RIVER DON FISHERY SURVEYS

INITIAL SURVEY

DRAFT REPORT

Introduction

As a condition of drought orders being imposed on several West Yorkshire rivers, Yorkshire Water are obliged to carry out fishery surveys on the relevant watercourses. These surveys are intended to take place once in April 1996 and to be repeated in October 1996 and April 1997. This report presents the results of the initial survey.

Methods

Between 1 and 4 April eight sites on the River Don Catchment were surveyed for their fish populations. Each site comprised a 200 m length of river divided into four equal 50 m sections. The location of each site had been predetermined.

On arrival, the sections were first marked out by measuring exactly from a predetermined upstream or downstream limit. Each section was then delimited by use of stop nets. In every case all four sections were stop netted before electric fishing commenced in any section.

Sections were then electric fished using a single anode attached to a 1.9 KVa Honda generator, which was either located on the bank, or pulled behind the anode on a rubber dingy depending on access at the site. Three of the sections were fished once and one of the sections was subjected to a triple shock. The estimated efficiency of capture derived from this triple shock was used to calibrate the single shocks on the other three sections. Selection of the section for the triple shock estimate took into account its similarity to the other sites. That is unusual sections were not selected for the triple shock. A period of at least 40 minutes elapsed between each shock on the triple shock sections.

At the end of the survey the area of each section was estimted from five width measurements

Trout, perch, dace, grayling, roach and pike

Once captured, fish were held in a bin. Each fish was measured to the nearest mm and a sample were weighed and had scales removed for age determination. All fish were then returned alive to the section that they were captured in. In the laboratory the electric fishing efficiencies, length weight relationships, density and biomass for each section, year class strengths, mean length and weight for each age class and, for trout, data for use in the HABSCORE model were estimated.

Stickleback, stone loach, bullheads, minnows, ruffe

Once captured these fish were treated in the same way as those fish in the above paragraph, except that, provided there were sufficient number not to impact on the local population, a sample was killed and taken away from the site for measuring and weighing and if necessary for age determination. If it were not possible to take a sample away, length weight relationships from one of the other sites were used to estimate biomass for that species.

RESULTS

Discussion

Some caution should be attached to the data presented in this report for the following reasons:-

1. Division of the sites in four sections often produced sections with widely varying features, which impact both on the electric fishing efficiency and the number and density of different fish species in them. Although a typical section was selected each time for the triple shock estimate of catch efficiency, use of that efficiency on other sections may not have been a realistic way of estimating density and biomass in every case.

2. Some of the rivers were quite wide and the disturbance of dividing the sites into 50 m sections with stop nets could have resulted in movement of large numbers of fish out of one section into another. So called 'edge effects' have a greater impact on the results the shorter the section in relation to its width.

3. It is not possible to attach much confidence to the catch efficiencies recorded for the smaller species of fish, even when an apparent fall in catches between shocks was observed. These include bullheads, stoneloach, minnows and stickleback. The equipment used, with a large anode and 1.9 KVa generator, are designed for capture of larger fish, and are generally inefficient at capturing smaller fish. Further, many of these species live in crevices or under rocks, and there is no way of determining what proportion was shocked but remained invisible to the fisherman. The most reliable data determined for these species is the average length in each age class. The value of the other data obtained on these species is probably negligible.

4. Some of the fish community structures were obviously affected by neighbouring aquatic features such as reservoirs, ponds etc. It is probable that such effects will be independent of manipulation of the water courses, or that the impacts of manipulation on these communities will be difficult to determine. It is recommended that species that are obviously not naturally resident in the sites, such as perch and ruffe, but are leakage from other water bodies should be ignored in estimating the impacts of any manipulation of the rivers.

RIVER SHEAF

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. This site is obviously angled regularly as two anglers had to be moved on to complete the survey. Visibility was good and the whole site was wadeable. Generally all shaded by a high tree canopy.

Section 1:- This comprised a short steep riffle at the bottom end and a deep pool at the top end

Section 2:- This comprised nearly all steep shallow riffle

Section 3:- This comprised nearly all steep shallow riffle with the exception of a shallow glide at the top end.

Section 4:- There was a deep pool at the bottom end with some root cover at this point. There was a small area of riffle at the top end.

Species present:

Brown Trout

Bullheads

Perch

Dace

Roach

3sp Stickleback

RIVER SHEAF - BROWN TROUT

Table 1. Electric fishing efficiencies for brown trout calculated from triple shocks of Section 1 of River Sheaf site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	28	19	8	66	43.7

Table 2. Number of brown trout captured in each section of River Sheaf site, together with density and biomass, calculated from efficiencies in Table 5. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	55	263	0.285	10.2
Section 2	11	290	0.117	2.46
Section 3	19	286	0.224	3.3
Section 4	18	274	0.106	8.2
Total	103	1113	0.181	5.9

Table 3. The length weight relationship for brown trout at the River Sheaf site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Brown Trout	- 1.58	2.71	98.8 %

Table 4. Number of brown trout captured in each year-class, year-class strengths and mean lengths and weights at the River Sheaf site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	45	117	57.9	8.0 ± 1.12	7.6 ± 3.1
1994	32	51	25.2	14.8 ± 1.55	39.4 ±11.0
1993	20	28	13.9	19.6 ± 1.60	85 ± 19.4
1992	4	4	2.0	25.9 ± 2.65	187 ± 57
1991	2	2	1.0	33.4± 0.50	323 ± 4.2

Table 5. Information for HABSCORE from the River Sheaf site. Section 1 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section together with density (n m^{-2}) in brackets				Estimated total biomass in each section (g) together with g m^{-2} in brackets			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	10/10/5	6	14	0	26.2	41 (0.156)	23 (0.079)	53 (0.185)	0 (0)	312 (1.19)	175 (0.60)	403 (1.41)	0 (0)
Trout <20 cm older than 1	13/9/3	5	5	10	47.2	29 (0.110)	11 (0.038)	11 (0.038)	21 (0.077)	1415 (5.4)	537 (1.85)	537 (1.88)	1025 (3.7)
Trout >20 cm	5/0/0	0	0	8	100	5 (0.019)	0 (0)	0 (0)	8 (0.0292)	957 (3.6)	0 (0)	0 (0)	1228 (4.5)

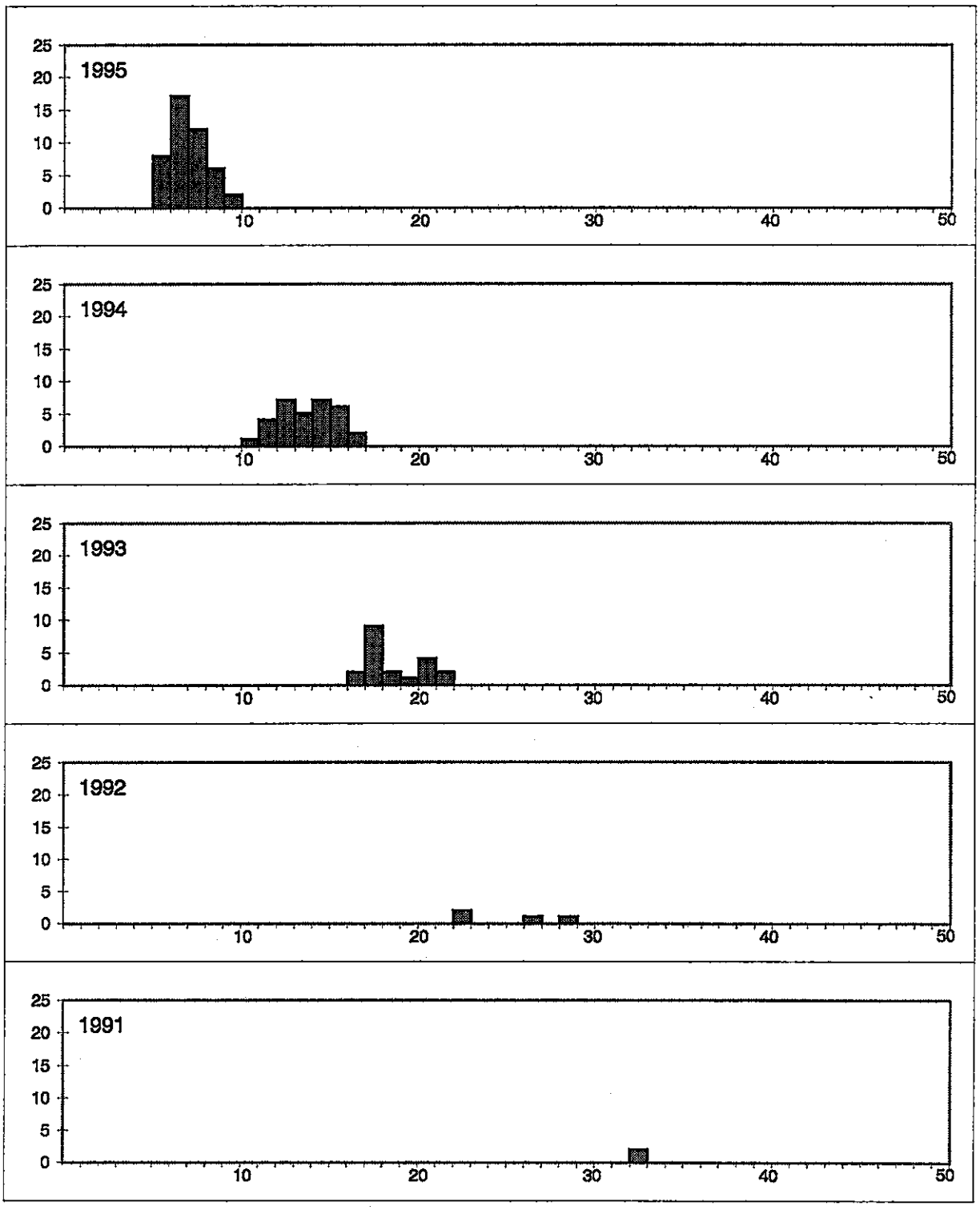


Figure ? Length frequency histogram of each year class of brown trout captured at River Sheaf site

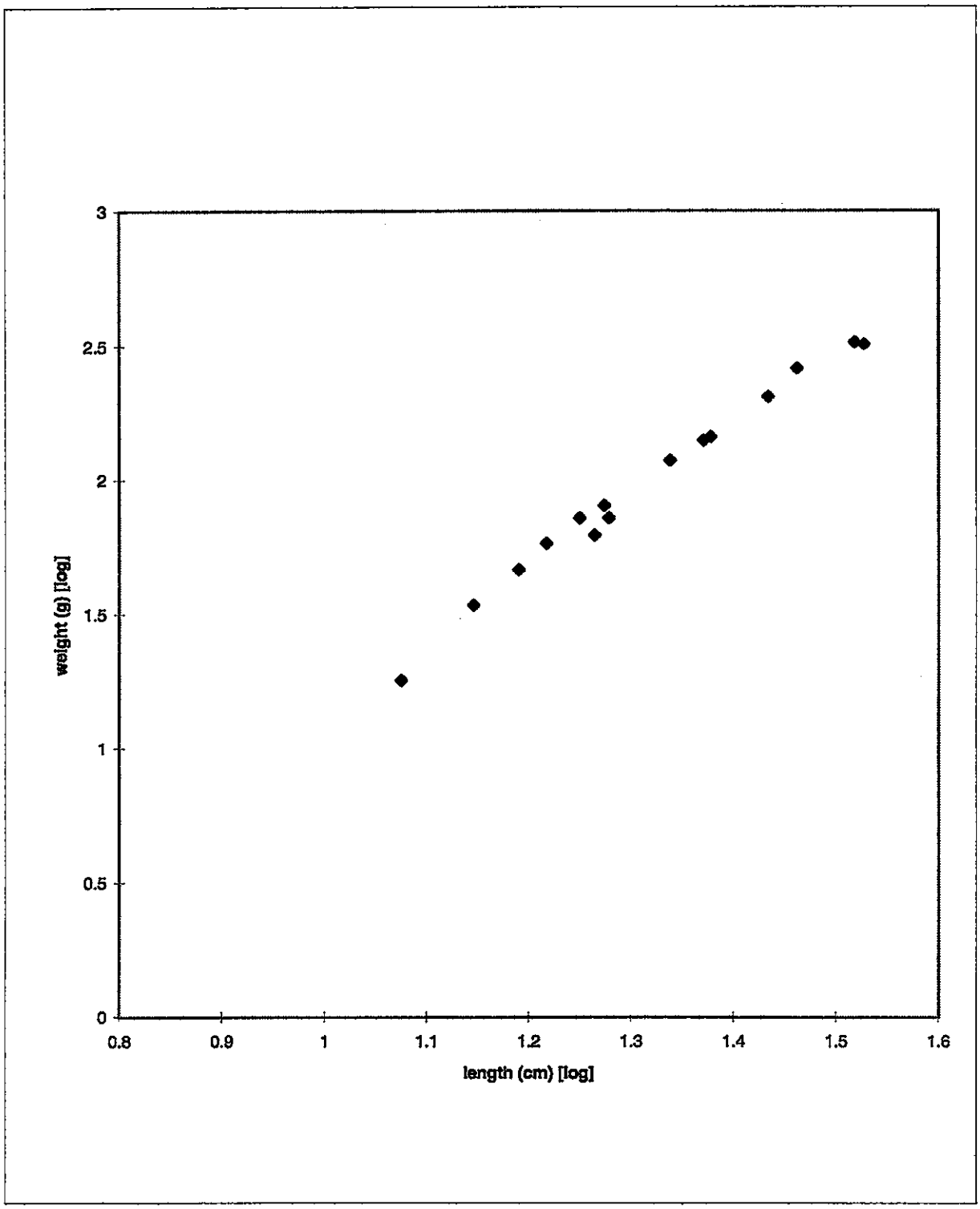


Figure ? Length [log] and weight [log] for brown trout at the River Sheaf site

RIVER SHEAF - BULLHEADS

Table 1. Electric fishing efficiencies for bullheads calculated from triple shocks of Section 1 of River Sheaf site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	22	14	8	56	39.1

Table 2. Number of bullheads captured in each section of River Sheaf site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	44	263	0.213	1.50
Section 2	12	290	0.107	0.71
Section 3	7	286	0.063	0.46
Section 4	6	274	0.055	0.44
Total	69	1113	0.108	0.77

Table 3. The length weight relationship for bullheads at the River Sheaf site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Bullheads	- 2.16	3.39	98.3 %

Table 4. Number of bullheads captured in each year-class, year-class strengths and mean lengths and weights at the River Sheaf site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	8	20	11.4	3.9 ± 0.50	0.76±0.279
1994	60	153	86.9	7.8 ± 0.88	7.7 ± 2.83
1993	1	3	1.7	10.5	20.0
1992					
1991					

RIVER SHEAF - PERCH

Table 1. Electric fishing efficiencies for perch calculated from triple shocks of Section 1 of River Sheaf site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	6	2	2	11	47.2

Table 2. Number of perch captured in each section of River Sheaf site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	10	263	0.42	1.00
Section 2	0	290	0	0
Section 3	3	286	0.0210	0.44
Section 4	5	274	0.040	1.72
Total	18	1113	0.114	0.77

Table 3. The length weight relationship for perch at the River Sheaf site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Perch	- 2.48	3.57	99.6 %

Table 4. Number of perch captured in each year-class, year-class strengths and mean lengths and weights at the River Sheaf site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	9	19	50	6.5 ± 0.59	2.70± 0.86
1994	8	17	44.7	14.6 ± 1.45	49 ± 15.9
1993	1	2	5.3	18.2	104
1992					
1991					

RIVER SHEAF - DACE

Table 1. Electric fishing efficiencies for dace calculated from triple shocks of Section 1 of River Sheaf site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	0	0	0	n/d

Table 2. Number of dace captured in each section of River Sheaf site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	0	263	0	0
Section 2	0	290	0	0
Section 3	0	286	0	0
Section 4	4	274	0.0146**	1.89**
Total	4	1113	0.0036**	0.47**

** represents minimum density and biomass

Table 3. The length weight relationship for dace at the River Sheaf site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Dace	n/a	n/a	n/a

Table 4. Number of dace captured in each year-class, year-class strengths and mean lengths and weights at the River Sheaf site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995					
1994					
1993					
1992					
1991	3	3	75	19.1 ±0.115	96 ± 11.0
1990					
1989					
1988	1	1	25	26.1	232

RIVER SHEAF - ROACH

Table 1. Electric fishing efficiencies for roach calculated from triple shocks of Section 1 of River Sheaf site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	0	0	0	n/d

Table 2. Number of dace captured in each section of River Sheaf site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	0	263	0	0
Section 2	0	290	0	0
Section 3	0	286	0	0
Section 4	1	274	0.0036**	0.78**
Total	1	1113	0.00090**	0.192**

** represents minimum density and biomass

Table 3. The length weight relationship for roach at the River Sheaf site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Roach	n/a	n/a	n/a

Table 4. Number of roach captured in each year-class, year-class strengths and mean lengths and weights at the River Sheaf site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995					
1994					
1993					
1992					
1991					
1990					
1989					
1988					
1987					
1986	1	1	100	23.4	214

RIVER SHEAF - STICKLEBACK

Table 1. Electric fishing efficiencies for stickleback calculated from triple shocks of Section 1 of River Sheaf site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	0	0	0	n/d

Table 2. Number of stickleback captured in each section of River Sheaf site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	0	263	0	0
Section 2	0	290	0	0
Section 3	1	286	0.0035#	0.0126**#
Section 4	0	274	0	0
Total	1	1113	0.00090#	0.0032**#

** Estimates of biomass derived from stickleback length weight relationship for fish captured in upper Frome (Log_{10} W (g) = -1.93 + 3.14 Log_{10} L (cm).
# represents minimum density and biomass

Table 3. The length weight relationship for stickleback at the River Sheaf site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Stickleback	n/a	n/a	n/a

Table 4. Number of stickleback captured in each year-class, year-class strengths and mean lengths and weights at the River Sheaf site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d. *
1995					
1994	1	1	100	6.2	3.6*
1993					
1992					
1991					

* Estimates of biomass derived from stickleback length weight relationship for fish captured in upper Frome (Log_{10} W (g) = -1.93 + 3.14 Log_{10} L (cm)

RIVER DON U/S BULLHOUSE MINEWATER SITE

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. This site was altered from the original one chosen because of the depth of water above the weir. The site surveyed extended for 100 m either side of the mill bridge. In general the river was impacted on by the presence of the weir and also the bridge to create extensive ponded areas.

Section 1:- This was entirely ponded, but wadeable where it was still backed from the weir. It was mostly shaded from a high tree canopy.

Section 2:- This section had more riffle habitat as it approached the bridge, and had some macrophyte growth. It mainly had open banks.

Section 3:- This section comprised riffle at its lower end and some deeper ponded areas at its higher end. The bankside was mainly open with some rubbish on one bank.

Section 4:- This section was mostly ponded again, with some high canopy shading from trees.

Species present:-

Brown trout
Grayling
3 spined stickleback
Minnow

RIVER DON U/S BULLHOUSE MINEWATER - BROWN TROUT

Table 1. Electric fishing efficiencies for brown trout calculated from triple shocks of Section 1 of River Don u/s Bullhouse Minewater site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	6	2	0	8	77.9

Table 2. Number of brown trout captured in each section of River Don u/s Bullhouse Minewater site, together with density and biomass, calculated from efficiencies in Table 1 & Table 5. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	8	393	0.020	1.34
Section 2	15	299	0.064	2.03
Section 3	10	364	0.036	1.40
Section 4	24	298	0.104	7.7
Total	57	1354	0.052	2.92

Table 3. The length weight relationship for brown trout at the River Don u/s Bullhouse Minewater site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Brown Trout	- 1.70	2.81	98.9 %

Table 4. Number of brown trout captured in each year-class, year-class strengths and mean lengths and weights at the River Don u/s Bullhouse Minewater site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	14	18	25.4	9.3 ± 0.90	10.8 ±2.90
1994	15	19	26.8	12.6 ± 0.99	24.9 ± 5.6
1993	15	18	25.4	16.9 ± 1.43	57.1 ±13.7
1992	13	16	22.4	23.1 ± 2.74	140 ± 49
1991					

Table 5. Information for HABSCORE from the River Don u/s Bullhouse Minewater site. Section 1 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section together with density (n m^{-2}) in brackets				Estimated total biomass in each section (g) together with g m^{-2} in brackets			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	0/0/0	7	3	4	n/d (77.9)*	0 (0)	9 (0.030)	4 (0.0110)	5 (0.0168)	0 (0)	97 (0.32)	43 (0.118)	54 (0.181)
Trout <20 cm older than 1	6/0/0	7	6	11	100 (77.9)*	6 (0.0153)	9 (0.030)	8 (0.0220)	14 (0.047)	246 (0.63)	369 (1.23)	328 (0.90)	574 (1.93)
Trout >20 cm	0/2/0	1	1	9	n/d (77.9)*	2 (0.0051)	1 (0.0033)	1 (0.0028)	12 (0.040)	280 (0.71)	140 (0.47)	140 (0.38)	1676 (5.6)

* The numbers of trout captured were so low that individual efficiencies either could not be estimated or were unrealistic for each age and size class. Therefore the efficiencies estimated in Table 1 were used to estimate the numbers and biomass of brown trout in each sectio, as this was considered to give the most realistic values.

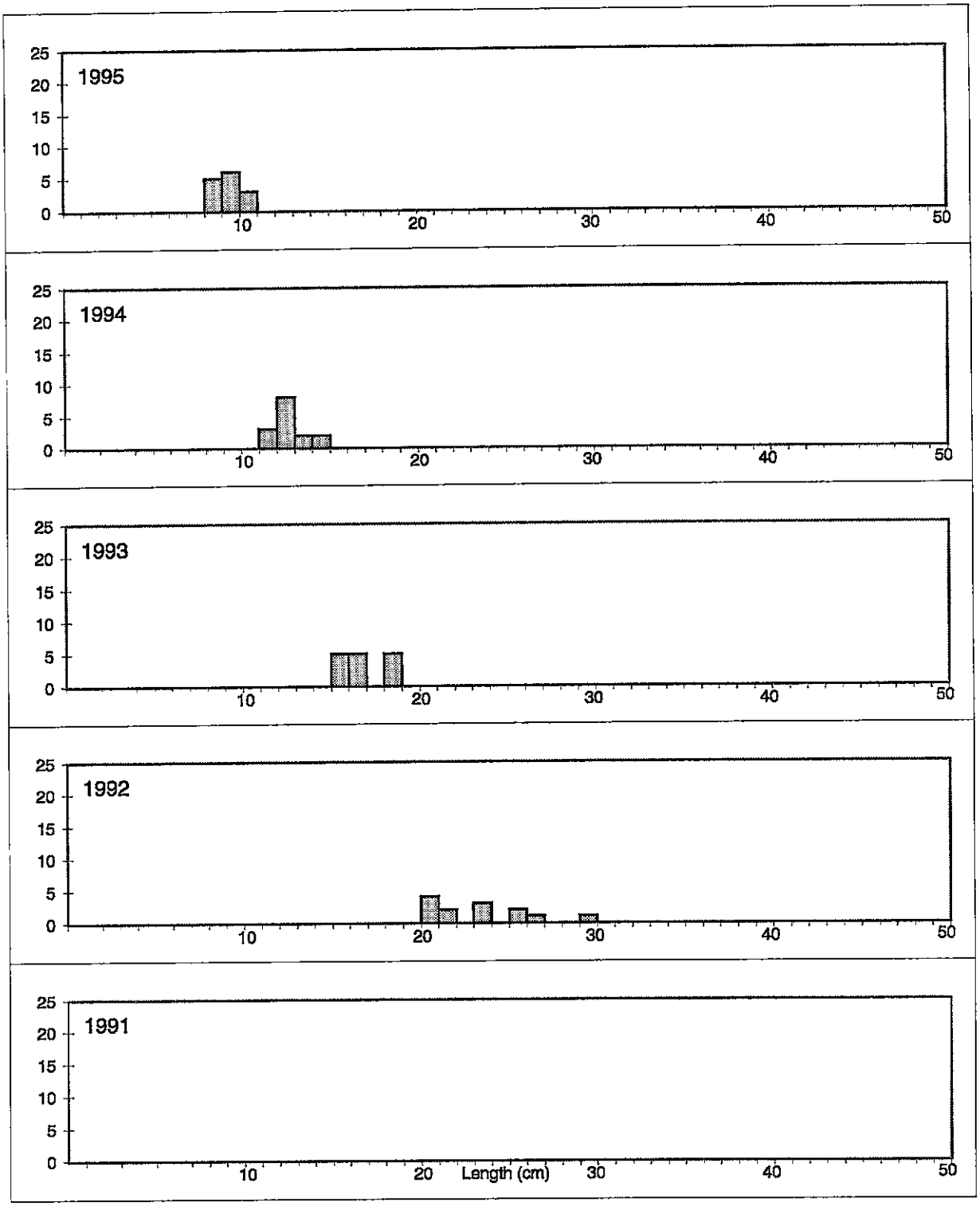


Figure ? Length frequency histogram of each year class of trout captured at River Don u/s Bullhouse Minewater

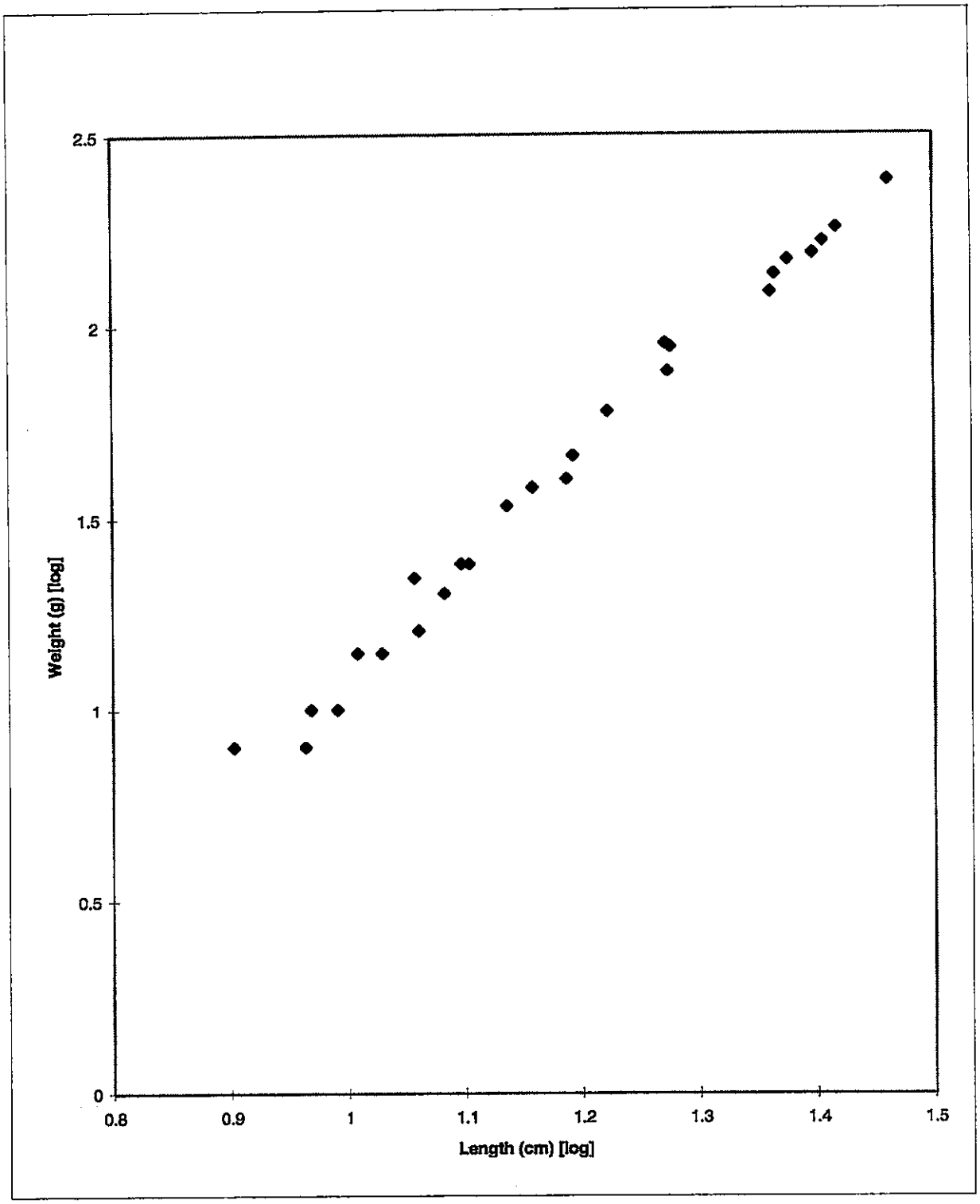


Figure ? Length [log] and weight [log] for brown trout at the River Don u/s Bullhouse Minewater

RIVER DON U/S BULLHOUSE MINEWATER - GRAYLING

Table 1. Electric fishing efficiencies for grayling calculated from triple shocks of Section 1 of River Don u/s Bullhouse Minewater site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	1	1	0	2	56.5

Table 2. Number of grayling captured in each section of River Don u/s Bullhouse Minewater site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	2	393	0.0051	0.173
Section 2	0	299	0	0
Section 3	1	364	0.0055	0.097
Section 4	1	298	0.0034	1.45
Total	4	1354	0.0037	0.40

Table 3. The length weight relationship for grayling at the River Don u/s Bullhouse Minewater site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Grayling	-2.09	3.11	99.9 %

Table 4. Number of grayling captured in each year-class, year-class strengths and mean lengths and weights at the River Don u/s Bullhouse Minewater site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	2	4	50	10.5 ± 2.9	13.0 ± 9.9
1994	1	2	25	17.5	62
1993	1	2	25	27.9	244
1992					
1991					

RIVER DON U/S BULLHOUSE MINEWATER - STICKLEBACK

Table 1. Electric fishing efficiencies for stickleback calculated from triple shocks of Section 1 of River Don u/s Bullhouse Minewater site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	4	2	2	11	31.8

Table 2. Number of stickleback captured in each section of River Don u/s Bullhouse Minewater site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	8	393	0.0280	0.255**
Section 2	1	299	0.0100	0.0105**
Section 3	1	364	0.0082	0.0114**
Section 4	2	298	0.0201	0.0193**
Total	12	1354	0.0170	0.084**

** Estimates of biomass derived from stickleback length weight relationship for fish captured in upper Frome (Log_{10} W (g) = -1.93 + 3.14 Log_{10} L (cm)

Table 3. The length weight relationship for stickleback at the River Don u/s Bullhouse Minewater site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Stickleback	n/a	n/a	n/a

Table 4. Number of stickleback captured in each year-class, year-class strengths and mean lengths and weights at the River Don u/s Bullhouse Minewater site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d. *
1995	4	13	34.2	3.05 ± 0.24	0.40±0.103
1994	8	25	65.8	4.35±0.58	1.25±0.55
1993					
1992					
1991					

* Estimates of biomass derived from stickleback length weight relationship for fish captured in upper Frome (Log_{10} W (g) = -1.93 + 3.14 Log_{10} L (cm)

RIVER DON U/S BULLHOUSE MINEWATER - MINNOWS

Table 1. Electric fishing efficiencies for minnows calculated from triple shocks of Section 1 of River Don u/s Bullhouse Minewater site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	76	38	20	154	48.9

Table 2. Number of minnows captured in each section of River Don u/s Bullhouse Minewater site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	134	393	0.39	0.70
Section 2	9	299	0.060	0.35
Section 3	18	364	0.102	0.34
Section 4	29	298	0.198	0.45
Total	190	1354	0.140	0.47

Table 3. The length weight relationship for minnows at the River Don u/s Bullhouse Minewater site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Minnows	-2.08	3.19	99.8 %

Table 4. Number of minnows captured in each year-class, year-class strengths and mean lengths and weights at the River Don u/s Bullhouse Minewater site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	19	39	10.6	3.1 ± 0.233	0.32±0.071
1994	138	282	76.6	5.2 ± 0.37	1.69 ±0.37
1993	23	47	12.8	7.5 ± 0.76	5.4 ±1.79
1992					
1991					

RIVER DON D/S WINSCAR RESERVOIR

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This section had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

Species present:-

Brown trout

RIVER DON D/S WINSCAR RESERVOIR - BROWN TROUT

Table 1. Electric fishing efficiencies for brown trout calculated from triple shocks of Section 2 of River Don d/s Winscar Reservoir site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	24	17	7	59	42.7

Table 2. Number of brown trout captured in each section of River Don d/s Winscar Reservoir site, together with density and biomass, calculated from efficiencies in Table 5. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	16	100	0.40	6.0
Section 2*	48	90	0.66	7.8
Section 3	19	93	0.49	6.2
Section 4	17	122	0.34	4.7
Total	100	405	0.46	6.0

Table 3. The length weight relationship for brown trout at the River Don d/s Winscar Reservoir site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Brown Trout	- 2.31	3.31	98.3 %

Table 4. Number of brown trout captured in each year-class, year-class strengths and mean lengths and weights at the River Don d/s Winscar Reservoir site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	28	42	22.5	5.6 ± 0.95	1.62 ±0.91
1994	63	127	67.9	10.5 ± 1.26	12.4 ± 5.2
1993	9	18	9.6	15.6 ± 1.07	44.6 ±10.2
1992	0	0	0	n/a	n/a
1991	0	0	0	n/a	n/a

Table 5. Information for HABSCORE from the River Don d/s Winscar Reservoir site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section together with density (n m^{-2}) in brackets				Estimated total biomass in each section (g) together with g m^{-2} in brackets			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	2	8/7/1	6	4	50.8	4 (0.040)	18 (0.20)	12 (0.129)	8 (0.066)	6.5 (0.065)	29.2 (0.324)	19.4 (0.209)	13.0 (0.107)
Trout <20 cm older than 1	14	16/10/6	13	13	38.5	36 (0.36)	41 (0.46)	34 (0.37)	34 ~~(0.37)~~ 0.279	590 (5.9)	672 (7.5)	558 (6.0)	558 (4.6)
Trout >20 cm	0	0/0/0	0	0	n/a								

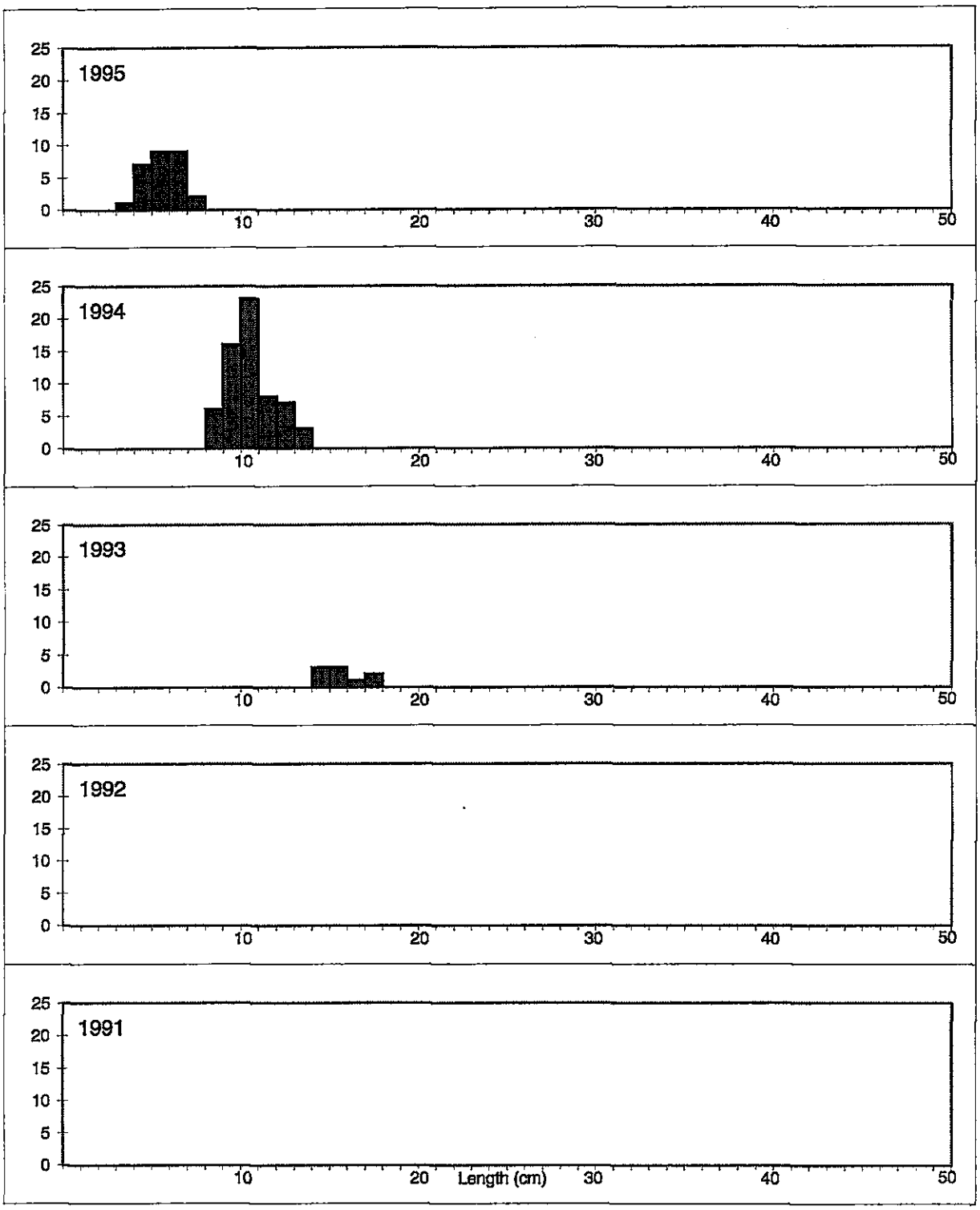


Figure ? Length frequency histogram of each year class of brown trout captured at River Don d/s Winscar Reservoir.

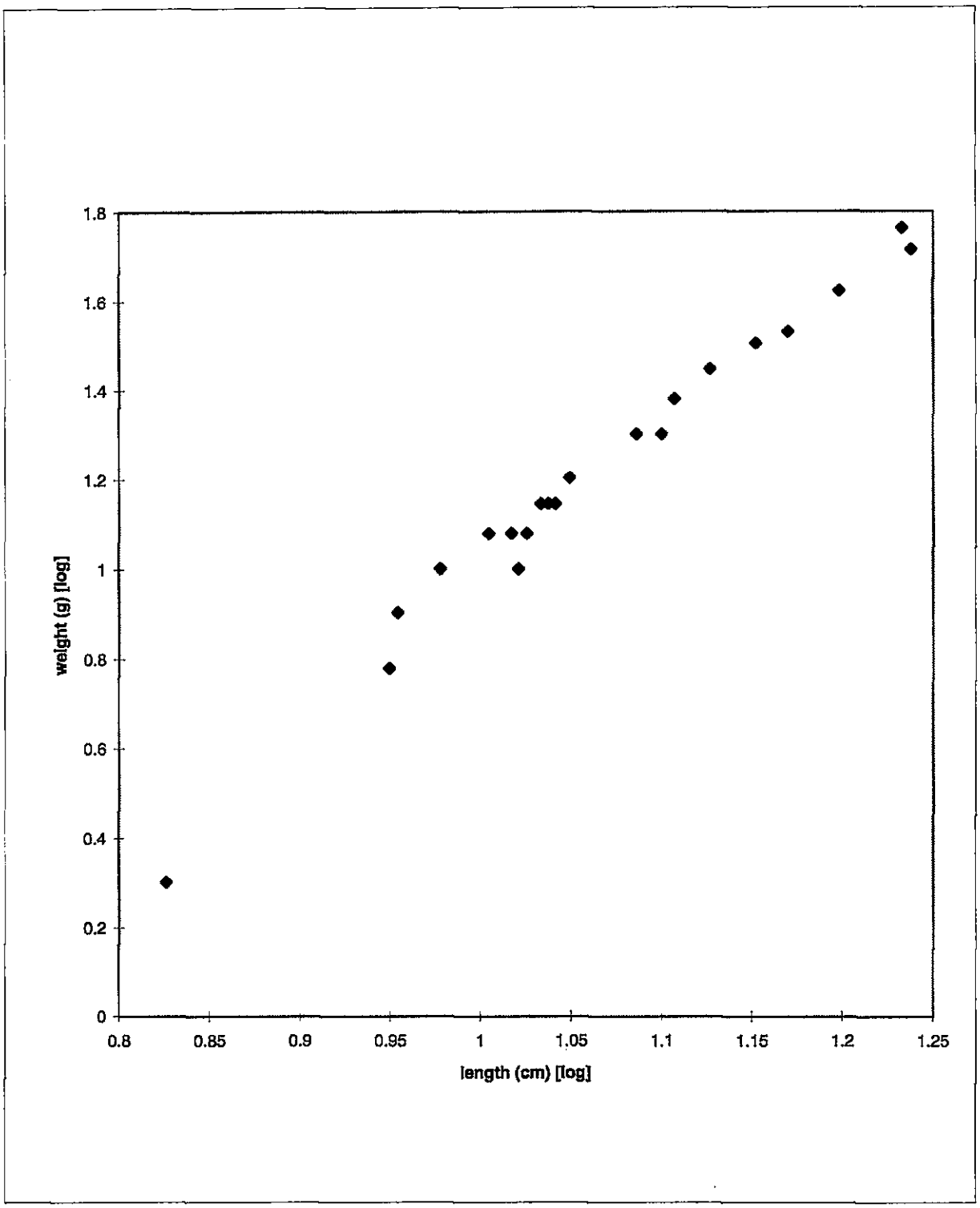


Figure ? Length [log] and weight [log] for brown trout at the River Don d/s Winscar Reservoir site

RIVER DON AT OXSPRING

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general the whole site was shaded by a high canopy of trees.

Section 1:- This section was very shallow throughout its entire length.

Section 2:- This section had more deeper water and some areas with submerged tree roots.

Section 3:- This section had some deeper water and the substrate size was large.

Section 4:- Most of this section was shallow, with the exception of a deep part at the top. Again substrate size was large.

Species present:-

Brown trout
Grayling
Bullhead
Minnow
Stone loach
3 spined stickleback

RIVER DON AT OXSPRING - BROWN TROUT

Table 1. Electric fishing efficiencies for brown trout calculated from triple shocks of Section 2 of River Don at Oxspring site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	8	2	1	11	68.4

Table 2. Number of brown trout captured in each section of River Don at Oxspring site, together with density and biomass, calculated from efficiencies in Table 5. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	2	392	0.0077	0.61
Section 2*	11	408	0.0270	3.0
Section 3	5	430	~~0.0163~~ 0.0186	0.235
Section 4	2	439	0.0068	0.198
Total	20	1669	0.0150	0.99

Table 3. The length weight relationship for brown trout at the River Don at Oxspring site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Brown Trout	- 2.27	3.24	98.9 %

Table 4. Number of brown trout captured in each year-class, year-class strengths and mean lengths and weights at the River Don at Oxspring site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	12	17	68	10.7 ± 1.78	12.6 ± 6.0
1994	1	1	4	17.9	61.6
1993	6	6	24	25.2 ± 2.9	194 ± 65
1992	1	1	4	25.6	196
1991					

Table 5. Information for HABSCORE from the River Don at Oxspring site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section together with density (n m^{-2}) in brackets				Estimated total biomass in each section (g) together with g m^{-2} in brackets			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	1	4/0/1	5	1	65.3	2 (0.0051)	5 (0.0123)	8 0.0186 (0.0197)	2 (0.0046)	25 (0.064)	63 (0.154)	101 (0.235)	25 (0.057)
Trout <20 cm older than 1	0	0/0/0	0	1	n/d (68.4)	0 (0)	0 (0)	0 (0)	1 (0.0023)	0 (0)	0 (0)	0 (0)	62 (0.141)
Trout >20 cm	1	4/2/0	0	0	71.0	1 (0.0026)	6 (0.0147)	0 (0)	0 (0)	216 (0.55)	1166 (2.86)	0 (0)	0 (0)

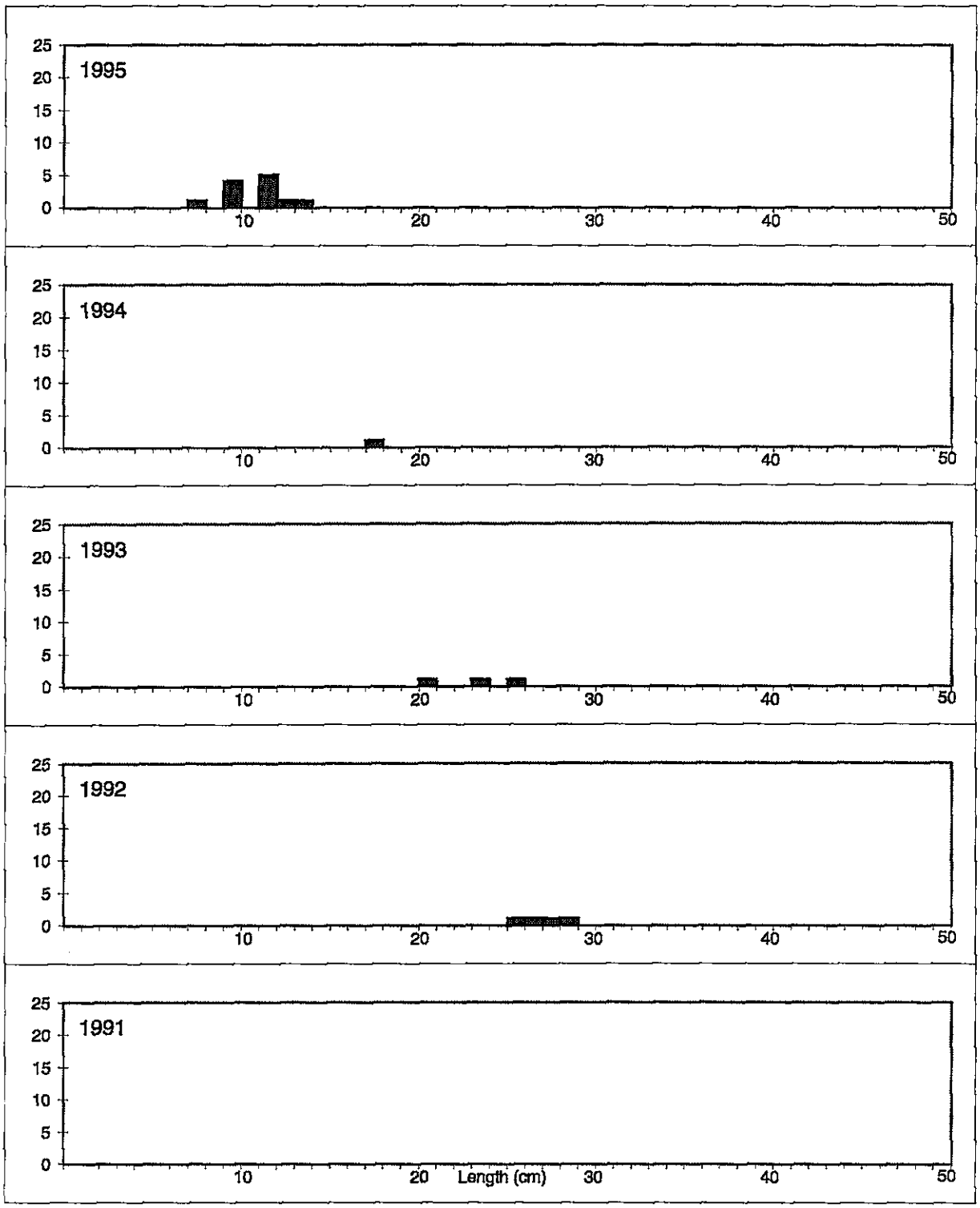


Figure ? Length frequency histogram of each year class of brown trout captured at River Don at Oxspring

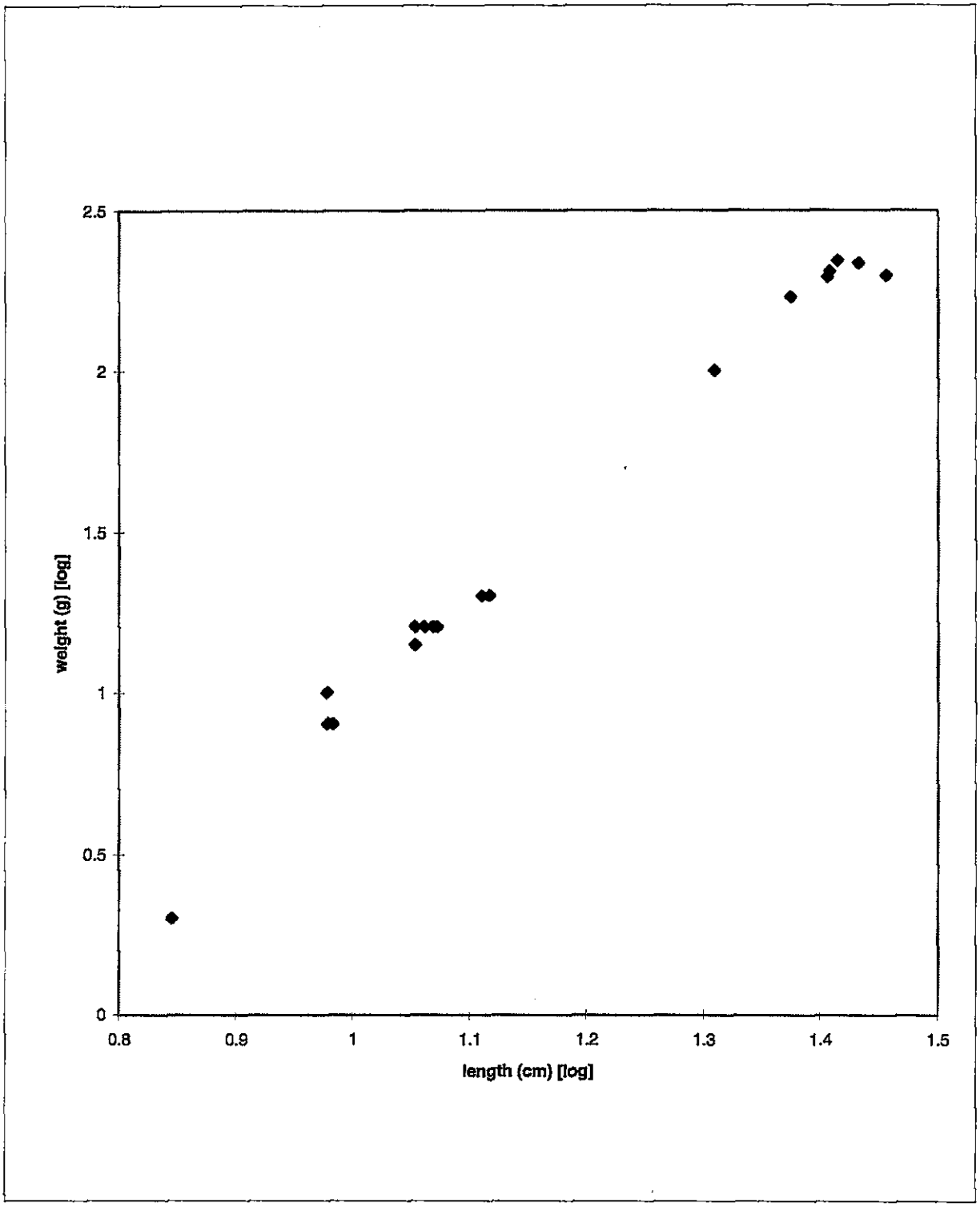


Figure ? Length [log] and weight [log] for brown trout at River Don at Oxspring

RIVER DON AT OXSPRING - STICKLEBACK

Table 1. Electric fishing efficiencies for stickleback calculated from triple shocks of Section 2 of River Don at Oxspring site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	0	0	0	n/d

Table 2. Number of stickleback captured in each section of River Don at Oxspring site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	0	392	0	0
Section 2*	0	408	0	0
Section 3	1	430	0.00275#	0.0033**#
Section 4	0	439	0	0
Total	1	1669	0.00060#	0.0006**#

** Estimates of biomass derived from stickleback length weight relationship for fish captured in upper Frome (Log_{10} W (g) = -1.93 + 3.14 Log_{10} L (cm)

represents minimum densities and biomass

Table 3. The length weight relationship for stickleback at the River Don at Oxspring site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Stickleback	n/a	n/a	n/a

Table 4. Number of stickleback captured in each year-class, year-class strengths and mean lengths and weights at the River Don at Oxspring site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d. *
1995					
1994	1	1	100	4.6	1.42
1993					
1992					
1991					

* Estimates of biomass derived from stickleback length weight relationship for fish captured in upper Frome (Log_{10} W (g) = -1.93 + 3.14 Log_{10} L (cm)

RIVER DON AT OXSPRING - MINNOWS

Table 1. Electric fishing efficiencies for minnows calculated from triple shocks of Section 2 of River Don at Oxspring site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	31	14	39	n/a	n/d

Table 2. Number of Minnows captured in each section of River Don at Oxspring site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	0	392	0	0
Section 2*	84	408	0.206**	0.60**
Section 3	11	430	0.0256**	0.084**
Section 4	4	439	0.0091**	0.041**
Total	99	1669	0.059**	0.0178**

** *represent minimum densities and biomass*

Table 3. The length weight relationship for minnows at the River Don at Oxspring site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Minnows	- 2.01	3.17	99.1 %

Table 4. Number of minnows captured in each year-class, year-class strengths and mean lengths and weights at the River Don at Oxspring.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	2	2	2.0	3.7 ± 0.14	0.62±0.075
1994	87	87	87.9	5.8 ± 0.29	2.60 ±0.41
1993	10	10	10.1	7.9±0.64	6.9± 1.74
1992					
1991					

RIVER DON AT OXSPRING - STONE LOACH

Table 1. Electric fishing efficiencies for stone loach calculated from triple shocks of Section 2 of River Don at Oxspring site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	6	3	5	n/a	n/d

Table 2. Number of stone loach captured in each section of River Don at Oxspring site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	0	392	0	0
Section 2*	14	408	0.034#	0.30**#
Section 3	2	430	0.0047#	0.039**#
Section 4	1	439	0.0023#	0.0162**#
Total	17	1669	0.0102#	0.088**#

** Estimates of biomass derived from stone loach length weight relationship for fish captured in River Rivelin ar Rivelin Mill (Log_{10} W (g) = -2.33 + 3.21 Log_{10} L (cm)

represents minimum densities and biomass

Table 3. The length weight relationship for stone loach at the River Don at Oxspring site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Stone loach	- 2.44	3.38	99.1 %

Table 4. Number of stone loach captured in each year-class, year-class strengths and mean lengths and weights at the River Don at Oxspring.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995					
1994	9	9	52.9	8.7 ± 0.64	5.0 ± 1.23
1993	8	8	47.1	11.7±0.81	12.8± 2.92
1992					
1991					

RIVER DON AT OXSPRING - GRAYLING

Table 1. Electric fishing efficiencies for grayling calculated from triple shocks of Section 2 of River Don at Oxspring site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	3	3	1	9	35.7

Table 2. Number of grayling captured in each section of River Don at Oxspring site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	0	392	0	0
Section 2*	7	408	0.022	1.85
Section 3	2	430	0.0140	0.195
Section 4	1	439	0.0068	0.077
Total	10	1669	0.0108	0.52

Table 3. The length weight relationship for grayling at the River Don at Oxspring site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Grayling	- 2.44	3.38	99.1 %

Table 4. Number of grayling captured in each year-class, year-class strengths and mean lengths and weights at the River Don at Oxspring.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	6	17	60.7	11.1 ± 1.52	12.7±4.3
1994	1	3	10.7	18.2	72
1993	3	8	28.6	23.5±0.64	160 ±12.5
1992					
1991					

RIVER DON AT OXSPRING - BULLHEADS

Table 1. Electric fishing efficiencies for bullheads calculated from triple shocks of Section 2 of River Don at Oxspring site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	26	11	10	58	41.4

Table 2. Number of bullheads captured in each section of River Don at Oxspring site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	31	392	0.191	0.35
Section 2*	47	408	0.142	0.56
Section 3	18	430	0.100	0.33
Section 4	9	439	0.050	0.171
Total	105	1669	0.118	0.35

Table 3. The length weight relationship for bullheads at the River Don at Oxspring site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Bullheads	- 1.98	3.10	98.1 %

Table 4. Number of bullheads captured in each year-class, year-class strengths and mean lengths and weights at the River Don at Oxspring.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	16	39	15.4	3.3 ± 0.31	0.42±0.123
1994	79	191	75.2	6.0± 0.65	2.86± 0.95
1993	10	24	9.4	8.0 ± 0.41	6.6 ±1.00
1992					
1991					

EWDEN BECK SITE

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. There were two options for this site. Option 2, the site furthest from the dam was selected. There was good visibility, except in one place where the water was very deep on one bank and not easily accessible and were a tree was lying across the river.

Section 1:- This section comprised almost entirley of shallow riffle and the river was wide here. The river was split by an island at the top end.

Section 2:- This section was nearly all ponded with a very deep section on one bank which was not wadeable. Fishing that part was difficult.

Section 3:- There was a great deal of woody debris in this section associated with a fallen tree. Fishing was difficult in this area.

Section 4:- This section had a typical riffle pool form and was selected for the triple shock.

Species present:-

Brown trout
Rainbow trout
Roach

EWDEN BECK SITE - BROWN TROUT

Table 1. Electric fishing efficiencies for brown trout calculated from triple shocks of Section 4 of Ewden Beck site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	50	17	4	73	69.4

Table 2. Number of brown trout captured in each section of Ewden Beck site, together with density and biomass, calculated from efficiencies in Table 5. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	34	500	0.102	2.27
Section 2	52	345	0.209	7.8
Section 3	32	319	0.150	3.3
Section 4*	71	253	0.289	8.1
Total	189	1417	0.172	4.9

Table 3. The length weight relationship for brown trout at the Ewden Beck site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

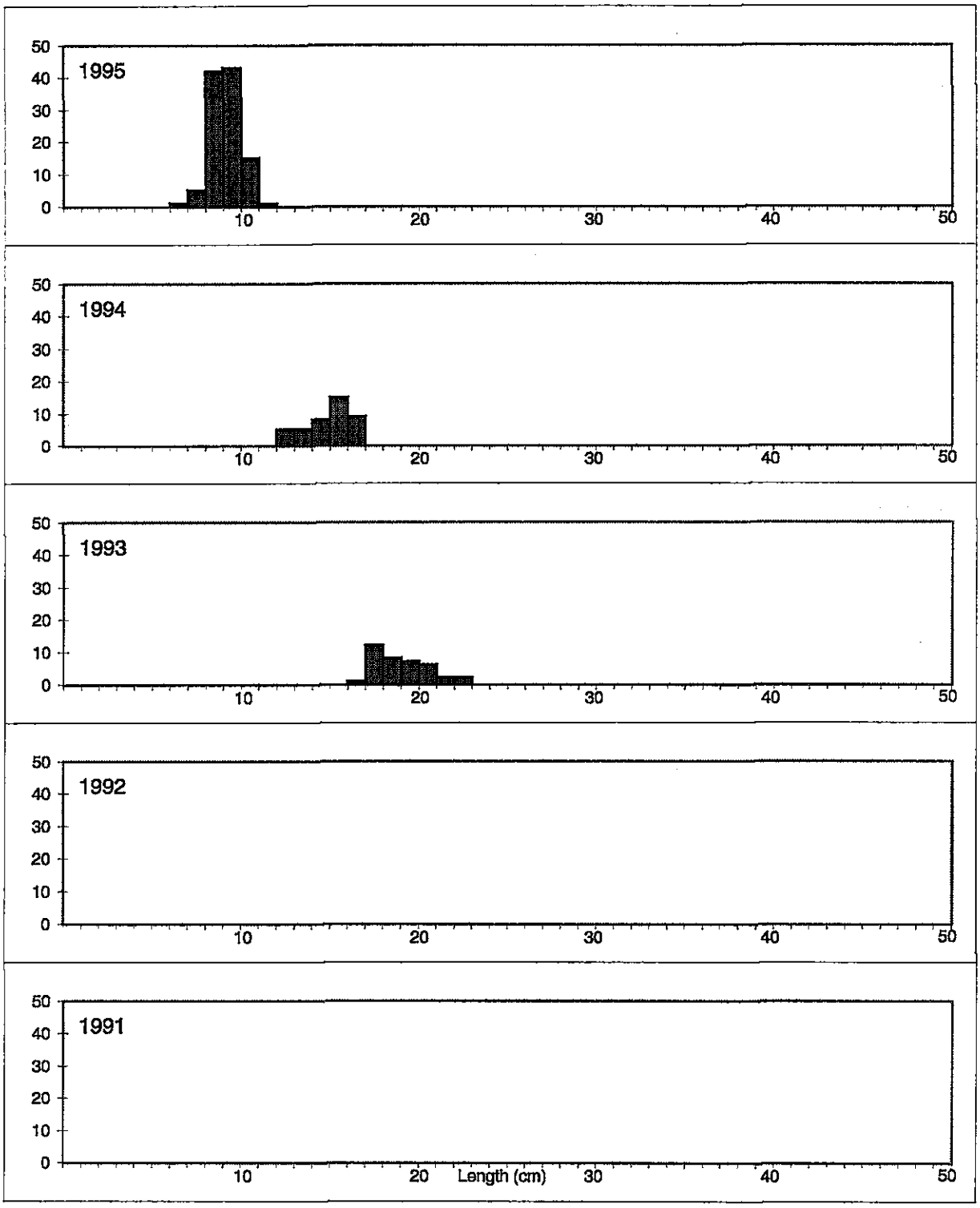
	a	b	R^2
Brown Trout	- 1.74	2.83	99.1 %

Table 4. Number of brown trout captured in each year-class, year-class strengths and mean lengths and weights at the Ewden Beck site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	107	145	59.4	9.1 ± 0.81	9.5 ± 2.41
1994	42	52	21.3	14.9 ± 1.23	39 ± 8.6
1993	38	47	19.3	18.9 ± 1.58	76 ± 18.5
1992	0	0	0	n/a	n/a
1991	0	0	0	n/a	n/a

Table 5. Information for HABSCORE from the Ewden Beck site. Section 4 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section together with density (n m^{-2}) in brackets				Estimated total biomass in each section (g) together with g m^{-2} in brackets			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	23	20	21	28/12/3	63.7	36 (0.072)	31 (0.090)	33 (0.103)	45 (0.178)	342 (0.68)	295 (0.86)	314 (0.98)	428 (1.69)
Trout <20 cm older than 1	10	26	11	17/5/1	73.4	14 (0.028)	35 (0.101)	15 (0.047)	23 (0.091)	700 (1.4)	1750 (5.1)	750 (2.35)	1150 (4.5)
Trout >20 cm	1	6	0	5/0/0	100	1 (0.002)	6 (0.0174)	0 (0)	5 (0.0198)	95 (0.19)	630 (1.83)	0 (0)	483 (1.91)



Length frequency histogram of each year class of brown trout captured at Ewden Beck.

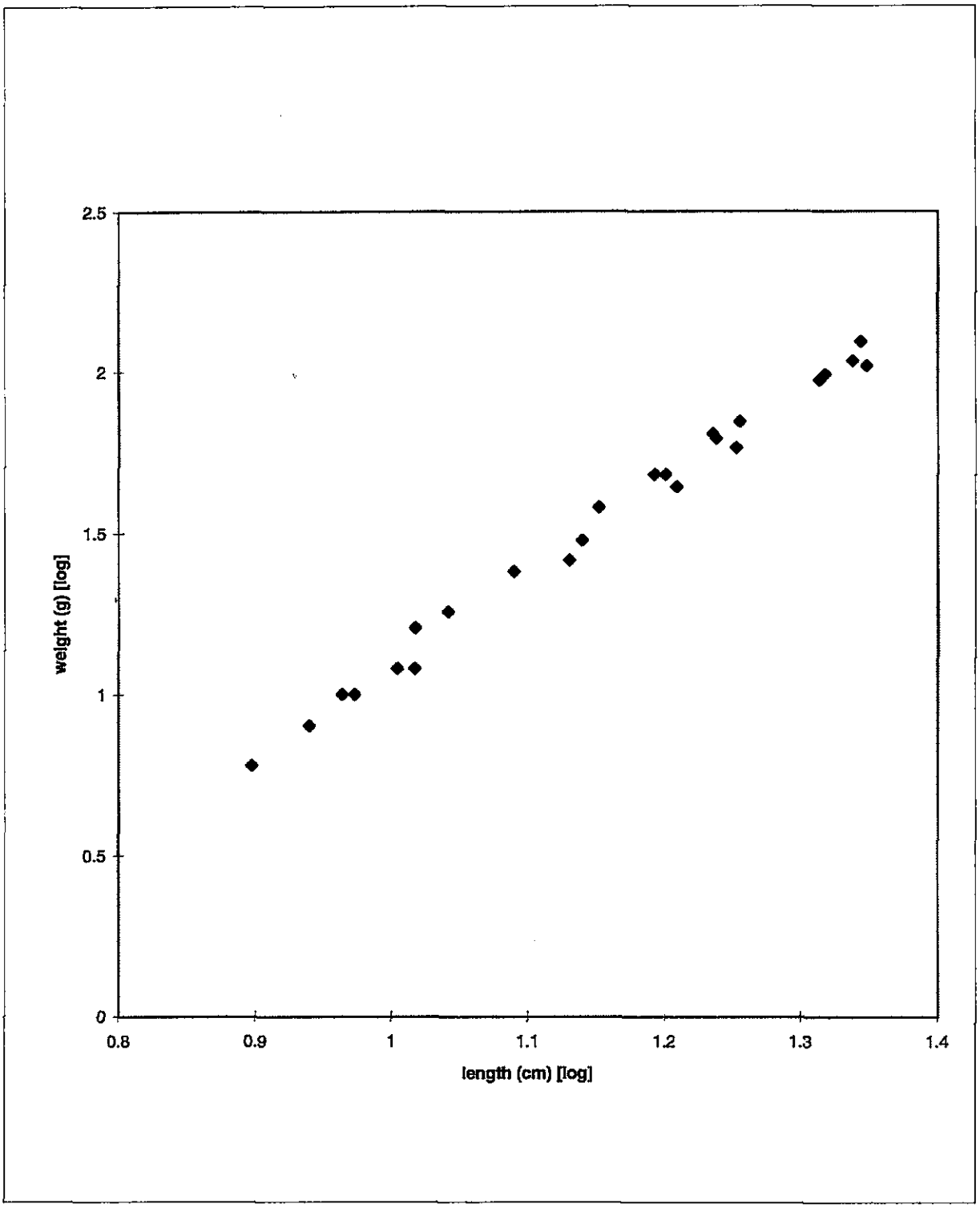


Figure ? Length [log] and weight [log] for brown trout at the Ewden Beck site

EWDEN BECK SITE - RAINBOW TROUT

Table 1. Electric fishing efficiencies for rainbow trout calculated from triple shocks of Section 4 of Ewden Beck site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	10	0	1	11	83.6

Table 2. Number of rainbow trout captured in each section of Ewden Beck site, together with density and biomass, calculated from efficiencies in Table 5. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	16	500	0.038	0.55
Section 2	3	345	0.0087	0.41
Section 3	8	319	0.0282	0.52
Section 4*	11	253	0.043	0.63
Total	38	1417	0.030	0.52

Table 3. The length weight relationship for rainbow trout at the Ewden Beck site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Rainbow Trout	- 1.51	2.63	98.9 %

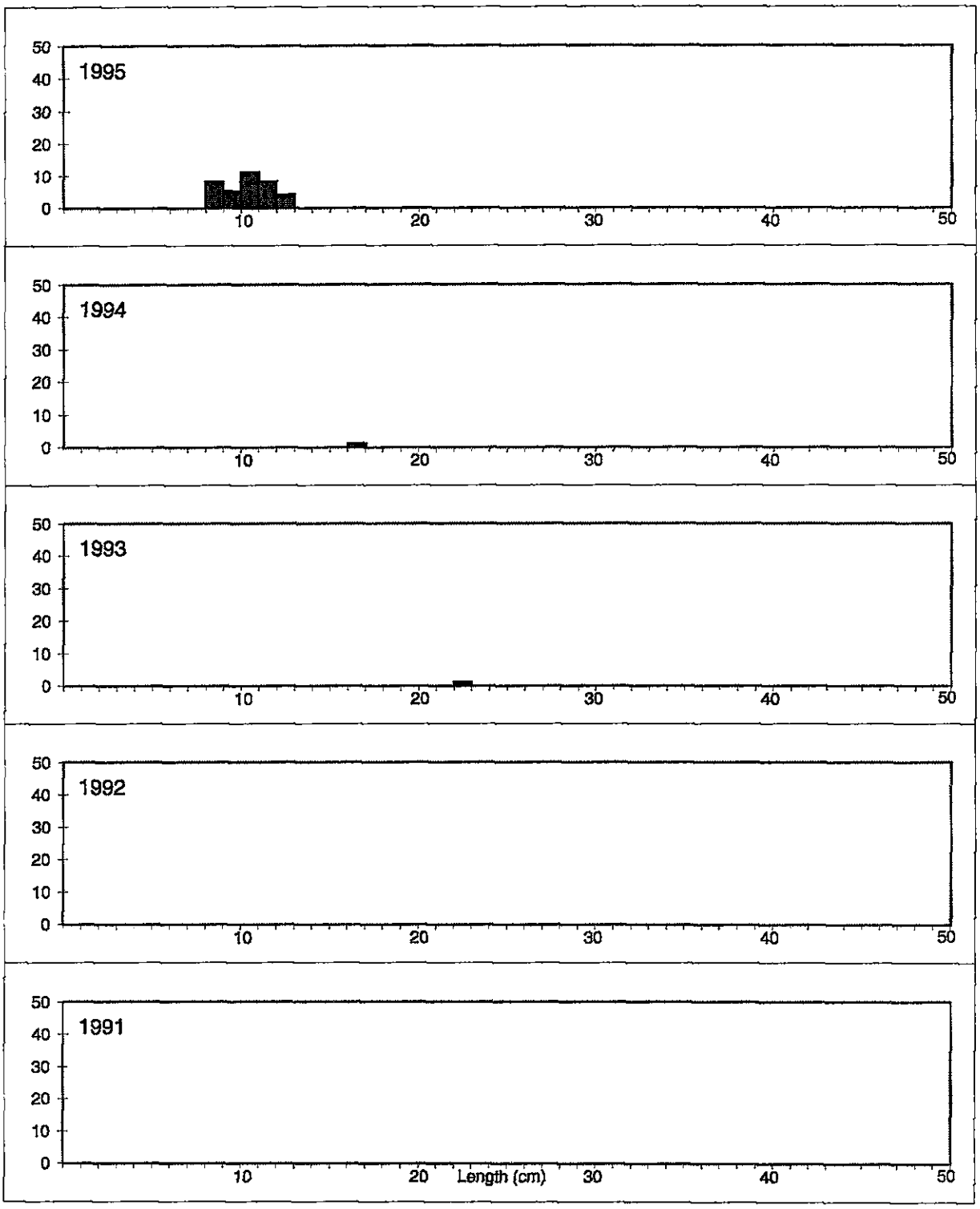
Table 4. Number of rainbow trout captured in each year-class, year-class strengths and mean lengths and weights at the Ewden Beck site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	36	40	95.2	10.2 ± 1.28	14.5 ± 4.6
1994	1	1	2.4	16.0 ±	50 ±
1993	1	1	2.4	22.5 ±	112 ±
1992	0	0	0	n/a	n/a
1991	0	0	0	n/a	n/a

Table 5. Information for HABSCORE from the Ewden Beck site. Section 4 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section together with density (n m^{-2}) in brackets				Estimated total biomass in each section (g) together with g m^{-2} in brackets			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	16	2	7	10/0/1	83.6	19 (0.038)	2 (0.006)	8 (0.025)	11 (0.043)	276 (0.55)	29 (0.084)	116 (0.36)	160 (0.63)
Trout <20 cm older than 1	0	0	1	0/0/0	n/d	0 (0)	0 (0)	1* (0.003)	0 (0)	0 (0)	0 (0)	50* (0.157)	0 (0)
Trout >20 cm	0	1	0	0/0/0	n/d	0 (0)	1* (0.003)	0 (0)	0 (0)	0 (0)	112* (0.32)	0 (0)	0 (0)

* Minimum density values



Length frequency histogram of each year class of rainbow trout captured at Ewden Beck.

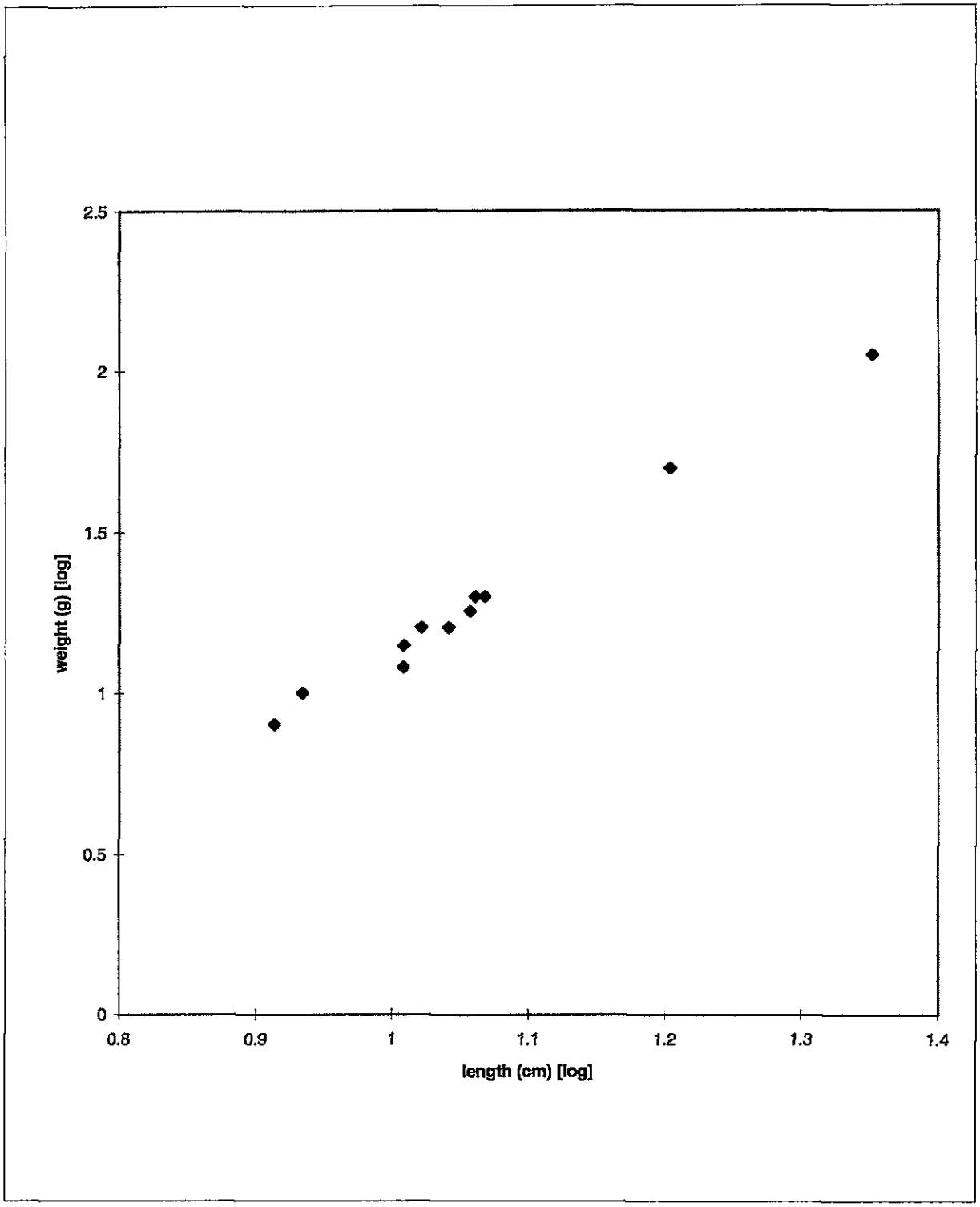


Figure ? Length [log] and weight [log] for rainbow trout at the Ewden Beck site

EWDEN BECK SITE - ROACH

Table 1. Electric fishing efficiencies for roach calculated from triple shocks of Section 4 of Ewden Beck site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	0	0	0	n/d

Table 2. Number of roach captured in each section of Ewden Beck site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	0	500	0	0
Section 2	1**	345	0.00290**	0.139**
Section 3	0	319	0	0
Section 4*	0	253	0	0
Total	1	1417	0.00071**	0.034**

** represents minimum density and biomass

Table 3. The length weight relationship for roach at the Ewden Beck site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Roach	n/a	n/a	n/a

Table 4. Number of roach captured in each year-class, year-class strengths and mean lengths and weights at the Ewden Beck site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	0	0	0	n/a	n/a
1994	1	1	100	14.4	48
1993	0	0	0	n/a	n/a
1992	0	0	0	n/a	n/a
1991	0	0	0	n/a	n/a

LITTLE DON D/S UNDERBANK RESERVOIR SITE

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general the water clarity was poor, with diffuse light and large amount of ochrous deposits. The substrate size was large, making efficiency of capture of bullheads low.

Section 1, 2 & 3:- These sections were similar in character, mostly shallow riffle flowing over ochrous coated substrate. Shaded by high tree canopy.

Section 4:- This section was very different in character, because the top of this section was a weir with a bridge immediately below. Most of the fish from this section came from the weir pool.

Species present:-

Brown trout
Bullheads
Perch
Ruffe

LITTLE DON D/S UNDERBANK RESERVOIR - BROWN TROUT

Table 1. Electric fishing efficiencies for brown trout calculated from triple shocks of Section 1 of Little Don d/s Underbank Reservoir site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	8	5	4	25	30.2

Table 2. Number of brown trout captured in each section of Little Don d/s Underbank Reservoir site, together with density and biomass, calculated from efficiencies in Table 1 & Table 5. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	17	328	0.061	4.1
Section 2	6	416	0.041	1.34
Section 3	1	416	0.0072	0.075
Section 4	8	363	0.033	6.5
Total	32	1523	0.034	2.82

Table 3. The length weight relationship for brown trout at the Little Don d/s Underbank Reservoir site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Brown Trout	- 1.90	2.93	99.3 %

Table 4. Number of brown trout captured in each year-class, year-class strengths and mean lengths and weights at the Little Don d/s Underbank Reservoir site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	16	32	61.5	9.6 ± 1.39	10.2 ± 4.4
1994	4	6	11.5	17.3 ± 0.87	53 ± 8.0
1993	6	7	13.5	24.2 ± 1.98	144 ± 35
1992	4	5	9.6	30.2 ± 1.49	273 ± 41
1991	2	2	3.9	39.9 ± 4.7	628 ± 215

Table 5. Information for HABSCORE from the Little Don d/s Underbank Reservoir site. Section 1 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section together with density (n m^{-2}) in brackets				Estimated total biomass in each section (g) together with g m^{-2} in brackets			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	4/2/4	4	1	1	n/d (30.2)*	13 (0.040)	13 (0.031)	3 (0.0072)	3 (0.0083)	133 (0.41)	133 (0.32)	31 (0.075)	31 (0.085)
Trout <20 cm older than 1	1/2/0	1	0	0	n/d (30.2)*	3 (0.0091)	3 (0.0072)	0 (0)	0 (0)	165 (0.50)	165 (0.40)	0 (0)	0 (0)
Trout >20 cm	3/1/0	1	0	7	77.9	4 (0.0122)	1 (0.0024)	0 (0)	9 (0.0248)	1040 (3.2)	260 (0.63)	0 (0)	2340 (6.5)

* Where the efficiency for individual size groups could not be estimated, because there was no depletion, the estimated efficiency for all sizes of trout was used as this was considered to best represent the estimated numbers of fish and biomass in the site.

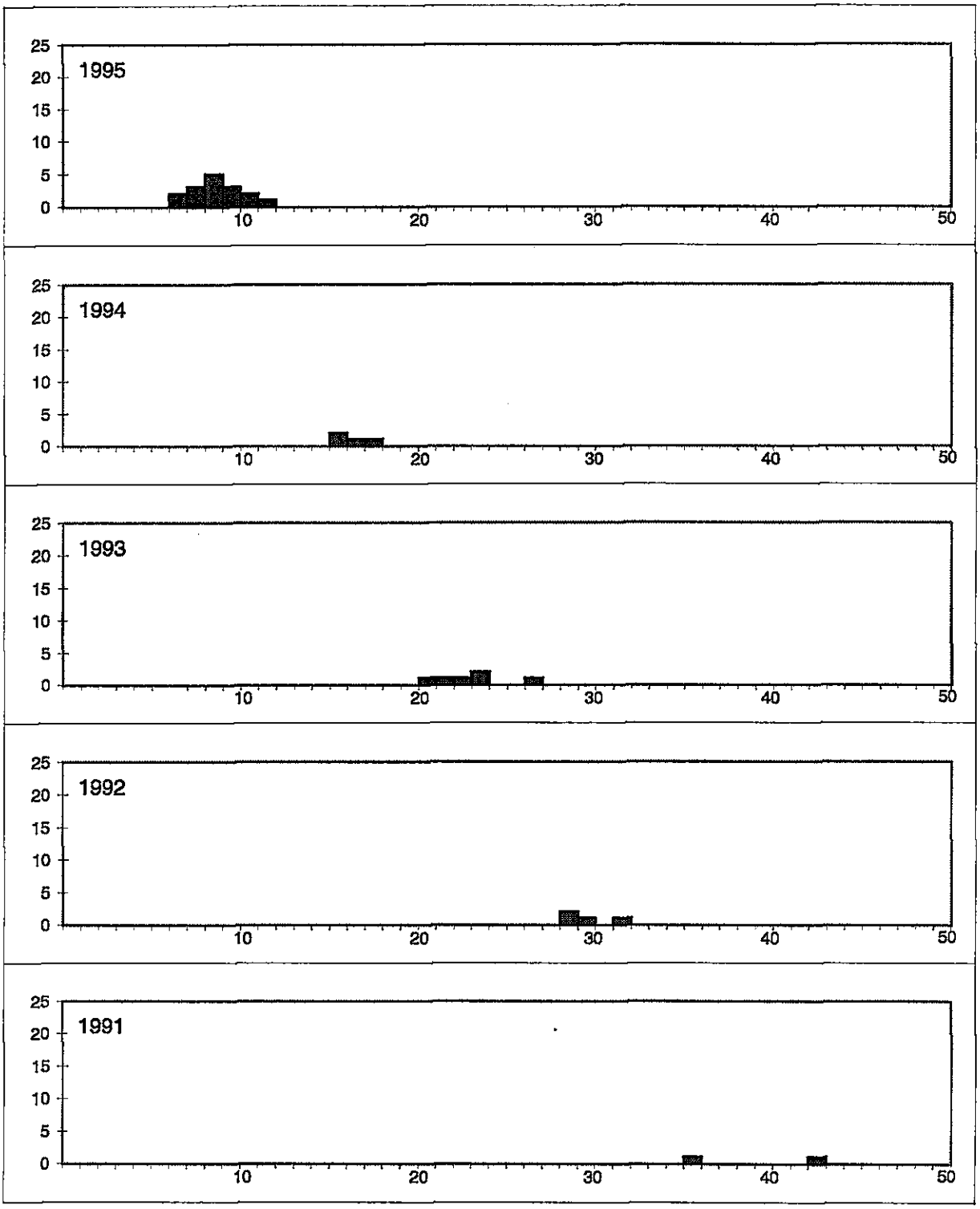


Figure ? Length frequency histogram of each year class of trout captured at Little Don d/s Underbank Reservoir

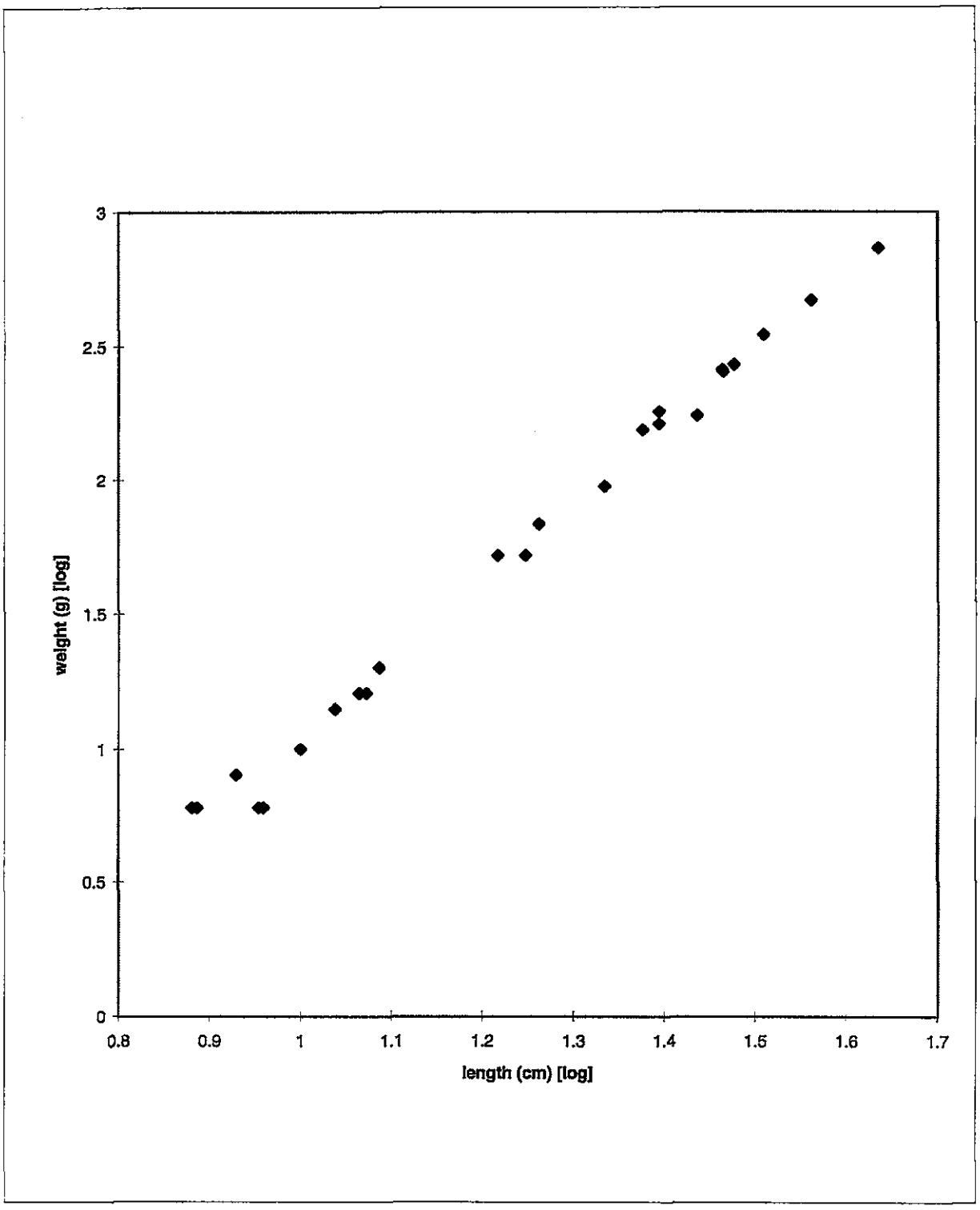


Figure ? Length [log] and weight [log] for brown trout at the Little Don d/s Underbank Reservoir site

LITTLE DON D/S UNDERBANK RESERVOIR - RUFFE

Table 1. Electric fishing efficiencies for ruffe calculated from triple shocks of Section 1 of Little Don d/s Underbank Reservoir site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	0	0	0	n/d

Table 2. Number of ruffe captured in each section of Little Don d/s Underbank Reservoir site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	0	328	0	0
Section 2	0	416	0	0
Section 3	0	416	0	0
Section 4	1	363	0.028**	0.0220**
Total	1	1523	0.00066**	0.0053**

** represents minimum density and biomass

Table 3. The length weight relationship for ruffe at the Little Don d/s Underbank Reservoir site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Ruffe	n/a	n/a	n/a

Table 4. Number of ruffe captured in each year-class, year-class strengths and mean lengths and weights at the Little Don d/s Underbank Reservoir site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995					
1994	1	1	100	8.8	8
1993					
1992					
1991					

LITTLE DON D/S UNDERBANK RESERVOIR - PERCH

Table 1. Electric fishing efficiencies for perch calculated from triple shocks of Section 1 of Little Don d/s Underbank Reservoir site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	0	0	0	n/d

Table 2. Number of perch captured in each section of Little Don d/s Underbank Reservoir site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	0	328		
Section 2	0	416		
Section 3	0	416		
Section 4	11	363	0.030**	2.13**
Total	85	1523	0.0072**	0.51**

** represents minimum density and biomass

Table 3. The *length weight relationship* for perch at the Little Don d/s Underbank Reservoir site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Perch	- 2.54	3.63	99.8 %

Table 4. Number of perch captured in each year-class, year-class strengths and mean lengths and weights at the Little Don d/s Underbank Reservoir site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	1	1	9.1	6.2	2
1994	5	5	45.4	11.7 ± 0.96	23.2 ± 7.3
1993	4	4	36.4	18.0 ± 1.32	104 ± 25.6
1992	1	1	9.1	23.1	242
1991					

LITTLE DON D/S UNDERBANK RESERVOIR - BULLHEADS

Table 1. Electric fishing efficiencies for bullheads calculated from triple shocks of Section 1 of Little Don d/s Underbank Reservoir site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	7	9	4	n/d	n/d

Table 2. Number of bullheads captured in each section of Little Don d/s Underbank Reservoir site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	20	328	0.061**	0.48**
Section 2	20	416	0.048**	0.37**
Section 3	34	416	0.082**	0.58**
Section 4	11	363	0.030**	0.23**
Total	85	1523	0.056**	0.42**

** represents minimum density and biomass

Table 3. The length weight relationship for bullheads at the Little Don d/s Underbank Reservoir site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Bullheads	- 2.09	3.26	98.4 %

Table 4. Number of bullheads captured in each year-class, year-class strengths and mean lengths and weights at the Little Don d/s Underbank Reservoir site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	11	11	12.9	4.1 ± 0.45	0.81±0.278
1994	15	15	17.6	6.2 ± 0.52	3.1 ± 0.84
1993	59	59	69.5	8.4 ± 0.91	8.9 ± 3.3
1992					
1991					

RIVER LOXLEY AT STORRS LANE BRIDGE SITE

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general there were two section on each side of a stone road bridge. Most of the site was shallow and there was good visibility, except in Section 1 where a small amount of suspended solids made it difficult in deep water.

Section 1:- This had two deep parts under a foot bridge and against a stone wall. These provided alot of cover for trout. There were parts with some large substrate sizes and it is anticipated that efficiency of capture for bullheads would be low.

Section 2:- This comprised a long shallow riffle with a deep pool close to the bridge at the upper end. This was selected for the tripke shock.

Section 3:- Mixture of riffles and pools; there was a very deep scour hole at the top end.

Section 4:- This section consisted of a wider shallower glide for the greater part, with less cover for trout than the other sections.

Species present:-

Brown trout
Rainbow trout
Bullheads
Pike

RIVER LOXLEY AT STORRS LANE BRIDGE - BROWN TROUT

Table 1. Electric fishing efficiencies for brown trout calculated from triple shocks of Section 2 of River Loxley at Storrs Lane Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	70	23	16	119	56.1

Table 2. Number of brown trout captured in each section of River Loxley at Storrs Lane Bridge site, together with density and biomass, calculated from efficiencies in Table 5. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	51	340	0.259	12.4
Section 2*	109	319	0.288	15.7
Section 3	69	334	0.383	14.4
Section 4	22	369	0.103	5.2
Total	251	1362	0.254	11.7

Table 3. The length weight relationship for brown trout at the River Loxley at Storrs Lane Bridge site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Brown Trout	- 1.96	2.97	96.4 %

Table 4. Number of brown trout captured in each year-class, year-class strengths and mean lengths and weights at the River Loxley at Storrs Lane Bridge site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	32	64	17.0	7.9 ± 1.22	5.4 ± 2.68
1994	124	184	48.9	13.7 ± 1.49	27.2 ± 8.7
1993	83	115	30.6	19.0 ± 1.44	70 ± 16.2
1992	11	12	3.2	24.5 ± 1.39	148 ± 26.5
1991	1	1	0.3	44.1	839

Table 5. Information for HABSCORE from the River Loxley at Storrs Lane Bridge site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section together with density (n m^{-2}) in brackets				Estimated total biomass in each section (g) together with g m^{-2} in brackets			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	4	10/3/5	8	2	34.9	11 (0.032)	24 (0.075)	23 (0.069)	6 (0.0163)	59 (0.174)	130 (0.41)	124 (0.37)	32 (0.087)
Trout <20 cm older than 1	36	49/20/ 10	55	14	56.0	64 (0.188)	56 (0.175)	98 (0.293)	25 (0.068)	2464 (7.2)	3311 (10.4)	3773 (11.3)	963 (2.61)
Trout >20 cm	11	11/0/1	6	6	84.9	13 (0.038)	12 (0.038)	7 (0.0210)	7 (0.0190)	1703 (5.0)	1572 (4.9)	917 (2.75)	917 (2.49)

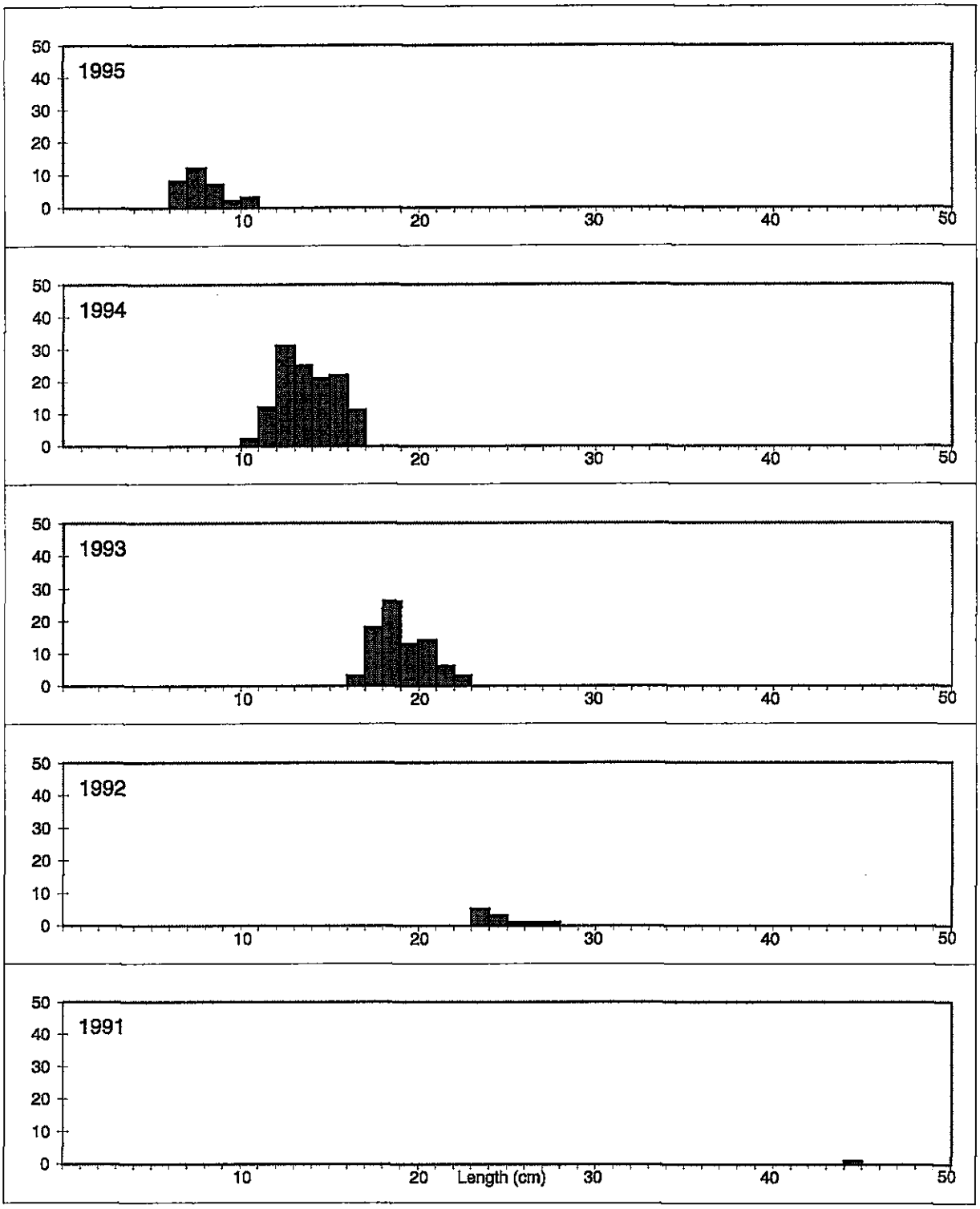


Figure ? Length frequency histogram of each year class of brown trout captured at River Loxley at Storrs Lane Bridge

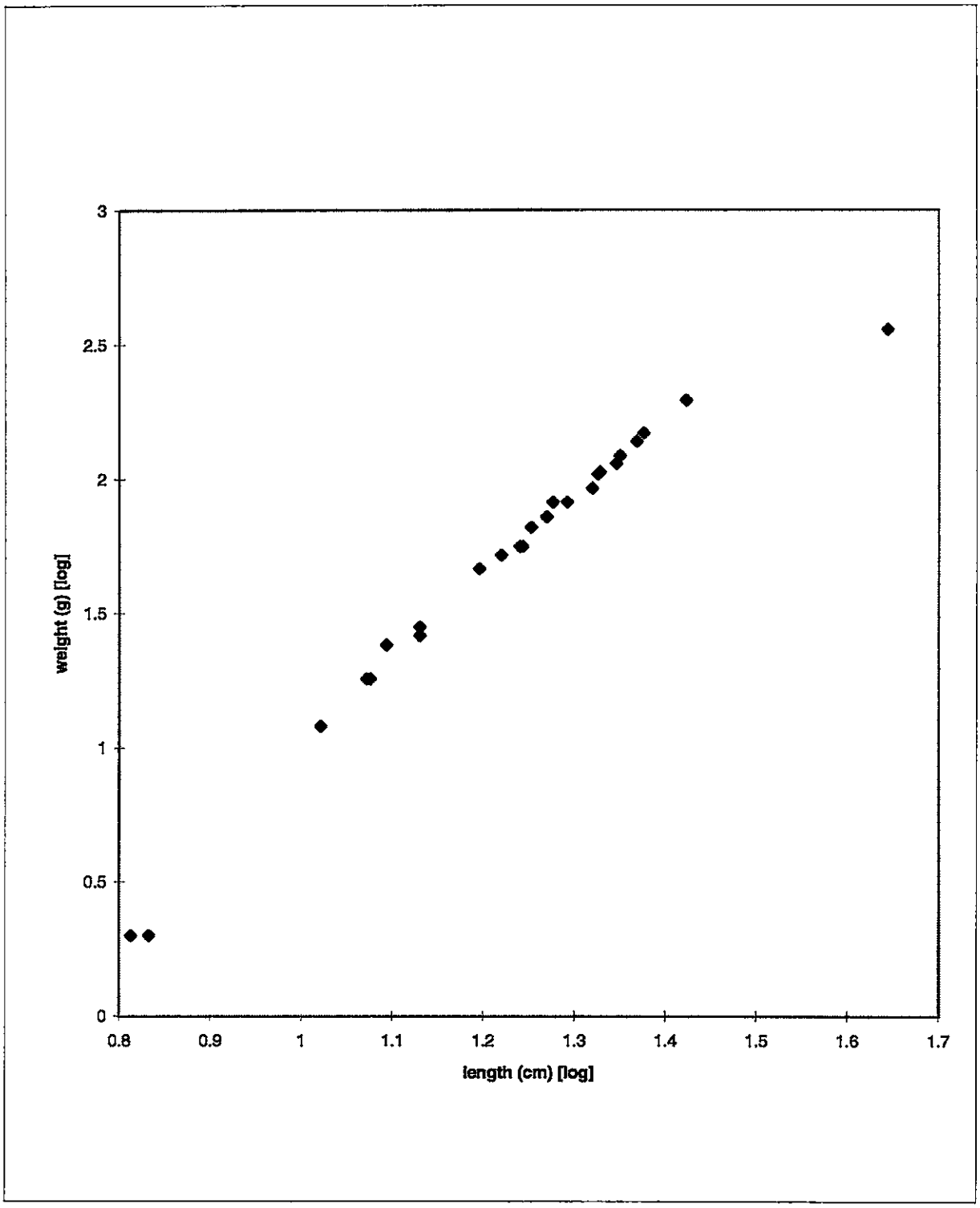


Figure ? Length [log] and weight [log] for brown trout at the River Loxley at Storrs Lane Bridge

RIVER LOXLEY AT STORRS LANE BRIDGE - RAINBOW TROUT

Table 1. Electric fishing efficiencies for rainbow trout calculated from triple shocks of Section 2 of River Loxley at Storrs Lane Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	1	0	0	1	100

Table 2. Number of rainbow trout captured in each section of River Loxley at Storrs Lane Bridge site, together with density and biomass, calculated from efficiencies in Table 5. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	0	340	0	0
Section 2*	1	319	0.0031	0.45
Section 3	0	334	0	0
Section 4	0	369	0	0
Total	1	1362	0.00073	0.106

Table 3. The length weight relationship for rainbow trout at the River Loxley at Storrs Lane Bridge site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

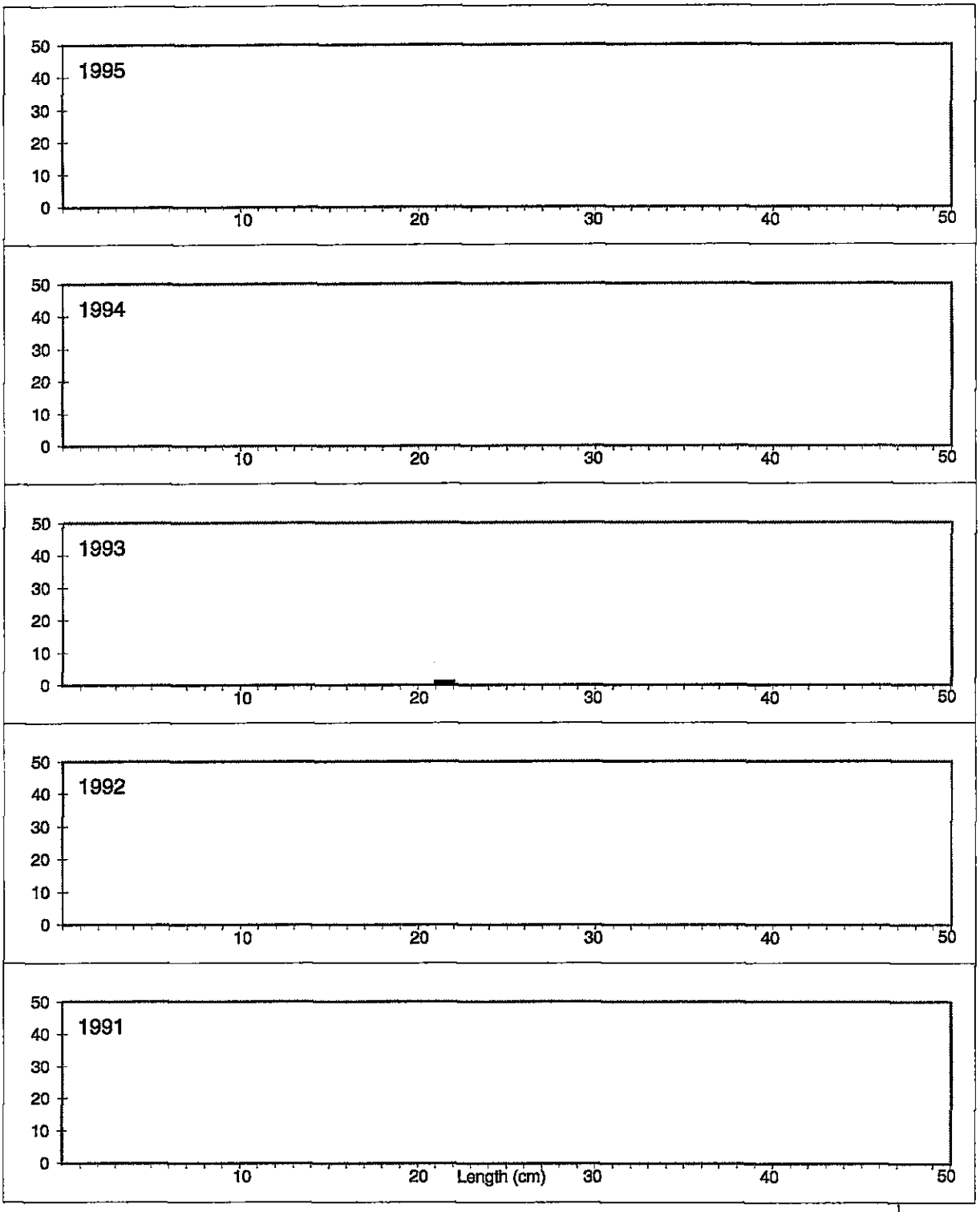
	a	b	R^2
Rainbow Trout	n/a	n/a	n/a

Table 4. Number of rainbow trout captured in each year-class, year-class strengths and mean lengths and weights at the River Loxley at Storrs Lane Bridge site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	0	0	0		
1994	0	0	0		
1993	1	1	100	21.6 ±	144 ±
1992					
1991					

Table 5. Information for HABSCORE from the River Loxley at Storrs Lane Bridge site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section together with density (n m^{-2}) in brackets				Estimated total biomass in each section (g) together with g m^{-2} in brackets			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	0	0/0/0	0	0	n/d	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Trout <20 cm older than 1	0	0/0/0	0	0	n/d	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Trout >20 cm	0	1/0/0	0	0	100	0 (0)	1 (0.0031)	0 (0)	0 (0)	0 (0)	144 (0.45)	0 (0)	0 (0)



Length frequency histogram of each year class of rainbow trout captured at [redacted] River Loxley at Stens Lane Bridge

RIVER LOXLEY AT STORRS LANE BRIDGE - BULLHEADS

Table 1. Electric fishing efficiencies for bullheads calculated from triple shocks of Section 2 of River Loxley at Storrs Lane Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	10	3	0	13	79.5

Table 2. Number of bullheads captured in each section of River Loxley at Storrs Lane Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	5	340	0.0176	0.192
Section 2*	13	319	0.041	0.279
Section 3	10	334	0.039	0.215
Section 4	26	369	0.089	0.64
Total	54	1362	0.048	0.34

Table 3. The length weight relationship for bullheads at the River Loxley at Storrs Lane Bridge site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Bullheads	- 2.22	3.42	99.6 %

Table 4. Number of bullheads captured in each year-class, year-class strengths and mean lengths and weights at the River Loxley at Storrs Lane Bridge site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	2	3	4.4	3.9 ± 0.64	0.64 ±0.34
1994	48	60	88.2	7.6 ± 0.94	6.6 ± 2.59
1993	4	5	7.4	10.0 ± 0.33	16.0 ±1.86
1992					
1991					

RIVER LOXLEY AT STORRS LANE BRIDGE - PIKE

Table 1. Electric fishing efficiencies for pike calculated from triple shocks of Section 2 of River Loxley at Storrs Lane Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	0	0	0	n/d

Table 2. Number of pike captured in each section of River Loxley at Storrs Lane Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	0	340	0	0
Section 2*	0	319	0	0
Section 3	1**	334	00030**	0.120**
Section 4	0	369	0	0
Total	1**	1362	0.00073**	0.294**

** represent minimum density and biomas estimates

Table 3. The length weight relationship for pike at the River Loxley at Storrs Lane Bridge site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Pike	n/a	n/a	n/a

Table 4. Number of pike captured in each year-class, year-class strengths and mean lengths and weights at the River Loxley at Storrs Lane Bridge site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	1	1	100	16.5	40
1994					
1993					
1992					
1991					

RIVER RIVELIN AT RIVELIN MILL

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this river was impacted on by the presence of a number of man made objects including a small dam and outflows from the neighbouring pond.

Section 1:- This was ponded for the greater part of the section, with the exception that towards the top there was a riffle caused partly by water flowing over a small man-made dam wall. It was mostly shaded by a high tree canopy.

Section 2:- This section was ponded for the greater part of its length where it was backed up from the dam wall. This made it deeper than the other sections. The outflow from the raised pond entered this section. It was mostly shaded by a high tree canopy.

Section 3:- This section had a steeper gradient, with primarily riffle habitat. It was mostly shaded by a high tree canopy.

Section 4:- This section comprised riffle habitat at its lower end, where it was also shaded by a high tree canopy. Towards the top of this section the river became slightly wider and shallower and was more open.

Species present:-

Brown trout
Minnows
Perch
Stone loach
3 spined Stickleback

The presence of the perch and possibly also the stickleback is likely to be associated with the pond, which flows into the river.

RIVER RIVELIN AT RIVELIN MILL - BROWN TROUT

Table 1. Electric fishing efficiencies for brown trout calculated from triple shocks of Section 1 of River Rivelin at Rivelin Mill site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	14	8	8	50	26.2

Table 2. Number of brown trout captured in each section of River Rivelin at Rivelin Mill site, together with density and biomass, calculated from efficiencies in Table 5. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	30	300	~~0.12~~ 0.120	3.14
Section 2	31	266	0.267	12.0
Section 3	15	218	0.220	4.9
Section 4	15	322	0.146	3.3
Total	91	1106	0.183	5.7

Table 3. The length weight relationship for brown trout at the River Rivelin at Rivelin Mill site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Brown Trout	- 1.67	2.78	99.2 %

Table 4. Number of brown trout captured in each year-class, year-class strengths and mean lengths and weights at the River Rivelin at Rivelin Mill site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	40	104	51.5	8.2 ± 0.95	7.6 ± 2.54
1994	18	39	19.3	13.8 ± 0.95	31.7 ± 6.0
1993	32	58	28.7	18.8 ± 1.92	77 ± 22.2
1992	1	1	0.5	24.0	138
1991					

Table 5. Information for HABSCORE from the River Rivelin at Rivelin Mill site. Section 1 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section together with density (n m^{-2}) in brackets				Estimated total biomass in each section (g) together with g m^{-2} in brackets			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	6/8/5	5	8	8	n/d (26.2)*	23 (0.077)	19 (0.071)	31 (0.142)	31 (0.096)	175 (0.58)	144 (0.54)	236 (1.08)	236 (0.73)
Trout <20 cm older than 1	6/0/3	18	7	6	40.6	11 (0.037)	44 (0.165)	17 (0.080)	15 (0.047)	539 (1.80)	2156 (8.1)	833 (3.8)	735 (2.28)
Trout >20 cm	2/0/0	8	0	1	100	2 (0.0067)	8 (0.030)	0 (0)	1 (0.0031)	228 (0.76)	888 (3.3)	0 (0)	88 (0.273)

* It was not possible to estimate an efficiency of capture for 1 year old brown trout. Therefore the efficiency estimated for the capture of all trout was used for this age group instead, because it was felt tat this would be the most realistic option.

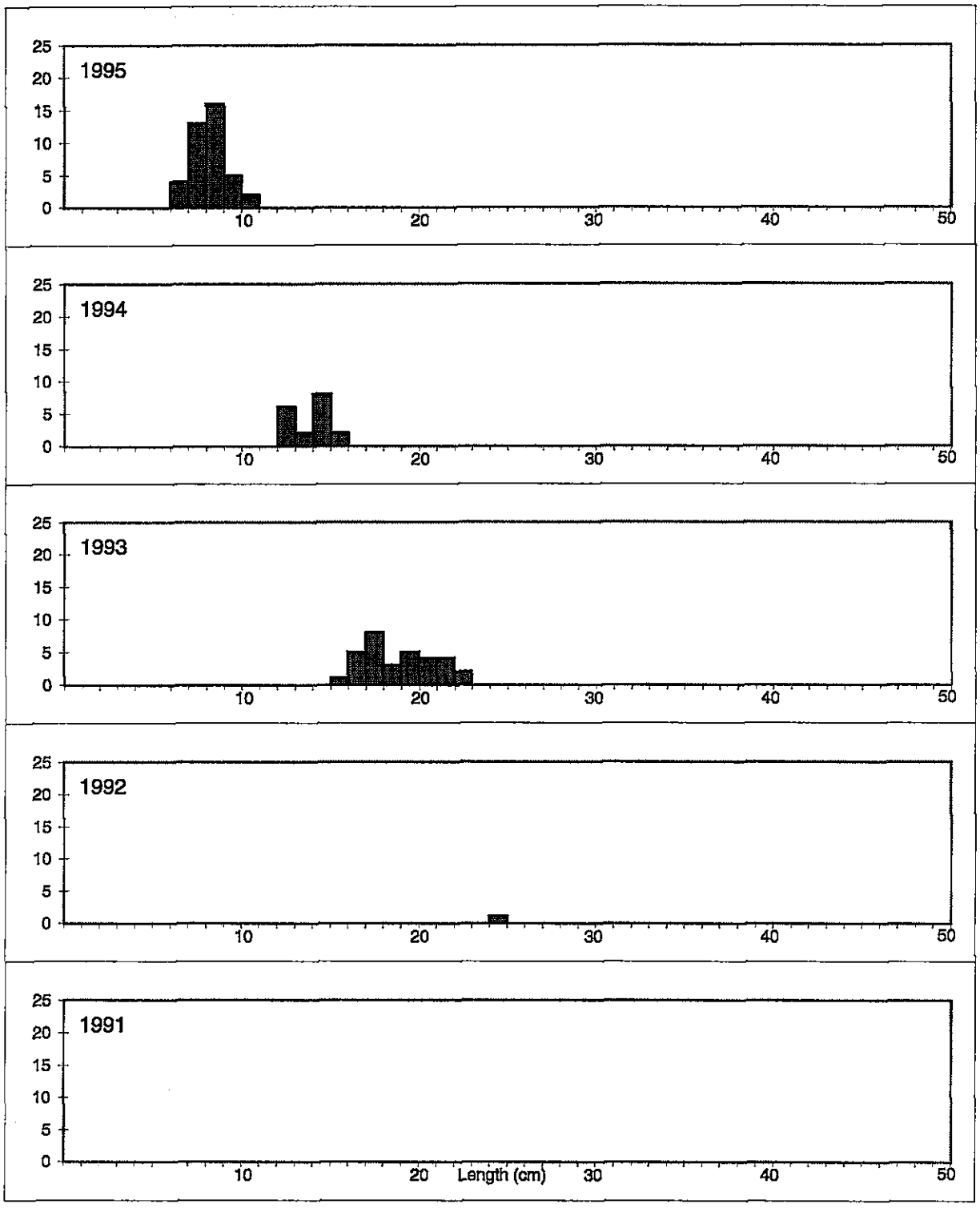


Figure ? Length frequency histogram of each year class of trout captured at River Rivelin at Rivelin Mill

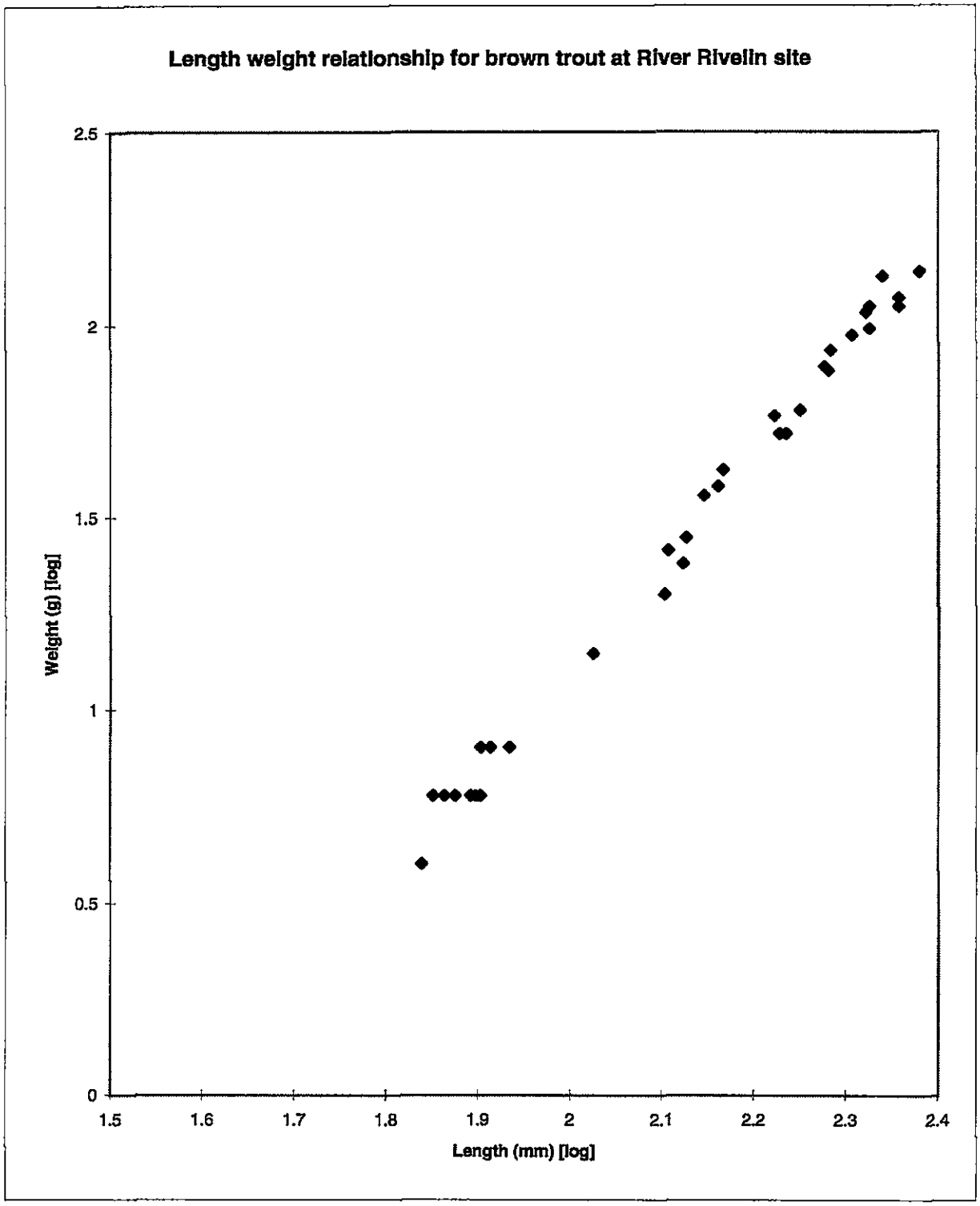


Figure ? Length [log] and weight [log]for brown trout at the River Rivelin at Rivelin Mill

RIVER RIVELIN AT RIVELIN MILL - STONE LOACH

Table 1. Electric fishing efficiencies for stone loach calculated from triple shocks of Section 1 of River Rivelin at Rivelin Mill site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	7	11	6	n/a	n/d

Table 2. Number of stone loach captured in each section of River Rivelin at Rivelin Mill site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	24	300	0.08**	0.56**
Section 2	5	266	0.0188**	0.086**
Section 3	11	218	0.050**	0.33**
Section 4	42	322	0.130**	0.76**
Total	82	1106	0.074**	0.46**

** represents minimum density and biomass

Table 3. The length weight relationship for stone loach at the River Rivelin at Rivelin Mill site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Stone loach	- 2.33	3.21	98.4 %

Table 4. Number of stone loach captured in each year-class, year-class strengths and mean lengths and weights at the River Rivelin at Rivelin Mill site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	5	5	6.1	5.1 ± 0.37	0.88±0.199
1994	52	52	63.4	8.0 ± 0.75	3.8 ± 1.12
1993	25	25	30.5	11.6 ± 0.89	12.3 ±2.97
1992					
1991					

RIVER RIVELIN AT RIVELIN MILL - STICKLEBACK

Table 1. Electric fishing efficiencies for stickleback calculated from triple shocks of Section 1 of River Rivelin at Rivelin Mill site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	1	6	n/a	n/d

Table 2. Number of stickleback captured in each section of River Rivelin at Rivelin Mill site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	7	300	0.0233#	0.103**#
Section 2	0	266	0	0
Section 3	1	218	0.0046#	0.0061**#
Section 4	6	322	0.0186#	0.0248**#
Total	14	1106	0.0127#	0.036**#

** Estimates of biomass derived from stickleback length weight relationship for fish captured in upper Frome (Log_{10} W (g) = -1.93 + 3.14 Log_{10} L (cm)

represents minimum densities and biomass

Table 3. The length weight relationship for stickleback at the River Rivelin at Rivelin Mill site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Stickleback	n/a	n/a	n/a

Table 4. Number of stickleback captured in each year-class, year-class strengths and mean lengths and weights at the River Rivelin at Rivelin Mill site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d. *
1995	1	1	7.1	3.5	0.60
1994	13	13	92.9	4.5±0.187	1.33±0.173
1993					
1992					
1991					

* Estimates of biomass derived from stickleback length weight relationship for fish captured in upper Frome (Log_{10} W (g) = -1.93 + 3.14 Log_{10} L (cm)

RIVER RIVELIN AT RIVELIN MILL - PERCH

Table 1. Electric fishing efficiencies for perch calculated from triple shocks of Section 1 of River Rivelin at Rivelin Mill site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	0	0	0	n/d

Table 2. Number of perch captured in each section of River Rivelin at Rivelin Mill site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	0	300	0	0
Section 2	4	266	0.0150**	0.87**
Section 3	0	218	0	0
Section 4	0	322	0	0
Total	4	1106	0.0036**	0.210**

** represents minimum density and biomass

Table 3. The length weight relationship for perch at the River Rivelin at Rivelin Mill site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Perch	n/a	n/a	n/a

Table 4. Number of perch captured in each year-class, year-class strengths and mean lengths and weights at the River Rivelin at Rivelin Mill site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	1	1	25	9.5	10.0
1994	3	3	75	16.4 ± 1.78	74 ± 24.6
1993					
1992					
1991					

RIVER RIVELIN AT RIVELIN MILL - MINNOWS

Table 1. Electric fishing efficiencies for minnows calculated from triple shocks of Section 1 of River Rivelin at Rivelin Mill site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	0	0	0	n/d

Table 2. Number of minnows captured in each section of River Rivelin at Rivelin Mill site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1*	0	300	0	0
Section 2	0	266	0	0
Section 3	0	218	0	0
Section 4	1	322	0.0031#	0.0152**#
Total	1	1106	0.00090#	0.0044**#

** Estimates of biomass derived from minnow length weight relationship for fish captured in River don u/s Bullhouse Minwater (Log_{10} W (g) = -2.08 + 3.19 Log_{10} L (cm)

represents minimum density and biomass

Table 3. The length weight relationship for minnows at the River Rivelin at Rivelin Mill site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Minnows	n/a	n/a	n/a

Table 4. Number of minnows captured in each year-class, year-class strengths and mean lengths and weights at the River Rivelin at Rivelin Mill site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995					
1994	1	1	100	7.4	4.9
1993					
1992					
1991					

COLDEN WATER, HEBDEN BRIDGE SITE

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this stream had a steep gradient and ran over bedrock. There was good visibility. Wading was a little difficult with rocks being extremely slippery. All sections were very similar except that Section 1 had one particularly large deep pool, not found to the same extent in other sections. Because of the presence of this pool in Section 1, Section 2 was used for the triple shock.

Species present:-

Brown trout

COLDEN WATER, HEBDEN BRIDGE SITE - BROWN TROUT

Table 1. Electric fishing efficiencies for brown trout calculated from triple shocks of Section 2 of Colden Water, Hebden Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	10	4	1	15	65.3

Table 2. Number of brown trout captured in each section of Colden Water, Hebden Bridger site, together with density and biomass, calculated from efficiencies in Table 5. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m^2)	Density ($n\ m^{-2}$)	Biomass ($g\ m^{-2}$)
Section 1	16	283	0.106	2.75
Section 2*	15	254	0.071	3.6
Section 3	14	324	0.077	1.94
Section 4	30	347	0.161	3.9
Total	75	1208	0.107	3.0

Table 3. The length weight relationship for brown trout at the Colden Water, Hebden Bridge site. Relationship equates to Log_{10} W (g) = a + b Log_{10} L (cm).

	a	b	R^2
Brown Trout	- 1.91	2.97	98.4 %

Table 4. Number of brown trout captured in each year-class, year-class strengths and mean lengths and weights at the Colden Water, Hebden Bridge site.

Yearclass	No. of fish captured	Estimated number in each yearclass	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	19	61	47.3	9.3 ± 0.88	9.5 ± 2.52
1994	49	61	47.3	14.0 ± 1.73	32.6 ±12.5
1993	5	5	3.9	21.3 ± 0.82	110 ± 12.2
1992	2	2	1.5	29.3 ± 2.47	283 ± 71
1991	0	0	0	n/a	n/a

Table 5. Information for HABSCORE from the Colden Water, Hebden Bridge site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section together with density (n m^{-2}) in brackets				Estimated total biomass in each section (g) together with g m^{-2} in brackets			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	4	2/2/1	3	7	26.2	15 (0.053)	8 (0.032)	11 (0.034)	27 0.078 ~~(0.095)~~	143 (0.51)	76 (0.30)	105 (0.32)	257 (0.74)
Trout <20 cm older than 1	10	5/1/0	10	17	84.9	13 (0.046)	8 (0.032)	13 (0.040)	27 ~~(0.095)~~ 0.078	424 (1.50)	261 (1.03)	424 (1.31)	880 (2.54)
Trout >20 cm	2	2/0/0	1	2	100	2 (0.0071)	2 (0.0079)	1 (0.0031)	2 (0.0058)	210 (0.74)	567 (2.23)	101 (0.31)	207 (0.60)

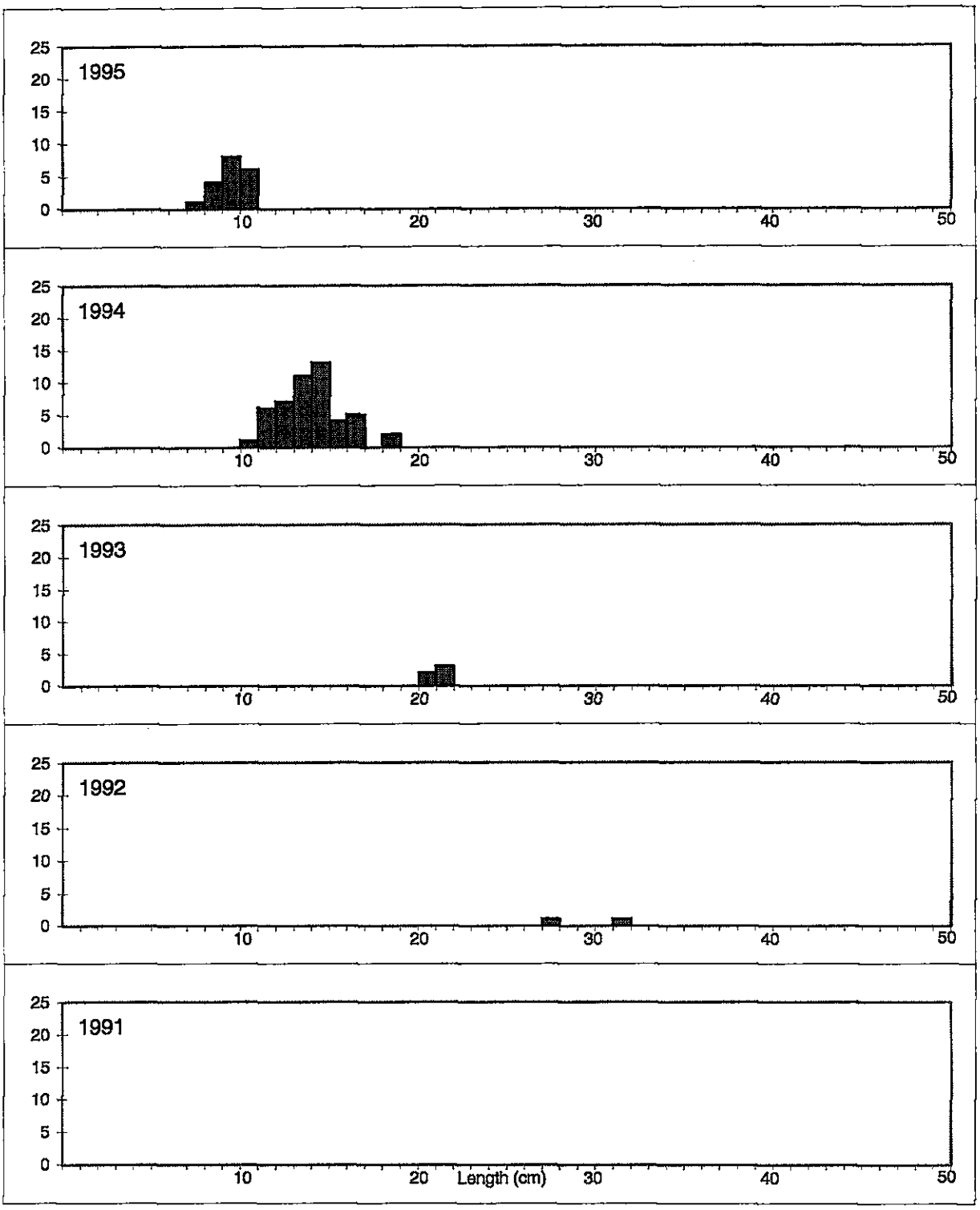


Figure ? Length frequency histogram of each year class of brown trout captured at Colden Water, Hebden Bridge site.

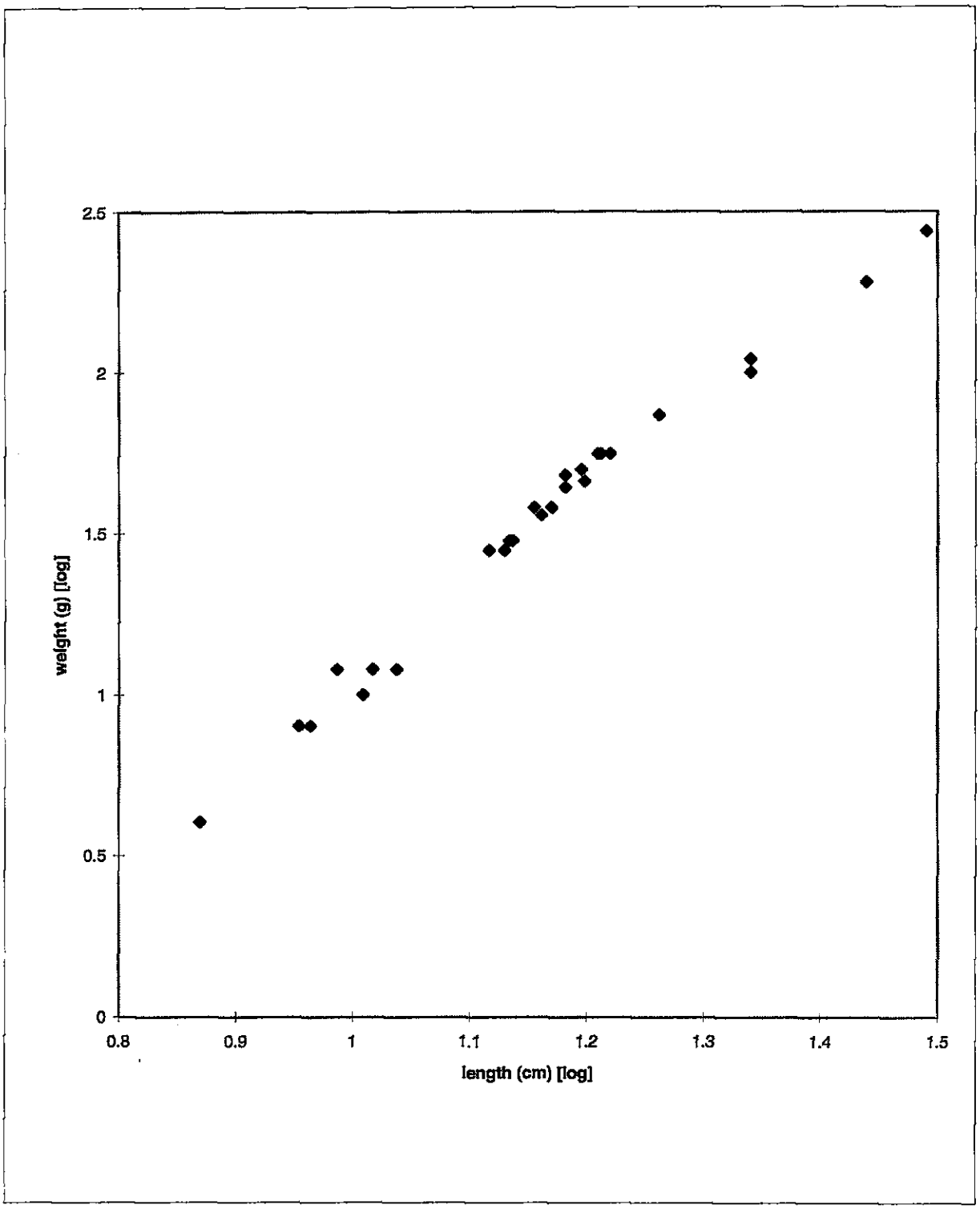


Figure 7 Length [log] and weight [log] for brown trout at the Colden Water - Hebden Bridge site

LITTLE DON - BROWN TROUT

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	8	5	4	25	30·2
Biomass (g)	141	232	75	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})	
Section 1*	17 (448)	328	~~0·076~~ 0·061	~~2·01~~ ~~4·08~~	4·1
Section 2*	6 (200)	416	~~0·045~~ 0·041	~~1·59~~	1·34
Section 3	1 (9)	416	~~0·0072~~ 0·0072	~~0·072~~	0·075
Section 4	8 (240)	363	~~0·072~~ 0·033	~~0·219~~	6·5
	32	1523	0·034	2·82	

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b\ Log_{10} L$.

	a	b	R^2
Trout	-1·90	2·93	99·3

LITTLE DON – BROWN TROUT

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured		Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	16	32	~~50~~ 61.5	9.6 ± 1.39	10.2 ± 4.4
1994	4	6	~~12.5~~ 11.5	17.3 ± 0.87	53 ± 8.0
1993	6	7	~~18.8~~ 13.5	24.2 ± 1.98	144 ± 35
1992	4	5	~~12.5~~ 9.6	30.2 ± 1.49	273 ± 41
1991	2	2	6.2 3.9	~~39.9~~ ± 4.7	628 ± 215

52

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

14

2 3 4
6 4 2

LITTLE DON – BROWN TROUT

Table 5. Information for HABSCORE from the Dunsford Bridge site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section				*Estimated biomass in each section* (g)			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	4/2/4 (108)	4 (35)	1 (9)	1 (9)	n/a	~~5~~ 10*	13	3	3	108*	116	30	30
Trout <20 cm older than 1	1/2/0 (172)	1 (47)	0	0	n/a	3*	3	0	0	172*	156	0	0
Trout >20 cm	3/1/0 (604)	1 (118)	0	7 (2392)	77.9%	4	1	0	9	604	118	0	3075

* min density + min biomass

55.

2600

LITTLEDON – PERCH

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	1		6·2 ± ~	2 ± ~
1994	5		11·7 ± 0·96	23·2 ± 7·3
1993	4		18·0 ± 1·32	104 ± 25·6
1992	1		23·1 ± ~	242 ± ~
1991				

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

LITTLEDON – PERCH

~~DUNSFORD BRIDGE SITE Below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	n/a	n/a	n/a	n/a	n/a
Biomass (g)	n/a	n/a	n/a	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	0	328	~~0~~ 0	0
Section 2*	0	416	~~0~~ 0	0
Section 3	0	416	~~0~~ 0	0
Section 4	11 (774)	363	0.030 ~~0.03~~	2.13

minimum min biomass

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

	a	b	R^2
Trout	−2.54	3.63	99.8%

LITTLE DON - Ruffe

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	0	0	±	±
1994	1	100	8.8 ±	8 ±
1993			±	±
1992				
1991				

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

LITTLE DON – Ruffe

~~DUNSFORD BRIDGE SITE below Wimcar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	n/a	n/a	n/a	n/a	n/a
Biomass (g)	n/a	n/a	n/a	n/a	n/a.

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1	0	328	0	0
Section 2*	0	416	0	0
Section 3	0	416	0	0
Section 4	1 (8)	363	0·00275	0·0220

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

	a	b	R^2
Trout	n/a	n/a	n/a

LITTLE DON - BULLHEAD

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight* (g) ± s.d.
1995	11	12.9	4.1 ± 0.45	~~0.81 0.278~~ ~~± 0.33~~
1994	~~16~~ 15	17.6	6.2 ± 0.52	~~3.1~~ 3.1 ± 0.~~9~~84
1993	~~38~~ 59	69.5.	8.4 ± 0.91	~~8.9~~ 8.9 ± 3.3~~8~~
1992				
1991				

5.0

7.0

* derived from relationship Mann.

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

LITTLE DON - BULLHEAD

~~DUNSFORD BRIDGE SITE below Winsor Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	7	9	4	n/a	n/a
Biomass (g)	n/a (65)	n/a (78)	n/a (41)	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass * (g m^{-2})
57+67+33	Section 1 *	20 (~~154~~)	328	0·061	0·56
152	Section 2*	20 (~~54~~)	416	0·048	0·377
243	Section 3	34 (~~244~~)	416	0·082	0·51
84	Section 4	11 (~~88~~)	363	0·030	0·242
		1523			

derived from Mann relationship

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b\ Log_{10} L$.

	a	b	R^2
~~Trout~~ Bullhead	~~-1·84~~ -2·09	~~3·03~~ 3·26	98·4

Used R. Mann length/weight relationship.

EWEDEN BECK — BROWN TROUT

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured		Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	107	145	59.4	± 0.81	9.5 ± 2.41
1994	42	52	21.3	14.9 ± 1.23	39.0 ± 8.6
1993	38	47	19.3	18.9 ± 1.58	76.0 ± 18.5
1992					
1991					

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

EWDEN BECK – BROWN TROUT

Table 5. Information for HABSCORE from the Dunsford Bridge site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section				Estimated biomass in each section (g)			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	(246) 23	(682) 20	(203) 21	(374) 28|12|3	63·7%	36	31	33	45	386	1071	319	391
Trout <20 cm older than 1	(392) 10	(1323) 26	(592) 11	(1190) 17|5|1	73·4%	14	35	15	23	534	1802	807	1190
Trout >20 cm	1 (95)	6 (630)	0	(483) 5|0|0	100%	1	6	0	5	95	630	0	483

87

42

70

244

$5

EWESEN BECK – BROWN TROUT

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section ~~2~~ 4 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	50	17	4	73	69.4%
Biomass (g)	1624	349	73	2066	78.6%

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})	
Section 1	34 (~~733~~)	500	0.102 ~~[illegible]~~	~~[illegible]~~	2.27
Section 2*	52 (2635)	345	0.209 ~~[illegible]~~	~~4.7~~	7.8~~5~~
Section 3	32 (795)	319	0.150 ~~[illegible]~~	3.17	3.3
Section 4*	71 (2047)	253	0.289 ~~[illegible]~~	8.2	8.1
	189	1417	0.172	4.9	

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

	a	b	R^2
Trout	−1.74	2.83	99.1%

EWESEN BECK - RAINBOW TROUT

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured		Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	36	40	95·2	10·2 ± 1·28	14·5± 4·6
1994	1	1	2·4	16 ± 9	50 ±
1993	1	1	2·4	22·5 ±	112 ±
1992					
1991					

13-0.

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

EWEDEN BECK – RAINBOW TROUT

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	10	0	1	11	83·6
Biomass (g)	153	0	8	161	90·7

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})		
Section 1	16 (229)	500	~~0·038~~	~~0·50~~	0·038	0·55
Section 2*	3 (132)	345	~~0·0116~~	~~0·42~~	0·00087	0·41
Section 3	8 (160)	319	~~0·0313~~	~~0·55~~	0·0282	0·52
Section 4*	11 (161)	253	~~0·043~~	~~0·64~~	0·043	0·63
	38	1417			0·030	0·52

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b\ Log_{10} L$.

	a	b	R^2
Trout	−1·51	2·63	98·9

EWDEN BECK - RAINBOW TROUT

Table 5. Information for HABSCORE from the Dunsford Bridge site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section				Estimated biomass in each section (g)			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	(229) 16	2 (20)	(110) 7	((61) 10/0/1	83·6	19	2	8	11	274	20	132	161
Trout <20 cm older than 1	0	0	(50) 1	0	n/a	0	0	1	0	0	0	50	0
Trout >20 cm	0	1 (112)	0	0	n/a	0	1	0	0	0	112	0	0

EWEDEN BEEK – ROACH

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995			±	±
1994	1	100%	14.4±	48 ±
1993			±	±
1992				
1991				

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

EWEDEN BECK – ROACH

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	0	0	n/a	n/a
Biomass (g)	n/a	n/a	n/a	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1	0	500	0	0
Section 2*	1 (48)	345	0·00290	0·139
Section 3	0	319	0	0
Section 4*	0	253	0	0

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

	a	b	R^2
Trout	n/a	n/a	n/a

LOXLEY – BULLHEAD

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	10	3	0	13	79·5
Biomass (g)	71	20	0	91	80·5

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1	5 (52)	340	0·0176	0·194
Section 2*	13 (89)	319	0·041	0·285
Section 3	10 (57)	334	0·039	0·234
Section 4	26 (187)	369	0·089	0·67

67 + 22

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

−2·22

	a	b 3·42	R^2
Trout			99·6%

used R. Mac length / weight relationship

LOXLEY - BULLHEAD

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	2	3·7	3·9 ± 0·64	0·64 0·34 ~~± ±~~
1994	48	88·9	7·6 ± 0·94	6·6 ~~±~~ 2·59 ~~±~~
1993	4	7·4	10·0 ± 0·33	16·0 ± 1·86 ~~±~~
1992				
1991				

9·2

54

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

LOXLEY - PIKE

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	1	100	16.5 ±	40 ±
1994			±	±
1993			±	±
1992				
1991				

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

LOXLEY — PIKE

~~DUNSFORD BRIDGE SITE below Winsor Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	n/a	n/a	n/a	n/a	n/a
Biomass (g)	n/a	n/a	n/a	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1	0	340	0	0
Section 2*	0	319	0	0
Section 3	1 (40)	334	0.00299	0.120
Section 4	0	369	0	0

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b\ Log_{10} L$.

	a	b	R^2
Trout	n/a	n/a	n/a

LOXLEY – RAINBOW TROUT

~~DUNSFORD BRIDGE SITE below Winsear Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	1	0	0	1	100
Biomass (g)	144	0	0	144	100

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1	0	340	0	0
Section 2*	1 (144)	319	0.00313	0.45
Section 3	0	334	0	0
Section 4	0	369	0	0

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

	a	b	R^2
Trout	n/a	n/a	n/a

LOXLEY - RAINBOW TROUT

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	0	0	±	±
1994	0	0	±	±
1993	1	100	21.6 ±	144 ±
1992				
1991				

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

LOXLEY - RAINBOW TROUT

Table 5. Information for HABSCORE from the Dunsford Bridge site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section				Estimated biomass in each section (g)			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	0	0	0	0	n/a	0	0	0	0	0	0	0	0
Trout <20 cm older than 1	0	0	0	0	n/a	0	0	0	0	0	0	0	0
Trout >20 cm	0	1/0/0	0	0	100%	0	1	0	0	0	144	0	0

LOXLEY - BROWN TROUT

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured		Mean length (cm) ± s.d.	Mean weight (g) ± s.d. 5·4 2·68
1995	32	64	17·0	7·9 ± 1·22	[illegible] ± [illegible]
1994	124	184	48·9	13·7 ± 1·49	27·2 ± 8·7
1993	83	115	30·6	19·0 ± 1·44	70· ± 16·2
1992	11	12	3·2	24·5 ± 1·39	148 ± 26·5
1991	1	1	0·3	44·1 ±	839 ±
	254	376			

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

LOXLEY - BROWN TROUT

~~DUNSFORD BRIDGE SITE below Winstar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	70	23	16	119	56·1
Biomass (g)	~~3132~~	805	372	4443	68·8

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1	51 (3533)	340	~~0·259~~	~~12·4~~
Section 2*	109 (~~4309~~)	319	~~0·288~~	~~15·7~~
Section 3	69 (2803)	334	~~0·383~~	~~14·4~~
Section 4	22 (1190)	369	~~0·103~~	~~5·2~~
TOTAL	251	1362	0·254	11·7

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b\ Log_{10} L$.

	a	b	R^2
Trout	~~-1·96~~	2·97	96·4%

441 358

LOXLEY – BROWN TROUT

Table 5. Information for HABSCORE from the Dunsford Bridge site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section				Estimated biomass in each section (g)			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	4 (21)	(41) (16) (26) 10 / 3 / 5	(57) 8 (**)	2 (11)	34.9%	11	24	23	6	60	113	163	32
Trout <20 cm older than 1	(1543) 36	(1762) (789) (264) 49 / 20 / 10	(2113) 55	(606) 14	56.0%	64	86	98	25	64	3064	3773	1082
Trout >20 cm	11 (1969)	(329) 11 / 0 / 80 1	6 (633)	6 (573)	84.9%	13	12	7	7	13	1409	746	675

273

1 2 ~~3~~ 4

124 ~~60~~ 4

~~89~~ 39

2 3 4

23 11 1

7077 4584

184

38.5 131

Bullhouse minnows - stickleback.

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d. 0.40 ~~0.39~~ 0.103
1995	4	33.3%	3.05± 0.24	~~n/a~~ ±
1994	8	66.7%	4.35± 0.58	n/a ±
1993			±	1.25 ± 0.55
1992				
1991				

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

River Don, upstream of Bullhouse Mineworks - STICKLEBACK

~~DUNSFORD BRIDGE SITE below Wimcar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	4	2	2	11	31·8
Biomass (g)	~~1·07~~ n/a	~~2·24~~ n/a	n/a	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	8 (7·3)	393	0·0280	n/a
Section 2*	1 (1·15)	299	0·0100	n/a
Section 3	1 (1·32)	364	0·0082	n/a
Section 4	2 (1·83)	298	0·0201	n/a

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

	a	b	R^2
Trout	n/a ~~-1·0220~~ ~~-1·94~~ -1·93	~~2·73~~ n/a 3·14	n/a

River Don, upstream of Bullhouse Mineswater — MINNOW.

~~DUNSFORD BRIDGE SITE~~ below Winscar Reservoir

minnows

Table 1. Electric fishing efficiencies for both number of ~~brown trout~~ and biomass calculated from triple shocks of ~~Section 2~~ of ~~Dunsford Bridge~~ site

Section 1 of Bullhouse Mineswater

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	76	38	20	154	48.9
Biomass (g)	129	59	28	239	53.6

minnows

Table 2. Number of ~~fish~~ captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	134	393	0.39	0.61
Section 2*	9 (51)	299	0.060	0.32
Section 3	18 (61)	364	0.102	0.31
Section 4	29 (65)	298	0.198	0.41

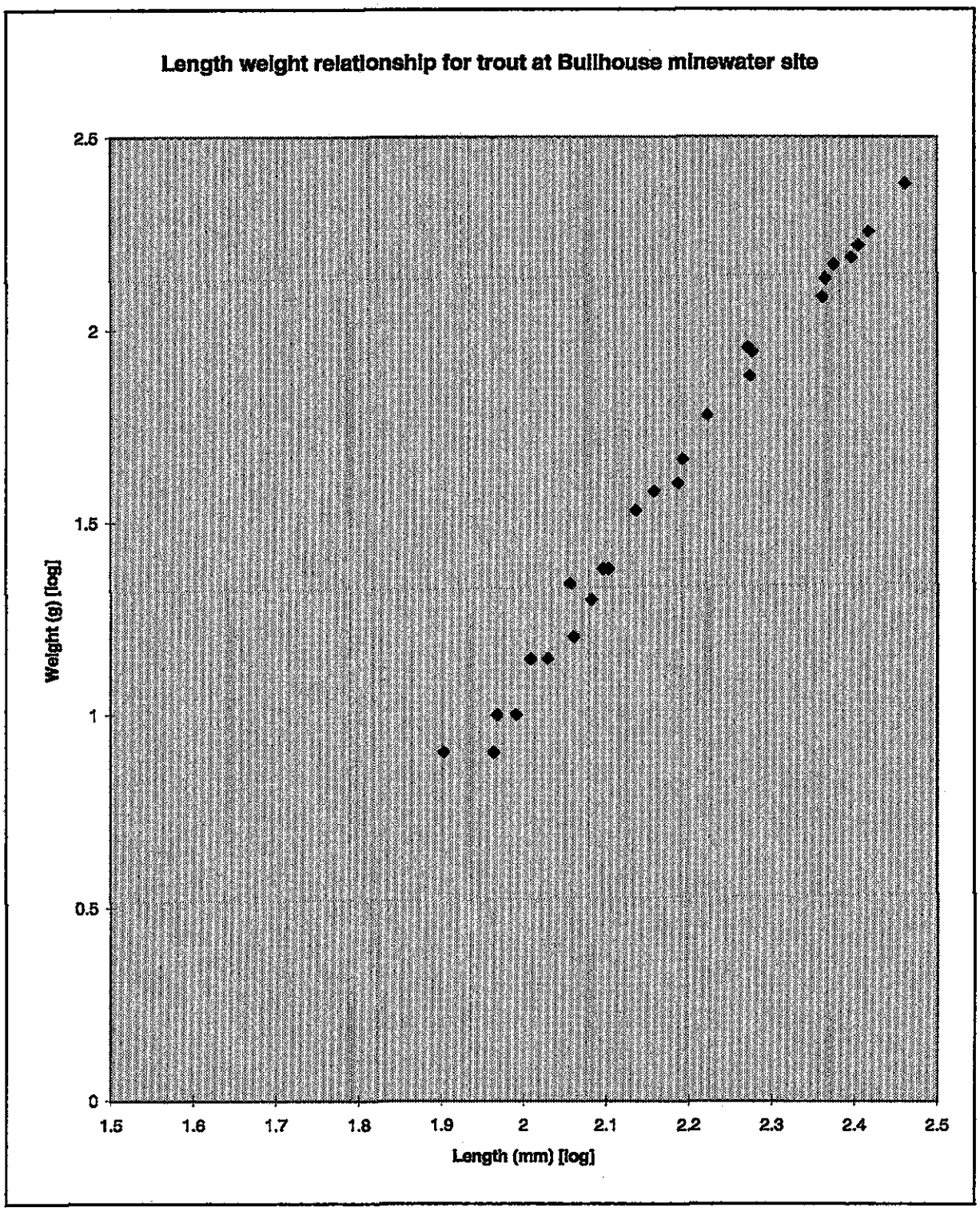
minnows

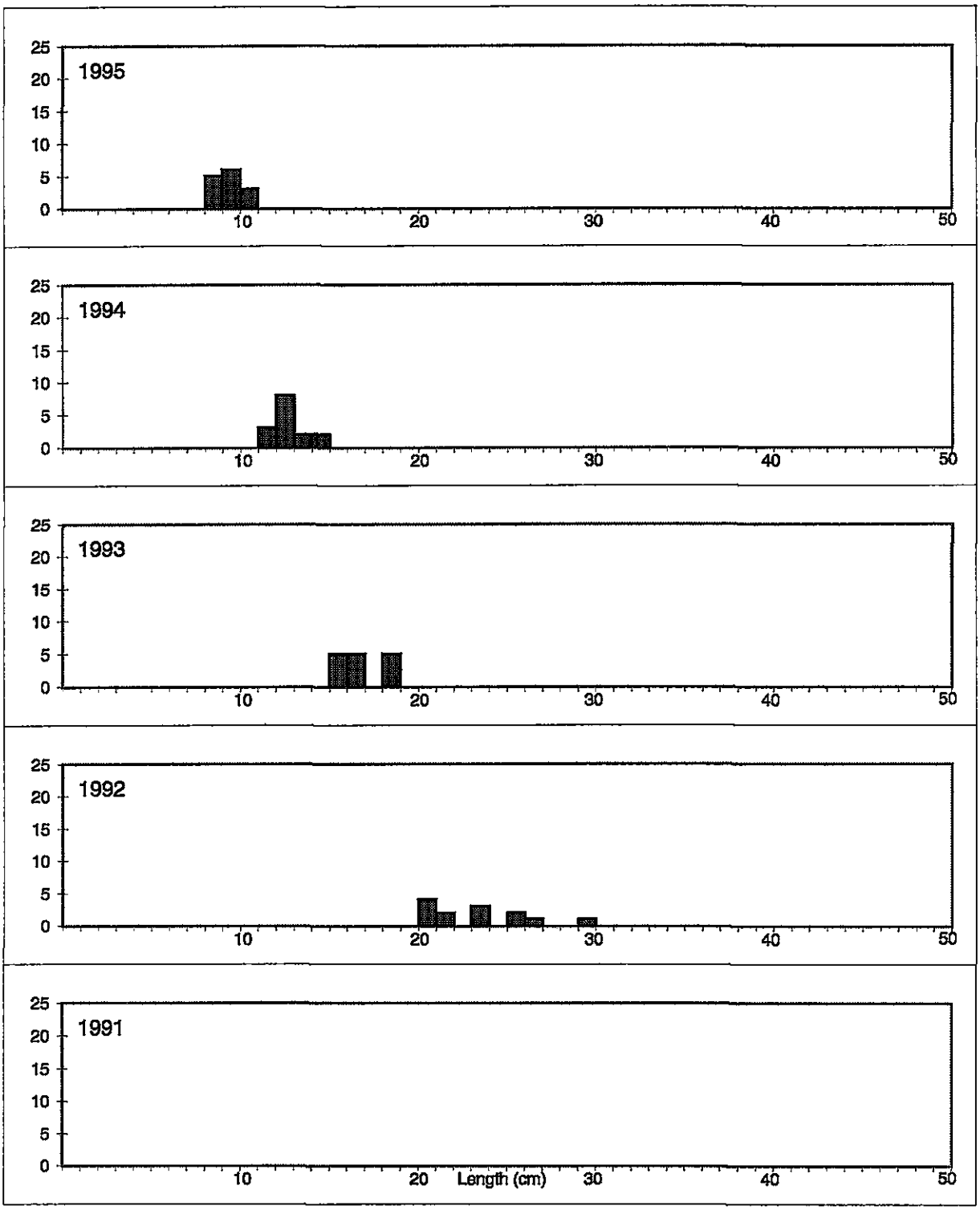
Table 3. The length/weight relationship for ~~trout~~ at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b\ Log_{10} L$.

	a	b	R^2
Trout	−2.08	3.19	99.8%

2.9	0.264
3.1	0.319
3.3	0.330
4.9	1.358
5.1	1.541
5.1	1.545
7.1	4.36
7.6	5.4
8.3	7.2
9.2	9.8

Bullhouse minewater – Trout.





Length frequency histogram of each year class of trout captured at R. Don Bullhouse Minewater.

BULLHOUSE SITE

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 1 of Bullhouse site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	6	2	0	8	77.9
Biomass (g)	230	334	0	564	n/a

Note: Efficiency could not be calculated for biomass

Table 2. Number of fish captured in each section of Bullhouse site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	8	393	0.020	~~1.44~~ 1.34
Section 2	15	299	0.064	~~2.24~~ 2.03
Section 3	10	364	0.036	~~1.35~~ 1.40
Section 4	24	298	0.104	~~7.84~~ 7.7
	57	1354	0.052	2.92

Table 3. The length/weight relationship for trout at the Bullhouse site. Relationship equates to $Log_{10} W = a + b\ Log_{10} L$.

	a	b	R^2
Trout	-1.70	2.81	98.9

Table 4. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Bullhouse site.

Yearclass	No. of fish captured		Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	14	18	~~24.6~~ 25.4	9.3 ± 0.90	10.8 ± 2.90
1994	15	19	~~28.3~~ 26.8	12.6 ± 0.99	24.9 ± 5.6
1993	15	18	~~28.3~~ 25.4	16.9 ± 1.43	57.1 ± 13.7
1992	13	16	22.8 22.4	23.1 ± 2.74	140 ± 49
1991					

71

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. This site was altered from the original one chosen because of the depth of water above the weir. The site surveyed extended for 100 m either side of the mill bridge. In general the river was impacted on by the presence of the weir and also the bridge to create extensive ponded areas.

Section 1:- This was entirely ponded, but wadeable where it was still backed from the weir. It was mostly shaded from a high tree canopy.

Section 2:- This section had more riffle habitat as it approached the bridge, and had some macrophyte growth. It mainly had open banks.

Section 3:- This section comprised riffle at its lower end and some deeper ponded areas at its higher end. The bankside was mainly open with some rubbish on one bank.

Section 4:- This section was mostly ponded again, with some high canopy shading from trees.

Other species present:-

374

37

41

Grayling
3 spined stickleback
Minnow

15 15.

Table 5. Information for HABSCORE from the Bullhouse site. Section 1 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section				Estimated biomass in each section (g)			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	0/0/0	7	3	4	n/a*	0	9	4	5	0	97	43	54
Trout <20 cm older than 1	6/0/0	7	6	11	100*	6	9	8	14	246	369	328	574
Trout >20 cm	0/2/0	1	1	9	n/a*	2	1	1	12	279	140	140	1676

Note:- So few trout were captured at this site that individual efficiences for different ages and size classes either could not be calculated or were unrealistic. Therefore the efficiencies calculated in Table 1 for numbers captured were used to estimate numbers and biomass in each section.

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	19	10.6%	3.1 ± 0.233	0.32 ± 0.071
1994	138	76.7%	5.2 ± 0.37	1.69 ± 0.37
1993	23	12.7%	7.5 ± 0.76	5.4 ± 1.79
1992				
1991				

368

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

River Don, upstream of Bullhouse Mineswater — GRAYLING.

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of ~~brown trout~~ grayling and biomass calculated from triple shocks of ~~Section 2~~ of ~~Dunsford Bridge~~ site Section 1 of Bullhouse Mineswater site.

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	1	1	0	2	56.5
Biomass (g)	6	62	0.	68	n/a

Table 2. Number of ~~fish~~ grayling captured in each section of ~~Dunsford Bridge~~ Bullhouse mineswater site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	2(68)	393	0.0051	0.173
Section 2*	0	299	0	0
Section 3	1(20)	364	0.0055	0.097
Section 4	1(244)	298	0.0034	1.45

Table 3. The length/weight relationship for ~~trout~~ grayling at the ~~Dunsford Bridge~~ Bullhouse Mineswater site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

	a	b	R^2
Trout	−2.09	3.11	99.9%

Table 3. Number of ~~trout~~ Grayling captured in each year-class, year-class strengths and mean lengths and weights at the ~~Dunsford Bridge~~ Bullhouse Mineiveter site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	2	50	10.5 ± 2.9	13.0 ± 9.9
1994	1	25	17.5 ±	62 ±
1993	1	25	27.9 ±	244 ±
1992	—	—	—	
1991	—	—	—	—

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

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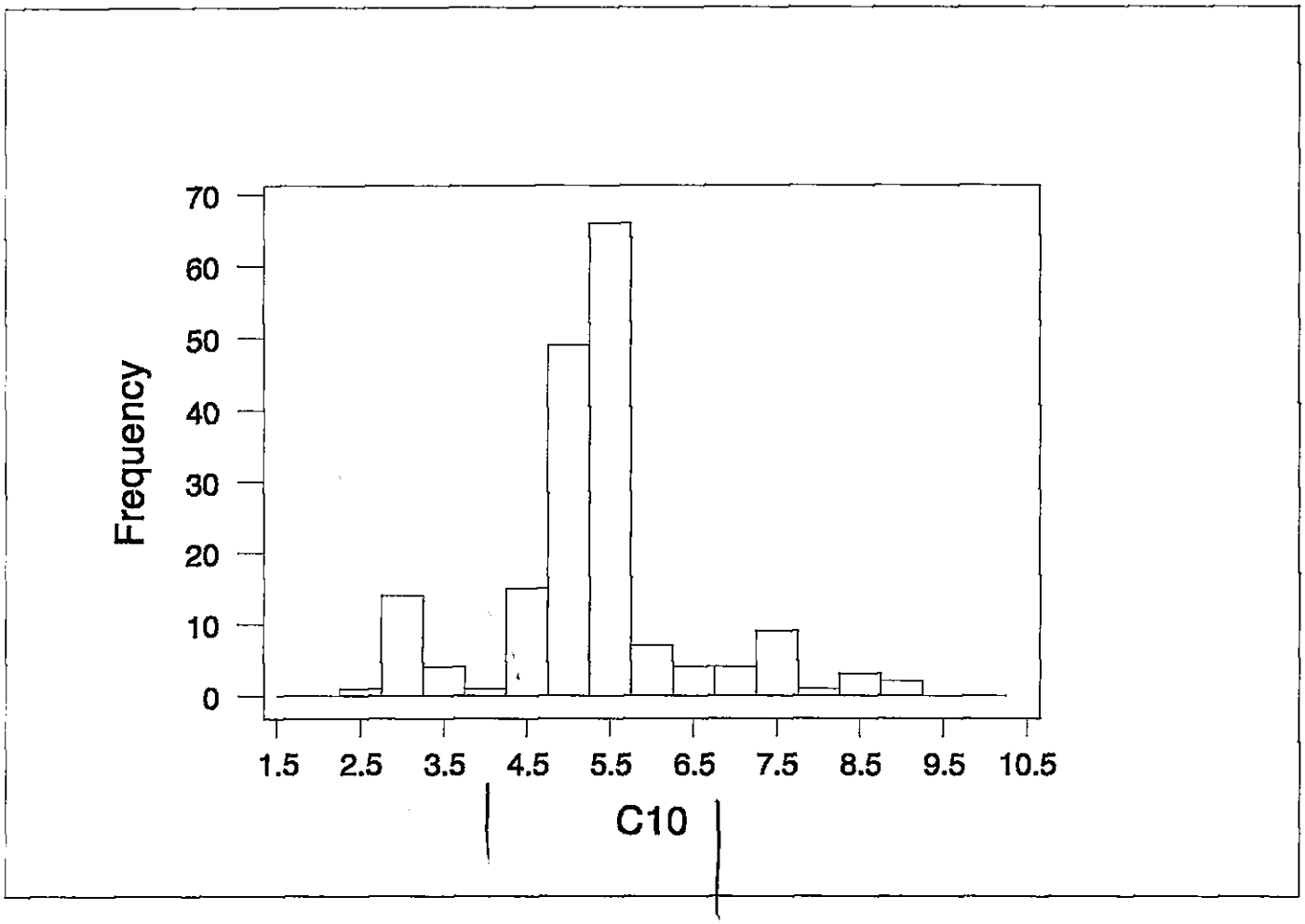
Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.



4.0 6.2

SHEAF – BROWN TROUT

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured		Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	45	117	43.7	8.0 ± 1.12	7.6 ± 3.1
1994	32	51	31.1	14.8 ± 1.55	39.4 ± 11.0
1993	20	28	19.4	19.6 ± 1.60	85 ± 19.4
1992	4	4	3.9	25.9 ± 2.65	187 ± 57
1991	2	2	1.9	33.4 ± 0.50	323 ± 4.2

11.0

202

Notes:-

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Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

SHEAF- BROWN TROUT

Table 5. Information for HABSCORE from the Dunsford Bridge site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section				Estimated biomass in each section (g)			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	68 87 41 / 10 10 5	6 (51)	14 (97)	0	26·2%	41	23	53	0	321	195	370	0
Trout <20 cm older than 1	654 480 163 / 13 9 3	54 (166)	5 (166)	(567) 10	47·2%	29	11	11	21	1505	352	352	1201
Trout >20 cm	957 0 0 / 5 0 0	0	0	(1228) 8	100%	5	0	0	8	957	0	0	1228

2196

2185

48·8

72

1 2

32 13

13

9 2 2

SHEAF - BROWN TROUT

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	28	19	8	66	43·7
Biomass (g)	1679	567	204	2554	65.5

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	55	263	0·285	10·2
Section 2*	11 (217)	290	0·117	2·46
Section 3	19 (263)	286	0·224	3·3
Section 4	18 (1795)	274	0·106	8·2
	103	1113	0·181	5·9.

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to Log_{10} W = a + b Log_{10} L.

	a	b	R^2
Trout	−1·58	2·71	98·8%

L. SALAR - BULLHEAD

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	8	11.6	3.94 ± 0.50	0.76 ± 2.79
1994	60	87.0	7.8 ± 0.88	7.7 ± 2.83
1993	1	1.4	10.5 ±	20.0 ±
1992				
1991				

Notes:-

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Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

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Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

R. SHEAF – BULLHEAD

DUNSFORD BRIDGE SITE below Winscar Reservoir

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	22	14	8	56	39·1
Biomass (g)	157	94	58	398	39·3

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1 *	(30) 44	263	0·213	1·51
Section 2*	(80) 12	290	0·107	0·70
Section 3	(51) 7	286	0·063	0·45
Section 4	(47) 6	274	0·055	0·44

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b\ Log_{10} L$.

	a	b	R^2
Trout	−2·16	3·39	98·3

STAAF - PERCH

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	9	50	6·5 ± 0·59	2·70 ± 0·86
1994	8	44·4	14·6 ± 1·45	49·0 ± 15·9
1993	1	5·6	18·2 ±	104 ±
1992				
1991				

Notes:-

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Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

SHEAF – PERCH

DUNSFORD BRIDGE SITE below Winscar Reservoir

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	6	2	2	11	47·2
Biomass (g)	203	5	32	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	10 (240)	263	0·42	1·00
Section 2*	0 (0)	290	0	0
Section 3	3 (60)	286	0·0210	0·44
Section 4	5 (222)	274	0·040	1·72

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to Log_{10} W = a + b Log_{10} L.

	a	b	R^2
Trout	−2·48	3·57	99·6%

R. SHSAF - DACE

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	n/a	n/a	n/a	n/a	n/a
Biomass (g)	n/a	n/a	n/a	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site; together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1	0	263	0	0
Section 2*	0	290	0	0
Section 3	0	286	0	0
Section 4	4 (519)	274	1·46	1·89

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b\ Log_{10} L$.

	a	b	R^2
Trout	n/a	n/a	n/a

R. SHEAF – DACE

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

/ read scales

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995			±	±
1994			±	±
1993			±	±
1992				
1991	3		19·1 ± 0·115	96.6 11·0

1990
1989
Notes:-
1988 1 26·1 232

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Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

R. SHEAF – ROACH

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

– read scale

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995			±	±
1994			±	±
1993			±	±
1992				
1991				

1990
1989
Notes:-
1988
1. 1987 1986 Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

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R. SHEAF - ROACH

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	n/a	n/a	n/a	n/a	n/a
Biomass (g)	n/a	n/a	n/a	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1 *	0	263	0	0
Section 2*	0	290	0	0
Section 3	0	286	0	0
Section 4	1 (214)	274	0·0036	0·78

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

	a	b	R^2
Trout	n/a	n/a	n/a

R. SHEAF- STICKLEBACK.

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995			±	±
1994	1	100	6·2 ±	3 6 ±
1993			±	±
1992				
1991				

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Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

R. SHEAF – STICKLEBACK.

DUNSFORD BRIDGE SITE below Winscar Reservoir

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	n/a	n/a	n/a	n/a	n/a
Biomass (g)	n/a	n/a	n/a	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	0	263	0	0
Section 2*	0	290	0	0
Section 3	1(3·6)	286	0·0035	
Section 4	0	274	0	0

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to Log_{10} W = a + b Log_{10} L.

	a	b	R^2
Trout	n/a	n/a	n/a

RIVELIN - MINNOWS

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995			±	±
1994	1	100%	7.4 ±	4.9 ±
1993			±	±
1992				
1991				

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RIVELIN - MINNOWS

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	n/c	n/c	n/c	n/c	n/c
Biomass (g)	n/c	n/c	n/c	n/c	n/c

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	0	300	0	
Section 2*	0	266	0	
Section 3	0	218	0	
Section 4	1 (4.9)	322	0.00310	

min density

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

	a	b	R^2
Trout	n/c	n/c	n/c

- 2.08 3.19 ??

using Bull house Municate relationship

RUDD IN PERCH

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	1		9.5 ±	10 ±
1994	3		16.4± 1.78	74 ± 24.6
1993			±	±
1992				
1991				

Notes:-

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Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

RIVELIN – PERCH

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	n/a	n/a	n/a	n/a	n/a
Biomass (g)	n/a	n/a	n/a	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	0	300	0	0
Section 2*	4 (232)	266	0.0150	0.87
Section 3	0	218	0	0
Section 4	0	322	0	0

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to Log_{10} W = a + b Log_{10} L.

	a	b	R^2
Trout	n/a	n/a	n/a

RIVELIN STICKLEBACK

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	1		3·5 ±	0·60±
1994	13		4·5± 0·187	1·33 ± 0·173
1993			±	±
1992				
1991				

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest *downstream* and Section 4 is the furthest upstream.

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Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

RIVELIN - STICKLEBACK

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	0	1	6	n/a	n/a
Biomass (g)	n/a	n/a	n/a	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	7 (31)	300	0.0233	n/a
Section 2*	0	266	0	n/a
Section 3	1 (1-32)	218	0.0046	n/a
Section 4	6 (8.0)	322	0.0186	n/a

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

	a	b	R^2
Trout	n/a	n/a	n/a

RWELIN = STONE LOACH

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	5	61·0	5·08 ± 0·37	0·88 ± 0·199
1994	52	63·4	8·0 ± 0·75	3·8 ± 1·12
1993	25		11·6 ± 0·89	12·3 ± 2·97
1992				
1991				

Notes:-

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Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

RIVELIN – STONE COACH

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	7	11	6	n/a	n/a
Biomass (g)	n/a	n/a	n/a	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

min density estimates

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	24 (168)	300	0·08	n/a
Section 2*	5 (23)	266	0·0188	n/a
Section 3	11 (73)	218	0·050	n/a
Section 4	42 (245)	322	0·130	n/a

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b\ Log_{10} L$.

	a	b	R^2
Trout	n/a	n/a	n/a
	−2·33	3·21	98·4%

RIVELIN - BROWN TROUT

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured		Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	40 ½	104	~~44.0~~	8·2 ± 0·95	7·6 ± 2·54
1994	18 ?	39	~~19.8~~	13·8 ± 0·95	31·7 ± 6·0
1993	32 ?	58	~~35.2~~	18·8 ± 1·92	77 ± 22·2
1992	1 ?	1	~~+1.0~~	24·0 ±	138 ±
1991	½				

11·0

15·5

23·0

Dead Slates 202

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

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Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

RIVELIN - BROWN TROUT

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	14	8	8	50	26.2%
Biomass (g)	512	55	173	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1*	30 (740)	300	0.12 ~~0.107~~	~~3.14~~
Section 2*	31 (1837)	266	0.267 ~~0.114~~	~~12.0~~
Section 3	15 (422)	218	0.220 ~~0.261~~	~~4.9~~
Section 4	15 (471)	322	0.146 ~~0.179~~	~~3.3~~
TOTAL	91	1106	0.183	5.7

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b\ Log_{10} L$.

	a −1.67	b 2.78	R^2
Trout	~~0.0~~ ~~0.0~~	~~0.0~~	~~0.0~~ 99.2

RIVELIN - BROWN TROUT

Table 5. Information for HABSCORE from the Dunsford Bridge site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section				Estimated biomass in each section (g)			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	(38)(55)(25) 6|8|5	5 (49)	8 (68)	8 (62)	n/a	23 *	19 *	31 *	31 *	175 *	144 *	236 *	236 *
Trout <20 cm older than 1	(246)/0/148 6|0|3	(900) 18	(354) 7	(321) 6	40.6%	11	44	17	15	482	2200	860	803
Trout >20 cm	(228)/0/0 2|0|0	8 (888)	0	1 (88)	100%	2	8	0	1	228	888	0	88

49

87

1 2
18 22

11

2 3
10 1

Oxspring - STICKLEBACK

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	0		±	±
1994	1 ?		46 ±	±
1993			±	±
1992				
1991				

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

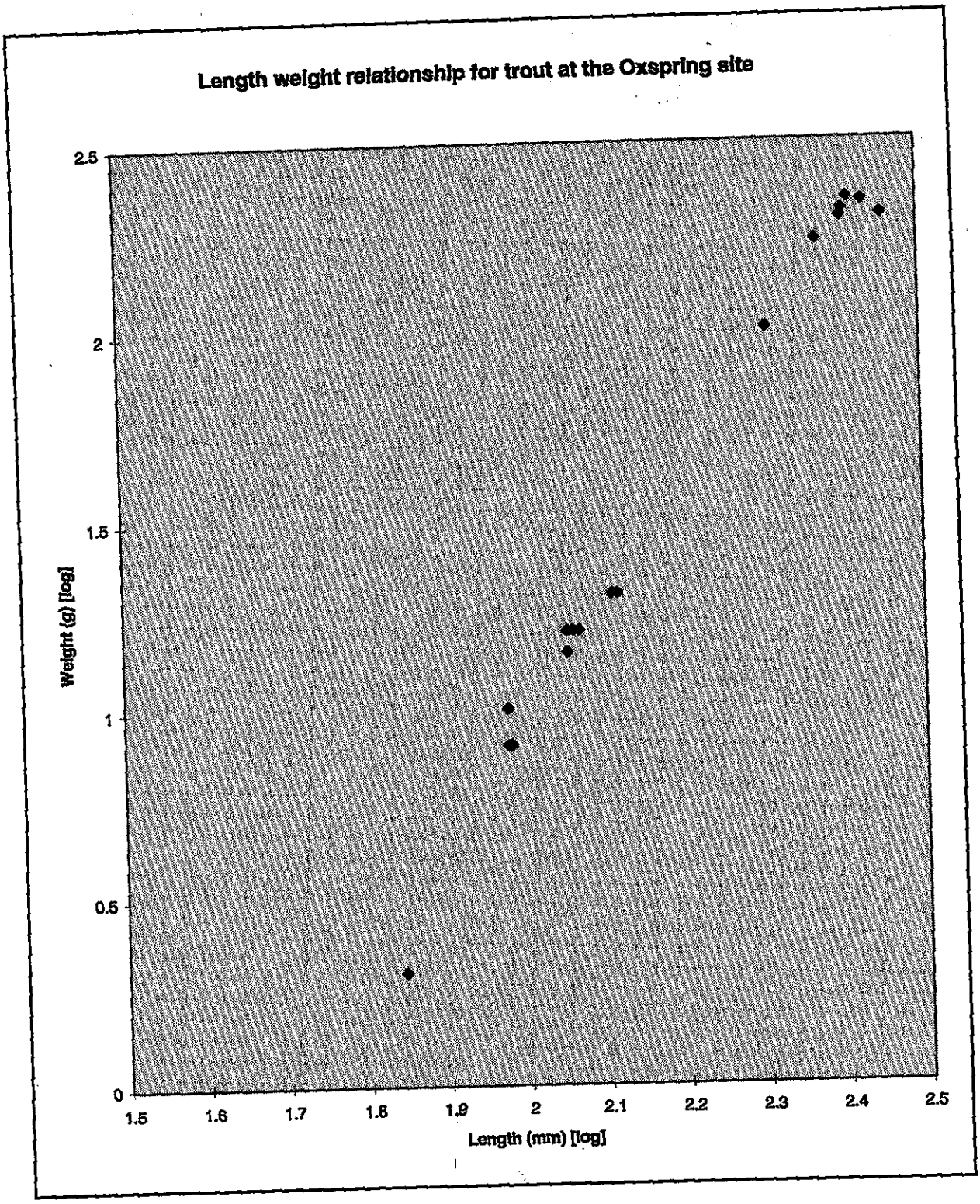
2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

Oxspring Trout



Oxspring - Minnows

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	31	14	39	n/a	n/a
Biomass (g)	n/a	n/a	n/a	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

min densities

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1	0	392	0	~~0~~ 0
Section 2*	24 (38) 84	408	0-206	0·52
Section 3	36 11 (47)	430	0·0256	0·074
Section 4	4 3 (18)	439	0·00 91	0·036

→ estimated from other length/weight relationships

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

	a	b	R^2
Trout	−2·01	3·17	99·1

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	2	2.0	3.7 ± 0.14	0.62 ± 0.075
1994	87	87.9	5.8 ± 0.29	2.60 ± 0.41
1993	10	10.1	7.9 ± 0.64	6.9 ± 1.74
1992				
1991				

Split at 4.0 & 6.5

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

Oxspring – Stone Loach

~~DUNSFORD BRIDGE SITE below Winsear Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	6	3	5	n/a	n/a
Biomass (g)	n/a	n/a	n/a		

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

min estimate

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1	0	392	0	n/a
Section 2*	(123) 14	408	0.034	n/a
Section 3	2 (16.9)	430	0.0047	n/a
Section 4	1 (7.1)	439	0.0023	n/a

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b Log_{10} L$.

	a	b	R^2
Trout	n/a	n/a	n/a

-2.33 3.21

as derived from Rivelin relationship

Oxspring - Stonecroft.

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	0	0	±	±
1994	9	52.9	8.7 ± 0.64	5.0 ± 1.23
1993	8	47.1	11.7 ± 0.81	12.8 ± 2.92
1992				
1991				

Notes:- Age split by histogram, not enough of a sample to age - split at 10 cm

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

Oxspring - Grayling

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	6	60	11·1 ± 1·52	12·7 ± 4·3
1994	1	10	18·2 ±	72 ±
1993	3	30	23·5 ± 0·64	160 ± 12·5
1992				
1991				

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

Oxspring Grayling.

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	3	3	1	9	35.7
Biomass (g)	~~[illegible]~~ 348	232	6	614	63.9

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1	0	392	0	0
Section 2*	7	408	0.022	1.51
Section 3	2 (30)	430	0.0140	0.109
Section 4	~~8~~ 1 (12)	439	0.0068	0.043

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to Log_{10} W = a + b Log_{10} L.

	a	b	R^2
Trout	~~[illegible]~~ -2.44	~~[illegible]~~ 3.38	~~[illegible]~~ 99.1%

Oxspring - Bullhead

Table 3. Number of trout captured in each year-class, year-class strengths and mean lengths and weights at the Dunsford Bridge site.

Yearclass	No. of fish captured	Yearclass strength (% of total fish captured	Mean length (cm) ± s.d.	Mean weight (g) ± s.d.
1995	16	15·2	3·26 ± 0·31	0·42 ± 0·123
1994	79	75·2	6·0 ± 0·65	2·86 ± 0·95
1993	10	9·6	8·0 ± 0·41	6·6 ± 1·00
1992				
1991				

4·0
7·2

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this was a small stream with good visiibility. Some overgrowths of vegetation will have reduced efficiency of electric fishing. Would prefer to use portable battery electric fishing here to increase efficiency.

Section 1:- This site had a large tree in the middle with difficult access and alot of collected rubbish in the stream. The impact of this on the efficiency made this section unsuitable for the triple shock.

Section 2:- This section was shallow with clear banks and easy access, and was selected as being most typical of the majority of the site. Used for triple shock.

Section 3 & 4:- Both these had banks with over hanging trees and plenty of cover.

Offspring – Bullhead.

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	26	11	10	58	41·4
Biomass (g)	111	30	44	n/a	n/a

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

92+25+37

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1	31 (56) (~~81~~)	392	0·191	0·41
Section 2*	47 (185)	408	0·142	1·10
Section 3	18 59 (~~72~~)	430	0·100	0·40
Section 4	9 31 (~~38~~)	439	0·050	0·209

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to $Log_{10} W = a + b\ Log_{10} L$.

	a -1.98	b 3·08	R^2
Trout	~~-1.98~~	~~3.08~~	98·1

-1.98 3·10

COLDEN WATER - HEBDEN BRIDGE.

~~HEBDEN~~

~~DUNSFORD BRIDGE SITE below Winscar Reservoir~~

Table 1. Electric fishing efficiencies for both number of brown trout and biomass calculated from triple shocks of Section 2 of Dunsford Bridge site

	Shock 1	Shock 2	Shock 3	Estimated total	Efficiency (%)
Number (n)	10	4	1	15	65·3
Biomass (g)	670	66	8	744	89·8

Table 2. Number of fish captured in each section of Dunsford Bridge site, together with density and biomass, calculated from efficiencies in Table 1. (* = section fished for triple shock estimate of efficiency)

	No. of fish captured	Area (m2)	Density (n m^{-2})	Biomass (g m^{-2})
Section 1	16 (728)	283	0·106	2·75
Section 2*	15 (744)	254	0·071	3·6
Section 3	14 (400)	324	0·077	1·94
Section 4	30 (936)	347	0·161	3·9
TOTAL	75	1208	0·107	3·0

Table 3. The length/weight relationship for trout at the Dunsford Bridge site. Relationship equates to Log_{10} W = a + b Log_{10} L.

	a	b	R^2
Trout	-1·91	2·97	98·4

Table 5. Information for HABSCORE from the Dunsford Bridge site. Section 2 provided estimate for triple shock estimate.

	No. of fish captured				Efficiency (%)	Estimated number in each section				Estimated biomass in each section (g)			
	Sect 1	Sect 2	Sect 3	Sect 4		Sect 1	Sect 2	Sect 3	Sect 4	Sect 1	Sect 2	Sect 3	Sect 4
1 year old	4 (42)	2 2 (78) 1	3 (27)	(136) 7	26.2	15	8	11	27	118	78	76	381
Trout <20 cm older than 1	(476) 10	(208) 6 2 0	(272) 10	(593) 21	77.9	13	8	13	27	561	208	320	698
Trout >20 cm	(210) 2	(567) 2 0 0	(101) 1	(207) 2	100	2	2	1	2	210	567	101	207

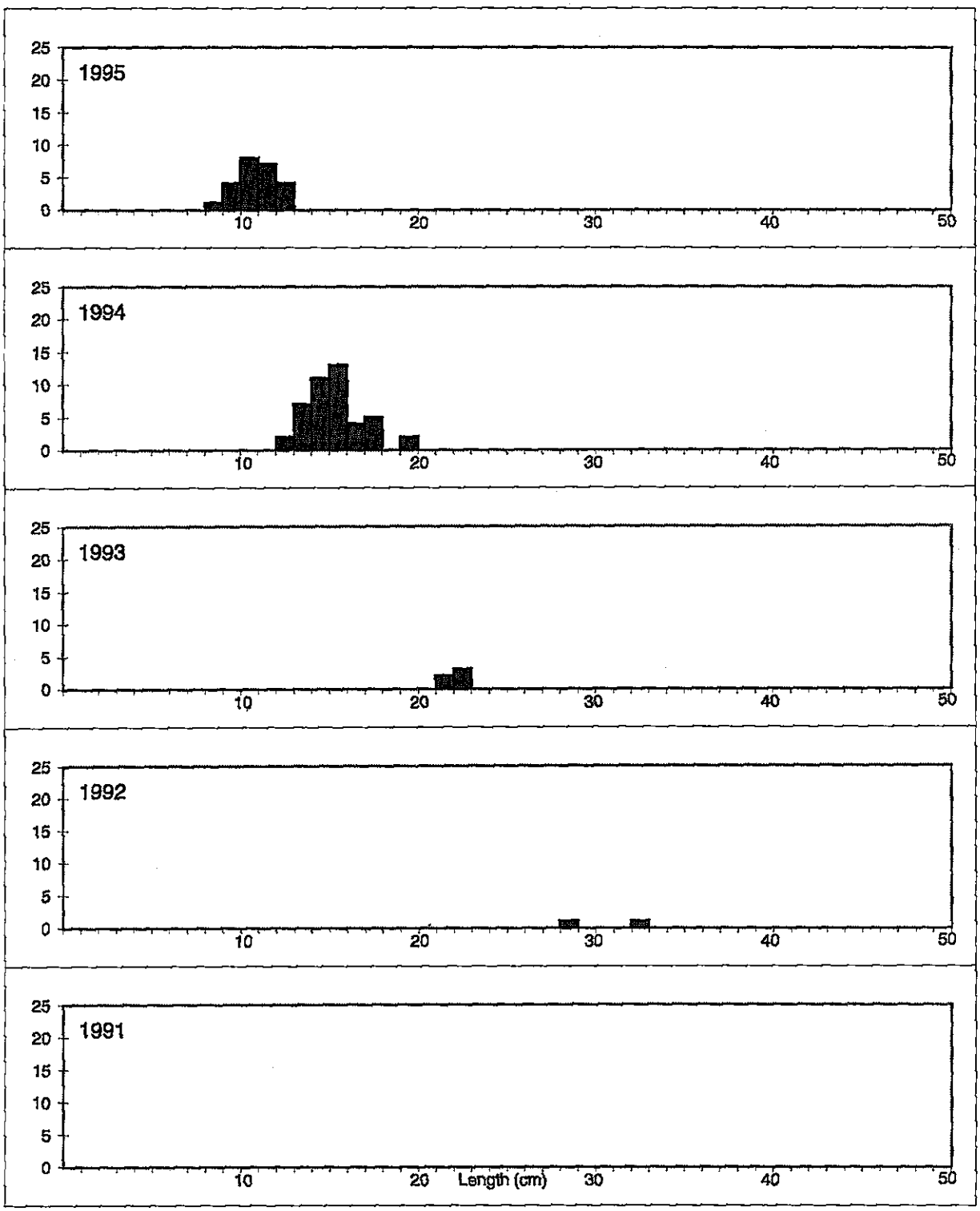


Figure ? Length frequency histogram of each year class of brown trout captured at Colden Water, Hebden Bridge site.

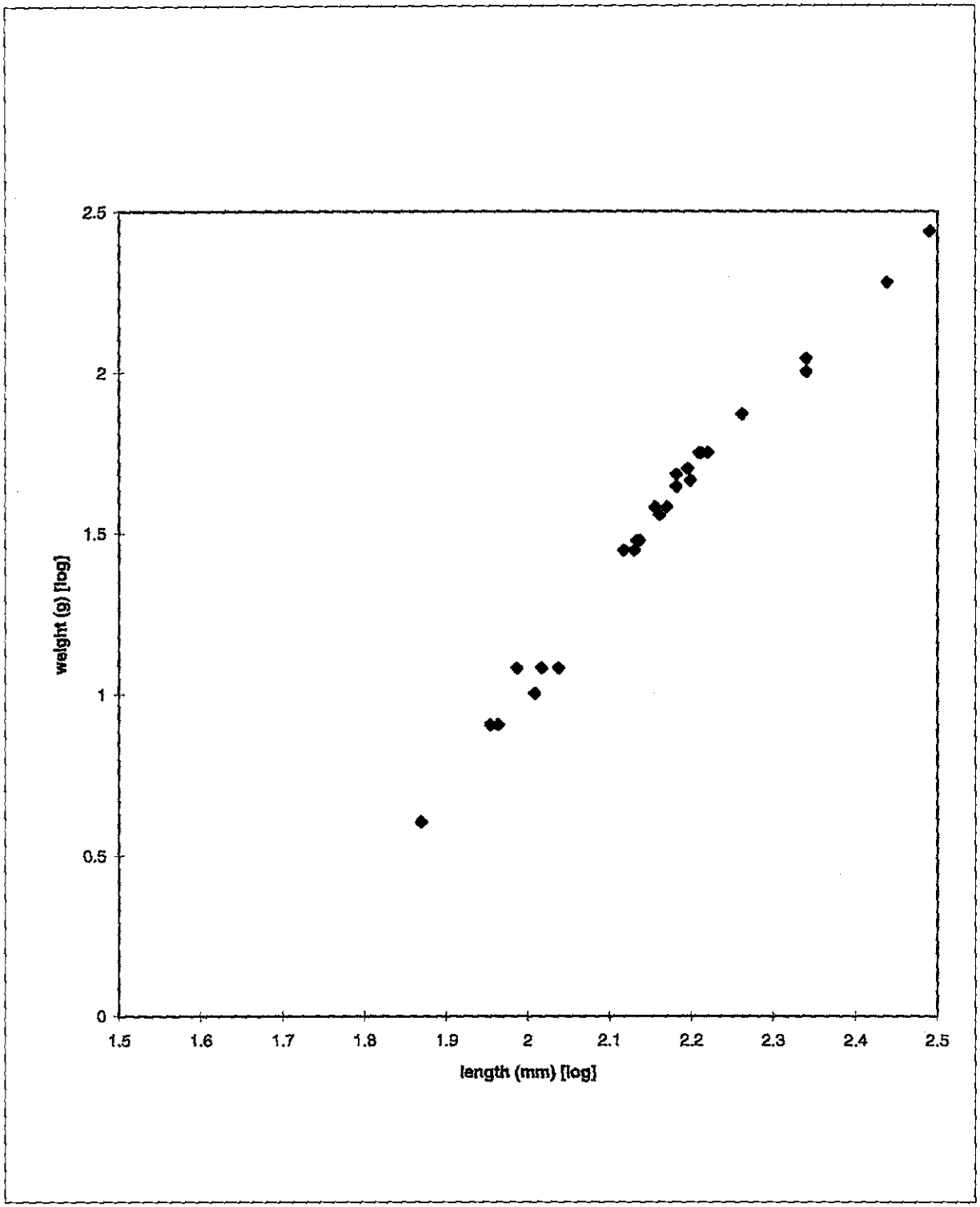


Figure ? Length [log] and weight [log] for brown trout at the Colden Water - Hebden Bridge site

COLDEN WATER, HEBDEN BRIDGE SITE

Notes:-

1. Sections are ordered in an upstream direction. That is Section 1 is the section furthest downstream and Section 4 is the furthest upstream.

2. In general this stream had a steep gradient and ran over bedrock. There was good visibility. Wading was a little difficult with rocks being extremely slippery. All sections were very similar except that Section 1 had one particularly large deep pool, not found to the same extent in other sections. Because of the presence of this pool in Section 1, Section 2 was used for the triple shock.

Species present:-

Brown trout