*	Although resulting in loss of cover for young salmon and a reduction in invertebrate productivity, on balance the medium term effects on both juvenile salmon and mussels seem positive.	
Removal of bank vegetation	Salmon (juvenile & adult)*	Salmon (juvenile)*	Salmon (juvenile)* Mussel beds (localised)***
Existing groynes			Mussel beds (localised)*** Lamprey* (in the longer term may also be positive due to siltation)
Building new groynes / repair of existing groynes	Salmon (juvenile)* Salmon (adult)* (if carried out during the winter)	Salmon (Redds)*** (if carried out in Oct to May) Salmon (juvenile)* Mussel beds*** Lamprey***	Mussel beds *** Lamprey*** (in the longer term may also be positive due to siltation)

Notes:
1. Unless noted otherwise all effects will be **localised** and therefore have only minor effects on the whole river populations of these species.
2.The assessment of 'degree of risk' (low, medium or high) is indicated by a scale of * to ***. Any likely positive effects are noted.

Whilst minor disturbance and damage may result directly from access for such purposes it is clear that more serious impacts may result from management activities such as removal of bank-side vegetation and river engineering activities such as building groynes/deflectors. The lack of information on the direct effects of such activities is a major impediment to providing clear guidance to fisheries managers and those recreating on and in the river.

In reviewing these findings it should be borne in mind that the 'SAC species' are present within an aquatic ecosystem which has an intimate relationship with the adjacent riparian one. In light of this any modification of either the river or the banks raises issues for a wide range of interdependent species which constitute the aquatic/riparian community. Whilst regulatory mechanisms designed to protect this are in place, these need both vigilance and efforts to inform and educate both the recreational and river management communities in the importance and sensitivity of the SAC.

The following recommendations may help in the long-term protection of the 'SAC species' and have a beneficial effect on the aquatic and riparian ecosystem:

1. Although current estimates suggest that around half of the smolt production of the Spey originates in the main stem (Butler, *pers comm*) the tributaries remain important for rearing juvenile salmon. Despite a selective survey of the tributaries carried out by Aberdeen University for SNH virtually no evidence of pearl mussels was found (Scott, *pers comm*). Nonetheless as the survey was not comprehensive and the tributaries *do* contain suitable habitat, this does not mean that there are no populations of mussels in the tributaries. The status of the sea lamprey is at present unknown but as yet no individuals have been recorded in the tributaries. Candidate SAC status has recently been extended to the tributaries. Whilst they are of less recreational (fishing and canoeing[16]) significance than the main stem of the Spey, this status is seen as an important manifestation of the conservation importance of the whole river and has value in publicising the importance of conservation with recreational interests and land managers.

2. Fisheries managers proposing river-works are bound by legal obligations to consult with regulatory bodies and these are outlined in the river works code (Spey Catchment Steering Group, 2002). However codes and requirements do not fully explain the sensitivity of the 'SAC species' to disturbance. SNH produce useful and attractive leaflets about 'SAC species' and there may be further benefit in developing similar materials about managing river-banks and their relationship to the ecology of the river. This might also provide encouragement to manage banks to maintain a diverse flora. Provision of these leaflets may be supplemented with a straightforward description of the ecology and pressures on the species (as outlined in Section 1.2 above and through the booklet 'River Runners' by Iain Sime (2003)) and this could be provided free of charge.

3. Notices explaining the status of the 'SAC species' (including the otter) and associated conservation issues could be designed and provided for all fishery managers and local outdoor activity providers. A letter should accompany multiple copies of these posters encouraging their display at appropriate locations such as in fishing huts, outdoor centres, outdoor equipment retailers and fishing tackle shops etc. Permanent notices should be located at the main access and egress points for canoeists and at Speyside campsites. Whilst such initiatives have a value in their own right there are other initiatives proposed in the Spey Catchment Management

[16] There is increasing interest amongst kayakers in paddling the smaller and steeper tributaries of rivers and whilst it is clear from the above that such activities have almost no effect on 'SAC species', in general terms sensitivity to the conservation value is of clear importance.

Plan and the Spey Fisheries Board bid for EU 'LIFE' funding[17] (Butler, *pers comm*) In light of this it would seem appropriate to co-ordinate these efforts to develop an integrated education and interpretation plan for the river. As with other initiatives (e.g. the river works code) this would have added impact if all relevant agencies and associations could support the plan and the 'educational messages'.

One aspect of this may have more widespread relevance. Whilst the focus of this report is the main stem of the Spey, the 'SAC species' are found in most other Scottish rivers which are popular for fishing and canoeing. If an appropriate person could be found to do so (e.g. a member of SNH staff) thought should be given to publishing an occasional column in popular canoeing and fishing magazines explaining the ecology of Scottish rivers and the biology of these and other species.

4. Whilst the suggestions above, which are relatively low cost, focus on local initiatives which rely primarily on the distribution of information on the 'SAC species' and the ecology of the river, this is a poor substitute for direct educational initiatives outdoors. It would be of benefit to both the recognition of the 'rights and responsibilities' of those engaged in recreation or management (of land or water) and to a general understanding of the natural heritage if issues such as these became an aspect of school education (indoors and outdoors). SNH is currently planning its strategy to promote the new Scottish Outdoor Access Code and it would fit in with both the general intent of this programme and issues associated with recreational activity on and around the Spey (and other rivers) if this broader educational programme embraced some of the issues outlined above. Furthermore, the establishment of a basic understanding of the ecology of rivers such as the Spey, the management of these as resource and the broader value of outdoor recreation might be considered as perhaps a valuable and meaningful long-term goal of this initiative. Whilst there are local initiatives of relevance and merit such as the Spey Fisheries Board's 'Salmon Go To School' initiative, our major rivers are of national importance and the recreational community is both local and national (and indeed international). Hence to meet the above educational objective requires appropriate policies within SNH and that such issues are articulated to the Scottish Executive as of educational merit. In the long term such initiatives should lead to both reduced environmental impact of recreational and management activities and also greater understanding and enjoyment of the natural heritage.

This review has necessarily been brief and selective, and to inform policy a more detailed assessment of the sensitivity of 'SAC species' to all potentially damaging activities would be of value. Whilst this report has focused on recreational impacts there

[17] This bid for EU LIFE funding was submitted by 10 salmon cSAC rivers in October 2003. The focus of the Spey component is the removal or easing of 13 man-made obstacles on the river. There is also an educational component which intends to extend the Spey Fisheries Board's 'Salmon Go To School' project and provide display boards at key points within the catchment. The total value of the bid is £600,000 which includes contributions from EU LIFE funding, the private owners of the obstacles, SNH and the Spey Fishery Board. If successful the project will run from 2004-2008. (Butler, *pers comm*).

are other activities (e.g. agriculture, forestry and whisky distilling) which may well have significant impacts and as suggested in the Spey Catchment Management Plan, this should be borne in mind in any future project. Such a study would offer some chance of assessing the relative significance of the agricultural, industrial and recreational impacts on the 'SAC species', and bring a useful perspective on such activities. This would be a broader and deeper assessment than the present study and may well require some original and specific hydrobiological studies of the SAC in the river.

SECTION 9 DEVELOPMENT OPPORTUNITIES

9.1 Introduction

The research remit (see Appendix A1.0) required the consultants to 'identify water-related recreation and tourism development opportunities'. The agreed method of data collection was a series of elite interviews with current providers such as angling proprietors and outdoor centre managers, and with other informed bodies such as Moray District Council, Grampian Tourist Board, MBSE, HIE and Forestry Commission. This data is analysed in the context of the environmental impact and competition between anglers and paddlers, with the objective of suggesting a number of "opportunities" that might be worth progressing by market research of likely demand and accurate assessment of costs.

It should be recognised that the method chosen carries with it the implicit criteria of those consulted. For example, nobody suggested jet skiing hire on Loch an Eilein despite the obvious possibility that this might prove commercially attractive. Respondents implicitly rejected such a proposal without identifying clearly what is acceptable and, more importantly, why a project is clearly so unacceptable it is not worth investigating.

9.2 SWOT Analysis

The analysis of opportunities needs to be referenced not only to the effects they have on the environment and individuals but the underlying characteristics of the water recreation economy. The following sections are therefore structured in the form of a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis.

Table 9.2.1 summarises the main points and these are then discussed in detail in Sections 9.2.1 to 2.2.5

Table 9.2.1

Strengths • Reputation and tradition of salmon angling • Predominantly unpolluted environment • Environmental Status as identified by cSAC , RAMSAR and SSSI classifications • Quiet • Ideal for canoeing • Wildlife • Speyside Way	**Weaknesses** • Floods and infrastructure • Public transport • Weather unpredictability • Angler/paddler conflicts • Fragmented information on recreational opportunities • Complex administrative framework of the catchment
Opportunities • The National Park • Demographic trends • International transport • Legal enshrinement of responsible access • Emerging extreme sports • Underutilised Brown Trout and Pike stocks	**Threats** • Decrease in salmon stocks • New alternatives destinations for high spending visiting anglers. • Inappropriate river bank development • Engineering works • International transport developments • Pollution and Outfalls • Decreasing activity in outdoor education by school groups

9.2.1 Strengths

9.2.1.1 Reputation and Tradition of Salmon Angling

"That the Spey is the most magnificent of Scottish rivers few would deny" (Ashley-Cooper (1987). It has an international reputation, experienced support services in the form of ghillies and the Spey Fishery Board. As outlined in Section 4, the sport salmon fishery generates substantial local income and supports many jobs. It does this largely because anglers from outside Highland Region fish a majority of Spey salmon angler days. These visiting anglers pay large sums of money in the expectation of good salmon fishing and high quality ancillary services, and these expectations appear to be met since information from ghillies and proprietors confirms that many of these return year after year. Hard-won reputations can quickly be destroyed and tradition dies with generations. To maintain the fishery every effort has to be made to preserve the reputation and maintain the repeat buyer tradition.

9.2.1.2 Predominantly unpolluted environment

During the downriver trip (See Appendix A8.1) the only significant litter found was some plastic in the marshes near Insh. The water quality is graded as good or very good by SEPA.

9.2.1.3 Environmental Status: cSAC, RAMSAR and SSSI classifications

The catchment possesses areas of internationally significant habitats and is home to some internationally significant populations of species. To the casual visitor, the angler or the paddler these classifications are an independent and wholly external verification of the unique and important qualities of the area. This kind of badgeing undoubtedly differentiates the catchment from others, and may add something for those who participate in recreational activity in the area.

9.2.1.4 Quiet

There is little urban development close to the river and, in general, roads are at some distance from the river. The prevalent sounds are the river itself and birdsong.

9.2.1.5 Ideal for Canoeing

The river system combines slow placid water in the Insh Marshes, with exciting, fast moving water downstream. Below Grantown on Spey there are a series of grade 2 rapids which offer excitement, challenge and the expectation of capsize without any danger for both kayakers and canoeists with limited experience. There is no need for any portaging. For those wanting more technically difficult kayaking this can be found on the Feshie and Avon and, in spate conditions, on tributaries such as the Truim.

9.2.1.6 Wildlife

The absence of buildings and roads plus woodland and water provides an ideal environment for many animals and birds. In addition to the four SAC species, there are many other rare or threatened animals, plants and invertebrates, living along the main stem and floodplain of the Spey

9.2.1.7 Speyside Way

This well marked long distance path follows the river for much of the way and provides an attractive, relatively flat long distance route. Other riverside paths exist but are not marked or used extensively.

9.2.2 Weaknesses

9.2.2.1 Floods and the Infrastructure

The Spey can suffer from extensive flooding particularly when snow melt combines with heavy rains. These reach a maximum of 5m (15ft) above normal mean flow although the flood of 1829 (The Muckle Spate) reached 8m (25 ft) above the norm. In these floods buildings close to the river, such as fishing huts can suffer significant damage or loss. Except at Aviemore, which has a residential caravan park a pub and a bunkhouse adjacent to the river, there are no pubs, hotels or restaurants directly on the riverside. Whilst overall, this contributes to the rivers ‘wild’ qualities, there are disadvantages in that few services are actually available on the river. The

absence of bank side services probably limits the amount that paddlers spend locally.

9.2.2.2 Public Transport

With settlements away from the river, public transport is limited. Moray Council fund Deveron Coaches to provide a service on summer weekends between Cullen and Cairngorm. This joins most of the key settlements on the Speyside Way: Aviemore, Grantown, Aberlour, Fochabers; Spey Bay and Buckie but is obviously limited both in terms of number of days and in the carriage of cycles and canoes.

9.2.2.3 Weather unpredictability

The enjoyment of outdoor recreation is dependent on weather conditions and the unpredictability of Scottish weather increases the variability in the quality of the recreational experience. Unexpected dry spells and associated low river flow may result in canoe descents being cancelled and very poor salmon catches.

9.2.2.4 Angler/Paddler Conflicts

Despite efforts through local liaison both groups utilise the same resource and this competition results in user conflicts. The surveys of both anglers and paddlers confirm the perception that each activity has a negative effect on the other. The problem is heightened because angling tends to occur close to sections of rapid water where the paddler has least choice of route.

It is certainly the case that increasing paddler numbers will lead to a perceived reduction in the angling experience and *vice versa*. There is a potential threat that increased conflict could be economically damaging to the local economy, if high spending anglers relocate.

9.2.2.5 Fragmented information on recreational opportunities

Our impression, confirmed by analysis of comments on the Angler Survey, is that information on both fishing and water sports in the catchment area is fragmented. For angling there is a portal site "Speyside Fishing" (www.fishing-scotland.net/spey.htm) with links to an excellent information site developed by individuals as a hobby (www.speycaster.net), a letting agent site (www.beard.u-net.com/Speysider) and a number of operator based sites. However the site is neither comprehensive in coverage of available fishing and accommodation, nor regularly updated. On the water-sports side, whilst good web sites from individual suppliers can be found (e.g. www.lochinsh.com) again there is no single source that would lead, for example, to information on commercially led Spey Descent trips. There is a similar shortage of general leaflets on opportunities for both angling and water sports in Strathspey.

9.2.2.6 Complex administrative framework of the catchment

The catchment area is part of the Moray, Badenoch and Strathspey Local Enterprise Area and covered by parts of the Cairngorms National Park, Highland Council and Moray Council. None of the boundaries are contiguous e.g. whilst the vast majority of the Highland District section of the catchment is in the National Park, a fraction that includes a key fishing estate, is excluded. Similarly the Park area of the catchment includes some of the Moray Council Area, whilst the MBSE covers areas outside the catchment. For European Transitional Fund purposes the MBSE is split, with some

parts of the catchment area being eligible and some excluded. This will end with the end of the fund.

Tourism promotion is also split between the Highlands of Scotland Tourist Board (Aviemore and Cairngorms Area) and the Aberdeen and Grampian Tourist Board (promoting the coastal area at Spey Bay and Kingston and the inland "Whisky Country" separately).

To add further confusion the Upper Spey Protection Order covers not only the catchment above Loch Insh but also Loch Ericht, Loch Laggan and the hill lochs between them.

The production of the CMP by the Spey Catchment Steering Group clearly illustrates that administrative complexity does not necessarily prevent effective cooperation. However, if the catchment area is to be marketed as a unit, there does need to be a clearly identified lead organisation. Almost two thirds of the catchment is in the National Park and this area constitutes roughly 50% of the National Park.

9.2.3 Opportunities

9.2.3.1 The Cairngorms National Park

The Cairngorms National Park covers two thirds of the catchment and, with the extension of the Speyside Way to Newtonmore, will also cover 50% of that long distance walking route. There is an opportunity for the National Park Authority to realise the potential of water-based recreation in the Park area and to assume the role of lead body for the Spey catchment area.

9.2.3.2 Demography

There are increasing numbers of elderly retired people. The interests of the over 40s consumer are varied but as the Keynote report on the "Over 40s Consumer" (Keynote 2002) points out a significant number are interested in quiet but active holidays, such as walking, angling and the more relaxed water-sports (such as cruising and touring). VisitScotland summarise it thus "People are living longer than ever before in developed western economies. Those approaching retirement are affluent and more active than previous generations and 'experience' rather than 'destination' focused"
(www.scotexchange.net/KnowYourMarket/tourismInScotland2003/tis3.htm)

9.2.3.3 International Transport

Improved (and cheaper) flights direct to Scotland from locations particularly in Northern Europe, have become available. The new RORO service between Rosyth and Zeebrugge also offers opportunities. In July 2003 the operators claimed the introduction of the route has been a huge success, attracting 100,000 passengers so far, many of whom were new tourists to Scotland. Biggar *et al* (2003) found that visitors using the route were relatively mature, came for scenery and tranquility and went to the Highlands (rather than Edinburgh). Almost one quarter engaged in activities such as walking with 4% taking part in adventure/extreme sports.

9.2.3.4 Legal enshrinement of the tradition of responsible access

The Land Reform (Scotland) Act enshrines in law the customary traditions of the countryside. This will of course include the network of riverside paths developed for anglers and maintained by the estates. Potential problems are obvious and to quote the Management Plan "It is vitally important that all relevant parties, including fishery proprietors, landowners, farmers and conservation groups should engage with recreation providers and users to agree a strategy for responsible access to river banks and lochs" (Spey Catchment Steering Group, 2003 p72).

9.2.3.5 Emerging Extreme Sports

The nature of river kayaking is changing. Short plastic canoes and improved paddler protection (and skill levels) have opened up white water routes that would have been deemed impossible twenty years ago. Many of these spate rivers can be found in the Spey Catchment. All are excellently documented in the book "Scottish WhiteWater" (Scottish Canoe Association (2001)) and on the website www.ukriversguidebook.co.uk

The most important new sport to emerge within the Spey Catchment is gorge walking, described in Section 5.10. This activity is increasingly popular and currently offered by four outdoor centres. However there is no local information or guide on possible routes. Gorge walking is an activity which could have significant impact on the natural heritage and would require careful consideration, were it to be promoted further as an organised activity. (see Section 5.10).

As new activities evolve, enthusiasts or commercial operators will explore the catchment to find appropriate locations. The 'opportunities' presented and 'threats' posed by these activities need to be carefully considered as they arise.

9.2.3.6 Under utilised Trout and Pike Stocks

The information received from the owners and anglers suggests that the trout and coarse fisheries could cope with a significant number of additional anglers without deprivation of the stock or angler experience.

9.2.4 Threats

9.2.4.1 Decrease in salmon stocks

A major threat to the Spey economy is a collapse of the salmon catch. Current Spey Fishery Board policies on catch and release and hatchery enhancement may maintain or improve the current status of stocks, but the critical factor, the marine survival of smolts is largely out with the control of the Board.

9.2.4.2 New alternatives destinations for high spending visiting anglers

The further an angler travels to fish and the more he/she is prepared to spend the greater are the alternatives within comparable distance and cost. In other words, those anglers who contribute most to local value added have many alternatives,

which may include activities other than salmon angling. It is our understanding that the international angling market is increasingly competitive. The Spey now has to compete with Russia, Canada, Iceland, Norway, each of which is developing a high quality infrastructure and it will become progressively harder to retain or replace loyal anglers

Fishery owners have served the local economy well in increasing quality and value added and in subsequently maintaining a significant population of repeat visitors. However it is essential that hotel and restaurant services continue to increase their quality to meet the standards required by this sector of the market. In addition any activity that strengthens angler loyalty to the Spey is to be welcomed.

9.2.4.3 Inappropriate river bank development

There are commercial pressures on estates to maximise the return on their assets, whether by improving fish catches or protecting their assets by river works or locating buildings or caravan sites on river banks.

9.2.4.4 Engineering works

Flood defence, bridge repair, groynes and other engineering can be damaging to economically important species. It is also important to ensure that any riparian or river engineering activity is entirely consistent with the catchments status as an area of internationally significant ecological importance. A River Works Code was published by the Spey Catchment steering Group in 2002, which offers simple guidance on how to proceed when considering river works on the Spey.

9.2.4.5 International transport developments

Improved (and cheaper) flights direct from Scotland to locations throughout Europe, and the new RORO service will offer opportunities for foreign tourists to come to Scotland but also opportunities for Scots who may have traditionally holidayed at home to go abroad.

9.2.4.6 Pollution and Outfalls

The main stem and tributaries experience both point and diffuse pollution. There are over 100 outfalls into the river but as the quality status makes plain, in all but one case these appear to have minimal impact. In addition, some outfalls can detract from visual quality, an example of this is the outfall from the Macallan distillery opposite Aberlour.

9.2.4.7 Decreasing activity in schools

Over the years there have been fewer and children participating in school-based outdoor activity. A combination of factors is responsible; low levels of local authority funding, pricing requirements on Outdoor Centres; new safety rules for any organised group and alternative more sedentary entertainments. Whatever the cause the result is fewer young people with the experience, skills and inclination to take part on their own volition in paddling expeditions. The angler survey revealed that 85% of anglers were over 40 years old, and there is the real possibility that, unless angling is actively promoted locally and nationally, recruitment to the sport will not be sufficient to counterbalance numbers retiring,

9.3 Possible Developments

In this section, we seek to identify possible water-related recreation and leisure developments and the associated infrastructural needs.

9.3.1 Salmon Angling

The opportunities to generate further value would seem to be limited. Proprietors have been very successful in developing their angling businesses with some able to report 80% to 90% repeat bookings. Given the year-to-year variability in the quality of the angling experience this is a very commendable performance and suggests that they are the best judges of how to manage their own businesses.

The angler survey shows a remarkable spread of charges reflecting the different areas of the river and the different seasons. There may be a limited number of beats not operating to capacity but the limited marketing effort suggests that this is not a major problem. It may not however be appropriate to rely on individual initiatives to ensure a continued future supply of similarly loyal replacements.

It is also important for the local economy that continual efforts are made to reward these loyal visiting anglers. While individual owners undoubtedly will continue to reward their repeat anglers, a more coordinated response might benefit from the economies of scale in promotion work. Owners could nominate loyal anglers for membership of “a Spey visitors association” with members receiving a newsletter. The purpose of the newsletter would be to heighten anticipation of the next Spey fishing trip with news of catches, profiles of beats, characters etc. The “association” may also provide members with Spey calendars, diaries, local discounts, etc.

9.3.2 Trout and Pike Opportunities

Information about Loch Angling is very scattered although one or two websites do provide guidance. Welcome-scotland.com identifies 11 of the 34 lochs identified in Section 2.1 including Loch Einich. There are also numerous hill lochs in the catchment area not referenced, which are fished by small numbers. The natural stocking density is unknown and no attempt is made to restock from outside. Normally trout fishing without a permit is not a criminal offence but the Upper Spey area is covered by a Protection Order which introduces criminal sanctions in return for promotion of angling in the area. Through the Protection Order, Badenoch and Strathspey Angling Association controls brown trout and coarse fishing on Spey Dam, the lochs around Laggan, Loch Einich and the upper Spey. The estate owners control the more remote lochs.

The Association use the permit revenue they receive to pay for a water bailiff, fish stocking and advertising. The important point is that in contrast to salmon angling the Association have un-let days on all the pike and brown trout fishing they control. Apart from advertising on the Web the Associations promotional work is locally based. Given the unused capacity, additional local income could be generated by promoting pike and brown trout angling to a wider market, perhaps by inviting travelling angling clubs to visit their waters. It is possible that the more remote hill lochs could attract a few additional tourists interested in both walking and fishing to the area. Whilst a permit is formally required it is probably uneconomic to collect.

9.3.3 Placid Water Loch Canoeing

This is currently a large market at Loch Insh and Loch Morlich. If the National Park increases tourist numbers then we might expect increased numbers and from a visitor management perspective there is spare capacity. It has been suggested that there exists a limited market for tours on Loch Morlich with a ranger to help find and identify wildlife. Consideration would need to be given to extent to which this might have negative impacts on wildlife.

9.3.4 Upper River Trips

These currently operate on a regular basis by the water-sports centre at Loch Insh and are based aimed at tourists already in the area. They are promoted as placid water trips suitable for beginners. Guided walks in the RSPB reserve are currently organised on a weekly basis in summer for a nominal charge. We did not find any information locally. There may be some enhancement possible if additional canoe trips were led by an RSPB Ranger familiar with birdlife and locations for possible viewing of otters. These would be promoted as a wildlife trip by canoe.

9.3.5 Mid River Trips

Day trips here would normally cover the Ballindalloch to Knockando section and would be by Raft, Canoe or Kayak and predominantly white water. The groups concerned are young and it is difficult to see much expansion, with the possible exception of rafting offered to family groups already staying in the area.

It should be recognized that rafting, because of the limited ability to control and reverse raft direction, is less compatible with angling than canoes or kayaks. It should also be recognized that this river section is a prime angling location and that a majority of anglers have, in the survey, expressed the view extra paddling would have a significant negative effect on their angling pleasure.

9.3.6 Spey Descents

The descent of the Spey from Newtonmore to Spey Bay takes four or five days and is generally considered as one of the best canoeing experiences of its type in Europe. Marketing and Information on the river and organised descents, is available on the web.. Dave Craig's excellent guide, for example, can be found under www.highlandhostel.co.uk/riverspey.html but some search engines do not immediately locate it. There is no link from the slightly less obscure SCA (www.scot-canoe.org) site. There is no list of commercial providers and little literature available at local or national tourist offices.

Most participants currently tend to be in their twenties and many of those are undertaking the trip in organised groups as part of a team building exercise. Currently most groups camp *en route*. There are two "low amenity" camp sites adjacent to the river at Boat of Bailiefurth and Craigellachie, one "no amenity" site, just back from the river at Blacksboat and commercial "high amenity" sites at Aviemore and Grantown some way from the river. It appears that paddlers without some form of vehicular support, "wild" camp, a customary practice which will be legitimised by the Land Reform (Scotland) Act. If the individual wants accommodation or a shower they need to leave the river and travel some way from the bank. If a vehicle is not available this means leaving the canoes unsecured overnight.

One option would be to provide a simple bank-side security system in the form of concreted post with large rings at the main entry and exit points, particularly at Aviemore, Boat of Garten, Grantown on Spey, Ballindalloch, Blacksboat, Knockando and Craigellachie. Those on the descent would carry a wire plus padlock. It has also been suggested that a co-operative (trade) association between suppliers could yield dividends both in marketing and supply. To further develop the accommodation infrastructure needs to be reviewed, extended and upgraded. The most significant gap is in the Blacksboat area where the recognised campsite with the minimum facilities site on the Speyside Way simply supplies a very poor water tap and no toilets. There is also no convenient accommodation nearby. The station building could be developed as a hostel. However an Inn at the bridge would fill a substantial gap in recreational provision in the area. Elsewhere the sites at Boat of Bailliefurth, Ballindalloch Station and Craigellachie provide toilets, but no showers. The full facility sites at Grantown on Spey and Aviemore are some way from the river. There is a significant gap in both camping and B&B lists in the Knockando area. A bunkhouse based at the old station would seem to be ideal, with B&Bs encouraged in the local community.

The above improvements may well increase the numbers descending the Spey. One issue however is that Spey 'descenders' do not spend very much and significant expansion might adversely affect anglers who do. It is particularly appropriate to focus on increasing the value added by the average paddler rather than to simply increase paddler numbers.

In this context, high spending, mature adventurers could be targeted. It is envisaged that a high quality product could be offered where individuals are transported from quality accommodation to their waiting canoe and back, with their luggage forwarded to the next accommodation stop. There is a lot of accommodation within 15 minutes of the river. The Speyside Way accommodation list www.moray.org/area/speyway/webpages/accom7.html provides about 100 possibilities including Aviemore, Boat of Garten, Grantown on Spey, Ballindalloch , Boat of Bailliefurth, Aberlour, Craigellachie, Fochabers and Spey Bay. Lunch stops and other activities would be planned to cope with the vagaries of the weather.

The combination of a very memorable paddling experience, quality accommodation, good restaurant services, distillery visits, funicular ascent, other trips and general attention to personal requirements would appeal to this sector of the adventure/activity holidaymakers. It is our understanding that this sector of the holiday market is expanding and this product mix may generate significant value added locally. One slot on "Holiday", "Scottish Passport" or an equivalent TV programme would generate business for a decade. MBSE have indicated that funding is likely to be available.

9.3.7 Rambling alongside the River

Walking is by far the most popular recreational activity in Scotland and there is a significant demand for short less than 5 miles, relatively undemanding circular routes. Riverside paths are a particular attraction for scenic, physical and wildlife characteristics. Both Moray and Highland area of the catchment are currently developing a range of such walks and the Land Reform (Scotland) Act should potentially open up many more, as restricting entry to open land becomes legally discouraged. Landowners, however, can still prevent sign-posting and it is unlikely that a walk will enter a guide if the landowner objects to its identification on the ground.

One particularly attractive circular route is simply up one side of a river and back down the other. Such a route is planned at Aberlour and a combination of fisherman's paths and the Speyside Way offers the possibility of a number more. The growth of cycling and horse riding on the main path might lead in time to a pedestrian only path predominantly on the opposite side of the river.

In the longer term it might prove possible to open up a parallel route to the Speyside Way on the other side of the river as has happened with the Dales Way. This makes round trips easy and very popular.

9.3.8 Other Waterside Activities

Waterside locations are an attractive element in the holiday package, particularly for those with young children. Beaches at Loch Morlich and Loch Insh in particular have an important role in hot weather. On 16th July 2003 we estimated over 1000 on the Loch Morlich beach. Clearly it would be unwise to identify the spend of this number as "due to water" but equally it is clear that many, if not most, would not have come to the area without the water. However the weather, beach and power-based water-sports activities available relatively cheaply abroad might suggest a contraction in the numbers of young people and families.

9.3.9 "Green" Tourism

There are two sectors in the Scottish Tourist Market that can be expected to expand. The first is the overseas market. The Scottish Airport study forecasts a 400% increase by 2025 but even if this is regarded as extremely unlikely there is no doubt that new routes into Scotland will expand the sector. Young foreign tourists will tend to go to the mountains and wilder areas, including the Cairngorms. The appeal of the middle and Lower-Spey is tranquillity and, currently, Whisky. The beauty, cleanliness and wildlife packaged in a Green wrapper are an alternative/complement.

Wildlife tourism already has an established base in the catchment. The role of the RSPB has been noted but one should also note Speyside Wildlife (www.speysidewildlife.co.uk) who organise trips throughout the catchment area and Scotland as a whole, and the Moray Wildlife Centre at Spey Bay (www.mfwc.co.uk) who, in addition to walks also organise sea trips for dolphin watching. Currently none of these groups use canoes but bird-life and water-based mammals, in particular, can be observed in greater numbers and closer from a canoe whether on placid or moving water. It is believed that there is a role for water-based activity, if only to add another dimension to a trip to the area.

The second growth sector is the elderly/retired many of whom will be active for twenty or more years. The "Green" package should be equally attractive to this group.

9.3.10 Institutional Development

The Spey is not a "naturally flowing wild river" but it is one of the least modified and therefore "natural" large rivers left in Europe. In places it has been carefully modified to meet the objectives of the landowners, their clients and the local population. It should be noted that these include

1) The RSPB, who manage (there is no control of water) the Insh marshes for the benefit of the birdlife;

2) The owners of the Loch Insh Watersports centre, who have developed and created beaches for their clients;
3) Estate owners who have built groynes, fishing stands and walkways and who cut the river bank vegetation to produce lawn areas and paths.
4) Assorted owners and Councils who have installed flood protection, reinforced river banks and built bridges.

Substantial areas have been left relatively untouched and a journey down river combines these "wild places" with other maintained areas to create a unique and for most visitors a highly satisfactory experience.

The scenery along the whole river should be nationally recognised as exceptional and the river as a whole should be promoted as a complete experience. Unfortunately, the sections of the river running through the National Park have an enhanced status as a national asset. Designating those areas currently outside the National Park as a National Scenic Area (see Appendix 9.2) would enable a more coherent marketing strategy. Indeed, a similar relationship exists in England between the Yorkshire Dales National Park and the adjacent Nidderdale Area of Outstanding National Beauty. Nidderdale is marketed along with the National Park and the National Park offers some services (e.g. on the Dales Way LDR) to the local council.

There is currently some uncertainty about the role of the Cairngorm National Park Authority and the extent to which it can and would take responsibility for catchment issues and/or the operations of transboundary activity such as the Speyside Way Ranger service. The recent study for SNH (LandUse Consultants *et al* (2002)) suggested that edge effects are best addressed by treating Park boundaries as being permeable in nature with policies, strategies and programmes extending across the boundary in both directions on an issue by issue basis. They suggest that the Park Authority and local authorities should take the lead in establishing effective partnership working and that the Park Plan is a key mechanism for this. As an alternative, the Spey Catchment Steering Group (SCSG) already comprises the key agencies and is well placed to seek to develop an integrated cross-boundary approach to managing and promoting the water-based activity in the catchment and along the whole river. In this context, the SCSG should evaluate alternative institutional arrangements for the management and promotion of water-based recreation and leisure over the whole catchment.

9.3.11 Gorge Walking

The popularity of gorge walking with young people and adult groups suggests there may be possibilities of expansion. However because of the sensitive nature of the plant communities in these gorges (primarily mosses and lichens) the environmental impact of such activities should be carefully considered. Scrambling and sliding on the areas where these plants grow will undoubtedly lead to damage and the popular part of gorges can be subject to significant impact. As far as we know decisions on the use or non-use of gorges are made on an ad hoc basis by individual centres, usually without consultation. and there is no effort made between centres to coordinate use or to confine usage to a few sacrificial locations. This issue requires careful consideration by centres in consultation with SNH and indeed the situation would probably benefit from an SNH and National Park Authority initiative to identify potential locations, research damage and re-growth and encourage careful decision making.

9.4 Possible Short Term Actions

Despite the views expressed in Section 2-1 there are five possible actions where the win-loss balance appears very favourable

9.4.1 Comprehensive Angling Information

Reliance upon individuals to develop web sites has not proved successful. A comprehensive regularly updated website such as Fish Tweed is a model suggested by a number of commentators. This could help utilise unused capacity and promote the underutilised brown trout and coarse angling opportunities. In addition, a general leaflet for both current and potential visitors would also seem desirable, particularly if it incorporated a code of conduct to minimize any conflict with other users.

9.4.2 Comprehensive Water Sports Information

There is an even greater demand for a comprehensive water sports website to help utilise the capacity on both the river and river guide/leadership. Part of the problem appears to be a lack of formal co-operation between suppliers, although informally most work and often canoe, together. A trade association might well obtain matching funding from MBSE, sufficient to establish, if not maintain the site. There is a similar, and possibly more pressing need for general leaflets on water-sports that give some prominence to the relevant sections of the Scottish Outdoor Access Code.

9.4.3 Security Rings

At present, one of the reasons why it is difficult for unsupported down river paddlers to access local accommodation and serviced campsites, is because of a lack of security for canoes on the river-bank. The provision of large metal security rings to which canoes can be padlocked (using a coated wire) would open up the local accommodation market to paddlers and hence increase the value added in the area.

9.4.4 Gorge Walking Research

It is suggested that a small research programme is initiated to

a) Identify more accurately the number of participants and the growth rate locally and nationally in the sport
b) Establish the effects of gorge walking on the ecology of the tributaries
c) Identify possible locations and develop a guide

SECTION 10 CONCLUSIONS AND RECOMMENDATIONS

10.1 Introduction

This project was commissioned by the Spey Catchment Management Plan Partnership to satisfy an information gap identified in the management plan on the economic importance of water related recreation (CMP Section:10.4). This research had five objectives

1. The estimation and analysis of the volume and economic Impact of angling activity
2. The estimation and analysis of the volume and economic Impact of water-sports activity
3. An analysis of the interaction between angling and water-sports in the catchment
4. An analysis of the impact of these activities on the four SAC species in the main stem of the river
5. An identification of some development opportunities for further consideration by the partners

To estimate angling volume and expenditure the following activities were undertaken

1. A census of managers was conducted. For salmon and sea trout 41 questionnaires were issued and 31 replies were eventually received. The replies covered 86% of the salmon and sea trout catch. Details of trout and coarse fisheries were obtained from a combination of questionnaire responses and follow up telephone responses. Coincidentally it is estimated that details of fishery days from proprietors responsible for 86% of the angler days were obtained.
2. A survey of anglers was conducted on both a self-completion and on-site basis. There was no statistical difference in the responses. There were 277 responses yielding 372 observations (an observation related to a species and, in theory, each respondent could have provided 4 observations). The response rate cannot be calculated since the number taken by anglers is unknown. However on the basis of estimated angler days (from the owner survey) respondents constituted from 14.5% of salmon angler days to 17.3% of rainbow angler days.
3. Five estate owners were interviewed to establish their cost structures

The economic impact was traced through the local economy by a model developed by CogentiSI specifically for angling in the MBSE

To estimate water-sports volume and expenditure the following were undertaken

1. Counts were undertaken by observers at Lochs Morlich and Insh, and on the river at Knockando and Gordon Castle (Spey Bay). Of the 36,627 estimated activity days, 31,788 (87%) were observed at these points.
2. Card responses were sought at Knockando and Spey Bay to identify unobserved canoeists. These were completed by 179 group leaders corresponding to 1440

paddlers, an estimated response rate of 37%, which, given the respondents were exiting after a number of hours of wet physical activity and the absence of cards on key occasions because of vandalism, is regarded as very satisfactory.

3. Questionnaires were issued via the Scottish Canoe Association, the Internet and On-Site. There were significant differences in age and gender profiles between on and off site respondents but there were no significant differences in expenditure levels and patterns. There were 312 responses from the 1560 issued via the SCA, a response rate of 20%. In total 214 questionnaires specifically relating to the Spey were analysed, which relates to around 2.5% of the total. Given the low variance in expenditure in the sample, this is considered as adequate.
4. All 9 identified residential suppliers were interviewed either in person or on the phone, to establish their cost structures.

The economic impact was traced through the local economy by a model developed by CogentSI specifically for water sports in the MBSE

The analysis of interaction was based on questions in the 277 angler questionnaires and the 214 water sports questionnaires, a total of 491 observations.

The analysis of the impact on the SAC species in the main stem was desk based.

A total of 43 key individuals were consulted to establish the development opportunities for water-based leisure and recreation.

10.2 Main Findings

10.2.1 Number, Expenditure and Impact of Angling

Table 10.2.1.1 summarises the information contained in Sections 3 and 4

Table 10.2.1.1 Summary of Economic Impact of Angling on MBSE

		Salmon	Brown Trout	Rainbow Trout	Coarse Fish	Total
	Activity Days	40543	4815	8186	1202	**54746**
	Angler Expenditure	£10,748,517	£360,731	£672,549	£45,732	**£11,827,529**
Without Substitution	**Total MBSE Output**	£11,549,005	£364,070	£623,136	£40,883	**£12,577,094**
	Jobs	401	10	7	2	**419**
	MBSE Income	£6,353,263	£180,611	£327,273	£23,737	**£6,884,884**
With Substitution	**Total MBSE Output**	£10,085,746	£307,421	£453,768	£34,280	**£10,928,236**
	Jobs	350	9	5	2	**367**
	MBSE Income	£5,548,304	£152,508	£238,320	£19,904	**£5,959,036**

Our best estimate is that without angling in the MBSE economy would produce £10.9m less output per year, households in the community would have £6m less income and there would be 366 fewer FTE jobs

10.2.2 Number, Expenditure and Impact of Water Sports

Table 10.2.2.1 summarises the information contained in sections 3 and 4

Table 10.2.2.1 Summary of Economic Impact of Water Sports on MBSE

		Centres	Descent	Day Trips	Total
	Paddler Days	31246	1644	5300	**38190**
	Paddler Expenditure	£1,460,751	£75,608	£140,874	**£1,677,233**
Without Substitution	**Total MBSE Output**	£1,771,868	£67,981	£88,368	**£1,928,216**
	Jobs	49	2	3	**54**
	MBSE Income	£859,504	£34,490	£44,569	**£938,563**
With Substitution	**Total MBSE Output**	£1,279,618	£67,981	£88,368	**£1,435,967**
	Jobs	43	2	3	**48**
	MBSE Income	£752,926	£34,490	£44,569	**£831,985**

Again our best estimate is without water sports the region people in the community would have £0.8mn less in the pocket and 48 fewer jobs.

10.2.3 Interaction

Problems of interaction are largely confined to the middle Spey where both fishing and paddling activity is focussed. On the lochs there are few anglers, on the lower Spey and tributaries relatively few canoeists and on the upper Spey few of either group.

As might be expected anglers/owners and paddlers perceptions of conflict differ. Eighty-five percent of anglers never experience conflict and 97% never or less than 10% of the time. Seventy-seven percent of owners never experience conflict and 90% never or less than10% of the time. Forty-five percent of paddlers report never experiencing conflict and 85% report less than 10%.

The limited area and the limited conflict suggest that currently problems are relatively small, confined in area and probably improving. However both groups are clear that expansion of numbers of both paddlers and, anglers, would have a negative effect on the activities of both groups.

10.2.4 Effect on SAC Species

The effect of water sports activities on the main stem is very limited. The effect of modifying the river for angling can be negative but these activities are now under strict

control. The effects of other activities such as weed clearance, grass cutting and tree clearance are much less clear and their impacts need further research.

10.2.5 Development Opportunities

Most respondents expected only very limited “natural” expansion of demand and, with the negative effects of expansion identified in the interaction report, development opportunities are limited. The main finding concerns methods of adding value to the existing water sports market.

10.3 Recommendations

This report was commissioned by the Spey Catchment Management Plan Partners, as an input to the wider project. The main Steering Group is formed by agencies and bodies who to a lesser or greater extent would be involved in the implementation of any outputs arising from this report. The report therefore recommends further work and actions under the assumption that the members of the group are best able to determine how recommendations might proceed.

10.3.1 Promoting Sustainable Activity

1. Information on both water sports and angling is fragmented. It is recommended that partners identify a strategy to ensure that there is comprehensive easy access to information that is currently available both in text and on the worldwide web.
2. More information for both anglers and paddlers on the sensitive species in the river and their ecology should be provided. It is suggested that there might be both leaflets and information boards at strategic points along the river.
3. There are opportunities for adding value to and expanding the market for down river canoe descents. It is suggested that security rings at a number of key egress points, to allow canoes to be safely left overnight on the river bank when utilising local accommodation.
4. Although provision for organised down river trips exist it is extremely fragmented. It is believed that a co-operative approach via a Trade Association could yield dividends if combined with targeted marketing.
5. There are also thought to be limited opportunities for combining wildlife tours and canoeing, particularly on the upper Spey. Wildlife trips on Loch Morlich might also be viable but great care would be needed to ensure that the environment of rare species was not disturbed.
6. There are also thought to be limited opportunities from combining mountain loch angling and hill walking and also from better promotion of brown trout and pike fishing on the upper Spey and valley lochs. The SCSG may wish to consider if a more limited Protection Order covering those areas that can reasonably be monitored and promoted might be more appropriate.
7. Possibly the most important long term development will be river-side rambles along paths previously the preserve of anglers. The partners in conjunction with

the owners will need to develop a long term strategy on routing, signposting and maintenance.

10.3.2 Maintaining and Enhancing the Natural Resource

1. Work at the canoe access points at Aviemore and Knockando is required to prevent further bank erosion. It is also suggested that early action at the main access point at Ballindalloch would prevent problems of car parking and bank erosion developing..
2. There should be discussion with managers over any tree clearance operations
3. In the longer term the effects of each groyne should be evaluated and the impact of removal (or introduction) assessed.
4. Although primarily cosmetic, an annual spring check of the upper river to remove non-natural debris would be desirable, as would some attempt to reduce the disfigurement caused by the bridge works at Newtonmore and the outfall opposite Aberlour.
5. As far as is known decisions on the use or non-use of gorges are made on an ad hoc basis by individual centres and there is no effort made between centres to coordinate use or to confine usage to a few sacrificial locations. This issue requires careful consideration led by the centres in consultation with SNH and indeed the situation would probably benefit from an initiative to identify potential locations, research damage and re-growth and encourage careful decision making.

10.3.3 Reducing Conflict

1. The valuable work of the Spey Users group should continue.
2. The implications of the Land Reform (Scotland) Act need to be explained fully to recreational users, anglers and ghillies. In particular promoting the codes of responsible access and wild camping.
3. Information on the relevant parts of the Scottish Outdoor Access Code should be distributed widely to ensure there is a clear understanding of the responsibilities of all participants.

10.3.4 Monitoring and Research

1. In a situation of competition between recreational users it is important to know the number of individuals, the intensity and location of their activity. For angling the obvious repository of such information is the owners and it is suggested that such data should be collected on a confidential basis
2. In contrast to angling there is no historic record of water sport activity. It is not possible, for example, to establish the extent that activity this atypically dry sunny year is above or below the norm, apart from anecdote. It is recommended therefore that every effort is made to retain the services of the observers at Loch Morlich, Knockando and Spey Bay (Gordon Castle) and implement a more robust card survey at Knockando and Spey Bay. In addition it is suggested that the hours the ghillie is actually on the river are recorded as well as the actual time a vessel is observed. This will allow both a more accurate assessment of the scaling factor and useful information for planning to minimise conflicts.

3. It is believed that in the longer term 24-hour automatic monitoring will prove better and would recommend purchase if only on a trial basis. It is important, however, for calibration purposes, to maintain the ghillie/card system for next year along with one automatic teller.
4. It is also recommended that some attempt be made to assess the total numbers, including independents, participating in gorge walking and identify other sites that either need protection or can be promoted with limited 'environmental cost'.
5. Before promoting fishing in the mountain lochs there should be some assessment of stock levels and an estimate made of the levels of sustainable angling.
6. The impact of any increase in water sport activity (and associated on bank activities such as parking) on the environment of Loch Morlich should be monitored

10.4 Conclusion

This research is on water based recreation in the catchment and was commissioned by the Catchment Management Plan Partners. It has found that these activities are economically important to the people of the area in terms of income and employment. It has also been found that there is little conflict between groups and that the environmental impact is limited. Some limited development opportunities exist that would not threaten current activities, increase conflicts or harm the environment.

In short, water-based recreation in the Spey Catchment is an exemplar of a sustainable economic activity that has generated, and will continue to generate significant economic benefits to the local community provided that there is continued sensitive and coordinated management.

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A1.0 THE RESEARCH REMIT

RIVER SPEY CATCHMENT MANAGEMENT PROJECT
BRIEF FOR CONSULTANTS

An Assessment of the Economic Impact of Water-Related Recreation and Tourism in the Spey Catchment

INTRODUCTION

The purpose of this study is to provide an accurate and up-to-date analysis of the volume and value of directly water-related recreation and tourism to the local Spey catchment economy. This economic impact study will include an evaluation of the type and number of jobs which underpin water-related recreation and tourism, as well as spend and uptake. A qualitative assessment of the potential impacts on the environment of water-related recreation and tourism, and a qualitative assessment of the interaction between the different types of activity, is also to be undertaken. Whilst some work was carried out in the late 1980s on the value of salmon fishing and netting Scotland-wide[18], a study which brings this evaluation up-to-date, but focusing on the Spey catchment, and broadened to include all forms of water-related recreation and tourism, would be of great benefit. Currently there is no objective assessment of the value of these activities to the local area and employment, either directly or indirectly.

STRATEGIC CONTEXT

A Catchment Management Plan (CMP) for the Spey, part of which falls within the proposed Cairngorms National Park, has recently been drafted and launched as a public consultative document (September 2002). This plan considers the key issues affecting the Spey and its tributaries and sets out a number of objectives which will secure the future sustainable management of the water resource of the Spey catchment. As well as environmental matters, a whole range of issues from recreation and tourism, through to industry (whisky distilling, food processing, hydro-power generation) farming, forestry, fishery management and others are discussed.

One of the management objectives of the draft CMP is to *'improve the level of understanding of the volume, economic value and costs to the environment, of water-related recreation and tourism'* (see pp 75-77 of the River Spey draft Catchment Management Plan, website address given below). This in itself will assist with the strategic development and management of different forms of water-related recreation

[18] The Economic Importance of Salmon Fishing in Scotland. 1988. "The Mackay Report". Scottish Tourist Board/Highlands & Islands Development Board.

and tourism in the Spey catchment. A figure extrapolated by the Spey Fishery Board from the 1988 Mackay Report indicates that the Spey salmon fishery generated about £7 million for the local economy. No such figure exists for other water-related recreation and tourism activities in the Spey catchment, such as canoeing, sailing and rafting, or other formal or informal leisure and recreation pursuit which relate to the water. Therefore, a better understanding of the value to the local economy of the Spey catchment's water-related recreation and tourism 'in the round' is an essential starting point for developing management strategies for the future growth and development of any particular sector. An important part of this increased understanding is to gain a better feel for the costs to the environment of water-related recreation and tourism and the sustainability levels of the various activities.

PROJECT FUNDING

An award of European funds, through the Highlands & Islands Special Transitional Programme, was made in August 2001 for the partnership project, the *River Spey Catchment Management Project*. This European funding contributes towards the costs of producing the CMP, plus a number of ancillary projects which will begin to implement some of the recommendations from the CMP. Match-funding comes from contributions made by the partners of the Project (including MBSE, Highland Council, Moray Council, Spey Fishery Board, Cairngorms Partnership, sportscotland, SEPA and SNH). The costs of this economic assessment are being met by the Project. The draft CMP can be accessed on the following website http://www.snh.org.uk//news/pc-intro.htm

OBJECTIVES

The aim of this project is to identify, and assess the volume and impact on the local economy, of water-related recreation and tourism activities on the River Spey, including its tributaries and lochs. The study will examine not only the benefits to the local economy of water-related tourism and recreation in the Spey catchment area, but will also make a qualitative assessment of the impacts on the environment of these activities, such as litter, pollution, disturbance to wildlife etc. Another important aspect of the study is to gain some sort of perception, from the users themselves, about the extent to which changes in other recreational uses of the river will affect their own enjoyment. The study will also identify how better integration of the different activities could be achieved through carefully planned development and monitoring strategies. The study will cover all forms of recreation and tourism activities that are directly water-related, including angling (both game and coarse fisheries), canoeing, rafting, sailing, etc. It is also important to note that a key objective of this study is to be able to compare the economic value of salmon and sea trout fishing against other water-related recreation activities. Results should therefore be presented for all relevant niche activities in the catchment area.

The study has five objectives;

Objective 1. Identify water-related recreation and tourism activities in the Spey catchment.

Consultants will be expected to identify, and quantify, the different sorts of water-related recreation and tourism in the Spey catchment. It is expected that this data-gathering exercise will cover recreation and tourism which can be linked directly to the water resource of the Spey catchment. The objective will provide a baseline for the current water-related activity in the Spey catchment.

Objective 2. Determine the economic impact of water-related recreation and tourism in the Spey catchment.

Consultants will be expected to undertake an extensive literature review and survey to gather relevant information on the economic impact of the activities identified under objective 1 above, such as employment, turnover, visitor spend etc. It is expected that this data-gathering exercise will cover angling (both game and coarse fisheries), canoeing, rafting, sailing and other forms of recreation that can be linked directly to the water resource of the Spey catchment. The objective will provide an audit of the current, economic, water-related activity in the Spey catchment. Consultants will be expected to work/liaise closely with appropriate bodies and the steering group to access data and information on relevant niche markets. Measurements of employment and expenditure should be identified for each niche using a methodology that removes double counting of visitor spending impacts.

Objective 3 . Identify the environmental impacts that these activities create.

Consultants will be expected to make a qualitative assessment of the impacts on the environment of water-related recreation and tourism. Any practices which minimise degradation, together with information on how these practices are established, or managed, should also be identified. The sorts of 'environmental impacts' might include litter, pollution, bank erosion, disturbance to wildlife etc.

Objective 4. Qualitative assessment of the interaction between different activities.

Consultants will also be expected to make a qualitative assessment of the interaction between the various types of recreational activity. It is a matter of perception of the users themselves as to the extent to which changes in other recreational uses of the river will affect their own enjoyment (e.g. if numbers of canoeists or rafters were to increase, at what level would that affect enjoyment of anglers, and vice versa). An assessment of people's perception of the interaction between different activities and the impact of potential change may help to provide some indicators for objective 5 below.

Objective 5. Identify water-related recreation and tourism development opportunities plus possible monitoring methodologies.

To improve the level of integrated management of the water resource in the catchment area, consultants will be expected to identify appropriate development opportunities and ways of supporting their establishment. The identification of a suitable monitoring framework, incorporating indicators which show progress towards key development/environmental improvement targets, should also be established in work for this objective.

AVAILABLE REFERENCES

A number of studies of the economic impact of angling have been undertaken in the past few years including the abovementioned Mackay Report. Others include a study commissioned by the Tweed Foundation and Scottish Borders Enterprise on the economic impact of angling in the Tweed catchment[19]. The Western Isles Fisheries Trust commissioned a similar such study in 2000[20]. More recently, the Scottish Executive has let a contract (2002) to a university consortium to look at the economic importance of Scotland's freshwater fisheries[21]. There have been fewer such studies looking specifically at the economic impact of other forms of water-related recreation and tourism, such as canoeing or rafting, and none specifically for the Spey catchment. Two additional references may be of general assistance, one looking at the demand for recreational use of inland water[22] and the other, case studies on the contribution of outdoor recreation and outdoor education to the economy of Scotland[23].

METHODOLOGY

The study is planned to run from Jan 2003 to the end of the autumn of 2003. A small steering group will manage the study. It is anticipated that successful Consultants will meet with the steering group on at least three occasions, once at the start of the study to discuss the details of the project and again after submission of the final draft report to obtain feedback from the steering group and allow for discussion of the findings. There will also be a need to meet with the steering group part way through the study to review progress.

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[19] The Economic Impact of Angling in the Tweed Catchment. 1996. Deloitte & Touche Consulting Group.

[20] Assessing the Economic Value and Realising the Potential of Recreational Freshwater Fisheries in the Western Isles. 2000. Fisheries Resource Management Ltd.

[21] Proposed Research Study on the Economic Value of Game and Coarse Fishing in Scotland. 2002. Scottish Executive

[22] Demand for Recreational use of Inland Water in Scotland. 1998. A Report to the Scottish Sports Council.

[23] The Contribution of Outdoor Recreation & Education to the Economy of Scotland . Case studies and preliminary findings. 2000. P Higgins. Univ. Edin. Jnl of Adventure Education and Outdoor Learning 1 (1) 69-82

It is envisaged that the study will involve an initial literature review to assess the availability and cover of existing data and surveys. Collecting up-to-date niche market impacts (such as for the salmon, trout or pike fisheries, or for watersports activities) will involve business surveys. The consultant will be expected to gather information using a range of techniques, e.g. through direct communication with stakeholders identified by the steering group, as well as the possibility of gathering information from informal users of the catchment area via a questionnaire. Insofar as data collating and evaluation for salmon and sea trout angling is concerned, Consultants should replicate as far as possible, relevant aspects of the methodology deployed during the 1988 Mackay study. It is important that the current study is broadly comparable with the Mackay study so that apparent changes are real changes, and are not derived as a result from the way the data was collated. It is recognised however that the Mackay methodology may not be all that readily transferable to other forms of water-use, such as canoeing. It is anticipated therefore, that this sort of detail may need to be discussed and agreed with the steering group at the initial meeting.

Consultants should identify in their proposal how they intend to structure their survey work. The main niche activities in the context of this study include :

Salmon & sea trout fishing
Brown trout fishing
Pike fishing
'Put & Take' fishery
Canoeing (kyaking & Canadian canoeing)
Rafting
Sailing & windsurfing
Birdwatching (specific to water-bodies or rivers)
Others?

OUTPUTS

Outputs from this study should include:-

- Baseline information on water-based recreation and tourism which can be monitored to establish trends within the catchment, part of which falls within the proposed Cairngorms National Park.
- An identification of locations in the catchment area that are popular for specific recreation/ tourism purposes to enable these areas to be effectively managed.
- An identification of seasonal patterns of activity.
- Information on the value of water-related and tourism to the local economy, broken down by the type of recreation, seasonal trends and potential "honeypot" locations.
- An indication of the number of jobs provided either directly or indirectly from water-related recreation/ tourism activities.
- A qualitative assessment of the environmental impacts of water-related recreation and tourism, and an indication of how these environmental impacts are currently managed and minimised

- A qualitative assessment of the interaction between different activities based on the impact of potential change.
- Identification of development opportunities and a monitoring framework to check progress towards meeting objectives.

PROJECT TIMETABLE

The contractor will be required to adhere to a project timetable. As a guide, it is expected that the initial data-gathering and fact-finding phase of the project will take place between Jan-Mar 2003. Collecting information from business surveys or questionnaires may be season-dependent, therefore it is expected that this may take the project into the summer of 2003. The final draft report should be submitted no later than the end of September 2003.

TENDER REQUIREMENTS

In tendering for this project, the contractor should outline the means and methods by which they would meet the overall objectives and outputs of the study specified above. Personnel managing and participating in the project should also be identified in the tender and details of relevant experience included. Tenders should also identify a suggested project timetable that can be split into component parts so that payment can be made by instalments.

Consultants should provide detailed costings (exclusive of VAT, but with the VAT element marked separately), including expenses for the study. This information should include the various day rates for consultants and expenses for the project.

Two copies of all tender documents should be included and at a very minimum, the tender should include the following;

- Methodologies to be employed in the study.
- The cost of conducting the study, indicating labour input, fees, expenses and the CVs for each member of the consultancy team.
- A detailed timing plan for delivery of the various elements of the project, including a schedule of review meetings and delivery of the results.

MANAGEMENT OF THE STUDY

A steering group chaired by Moray, Badenoch & Strathspey Enterprise and with representatives from the Spey Fishery Board, sportscotland, the Cairngorms Partnership and Scottish Natural Heritage will be established. For day to day business, the project will be managed by the nominated officer with whom contact should be made in the first instances in connection with any matter pertaining to the contract. The nominated officer is : Kristin Scott, River Spey Project Manager, c/o SNH, Achantoul, Aviemore, Inverness-shire, PH22 1QD tel : 01479 810477 fax: 01479 811363
e-mail kristin.scott@snh.gov.uk

REPORTING OF RESULTS

The contractor shall provide six hard copies (5 bound, I unbound), and an electronic version of the draft and final study reports. The draft and final reports must be prepared in the standard format for publication as detailed in Annex B.

The final report may be published at the discretion of the steering group.

A1.1 CONSTRUCTING LOCAL INPUT-OUTPUT TABLES: THE COGENTSI METHOD

Introduction

This section details the construction of the input output model for the MBSE and HIE areas. These are based on tables constructed for every unitary authority area. The tables cover all of the 123 products identified in UK IO tables. For each of them it shows how much of local demand is sourced from within the area, from within the same region of Scotland, from the rest of Scotland, from the rest of the UK, and as imports from abroad.

The construction of the tables consists of estimating local production of each commodity and local absorption (consumption) of that commodity production. These show the balance of supply and use within the area. A full trade table is then estimated to balance production and absorption between 45 regions of the world.

For this study the relevant Scottish UA IO tables have been grouped to correspond to the MBSE and HIE regions. For both regions a full trade and input output structure has been estimated. This enables region-specific impacts and multipliers to be calculated. A model has been developed for this purpose. The multipliers calculated are both type 1 multipliers, where the industry supply chain is followed, and type 2, where the impact of spending of personal incomes is also counted in.

Regional input output tables and models

The following is the method used to estimate input output tables for the Unitary Authority areas of Scotland.

The tables are based on a detailed geographic and product/industry breakdown. The geography consists of:

- 32 Unitary Authorities in Scotland
- 11 non-Scottish UK regions
- the rest of the world (RoW)

The product/industry breakdown is based on the 123 categories shown in the UK input output tables. These are in turn based on the UK Standard Industrial Classification (1992) which is itself based on the European Union's NACE. For five products/industries

some of the Scottish calculations are carried out using a further subdivision, yielding 128 categories consistent with the Scottish Input Output tables.

The basic method is carried out in three stages

1. Estimate production at basic prices (Gross Value Added and Gross Output) for each UA, for each of 128 commodities.
2. Estimate absorption (use) of each commodity for the same areas based on the main categories of demand
3. Estimate trade between the areas

The steps in each stage are described in the following sections.

Principles of Construction

An important principle of this system is that at any time it should be based on the best and most detailed consistent information that is available. Because many government statistics are continually updated, it is often the case that official statistics are not completely consistent. Two main reference markers have been adopted:

1. The basic benchmark for Scottish data is an adjusted version of the latest Scottish Input Output tables, which cover 1999. The adjustments made are solely to take account of a small number of known errors in the published tables.
2. For the other UK regions the references are the UK Input Output balances and the revised 1999 Regional Accounts published in September 2003. These superseded the 1998 figures published in February 2001.

Because of the radical nature of the change to the Regional Accounts, and the fact that a spate of other updated statistics is about to be issued, the current version of the estimates (September 2003) should be treated as a 'Beta' or trial version. Cogentsi would be glad to receive any comments users wish to make.

Estimating production

The basic methodology to estimate production is to use the most detailed employment data (mainly collected in the first section of the ONS Annual Business Inquiry ABI1) to disaggregate output information (collected in the second section, ABI2 and published or Scotland in the Scottish Production Database and related series).

For most industries the steps carried out are as follows. The procedure is carried out separately for Gross Output and Gross Value Added:

1. Calculate UK output per employee at the maximum level of detail contained in the ABI2 (3-4 digit)
2. Apply to Scottish employees in employment (ABI1) to obtain first detailed estimates of Scottish output.
3. Group to 128-indusry level
4. Scale to output as recorded in Scottish IO tables
5. Estimate Scottish output and productivity at the four-digit SIC level.
6. Estimate local output based on Scottish productivity
7. Scale to fifteen industries identified in Scottish Production Database (and similar sources such as Scottish Construction Database, Scottish Services Database). For the SPD a total of 6*32=192 observations should be available, however 27 of these (for GVA) and XX (for Turnover) are suppressed on grounds of confidentiality. Additional procedures are followed to prepare best estimates for these, consistent with the other data published for that UA and that cell.
8. Estimate local output and productivity at the four digit sic level
9. Group to 128 industries
10. Rescale Scottish totals to match IO tables, and then rescale local output and productivity using these scaling factors
11. Rescale local output to SPD totals
12. Rescale Scottish totals to match IO tables again, and then rescale local industry output and productivity using these scaling factors
13. Apply a Scottish make matrix (estimated separately) to each industry to calculate the production of co-products and thus derive commodity supply from Scotland

There are some industries/commodities for which this approach is not suitable:

1. ABI1 figures for agriculture and sea fishing, where supplied, are not appropriate as the Inquiry does not capture everyone working in the industries. For these industries data provided by SEERAD on people employed is used.
2. For agriculture and fishing no SPD or similar totals are available but regional or port figures are produced by SEERAD, and the Census 2001 provided self reported employment estimates. The figures are adjusted to the SEERAD totals, then subdivided within the regions.
3. Figures are not available for primary industries at the UA level, for utilities, or for banking and most public services. For each UA a GVA total is available (based on disaggregating the Regional Accounts: national statistics estimates at sub-regional level have not been issued since February 2001). After subtracting the GVA estimated for the available industries a residual GVA can be calculated. For the ‘non-available’ industries in each UA estimates of output based on Scottish

productivity are made, and these figures are then scaled to match the 'non-available' total for the UA. Each industry is then scaled to its national total and the resulting figures are again scaled to match the 'non-available' total for the UA.

4. In some industries additional knowledge can be brought to bear. For example the 'Fuels' industry consists mainly of nuclear fuels (made in 1999 at only a few well known establishments), two very different oil refinery complexes at Grangemouth and in Dundee, and a number of small-scale low value-added operations such as briquette manufacture. Specific adjustments are made in these cases.
5. In some industries or industry groups sales income does not cover the cost of purchases. This implies there is negative value added, and in these cases an individual estimate is made on a more detailed basis (specific industries and or locations) of where the deficit occurs. Balancing estimates are inserted for other industries and locations.

A 1.1.5 Estimating absorption

A 1.1.5.1 Procedure

Absorption is estimated according to the main categories of demand. The procedure described below is recognised as an interim method, which still contains more arbitrary allocations than is desirable. But although there is a great deal of scope and opportunity for an improved modelling approach, the method set out seeks to capture the main characteristics of production and trade flows.

A 1.1.5.2 Industries' intermediate absorption

The first task is to estimate a 'technical coefficients' matrix on the basis of the UK supply and use table. This is compared by inspection with the matrix obtained by adding the Scottish domestic use and the two Scottish imports matrices. (After adjusting for the price bases, margins, etc) and some adjustments are made.

Industries' intermediate absorption is then estimated by applying this to industry output. At a later stage adjustments are made to some inputs, notably business services.

A 1.1.5.3 Households' final demand

The vector of household final demand for Scotland (combined use) is estimated by adding the vectors from the domestic use, and the two imports tables.

Council area household disposable income, car ownership and durable ownership is estimated from the Scottish household survey on the basis of the four categories of income distribution therein and the ownership details.

Scottish expenditure on motoring is divided on the basis of the SHS car ownership estimates, and similarly durables. Expenditure on housing is divided regionally on the basis of house price and tenure data and within regions on the basis of Council Tax bands. Some adjustments are made for known 'hotspots'.
The remaining household expenditure on each commodity is divided on the basis of remaining household income.

A 1.1.5.4 Non-profit institutions serving households
NPISH expenditure in Scotland is divided amongst UAs on the basis of three indices which are given equal weight: population; population of 20-24 year-olds; and employment in higher education.

A 1.1.5.5 Collective consumption
Government consumption in Scotland is divided on the basis of population. Pending receipt of data the current model divides local government consumption on the basis of UAs' actual spend. National government consumption is based on population.

A 1.1.5.6 Fixed capital formation
An estimated division of Scottish fixed capital formation is made, into housing, other buildings and infrastructure, and plant and equipment.

A 1.1.5.7 Stockbuilding
Stockbuilding of each commodity is allocated half on the basis of local absorption and half local production.

A 1.1.6 Trade between areas

A 1.1.6.1 Method Stages
Trade is calculated in two stages: trade amongst the regions of the UK and trade within Scotland. Both calculations use distance as one of the important determinants of trade.

A 1.1.6.2 Estimation of distance effects
To estimate the effect of distance on trade the UK and Scottish IO tables are firstly both adjusted to a common price basis. This is a lengthy procedure allocating transport and distribution margins and some taxes between imports, trade within Scotland, and trade within UK). Sales within the UK are then divided into four categories: Scotland to Scotland, Rest of UK (RUK) to RUK, RUK to Scotland, and Scotland to RUK For a few commodities there is a clear incompatibility between the Scottish and the UK IO tables. This usually takes one of four forms:

a) Within-Scotland trade plus RUK imports to Scotland plus RUK exports from Scotland (as shown in the Scottish tables) exceeds the total of within-UK trade as shown in the UK tables.
b) A less extreme version, in which the residual (within-RUK trade) is implausibly small.
c) Scotland purchases from RUK, but RUK does not purchase from Scotland (or vice versa) even though there is no particular reason for the trade to flow in one direction only.
d) Trade between RUK and the rest of the world (calculated as a residual) is implausible in relation to trade between Scotland and the rest of the world.

In these cases ad-hoc adjustments are made. Often this comprises adding to the diagonal (sales to own industry) in the UK tables, on the assumption that inter-establishment trade within the industry has been omitted.

The four trade flows identified are estimated in a logarithmic regression of the form:

*ln(trade flow) = a+ b*ln(local prodn at source) + c*ln(local absorption at destination) + d*ln(distance from source to destination)*

The coefficients b and c are constrained to 1 to ensure positive trade flows.

Initially distances for the regression are taken as 50km within Scotland, 150 km within RUK and 500 km between the two. (These are later adjusted in the light of estimated trade patterns for individual products, and the estimation procedure is reiterated).

The distance coefficients obtained are subjected to review on a number of bases. They have been compared with similar coefficients estimated in Canada (where the available input output tables distinguish several provinces, so there are more degrees of freedom); they have been compared with international and intercontinental gravity coefficients estimated in models of world trade; they have been compared with 'physical' distance regressions based on transport statistics; and they have been ranked across commodities, and reviewed in the light of such factors as diversity of source and destination, physical characteristics of the product and its 'transportability'.

Finally 'Apparent distances' for exports and imports are calculated and reviewed across commodities

A 1.1.6.3 Trade amongst UK regions

For this calculation Scotland is divided into five areas: Highland, Argyll & the islands (the Lec area), Moray, the Islands (Shetland, Orkney, Eilean Siar), and the Scottish Enterprise area. For each of 123 commodities an 18*18 matrix is established of trade flows. Each row shows the destinations of product from one location to the 18 locations

(5 Scottish, 11 RUK land regions, 'extra regio' (mainly the UK Continental Shelf) and the rest of the world (RoW)).

The data available is as follows:

a. a 3*3 trade matrix (Scotland/RUK/RoW) estimated by combining trade from the two IO tables with an estimate of world total production
b. 18 row totals of production
c. 18 column totals of absorption
d. Separately (and not described here) an estimate has been made of global production of each of the 13 commodities.

For each commodity this makes a total 46 data points of which 43 are independent (9+17+17, because once 17 marginal totals have been established the final one can be derived by subtraction).

In addition there are trade totals for some groups of commodities, based on the Customs and Excise regional trade statistics for the UK regions and the SCDI export survey for Scottish Lec areas and these are used as check totals throughout the estimation process.

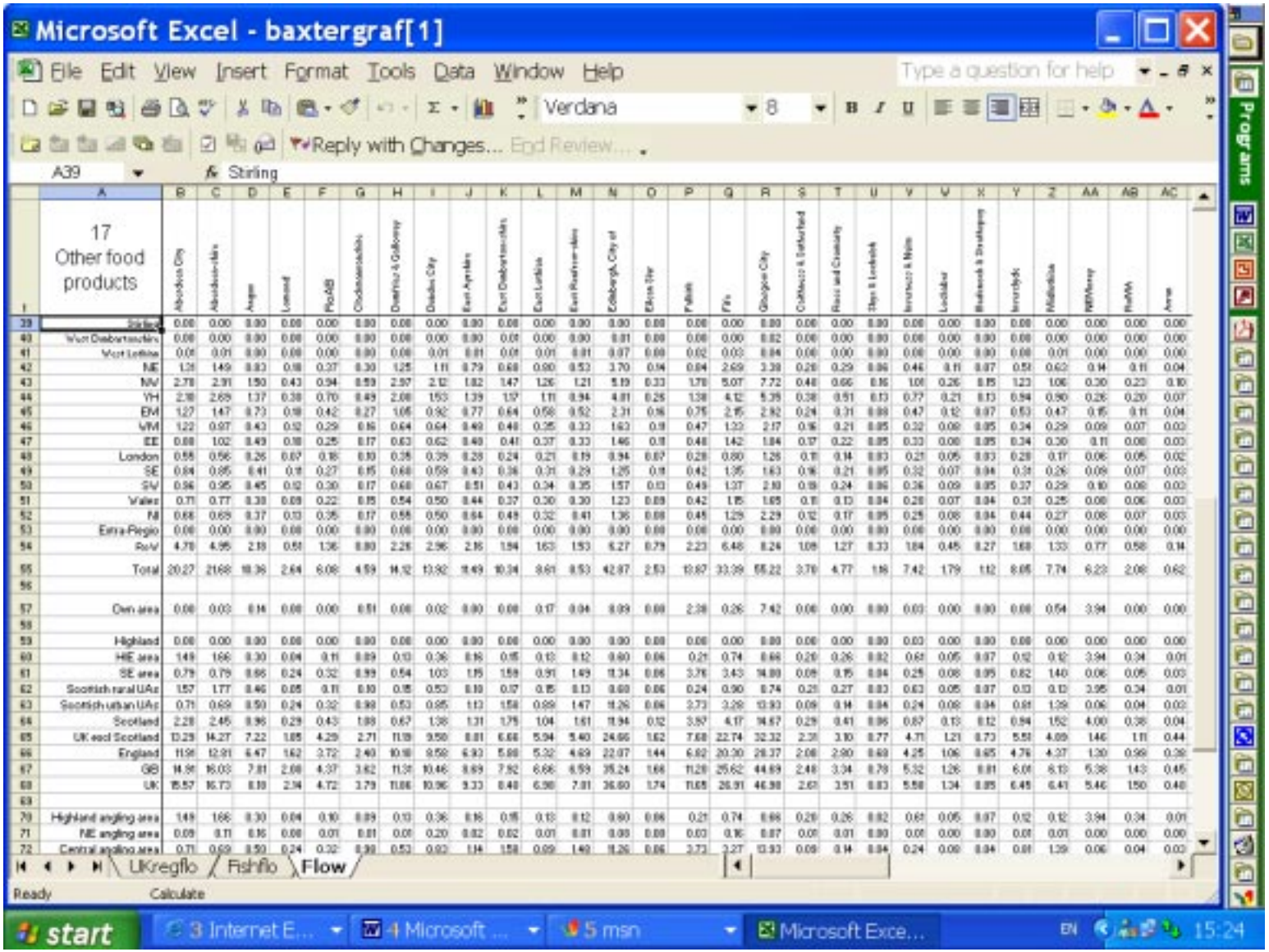
The distance relationship is used to disaggregate the 43 data points into 324 estimated flows. A RAS-like procedure is then used to bring the data-regression estimates into accord with the available totals. The method is successively to pro-rate rows, columns, and block totals until the estimates stabilise.

The distances within and between Scotland and RUK based on the estimated pattern of trade are inserted in the distance regressions and the procedure repeated.

A 1.1.6.4 Trade between Scottish localities

A similar procedure is then followed for the Scottish UA areas, disaggregating the Scottish balance into a 34*34 matrix where the rows and columns are the 32 Scottish UA areas, RUK and RoW. Thus this procedure disaggregates 49 inter-regional totals into 1156 inter-locality figures.

At the conclusion of this exercise there is a 54*54 matrix for each of the 123 commodity groups. An example for product group 19 is given in Fig 2.5.5.4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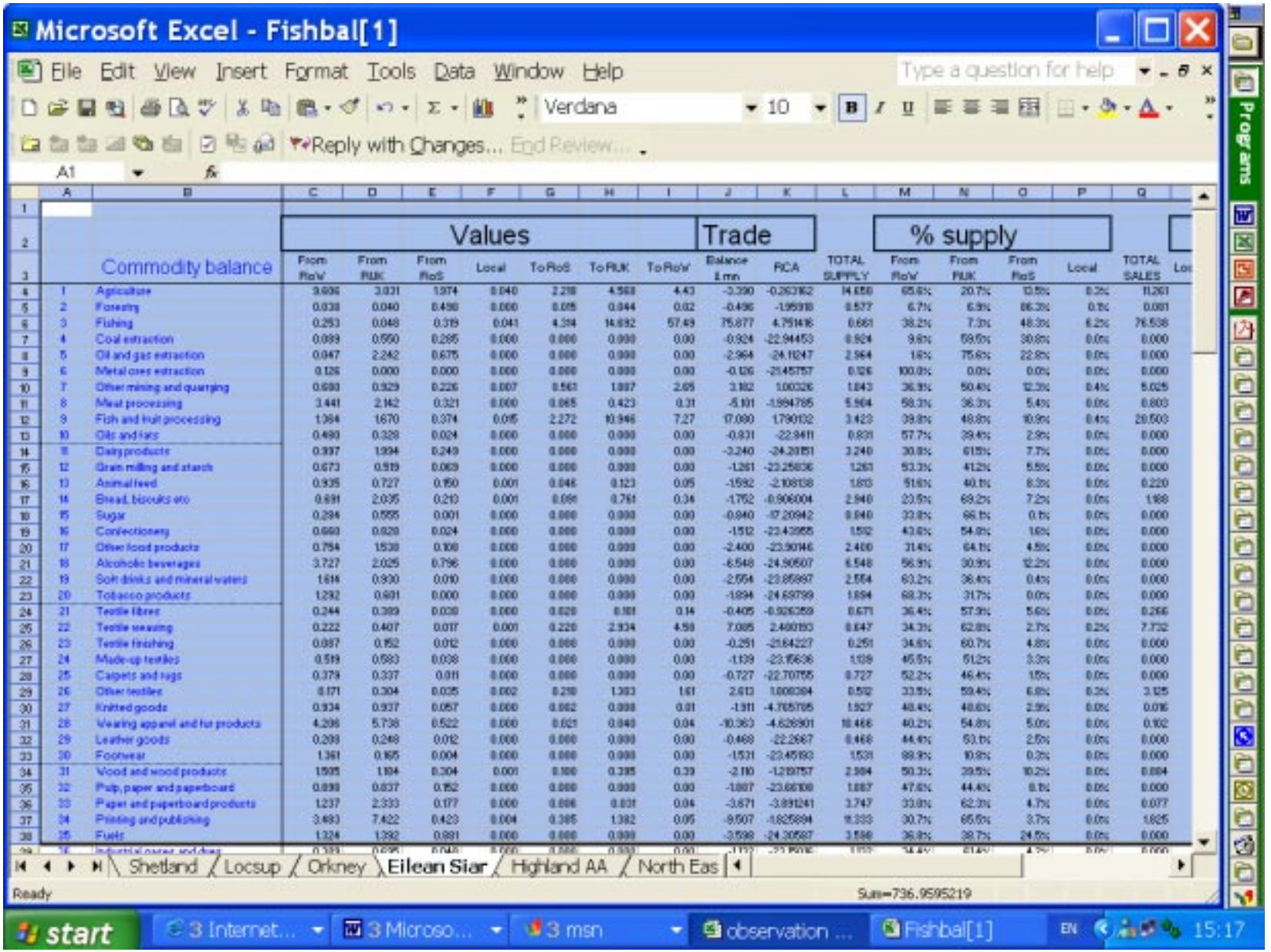
A 1.1.6.5 Trade for specified regions

The final stage in formulating the trade matrices aggregates the flows for the UA areas that form the regions specified in this project. Thus for each area estimates of trade flows to/from the Rest of World, the Rest of the UK and the Rest of Scotland are detailed. An example of the matrix for Eilian Siar (Western Isles) is given in Fig 2.5.5.5

A 1.1.6.6 Final Matrices

The trade matrices for each area are finally incorporated with the Input Output tables, formed from the aggregation of the UA Input Output tables. The final stage is the addition of an expenditure column that provides the spending pattern of the specific angling group, and an additional row and column for the angling industry to allow rents to be spread between commodity groupings (or lost to the local economy)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3 Fishing
4 Coal extraction
5 Oil and gas extraction
6 Metal ores extraction
7 Other mining and quarrying
8 Meat processing
9 Fish and fruit processing
10 Oils and fats
11 Dairy products
12 Grain milling and starch
13 Animal feed
14 Bread, biscuits etc
15 Sugar
16 Confectionery
17 Other food products
18 Alcoholic beverages
19 Soft drinks and mineral waters
20 Tobacco products
21 Textile fibres
22 Textile weaving
23 Textile finishing
24 Made-up textiles
25 Carpets and rugs
26 Other textiles
27 Knitted goods
28 Wearing apparel and fur products
29 Leather goods
30 Footwear
31 Wood and wood products
32 Pulp, paper and paperboard
33 Paper and paperboard products
34 Printing and publishing
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A1.1.7.The Multiplier Process.

Each area and species combination has a different expenditure pattern that enters the system via the expenditure column in the relevant area table. Goods purchased through retailers are allocated to the industries concerned after allocating a retail margin to the retail sector. If, as is very likely in small economies, the good is imported, then the expenditure is withdrawn from the local economy. Withdrawals at this stage also include Fuel Duty.

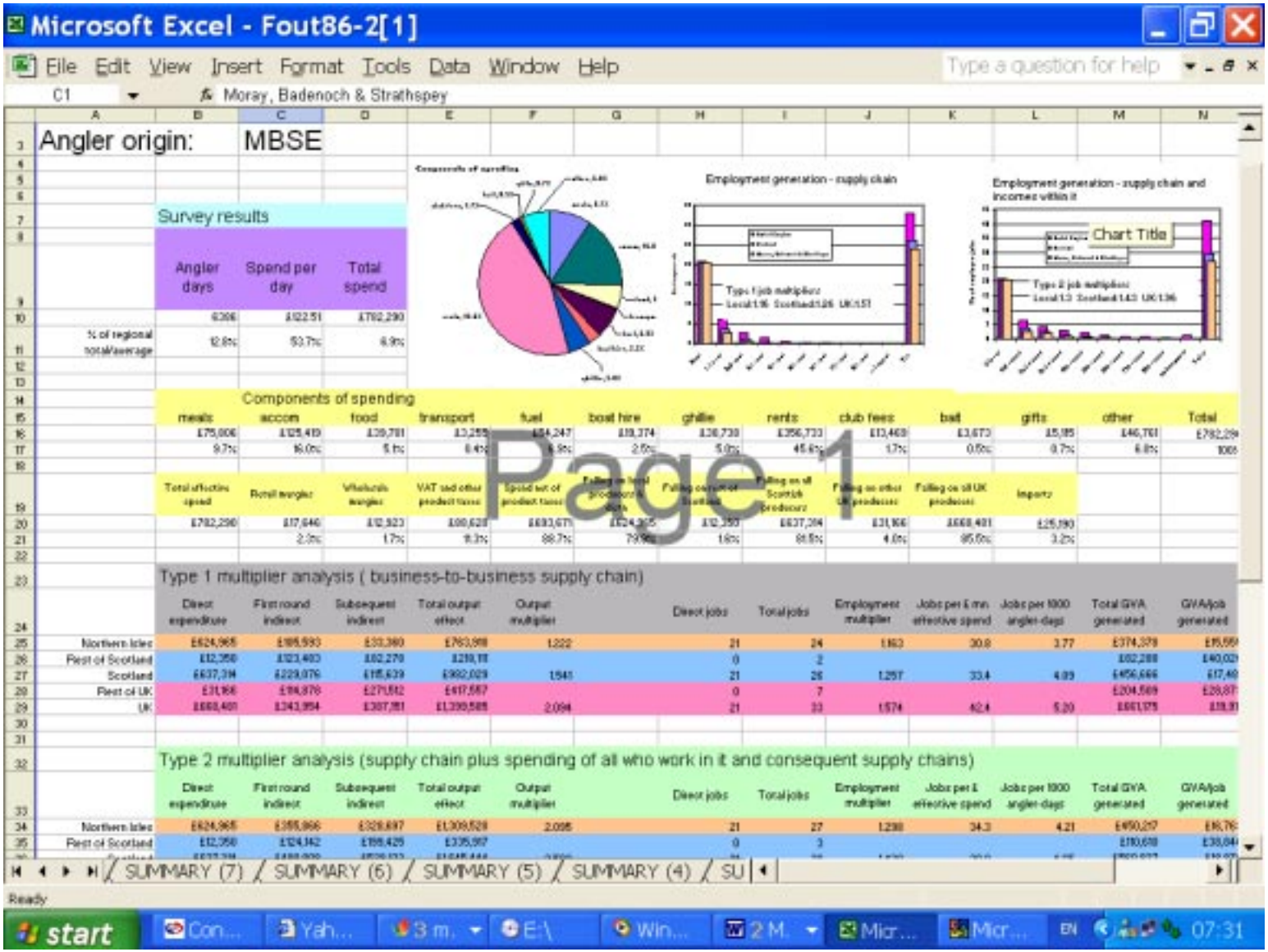
The multiplier process is simulated one step at a time using an Excel spreadsheet with macros (to deal with the size problem). Firstly for type 1 multipliers the indirect effect on local industries is calculated. Again, as might be expected, this can be very small as local industries source their raw materials from outside.

For these type 1 multipliers, expenditure on wages is lost. For type 2, however, it feeds back into the system via the household expenditure vector where some (most) is lost to imports and tax but some continues to expand the local economy.

The simulation is conducted in terms of gross output and then converted using local ratios to value added and consequently employment. It should be emphasised that these ratios are specific to industry and region, having been derived from the individual estimates of production and intermediate absorption.

A 1.1.8 Output

Output from the model covers total, direct, indirect and induced expenditure for the MBSE, Scotland and the UK from both type 1 and type 2 models. It also generates data on Gross Value Added, Jobs and the Expenditure per job. Multipliers are reported. Full out for he angling model is attached to this report (Excel workbook *CogentsiModel.XLS*) and an illustration of the output is provided in Fig A1.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Angler days
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Total spend
Components of spending
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accom
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fuel
boat hire
ghillie
rents
club fees
bait
gifts
other
Total
Employment generation - supply chain
Employment generation - supply chain and incomes within it
Chart Title
Type 1 multiplier analysis (business-to-business supply chain)
Direct expenditure
First round indirect
Subsequent indirect
Total output effect
Output multiplier
Direct jobs
Total jobs
Employment multiplier
Jobs per £ mn effective spend
Jobs per 1000 angler-days
Total GVA generated
GVA/job generated
Northern Isles
Rest of Scotland
Scotland
Rest of UK
UK
Type 2 multiplier analysis (supply chain plus spending of all who work in it and consequent supply chains)
Direct expenditure
First round indirect
Subsequent indirect
Total output effect
Output multiplier
Direct jobs
Total jobs
Employment multiplier
Jobs per £ effective spend
Jobs per 1000 angler-days
Total GVA generated
GVA/job generated
Northern Isles
Rest of Scotland
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A1.2 CONSTRUCTING THE MBSE INPUT-OUTPUT TABLE BY SURVEY

A.1.2.1. Introduction

The development and application of an MBSE multiplier is central to the economic impact study. Two models of the regional economy have been developed for the purposes of this study. The first uses national data and 128 industry categories from the 1999 Scottish Input-Output tables and is described in Appendix A1.1. While the data supplied within these I-O tables are robust industry averages, questions have been raised about the suitability of applying these nationally derived figures to a small region such as the MBSE. In particular it was thought that one or two large employers might have a distorting in a small region with a very high degree of leakage. It was decided therefore that the development of a regional model using a telephone-based survey approach would be very useful, allowing comparisons between the two models to be made. The following sections outline the construction of the model, how the survey data were collected and applied, together with an overview of the model outputs and what they mean.

A.1.2.2. Explaining the model

The model requires three basic matrices. First the initial consumer expenditure must be allocated either to local industries or outside the region. This matrix gives rise to Direct Expenditure, which is necessarily equal to output from local industry.

The expenditure of these industries/sectors on the products of other local industries/sectors and on local wages is the second matrix required. This is the local Input-Output table. The requirements from local industries are summed together to obtain the 1st round *indirect* impact. As some of the direct spend will be in the form of wages, it is also necessary to trace the flow of household expenditure to each local industry/sector and outside the region. This is done using the third household expenditure matrix. Summing these expenditure flows together produces the 1st round *induced* expenditure. The total round 1 impact figure (indirect & induced) is then fed back into the model and the process repeats itself again and again until the round n impact figure becomes insignificant. A more in depth look at the multiplier types and the various ratio's involved will appear later in the appendix.

A.1.2.3. Expenditure Patterns

Three different measures of total spending on angling in the MBSE zone have been calculated and applied using the survey-based approach model. (There are also three types of paddlers expenditure applied to the model).

Table: A.1.2.3.1. Distribution of Consumer Spending on angling activities

Components of Angler Spend	All Anglers Spend	External Anglers Spend	All Anglers spend after substitution
Hospitality	31.60%	35.60%	30.01%
Food (Shop)	4.80%	5.10%	5.69%
Rents etc	40.20%	38.60%	48.98%
Ghillies	2.00%	4.90%	5.82%
Petrol/Transport	6.50%	7.00%	4.14%
Clothes etc	2.50%	2.90%	0.39%
Other	12.40%	5.90%	4.98%
Total	100.00%	100.00%	100.00%

The total expenditure figures have been split into 7 categories as shown in table A.1.2.3.1. The weighting of each of these categories (defined by the angler survey) will play an important role in the calculation of the direct impact.

Table A.1.2.3.2. Distribution of Consumer Spending on Paddle Sports

Components of Paddlers Spend	Outdoor Centre	Day trip	Spey Descent
Hospitality	38.90%	27.70%	15.42%
Food (Shop)	9.20%	14.50%	14.95%
Rents etc	45.70%	10.00%	13.53%
Ghillies	0.00%	0.00%	14.93%
Petrol/Transport	6.20%	47.80%	2.67%
Clothes etc	0.00%	0.00%	27.78%
Other	0.00%	0.00%	10.72%
Total	100.00%	100.00%	100.00%
Consumer Spend	**£1,387,599**	**£101,179**	**£146,169**
Daily Spend	**£46.75**	**£26.58**	**£45.99**
Type 2 Multiplier	**1.51**	**1.33**	**1.36**

In the case of angling the distribution of spend by each angler type is similar, as is the Type 2 multiplier. Table A1.2.3.2 however, shows there to be a large degree of variation in paddlers spend and its components. For those on day trips as opposed to those who are using the outdoor centers over 40% is in fuel and transport costs. This will largely flow straight out of the system resulting in the smaller multiplier.

A.1.2.4. Industry Categories

The tables within this multiplier model utilize 13 categories/industries/sectors. These are the sectors identified as being the main beneficiaries (initial and eventual) of consumer expenditure on angling within MBSE. These are; Agriculture & Fish (local), Minerals & Building Materials (local), Energy (local), Food Proc (local), Retail Services Food, Retail Services Materials, Retail Services Energy, Building Services, Hospitality Services, Admin and Financial Services, Outdoor Centres (No Angling impact), Recreational Services (Angling: No paddling impact), Fishery Board Services (as a service to recreational services; the owners) and Transport.

A.1.2.5. Initial 1st Round Consumer Spend (Direct)

The 1st matrix allocates the total consumer expenditure on angling within the MBSE into the industry categories as described above. It should also be noted that a VAT element of 17.5% flows directly out of the system at this point, which is the case with all the sectors except for Food (from shops) which is exempt from VAT and Ghillies, as they do not pay VAT on tips received from anglers. For hospitality the remaining 82.5% goes direct to hospitality services, for Food (shop) we have taken the average retail margin with most going to Retail food services, and small amounts going to Food Processing (local) and Agriculture & Fish (local). Rents all go to recreational services after removal of the VAT element, expenditure on Petrol & Transport will largely be at locations within MBSE, however most of this expenditure will flow out of the system almost immediately as retailers pay for petrol and fuel duty. This is detailed in the table shown below.

Table: A.1.2.5.1. Matrix of Consumer Expenditure (Direct impact)

MBSE CONSUMER EXPENDITURE	*Hospitality*	*Food (Shop)*	*Rents etc*	*Ghillies*	*Petrol/ Transport*	*Clothes etc*	*Other*
Ag & Fish (local)		1%					
Min & Building Mats (local)							
Energy (local)							
Food Proc (local)		1%					
Retail Services Food		29%					
Retail Services Mats						15%	
Retail Services Energy					40%		
Building Services							20%
Hospitality Services	83%						
Admin and Fin Service							
Outdoor Centres			100%				
Recreational Services				100%			

Scientific Services							
Transport					10%		
VAT	18%				18%	18%	18%
External Proportion (not incl tax)	**0%**	**69%**	**0%**	**0%**	**33%**	**68%**	**63%**

This 1st matrix converts the percentages into monetary values, which shows us, in money terms, which sectors directly benefit from consumers expenditure. We have calculated the local, external & total spends for each consumer category as well as their absorption rate into the local economy. As mentioned earlier, adding these expenditures together gives the total, direct spend.

A.1.2.6. Initial 1st Round Industry to Industry Spend (Direct effect)

This second matrix captures the 1st round indirect effects of the consumer spend within the area. An *ad-hoc* telephone survey of the 13 industry/sectors was conducted to identify their individual cost structures and local absorption rates, which was required in order to ascertain exactly how each industry/sector spends its income and how much of this expenditure is local to MBSE. For each of the industry categories identified, a search was carried out through Yell.com to find out the number of businesses within MBSE that fitted into these categories. Initially we started out with 16 categories but soon realized that as these industries were all outside the region they were therefore 'dropped'. Once a business was identified, telephone contact was initiated but, due to the confidential nature of this information in most cases the business concerned was unwilling to provide local cost structure data. In this instance we simply moved onto the next business. After 40 or so calls the sectors/industries had been adequately sampled (census minus those unwilling) and cost structure averages were taken and entered into Matrix 2, summed together to determine the indirect spend. In addition to calculating the local, external, total spends and absorption rate by industry, Wages and profits were also surveyed; wages in particular were important to obtain as this is used as a proxy for household spend which will be looked at.

Table: A.1.2.9.1. Industry to Industry Expenditure (Input-Output Table)

Industry Expenditure (MBSE Survey Data)	***Agriculture & Fish (local)***	***Building Materials (local)***	***Energy (local)***	***Processing (local)***	***Retail Services Food***	***Retail Services Materials***	***Retail Services Energy***	***Building Services***	***Hospitality Services***
Ag & Fish (local)				25%	3%				5%
Min & Building Mats (loc)	2%	5%	2%					9%	
Energy (loc)									
Food Proc (loc)					3%				
Retail Services Food									5%
Retail Services Materials	10%	3%	1%					2%	1%
Retail Services Energy								3%	1%
Building Services				1%	1%	5%	2%		2%
Hospitality Services									

Admin and Fin Services	5%	1%	1%	2%		5%	2%		2%
Outdoor Centres									
Recreational Services									
Scientific Services	3%								
Transport	1%	5%	1%	5%	1%			5%	3%
LOCAL SPEND	21%	14%	5%	33%	7%	10%	4%	19%	18%
EXTERNAL SPEND	39%	56%	93%	42%	83%	75%	66%	41%	37%
TOTAL SPEND	60%	70%	98%	75%	90%	85%	70%	60%	55%
WAGES	30%	20%	2%	15%	10%	15%	20%	35%	25%
PROFITS	10%	10%	0%	10%	20%	0%	10%	5%	20%
ABSORPTION	**31%**	**24%**	**5%**	**43%**	**7%**	**10%**	**14%**	**24%**	**38%**

A.1.2.7. Household Spend

This third matrix captures the induced effects of the initial consumer spend. Taking data from the Family Expenditure Survey (FES) on the breakdown of family expenditure, we can calculate how the family will spend its income (wages taken from the Industry to Industry matrix). Assumptions had to be made as to whether this spending would be local to MBSE; however this was relatively easy as we already knew what products and services are available in the area. Again, as before, the expenditures on each industry/sector are summed up to give the induced spend.

Table: A.1.2.7.1. Family household expenditure (Induced effect)

Household Expenditure (FES Survey Data)	***Hospitality***	***Food (Shop)***	***Recreational Services***	***Petrol/Transport***	***Clothes etc***	***Housing***	***Other***	***Taxes***
Ag & Fish (local)		5%						
Min & Building Mats (loc)						10%		
Energy (loc)								
Food Proc (loc)								
Retail Services Food		80%						
Retail Services Materials					35%			
Retail Services Energy				30%				
Building Services						10%		
Hospitality Services	15%							
Admin and Fin Service								
Outdoor Centres			10%					
Recreational Services			10%					
Scientific Services								

Transport				35%				
External Proportion (incl Taxes)	**85%**	**15%**	**80%**	**35%**	**65%**	**80%**	**100%**	**100%**

A1.2.8. Multiplier Ratios

For each of the various angler and paddler types there are a number of relevant multipliers/ratios. For each activity type the following has been calculated; the output to output ratio, the expenditure to output ratio, the number of jobs that can be attributed to direct expenditure (direct jobs), the total number of jobs (direct & indirect), the job multiplier ratio, and the expenditure per £1000 to jobs ratio. Table A 4.2.8.1 shown below shows each of the above outputs for all anglers.

Table A 4.2.8.1. Output from all anglers in MBSE

ALL ANGLERS IN MBSE	
Output to output ratio	**1.52**
Expenditure to output ratio	**1.36**
Direct jobs	**126**
Total jobs (direct & indirect)	**185**
Job multiplier (ratio)	**1.46**
Expenditure (£1000) to total jobs ratio	**58**

A.1.2.9. Output to Output Ratio (type 2 multiplier)

This ratio is obtained by adding together the total impact for each round (indirect & induced) and dividing through by direct local spend or output (£7,405,548). This figure (1.52) will be higher than the type 1 calculation which does not take induced expenditure into account. Type 1 Output-output multipliers emerge directly from the Input Output table and are published at national level alongside the I-O tables. They are often applied (incorrectly) to total expenditure.

A.1.2.10. Expenditure to Output Ratio (type 2 multiplier)

This ratio is obtained in the same way; however instead of dividing through using the 1st round direct local spend or output figure, instead the initial consumer expenditure figure of £10,759,499 is used. As we are dividing through by a larger number we are obviously going to get the smaller ratio of 1.36. This multiplier is relatively unstable because it needs details of the extent to which visitors (as opposed to local businesses and workers) purchase local goods.

A.1.2.11. Direct Jobs

The number of jobs that can estimated from the total spend by industry on wages and the average wage in the MBSE area, which is quoted as being £16,030. As can be seen from the table above, this equates to 126 jobs which are directly attributable to anglers spend.

A.1.2.12. Total Jobs & the Employment Multiplier

Total jobs are calculated from the cumulative spend on wages within the MBSE (£2,960,168), which is then divided by the average annual wage in the MBSE of £16,030. As can be seen from the table above, this amounts to 185 jobs. We can therefore calculate those jobs which are indirectly attributed to the initial consumer injection; 185–126 = 59 jobs. The employment multiplier is simply the ratio of direct jobs over total jobs and in this case is coming in at 1.46.

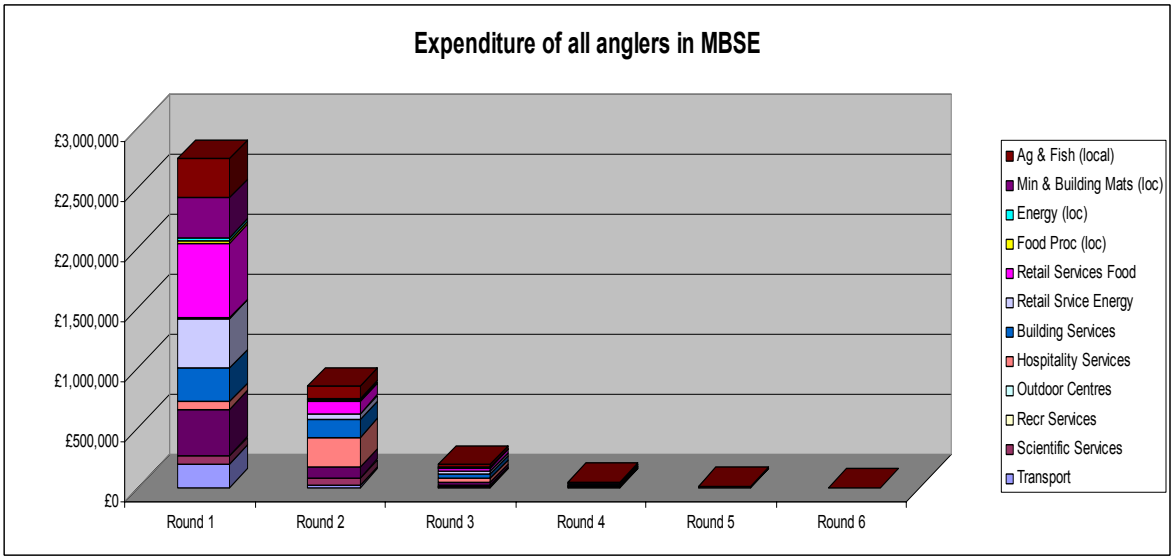
A.1.2.13. Expenditure (£1000) to total jobs ratio

This measure tells us how much would need to be spent by consumers within the MBSE to create/sustain a certain amount of jobs. It is calculated by taking initial consumer spend and dividing through by the total number of jobs (direct & indirect) already calculated. The figure of 58 in the table above indicates that for every £58,000 that is spent by anglers on Speyside or within the MBSE, a job is created or sustained.

A.1.2.14. Impact over time

As can clearly be seen from the bar chart, within three rounds almost all expenditure has leaked out of the system which is not surprising given the size and limited infrastructure possessed by the MBSE. What is interesting is that in the 1st round of expenditure food retail services appears to make up the largest slice of expenditure, followed closely by scientific services. However, looking at the second round, hospitality services clearly has the largest slice of expenditure. This reflects local household spending (the induced effect) which has greatest impact at the second round.

Figure A.1.2.14.1 Angler expenditure by category in each round



A1.2.15 Summary and Conclusions

Tables A 1.2.15.1 ,2 and 3 summarise the results for this approach. Differences between the results published in the main document produced by CogentSI and this model are the subject of further research.

Table A1.2.15.3 Economic Impact without substitution of water sports on the MBSE area

	Centres	Descent	Day Trips	Gorge	Totals
Total Expenditure (£1000)	£1,387	£146	£101	£73	£1,707
Direct (Local) Expenditure (£1000)	£1,162	£100	£62	£61	£1,385
Impact (Direct plus Indirect & Induced)	£1,753	£136	£82	£92	£2,062
output to output ratio	1.51	1.36	1.33	1.51	1.49
expenditure to output ratio	1.43	1.25	1.20	1.43	1.40
direct jobs	22	1	1	1	26
total jobs (direct & indirect)	31	1	1	2	35
job to job ratio	1.37	1.31	1.30	1.37	1.37
expenditure (£1000) to total jobs ratio	45	71	84	45	51

Table A 1.2.15.1 Summary of Economic Impact (No Displacement)

Species	Origin of anglers	Angler days	Spend per day	Effective spend	Direct Spend	Indirect and Induced	Direct Jobs	Total Jobs
Salmon	**MBSE**	6386	£122.51	£782,290	£508,577	£196,794	9	13
	RHIGH	2319	£113.89	£264,072	£196,643	£86,902	4	5
	SCOT	5486	£307.74	£1,688,223	£1,103,615	£431,834	19	28
	RWORLD	26353	£304.10	£8,013,932	£5,841,334	£2,144,467	99	145
	Total	**40543**	**£228.44**	**£10,748,517**	**£7,650,170**	**£2,859,997**	**130**	**192**
Brown trout	**MBSE**	1910	£34.84	£66,559	£42,208	£17,058	1	1
	RHIGH	539	£73.57	£39,681	£24,115	£7,542	0	1
	SCOT	1023	£82.23	£84,129	£61,331	£20,255	1	1
	RWORLD	1342	£126.91	£170,361	£107,806	£32,501	2	2
	Total	**4815**	**£71.82**	**£360,731**	**£235,459**	**£77,357**	**4**	**5**
Rainbow trout	**MBSE**	1401	£26.33	£36,888	£15,084	£3,615	0	0
	RHIGH	341	£40.92	£13,954	£5,706	£1,368	0	0
	SCOT	722	£49.17	£35,501	£24,307	£6,715	0	1
	RWORLD	806	£156.28	£125,962	£79,709	£24,031	1	2
	Total	**3270**	**£51.80**	**£212,304**	**£124,805**	**£35,728**	**2**	**3**
Coarse	**MBSE**	300	£37.79	£11,219	£4,588	£1,100	0	0
	RHIGH	253	£37.79	£9,552	£3,906	£936	0	0
	SCOT	350	£39.17	£13,237	£9,063	£2,504	0	0
	Wrld	299	£39.17	£11,724	£8,027	£2,217	0	0
	Total	**299**	**£39.17**	**£45,732**	**£150,389**	**£42,485**	**2**	**3**
Total	**MBSE**	9997	£97.32	£896,957	£570,456	£218,567	10	14
	RHIGH	3452	£89.45	£327,258	£230,370	£96,748	4	6
	RSCOT	7581	£235.17	£1,821,090	£1,198,316	£461,307	20	31
	RWORLD	28801	£285.16	£8,321,979	£6,179,237	£2,243,484	104	152
	Total	**49830**	**£193.17**	**£11,367,284**	**£8,580,891**	**£3,191,649**	**146**	**214**

This model generates a total economic impact before substitution of **£11,772,590** or **214** FTEs.

Table A 1.2.15.2 Summary of Economic Impact with displacement

Species	Origin of anglers	Angler days	Spend per day	Lost Effective spend	Lost Direct Spend	Indirect and Induced	Direct Jobs	Total Jobs	Displace-ment Factor
Salmon	**MBSE**	6386	£123	£560,903	£364,650	£141,101	6	9	71.7%
	RHIGH	2319	£114	£254,833	£189,763	£83,862	3	5	96.5%
	SCOT	5486	£308	£1,379,965	£902,103	£352,984	15	23	81.7%
	RWORLD	26353	£304	£7,177,134	£5,231,394	£1,920,546	89	130	89.6%
	Total	**40543**	**£228**	**£9,372,834**	**£6,687,910**	**£2,498,493**	**114**	**167**	**87.2%**
Brown trout	**MBSE**	1910	£35	£57,575	£36,510	£14,756	1	1	86.5%
	RHIGH	539	£74	£30,754	£18,690	£5,845	0	0	77.5%
	SCOT	1023	£82	£79,259	£57,780	£19,083	1	1	94.2%
	RWORLD	1342	£127	£136,304	£86,254	£26,004	1	2	80.0%
	Total	**4815**	**£72**	**£303,891**	**£199,234**	**£65,687**	**3**	**5**	**84.2%**
Rainbow trout	**MBSE**	1401	£26	£17,600	£7,196	£1,725	0	0	47.7%
	RHIGH	341	£41	£6,657	£2,722	£652	0	0	47.7%
	SCOT	722	£49	£29,197	£19,991	£5,522	0	0	82.2%
	RWORLD	806	£156	£97,640	£61,787	£18,628	1	1	77.5%
	Total	**3270**	**£52**	**£151,094**	**£91,697**	**£26,527**	**1**	**2**	**71.2%**
Coarse	**MBSE**	300	£38	£6,402	£2,618	£627	0	0	57.1%
	RHIGH	253	£38	£5,451	£2,229	£534	0	0	57.1%
	SCOT	350	£39	£13,021	£8,915	£2,463	0	0	98.4%
	Wrld	299	£39	£11,533	£7,896	£2,181	0	0	98.4%
	Total	**299**	**£39**	**£36,407**	**£21,658**	**£5,806**	**0**	**0**	**79.6%**
Total	**MBSE**	9997	£97	£642,479	£410,975	£158,209	7	10	68.2%
	RHIGH	3452	£89	£297,695	£213,404	£90,894	4	6	86.4%
	RSCOT	7581	£235	£1,501,442	£988,789	£380,052	17	25	79.0%
	RWORLD	28801	£285	£7,422,610	£5,387,331	£1,967,359	91	133	86.1%
	Total	**49830**	**£193**	**£9,864,226**	**£7,000,499**	**£2,596,514**	**119**	**174**	**83.6%**

This model generates a total economic impact after substitution of **£9,597,013** or **174** FTEs**.**

A3.1 THE SURVEY OF FISHERY PROPRIETORS

GLASGOW CALEDONIAN UNIVERSITY

PROJECT PART-FINANCED BY THE EUROPEAN UNION

Europe and Scotland
Making it **work together**

April 2003

River Spey Recreational Water-Sports Study
Division of Economics and Enterprise
Glasgow Caledonian University
Cowcadden's Road
Glasgow
Scotland

Dear Sir / Madam

The recent consultative draft River Spey Catchment Management Plan highlighted the need to improve our understanding of the volume and economic contribution of water-related recreation and tourism. Following this, eight partner organizations[1] with funding assistance from the European Union commissioned researchers from the universities of Glasgow Caledonian and Edinburgh to undertake research in this area.

We require assistance from **managers** and **owners** of fisheries in our efforts to understand the extent of angling's wider economic contribution in the 'Spey Catchment.' In particular, we need to know how frequently your freshwater fisheries are visited, where the anglers come from, the species they fish for, their interaction with other water users and the number of people you employ. We would therefore be most grateful if you would complete this questionnaire.

This fishery survey is only part of the Spey study. There will be companion surveys of anglers and paddlers. We will also use the Spey data in further research work commissioned by the Scottish Executive on the economic contribution of freshwater fisheries across the whole of Scotland.

- Please provide information relating only to a typical fishing season within the ***past 3 years.***
- Under the **Data Protection Act**, all replies are treated in the strictest confidence and the results will be presented to the 'Spey Partnership' and the Scottish Executive in a summary format only. **It will not be possible to identify individual fisheries.**
- Please return the questionnaire in the enclosed envelope on or before the closing date of **August 31st 2003.**
- If you have any queries please do not hesitate to contact us at the above address.

Thank you for your co-operation.

John Anderson
Researcher

[1] Comprising the Spey Fishery Board; Moray, Badenoch and Strathspey Enterprise; sportscotland; The Cairngorms Partnership; Moray Council; Highland Council; Scottish Environment Protection Agency and Scottish Natural Heritage.

Spey Catchment Recreational Water -Sports Study
Fishery Owner/Manager Survey

The following Questionnaire is designed to capture **ALL** types of angling undertaken at your fishery. Thus, if anglers fish for different species (e.g. salmon and sea trout and brown trout), all this activity can be recorded within this one form. However, if you manage/own more than one fisher y within the Spey Catchment, we must ask you to **complete a second form for the second location** and so on.

SECTION 1: FISHERY CHARACTERISTICS

Please give the **name** and **contact details** for this fishery (including contact phone no)

_____

_____

Please indicate where within the Spey Catchment this fishery is situated.

	Please Tick	
a) Stillwater in the Spey Catchment		**Go to Question 3**
b) Tributary of the Spey		**Go to Question 4**
c) Main Spey River		**Go to Question 5**

Please indicate the location of your Still -water fishery **(Answer only if option (a) in Question 2 was selected).**

Still-Water	**(Tick)**	**Still-Water**	**(Tick)**
Loch Insh		Loch Vaa	
Loch Morlich		Loch Alvie	
Loch Pityoulish		Loch Einich	
Loch Gynack		Loch Garten	
Loch Spey		Inverlochy	
Spey Dam		Loch Avon	
Loch An Eilein		Avielochan	
Other			

If 'Other', please give the name of the Stillwater _____

Please estimate the size of your fishery _____ **Hectares**

Now go to Question (8).

Please indicate the tributary of the River Spey on which your fishery is situated.
(Answer only if option (b) in Question 2 was selected).

Trium	**Calder**	**Feshie**	**Nethy**	**Dulnain**
Avon	**Livet**	**Fiddich**	**Tromie**	**Other**

If 'Other', please give the name of the tributary _____
Now go to Question (6)

Please indicate where the fishery is located on the main part of the river.
(Answer only if option (c) in Question 2 was selected).

Upper Spey (Source to Grantown)	**Middle Spey** (Grantown to Aberlour)	**Lower Spey** (Aberlour to Spey Bay)

What is the **length of water** controlled by your fishery: _____ **Kilometres**

Is your fishery single or double bank? ☐ **Single** ☐ **Double**

Please indicate all the **species** that anglers **seek to catch** at this fishery.

		Tick
Salmon & Sea Trout	**Please answer the Yellow section**	**(2)**
Brown Trout	**Please answer the Red section**	**(3)**
Rainbow Trout	**Please answer the Blue section**	**(4)**
Pike	**Please answer the Green section**	**(5)**

For each species selected please go on and answer the corresponding section. Each section is indicated by the colour scheme given above.

In addition, all respondents are asked to complete Sections 7 and 8 .

-- End of Section 1 --

SECTION 2: SALMON & SEA TROUT

Please estimate the number of **angler days** for salmon and/or sea trout at this fishery in the latest typical season within the last 3 years.

*Note: A salmon and or sea trout **angler day** is any angler visit to a fishery for the purpose of angling for salmon and or sea trout. **One angler day** may be one angler fishing for a morning, or a whole day.*

Estimated salmon and/or sea trout angler days at this fishery in the latest typical season. _____ **Days**

How does this compare with the number of salmon and or sea trout angler days at this fishery in a typical season 10 years ago?

Estimated percentage change in salmon and/ or sea trout angler days _____ **%**

Of the total salmon and sea trout angler days in Q1 above **, please estimate the percentage accounted for by anglers normally resident in**:

Scotland	**%**	**Rest of United Kingdom**	**%**
North of England	**%**	**Mainland Europe**	**%**
Ireland (North and South)	**%**	**North America**	**%**

Of the total salmon and sea trout anglers days **attributed to Scotland** in Q3 above, **please estimate the percentage of days accounted for by anglers normally resident in**:

Moray, Badenoch & Strathspey	**%**
Inverness & Nairn	**%**
Rest of Highlands (the main Highland Regions plus Inner Hebrides, Arran, Argyll and Bute excluding Lomond)	**%**
North East (Aberdeenshire, Angus, Perth and Kinross, Grampian and Tayside)	**%**
Borders	**%**
Orkney and Shetland	**%**
Western Isles	**%**
Dumfries and Galloway	**%**
Central (the rest of Scotland including Loch Lomond)	**%**
Total =	**100%**

Please indicate a **5-year average of Salmon and Sea Trout Catches** for this fishery (including fish released):

_____ **Salmon**

_____ **Sea Trout**

-- End of Section 2 --

SECTION 3: BROWN TROUT

Please estimate the number of **angler days** for brown trout at this fishery in the latest typical season within the last 3 years.

*Note: A brown trout **angler day** is any angler visit to a fishery for the purpose of angling for brown trout. **One angler day** may be one angler fishing for a morning, or a whole day.*

Estimated brown trout angler days at this fishery in the latest typical season.

_____ **Days**

How does this compare with the number of brown trout angler days at this fishery in a typical season 10 years ago?

Estimated percentage change in brown trout angler days

_____ **%**

Of the total brown trout angler days in Q1 above, **please estimate the percentage accounted for by anglers normally resident in:**

Scotland	**%**	**Rest of United Kingdom**	**%**
North of England	**%**	**Mainland Europe**	**%**
Ireland (North and South)	**%**	**North America**	**%**

Of the total brown trout anglers days **attributed to Scotland** in Q3 above, **please estimate the percentage of days accounted for by anglers normally resident in**:

Moray, Badenoch & Strathspey	**%**
Inverness & Nairn	**%**
Rest of Highlands (the main Highland Regions plus Inner Hebrides, Arran, Argyll and Bute excluding Lomond)	**%**
North East (Aberdeenshire, Angus, Perth and Kinross, Grampian and Tayside)	**%**
Borders	**%**
Orkney and Shetland	**%**
Western Isles	**%**
Dumfries and Galloway	**%**
Central (the rest of Scotland including Loch Lomond)	**%**
Total =	**100%**

Please indicate a **5-year average of Brown Trout Catches** for this fishery (including fish released):

_____ **Brown Trout**

-- End of Section 3 --

SECTION 4: RAINBOW TROUT

Please estimate below the number of **angler days** for rainbow trout at this fishery in the latest typical season within the last 3 years.

*Note: A rainbow trout **angler day** is any angler visit to a fishery for the purpose of angling for rainbow trout. **One angler day** may be one angler fishing for a morning, or a whole day.*

Estimated rainbow trout angler days at this fishery in the latest typical season.

_____ **Days**

How does this compare with the number of rainbow trout angler days at this fishery in a typical season 10 years ago or when the fishery opened, whichever is the most recent?

Estimated percentage change in rainbow trout angler days

_____ **%**

Of the total rainbow trout angler days in Q1 above, **please estimate the percentage accounted for by anglers normally resident in:**

Scotland	**%**	**Rest of United Kingdom**	**%**
North of England	**%**	**Mainland Europe**	**%**
Ireland (North and South)	**%**	**North America**	**%**

Of the total rainbow trout anglers days **attributed to Scotland** in Q3 above, **please estimate the percentage of days accounted for by anglers normally resident in:**

Moray, Badenoch & Strathspey	**%**
Inverness & Nairn	**%**
Rest of Highlands (the main Highland Regions plus Inner Hebrides, Arran, Argyll and Bute excluding Lomond)	**%**
North East (Aberdeenshire, Angus, Perth and Kinross, Grampian and Tayside)	**%**
Borders	**%**
Orkney and Shetland	**%**
Western Isles	**%**
Dumfries and Gallowa y	**%**
Central (the rest of Scotland including Loch Lomond)	**%**
Total =	**100%**

Please indicate a **5-year average of Rainbow Trout Catches** for this fishery (including fish released):

_____ **Rainbow Trout**

-- End of Section 4 --

SECTION 5: PIKE

Please estimate the number of **angler days** for pike at this fishery in the latest typical season within the last 3 years.

*Note: A pike **angler day** is any angler visit t o a fishery for the purpose of angling for pike. **One angler day** may be one angler fishing for a morning, or a whole day.*

Estimated pike angler days at this fishery in the latest typical season.

_____ **Days**

How does this compare with the number of pike angler days at this fishery in a typical season, say 10 seasons ago?

Estimated percentage change in pike angler days?

_____ **%**

Of the total pike angler days in Q1 above, **please estimate the percentage accounted for by anglers normally resident in:**

Scotland	**%**	**Rest of United Kingdom**	**%**
North of England	**%**	**Mainland Europe**	**%**
Ireland (North and South)	**%**	**North America**	**%**

Of the total pike anglers days **attributed to Scotland** in Q3 above, **please estimate the percent age of days accounted for by anglers normally resident in**:

Moray, Badenoch & Strathspey	**%**
Inverness & Nairn	**%**
Rest of Highlands (the main Highland Regions plus Inner Hebrides, Arran, Argyll and Bute excluding Lomond)	**%**
North East (Aberdeen-shire, Angus, Perth and Kinross, Grampian and Tayside)	**%**
Borders	**%**
Orkney and Shetland	**%**
Western Isles	**%**
Dumfries and Galloway	**%**
Central (the rest of Scotland including Loch Lomond)	**%**
Total =	**100%**

Please indicate a **5-year average of Pike Catches** for this fishery (including fish released):

_____ **Pike**

-- End of Section 5 --

SECTION 7: INTERACTION WITH OTHER WATER RELATED ACTIVITY

In this section, we are trying to identify anglers' perception of the **interaction**, if any, between anglers and other users of the bank and water.

Please indicate how often you r anglers meet other users whilst fi shing your water, if at all. (Please tick)

	Paddlers	Walkers
Every Day		
Every other Day		
Rarely		
Never		

Paddlers and walkers travel in groups ranging from one to more than ten in size. In a typical day, please estimate how many such groups your anglers are likely to encounter?

	Paddlers	Walkers
Maximum number of Groups		
Average number of Groups		
Minimum number of Groups		

In the tables below, please indicate the frequency of differe nt levels of interaction experienced by your anglers, e.g. they may 'Never' experience 'Personal Conflict' but 'Regularly' have an 'Exchange of Pleasantries' with other users.

On-Water Activity (Canoeing, Rafting etc) (Please tick one box per row)

Type	Never	Rarely	Occasionally	Regularly	Almost Continuously
Exchange of Pleasantries					
Visual/ Noise Distraction					
Interruption of Activity					
Disruption leading to Relocation					
Personal Conflict					

Informal Bank Activity (Walking, Picnics etc) (Please tick one box per row)

Type	Never	Rarely	Occasionally	Regularly	Almost Co ntinuously
Exchange of Pleasantries					
Visual/Noise Distraction					
Interruption of Activity					
Disruption leading to Relocation					
Personal Conflict					

Please describe the **effect on your anglers' fishing experience** if there were to be a hypothetical **doubling in the number of a) paddlers b) walkers and c) anglers**. (Please tick)

	Paddlers	Walkers	Anglers
Major Negative effect on Angling			
Minor Negative effect on Angling			
No effect on Angling			
Minor Positive effect on Angling			
Major Positive effect on Angling			

If you would like to comment upon the **interaction between anglers and other users,** please do so here**.**

SECTION 8: EMPLOYMENT AT YOUR FISHERY

Please indicate number of full -time and part time workers employed spe cifically in providing angling services and estate support for angling services.

If workers are also employed to carry out work other than the provision of fishing services (e.g. general estate maintenance work), ple ase indicate the percentage of their total time devoted to angling services.

	Full-Time	% Angling	Part-Time	% Angling
Permanent				
Seasonal				

Thank you very much for your assistance and please provide any additional information you feel may be relevant to this study.

- End of Questionnaire -

A4.1 ANGLER SURVEY

GLASGOW CALEDONIAN UNIVERSITY

PROJECT PART-FINANCED BY THE EUROPEAN UNION

Europe and Scotland
Making it **work together**

Dear Angler

The recent consultative draft River Spey Catchment Management Plan highlighted the need to improve our understanding of the volume and economic contribution of water-related recreation and tourism. Following this, eight partner organisations1, with funding assistance from the European Union, commissioned researchers from the universities of Glasgow Caledonian and Edinburgh to undertake research in this area.

As an angler, we require your assistance with this work that will inform policy decisions affecting not only the management of fresh-water fisheries in the 'Spey Catchment' but also other recreational water-sports. This angler survey is only part of the Spey study. There will be companion surveys of Spey fishery proprietors and paddlers. We will also use the Spey data in further research work commissioned by the Scottish Executive on the economic contribution of freshwater fisheries across the whole of Scotland.

- Only complete this questionnaire if you have fished within the Spey Catchment at least once in the ***last three years***.

- **Under the** Data Protection Act, **all replies are treated in the strictest confidence and the results will be presented to the 'Spey Partnership' and the Scottish Executive in a summary format only**. It will not be possible to identify individual anglers.

- Please return the questionnaire in the enclosed envelope as soon as possible. The closing date is **August 31st 2003**.

- If you have any queries please do not hesitate to contact us at the above address. **Thank you for your co-operation.**

John Anderson
Researcher

1 Comprising the Spey Fishery Board; Moray, Badenoch and Strathspey Enterprise; sportscotland; the Cairngorms Partnership; Moray Council; Highland Council; Scottish Environment Protection Agency and Scottish Natural Heritage.

Q1) Please indicate where you normally live. Please Tick **One** Box

A) Moray, Badenoch & Strathspey…….....	
B) Inverness & Nairn…….....	
C) Rest of the Highlands (the main Highland Regions plus Inner Hebrides, Arran, Argyll and Bute excluding Loch Lomond)……..	
D) Dumfries and Galloway…..…….....	
E) Borders……..…….....	
F) Orkney and Shetland……..…….....	
G) Western Isles……..…….....	
H) North East (Aberdeenshire, Angus, Perth and Kinross, Grampian and Tayside)……..…….....	
I) Central (the rest of Scotland including Loch Lomond)…..…….....	
J) Northern England (North East and West, Yorks and Humberside) ……	
K) Ireland (North and South) …….....	
L) Rest of the United Kingdom ……..……	
M) Mainland Europe ……..……	
N) North America ……..…….....	
O) Elsewhere……..……..……	

Q2) Please indicate your **age** and **gender**.

Male	**Female**		**Under 18**	**18-25**	**26-45**	**46-59**	**60+**

Q3) Please indicate the species you fish for in the Spey Catchment. Tick all relevant boxes.

Salmon & Sea Trout	**Brown Trout**	**Rainbow Trout**	**Pike**

Q4) For each species fished, please indicate **how many days in total** you fished during a typical season in the last 3 years. Please count one half day, or part of a day as one full day.

Salmon & Sea Trout	**Brown Trout**	**Rainbow Trout**	**Pike**
days	days	days	days

Q5) For each species fished, please indicate the **percentage of the above days** where fishing was the **main purpose** for being in the Spey Catchment. It would not be the main purpose if, for example, you decided to fish for only a day whilst on a family holiday.

Salmon & Sea Trout	**Brown Trout**	**Rainbow Trout**	**Pike**
%	%	%	%

Q6) For each species fished, please estimate your **typical daily expenditure whilst in the Spey Catchment.** Include **all** your expenditure on such trips, even if it covered more than one person, including daily accommodation costs.

We would be very grateful if you could use the subdivisions below to record your **daily** expenditure.

	Salmon & Sea Trout	**Brown Trout**	**Rainbow Trout**	**Pike**
Accommodation per day	£ :	£ :	£ :	£ :
Meals/drinks served to you	£ :	£ :	£ :	£ :
Food and drinks from shops	£ :	£ :	£ :	£ :
Public transport and vehicle hire	£ :	£ :	£ :	£ :
Petrol, diesel etc. purchased	£ :	£ :	£ :	£ :
Rents, licences and permits	£ :	£ :	£ :	£ :
Club fees in fishery region	£ :	£ :	£ :	£ :
Fishing clothes and footwear	£ :	£ :	£ :	£ :
Hire of Tackle and boats	£ :	£ :	£ :	£ :
Other goods including gifts and souvenirs	£ :	£ :	£ :	£ :
Ghillie hire and tips	£ :	£ :	£ :	£ :
Tackle	£ :	£ :	£ :	£ :
Bait	£ :	£ :	£ :	£ :
Other (please specify)	£ :	£ :	£ :	£ :

Q7) For each species you have fished for, please indicate what you **would have done** in a typical season **if that type of fishery had not been available in the Spey Catchment.**
Please tick the appropriate box(es).

	Salmon & Sea Trout	**Brown Trout**	**Rainbow Trout**	**Pike**
Fished **another type of fishery** within **Spey Catchment**				
Fished **the same type of fishery** in **another Scottish region**				
Fished **outside** of Scotland				
Not fished but **still visited** Spey Catchment				
Not fished and **not visited** Spey Catchment				

INTERACTION WITH OTHER WATER RELATED ACTIVITY

In this section, we are trying to identify anglers' perception of the **interaction**, if any, between anglers and other users of the bank and water.

Q8) Please indicate how often you meet other users whilst fishing within the Spey Catchment, if at all. (Please tick)

	Paddlers	Walkers
Every Day		
Every other Day		
Rarely		
Never		

Q9) Paddlers and walkers travel in groups ranging from one to more than ten in size. In a typical day, please estimate how many such groups you encountered.

	Paddlers	Walkers
Maximum number of groups		
Average number of groups		
Minimum number of groups		

Q10) In the tables below, please indicate the frequency of different levels of interaction, e.g. you may 'Never' experience 'Personal Conflict' but 'Regularly' experience an 'Exchange of Pleasantries' with other users.

On-Water Activity (Canoeing, Rafting etc)

(Please tick one box per row)

Type	Never	Rarely	Occasionally	Regularly	Almost Continuously
Exchange of Pleasantries					
Visual/Noise Distraction					
Interruption of Activity					
Disruption leading to Relocation					
Personal Conflict					

Informal Bank Activity (Walking, Picnics etc)

(Please tick one box per row)

Type	Never	Rarely	Occasionally	Regularly	Almost Continuously
Exchange of Pleasantries					
Visual/Noise Distraction					
Interruption of Activity					
Disruption leading to Relocation					
Personal Conflict					

Q11) Please describe the **effect on your angling experience** if there were to be a hypothetical **doubling in the number of a) paddlers b) walkers and c) anglers**. (Please tick)

	Paddlers	**Walkers**	**Anglers**
Major Negative effect on Angling			
Minor Negative effect on Angling			
No effect on Angling			
Minor Positive effect on Angling			
Major Positive effect on Angling			

If you would like to comment upon the **interaction between you and other users whilst fishing within the Spey Catchment,** please do so here**.**

Q12) Please provide any suggestions you have about **how services to anglers including information can be improved** within the Spey Catchment.

- End of Questionnaire -

A4.2 ESTIMATING ANGLER NUMBERS

In the angler survey it was assumed that the likelihood of an angler response was directly proportional to the number of days fished. This assumption is based on the likelihood of meeting an angler on the riverbank in order to distribute the questionnaire. When estimating angler numbers therefore, this same likelihood has to be factored into the calculation.

The probability of finding a specific angler with a given number of days is the number of days fished by the angler divided by the total number of days observed. The calculated mean is then a weighted mean of the number of days in the questionnaires where the weights are determined by the probabilities.

Figure 1.1 Angler Numbers					
Home Region	**Salmon & Sea Trout**	**Brown Trout**	**Rainbow Trout**	**Coarse Fish**	**All**
MBSE	396	247	267	75	984
Rest of Highlands	308	219	408	63	998
Rest of Scotland	770	189	848	35	1843
Outside Scotland	2834	560	345	30	3769
ALL	**4308**	**1214**	**1868**	**202**	**7593**

Figure 1.1 shows the estimated number of anglers on the Spey catchment based on the weighted mean number of days spent by origin and species specific and the total number of angler days obtained form the owner survey. As is shown above, 4300 anglers fish for salmon & sea trout on Speyside which is almost 60% of all anglers. This contrasts with 75% of angler days i.e. salmon anglers spend more time fishing than say rainbow trout anglers (see table 3.6.1). Some 65% of salmon anglers are from out-with Scotland (66% of activity days) emphasisng the importance of the tourist to the eindustry.

In total, we estimate there to be somewhere in the region of 7600 anglers annually on Speyside, the vast majority of which are visiting salmon & sea trout anglers.

A5.1 COMPANIES AND CENTRES OFFERING WATER-SPORTS

A. RESIDENTIAL SUPPLIERS
Craigower Lodge/Outdoor Adventure
Lagganlia Centre for Outdoor Education
Loch Insh Watersports & Skiing
Glenmore Lodge
Abernethy (Nethy Bridge)
RAF Granton
Ardenbeg
Badaguish (Charity)
Woodlands (Edinburgh Uni)

B: RESIDENTIAL
Dulnain Bridge
Hostel Holidays
Badenoch
Rothiemurchus (Army)
Feshiebridge Lodge (Nuffield Trust)

C: NON_RESIDENTIAL
Adventure Scotland
Loch Morlich Watersports
Woolly Mammoth

Dave Craig

D: EXTERNAL COMMERCIAL
John Muir Trust
Sunrise International (US)
Ardmay House (Arrochar)
Big Foot
Fife Outdoor
Beyond Adventure
G2

E: INSTRUCTORS/GUIDES
Mark Samuels
Ron Woodwark
Dave Latham
Alan Beaton
Alasdair Dawson

A5.2 PADDLER QUESTIONNAIRE

(1)

Survey of Paddlers in Scotland

Division of Economics, Glasgow Caledonian University and Dept of Outdoor Recreation, Edinburgh University

The Division of Economics at Glasgow Caledonian University and the Dept of Outdoor Education at Moray House, Edinburgh have been asked by the Spey Management Partners to establish the usage of the river by all users, including and specifically paddlers, and the impact this has on the local economy. As part of the project we are asking anybody who has canoed in Scotland and particularly on the Spey, to indicate where, how often and how much they typically spend. We are also trying to identify the reasons why people choose a particular location and how access and the infrastructure might be improved to increase responsible use.*
The team would like to emphasise that a good response is necessary to ensure that the importance of paddle sports is accurately evaluated. For further information please email g.riddington@gcal.ac.uk

**SportScotland; Moray,Badenoch and Strathspey Enterprise, Moray Council; Highland Council; SEPA; SNH; Spey Fishery Board*

About You

Q1 Gender

Male ☑ Female ☐

Q2 Age

Under 18 ☐ 18-25 ☑
25-40 ☐ 41-60 ☐
More than 60 ☐

Q3 Area of your home (Tick 1)

Dumfries and Galloway	☐	Borders	☐
Orkney and Shetland	☐	Western Isles	☐
North East Scotland (1)	☐	Highlands (2)	☐
Central (3)	☑	Northern England (4)	☐
Ireland (north and South)	☐	Rest of UK	☐
Mainland Europe	☐	North America	☐
Other	☐		

1: Aberdeenshire, Angus, Perth and Kinross, Grampian and Tayside
2: Council plus Inner Hebrides, Moray, Arran, Argyll&Bute exc Lomond
3: Rest of Scotland including Loch Lomond Area
4: North West, North East, Yorks and Humberside

Q4 Please rank your paddling activity from 1 to 6 (1 being most commonly pursued)

Touring Kayak	5	Touring Canoe	6
Whitewater/Playboat	1	Slalom/Competition	5
Rafting	6	Sea Kayaking	4

Your Paddling

Q5 Please indicate the total number of days spent on the following Scottish Waters in the past three years. Please add unspecified rivers you use regularly under Other 1- 3, in order of usage and identify in Q6

	0	1	2 or 3	3 to 5	5 to 10	10 to 25	> 25
Spey	☑	☐	☐	☐	☐	☐	☐
Feshie	☑	☐	☐	☐	☐	☐	☐
Avon	☑	☐	☐	☐	☐	☐	☐
Findhorn	☑	☐	☐	☐	☐	☐	☐
Tay	☐	☐	☐	☐	☐	☑	☐
Dee	☑	☐	☐	☐	☐	☐	☐
Tweed	☑	☐	☐	☐	☐	☐	☐
Clyde	☐	☑	☐	☐	☐	☐	☐
Leny/Teith	☐	☐	☐	☐	☑	☐	☐
Awe	☐	☐	☐	☑	☐	☐	☐
Other 1	☐	☐	☑	☐	☐	☐	☐
Other 2	☐	☐	☐	☐	☐	☐	☐
Other 3	☐	☐	☐	☐	☐	☐	☐
The Sea	☐	☐	☐	☐	☑	☑	☐

Other 1 ..... KELVIN

Other 2 .....

Other 3 .....

Q7 Please rate the qualities you associate with the following Scottish Rivers from 1 (Poor) to 5 (Excellent)

	Access	White water	Scenery	Calm water	Long	Summer Flow
Spey						
Feshie						
Avon						
Findhorn						
Tay	2	3	4	3	4	2
Dee						
Tweed						
Clyde						
Leny/Teith	5	4	4	3	3	1
Awe	4	3	4	2	3	1
Other 1	3	2	1	3	3	1
Other 2						
Other 3						

Q8 Paddling Group (tick the one that applies most often)

Canoe Club ..... ☐ University/College ..... ☑

Youth Group ..... ☐ Friends ..... ☐

Alone ..... ☐

How Much it Costs You

Q9 Please indicate approximately how much you spent in total in SCOTLAND over the last 3 years on Equipment used in your paddling

Nothing ..... ☐ Under £50 ..... ☐

£50 to £200 ..... ☐ £201 to £500 ..... ☐

£501 to £1000 ..... ☐ £1001 to £2500 ..... ☑

More than £2500 ..... ☐

Nothing ..... ☐ Under £50 ..... ☐

£50 to £200 ..... ☑ £201 to £500 ..... ☐

£501 to £1000 ..... ☐ £1001 to £2500 ..... ☐

More than £2500 ..... ☐

Q11 Please indicate the total number of days spent in SCOTLAND on paddling courses over the last 3 years

None ..... ☐ 1 or 2 ..... ☐

3 to 5 ..... ☑ 6 to 10 ..... ☐

10 to 25 ..... ☐ More than 25 ..... ☐

Q12 Please indicate the total number of days spent in the SPEY area on paddling courses over the last 3 years

None ..... ☑ 1 or 2 ..... ☐

3 to 5 ..... ☐ 6 to 10 ..... ☐

10 to 25 ..... ☐ More than 25 ..... ☐

Q13 Please indicate total nights you spent in each type of accommodation away from home over the last 3 years when paddling in SCOTLAND

	0	1 or 2	2 to 5	6 to 10	11 to 15	15 to 20	21 to 30	31 to 50	> 50
Hotel/B&B ...	☑	☐	☐	☐	☐	☐	☐	☐	☐
Hostel/Bunkhouse	☐	☐	☐	☐	☐	☑	☐	☐	☐
Friends/Family	☐	☐	☑	☐	☐	☐	☐	☐	☐
Camp/Caravan	☐	☐	☐	☐	☐	☐	☐	☐	☐
TOTAL	☐	☐	☐	☑	☐	☐	☑	☐	☐

If you have not paddled the Spey please go to Q15

Q14 Please indicate total nights you spent in each type of accommodation away from home over the last 3 years when paddling on the SPEY

	0	1 or 2	2 to 5	6 to 10	11 to 15	15 to 20	21 to 30	31 to 50	> 50
Hotel/B&B ...	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hostel/Bunkhouse	☐	☐	☐	☐	☐	☐	☐	☐	☐
Friends/Family	☐	☐	☐	☐	☐	☐	☐	☐	☐
Camp/Caravan	☐	☐	☐	☐	☐	☐	☐	☐	☐
TOTAL	☐	☐	☐	☐	☐	☐	☐	☐	☐

In the next four questions, If you paid a trip or course fee to an organiser please divide the fee by the number of paddling days and record along with ALL your personal LOCAL expenditure

If you did not make any paddling trips involving an overnight stay please go to Q17

Q15 On a typical OVERNIGHT trip in SCOTLAND please estimate your expenditure in a typical 24 hour period

	£0	less than £5	£5 to £10	£11 to £25	More than £25
Bed or Camp Site Fees	☐	☑	☐	☐	☐
Purchased Meals	☐	☑	☐	☐	☐
Drinks	☐	☐	☑	☐	☐
Food and Drink from local store	☐	☑	☐	☐	☐
Rented Equipment	☑	☐	☐	☐	☐
Petrol or Local Transport	☐	☑	☐	☐	☐
Trip Fees (per day)	☐	☑	☐	☐	☐

If you have not had an overnight trip on the Spey please go to Q17

Q16 On a typical OVERNIGHT trip on the SPEY please estimate your expenditure in a typical 24 hour period

	£0	less than £5	£5 to £10	£11 to £25	More than £25
Bed or Camp Site Fees	☐	☐	☐	☐	☐
Purchased Meals	☐	☐	☐	☐	☐
Drinks	☐	☐	☐	☐	☐
Food and Drink from local store	☐	☐	☐	☐	☐
Rented Equipment	☐	☐	☐	☐	☐
Petrol or Local Transport	☐	☐	☐	☐	☐
Trip Fees (per day)	☐	☐	☐	☐	☐

If all your paddling trips to Scotland involved an overnight stay please go to Q19

Q17 On a typical DAY trip in SCOTLAND, please estimate your typical expenses

	£0	less than £5	£5 to £10	£11 to £25	More than £25
Petrol or local transport	☐	☑	☐	☐	☐
Purchased Meals	☐	☑	☐	☐	☐
Drinks	☐	☑	☐	☐	☐
Food and Drink from local store	☐	☑	☐	☐	☐
Rented Equipment	☑	☐	☐	☐	☐
Trip Fees (per day)	☑	☐	☐	☐	☐

If you have not had a day trip on the Spey please go to Q19

Q18 On a typical DAY trip on the SPEY, please estimate your typical expenses

	£0	less than £5	£5 to £10	£11 to £25	More than £25
Petrol or local transport	☐	☐	☐	☐	☐
Purchased Meals	☐	☐	☐	☐	☐
Drinks	☐	☐	☐	☐	☐
Food and Drink from local store	☐	☐	☐	☐	☐
Rented Equipment	☐	☐	☐	☐	☐
Trip Fees (per day)	☐	☐	☐	☐	☐

Q19 If you intended to but could not paddle in the Spey Area please indicate your most likely alternative action

Paddle a different river in the Highlands ☑ *Paddle in a different region* ☐

Do alternative activity in Spey Area ☐ *Do alternative activity elsewhere* ☐

Developing Paddle Sports

Q20 Please indicate your views on facilities in general in SCOTLAND provided for paddle sports

	Very Poor	Poor	Average	Good	Excellent
River Information	☐	☐	☐	☑	☐
Accommodation/Area Information	☐	☐	☑	☐	☐
Changing Facilities	☐	☐	☑	☐	☐
Parking Facilities	☐	☐	☑	☐	☐
Adjacent Camp Sites	☐	☑	☐	☐	☐
Convenient Food and Accommodation	☐	☐	☑	☐	☐
Rental of Equipment	☐	☐	☑	☐	☐
Instruction/Guiding	☐	☐	☑	☐	☐

If you have not paddled the Spey please go to Q22

Q21 Please indicate your views on facilities in general on the SPEY provided for paddle sports

	Very Poor	Poor	Average	Good	Excellent
River Information	☐	☐	☐	☐	☐
Accommodation/Area Information	☐	☐	☐	☐	☐
Changing Facilities	☐	☐	☐	☐	☐
Parking Facilities	☐	☐	☐	☐	☐
Adjacent Camp Sites	☐	☐	☐	☐	☐
Convenient Food and Accommodation	☐	☐	☐	☐	☐
Rental of Equipment	☐	☐	☐	☐	☐
Instruction/Guiding	☐	☐	☐	☐	☐

Q22 Please indicate the frequency of types of interaction with anglers in SCOTLAND e.g. You may experience "Personal Conflict" in "less than 10%" of encounters but experience an "Exchange of Pleasantaries" between 30% and 70% of encounters. Please tick one box per row.

	0%	Less than 10%	10%-30%	30% to 70%	More than 70%
Exchange of pleasantaries	☐	☐	☑	☐	☐
Avoidance Action	☐	☐	☐	☑	☐
Personal Conflict	☑	☐	☐	☐	☐

If you have not paddled the Spey please go to Q24

Q23 Please indicate the frequency of types of interaction with anglers on the SPEY. Please tick one box per row.

	0%	Less than 10%	10%-30%	30% to 70%	More than 70%
Exchange of pleasantaries	☐	☐	☐	☐	☐
Avoidance Action	☐	☐	☐	☐	☐
Personal Conflict	☐	☐	☐	☐	☐

Q24 Please describe the effect on your paddling experience in SCOTLAND if there were a hypothetical doubling of the number of participants in each of the activities

	Major -ve	Minor -ve	None	Minor +ve	Major +ve
Paddle Sports	☐	☑	☐	☐	☐
Walkers	☐	☐	☑	☐	☐
Anglers	☑	☐	☐	☐	☐

If you have not paddled the Spey please go to Q26

Q25 Please describe the effect on your paddling experience on the SPEY if there were a hypothetical doubling of the number of participants in each of the activities

	Major -ve	Minor -ve	None	Minor +ve	Major +ve
Paddle Sports	☐	☐	☐	☐	☐
Walkers	☐	☐	☐	☐	☐
Anglers	☐	☐	☐	☐	☐

Q26 Please use this space to comment on anything that might be done to improve the paddling experience on Scottish Rivers and encourage more visitors.

Better guidance on the SEPA river flow website for each river to allow more accurate prediction of levels.
Better surf report website for Scottish beaches

Thank you for Your Assistance

A8.1 OBSERVATION REPORT

Introduction
The audit trip was specified in the original document with the intention of providing a detailed description of the river. In the light of information on previous SNH work the objectives were modified to the following
"The down river trip is intended to complement the main analysis of the effect of recreational activity on the River Spey on river based wildlife specified as important to SNH to maintain species diversity. Three visually obvious impacts can be identified

a) Pollution in both solid and fluid form
b) Work on the banks that affects direction and flow e.g. stone works intended to create quiet pools or deepen th river
c) Damage to the river bank and bottom causes by entry and exit of both paddlers and anglers
d)

The survey will seek to identify the size and location of the largest of these i.e. those that are clearly obvious from the river. The incidence can then be matched with the analysis to give a measure of the problems at current levels of recreational river use and at any likely projected levels"

Interaction
The trip was undertaken by kayak and consequently gives a paddlers view of the river and its surrounds. The weather was excellent and consequently most of the fishing beats were occupied. Although there were no points of conflict and a good deal of friendly communication, some anglers clearly thought that "they owned the river" and resented the presence of paddlers. The bridge building work of Dave Craig and Tim Walker on the canoeing side and Sandy Main and his colleagues amongst the ghillies is to be strongly welcomed. Whilst relationships here have undoubtedly improved there is clearly still work to be done amongst some of the clients perhaps more familiar with the exclusivity of English rivers. This will become even more necessary as the Access Act removes exclusivity from the land. If anglers and paddlers understand the right of responsible access then unpleasant incidents that mar the enjoyment of all can be avoided.

Kingussie to Aviemore
The access used was easy although parking was limited. There was no sign of damage to the bank. The river is placid and the environment tranquil. The A9 bridge is a significant negative feature with a number of reinforced concrete blocks, broken and unbroken underneath the bridge.

After the bridge the river winds through the Insh marshes, which are an RSPB reserve. As might be expected there is extensive birdlife and an otter (with fish) was seen. There is some flood based detritus caught on the banks but the general impression was of an incredibly clean river.

The waterside development at the watersport centre on Loch Insh is a prominent feature but the design and setting does not detract from the environment.

The river from Loch Insh is faster and there are no visual imperfections until Aviemore is reached. Here there are rock reinforcements on the river bank to resist flooding to the caravan park. These impede access to the river and are visually unattractive.

Egress was under the second bridge into a large car park by an Inn and Bunkhouse. This was the only location where there was obvious and significant damage to the riverbank The Aviemore camp site was only a short walk from the car park but there is no secure place for canoes.

Aviemore to Boat of Bailliefurth
Some limited litter was observed in the immediate environs of Aviemore but after that there was a total absence of litter, blown or dropped. The bankworks were limited and there were relatively few anglers.

The campsite at Boat of Bailliefurth (fig 3) was ideal; small, unobtrusive but adequate with a toilet and hot water.

Boat of Bailliefurth to Blacksboat
On this section there are a number of white-water sections and increasing numbers of anglers. A number of groynes and bank reinforcement are obvious. Normally these are unobtrusive but in the Dular area the estate had built a semicircular groyne opposite existing groynes, effectively narrowing and channelling the water. The purpose of this development was not clear. Just down river the normal open rock defence had been replaced by square gabions. There would appear to be a benefit of these as an angling platform but clearly they are more obtrusive in environmental terms and as the netting ages may become unsightly.

A very positive feature of the Tulchan estate was a long walkway (1.5km) on the west side of the river that protects and enhances the river-side. It is unclear how the estate will react if the general public start to use the path under the Access legislation.

Blacksboat Rapid offers a short but exciting drop. It became clear here that the Spey Descent would not normally be a suitable trip for the elderly.

The minimum facility campsite at Blacksboat Station is just that. There are no toilets and none in the area. If numbers on the Speyside Way and river increase then some sanitation will be essential.

Blacksboat to Craigellachie

This is a stunning stretch of water that includes the Knockando Rapids. At Knockando the path used by the canoeists is steep and muddy and could do with improvement. The valley itself is heavily wooded and/or steeply sided at times and the river environment is impeccable until Aberlour. At this point there is some slight urbanisation, some bank damage from cutting a path and an ugly, unpleasant outfall.

The campsite at the Speyside Rangers HQ at Craigellachie is convenient and beautiful Like virtually everything on the river, the site and the adjacent park and toilets were remarkably clean.

Craigellachie to Spey Bay

Craigellachie to Fochabers is similar to the river from Granton, fast and beautiful, with some sharp little rapids that can easily catch unwary paddlers and deposit them into the

river. Again the ghillies maintain the river and banks with a care one associates with the best gardeners.

The final stretch from Fochabers to Spey Bay is flat through sand. It is the only location where serious bank erosion was visible. At one point a fence is suspended high above the river, where a bend has eroded a high bank/sand cliff. Even in this area, subject to strong winds from and along the shore there was no litter.

Conclusions

The river is clean and tranquil throughout its length. Some cosmetic work in the Insh Marches, at the A9 bridge and at the Aberlour outfall would be desirable. In addtion there needs to be some bank protection work at the access points at Aviemore and Knockando and possibly some precautionary work at Ballindalloch. Any other development however needs to be managed with extraordinary caution.

In the past the estate system acted as a conservative force, preserving both environment and fish stocks and providing a ghillie system that maintains the river and its banks. It is to be hoped that financial pressures do not have an adverse effect on the system.

A9.1 STRATHSPEY STROLLER BUS SERVICE

Service 500

Bus Times - Saturday & Sunday

CULLEN (Square)	0810
Portknockie	0817
Findochty	0825
Buckie (East Church Street)	0835
Portgordon	0841
Spey Bay (Tugnet Ice House)	0855
Fochabers (Square)	0905
Mosstodloch	0910
Lhanbryde	0915
Elgin Bus Station (Arr)	0925
Elgin Bus Station (Dep)	0930
Rothes	0950
Craigellachie (Hotel)	0955
Dufftown Station/Glenfiddich Distillery	0959
Dufftown Square	1001
Glenfiddich Distillery/Dufftown Station	1003
Craigellachie (Filling Station)	1011
Aberlour (Square)	1015
Grantown (Square)	1055
Boat of Garten	1120
AVIEMORE (Station)	1135
CAIRNGORM (Mountain Railway)	1155
CAIRNGORM (Mountain Railway)	1527
AVIEMORE (Station)	1545
Boat of Garten	1600
Grantown (Square)	1625
Aberlour (Square)	1705
Craigellachie (Filling Station)	1710
Glenfiddich Distillery/Dufftown Station	1716
Dufftown (Square)	1718
Dufftown Station/Glenfiddich Distillery	1720
Craigellachie (Hotel)	1730
Rothes	1735
Elgin Bus Station (Arr)	1755
Elgin Bus Station (Dep)	1800
Lhanbryde	1810
Mosstodloch	1815
Fochabers (Square)	1820
Spey Bay (Tugnet Ice House)	1830
Portgordon	1840
Buckie (East Church Street)	1846
Findochty	1850
Portknockie	1858
CULLEN (Square)	1905

A9.2 NATIONAL SCENIC AREAS

"National Scenic Areas are areas of land and water which represent the very best of Scotland's renowned scenery. They are of such outstanding natural beauty and amenity that they should be safeguarded and enhanced as part of the national heritage. Within them, the aim is to manage change arising from development and land management decisions consistent with this purpose, while allowing for the social and economic needs of communities. If any proposed change is inescapably in conflict with the underlying purpose of the designation, priority must be given to the long-term conservation of the scenic qualities for which the area has been designated." (SNH 1999)

Originally promoted as an alternative to National Parks and focused on the most spectacular of the mountain areas (Loch Lomond, Cairngorm, Glencoe, Torridon) the objective now is to apply the designation to more types of scenery which have outstanding qualities. It is believed that the Middle and Lower Spey is one such area (as is much of the Dee).

Boundaries are clearly an issue here as they were with the National Park. The national Park forms the southern boundary, and the sea the northern boundary. The problem lie with the width and whether to include areas like Ben Rinnes and Dufftown. The key requirement is a central management plan, which in the case of the Spey largely exists in the form of the Spey Catchment Management Plan.