

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 factor⁷. 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's 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.

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 type⁸. 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. It 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 survey¹⁰	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

	<i>postal</i>	<i>on site</i>
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 of 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 origins.

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
310	256	284	466	91	6	0	7	453
9%	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.