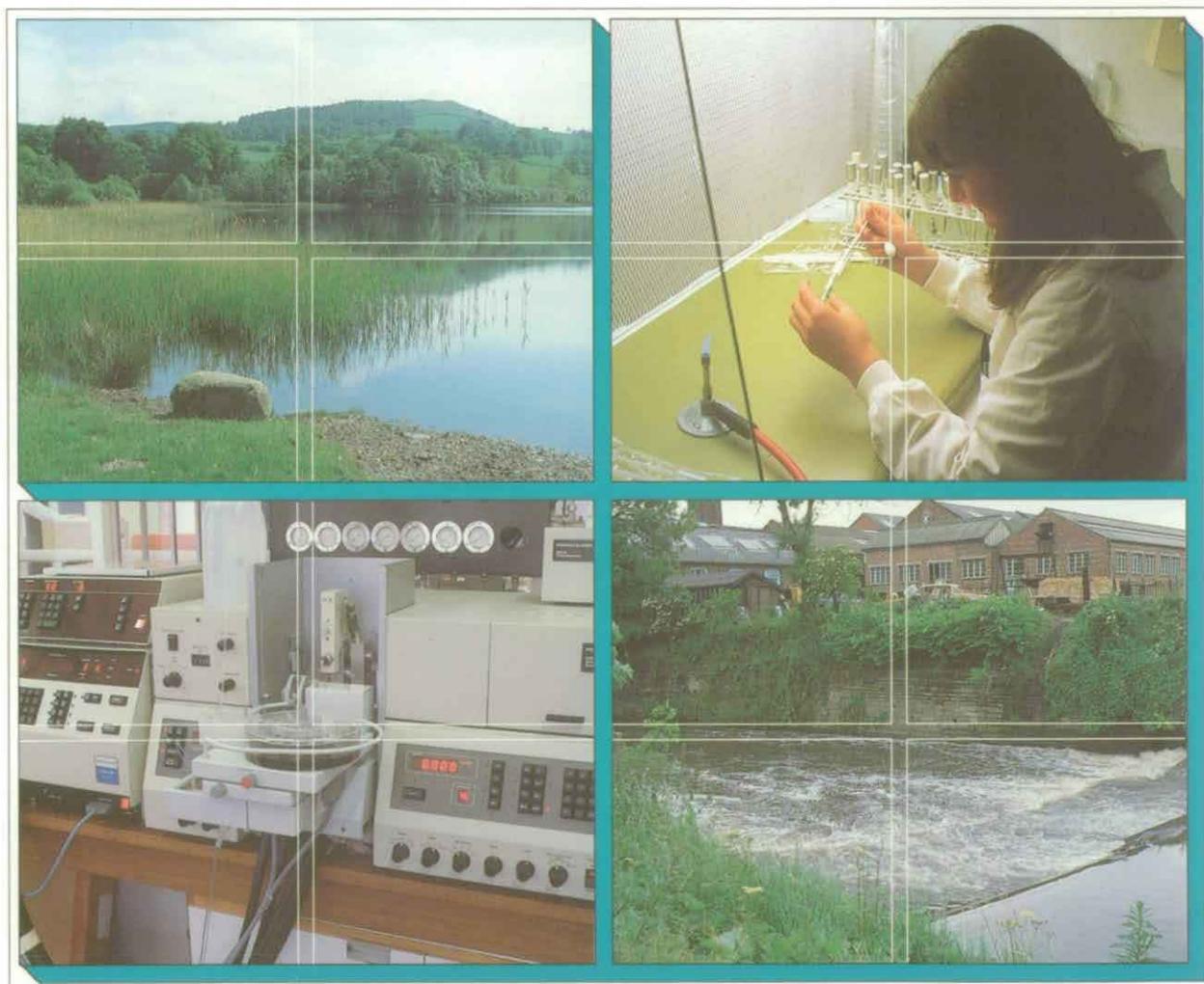
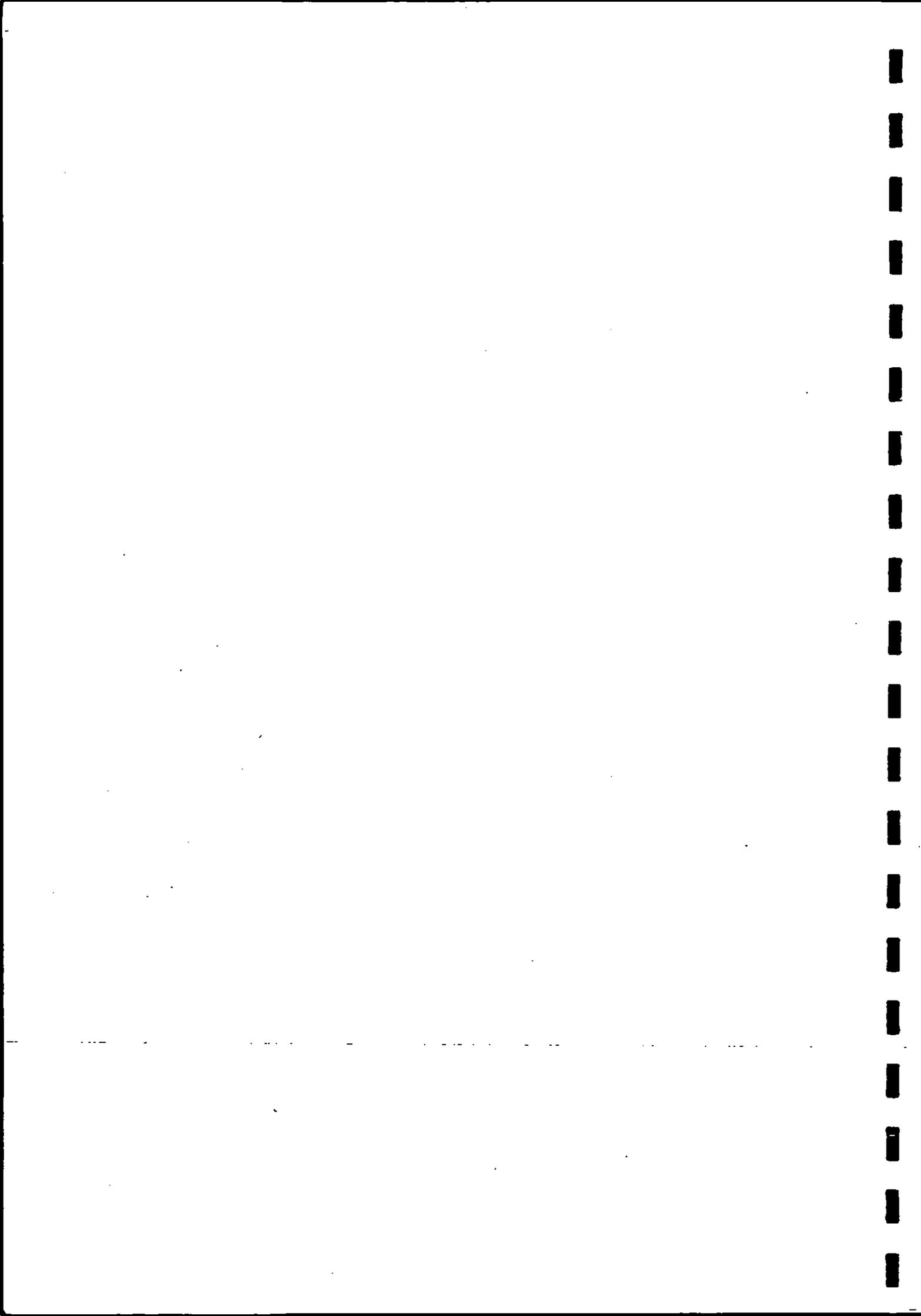


Electro-fishing survey of the River Dever, Hampshire

Final Report

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the River Dever, Hampshire**

**Final Report: December 1991
R.H.K.MANN**

**Project Leader: R.H.K.MANN
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1. INTRODUCTION

This report covers the terms of reference as detailed in the letter (dated 13 May 1991) from Aquatic Environmental Consultants to Dr L.C.V.Pinder. These terms are set out in Appendix A.

The fish survey was carried out on 21 October 1991, in the presence of Dr Phil Smith (Aquatic Environmental Consultants) and, for part of the time, by Mr Dick Kitson (Eagle Star estate office).

The IFE staff were: R.H.K.Mann (Project Leader), W.R.C.Beaumont (in charge of electro-fishing operations), A.C.Pinder, B.Dear and A.Ibbotson (research student).

2. DESCRIPTION OF SITES

The selection of the three sites for the fish survey was made by Eagle Star and Aquatic Environmental Consultants. They were:

Site 1.	Sutton Scotney	NGR	SU	467	398
Site 2.	Weston Colley	NGR	SU	499	394
Site 3.	Micheldever	NGR	SU	508	393

Sutton Scotney (site 1): Section bordered by alder and willow trees and a Phragmites reed bed. Stream bed composed of fine gravel overlaid with mud and silt. Many fallen leaves on stream bed and among the marginal vegetation.

Weston Colley (site 2): Very shallow section bordered on both banks by trees. Stream bed composed of fine gravel overlaid with mud and silt. An abundance of fallen leaves in the stream, especially along the stream margins.

Micheldever (site 3): Shallow section with open fields on both banks, with occasional large trees on the stream bank. Stream bed composed of fine gravel overlaid with mud and silt, especially along the stream margins. Many fallen leaves along the stream margins.

On the day of the survey (21.10.91) a temporary barrier had been placed at the upstream end of the survey section, apparently to create a deeper section upstream of the barrier for a small inflatable dinghy (for children). The presence of this barrier is not considered to have affected the composition of the fish population in the survey section.

Site 1 was the furthest site downstream and site 3 the furthest upstream. Site dimensions are detailed in Table 1; stream widths were measured at approximately 10 m intervals along each section, with mid-stream depths being measured at these locations.

2.

Table 1. Physical dimensions of the three fish survey sites on the River Dever.

Site 1		Site 2		Site 3		
Widths	Depths	Widths	Depths	Widths	Depths	
m	cm	m	cm	m	cm	
6.8	46	4.25	8	3.25	10	
5.8	61	3.50	5	3.30	10	
6.0	53	3.60	3	3.15	8	
5.9	43	2.65	4	3.40	10	
8.9	40	3.45	5	3.65	6	
7.5	42	2.90	6	3.10	8	
6.2	38	3.00	5	2.95	8	
8.2	35	2.90	4	2.85	6	
6.5	44	2.20	4	3.45	4	
5.0	47	2.40	5	3.90	6	
Means	6.68	44.9	3.085	4.9	3.30	7.6
Length m	97		102		90	
Area m ²	648		315		297	

3. ELECTRO-FISHING PROTOCOL

Two electro-fishing gears were used in the survey:

a) A 1000 KVA Honda petrol generator with full-wave rectification producing 100 pulses per second, 200 volts (maximum) at the single anode.

This was used at Sutton Scotney (site 1).

b) A battery-powered 'Deka Lady 3000' machine producing 60 pulses per second, 400 volts (maximum) at the single anode.

This was used at Weston Colley (site 2) and Micheldever (site 3).

Prior to electro-fishing at each site, stop-nets (1.5 inch mesh) were placed at the upstream and downstream limits of the section.

Each section was electro-fished in an upstream direction and all the fish caught were placed in a large plastic dustbin containing water. Two repeated fishings were carried out at sites 1 and 3, and three repeated fishings at site 2. At each site, all fish were returned to the study reach after the final fishing, and after the fish had been measured and weighed.

Trout, grayling and eels (Sutton Scotney only) were individually anaesthetized (benzocaine), measured and weighed. Scale samples were taken from the trout and grayling for age determination. All other species were measured by pricking their lengths on to 'Permatrace' tracing plastic pinned to a cork measuring board. Lengths of individual fish were subsequently determined in the laboratory by placing the 'Permatrace' on to accurate graph paper. In the field, each of these other species was weighed (in batches) to determine the total weights caught in each of the repeated electro-fishings.

At Sutton Scotney (site 1) the bin containing the trout and grayling that were recovering from being measured and weighed was aerated from an air cylinder.

During all these procedures only one fish was killed accidentally; this was a grayling (site 1) that had been adjacent to the stationary cathode when the power was switched on.

4. RESULTS

A total of eight fish species was caught during the survey:

Species	Scientific name
Brown Trout	<u>Salmo trutta</u> L.
Grayling	<u>Thymallus thymallus</u> L.
Eel	<u>Anguilla anguilla</u> (L.)
Stone Loach	<u>Noemacheilus barbatulus</u> (L.)
Bullhead (or Miller's Thumb)	<u>Cottus gobio</u> L.
3-spined Stickleback	<u>Gasterosteus aculeatus</u> L.
10-spined Stickleback	<u>Pungitius pungitius</u> (L.)
Brook Lamprey	<u>Lampetra planeri</u> (Bloch)

From their external appearance and the annulus formation on their scales, all the trout were thought to be wild fish, rather than stocked fish. However, it is not possible to be categorical about this conclusion as trout that are stocked at a young age often resemble wild fish when they are older.

All fish species appeared to be in good condition, with no indication of any disease. Two specimens of the fish leech Piscicola geometra (L.) were observed (not attached to a fish) at site 2. This species is common in most chalk streams.

4.1 Population Estimates

Details of the lengths and weights of each species caught at each site are given in Appendix B. Population numbers of each species were calculated from the successive removal catches at each site using the Zippin method (Zippin 1956, 1958). The computations were carried out using the IFE software program 'REMOVE', part of which is based on the program published by Higgins (1985). Where catch data could not be used for Zippin estimates, the numbers of fish caught provide a minimum estimate. The results from the three sections are given in Tables 2, 3 & 4.

Table 2. Catch data and population estimates of fish caught at Sutton Scotney (site 1); figures in parentheses = 2 x Standard Error, MIN = minimum estimate.

Species		Catch 1	Catch 2	Total catch	Total Wt(g)	Number 100 m ²	Biomass g 100 m ²
Trout		5	0	5	1470	0.7716	226.85 (0)
Grayling		11	0	11	387	1.6975	59.72 (0)
Eel	MIN	14	15	29	2692	4.4753	799.383
Loach	MIN	9	10	19	73	2.9321	11.265
Bullhead	MIN	1	1	1	12	0.3086	1.852
3-sp St	MIN	1	0	1	<1	0.1543	<0.1543
Lamprey	MIN	4	4	8	40	1.2346	6.1728

Table 3. Catch data and population estimates of fish caught at Weston Colley (site 2); figures in parentheses = 2 x Standard Error, MIN = minimum estimate.

Species	Catch 1	Catch 2	Catch 3	Total catch	Total Wt(g)	Number 100 m ⁻²	Biomass g 100 m ⁻²
Loach	MIN 27	30	30	87	359	27.619	113.968
Bullhead	42	30	18	90	190	40.300 (14.100)	85.078 (29.767)
10-sp St.	MIN 1	1	2	4	2	1.2698	<1.0
3-sp St.	42	30	48	120	28	Not assessed - see text.	

Table 4. Catch data and population estimates of fish caught at Micheldever (site 3); figures in parentheses = 2 x Standard Error, MIN = minimum estimate.

Species	Catch 1	Catch 2	Total catch	Total Wt(g)	Number 100 m ⁻²	Biomass g 100 m ⁻²
Loach	54	44	98	223	97.978 (121.192)	222.95 (275.77)
Bullhead	9	3	12	66	4.377 (0.972)	23.854 (5.344)
3-sp St.	MIN 7	11	18	4	6.061	1.347
10-sp St.	6	4	10	6	6.061 (12.411)	3.363 (7.447)

4.2 Catch efficiencies and accuracy of population estimates

Mid-water fish species (trout and grayling at site 1) were caught with 100 per cent efficiency, i.e. all were caught in the first of the repeated fishings. More problems were encountered with bottom-dwelling species (eel, stone loach, bullhead, lamprey), which were caught with low efficiency. This is a normal occurrence in electro-fishing surveys, but in the River Dever the efficiencies of capture were further decreased because most of these benthic species were hidden among the mud, silt, fallen leaves or marginal aquatic vegetation.

The two species of stickleback (3-spined and 10-spined) were present in relatively small numbers, except at Weston Colley

(site 2), where 3-spined sticklebacks were present in profusion. In view of the time constraints in completing the survey of the three sites in one day, no attempt was made to catch all 3-spined sticklebacks at site during the three repeated fishings. Thus, the numbers of this species given in Table 3 represent random catches taken at the downstream end of the section, where they were most numerous. A subjective assessment, based on the numbers caught, is that the section contained c. 1000 individuals (equivalent to c. 3.37 fish 100 m²)

4.3 Age and Growth estimates

The 5 trout and 11 grayling were aged by examining scale samples under a binocular microscope at x35 magnification. The results are presented in Table 5 and (trout only) in Figure 1.

Table 5. Individual lengths (cm) & weights (g) for age of trout and grayling at site 1.

	Length (cm)	Weight (g)	Age (years)
Trout	12.2	23	0+
	24.4	159	1+
	31.6	364	2+
	32.0	366	3+
	36.0	558	3+
Grayling	All fish were aged 0+		
	Mean length (cm) = 140.36		S.E. = 3.11
	Mean weight (g) = 25.18		S.E. = 1.57

It was possible to identify 0+ stone loach, bullheads and 3-spined sticklebacks from their length-frequency distributions (Figures 2, 3 & 4), using combined data for all three sites and, hence, to determine the mean lengths for this age-group:

3-spined Stickleback	Number of fish	= 139		
	Mean length (mm)	= 26.324	S.E. = 0.418	
Bullhead	Number of fish	= 80		
	Mean length (mm)	= 43.150	S.E. = 0.731	
Stone loach	Number of fish	= 106		
	Mean length (mm)	= 45.396	S.E. = 0.741	

5. COMPARISONS WITH DATA FROM OTHER CHALK STREAMS

Published information is available for most of the eight fish species found in the River Dever. However, there are no data on population densities of grayling and brook lamprey, and no previous studies of chalk streams have recorded 10-spined sticklebacks in the numbers found in the River Dever.

No minnows, Phoxinus phoxinus (L.), were caught during the survey, though this species is common in most chalk streams.

5.1 Population densities

Tables 6 and 7 detail the population densities (numbers and biomass) of fish in the River Dever and other southern chalk streams.

Table 6. Population densities (Number 100 m²) of fish in the River Dever and other chalk streams (Mann, 1971; Mann et al., 1989) in southern England. Each River Dever value is the maximum for that species between the three sites. + = <1.0, ? = status unknown.

	Trout	Loach	Bullhead	3-sp. Stickle.	Eel
River Dever	0.77	98	40	6	(4.5)
Bere Stream	20.0	+	1047	+	+
River Tarrant	80.0	40.0	7510	+	+
Devil's Brook	10.0	+	530	10.0	+
Tadnoll Brook	20.0	14.0	39	8.0	500
Sydling Brook	10.0	6.0	2.0	+	5.0
Candover Brook	13.7	?	?	?	?
River Lambourn	10.0	?	980	?	?

Table 7. Population estimates (Biomass g 100 m⁻²) of fish in the River Dever and other chalk streams (Mann, 1971; Mann *et al.*, 1989) in southern England. Each River Dever value is the maximum for that species between the three sites. + = <1.0, ? = status unknown.

	Trout	Loach	Bullhead	3-sp. Stickle.	Eel
River Dever	227	60	14	12	(799)
Bere Stream	640	+	587	+	+
River Tarrant	440	10	1350	+	+
Devil's Brook	50	+	860	40	+
Tadnoll Brook	1000	28	690	+	1575
Sydling Brook	254	+	380	+	+
Candover Brook	?	?	?	?	?
River Lambourn	?	?	?	?	?

5.2 Age and Growth

Table 8. Mean lengths (cm) for age of trout in the River Dever and other chalk streams (from Mann *et al.*, 1989) in southern England.

	Lengths (cm) at age (years)			
	1	2	3	4
River Dever	12.2	24.4	31.6	34.0
Bere Stream	12.5	18.7	22.0	-
River Tarrant	12.5	24.0	-	-
Devil's Brook	11.8	22.0	-	-
Tadnoll Brook	11.2	18.0	23.3	26.3
Candover Brook	10.8	22.2	27.8	32.3
River Lambourn	12.5	22.4	27.9	32.7
River Test	12.2	25.4	33.0	40.0
River Kennet	11.4	23.6	33.8	39.6

Table 9. Mean lengths (cm) of 0+ grayling, stone loach, bullhead and 3-spined stickleback from the River Dever and other chalk streams (from Mann, 1971 and unpublished data) in southern England.

	Grayling	Loach	Bullhead	3-spined Stickle.
River Dever	14.0	4.5	4.3	2.6
Bere Stream	-	-	4.4	3.4
River Tarrant	-	5.3	3.9	-
Devil's Brook	-	-	4.3	3.3
River Frome (Dorset)	14.1	-	-	-
River Avon (Hants)	14.2	-	-	-

6. DISCUSSION

The population densities of all species at each of the sites were very much lower than those previously recorded for the same species in other chalk streams. The exceptions were the presence of 10-spined sticklebacks and the high numbers of 3-spined sticklebacks at site 2 (Weston Colley). Several of the fish species, particularly trout and grayling, require a substratum of coarse gravel in which to deposit their eggs. At the sites visited for the electro-fishing survey, few such areas were observed, most of the stream bed consisting of very fine gravel with deposits of mud and silt.

In contrast to the low population densities, growth rates of the River Dever fish were similar to those in other chalk streams, though it should be noted that the trout and grayling data from the Dever are derived from very small samples (5 and 11 fish, respectively).

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APPENDIX B

LENGTHS (mm & cm) AND WEIGHTS (g) OF FISH CAUGHT IN THE RIVER DEVER ON 29 OCTOBER 1991.

Site 1. Sutton Scotney (area 648 m²)

TROUT		GRAYLING		EEL		EEL	
Catch 1		Catch 1		Catch 1		Catch 2	
L (cm)	W (g)	L (cm)	W (g)	L (mm)	W (g)	L (mm)	W (g)
12.2	23	12.0	14	346	60	247	11
24.4	159	12.8	20	368	70	368	78
31.6	364	13.1	21	368	75	368	88
32.0	366	13.8	24	388	93	387	101
36.0	558	14.3	26	428	157	412	107
		14.3	27	433	138	434	115
		14.4	26	444	162	447	153
		14.5	28	493	227	455	137
		14.6	28	507	230	459	147
		15.2	31	511	192	528	228
		15.4	32	518	222	530	269
				524	261	532	236
				535	263	556	269
				573	338	577	359
						629	394

BULLHEAD		3-SPINED STICKLEBACK		BROOK LAMPREY (A = adult)	
Catch 1	Catch 2	Catch 1	Catch 1	Catch 1	Catch 2
L (mm)	L (mm)	L (mm)	L (mm)	L (mm)	L (mm)
61	87	35		125	130
				135 A	135 A
				138 A	136 A
				142 A	139 A
W (g)	3	9	<1	18	22

Appendix B - continued

Site 2. Weston Colley

3-sp STICKLEBACK

Catch 1		Catch 2		Catch 3	
L (mm)	No.	L (mm)	No.	L (mm)	No.
15	1	19	2	18	1
16	2	22	1	19	1
17	2	23	2	20	1
18	1	25	4	21	1
19	3	26	2	22	2
20	5	27	3	23	4
21	2	28	6	24	6
22	2	29	3	25	4
23	2	30	1	26	5
24	3	31	1	27	8
25	5	32	2	28	3
26	2	33	1	29	4
27	2	34	1	30	1
28	4	35	1	31	3
29	4			32	2
30	1			34	1
31	1			44	1
W (g)	10	30		48	

10-sp STICKLEBACK

Catch 1		Catch 2		Catch 3	
L (mm)	No.	L (mm)	No.	L (mm)	No.
28	1	47	1	22	1
				27	1
W (g)	<1	1		<1	

Appendix B - continued

BULLHEAD

Catch 1		Catch 2		Catch 3	
L (mm)	No.	L (mm)	No.	L (mm)	No.
26	1	31	2	35	1
31	1	37	2	37	2
32	2	38	2	40	2
34	1	41	2	41	2
35	2	42	3	43	2
36	1	43	1	46	1
37	1	44	2	49	2
38	1	45	3	50	1
40	3	46	1	52	1
41	1	49	1	53	1
42	3	50	2	74	1
43	1	51	1	76	1
44	1	56	1	77	1
45	3	61	1		
46	2	67	1		
47	4	73	1		
48	1	74	1		
50	1	75	1		
51	1	80	1		
52	1	83	1		
56	1				
58	1				
66	2				
67	1				
72	1				
79	1				
85	2				
88	1				
W (g)	93	61		36	

Appendix B - continued

STONE LOACH

Catch 1		Catch 2		Catch 3	
L (mm)	No.	L (mm)	No.	L (mm)	No.
28	1	28	1	29	1
34	2	37	1	36	2
35	1	39	2	44	1
36	1	40	1	48	1
40	1	42	1	49	1
42	2	44	1	57	1
43	2	45	1	62	1
71	1	48	1	67	1
72	1	49	1	71	1
86	1	54	1	80	1
87	1	74	1	81	1
88	1	79	1	83	2
89	2	80	3	84	1
90	1	81	1	86	1
92	1	84	2	87	4
93	1	85	2	90	2
94	1	86	2	91	1
95	1	88	1	92	1
97	2	89	1	94	2
98	2	90	1	95	1
100	1	92	1	96	1
		93	1	98	2
		95	1		
		109	1		
W (g)	114		105		140

Appendix B - continued

STONE LOACH

Catch 1		Catch 2	
L (mm)	No.	L (mm)	No.
29	2	34	1
32	1	36	1
34	1	37	2
36	3	40	1
39	2	43	1
40	1	44	2
41	3	45	1
43	1	46	1
45	4	47	4
46	1	48	1
47	6	49	1
48	3	50	4
49	2	51	1
50	1	53	3
51	2	54	2
52	2	55	1
53	2	56	1
54	2	57	1
55	1	58	2
56	2	67	1
57	1	70	1
60	1	85	1
61	1	86	1
79	1	87	1
82	1	89	1
87	1	90	1
90	1	91	1
92	1	97	2
93	1	98	2
95	1	102	1
96	1		
105	1		
W (g)	98		125

Fig.1.Growth curves for the brown trout

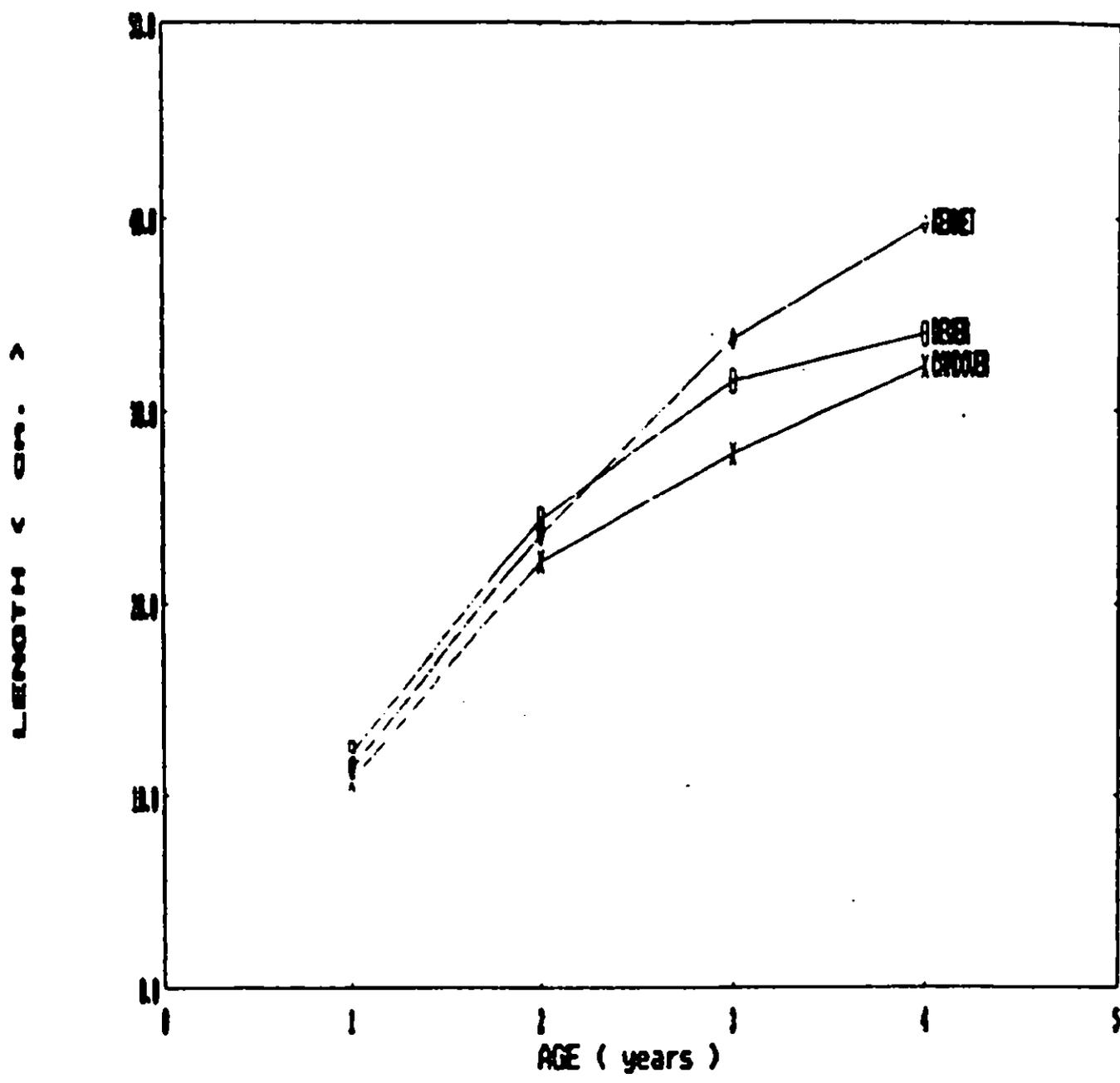


Fig. 2. Stone loach

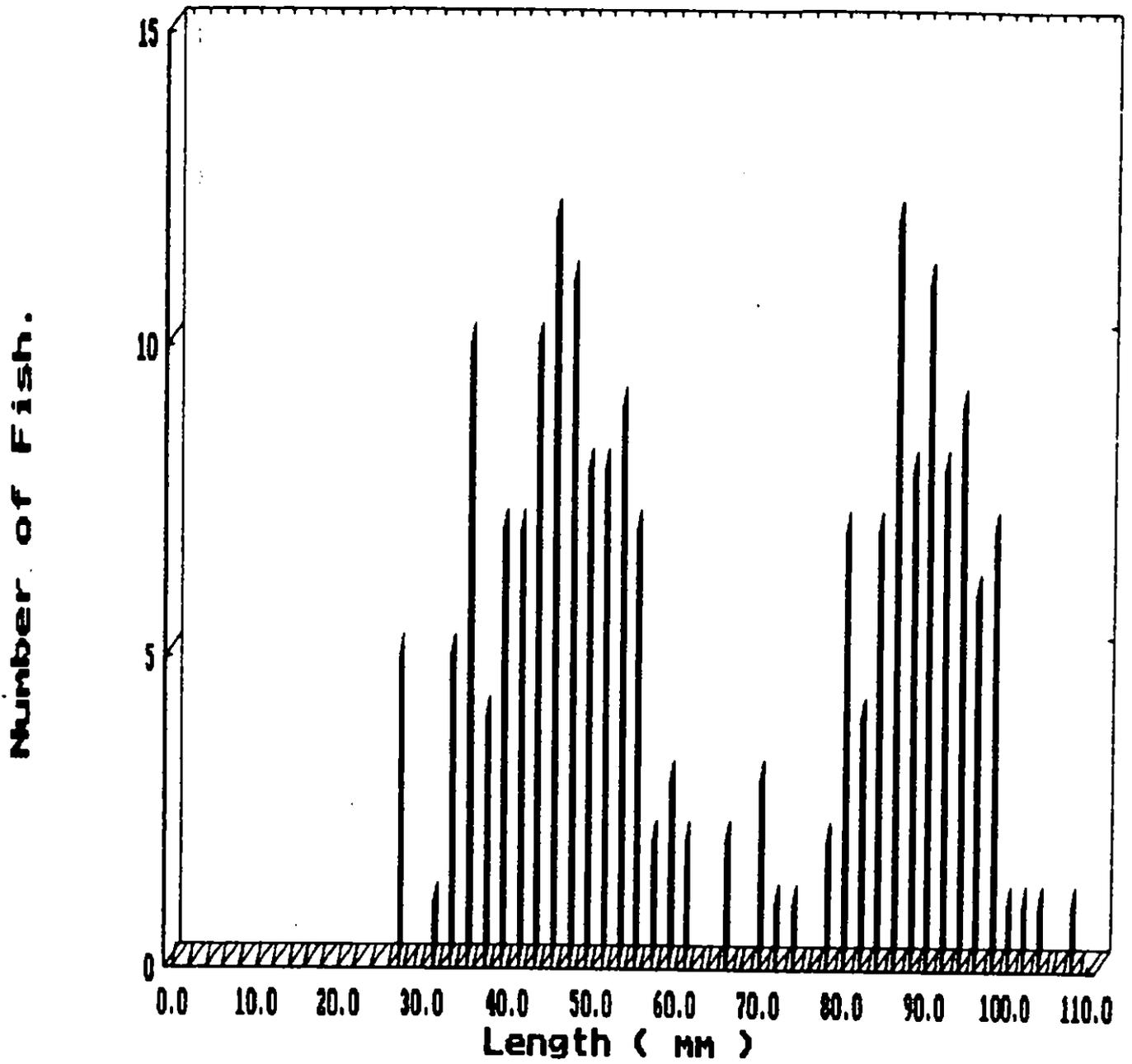


Fig. 3. Bullhead

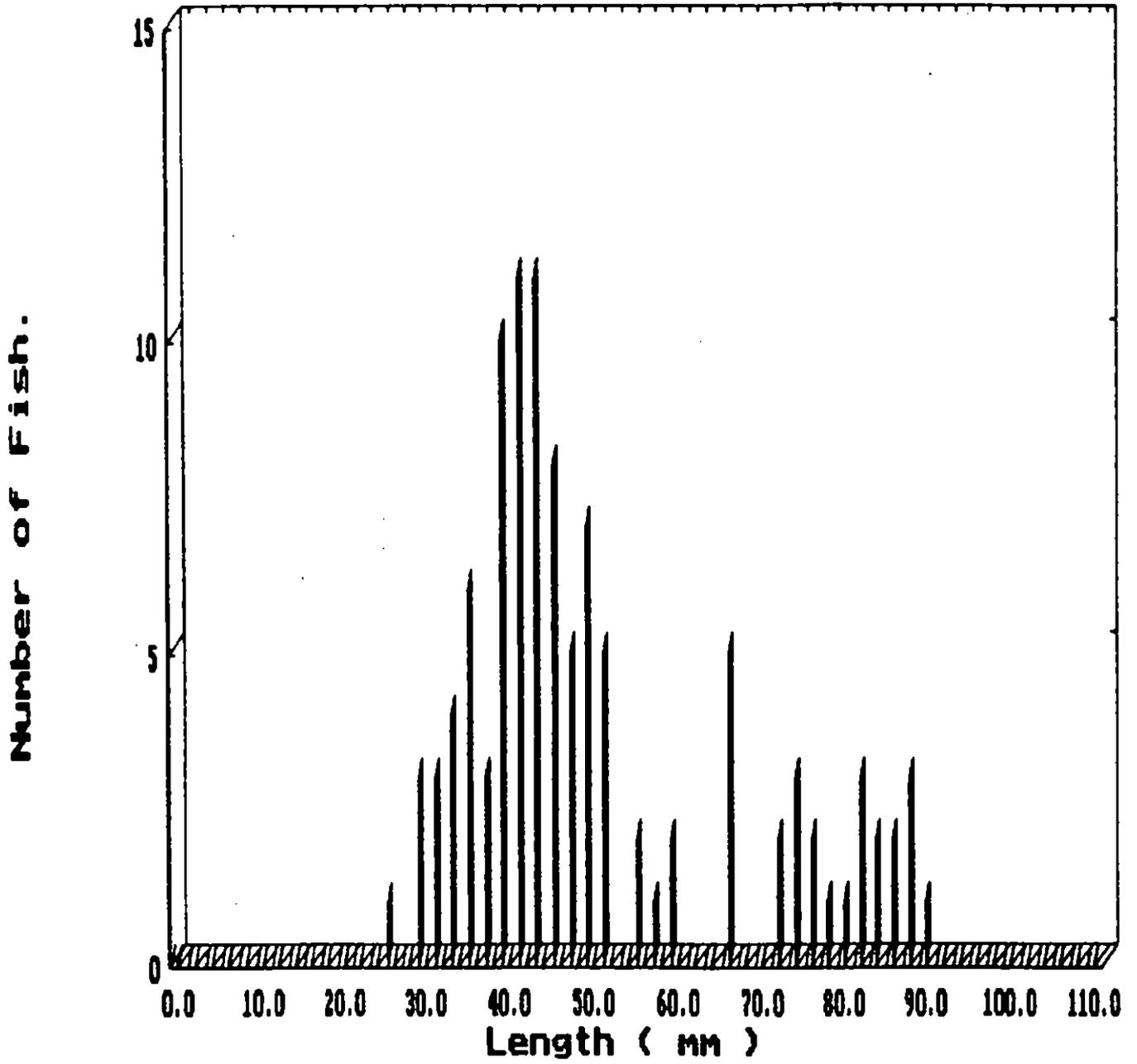


Fig. 4. 3-spined Stickleback

