A CONSERVATION AUDIT OF FISH SPECIES IN TRIBUTARIES OF NORTHUMBRIAN WATER RESERVOIRS

2004-2006

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CONTENTS

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INTRODUCTION

Northumbrian Water has responsibility for 23 reservoirs of varying sizes in northeastern England. Information on "major" species (i.e. species of interest to anglers) within the reservoirs is already available from the Northumbrian Water rangers and reports by anglers. For most reservoirs, however, there is little or no information on "minor" species in small tributaries and, to a lesser extent, in the main inflow and outflow streams/rivers. These minor species include fish rarely caught by anglers and some of them such as the bullhead (*Cottus gobio* L.) and the brook lamprey (*Lampetra planeri* Bloch) are of conservation interest (Boon *et al*. 1992, Maitland 2004).

It would, therefore, be useful to make an audit of fish species in a representative selection of small tributaries (plus, possibly, the inflow and outflow streams) for each reservoir.

METHODS & EQUIPMENT

The reservoirs can be conveniently separated into six geographical groups (Table 1) and the sampling was scheduled to take place over a period of five years, covering three to six reservoirs in each year during a working week early in May. This time was selected as a time of year when temperatures are high enough to facilitate efficient electrofishing but water temperatures are not likely to be so high as to cause stress to the fish. It was assumed that each reservoir would, on average, take one day. In practice, it was occasionally possible to complete two reservoirs in one day and the whole programme was completed in May 2006.

At small reservoirs it was usually possible to cover all tributaries large enough to contain fish, plus the inflow and outflow. At larger reservoirs it was sometimes only possible to fish a representative selection of streams.

Fishing was normally confined to reaches actually owned by Northumbrian Water and sampling stations were usually reached by walking round each reservoir margin. The position of sampling sites was defined by means of National Grid references, to eight figures when suitable maps were available, otherwise to six figures.

Generally, each sampling reach was measured (length and mean width) and was given a single upstream fishing. As a rule, all fish caught were identified to species, measured and released. Identification and nomenclature follow Maitland (2004).
This procedure gave a species list for each sampling reach and usually a minimum estimate of population density for each species.

Records were also kept of any crayfish, newts or *Ephemera danica* seen.

The electrofishing equipment was a "Deka" lightweight (5.5 kg) set powered by a 6.5 ampère-hour, 12 volt, sealed lead/acid battery operating at c. 2.0 amps. The output was pulsed DC at 80 cycles sec^{-1} and 220 volts. The equipment was fitted with a "dead man's switch" and an external emergency "stop" button.

EXISTING DATA

Suitable species lists already exist for Cow Green Reservoir because this water body and its tributaries were the subject of a long-term study of fish populations by the FBA/IFE during the period 1967 – 1980 and the results have been published (Crisp, 1984; Crisp, Mann

& Cubby, 1984; Crisp, Mann, Cubby & Robson, 1990; Crisp & Mann, 1991 – see Appendix II).

During March 1997 three tributaries of Derwent Reservoir and two sites downstream were electrofished for Northumbrian Water as part of a study on feral rainbow trout. Similarly, two stations at Burnhope reservoir were examined.

Fish census work was carried out at Kielder/Bakethin before impoundment (Ottaway, 1979, unpublished) and after (Haile, 1992, 1996, unpublished). Retrieval of the data facilitated creation of a species list without the need for further major fieldwork.

This information is summarised in Appendices I & II and Tables a – d.

THE RESERVOIRS

The reservoirs are listed in Table 2. They vary in area from 8.2 ha (Airy Holm header pond) to 1093 ha (Kielder Water) and in altitude from 105 m.O.D. (Whittle Dene) to 449 m.O.D. (Cow Green).

THE FISH SPECIES

The fish species recorded are listed in Table 3 together with abbreviations used in some of the species lists.

NEW INFORMATION FROM INDIVIDUAL RESERVOIRS

This section consists of a brief verbal statement about each reservoir together with tables for each reservoir, giving details of individual stations and minimum fish population densities. More detailed descriptions of individual stations are given in Appendix III and more details of the fish examined are in Appendix IV.

1. Grassholme

Visited on 3 May 2004. Seven stations were electrofished. Six fish species were recorded and details of their distributions together with minimum estimates of their population densities are given in Table 4. Numerous newly emerged salmonid fry (brown trout?) were seen at Station 4.

2. Selset

Visited on 4 May 2004 and seven stations were electrofished whilst a further station (St 8) was fished on 17 August 2005. Four fish species were recorded (Table 5).

3. Balderhead

Seven stations were visited on 5 May 2004 but two (Stations 3 and 5) were found not to be safely accessible and safety considerations led to some of the others being fished away from the reservoir margins and close to Northumbrian Water boundary. See Table 6 and Appendix III for details. Three fish species were recorded (Table 6).

4. Blackton

On 6 May 2004 six stations were electrofished and three fish species were recorded (Table 7).

5. Hury

Six stations were sampled on 7 May 2004 and five fish species were recorded in tributaries and the downstream river (Table 8).

6. Scaling Dam

Two stations were visited on 8 May 2004. Station 1 was the main inflow and no fish and very few invertebrates were found in the lowermost parts of the stream itself. No fish but good numbers of invertebrates were seen at the reservoir margin. Station 2 was the outflow beside the old pumping station. Very large numbers of small fish were seen there and a subsample of several dozen was examined but not measured. All were three-spined sticklebacks (Table 9).

7. Lockwood Beck

One station sampled on 8 May 2004. There are no other inflows of significant size and the outflow is of such a nature as to be unlikely to harbour fish on a long-term basis. See Table 10 for details of species and minimum
population densities. Recently emerged salmonid fry (brown trout?) present.

8. Burnhope

On 18 March 1997 the outflow and main inflow (Burnhope Burn) were electrofished. Only brown trout were found in the outflow. The inflow was difficult to fish due to high water levels but a sample of eleven 0-group trout was collected. Ten were brown trout and the other was a rainbow trout (see Appendix I).

On 2 May 2005 a total of six stations was electrofished, including the inflow (Station 1) and the outflow (Station 6). Four fish species were recorded (Table 11).

9. Tunstall

Four stations were fished on 3 May 2005 and seven fish species recorded (Table 12). A major tributary by the car park lies outside the Northumbrian Water boundary and was not fished. The two lampreys were both adult brook lampreys.

10. Waskerley

Eight stations were visited on 4 May 2005 but fish (two species) were found in only three of them (Table 13).

11. Smiddy Shaw

Three stations were sampled on 4 May 2005. A single fish species was found in one of them (Table 14).

12. Hisehope

Visited on 5 May 2005 and four stations were fished but no fish seen or caught (Table15).

13. Airy Holm

Visited on 5 May 2005. Three stations were fished, two of them little more than drains. Fish (three species) were found only in the outflow. See Table 16.

14. Derwent

Five stations were electrofished on 19 March 1997 (see Appendix I) and these are designated “1A” to “5A”. Six additional stations were fished on 6 May 2005 and, combining the results from 1997 and 2005, a total of five species was recorded (Table 17).

15. Whittle Dene

Five stations were electrofished on 1 May 2006. Two additional streams shown on the maps were examined but found to be ditches with ephemeral flow. A total of five species was recorded (Table 18).

16. Hallington

Two stations were electrofished on 2 May 2006. Two other sites were visited but one was dry and the other was a man-made channel. A total of two species was recorded (Table 19).

17. Colt Crag

Three stations were electrofished on 3 May. The outflow was not fished as it was less than 1 km upstream of Station 1 at Little Swinburn, which was fished. Four species were recorded (Table 20).

18. Little Swinburne

One station was electrofished on 3 May 2006. The outflow was a deep, engineered channel and was not fished. A further "inflow" was examined but found to be a small ditch. A total of three species was recorded (Table 21).

19. Fontburn

Five stations were electrofished on 4 May 2006 and five species were found (Table 22).

20. Catcleugh

Four stations were electrofished on 5 May 2006 and six species were seen (Table 23). A further site was examined and found to be only a ditch.

SPECIES DISTRIBUTION SUMMARY

The data from individual reservoirs are brought together in Table 24.

OTHER OBSERVATIONS

Electrofishing is a useful method of detecting groups other than fish. Newts are prone to capture by electrofishing and some groups of invertebrates such as crayfish and the large burrowing mayfly larva (*Ephemera danica*) can often be detected during electrofishing even though they may be missed by standard sampling methods for stream invertebrates.

Up to the end of 2006 sampling no crayfish were seen. *Ephemera danica* (Müller) nymphs were seen at Tunstall (Station 3), Derwent (Station 5), Whittle Dene (Station 3) and Catcleugh (Station 2). Palmate newts (*Triturus helveticus* Razoumoski) were seen at Waskerley (Station 1) and Hisehope (Station 2).

DISCUSSION AND CONCLUSIONS

Table 24 is presented in due order in the Tables section but is repeated overleaf for convenience.

1. Distribution and identification of species.

A total of eleven species was recorded (Tables 3 & 24).

Brown trout (*Salmo trutta*), stone loach (*Neomacheilus barbatulus*), bullhead (*Cottus gobio*), minnow (*Phoxinus phoxinus*) and three-spined stickleback (*Gasterosteus aculeatus*) occurred at a large proportion of the reservoirs (45 to 82%) and covered most of the observed

altitudinal range. A *Salmo trutta* pre-smolt of 12.0 cm length was found at Derwent Station 6 on 5 May 2005. The dam there was closed in 1966 and there is no fish pass. This implies that the tendency to smolt has been retained by the resident trout population for some 40 years. Similarly, a run of trout smolts occurs in Kielder Burn each spring (Peter Gray, pers. comm.).

Juvenile Atlantic salmon (*Salmo salar*) were found downstream of Grassholme, Kielder and Catcleugh reservoirs but not upstream. This might be expected because none of these reservoirs has an effective fish pass and the only way juvenile salmon could, therefore, appear upstream of a dam would be as a result of escapes from hatcheries (see Appendix I) or of deliberate introduction.

The rainbow trout (*Oncorhynchus mykiss*) is an alien species which is extensively stocked in reservoir fisheries and is adept at escaping downstream. Juveniles, almost certainly produced as a result of escapees or their progeny breeding in the wild, were found at four reservoirs.

The grayling (*Thymallus thymallus*) is included in the list on the basis of a single juvenile seen in Carl Beck and of the known occurrence of the species in the River Lune downstream of Grassholme Reservoir.

The European eel (*Anguilla anguilla*) was found at only three reservoirs and only downstream of the dam at two of them. Although eels can travel over damp ground, it is likely that the dams are a substantial obstacle to the upstream movement of elvers.

Britain has three species of lamprey. The sea lamprey (*Petromyzon marinus*) whose ammocete larvae live in sandy silt deposits in rivers for 2 – 5 years and then migrate to sea. The adults return to freshwater to spawn (Maitland, 2004). The river lamprey (*Lampetra fluvialitis*) has a similar life cycle to the sea lamprey. There are several purely freshwater populations in Europe but the only one known in Britain is in Loch Lomond (Maitland, 2004). The brook lamprey (*Lampetra planeri*) spends the whole of its life in freshwater and is the smallest of three species. In the present study both adults (Derwent, Tunstall, Kielder, and Fontburn) and ammocete larvae (Derwent, Catcleugh) were found. The adults were positively identified as brook lampreys (Maitland, 2004) and the ammocetes are almost certainly the same species on the grounds of both size (all within the range 3.1 to 9.7 cm) and the fact that the dams will prevent access by adult sea and river lampreys.

The gudgeon (*Gobio gobio*) was found only at the inflow of Tunstall reservoir. This is a common and widespread lowland species but would not be expected at this location. It is almost certainly there as an introduced species, possibly as a result of an angler discarding unwanted live bait.

In reservoirs such as Hury, Lockwood Beck, Whittle Dene and Hallington, where coarse fish are known to be present, occasional incursions to the tributaries by such species as perch (*Perca fluviatilis* L.) and roach (*Rutilus rutilus* (L)) might be expected, but none were found during the present survey.

2. Conservation status of each species.

The conservation status of British freshwater organisms has been summarized and discussed by Boon, Morgan & Palmer (1992) and Boon & Lee (2005). It is worth noting that the palmate newt (see pp 6 & 7) was given some protection under the Wildlife and Countryside Act 1981.

There are three main enactments that give protection to some fish species (Boon *et al*., 1992). They are the Wildlife and Countryside Act (as reviewed in 1992) (= WCA), the EC Habitats and Species Directorate (Annexes IV and V) (= EC) and the Bern Convention (Appendices I-III) (= Bern). These give protection to the brook lamprey (EC V), grayling (EC V, Bern III) and Atlantic salmon (EC V, Bern III).

Maitland (2004) gives a more detailed summary for individual fish species and his comments on the eleven species listed in Tables 3 and 24 are summarized below.

a) The rainbow trout (*Oncorhynchus mykiss*) is an alien species that requires no conservation measures in Britain.

b) The stone loach (*Neomacheilus barbatulus*), minnow (*Phoxinus phoxinus*), three-spined stickleback (*Gasterosteus aculeatus*) and gudgeon (*Gobio gobio*) are all classed as "common" or "relatively common" and in no need of protection in Britain.

c) The brown trout (*Salmo trutta*). Maitland comments that this is one of Britain's commonest native species and that there are no national conservation measures. There is, however, some concern about the conservation of isolated genetic stocks and such stocks could occur upstream of some of Northumbrian Water reservoirs where there has been little or no artificial stocking (e.g. Balderhead, Cow Green).

d) The European eel (*Anguilla anguilla*). Although there are at present no conservation measures, this species appears to be in decline throughout Europe and it may well receive protection in the future.

e) The Atlantic salmon (*Salmo salar*) is protected by various pieces of British legislation and also by Annexes II a and V a of the EC Habitat and Species Directive and by Appendix III of the Bern Convention.

f) The grayling (*Thymallus thymallus*) is listed in Annex Va of the EC Habitat and Species Directive and in Appendix III of the Bern Convention.

g) The bullhead (*Cottus gobio*) is a common British species but is in decline in parts of Europe and is listed in Annex IIa of the EC Habitat and Species Directive.

h) The brook lamprey (*Lampetra planeri*) is in decline and is listed in Annex II a of the EC Habitat and Species Directive and in Appendix III of the Bern Convention.

3. Information on habitat requirements and monitoring.

For Atlantic salmon, bullhead and brook lamprey, guidance on monitoring and ecological requirements have been developed in support of the European Commission's LIFE Nature Programme. Hendry & Cragg-Hine (2003) and Cowx & Fraser ((2003) cover the ecology and monitoring, respectively, of the Atlantic salmon. The corresponding works for bullhead are Tomlinson & Perrow (2003) and Cowx & Harvey (2003) and for the brook lamprey are Maitland (2003) and Harvey & Cowx (2003).

Flow, habitat and water quality requirements for Atlantic salmon are summarized by Hendry & Cragg-Hine (2003) and covered in more detail by Crisp (2000) and will be discussed below.

Ecological requirements of the bullhead are similar to those for brown trout and the main threats to them arise from pollution, habitat deterioration as a result of engineering and failure to re-introduce bullheads after fish kills (Tomlinson & Perrow, 2003).

Adult brook lampreys require fine gravel for spawning whilst the requirements of the eggs for shelter and oxygen are likely to be similar to those for brown trout (see Crisp, 2000 for brown trout requirements). The larvae require beds of mud, silt or silt and sand but are sensitive to low oxygen concentrations and to pollution (Maitland, 2003). The main threats listed by Maitland are pollution, disturbance by engineering works, deposition of fine silt, eutrophication and obstructions that hinder movements to the spawning areas.

It is worth noting that lampreys really require specialised sampling methods (Cowx & Harvey (2003) but in the present survey they were caught by standard electrofishing methods. The sampling time in early May is a good time in which to find adult lampreys. Nevertheless, brook lampreys may be more widespread in the tributaries of Northumbrian Water reservoirs than Table 24 suggests.

4. Fish conservation with special reference to Northumbrian Water reservoirs.

a) Reservoirs in whose tributaries fish were absent or scarce.

Four stations were fished at Hisehope Reservoir but no fish were seen. At the main inflow (Station 1) numerous dead earthworms and the scarcity or absence of aquatic

invertebrates suggest a water quality problem. This could arise from periodic pollution from agriculture (e.g. sheep dip) or old mine spoil, or a problem of acid inputs. Water analyses might give some indication of the cause(s). At Smiddy Shaw Reservoir three stations were fished and a single brown trout was found in one of them. The other two stations were not likely to have supported much by way of fish but invertebrates were seen at both. Eight stations were fished at Waskerley Reservoir and three of them contained fish representing two species (brown trout and minnow).

Hisehope Reservoir is, apparently, known as a fishless body of water whereas Waskerley reservoir clearly supports sufficient game fish as to be a viable fishery. The general paucity of fish populations in the tributaries of the whole of this system is puzzling but probably reflects some aspect of water quality.

b) Atlantic salmon.

This species occurs only downstream of several of the reservoirs. Its welfare in these places may be influenced by aspects of reservoir operation. The following are, perhaps, most important.

(i) Large falls in downstream water level during the intragravel life (i.e. October-May/June) could lead to exposure of the young stages to drying-out or freezing.

(ii) Instream engineering works, or release of suspended solids from scour valves could lead to silting of redds and, hence, damage to young stages.

(iii) Changes in downstream water temperature as a result of impoundment could influence incubation, growth rate or, even, survival of young stages. The precise effects, if any, will be site specific.

c) Bullhead.

There is a requirement for clean water and a stony substratum. The main potential threats arise from pollution (sheep dip, silage liquor, slurry) and from siltation (land use effects). Such threats will not usually arise on Northumbrian Water land but could come from agricultural and engineering activities upstream and outwith NW property.

d) Brook lamprey.

The main threats, again, hinge upon pollution, silt deposition and engineering works. It is worth noting that the ammocete larvae live in beds of fine gravel/sand/silt that often occur at the sides of the main stream flow. Attempts to "clean-up" such deposits should be resisted.

e) General comments.

For all of the above species the main conservation requirement is the maintenance of suitable water quality, water flow and habitat and, for these purposes, "water quality" includes fine suspended solids and temperature. The main threats are from agriculture and instream engineering. Some tributaries of Whittle Dene, Hallington and Colt Cragg Reservoirs appeared to contain large amounts of fine silt. These problems may emanate from outwith stream sections that are controlled by Northumbrian Water. The best way of mitigating these threats is likely to be through a programme of education aimed at Northumbrian Water staff and at owners of adjacent land whose operations might affect streams within Northumbrian Water boundaries.

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TABLE 1. Reservoirs listed in six geographical regions together with the year in which each group was surveyed.

GROUP	YEAR	RESERVOIRS
1	2004	Scaling Dam, Lockwood Beck.
2	2004	Grassholme, Selset, Balderhead, Blackton, Hury
3	2005	(Cow Green), Burnhope
4	2005	Derwent, Airy Holm, Hisehope, Smiddyshaw, Waskerley, Tunstall
5	2006	Colt Crag, Little Swinburne, E & W Hallington, Whittle Dene
6	2006	(Kielder, Bakethin), Fontburn, Catcleugh

TABLE 2. Details of the reservoirs (provided by Northumbrian Water).

RESERVOIR	NAT. GRID REF.	AREA (ha)	ALTITUDE (m.O.D.)
Scaling Dam	NZ/745127	49	179
Lockwood Beck	NZ/670138	14	180
Grassholme	NY/947228	57	275
Selset	NY/919212	111	316
Balderhead	NY/928183	117	335
Blackton	NY/942185	26	282
Hury	NY/960139	50	264
Cow Green	NY/813289	312	449
Burnhope	NY/847390	43	398
Derwent	NZ/024513	405	225
Airy Holm	NZ/037540	8.2	210
Hisehope	NZ/022465	8.8	340
Smiddyshaw	NZ/043463	24	320
Waskerley	NZ/022442	26	355
Tunstall	NZ/066410	27	230
Colt Crag	NY/935783	86	205
Little Swinburne	NY/945773	3.5	205
E & W Hallington	NY/970763	132	155
Whittle Dene	NZ/065680	32	105
Kielder	NY/690880	1093	205
Bakethin	NY/635915	63	205
Fontburn	NZ/045935	35	190
Catcleugh	NT/735034	100	260

TABLE 3. List of fish species, their common names and abbreviations used in the summary table. Nomenclature follows Maitland (2004).

SPECIES	COMMON NAME	ABBREVIATION
Salmo salar L.	Atlantic salmon	S
Salmo trutta L.	brown trout, sea trout	BT
Oncorhynchus mykiss (Walbaum)	rainbow trout	RT
Thymallus thymallus (L.)	grayling	Gr
Barbatula barbatula (L.)	stone loach	L
Anguilla anguilla (L.)	eel	E
Cottus gobio L.	bullhead	B
Lampetra planeri (Bloch)	brook lamprey	BL
Phoxinus phoxinus (L.)	minnow	M
Gasterosteus aculeatus L.	three-spined stickleback	SB
Gobio gobio (L.)	gudgeon	Gu

TABLE 4a. Sampling stations at Grassholme Reservoir on 3 May 2004.

STATION	Nat. Grid. Ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1.	NY/9362 2244	30.0	0.06	18.0
2.	NY/9311 2202	45.0	0.90	40.5
3.	NY/9291 2173	28.5	0.50	14.2
4.	NY/9268 2131	40.0	1.40	56.0
5.	NY/9307 2156	35.0	0.50	17.5
6.	NY/9385 2215	20.0	0.90	18.0
7.	NY/9439 2231	17.0	0.80	13.6

TABLE 4b. Distribution and minimum population densities (number m^{-2}) of six fish species in tributaries of Grassholme Reservoir.
BT = brown trout, RT = rainbow trout, L = stone loach, B = bullhead, M= minnow, SB = three-spined stickleback

SPECIES	BT	RT	L	B	M	SB
STATION						
1.	0.11	-	0.06	0.36	-	0.06
2.	0.32	-	0.02	0.25	0.07	0.05
3.	0.21	-	0.07	0.50	-	-
4.	0.25	0.02	0.20	0.02	0.04	0.14
5.	0.17	-	-	-	-	-
6.	0.78	-	0.44	0.44	-	-
7.	0.22	-	-	1.40	-	-

TABLE 5a. Sampling stations at Selset Reservoir on 4 May 2004 (Sts 1-7) and 17 August 2005 (St 8).

STATION	Nat. grid ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1.	NY/9169 2061	24.0	0.4	9.6
2.	NY/9092 2073	41.5	0.6	24.9
3.	NY/9010 2067	31.0	2.0	62.0
4.	NY/9007 2065	23.0	2.0	46.0
5.	NY/9006 2068	31.0	1.2	37.2
6.	NY/9005 2148	36.0	2.5	90.0
7.	NY/8987 2145	15.0	1.0	15.0
8.	NY/8890 2115	8.0	1.5	12.0

TABLE 5b. Distribution and minimum population densities (number m^{-2}) of four fish species in tributaries of Selset reservoir.
BT = brown trout, L = stone loach, B = bullhead, M = minnow.

SPECIES	BT	L	B	M
STATION				
1.	-	-	-	-
2.	0.08	-	-	-
3.	0.06	0.02	-	-
4.	-	0.02	0.11	-
5.	-	-	-	-
6.	-	-	-	-
7.	0.20	0.20	0.93	-
8.	-	0.17	0.25	0.92

TABLE 6a. Sampling stations at Balderhead Reservoir on 5 May 2004.

STATION	Nat. Grid Ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1.	NY/9229 1774	39.0	0.4	15.6
2.	NY/9199 1800	28.0	1.1	30.8
3.	NY/9100 1828	NA	NA	NA
4.	NY/9180 1893	22.0	0.5	11.0
5.	NY/9135 1892	NA	NA	NA
6.	NY/9028 1873	26.0	1.2	31.2
7.	NY/8993 1816	22.0	5.0	110.0

TABLE 6b. Distribution and minimum population density (number m^{-2}) of three fish species at Balderhead reservoir. Note that Station 7 is the River Balder at the head of the reservoir.
BT = brown trout, L = stone loach, M = minnow.

SPECIES	BT	L	M
STATION			
1.	-	-	-
2.	-	-	-
3.			
4.	-	-	0.18
5.			
6.	-	-	-
7.	0.05	0.01	0.11

TABLE 7a. Sampling stations at Blackton Reservoir on 6 May 2004.

STATION		Nat. Grid Ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1.		NY/9313 1825	10.0	1.5	15.0
2.	(i)	NY/9333 1813	9.0	5.0	45.0
	(ii)	NY/9336 1822	6.0	6.0	36.0
3.		NY/9372 1808	34.0	1.8	61.2
4.		NY/9400 1827	20.0	0.7	14.0
5.		NY/9371 1840	32.0	0.4	12.8
6.		NY/9403 1871	30.0	0.7	21.0

TABLE 7b. Distribution and minimum densities (number m^{-2}) in tributaries of Blackton Reservoir. Small rainbow trout have been seen at Station 2 on past occasions. BT = brown trout, L = stone loach, M = minnow.

SPECIES	BT	L	M
STATION			
1.	0.13	0.07	0.67
2.	0.05	0.06	0.06
3.	0.07	0.03	-
4.	-	-	-
5.	-	-	-
6.	0.19	-	-

TABLE 8a. Sampling stations at Hury Reservoir on 7 May 2004.

STATION	Nat. Grid Ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1.	NY/9492 1867	40.0	1.2	48.0
2.	NY/9510 1932	35.0	2.0	70.0
3.	NY/9535 1934	8.0	0.4	3.2
4.	NY/9576 1954	29.0	1.4	40.6
5.	NY/9556 1894	10.0	0.5	5.0
6.	NY/9683 1957	-	-	c.45.0

TABLE 8b. Distribution and minimum population densities (number m^{-2}) of five fish species in five tributaries of Hury Reservoir. Note that Station 6 was part of the downstream River Balder and opportunist fishing on the margins of the stilling pool. For this station a selection of each species found was measured. BT = brown trout, L = stone loach, B = bullhead, M = minnow, SB = three-spined stickleback.

SPECIES	BT	L	B	M	SB
STATION					
1.	0.25	-	-	-	-
2.	0.07	0.13	0.06	0.03	0.06
3.	0.31	-	-	-	-
4.	0.12	0.07	0.17		-
5.	-	-	-	-	-
6.	+	+	+	+	+

Note: Rainbow trout can be added to the list for Station 6, on the basis of Environment Agency observations.

TABLE 9a. Sampling stations at Scaling Dam on 8 May 2004.

STATION	Nat. Grid Ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1.	NZ/7409 1203	30.0	2.0	60.0
2.	NZ/7488 1289	-	-	-

TABLE 9b. Fish species recorded at Scaling Dam on 8 May 2004.
SB = three-spined stickleback.

SPECIES	SB
STATION	
2.	+

TABLE 10a. Sampling station at Lockwood Beck Reservoir on 8 May 2004.

STATION	Nat. Grid ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1.	NZ/6687 1357	33.0	1.2	39.6

TABLE 10b. Minimum population densities of two fish species (number m^{-2}) at Lockwood Beck Reservoir on 8 May 2004.
BT = brown trout, M = minnow

SPECIES	BT	M
STATION		
1.	0.43	0.23

TABLE 11a. Sampling stations at Burnhope Reservoir on 2 May 2005.

Station	Nat. Grid ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1*	NY/8315 3873	20 & 29	1.0 & 3.5	121.5
2.	NY/8313 3866	19	2.5	47.5
3.	NY/8340 3863	14	1.25	17.5
4.	NY/8394 3861	35	0.90	31.5
5.	NY/8442 3843	26	1.10	28.6
6.	NY/8520 3920	24	4.20	100.8

TABLE 11b. Distribution and minimum population densities (number m^{-2}) of fish species in tributaries of Burnhope Reservoir.
BT = brown trout, L = stone loach, M = minnow.

SPECIES	BT	L	M
STATION			
1.	0.02	<0.01	0.09
2.	0.06	0.08	0.11
3.	0.06	-	-
4.	0.29	-	-
5.	0.07	-	-
6.	0.03	-	-

N.B. A 0-group rainbow trout was caught at Station 2 on 18 March 1997 and is included in Table 50.

TABLE 12a. Sampling stations at Tunstall Reservoir on 3 May 2005.

STATION	Nat. Grid ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1.	NZ/0695 4171	12	0.65	7.8
2.	NZ/0690 4188	15	0.85	12.8
3.	NZ/0675 4196	37	4.20	155.4
4.	NZ/0665 4055	17	5.0	85.0

TABLE 12b. Distribution and minimum population densities (number m^{-2}) of fish species in tributaries of Tunstall Reservoir.
BT = brown trout, L = stone loach, B = bullhead, BL = brook lamprey, M = minnow, SB = three-spined stickleback, Gu = gudgeon.

SPECIES	BT	L	B	BL	M	SB	Gu
STATION							
2.	0.08	-	-	-	-	-	-
3.	-	0.02	0.03	0.01	0.04	<0.01	0.02
4.	0.04	-	0.08	-	-	0.06	-

TABLE 13a. Sampling stations at Waskerley Reservoir on 4 May 2005.

STATION	Nat. Grid ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1.	NZ/0264 4457	31	1.20	37.2
2.	NZ/0265 0445	20	5.55	111.0
3.	NZ/0243 4393	27	1.90	51.3
4.	NZ/0185 4402	23	1.10	25.3
5.	NZ/0151 4396	33	1.40	46.2
6.	NZ/0149 4401	22	0.63	13.9
7.	NZ/0159 4406	25	1.35	33.8
8.	NZ/0174 4419	22	1.05	23.1

TABLE 13b. Distribution and minimum population densities (numbers m^{-2}) of two fish species in tributaries of Waskerley Reservoir.
BT = brown trout, M = minnow

SPECIES	BT	M
STATION		
5.	0.04	-
6.	-	0.07
7.	0.09	0.53

TABLE 14a. Sampling stations at Smiddy Shaw Reservoir on 4 May 2005.

STATION	Nat. Grid ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1*.	NZ/0395 4610	14 & 7	0.55 & 0.5	11.2
2.	NZ/0390 4630	26	1.75	45.5
3.	NZ/0400 4595	27	0.50	13.5

* Two parts of a divided channel were fished.

TABLE 14b. Distribution and minimum population densities (numbers m^{-2}) of one fish species in tributaries of Smiddy Shaw Reservoir.
BT = brown trout.

SPECIES	BT
STATION	
1.	0.09

TABLE 15a. Sampling stations at Hisehope Reservoir on 5 May 2005.

STATION	Nat. Grid ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1.	NZ/0193 4622	49	1.25	61.3
2.	NZ/0245 4625	17	1.50	25.5
3.	NZ/0240 4661	36	0.75	27.0
4.	NZ/0227 4680	38	2.00	76.0

TABLE 15 b. No fish caught.

TABLE 16a. Sampling stations at Airy Holm Reservoir on 5 May 2005.

STATION	Nat. Grid ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1.	NZ/0444 5414	16	1.23	19.7
2.	NZ/0485 5412	17	0.47	8.0
3.	NZ/0482 5380	63	2.95	185.9

TABLE 16b. Distribution and minimum population densities (number m^{-2}) of three fish species at Airy Holm Reservoir on May 5 2005.
L = stone loach, M = minnow, SB = three-spined stickleback.

SPECIES	L	M	SB
STATION			
3.	<0.01	<0.01	0.02

TABLE 17a. Sampling stations at Derwent Reservoir on 19 March 1997 (1A to 5A) and 6 May 2005 (1 to 6).

STATION	Nat. Grid ref. (8 figures)	Length (m)	Mean width (m)	Area (m^2)
1A.	NZ/0065 4926	-	-	-
2A.	NZ/0077 5225	-	-	-
3A.	NZ/0125 5355	-	-	52.4
4A.	NY/9963 5294	-	-	164.9
5A.	NY/9880 5225	-	-	71.5
	NY/9866 5226	-	-	
1.	NY/9830 5132	38	13.0	494.00
2.	NZ/0077 5225	40	0.40	16.0
3.	NZ/0123 5175	61	0.56	34.2
4.	NY/9850 5172	70	0.53	37.1
5.	NZ/0082 5345	73	1.15	84.0
6.	NZ/0251 5265	68	1.72	117.0

TABLE 17b. Distribution and minimum population densities (number m^2) of five fish at Derwent Reservoir in 1997 (1A to 5A) and 6 May 2005 (1 to 6).
BT = brown trout, L = stone loach, B = bullhead, BL = brook lamprey, M = minnow.

SPECIES	BT	L	B	BL	M
STATION					
1A.	+	+	+	+	+
2A.	+	+	+	-	-
3A.	0.99	0.11	-	0.08	-
4A.	0.41	-	-	0.01	-
5A.	0.07	0.23	-	0.01	0.01
1.	<0.01	0.03	-	<0.01	0.02
3.	0.30	-	-	-	-
4.	-	0.16	-	-	-
5.	0.01	0.04	-	0.04	-
6*.	0.02	0.03	-	-	-

N.B. 1. Bullhead found only downstream of the reservoir.
2. All brook lampreys were mature except the one at Station 1 which was an ammocete larva.

* One of the two brown trout at this station was a pre-smolt.

TABLE 18a. Sampling stations at Whittle Dene Reservoirs on 1 May 2006.

STATION	Nat. Grid ref.	Length (m)	Mean width (m)	Area (m^2)
1.	NZ/076 668	10.0	6.0	60.0
2.	NZ/075 668	16.0	0.9	14.4
3.	NZ/060 677	22.0	0.8	17.6
4.	NZ/064 687	12.8	1.4	17.9
5.	NZ/065 688	11.0	1.5	16.5

TABLE 18b. Distribution and minimum population densities (number m^{-2}) of four fish species at Whittle Dene Reservoirs on 1 May 2006.
BT = brown trout, L = stone loach, E = eel, SB = three-spined stickleback.

SPECIES	BT	L	E	SB
STATION				
1.	0.06	0.13	0.03	0.10
2.	0.49	0.07	0.21	0.07
3.	-	-	-	0.57
4.	-	-	-	0.22
5.	-	0.12	-	0.30

TABLE 19a. Sampling stations at Hallington Reservoirs on 2 May 2006.

STATION	Nat. Grid ref.	Length (m)	Mean width (m)	Area (m^2)
1.	NY/9761 7732	17.0	2.9	49.3
2.	NY/9723 7611	17.0	2.5	42.5

TABLE 19b. Distribution and minimum population densities (number m^{-2}) of four fish species at Hallington Reservoirs on 2 May 2006.
BT = brown trout, B = bullhead.

SPECIES	BT	B
STATION		
1.	0.02	0.20
2.	-	-

TABLE 20a. Sampling stations at Colt Crag Reservoir on 3 May 2006.

STATION	Nat. Grid ref.	Length (m)	Mean width (m)	Area (m^2)
1.	NY/942 793	33.0	4.2	138.6
2.	NY/934 788	14.5	1.25	18.1
3.	NY/928 777	21.0	0.30	6.3

TABLE 20b. Distribution and minimum population densities (number m^{-1}) of four fish species at Colt Crag Reservoir on 3 May 2006.
BT = brown trout, B = bullhead, M = minnow, SB = three-spined stickleback

SPECIES	BT	B	M	SB
STATION				
1.	0.02	0.09+	0.07	0.03
2.	0.06	-	-	1.33
3.	-	-	-	0.16

TABLE 21a. Sampling station at Little Swinburne Reservoir on 3 May 2006.

STATION	Nat. Grid ref.	Length (m)	Mean width (m)	Area (m^2)
1.	NY/948 776	31.0	2.1	65.1

TABLE 21b. Distribution and minimum population densities (number m^{-2}) of three fish species at Little Swinburne Reservoir on 3 May 2006.
B = bullhead, M = minnow, SB = three-spined stickleback.

SPECIES	B	M	SB
STATION			
1.	0.05	0.02	0.54

TABLE 22a. Sampling stations at Fontburn Reservoir on 4 May 2006.

STATION	Nat. grid ref.	Length (m)	Mean width (m)	Area (m^2)
1.	NZ/054 937	15.0	7.9	118.5
2.	NZ/0353 9368	16.0	3.8	60.8
3.	NZ/0331 9355	25.0	4.2	105.0
4.	NZ/0332 9341	14.0	0.7	9.8
5.	NZ/0465 9329	7.0	0.7	4.9

TABLE 22b. Distribution and minimum population densities (number m^{-2}) of four fish species at Fontburn Reservoir on 4 May 2006.
BT = brown trout, L = stone loach, E = eel, BL = brook lamprey, M = minnow

SPECIES	BT	L	E	BL	M
STATION					
1.	-	0.11	0.01	0.01	0.03
2.	0.02	0.02	-	0.02	0.12+
3.	0.03	0.02	-	-	0.03
4.	-	-	-	-	0.09+
5.	-	-	-	-	-

N.B. Both brook lampreys were mature.

TABLE 23a. Sampling stations at Catcleugh Reservoir on 5 May 2006.

STATION	Nat. Grid ref.	Length (m)	Mean width (m)	Area (m^2)
1.	NT/752 031	11.0	10.2	112.2
2.	NT/7318 0403	30.2	1.3	39.2
3.	NT/724 042	14.0	5.5	77.0
4.	NT/7305 0278	11.0	3.2	35.2

TABLE 23b. Distribution and minimum population densities (number m^{-2}) of six fish species at Catcleugh Reservoir on 5 May 2006.
S = salmon, BT = brown trout, L = stone loach, BL = brook lamprey, M = minnow, SB = three-spined stickleback.

SPECIES	S	BT	L	BL	M	SB
STATION						
1.	0.02	0.04	0.05	-	0.09	0.01
2.	-	0.05	0.28	0.18	0.20	-
3.	-	0.04	0.06	0.12	0.09	-
4.	-	0.05	0.28	-	0.37	-

TABLE 24. Summary species list for tributaries of Northumbrian Water reservoirs. S = *Salmo salar* (salmon), BT = *Salmo trutta* (brown/sea trout), RT = *Oncorhynchus mykiss* (rainbow trout), Gr = *Thymallus thymallus* (grayling), L = *Noemacheilus barbatulus* (stone loach), E = *Anguilla anguilla* (eel), B = *Cottus gobio* (bullhead), BL = *Lampetra planeri* (brook lamprey), M = *Phoxinus phoxinus* (minnow), SB = *Gasterosteus aculeatus* (three-spined stickleback), Gu = *Gobio gobio* (gudgeon). (+) = present but only recorded downstream of the dam.

SPECIES		**S**	**BT**	**RT**	**Gr**	**L**	**E**	**B**	**BL**	**M**	**SB**	**Gu**	**TOTALS**
RESERVOIR													
Scaling Dam											+		**1**
Lockwood Beck			+							+			**2**
Grassholme		(+)	+	+	(+)	+	(+)	+		+	+		**9 (3)**
Selset			+			+				+			**3**
Balderhead			+			+				+			**3**
Blackton			+	+		+				+			**4**
Hury			+	+		+		+		+	+		**6**
Cow Green			+					+		+			**3**
Burnhope			+	+		+				+			**4**
Derwent			+			+		+	+	+			**5**
Airy Holm						(+)				(+)	+		**3 (3)**
Hisehope													**0**
Smiddyshaw			+										**1**
Waskerley			+							+			**2**
Tunstall			+			+		+	+	+	+	+	**7**
Colt Cragg			+					+		+	+		**4**
Little Swinburn								+		+	+		**3**
E & W Hallington			+					+					**2**
Whittle Dene			(+)			+	(+)	(+)			+		**5 (3)**
Kielder/Bakethin		(+)	+			+	+		+	+	+		**7**
Fontburn			+			+		(+)	+	+			**5 (1)**
Catcleugh		(+)	+			+			+	+	+		**6 (1)**
TOTALS		**3**	**18**	**4**	**1**	**13**	**3**	**10**	**5**	**17**	**10**	**1**	**84**

APPENDIX I

EXISTING INFORMATION FROM INDIVIDUAL RESERVOIRS

Tables a-d summarise data from existing accounts that have been incorporated into the present report.

1. Cow Green

Published information is included in Appendix II. The brown trout (*Salmo trutta*) and bullhead *(Cottus gobio*) occur in the reservoir, its tributaries and in the River Tees immediately downstream of the dam. The minnow (*Phoxinus phoxinus*) occurs in the downstream river and the reservoir. Minnows also enter the lower reaches of the minor tributaries and of the upstream River Tees during the summer months. On 15 August 2005, during a separate project, two minnows were captured at Tees Bridge (Moor House NNR) at Nat. Grid ref. NY/761339 and an altitude of 533 m.O.D. Minnows had never been recorded so far up the Tees in previous years.

2 Derwent & Burnhope

In March 1997 electrofishing was carried out at Derwent Reservoir in Burnhope Burn below the dam and below the "Derwent intake" and in tributaries known as the Branshaw, Cow and Acton Burns. The inflow and outflow of Burnhope Reservoir were also examined. The results were described in full in an unpublished report to Northumbrian Water [Crisp, 1997: Exploratory electrofishing in Hunder Beck (Baldersdale) and in selected streams around Burnhope and Derwent reservoirs]. Summaries for Derwent are given in Appendix IV & Tables a & b.

3. Grassholme

The tributaries of Grassholme Reservoir had been neglected prior to the present survey. The fish in the downstream River Lune have, however, been studied in some detail by the staff of the former Northumbrian Water Authority and the Freshwater Biological Association and, latterly, by the Environment Agency. In addition various groups have electrofished Carl Beck and, in recent years, this beck has been extensively electrofished as part of a study on feral rainbow trout on behalf of Northumbrian Water. Species lists for the River Lune just downstream of the dam and for Carl Beck are given in Table c.

4. Kielder Water (including Bakethin)

A wide ranging survey of tributaries of the River North Tyne and its tributaries within the basin of the proposed reservoir was made by E.M. Ottaway in 1978 and 1979 ("Report on two electrofishing surveys carried out between July10-25, 1978 and July 9-12, 1979 in the vicinity of the proposed Kielder Water". FBA Teesdale Unit Report No.

2 to Central Water Planning Unit, Northumbrian Water Authority and Natural Environment Research Council). Following impoundment, further surveys were made by S.M. Haile and these have been described in two unpublished reports ("Report on Fish Populations in the Kielder Area 1992" to the Forestry Commission and "Electro Fishing Surveys in the Kielder Forest District" (1996) to Northumbrian Water)**.** These two studies used almost the same set of 40+ stations as did Ottaway. The present account uses data abstracted from Haile (1996) for seven stations as close to the reservoir margin as possible in each of seven tributaries of the reservoir and data from Haile (1992) for two stations in burns downstream of the dam. The sites are listed and the species recorded are summarized in Table d. The following points are of note.

1. The total species list would not have increased with the inclusion of the rest of the stations. This supports the view that a good species list can be obtained from sampling only the lower reaches of each tributary.

2. Haile does not give scientific names for her fishes. "Stickleback" could, therefore, refer to either of two species. It is most likely to refer to the three-spined stickleback (*Gasterosteus aculeatus*) and this has been assumed below. Similarly, there are three British species of lamprey. The sea lamprey (*Petromyzon marinus*) and the river lamprey (*Lampetra fluviatilis*) would not be able to enter Kielder Water. The brook lamprey (*Lampetra planeri*) is most probable and has been assumed. The account by Ottaway gives scientific names for all species and this supports the above interpretation of the Haile data.

3. With one expected exception the species lists from all three studies are in agreement. Haile's summary of Ottaway's data does not include salmon, though juvenile salmon were widespread in the reservoir basin before impoundment and were recorded by Ottaway. The presence of salmon below the dam but not above it, after impoundment might be expected as there is no fish pass at Kielder dam. The future occurrence of small numbers of juvenile salmon upstream of the dam as a result of escapes or releases from Kielder hatchery cannot, however, be ruled out.

TABLE a. Sampling stations at Derwent Reservoir in March 1997.

STATION	Nat . Grid Ref.	Altitude (m.O.D.)	Station number
Burnhope Burn below "Derwent Intake"	NZ/007492	210	1A
Burnhope Burn near Derwent Dam	NZ/032510	190	2A
Branshaw Burn near Millshields picnic site	NZ/013532	220	3A
Cow Burn	NY/997530	220	4A
Acton Burn above road bridge	NY/988523	210	5A
Acton Burn below road bridge	NY/989523	210	5A

N.B. The station numbers given here are used in Table 17.

TABLE b. Population density estimates for those tributaries of Derwent Reservoir that were given a double quantitative electrofishing on 19 March 1997. *indicates a minimum estimate based on total catch. Where no fish of a given species were captured during the second fishing the 95% C.L. are given as "± 0". Estimated percentage fishing efficiency is also given, where appropriate.

BRANSHAW BURN (52.4 m^2)

	C_1	C_2	P ± 95% C.L.	No. m^2	% Efficiency
Brown trout	36	11	51.8 ± 8.7	0.99 ± 0.17	69.5
Stone loach	2	3	*5.0	*0.110	-
Brook lamprey	2	2	*4.0	*0.08	-

COW BURN (164.9 m^2)

Brown trout	59	7	66.9 ± 2.5	0.41 ± 0.02	88.2
Brook lamprey	0	1	*1.0	*0.01	-

ACTON BURN (71.5 m^2)

Brown trout	5	0	5.0 ± 0	0.07 ± 0	100.0
Minnow	1	0	1.0 ± 0	0.01 ± 0	100.0
Stone loach	7	0	16.3 ± 20.6	0.23 ± 0.29	42.9
Brook lamprey	0	1	*1.0	*0.01	-

TABLE c. Species list for Carl Beck and for the River Lune immediately downstream of Grassholme Reservoir. Based on past observations by FBA/IFE and the Environment Agency.

Salmo trutta
Oncorynchus mykiss
Anguilla anguilla
Cottus gobio
Noemacheilus barbatulus
**Thymallus thymallus*
Salmo salar
Phoxinus phoxinus

* A single juvenile fish found in Carl Beck on one occasion.

TABLE d. List of selected electrofishing stations in Kielder/Bakethin reservoir basin and below Kielder dam, from Haile (unpublished 1992, 1996).

STATION	STREAM	NAT. GRID REF.
17	Little Wickhope Burn	NY/687855
18	Cranescleugh Burn	NY/662858
2	Lewis Burn	NY/632892
12	Kielder Burn	NY/631933
13	Deadwater Burn	NY/622946
1	Placketts Burn	NY/662911
28	Belling Burn	NY/691899
*5	Tarset Burn	NY/896884
*9	Smales Burn	NY/731858

*Downstream of Kielder dam.

Species list for selected stations in Kielder/Bakethin reservoir basin and below Kielder dam from Haile (unpublished 1992, 1996).

STATION	S	BT	L	E	BL	SB	M
17			+				+
18							+
2		+	+	+			+
12		+	+		+	+	+
13		+	+		+		+
1		+	+				+
28							
*5	+	+		+			
*9	+	+	+	+			

*Downstream of Kielder dam.

APPENDIX II

Published information from Cow Green Reservoir.

APPENDIX III Edited field notes

1. **GrassholmeReservoir**, 3 May 2004.

Station 1.	Water clear and low, some 0+ bullheads seen.
Station 2.	Water clear. Pools and riffles.
Station 3.	Fished upstream and downstream of footbridge.
Station 4.	Pools and riffles. Numerous swim-up trout fry present.
Station 5.	Water clear, pools and riffles.
Station 6.	Narrowish section with pools.
Station 7.	A stretch of silty riffle below farm.

2. **Selset Reservoir**, 4 May 2004.

The water between Selset and Grassholme Reservoirs was inspected on 3 May but no area was found that could be safely fished.
There was heavy rainfall during the night of 3/4 May. The tributaries were fishable but survey work was not possible in the River Lune upstream of Selset reservoir.

Station 1.	Narrow and very silty stream (drain?), no catch.
Station 2.	Narrow peaty stream, visibility poor.
Station 3.	Rowantree Beck – peaty with large pools and riffles.
Station 4.	Soulgill Beck – riffle with some pools, water discoloured by silt.
Station 5.	Cottle Sike – clear & peaty, pools and waterfalls. No fish caught or seen.
Station 6.	Wemmergill – fast peaty flow over cobbles and boulders. Looks good, but no fish caught or seen.
Station 7.	Hargill Beck – torrential flow, fished at edges for a total area of $15m^{2.}$
Station 8.	Inflow (R. Lune) visited on 17 August 2005 and fished c. 12.0 m^2 of margins. Brown trout seen but not caught.

3. **Balderhead Reservoir**, 5 May 2004.

Two stations were not considered safely accessible by land and several others had to be fished in reaches relatively remote from the reservoir margin. It might be advisable to sample Balderhead again on some future date and gain access to the sites by use of a boat, though it is doubtful whether or not this would give any useful additional information.

Station. 1.	Access to lower reaches not safe. Fished an upper reach close to Northumbrian Water boundary. Small and peaty with two good, deep, peaty pools. No fish seen or caught.
Station 2.	Gill Sike – dangerous access to lower reaches so fished close to Northumbrian Water boundary wall. Falls with large boulders, bed rock and pools. No fish seen or caught.
Station 3.	Blea Gill – site inspected but not safely accessible from Northumbrian Water land.
Station 4.	Foul/Fell Sike – clear, peaty, small pools and riffles. Minnows present at reservoir's edge but no fish seen or caught in the stream itself.
Station 5.	East Carni Gill – not fished, access too dangerous.

Station 6. West Carni Gill – fished just below road bridge and two good pools above bridge. No fish seen or caught.

Station 7. River Balder – fished just downstream of footbridge in an area of pools and riffles.

4. **Blackton Reservoir**, 6 May 2004.

Station 1. Outflow from Balderhead fished below the weir. Opportunist fishing on margin by north bank over an area of c. 15m^2.
Station 2. Hunder Beck – two separate reaches sampled. First below bridge, fast, peaty flow over large stones. Second nearer reservoir margin, slower, shallower flow over wide stretch of riffle.
Station 3. How Sike. Fished from reservoir edge to Northumbrian Water boundary – pools and riffles.
Station 4. Fished from reservoir edge for 20 m, gravely areas and waterfalls with large boulders. No fish seen or caught.
Station 5. A tiny stream (drain?). A minnow was caught in the reservoir margin but no fish seen or caught in stream proper.
Station 6. Blind Beck – a small, stony stream, silty and peaty.

5. **Hury Reservoir**, 7 May 2004.

Station 1. Fished from reservoir edge upstream. Woody debris.
Station 2. Peaty, silty, large stones and pools, gravelly pools at top of reach. Many invertebrates present.
Station 3. Acre Sike – a very small stream with large stones and waterfalls.
Station 4. Hope Gill – fished from reservoir edge to bedrock below Northumbrian Water wall.
Station 5. Willypot Gill – a very small, narrow stream (drain?) below farm, fished from upstream side of track to Northumbrian Water boundary. No catch.
Station 6. River Balder below Hury Reservoir. Opportunist fishing on edges of stilling pool. Area fished c. 45 m^2. Only a selection of fish of each species was retained for measurement.

6. **Scaling Dam**, 8 May 2004.

Station 1. Fished 60 m^2 of wide, deep feeder stream but saw no fish and few invertebrates. Exploratory fishing in reservoir margin produced no fish but numerous invertebrates were seen.
Station 2. Reservoir outfall by old pumping station. A concrete channel but with a bed of gravel, stones and silt in some places, especially in the section underneath the public road. Very large numbers of small fish present. A sub-sample of several dozen was closely examined. All were three-spined sticklebacks.

7. **Lockwood Beck Reservoir**, 8 May 2004.

The outflow is an engineered channel that is unlikely to harbour fish on other than a temporary basis. Therefore, attention was concentrated on the main inflow stream.

Station 1. A clear, gravely stream, pools and riffles. Alder root cover. Fished from the reservoir edge for 33 m. Recently emerged salmonid (trout?) fry seen.

8. **Burnhope Reservoir**, 2 May 2005.

Station 1. Burnhope Burn - main inflow. Stony, with riffles and pools but considerable fine silt from engineering works upstream.
Station 2. Langtae Burn. Riffles, pools and boulders. Water brown, but visibility good.
Station 3. Whoe sike. Fished from water's edge into spruce wood. Riffles & pools, water brown but clear. One trout caught and one other seen.
Station 4. Limekiln Sike. Stony with pools and riffles within spruce wood. Water brown but clear.
Station 5. Whin Sike. Large stones, riffles and small pools. Within spruce wood. Water clear and colourless.
Station 6. Burnhope Burn – outflow. Over bedrock. Water dark & silty. Difficult to fish.

9. **Tunstall Reservoir**, 3 May, 2005.

Station 1. In deciduous woodland. Water clear. Small stony riffles and pools. Many invertebrates, no fish seen. Fished from reservoir margin to Northumbrian Water boundary,
Station 2. Small stream just within Nature Reserve. Gravel and sand bed with pools. Water slightly greyish. Insects abundant. Fished up to boundary fence.
Station 3. Waskerley Beck – main inflow. Patches of stones, gravel and sand. Water brown and deepish, difficult to fish.
Station 4. Reservoir outflow. Deep, fast flow with riffles and boulders. Water dark and fishing difficult. Lined with deciduous trees. Fished 2m wide strips at margins.

10. **Waskerley Reservoir**, 4 May, 2005.

Station 1. Drain upstream of bridge, by outflow near north end of dam. Peaty with gravel and even flow. No fish seen.
Station 2. Outflow to Waskerley Beck. Bedrock and boulders. Water dark. No fish seen.
Station 3. Drain near south end of dam. Deepish, dark water. Mainly bedrock but some overlying banks. On open moorland. No fish seen.
Station 4. Water dark. Pools, riffles, small stones. Open moorland. No fish seen.
Station 5. Deep, narrow channel with riffles and pools. Water very dark.
Station 6. Riffles and pools with clear water.

Station 7. Stony stream with pools & riffles. Water clear. Sub-sample from a large shoal of minnows in a brick sump at lowermost end.
Station 8. Peat bottom. No fish seen.

11. **Smiddy Shaw Reservoir**, 4 May 2005.
Most of the inflows shown on the map are field drains and were not fished.

Station 1. Peaty bed, fast flowing with clear water and moss growth. Invertebrates present.
Station 2. Inflow channel. Muddy bottom with good plant cover. Invertebrates but no fish seen.
Station 3. An amalgamation of several drains. Gravel bed, clear water. Invertebrates but no fish seen.

12. **Hisehope Reservoir**, 5 May 2005.

Station 1. Inflow stream. Deepish water with riffles and pools. Heather overhang at margins. Water clear. No fish or aquatic invertebrates seen but numerous dead earthworms and 2 dead millipedes in stream.
Station 2. Spillway from closed sluice near to house. Stone-lined channel with still water. No fish seen.
Station 3. Main outflow below paved section. Heather covered banks, fast flow, water dark. No fish seen but a few Plecoptera observed.
Station 4. Catchwater channel. Paved, water clear. A few Plecoptera but no fish.

13. **Airy Holm Reservoir**, 5 May 2005.

Station 1. Really a large drain. Slow flow. Bed of gravel and silt. No fish seen.
Station 2. Another drain. Shallow and stony with rather cloudy water. No fish seen.
Station 3. Outflow – a stream with gravely bed and a paved spillway. Deposits of silt.

14. **Derwent Reservoir**, 19 March, 1997 (Stations 1A to 5A) and 6 May, 2005 (Stations 1 to 6).

Station 1A. Stream below Derwent offtake.

Station 2A. Burnhope Burn close to the confluence of R. Derwent and Derwent Dam.
Station 3A. Branshaw Burn – lower reaches.
Station 4A. Cow Burn – lower reaches.
Station 5A. Acton Burn – lower reaches and a reach further upstream.
Station 1. Main inflow at Carricks picnic area. Gravel and stone bed with riffles and deeper areas. Fished selected accessible areas.
Station 2. Inflow close to a house to NW of Pow Hill. Bottom of silt and mud. Some invertebrates but no fish.

Station 3. Inflow by Pow Hill car park. Clear water. Stones and sand bottom good cover. Fished upstream from footbridge to fence. Salmonid fry (brown trout?) present.
Station 4. A narrow channel from reservoir margin upstream through Nature Reserve. Numerous invertebrates.

Station 5. Inflow through woodland. Riffles and pools. Bed of small stones and silt. 0-group (?) loach (3.3 cm).
Station 6. Inflow through coniferous woodland. Large stones, silt, pools and riffles. 0-group (?) loach (3.6 cm).

15. **Whittle Dene Reservoirs**, 1 May 2006.

Station 1. Whittle Burn near Spital Farm. A few 0-group salmonids (probably trout) present.
Station 2. Bogle Burn, close to station 1 and a tributary of Whittle Burn. Many 0-group salmonids.
Station 3. Gentle flow, fine gravel and much silt.
Station 4. Field drain, small stones and silty.
Station 5. As Station 4.

16. **Hallington Reservoirs**, 2 May 2006.

Station 1. Inflow, through woodland. Slow flow, all heavily silted. Evidence of other activity. Scales found on bank, probably from an otter kill, appeared to be from a large cyprinid (roach?).
Station 2. Erring Burn, - a stony stream but receiving effluent from some fish rearing tanks (appeared fairly clean) and a sewage outfall from some nearby cottages (not so clean!). No fish caught or seen.

17. **Colt Crag Reservoir**, 3 May 2006.

Station 1. Carry Burn – water clear. Bottom of stones and gravel but much silt.
Station 2. Water cloudy. Riffles and pools but heavily silted. One bullhead seen but not caught.
Station 3. A small stream, little more than a ditch. Overgrown with rank vegetation.

18. **Little Swinburne Reservoir**, 3 May 2006.

Station 1. Clear water flowing over fine gravel and sand with a few large stones with a little silt.

19. **Fontburn Reservoir**, 4 May 2006.

Station 1. River Font, downstream. Peaty water flowing over stones and rock slabs, abundant algal growth.

Station 2. Newbiggin Burn – water clear and peaty, little silt. Large stones on bed. Minnows very numerous and only a subsample collected.
Station 3. Fallowlees Burn – clear water. Bed of stones with some sand. Minnows very numerous and only a subsample collected.
Station 4. A large drain. No fish seen or caught.
Station 5. A large drain. No fish seen or caught.

20. **Catcleugh Reservoir**, 5 May 2006.

Station 1. Outflow, River Rede. Water clear and deepish. Bed of stones and gravel with a little silt.
Station 2. Ramshope Burn – a small, stony stream with riffles and pools. Ammocete larvae of lampreys found in a silt bank beside the main flow. The only inflow on the north side of the reservoir with Northumbrian Water ownership.
Station 3. River Rede inflow. A large, stony stream with some fine gravel and silt deposits by the margins. Ammocete larvae found in one of these deposits.
Station 4. Chattelhope Burn – water clear and peaty with some algal growth. Deep pools and some riffles.

APPENDIX IV

Lengths of fish of each species examined.

TABLE a. Derwent Reservoir, March 1997.

TABLE b. Grassholme Reservoir, 3 May 2004.

TABLE c. Selset Reservoir, 4 May 2004.

TABLE d. Balderhead Reservoir, 5 May 2004.

TABLE e. Blackton Reservoir, 6 May 2004.

TABLE f. Hury Reservoir, 7 May 2004.

TABLE g. Scaling Dam, 8 May 2004.

TABLE h. Lockwood Beck Reservoir, 8 May 2004.

TABLE i. Burnhope Reservoir, 2 May 2005.

TABLE j. Tunstall Reservoir, 3 May 2005.

TABLE k. Waskerley Reservoir, 4 May 2005.

TABLE l. Smiddy Shaw Reservoir, 4 May 2005.

TABLE m. Hisehope Reservoir, 5 May 2005.

TABLE n. Airy Holm Reservoir, 5 May 2005.

TABLE o. Derwent Reservoir, 6 May 2005.

TABLE p. Whittle Dene Reservoirs, 1 May 2006.

TABLE q. Hallington Reservoirs, 2 May 2006.

TABLE r. Colt Crag Reservoir, 3 May 2006.

TABLE s. Little Swinburne Reservoir, 3 May 2006.

TABLE t. Fontburn Reservoir, 4 May 2006.

TABLE u. Catcleugh Reservoir, 5 May 2006.

TABLE a.

STATION 1A. BURNHOPE BURN - DERWENT OFFTAKE

Brown trout	14.1	(1)
Stone loach	7.1, 11.0	(2)
Bullhead	6.2, 6.4, 6.7, 6.7, 6.9, 6.9	(6)
Brook lamprey	12.9, 12.9. 14.7, 14.8	(4)
Minnow	4.5, 4.8, 4.9 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.7, 5.8, 5.9, 6.1, 6.2, 6.2, 6.3	(17)

STATION 2A. BURNHOPE BURN – BELOW DERWENT DAM, CLOSE TO THE CONFLUENCE WITH R. DERWENT

Brown trout	5.2, 5.4, 5.5, 6.4, 6.5, 6.8, 7.1, 7.2, 7.3, 7.8, 7.9, 8.7, 9.1, 10.8, 12.9, 15.5	(16)
Bullhead	4.2, 5.9, 6.7	(3)
Stone loach	9.6	(1)

TABLE a cont

STATION 3A. BRANSHAW BURN – UPSTREAM OF DERWENT RESERVOIR

Catch 1

Brown trout	6.1, 6.4, 6.5, 6.7, 6.7, 6.8, 6.9, 6.9, 7.0, 7.0, 7.2, 7.4, 7.4, 7.5, 7.6, 7.6, 7.6, 7.7, 7.8, 7.9, 7.9, 8.0, 8.5, 8.6, 8.6, 9.2, 9.3, 9.4, 9.5, 9.6, 9.8, 10.0, 11.3, 11.5, 11.7, 13.7	(36)
Stone Loach	7.6, 8.0	(2)
Brook Lamprey	14.4, 14.9	(2)

Catch 2

Brown trout	6.3, 7.0, 7.0, 7.0, 7.1, 8.0, 8.1, 8.2, 8.4, 8.9, 9.3	(11)
Stone loach	8.5, 8.5, 10.7	(3)
Brook lamprey	15.7, 16.0	(2)

Extras

Brown trout	5.6, 5.9, 6.1, 6.2, 6.3, 6.3, 6.3, 6.4, 6.5, 6.6, 6.6, 6.7, 6.7, 6.7, 6.8, 6.9, 6.9, 7.1, 7.1, 7.1, 7.2, 7.2, 7.3, 7.3, 7.4, 7.6, 7.6, 7.6, 7.6, 7.6, 7.9, 8.0, 8.1, 8.2, 8.3, 8.4, 8.4, 8.6, 8.8, 8.8, 8.9, 10.1, 10.2, 10.2, 14.5, 21.6	(46)

STATION 4A. COW BURN – UPSTREAM OF DERWENT RESERVOIR

Catch 1

Brown trout	5.7, 5.9, 6.1, 6.1, 6.1, 6.2, 6.2, 6.3, 6.6, 6.6, 6.6, 7.0, 7.1, 7.1, 7.3, 7.4, 7.4, 7.4, 7.6, 7.7, 7.7, 7.8, 7.9, 8.0, 8.0, 8.0, 8.0, 8.1, 8.2, 8.2, 8.2, 8.2, 8.2, 8.3, 8.3, 8.4, 8.4, 8.4, 8.4, 8.4, 8.5, 8.7, 8.8, 8.8, 8.8, 8.9, 9.1, 9.2, 9.2, 9.2, 9.2, 9.6, 9.9, 10.1, 10.1, 10.8, 11.0, 11.1, 23.0	(59)

Catch 2

Brown trout	5.7, 6.6, 6.6, 6.8, 7.0, 7.3, 11.4	(7)
Brook lamprey	15.6	(1)

TABLE a. cont

STATION 5A. ACTON BURN – UPSTREAM OF DERWENT RESERVOIR

Catch 1			
	Brown trout	6.9, 11.5, 12.6, 12.9, 14.7	(5)
	Stone loach	7.6, 7.7, 10.2, 10.4, 10.5, 10.9, 11.4	(7)
	Minnow	5.6	(1)
Catch 2			
	Stone loach	8.0, 9.2, 9.7, 10.3	(4)
	Brook lamprey	16.4	(1)
Extras			
	Brown trout	7.4, 8.4	(2)

TABLE b. Grassholme Reservoir, 3 May 2004.

STATION 1		
Brown trout	6.7,7.8	(2)
Stone loach	7.3	(1)
Bullhead	4.1, 4.8, 5.1, 5.5, 5.6, 6.6	(6)
Stickleback 3-spined	4.4	(1)
STATION 2		
Brown trout	6.4, 6.6, 7.1, 7.4, 7.7, 8.0, 8.0, 8.1. 8.7, 11.9, 14.7, 15.4, 19.6	(13)
Stone loach	6.7	(1)
Bullhead	4.5, 4.6, 5.0, 5.3, 5.4, 5.5, 5.6, 6.2, 6.4, 7.4	(10)
Minnow	2.5, 3.1, 3.1	(3)
Stickleback 3-spined	4.2, 4.9	(2)
STATION 3.		
Brown trout	5.8, 7.7,7.8	(3)
Stone loach	7.3	(1)
Bullhead	4.6, 4.7, 5.3, 5.3, 5.5, 6.0, 6.4	(7)
STATION 4.		
Brown trout	7.2, 7.4, 7.6, 7.8, 7.9, 8.1, 8.3, 8.4, 8.8, 8.9, 10.2, 11.4, 11.6, 14.4	(14)
Rainbow trout	13.0	(1)
Stone loach	6.4, 6.7, 7.1, 8.0, 8.0, 8.0, 8.4, 8.7, 8.9, 9.5, 9.9	(11)
Bullhead	5.9	(1)
Minnow	3.1, 5.7	(2)
Stickleback 3-spined	4.2, 4.3, 4.5, 4.5, 4.7, 4.7, 5.0, 5.0	(8)

TABLE b. cont. Grassholme Reservoir.

STATION 5		
Brown trout	7.3, 8.5, 8.6	(3)
STATION 6		
Brown trout	5.7, 5.9, 6.4, 6.4, 6.5, 6.8, 7.2, 7.3, 7.3, 7.4, 8.8, 9.2, 9.4, 12.7	(14)
Stone loach	7.3, 7.7, 7.8, 8.0, 8.4, 9.2, 9.3, 9.3	(8)
Bullhead	4.4, 4.5, 5.1, 5.1, 5.8, 6.0, 6.1, 7.1	(8)
STATION 7		
Brown trout	6.3, 7.6, 7.8	(3)
Bullhead	4.0, 4.8, 5.3, 5.6, 5.8, 5.9, 6.0, 6.0, 6.0, 6.0, 6.0, 6.2, 6.3, 6.5, 6.5, 6.5, 6.8, 6.9, 7.5	(19)

TABLE c. Selset Reservoir, 4 May 2004 (Sts 1-7) and 17 August 2005 (St 8).

STATION 1		
No catch		NIL
STATION 2		
Brown trout	7.5, 12.0	(2)
STATION 3		
Brown trout	7.4, 8.5, 8.5, 12.4	(4)
Stone loach	5.6	(1)
STATION 4		
Stone loach	5.2	(1)
Bullhead	3.8, 4.0, 5.4, 7.2, 7.8	(5)
STATION 5		
No catch		NIL
STATION 6		
No catch		NIL
STATION 7		
Brown trout	7.8, 7.8, 12.5	(3)
Stone loach	5.3, 5.4, 5.4	(3)
Bullhead	3.6, 3.6, 3.7, 3.9, 3.9, 4.9, 5.4, 6.6, 6.9, 7.1, 7.4, 7.5, 7.6, 7.6	(14)
STATION 8		
Stone loach	6.8, 9.0	(2)
Bullhead	4.9, 5.0, 5.5	(3)
Minnow	5.2, 5.4, 5.8, 6.1, 6.1, 6.4, 6.7, 7.0, 7.2, 7.7, 7.9	(11)

TABLE d. Balderhead Reservoir, 5 May 2004

STATION 1		
No catch		NIL
STATION 2		
No catch		NIL
STATION 3		
No catch		NIL
STATION 4		
Minnow	3.8, 4.2	(2)
STATION 5		
No catch		NIL
STATION 6		
No catch		NIL
STATION 7		
Brown trout	11.2, 11.7, 11.9. 14.1, 16.9	(5)
Stone loach	11.3	(1)
Minnow	5.2, 5.7, 6.4, 6.5, 6.7, 7.0, 7.1, 7.5, 7.7, 7.7, 8.0, 9.3	(12)

TABLE e. Blackton Reservoir, 6 May 2004.

STATION 1		
Brown trout	8.8, 9.0	(2)
Stone loach	7.6	
Minnow	4.8, 5.7, 6.0, 6.1, 6.6, 6.7, 6.8, 6.9, 6.9, 7.3	(10)
STATION 2		
Brown trout	6.8, 7.0. 7.5, 7.9	(4)
Stone loach	5.6, 5.6, 5.9, 8.9, 9.3	(5)
Minnow	6.1, 6.4, 6.4, 6.5, 7.0	(5)
STATION 3		
Brown trout	6.6, 6.7, 7.0, 7.6	(4)
Stone loach	5.8, 5.9	(2)
STATION 4		
No catch		NIL
STATION 5		
Minnow	7.8	(1)
STATION 6		
Brown trout	8.2, 8.4, 8.5, 8.7	(4)

TABLE f. Hury Reservoir, 7 May 2004

STATION 1.		
Brown trout	6.1, 6.5, 7.6, 7.6, 8.0, 8.0, 8.4, 8.7, 9.1, 9.2, 9.6, 10.2	(12)
STATION 2		
Brown trout	9.3, 9.6, 10.9, 11.9, 13.7	(5)
Stone loach	7.2, 7.7, 8.1, 8.1, 8.4, 8.5, 8.8, 9.4, 10.0	(9)
Bullhead	5.2, 5.3, 5.9, 6.3	(4)
Minnow	6.4, 6.5	(2)
Stickleback 3-spined	5.0, 5.0, 5.1, 5.3	(4)
STATION 3		
Brown trout	7.6	(1)
STATION 4		
Brown trout	7.3. 8.4, 8.7, 9.4, 9.6	(5)
Stone loach	7.0, 7.4, 9.5	(3)
Bullhead	4.6, 5.2, 5.4, 5.6, 5.6, 6.0, 6.0	(7)
STATION 5		
No catch		NIL
STATION 6		
Brown trout	8.4	(1)
Stone loach	5.5, 7.4, 9.6, 9.8, 9.8	(5)
Bullhead	3.4, 4.4, 4.8, 5.1, 5.5, 5.5, 6.0	(7)
Minnow	5.0, 5.8, 6.0, 6.5, 7.5	(5)
Stickleback 3-spined	4.4, 4.7, 5.3	(4)

TABLE g. Scaling Dam, 8 May 2004.

STATION 1

No catch NIL

STATION 2

Stickleback 3-spined abundant

TABLE h. Lockwood Beck Reservoir, 8 May 2004

STATION 1

Brown trout	5.5, 5.6, 5.6, 5.6, 5.8, 6.0, 6.3, 6.7, 7.2, 7.2, 7.4, 7.5, 8.6, 9.6, 10.4 + 2	(17)
Minnow	6.1, 6.2, 7.0, 7.6, 7.6, 7.6, 7.7, 9.1, 10.0	(9)

TABLE i. Burnhope Reservoir, 2 May 2005.

STATION 1		
Brown trout	8.4, 11.2, 16.1	(3)
Stone loach	8.9	(1)
Minnow	6.5, 6.7, 6.8, 7.0, 7.1, 7.1, 7.1	(11)
STATION 2		
Brown trout	8.1, 9.6, 11.1	(3)
Stone loach	8.0, 9.6, 10.0, 11.9	(4)
Minnow	6.4, 6.5, 6.9, 7.1, 7.5	(5)
STATION 3		
Brown trout	8.5	(1)
STATION 4		
Brown trout	5.5, 6.6, 7.4, 7.8, 8.8, 8.8, 9.2, 9.2, 10.0	(9)
STATION 5		
Brown trout	7.6, 12.0	(2)
STATION 6		
Brown trout	7.5, 8.3, 11.4	(3)

TABLE j. Tunstall Reservoir, 3 May 2005.

STATION 1		
No catch		
STATION 2		
Brown trout	11.9	(1)
STATION 3		
Stone loach	10.4, 11.2, 11.8	(3)
Bullhead	6.0, 6.0, 6.4, 6.9, 7.5	(5)
Minnow	6.6, 7.2, 7.3, 7.6, 7.9, 8.4	(6)
Stickleback 3-spined	4.0	(1)
Brook lamprey	12.2, 12.3	(2)
Gudgeon	9.1, 12.1, 14.1	(3)
STATION 4		
Brown trout	7.1, 8.3, 8.6	(3)
Bullhead	3.7, 4.4, 4.6, 4.8, 4.9, 6.0, 7.9	(7)
Stickleback 3-spined	4.2, 4.4, 4.7, 4.9, 4.9	(5)

TABLE k. Waskerley Reservoir, 4 May 2005.

STATIONS 1 to 4

No catch

STATION 5

Brown trout	8.8, 14.5	(2)

STATION 6

Minnow	6.5	

STATION 7

Brown trout	8.6, 8.8, 13.7	(3)
Minnow	5.4, 5.4, 5.8, 5.8, 5.9, 5.9, 6.1, 6.1, 6.2, 6.4, 6.5, 6.6, 6.6, 6.6, 6.7, 6.9, 7.0, 7.2	(18)

TABLE l. Smiddy Shaw Reservoir, 4 May 2005.

STATION 1

Brown trout	11.8	(1)

STATIONS 2 & 3

No catch

TABLE m. Hisehope Reservoir, 5 May 2005.

STATIONS 1 to 4

No catch

TABLE n. Airy Holm Reservoir, 5 May 2005.

STATIONS 1 & 2

No catch

STATION 3

Stone loach	8.0	(1)
Minnow	5.6	(1)
Stickleback 3-spined	3.6, 3.9, 4.1, 4.8	(4)

TABLE o. Derwent Reservoir, 5 May 2005.

STATION 1		
Brown trout	10.3, 11.3	(2)
Stone loach	4.9, 5.4, 5.8, 5.9, 6.1, 6.6, 7.1, 7.7, 7.9, 8.0, 8.9, 9.2, 9.3, 9.3, 9.7	(15)
Minnow	3.8, 4.9, 5.1, 5.1, 5.2, 5.3, 5.5, 5.5, 5.8, 6.0, 6.0	(11)
Brook lamprey ammocete	6.5	(1)
STATION 2		
No catch		
STATION 3		
Brown trout	8.4, 8.6, 9.6, 9.6, 9.7, 10.8, 11.0, 11.0, 11.9, 14.3	(10)
STATION 4		
Stone loach	4.6, 5.3, 5.4, 5.5, 5.7, 6.1	(6)
STATION 5		
Brown trout	10.3	(1)
Stone loach	3.3, 8.8, 10.5	(3)
Brook lamprey	11.5, 13.4, 14.4	(3)
STATION 6		
Brown trout	12.0 (smolting), 13.4	(2)
Stone loach	3.6, 5.2, 5.4, 10.2	(4)

TABLE p. Whittle Dene Reservoirs, 1 May 2006.

STATION 1		
Brown trout	2.7, 2.8, 9.2, 10.9	(2 + 2)
Stone loach	4.2, 4.5, 5.2, 6.3, 8.9, 9.0, 9.1, 10.8	(8)
Eel	11.9, 14.1	(2)
Stickleback 3-spined	4.2, 4.5, 4.6, 4.6, 5.2, 5.4	(6)
STATION 2.		
Brown trout	2.4, 2.4, 2.5, 2.7, 2.8, 2.9, 3.0	(0 +7)
Stone loach	4.6	(1)
Eel	29.3	(1)
Stickleback 3-spined	3.1, 3.2, 4.2	(3)
STATION 3		
Stickleback 3-spined	2.7, 2.8, 3.2, 3.3, 3.4, 3.6, 3.7, 3.8, 4.5, 5.5	(10)
STATION 4.		
Stickleback 3-spined	3.7, 3.7, 4.2, 4.6	(4)
STATION 5		
Stone loach	5.5, 5.9	(2)
Stickleback 3-spined	2.6, 2.6, 2.8, 3.1, 4.0	(5)

TABLE q. Hallington reservoirs, 2 May 2006.

STATION 1

Brown trout	11.9	(1 + 1 extra)
Bullhead	3.5, 3.9, 4.1, 4.2, 4.3, 4.6, 4.9, 5.2, 6.0, 8.3	(10)

STATION 2

No catch	(0)

TABLE r. Colt Crag, 3 May 2006.

STATION 1.

Brown trout	10.0, 10.4, 12.5	(3)
Stone loach	3.6, 4.1, 7.8	(3)
Bullhead	3.5, 3.8, 3.9, 4.1, 4.2, 4.2, 4.3, 4.7, 5.0, 6.2, 6.2, 6.8	(12)
Minnow	2.4, 2.7, 2.8, 2.8, 2.8, 2.8, 2.9, 3.0, 3.0, 3.0	(10)
Stickleback 3-spined	3.6, 4.1, 4.9, 4.9	(4)

STATION 2

Brown trout	11.2	(1)
Stickleback 3-spined	2.1, 3.7, 3.9, 4.1, 4.1, 4.1, 4.1, 4.1, 4.2, 4.2, 4.4, 4.4, 4.5, 4.6, 4.6, 4.6, 4.7, 4.7, 4.8, 4.8, 4.9, 5.0, 5.3, 5.7	(24)

STATION 3

Stickleback 3-spined	4.8	(1)

TABLE s. Little Swinburne Reservoir, 3 May 2006.

STATION 1.

Bullhead	5.8, 6.0, 6.2	(3)
Minnow	6.4	(1)
Stickleback 3-spined	2.5, 2.6, 2.8, 2.9, 2.9, 2.9, 2.9, 2.9, 3.0, 3.1, 3.2, 3.2, 3.2, 3.2, 3.2, 3.2, 3.2, 3.2, 3.3, 3.3, 3.4. 3.4, 3.4, 3.5, 3.5, 3.5, 3.5, 3.6, 3.6, 3.6, 3..7, 3.8, 4.1, 5.0, 5.3	(35)

TABLE t. Fontburn Reservoir, 4 May 2006.

STATION 1		
Stone loach	3.6, 3.8, 4.5, 4.7, 8.2, 8.6, 8.9, 9.1, 9.4, 9.7, 9.8, 9.9, 10.1	(13)
Eel	32.5	(1)
Lamprey (adult)	15.7	(1)
Minnow	6.4, 6.7, 7.5	(3)
STATION 2		
Brown trout	10.7, 11.0, 14.9	(3)
Stone loach (adult)	10.1	(1)
Lamprey	15.5	(1)
Minnow	4.6, 4.7, 4.7, 4.7, 6.6, 7.0, 7.2	(7)
STATION 3		
Brown trout	9.4, 10.4, 14.1	(3)
Stone loach	4.7, 7.7	(2)
Minnow	4.6, 4.8, 5.2, 5.7, 6.5, 6.5, 6.8m 7.0, 7.2	(9)
STATION 4		
No catch		(0)
STATION 5		
No catch		(0)

TABLE u. Catcleugh Reservoir, 5 May 2006.

STATION 1		
Salmon	6.9, 7.8	(2)
Brown trout	3.0, 3.2, 7.0, 7.5, 12.7	(5)
Stone loach	5.6, 8.1, 9.9, 10.1, 10.3, 10.4	(6)
Minnow	3.2, 3.2, 3.3, 3.5, 4.2, 4.5, 4.6, 6.5, 6.8, 7.4	(10)
Stickleback 3-spined	4.3	(1)
STATION 2		
Brown trout	8.9, 11.2	(2)
Stone loach	2.7, 2.9, 3.0, 3.1, 3.8, 4.0, 4.1, 6.3, 6.6, 7.0, 7.0	(11)
Lamprey	4.2, 6.4, 6.7, 7.6, 9.0, 9.6, 9.7	(7)
Minnow	2.4, 3.9, 4.2, 4.5, 4.9, 5.0, 5.4, 6.8	(8)
STATION 3		
Brown trout	10.1, 10.9, 13.9	(3)
Stone loach	2.9, 3.1, 6.3, 6.3, 6.6	(5)
Lamprey	3.1, 3.1, 3.4, 3.6, 3.8, 4.3, 5.4, 5.5, 8.2	(9)
Minnow	2.7, 3.0, 3.4, 4.7, 4.8, 6.2, 6.9	(7)
STATION 4		
Brown trout	7.7, 8.0	(2)
Stone loach	3.1, 3.3, 5.0, 5.7, 7.5, 8.3, 8.4, 9.5, 10.3, 10.6	(10)
Minnow	4.0, 4.1, 4.5, 4.6, 4.8, 4.8, 5.0, 5.0, 5.1, 5.2, 5.4, 5.5, 6.1	(13)