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Institute of Freshwater Ecology

1992 Survey of the coarse fish of the River Tees before construction of the barrage

Interim report

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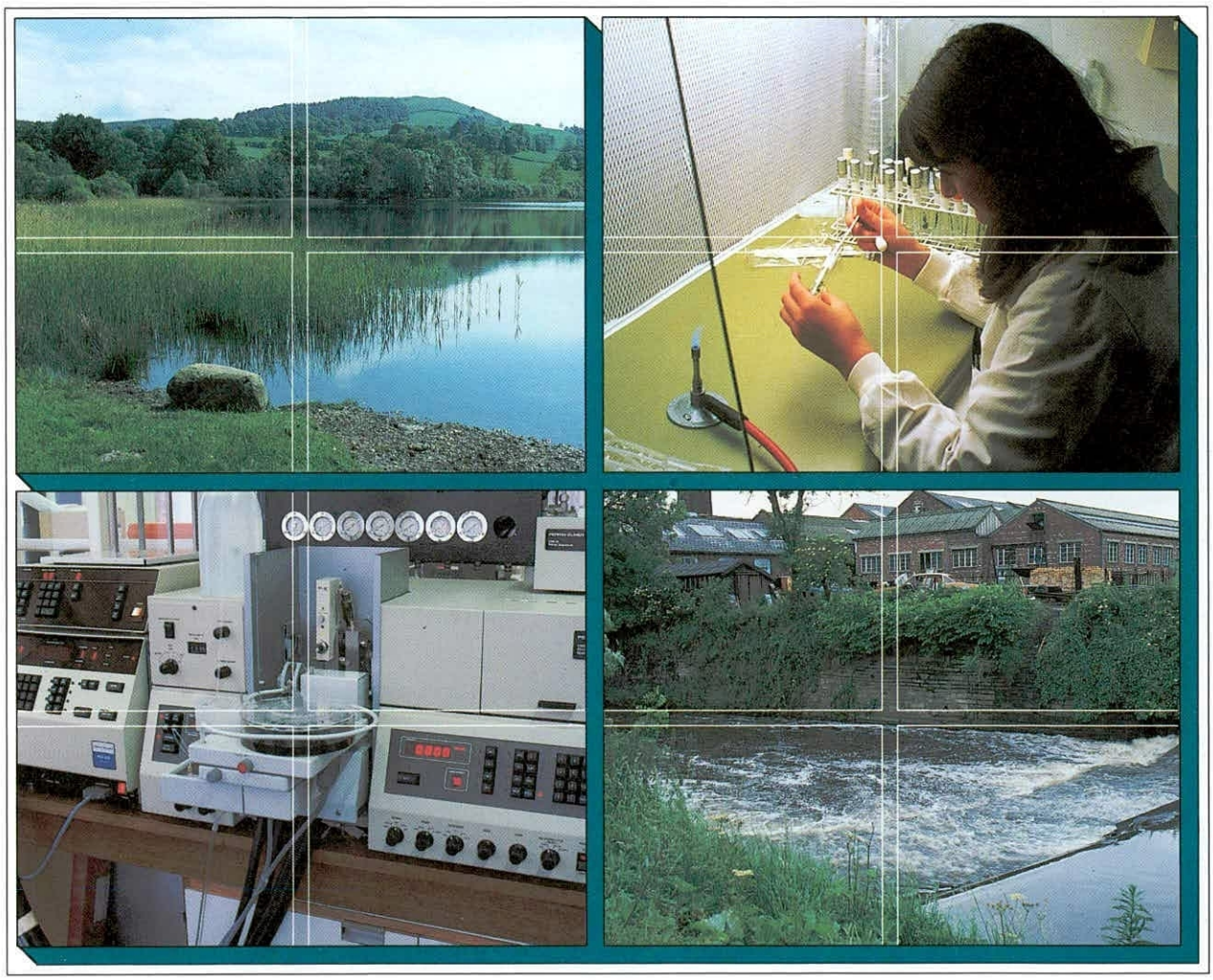

Natural Environment Research Council

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1992 Survey of the coarse fish of the River Tees before construction of the barrage

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Project leader:	J.S. Welton
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CONTENTS

REVIEW OF PROGRESS

This report covers the period April 1992 to September 1992. Two sampling trips to the River Tees were planned for this period, the first to sample fry and the second to sample adult fish. The objectives of this year's work were to

1. Determine the spawning sites of dace in the lower Tees.

2. Conduct a detailed survey of the coarse fish of the Tees to add to information from the 1991 survey. Particular emphasis was to be placed in the area below Preston Park which is not intensively fished as it is perceived by the anglers to contain few fish.

3. Collect information from angling matches on the river and analyse results.

4. Continue data collection from temperature loggers.

1. Over 2700 fry were sampled and identified. High concentrations of dace fry were found at Yarm, Low Worsall and Low Moor. It is concluded that these are the major spawning sites on the lower part of the river.

2. Gill netting and fish trapping were tried in the sections of river where, because of high conductivity due to saline intrusion, it was not possible to electrofish (Thornaby-Pipe bridge). Few fish were caught by either method. Both methods suffered from drifting debris with traps moved or lost. Gill netting was concentrated around the time of slack tide and consequently the effect of drifting debris was minimized. The lack of fish in the nets is taken to be indicative of a general lack of fish in the area.

   A gudgeon (length 15.5 cm) caught in a trap at below The Holmes (Thornaby) is the lowest recorded presence of coarse fish on the river.

   Electrofishing in areas further upstream produced over 2500 fish including many young of the year. Important nursery areas have been identified. The length of each fish was measured and many were weighed. Scales were taken from a representative sample for age determination. Five hundred and fifty scales have been cleaned, mounted and aged.

   Adult salmon were caught in sections 7 (Yarm), 11 (Aislaby) and 15 (Low Worsall). All were fresh with sea-lice. A further number (3-4) were seen between Yarm and Aislaby.

3. Information has continued to be collected from angling matches.

4. The temperature loggers have worked continuously this year.

1. FRY SURVEY 1992

1.1 Introduction

In 1991 the fry survey was conducted in September. This time was chosen as a compromise between the need to collect data on fry and on adults. At that time of year the fry were found to be highly mobile and, in particular, the dace had moved from the marginal habitats into deeper water. Thus it was difficult to assess the spawning areas for dace and the relative abundance of each species of fry.

To overcome these problems it was decided to bring forward the time of the fry survey. Sampling close to the time of hatch would give the best data on distribution along the river and location of spawning sites. However, at the pinhead stage, fry are difficult to identify and for this reason the survey was planned for July when it was expected that fry would not be excessively mobile and would still be in marginal habitats but would be easily identifiable. This time also had the advantage of being able to record dace, roach and chub, the three major species whereas earlier sampling would have been before the chub had spawned.

1.2 Methods

The survey was conducted in early July and covered most of the length of river to be affected by the barrage and areas above this for comparison. Effort was concentrated in areas known to contain adult fish (from the 1991 surveys) between Preston Park (Section 4) and Low Dinsdale (Section 25).

Electric fishing apparatus designed for fry sampling was used. This is battery powered with the anode ring mounted on a telescopic pole so that it can be extended in front of the boat to sample fry before disturbance. The shape and size of the anode allows point sampling, producing a high intensity field capable of stunning fry in a small area. At each sampling area up to 10 point samples were taken over a 25 metre area. The number of point samples depended on the number of fry caught.

In addition to the electric fishing, a micromesh seine was used in areas where large congregations of fry were expected and where no snags were present.

1.3 Results

Over 2700 fry were sampled, measured and identified. As in 1991, adult minnows and three spined sticklebacks were included in the results as these fish occupy similar habitats to those used by fry of larger coarse fish. Unlike the previous year when the dace fry had left the marginal areas of the river, dace fry were abundant comprising 34% of the fry sampled. Minnows and chub were the other common species comprising 31.7% and 17.1% respectively (Table 1). Barbel fry increased from 0.8% to 4.8% of the sampled fry with 124 individuals caught compared with 13 the previous year. The number of roach caught was lower, being 133 compared with 301 in 1991.

Table 1. Percentage composition and numbers of each species of fry sampled in the R. Tees in July 1992

Species	Total	Percentage
Barbel *Barbus barbus* (L.)	124	4.5
Chub *Leuciscus cephalus* (L.)	470	17.1
Dace *Leuciscus leuciscus* (L.)	936	34.0
Gudgeon *Gobio gobio* (L.)	168	6.1
Minnow *Phoxinus phoxinus* (L.)	873	31.7
Roach *Rutilus rutilus* (L.)	133	4.8
Stone loach *Barbatula barbatula* (L.)	46	1.6
3 spined stickleback *Gasterosteus aculeatus* L.	5	0.2

1.3.1 Distribution of fry

The species composition in each of the sections sampled is shown in Figs 1-6 and summarized in Fig. 7.

The survey this year showed the presence of fry in Section 4 (Preston Park). No fry had been found in the previous year in this section. Four species were recorded, mainly chub and roach with one specimen each of a dace and a three spined stickleback (Fig. 1).

The main impetus of the sampling programme was to obtain information on the spawning sites of dace by mapping the distribution of the fry. Dace were found in all sections sampled apart from Section 6 (immediately upstream of the R. Leven). They were much more abundant in the samples than in the previous year with 936 individuals collected compared with 150 in 1991. High numbers were found in only four sections:

Section 7 Yarm, downstream of the bridges, 165 individuals (72% of the sampled fry).
Section 8 Yarm, between the bridges, 212 individuals (95% of the sampled fry).
Section 17 Low Worsall, 348 individuals (59% of the sampled fry).
Section 21 Low Moor, 157 individuals (16% of the sampled fry).

Whilst there is no guarantee that these four sites are the only dace spawning areas on this part of the R. Tees, the sampling was extensive within this area and it must be concluded that these are the main spawning areas.

Fig. 1. Species composition of fry in Sections 1-4.

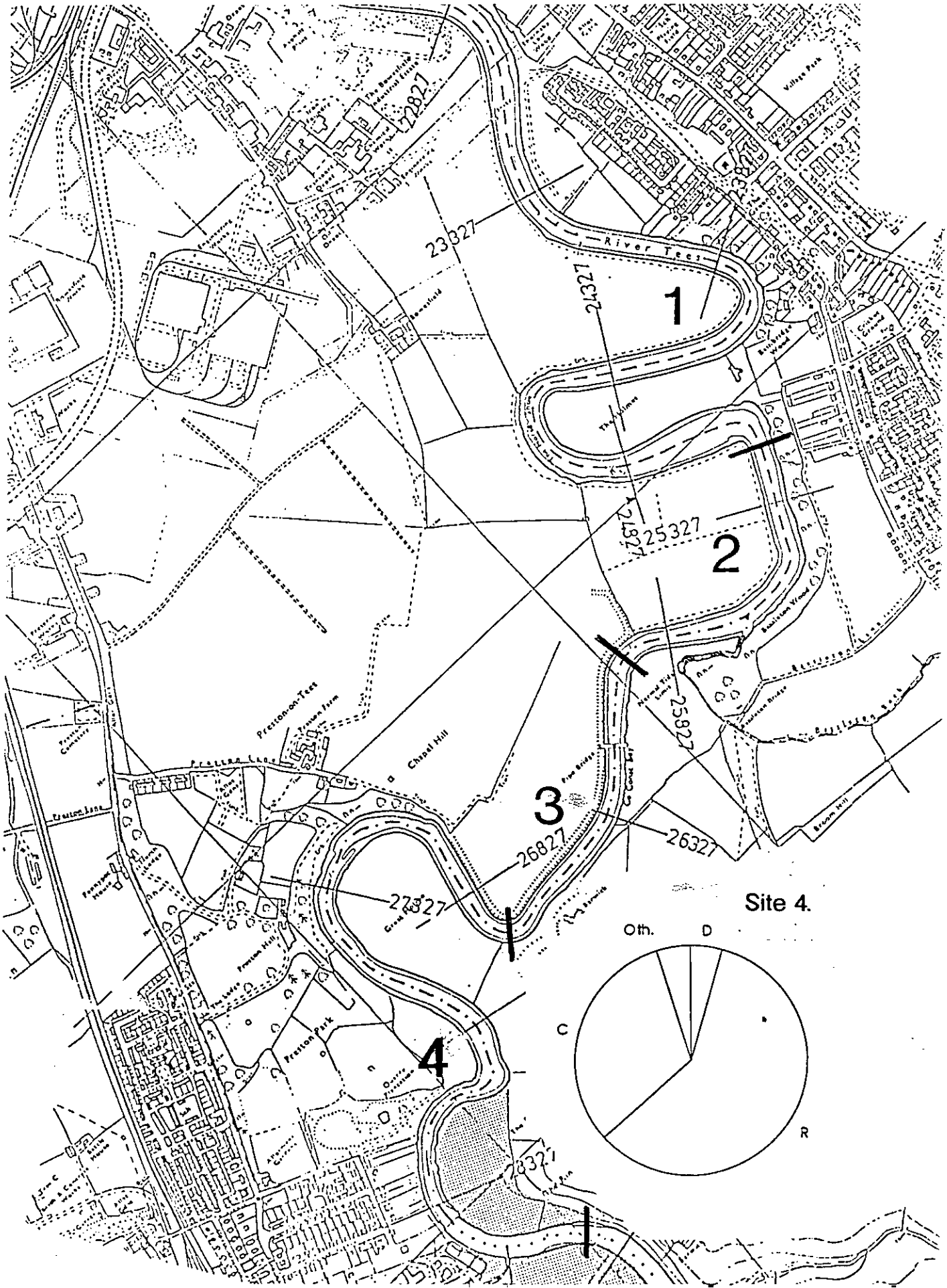


Fig. 2. Species composition of fry in Sections 5-9.

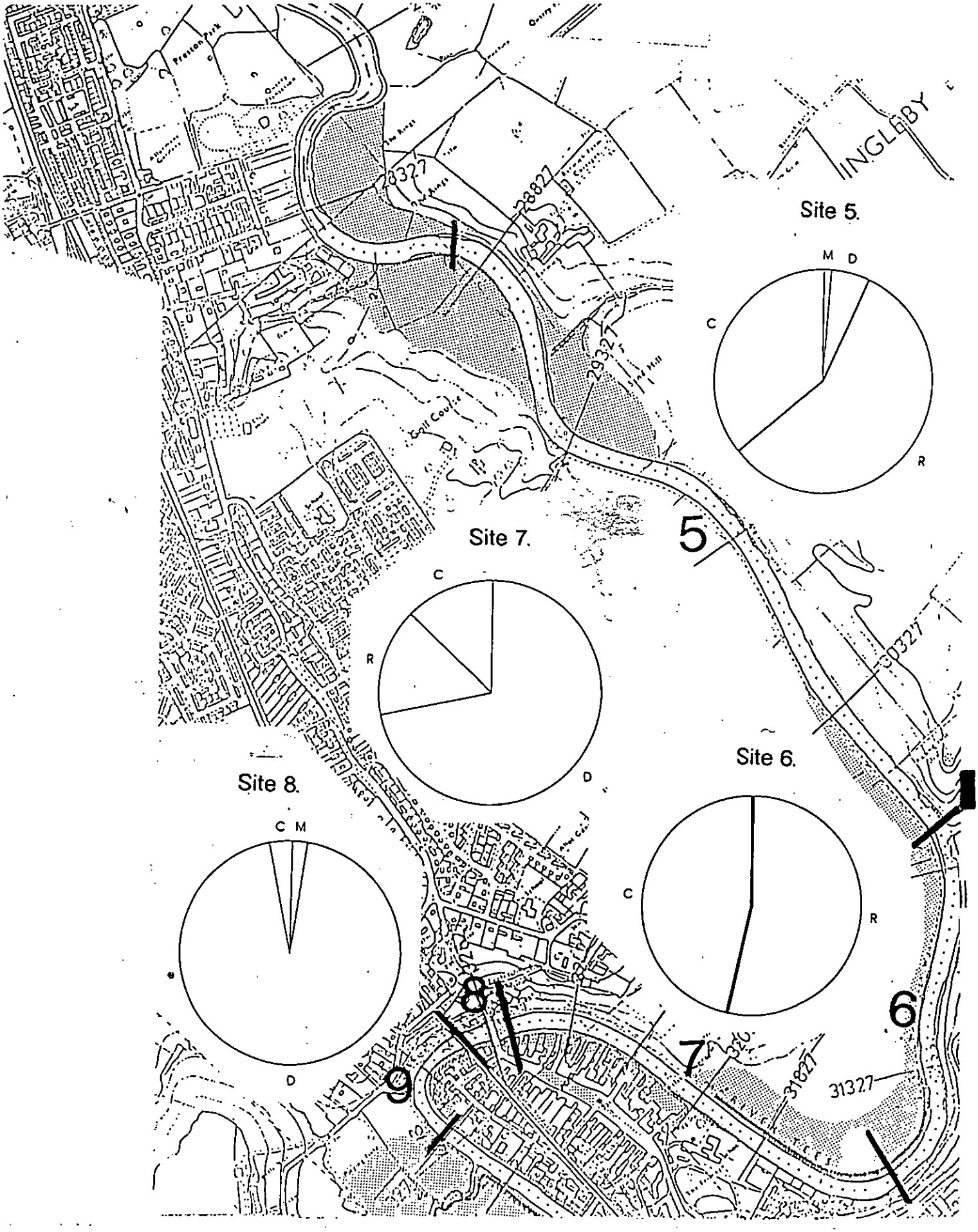


Fig. 3. Species composition of fry in Sections 10-14.

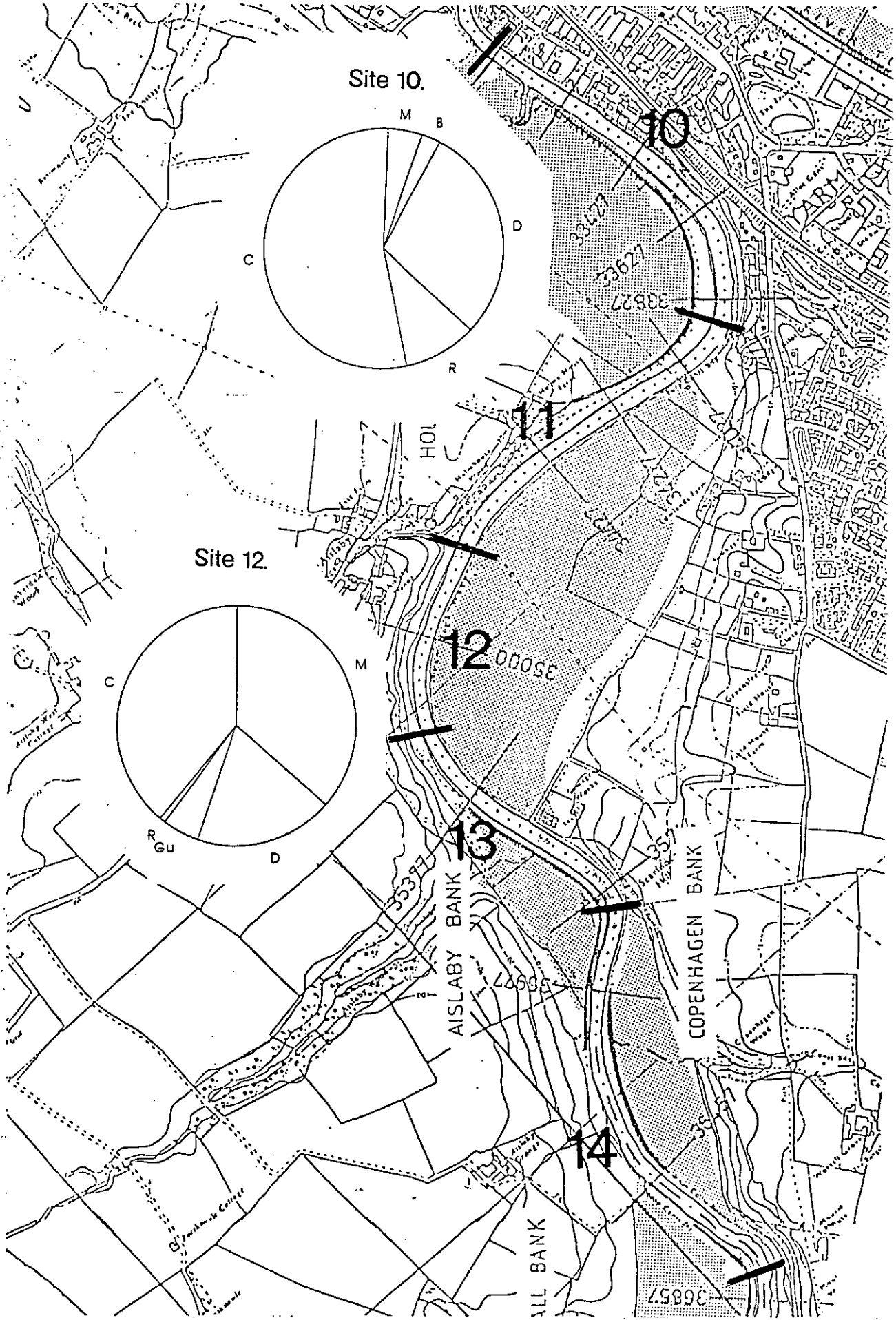


Fig. 4. Species composition of fry in Sections 15-18.

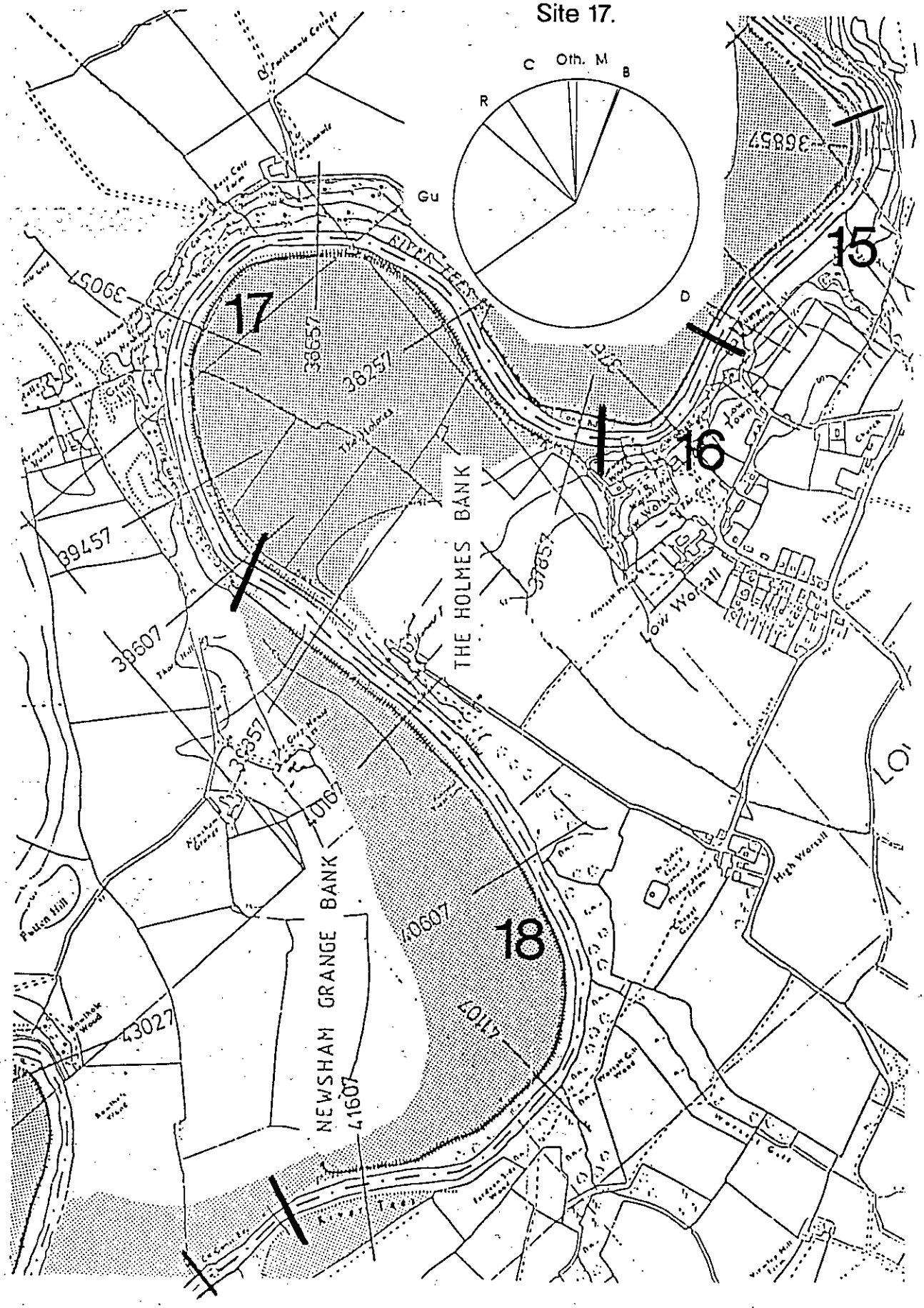


Fig. 5. Species composition of fry in Sections 19-21.

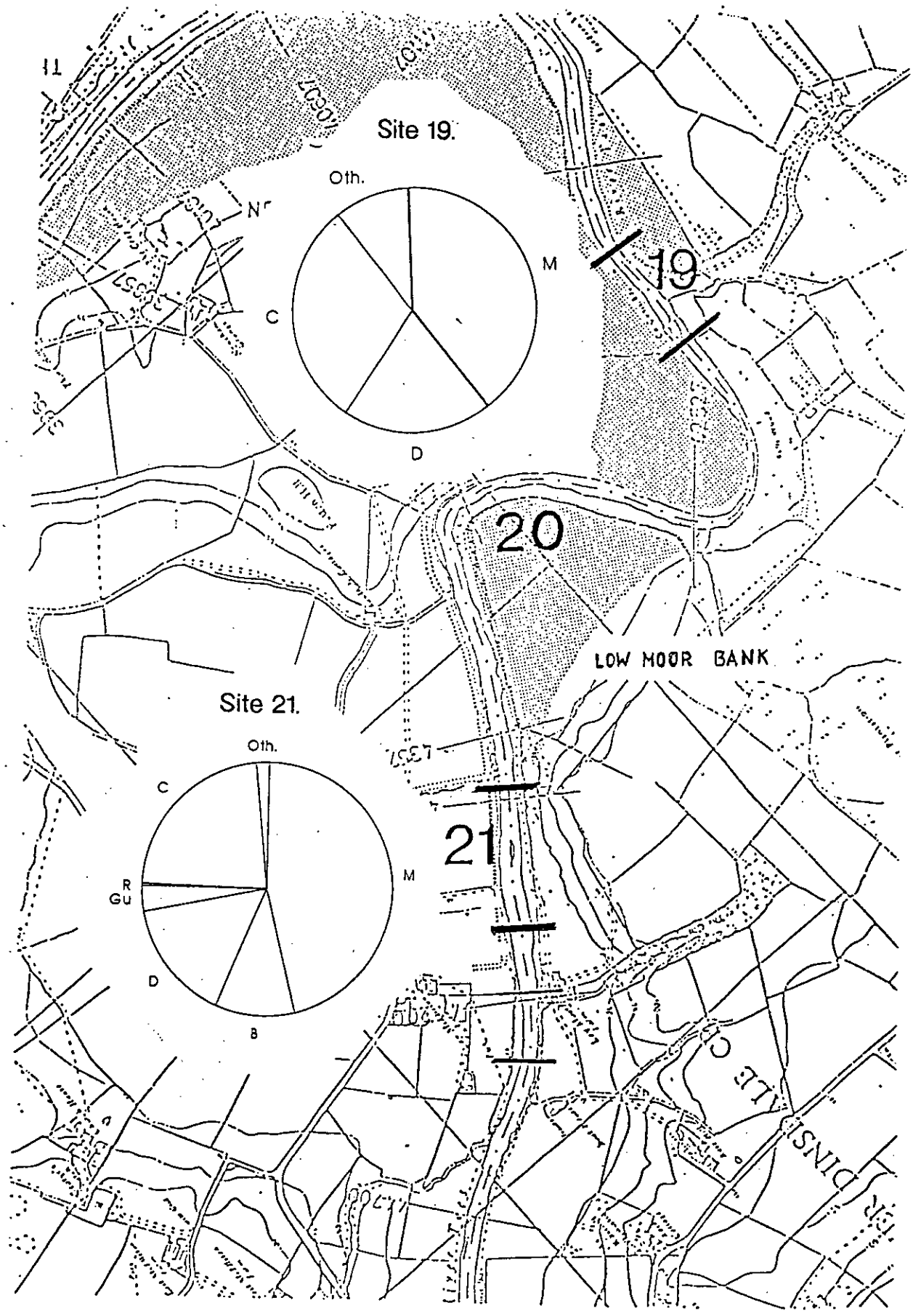


Fig. 6. Species composition of fry in Sections 22-25.

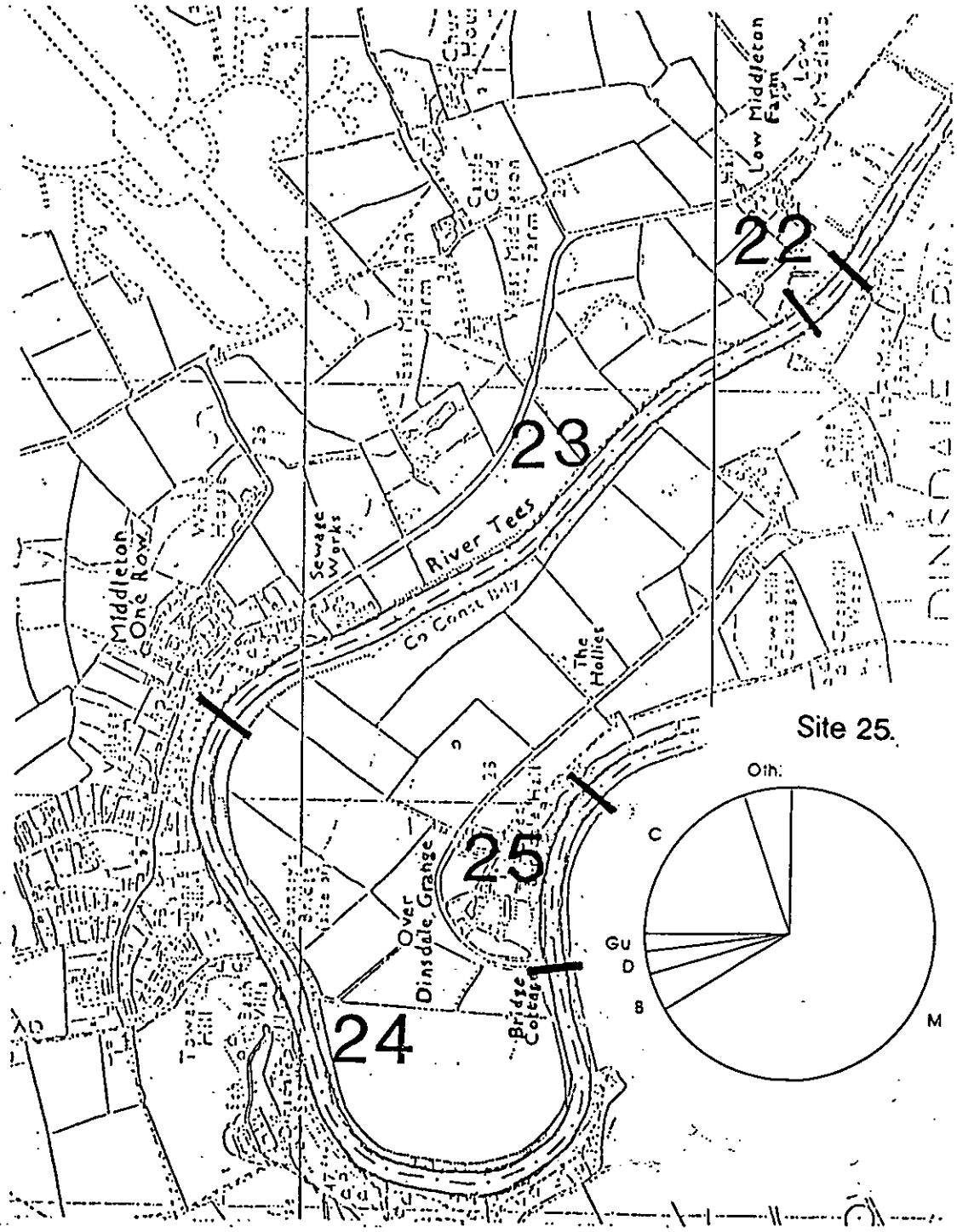
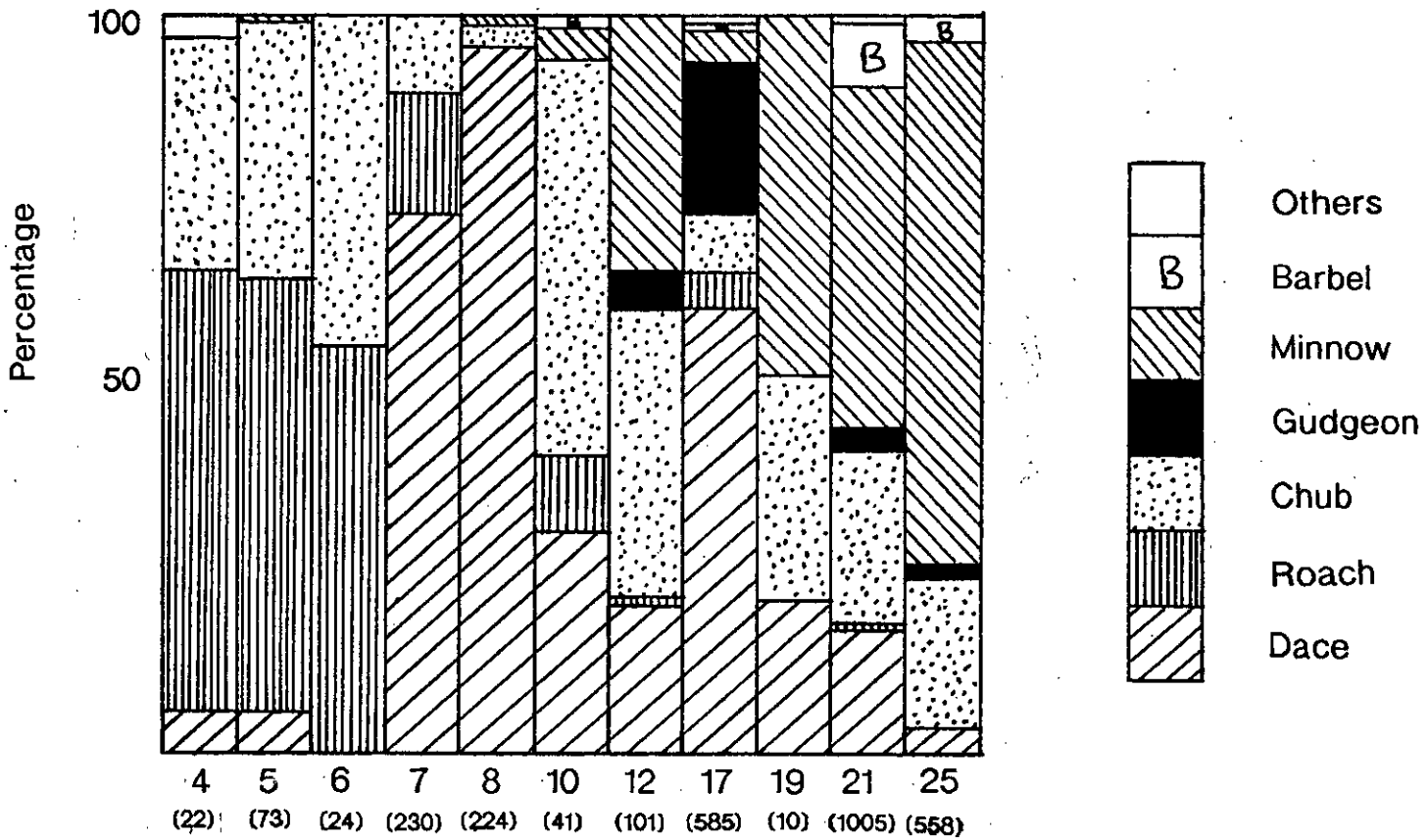


Fig. 7. Species composition of fry in the R. Tees in July 1992 at various sites. The number of fish caught in each section is given in parentheses.



Chub were found in all sections sampled and a similar number to last year was collected. High numbers were found in upstream sections (21 and 25) where they comprised *c.*20% of the sampled fry. Fair numbers were found distributed along the length of the study areas, in particular in Sections 5, 7, 10, 12 and 17. In comparison with other species, chub formed a high percentage of the fry sampled in all sections except 7, 8 and 17 where there were very high numbers of dace fry.

Roach fry were more common in the lower reaches of the river (below Yarm) where they represented over half of the fry sampled although numbers were never high. Roach were found in similar numbers in Section 17 (Low Worsall), the only site above Yarm with significant numbers of fry.

There was a large increase in numbers of barbel fry. Apart from one specimen in each of Sections 10 and 17, all fry were found in Sections 21 (Low Moor) and 25 (Low Dinsdale). At Low Moor they comprised 10% of the sampled fry.

Gudgeon fry were only found in four sections, all in the upper reaches of the study area. High numbers were found in Section 17 (Low Worsall) comprising 21% of the fry. They were more numerous than in 1991.

1.3.2 Length frequency distribution

Length frequency histograms are shown for each species (Fig. 8). Sizes of fry were smaller than in the previous year due to the earlier time of sampling. Dace were again the largest fry with a modal length of 36 mm. Apart from some very small chub fry (<14 mm) most species had similar size ranges.

There was no difference in size of dace fry between sites (Fig. 9). This does not seem to be the case for chub where fry appear to be smaller in the upstream sections (21 and 25). There is a bimodal length distribution which may indicate a disruption in spawning, possibly temperature related (Fig. 10). This size difference between sites is more clearly seen in roach (Fig. 11).

Fig. 8. Length frequency histograms for each species of fry in the R. Tees.

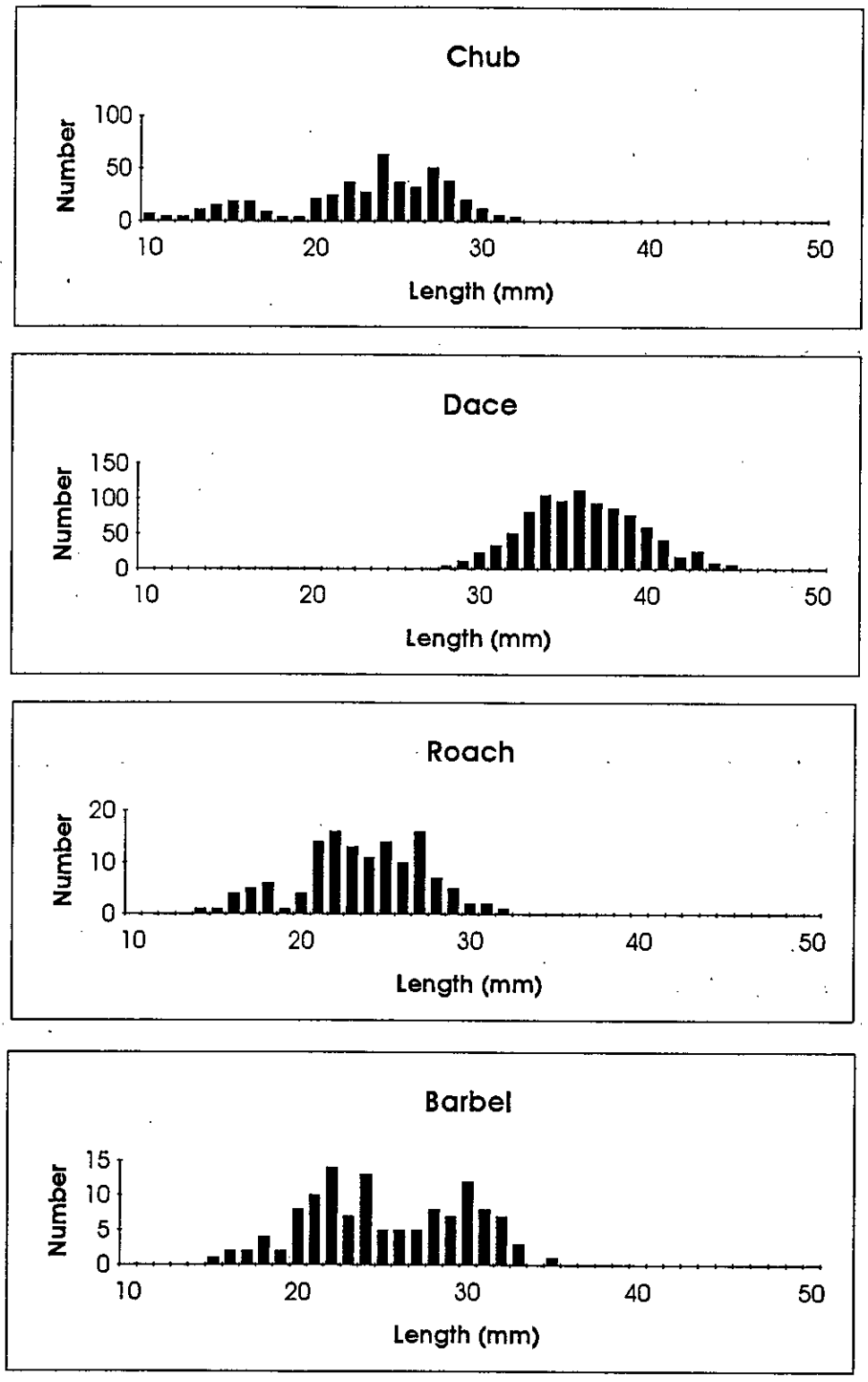


Fig. 8. Continued.

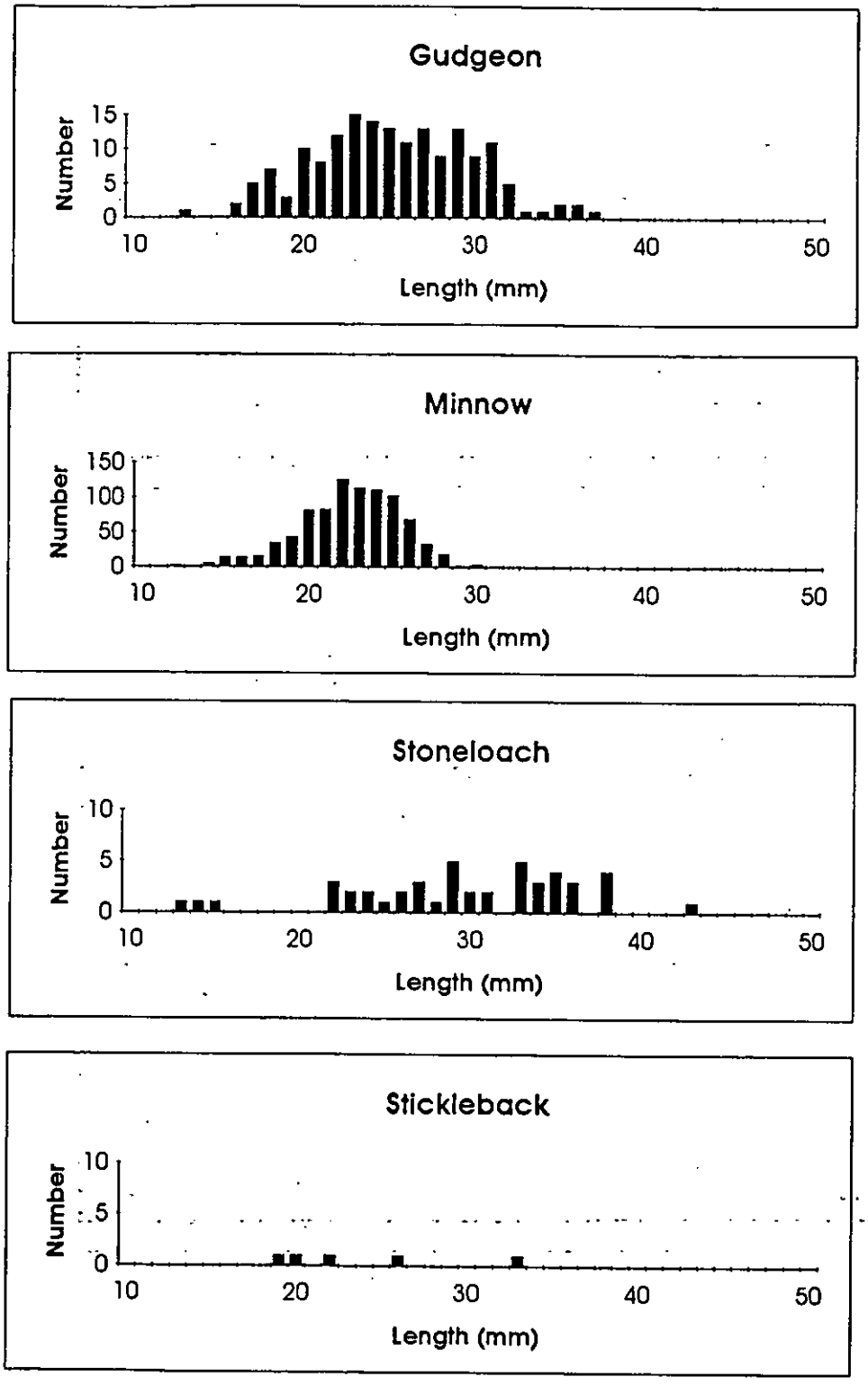


Fig. 9. Length frequency distribution of dace fry in each section in the R. Tees.

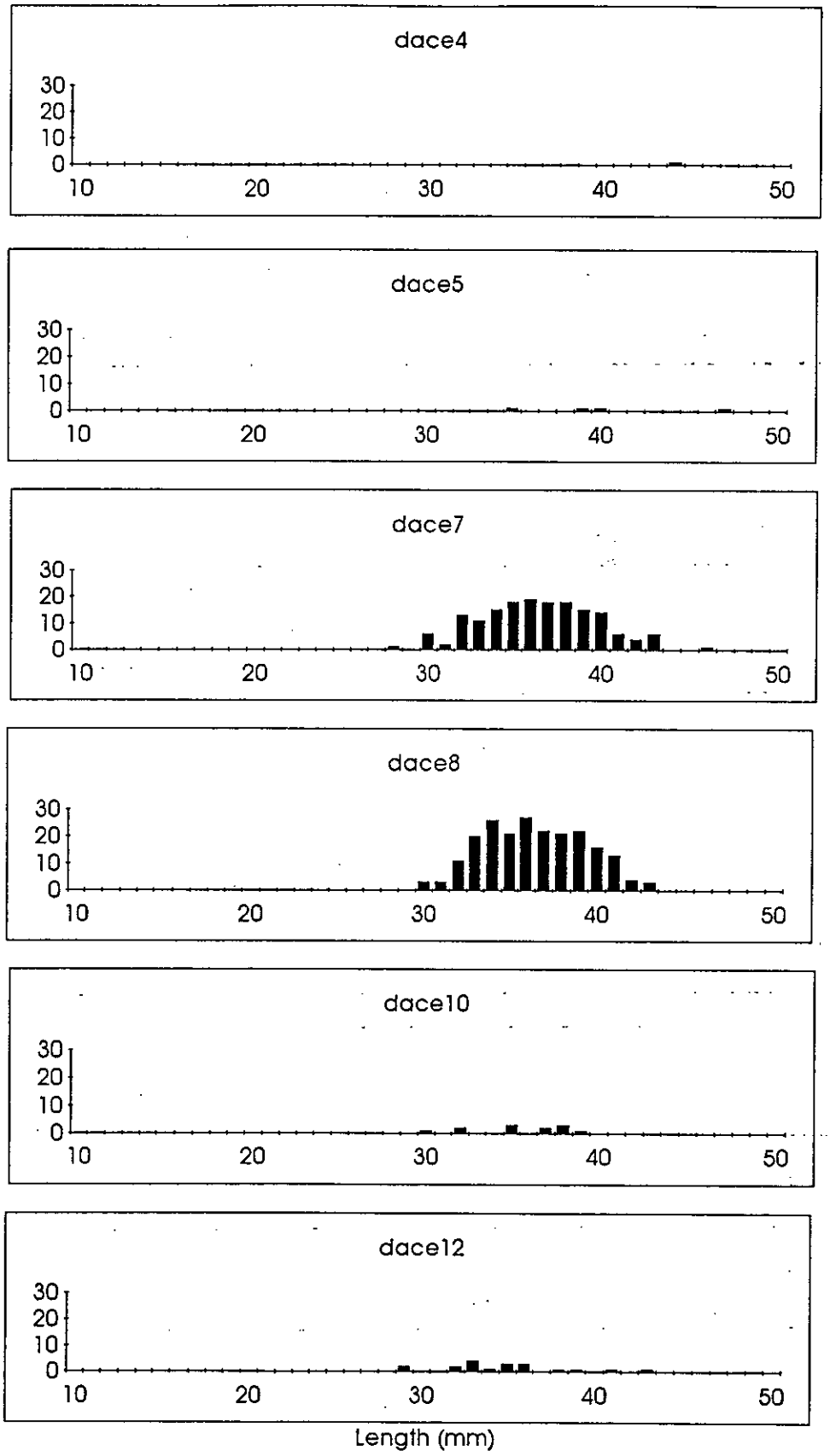


Fig. 9. Continued.

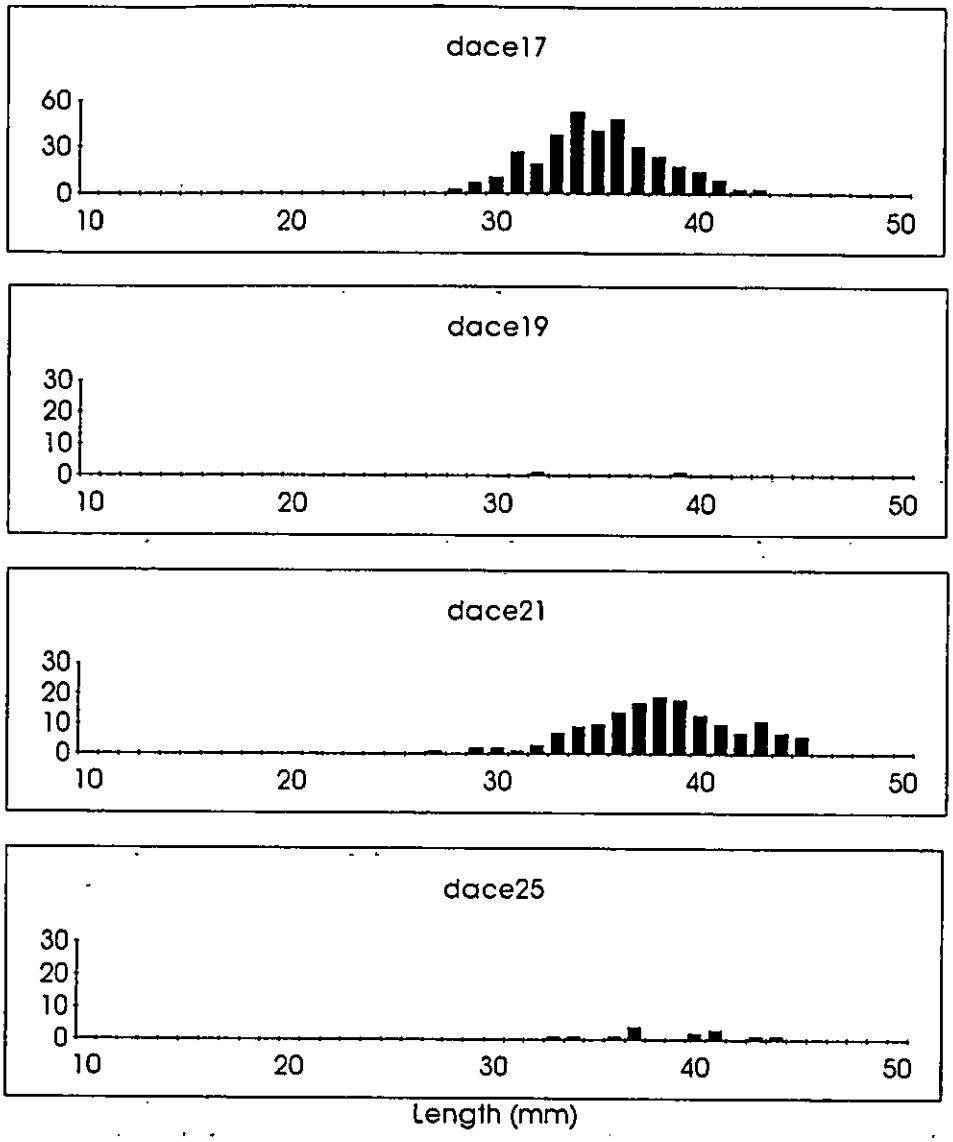


Fig. 10. Length frequency distribution of chub fry in each section in the R. Tees.

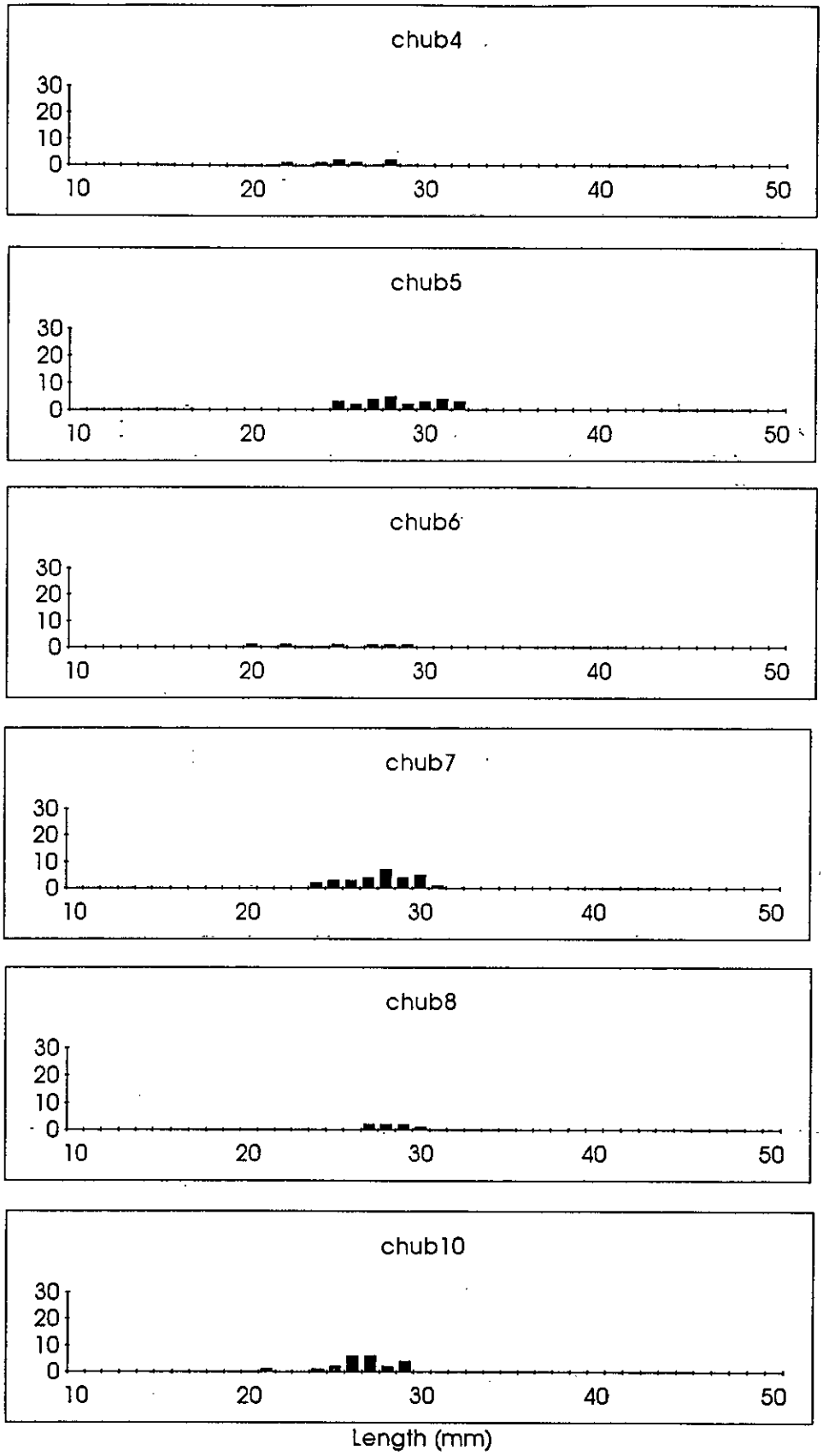


Fig. 10. Continued.

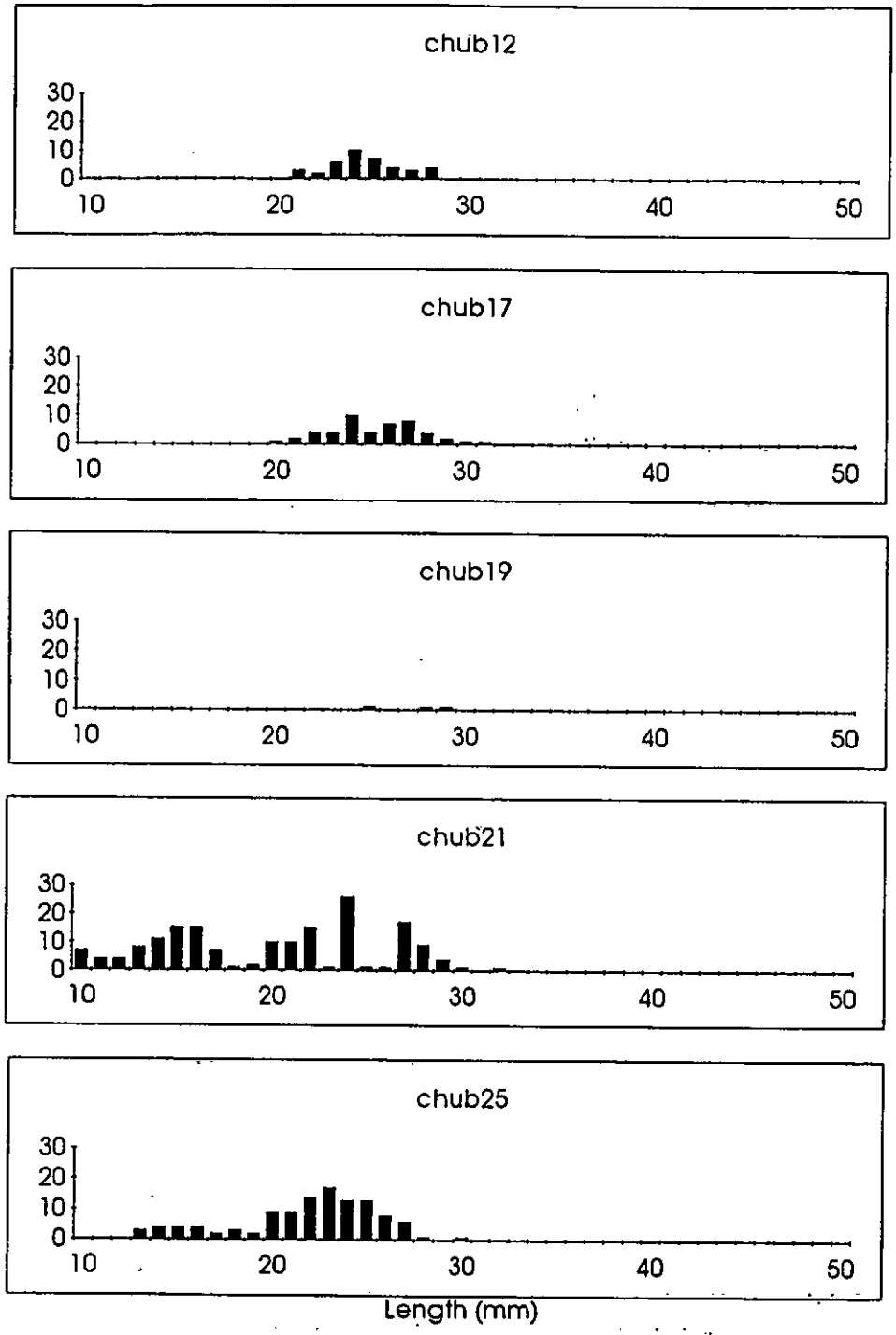


Fig. 11. Length frequency distribution of roach fry in each section in the R. Tees.

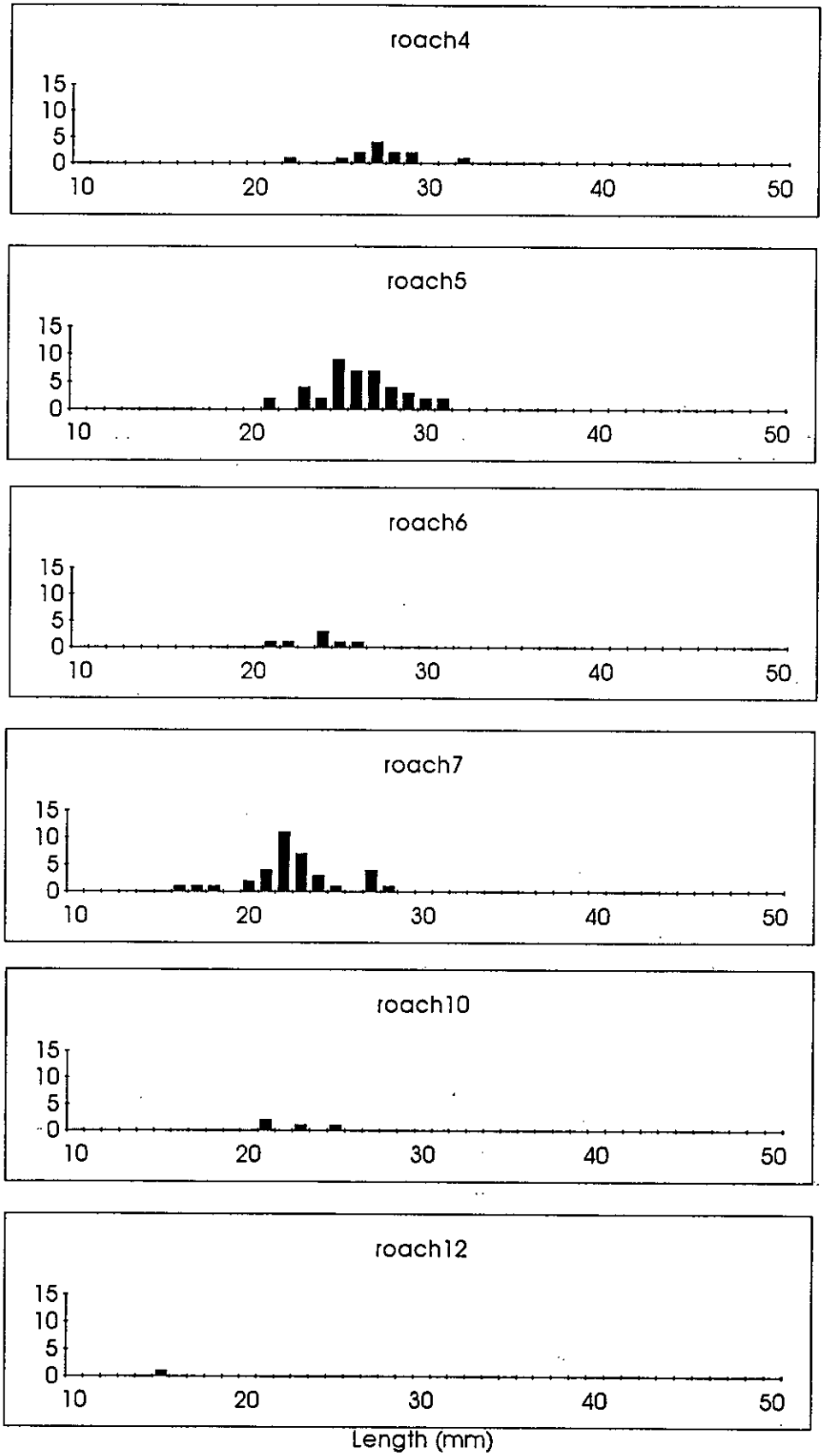
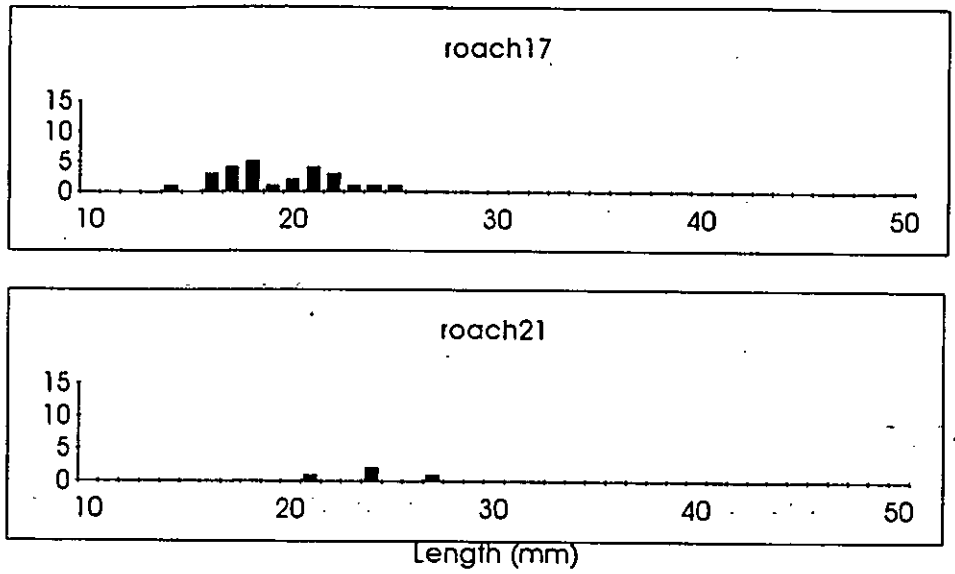


Fig. 11. Continued.



2. SURVEY OF COARSE FISH SEPTEMBER 1992

2.1 Introduction

This survey was designed to increase the data base on the major fish species of the river before the construction of the barrage. It was carried out at the same time of year as previously and in sections as designated in the 1991 survey. Special emphasis was placed in the lower sections where saline intrusion makes electrofishing impossible at most states of the tide.

2.2 Methods

In addition to electrofishing, fish trapping and gill netting methods were used on the river.

2.2.1 Fish trapping

Traps 1.3 m × 65 cm × 65 cm with a mesh size of 1 cm were baited with bread and anchored to the bottom of the river in sections 1-4 in different positions (ie mid river, close to bank, in backwaters etc). They were left in place for varying times depending on location and the state of the tide and were checked regularly.

2.2.2 Gill netting

Gill nets were used in Sections 1, 3 and 4. Due to the considerable amount of debris drifting in the river, they were deployed only around slack tide. Nets were laid parallel to the bank to minimize disturbance from drifting debris. The nets were 22 m × 1.8 m with a mesh size of 24 mm. The lead lines were set 50 cm from the bottom to avoid snags.

2.2.3 Electrofishing

Sections 4-16 were electrofished with the boom boat at 200 v, 10 amps from a 7.5 KvA generator. Each section was fished twice with the flow, once along each bank. Fish from both runs were retained in the holding tank and processed as one catch.

Section 21 was electrofished with twin anodes by wading (200 v, 1.9 KvA) and Section 25 by single anode fishing from a boat (200 v, 1.9 KvA).

2.2.4 Processing

Length measurements were taken from each fish and weight measurements and scales for aging were taken from a representative sample of these.

2.3 Results

Two species were recorded for the first time in this study. A river lamprey, *Lampetra fluviatilis* (L.) was found in Section 21 and bullhead, *Cottus gobio* L. in Section 25.

2.3.1 Fish trapping

The position of the traps within the sections is shown in Fig. 12. Three traps were placed in the general area of The Holmes (Thornaby) where there are no records of coarse fish and a fourth downstream of the pipe bridge where coarse fish were gill netted the previous year. Traps were set at approximately high tide (11 am) when the conductivity was 5000 µS cm^{-1}. Eels were caught in Trap 1 (16.50 hr, 1750 µS cm^{-1}) and Trap 3 (overnight). A 15.5 cm gudgeon was caught in Trap 2 (Stockton side of The Holmes) at 13.15 hr. The conductivity at this time was between 5000 and 1100 µS cm^{-1}. Two roach were caught in Trap 4, a 5.0 cm fish at 16.15 hr (conductivity 250 µS cm^{-1}) and a 17.0 cm individual overnight.

Traps 5-8 the following day were set in Sections 2-4 (Fig. 12) in areas known to contain fish. Only three fish (two roach and one dace) were caught.

Trap 7 was lost, presumably carried downstream by debris.

2.3.2 Gill netting

Gill nets were set downstream of The Holmes (Section 1), downstream of the pipe bridge (Section 3) and Preston Park (Section 4) (Fig. 12). Nets were set at approximately high tide and left as long as possible. In practice, 2-3 hours was possible. Only three dace were caught.

2.3.3 Electrofishing

Over 2800 fish were caught during the survey which is more than double that caught in the corresponding period the previous year. This year, because of a perceived decline in fish of anglable size, all young of the year were also sampled to compare with the fry survey carried out in July. Approximately 2000 of the fish caught were less than 8 cm in length compared with 200-300 the previous year when not all were sampled. Interestingly, the number of fish >8 cm caught in 1992 (*c.* 850) was not very different from 1991 (900-1000), indicating that perceptions can be erroneous.

Dace, chub and roach were again the most common species with increasing numbers of flounder and gudgeon compared with the previous September (Table 2).

Fig. 12. Map showing positions of traps and gill nets.

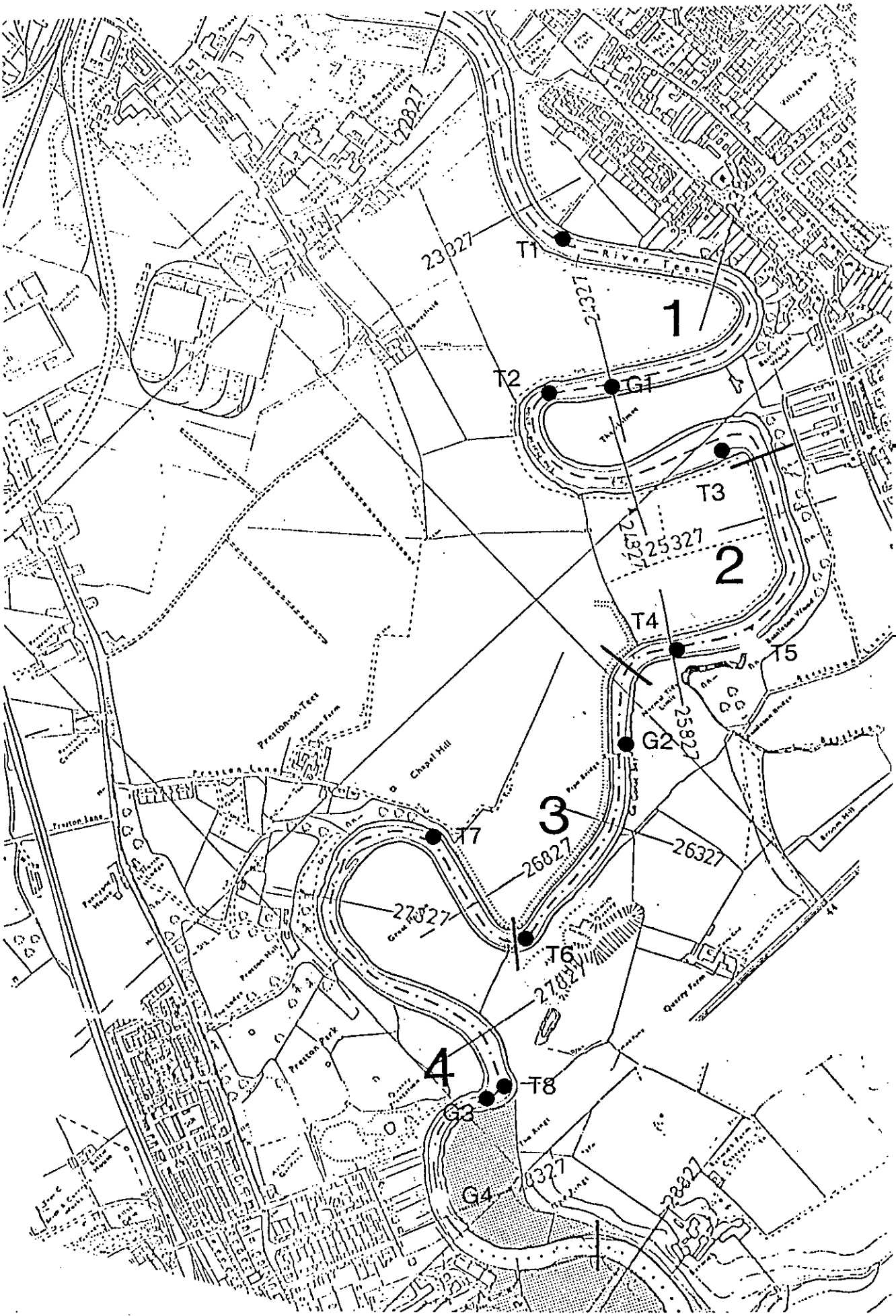


Table 2. Species lists for the R. Tees and number of each species caught - September 1992

Species	Totals
Barbel *Barbus barbus* (L.)	9
Bullhead *Cottus gobio* L.	1
Chub *Leuciscus cephalus* (L.)	356
Dace *Leuciscus leuciscus* (L.)	1566
Eel *Anguilla anguilla* (L.)	>>100
Flounder *Platichthys flesus* (L.)	85
Grayling *Thymallus thymallus* (L.)	2
Gudgeon *Gobio gobio* (L.)	275
Minnow *Phoxinus phoxinus* (L.)	109
River Lamprey *Lampetra fluviatilis* (L.)	1
Roach *Rutilus rutilus* (L.)	385
Salmon adult *Salmo salar* L.	3
Stone loach *Barbatula barbatula* (L.)	12
Three spined stickleback *Gasterosteus aculeatus* L.	11
Trout (brown) *Salmo trutta* L.	15

2.3.4 Distribution of fish

Species composition at each site is given in Figs 13-18 and summarized in Fig. 19. Site descriptions, fishing method, date, state of the tide, species and number of fish caught in each section are given in Appendix 1.

Semi-quantitative information on number of fish per 100 m of river for each section is given in Table 3. Comparisons between sections and between years may be made only after regard to the different efficiencies with which each section is fished, factors such as the state of tide, depth and turbidity having a marked effect.

Dace were found in all sections except Section 1 and comparisons with the survey in 1991 confirm that high densities occur in the Yarm area (Sections 7-9), at Aislaby (Section 12), at Low Moor (Section 21) and at Low Dinsdale (Section 25). The density at Low Worsall (Section 15) this year was much greater than in the previous year.

D	=	dace
C	=	chub
R	=	roach
Gu	=	gudgeon
B	=	barbel
T	=	trout
F	=	flounder
M	=	minnow
Oth	=	others

Fig. 13. Species composition of fish in Sections 1-4.

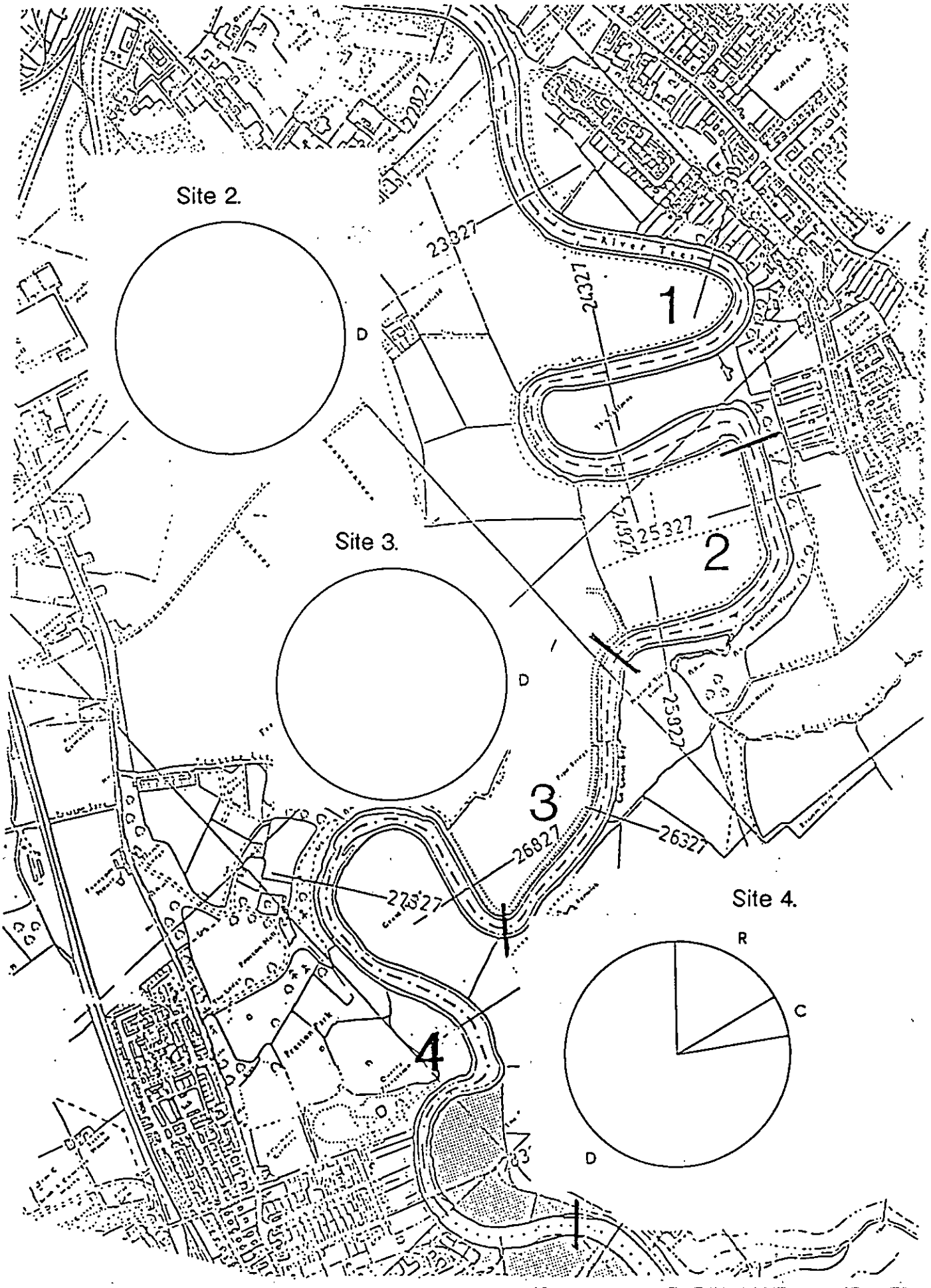


Fig. 14. Species composition of fish in Sections 5-9.

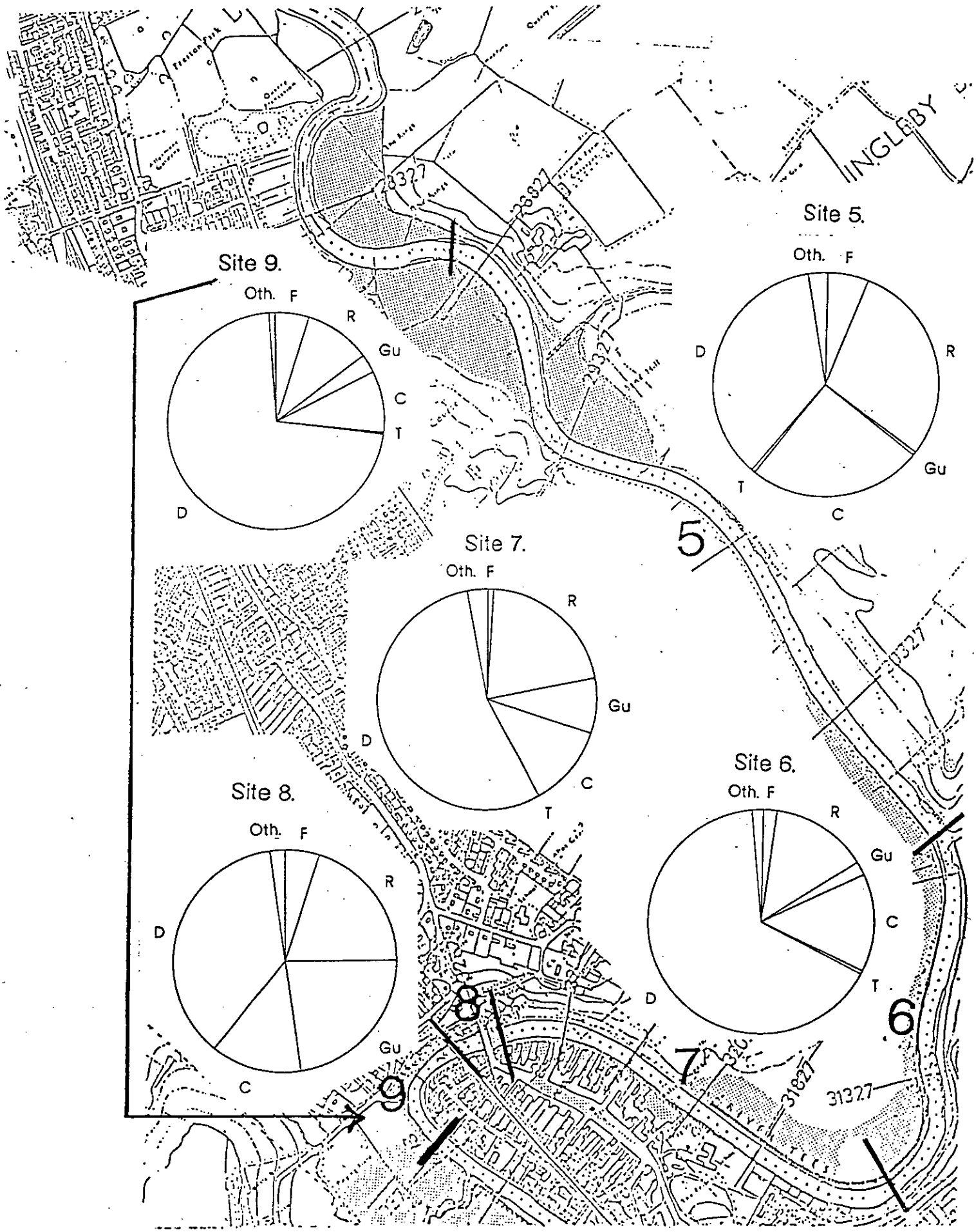


Fig. 15. Species composition of fish in Sections 10-14.

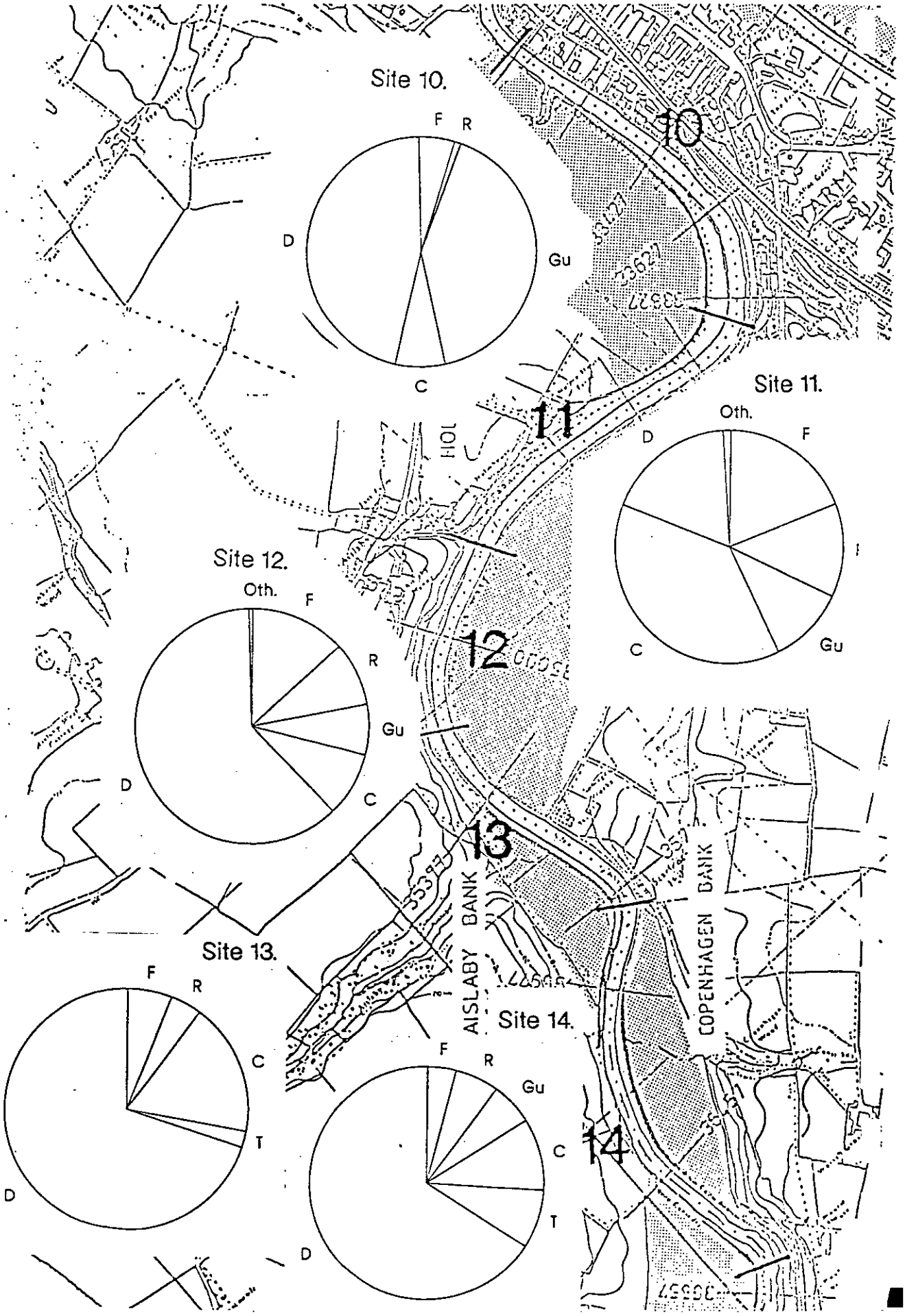


Fig. 16. Species composition of fish in Sections 15-18.

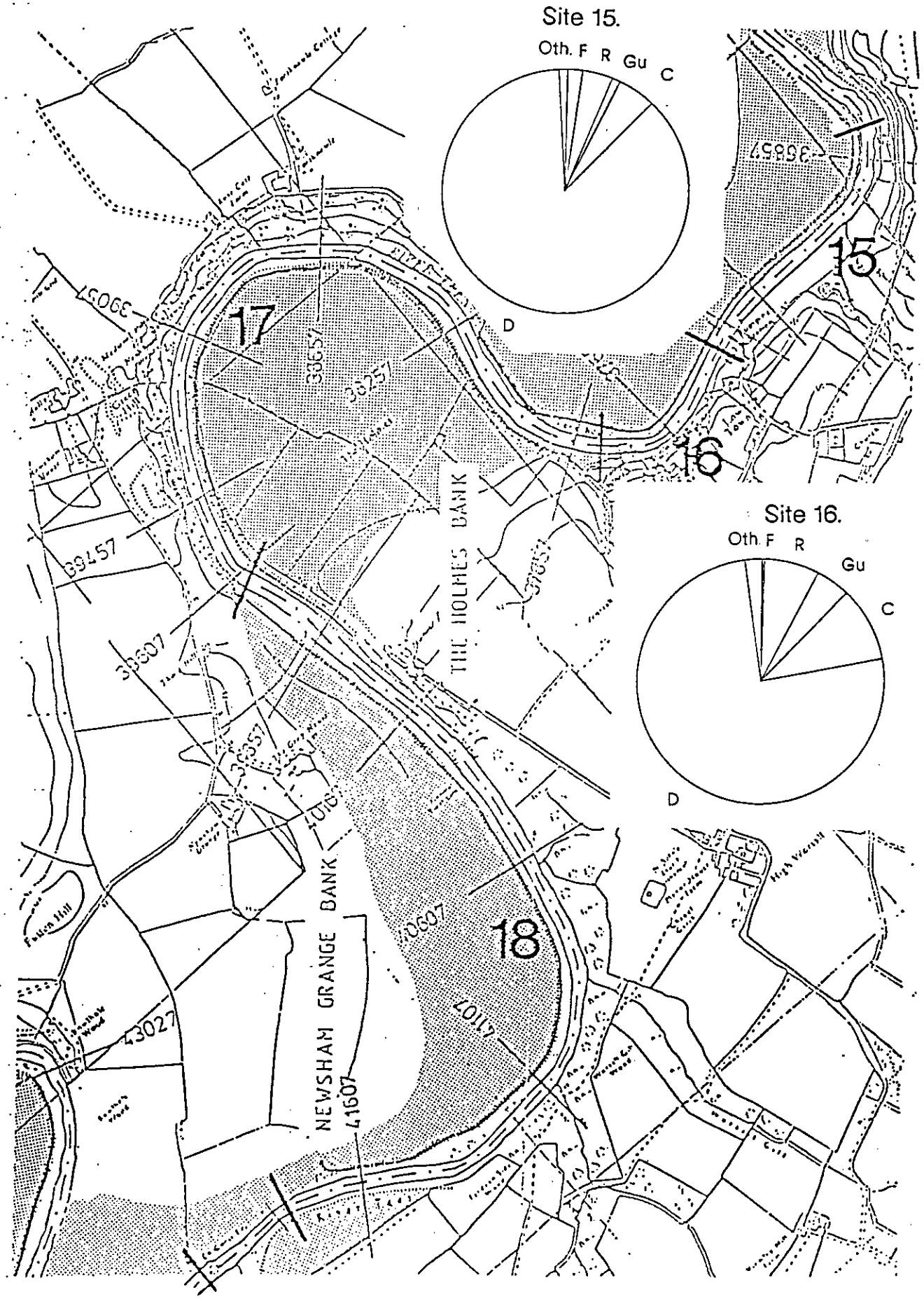


Fig. 17. Species composition of fish in Sections 19-21.

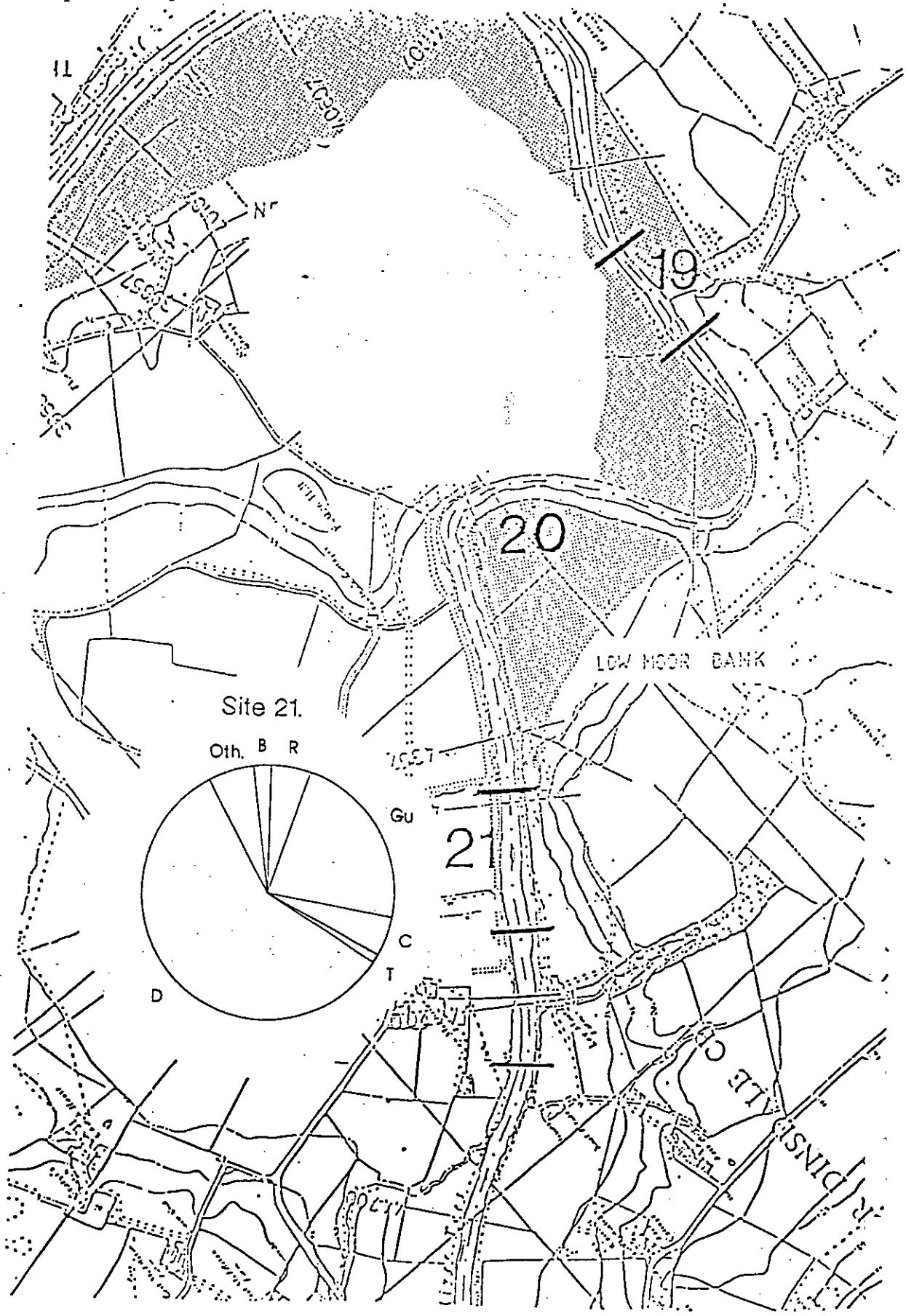


Fig. 18. Species composition of fish in Sections 22-25.

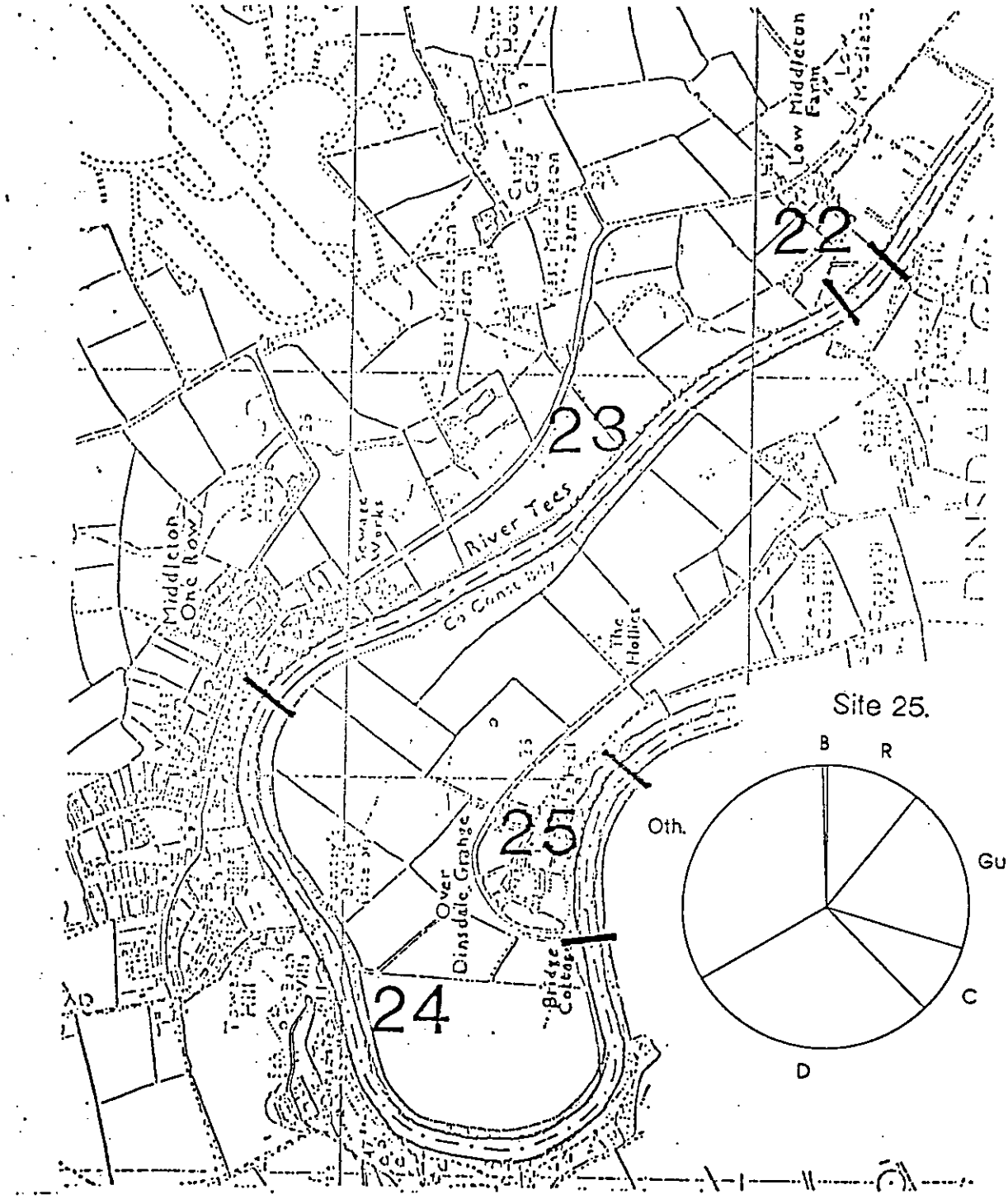


Fig. 19. Species composition of fish in the R. Tees in September 1992 at various sites. The number of fish caught in each section is given in parentheses.

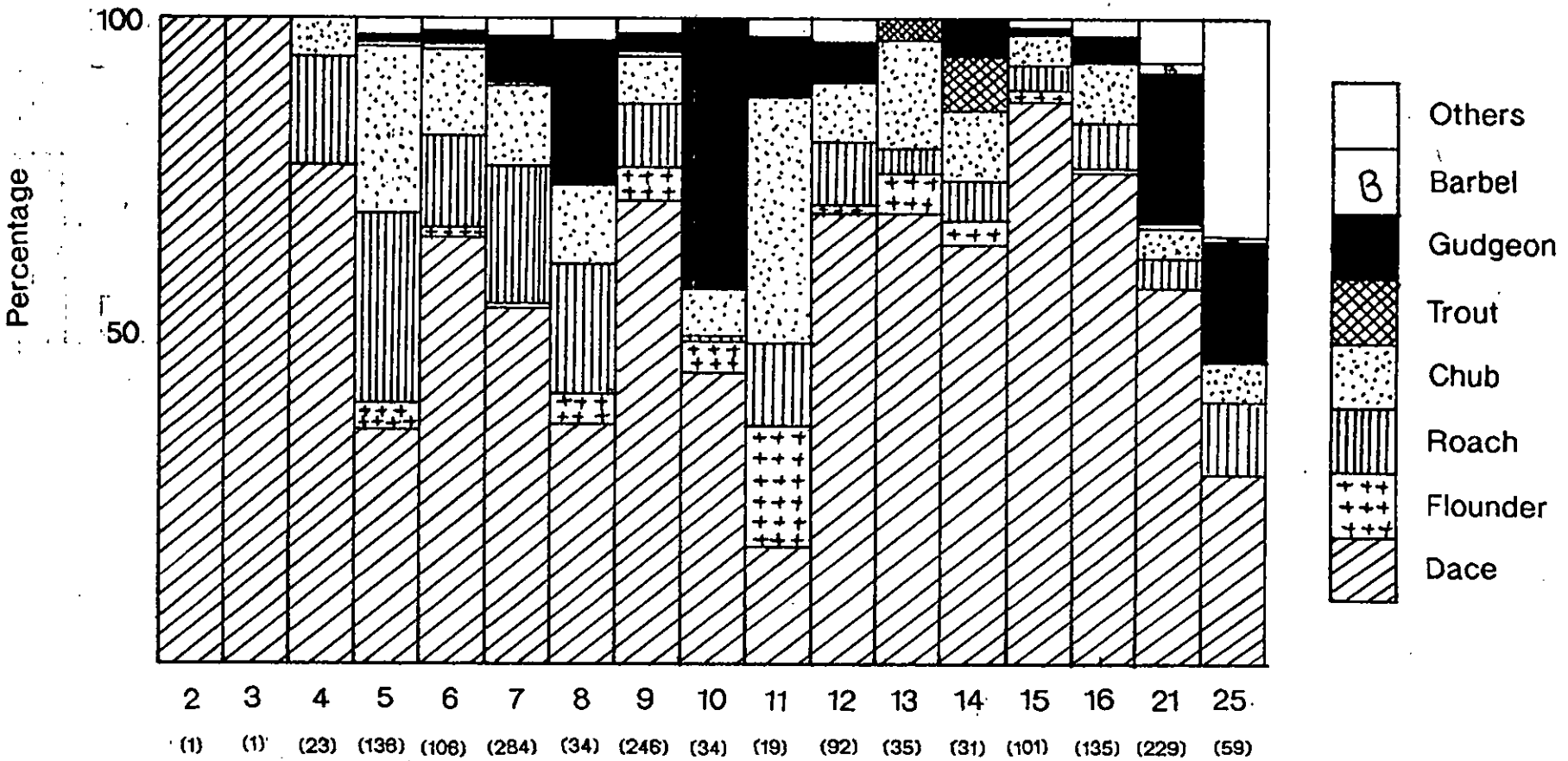


Table 3. Number of fish per 100 m found in each section in September 1992

Section	Dace	Roach	Chub
1	-		
2	0.1	-	-
3	0.1	-	-
4	1.0	0.2	<0.1
5	7.4	5.9	5.2
6	8.5	1.9	1.8
7	24.9	8.6	5.0
8	42.5	22.5	15.0
9	82.0	11.3	10.7
10	6.1	0.2	0.9
11	2.3	1.5	4.6
12	20.9	3.0	3.0
13	5.8	0.3	1.5
14	3.0	0.7	1.1
15	17.4	0.9	1.0
16	33.8	3.0	4.3
21	88.1	7.3	8.1
25	16.9	6.3	4.6

As in 1991, roach densities were greatest at Yarm (Sections 7 and 8) but at a much reduced level. Roach had also been associated with the sewage outfall in Section 13 but this year after the rerouting of the pipeline away from the river, they were not present in this area in the same numbers. In general, densities of roach were lower than the previous year.

Chub densities were much higher in the Yarm area than previously due in part to the large number of young of the year caught. In Section 21 (Low Moor), similar to roach, densities were lower than in 1991.

Adult salmon were caught in sections 7 (Yarm), 11 (Aislaby) and 15 (Low Worsall). All were fresh with sea-lice. A further number (3-4) were seen between Yarm and Aislaby.

2.3.5 Length frequency distribution

The length frequency distribution of each species is given in Fig. 20 and is divided into length frequency by section for each major species in Figs 21-24.

Young of the year dace were distributed along most of the study length of the river being absent in Sections 2 and 3 only (Fig. 21). Sections 2 and 3 are low down the river system, highly affected by saline intrusion and contain few fish of any size. Low numbers of young of the year were found in Section 8, one of the spawning areas. No fry were found in Section 6 in July but in September large numbers of young of the year were present. It appears that fry have moved from some of the spawning sites into nursery areas. The main nursery areas are immediately 'downstream' of the spawning sites. At Yarm, however, fairly high numbers were found immediately 'upstream', presumably the fry drifted on a flooding tide into these areas.

High numbers of chub fry were found in Sections 21 and 25 in July but these areas produced few young of the year in September (Fig. 22). Most young of the year were found in Sections 5, 7 and 11, the former two having fair numbers of fry in July and the latter being between two sites having fair numbers of fry in July.

Roach young of the year were only found in good numbers in Sections 5 and 7, both areas containing fry in July. Few fish of this age were found above Yarm (Fig. 23).

Young of the year gudgeon were found in nine sections between Section 5 (golf course) and Section 25 (Low Dinsdale) compared with only four for fry in July. They were abundant in Sections 21 and 25, two of the sites where fry were found and common in Section 7 (Fig. 24).

Fig. 20. Length frequency distribution of fish in the R. Tees in September 1992.

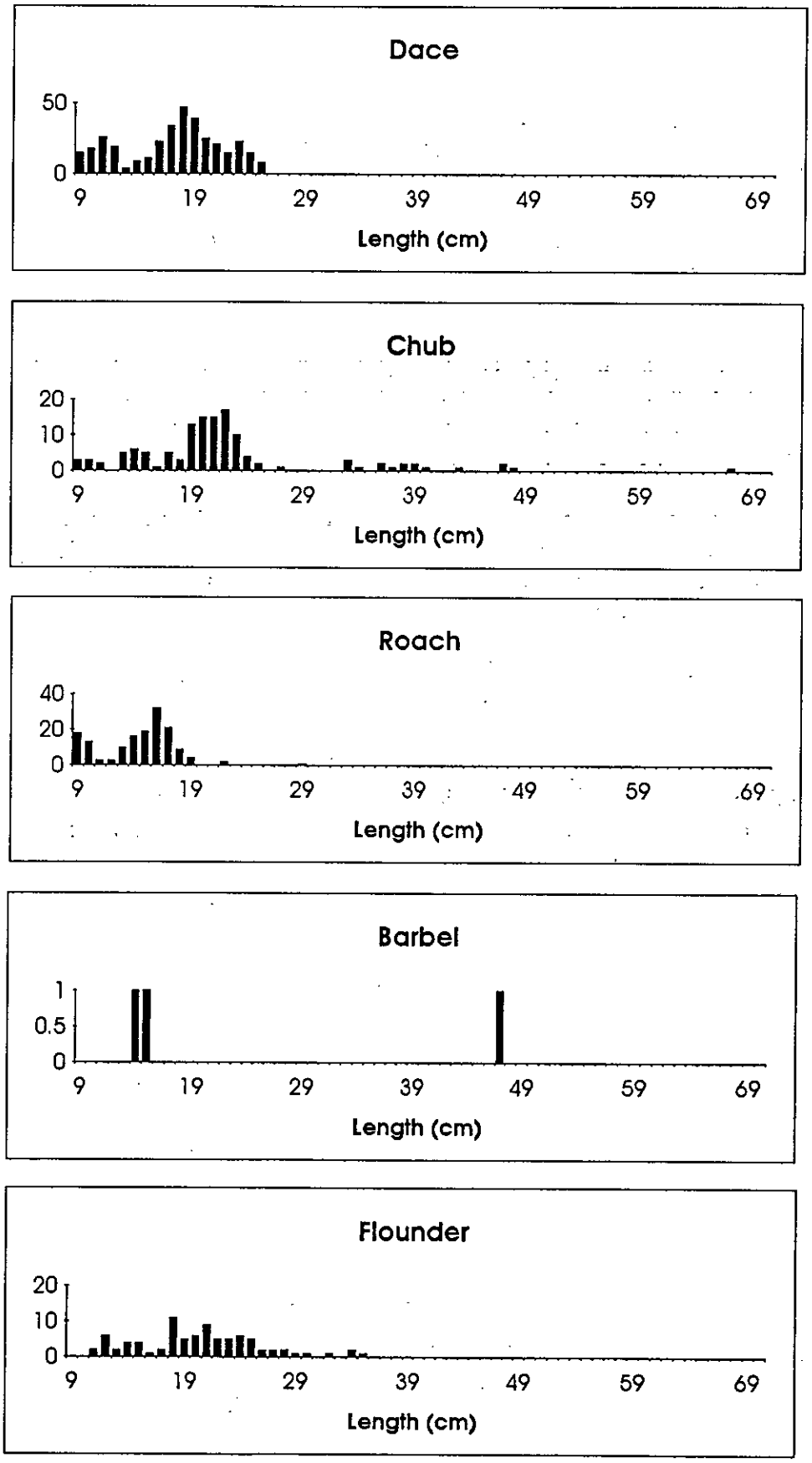


Fig. 20 Continued.

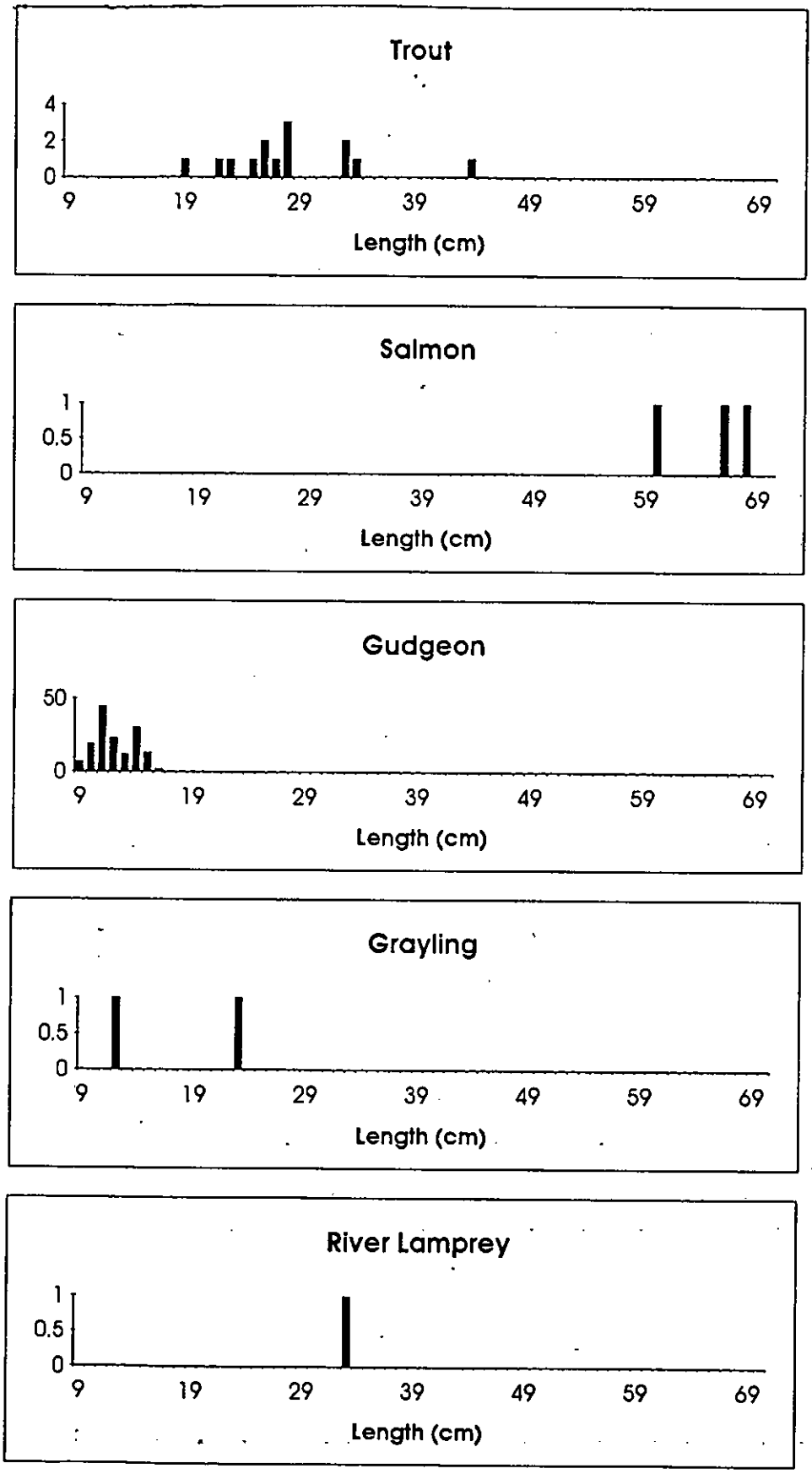


Fig. 21 Length frequency distribution of dace in each section of the River Tees in September 1992. All lengths in cm.

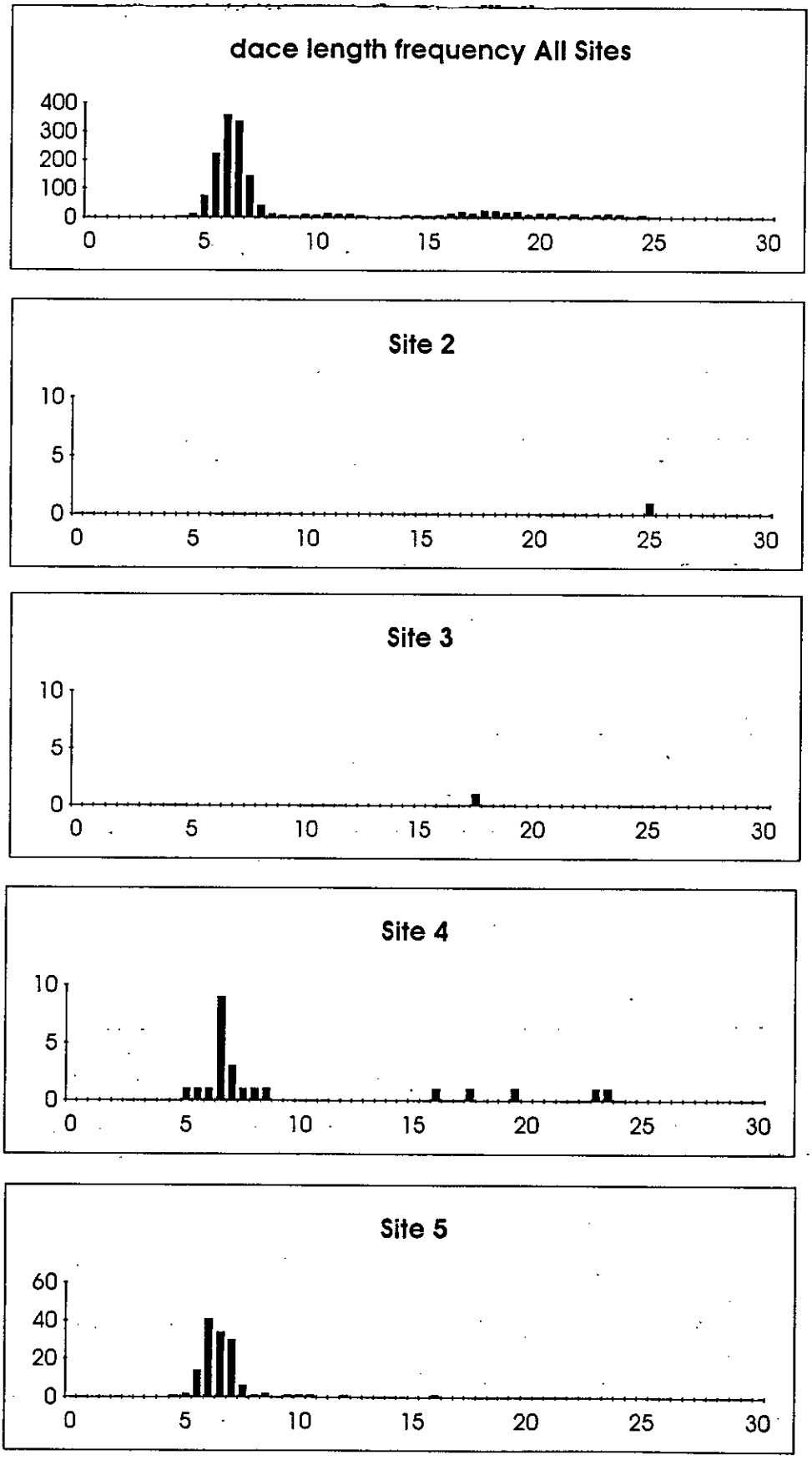


Fig. 21. Continued.

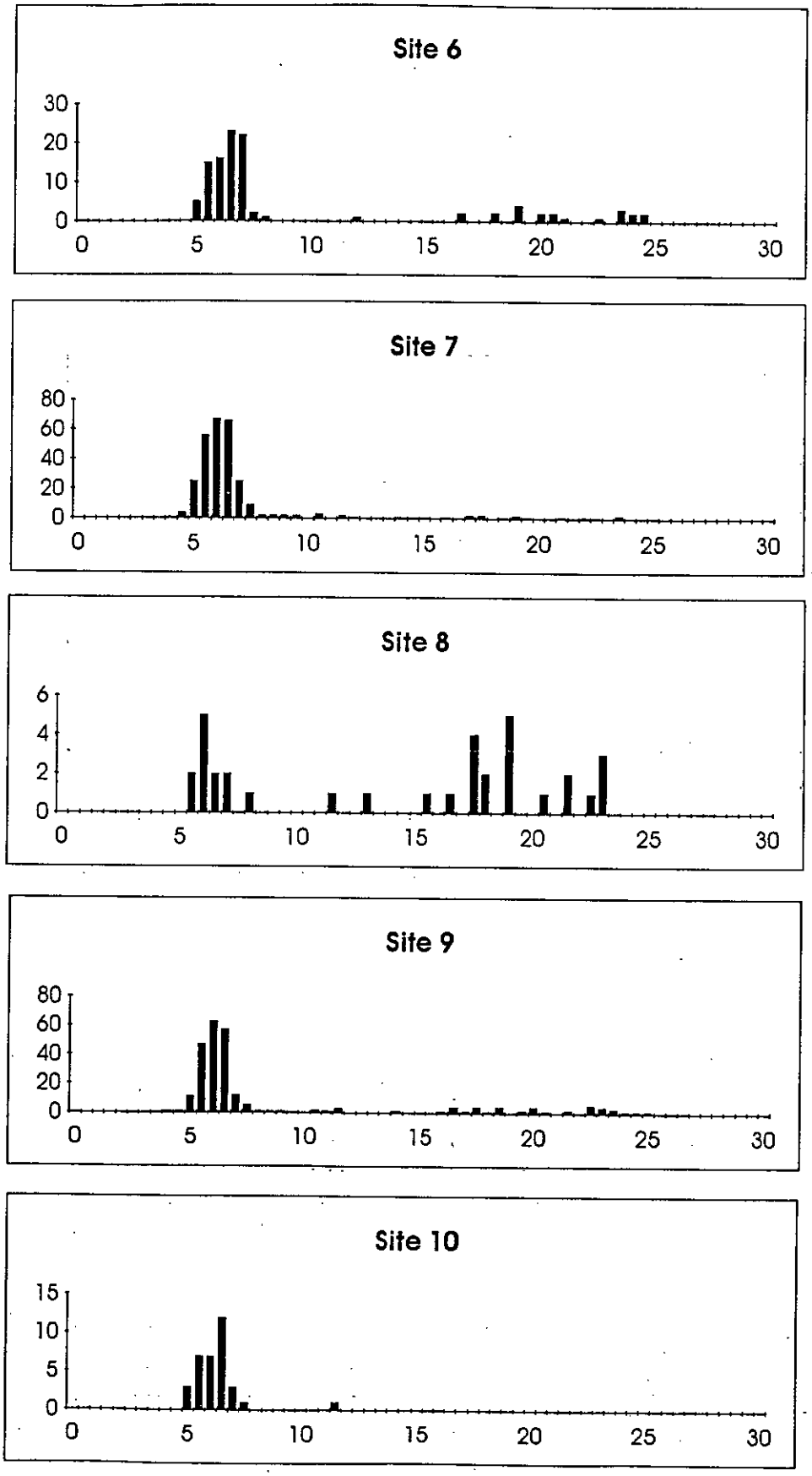


Fig. 21. Continued.

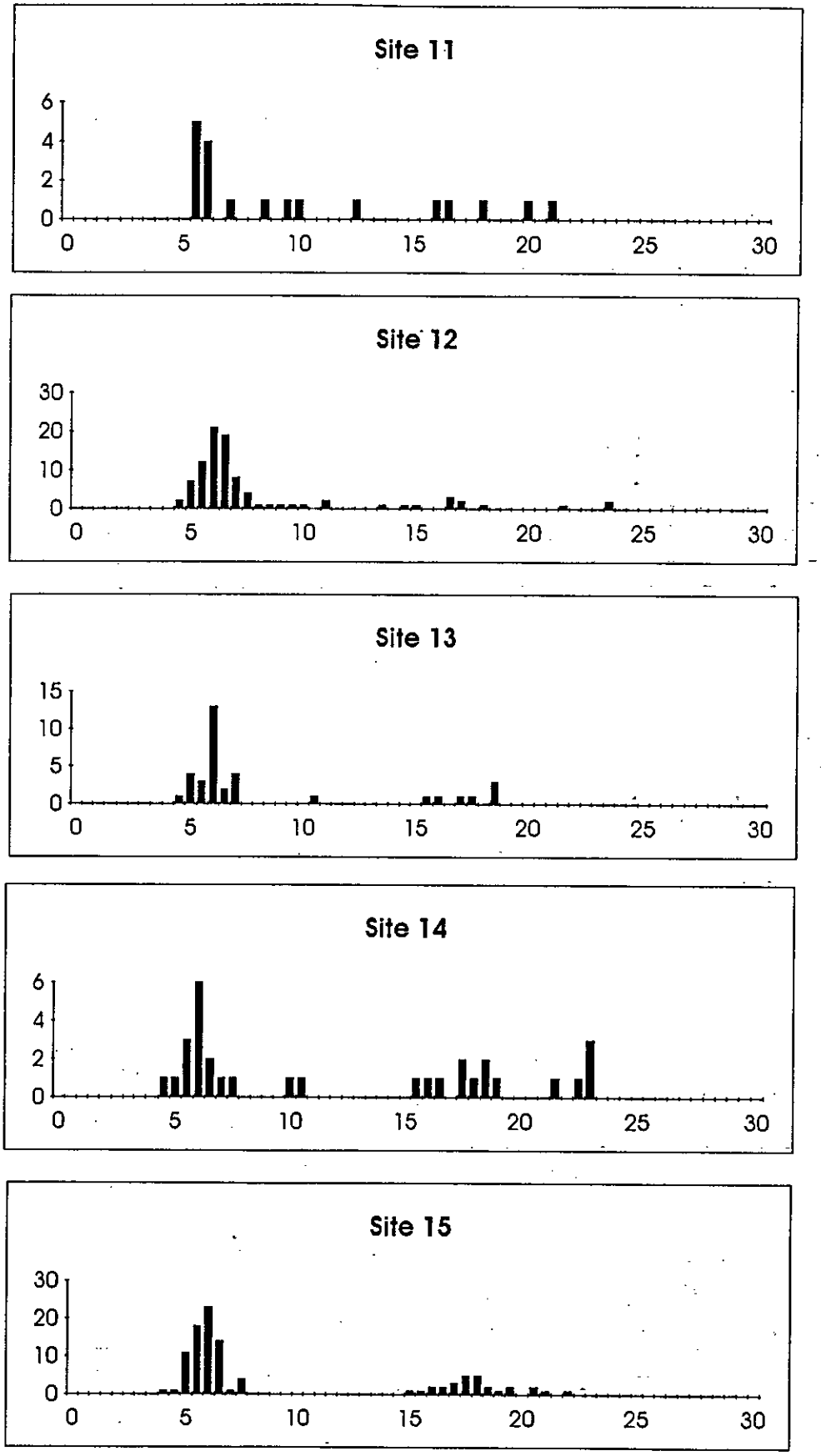


Fig. 21. Continued.

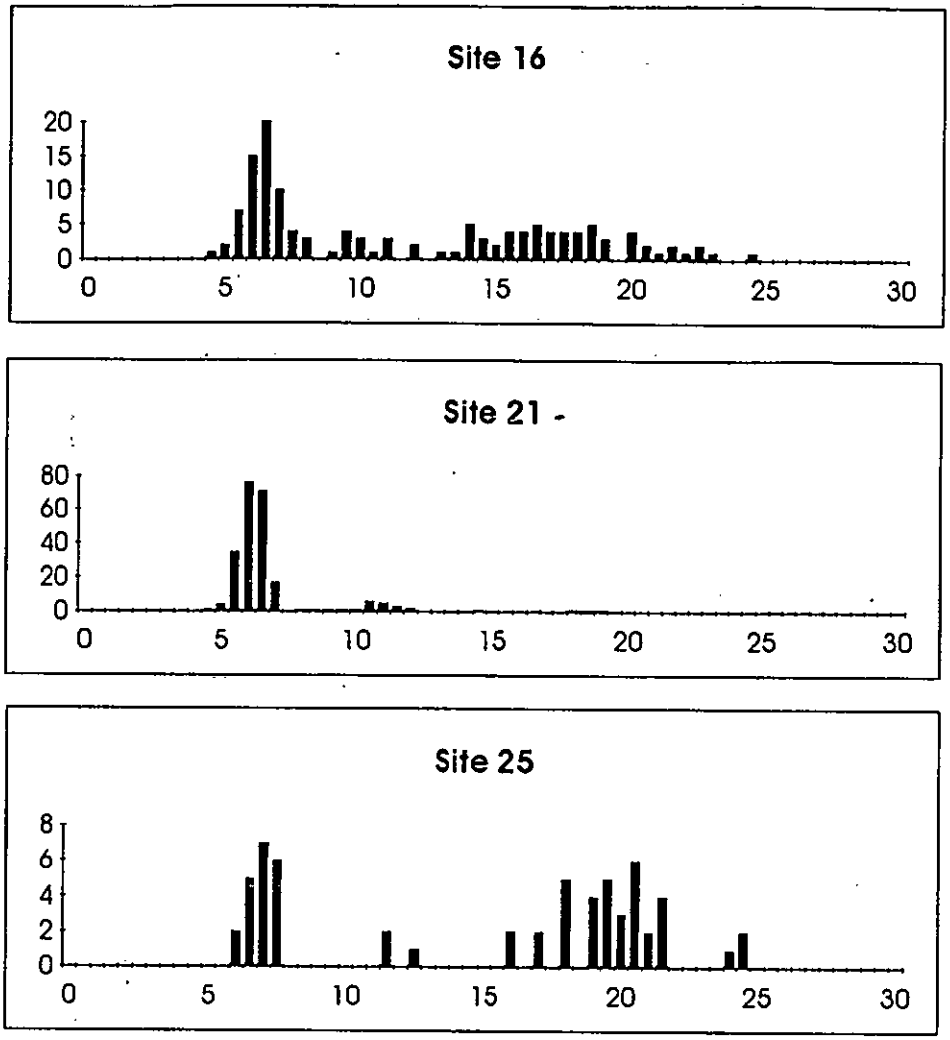
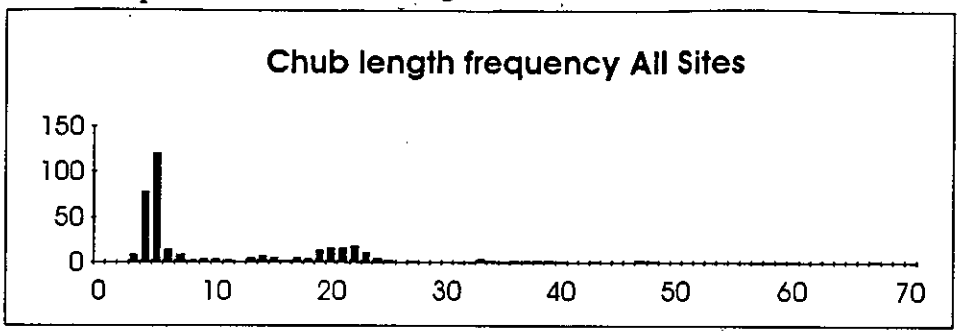
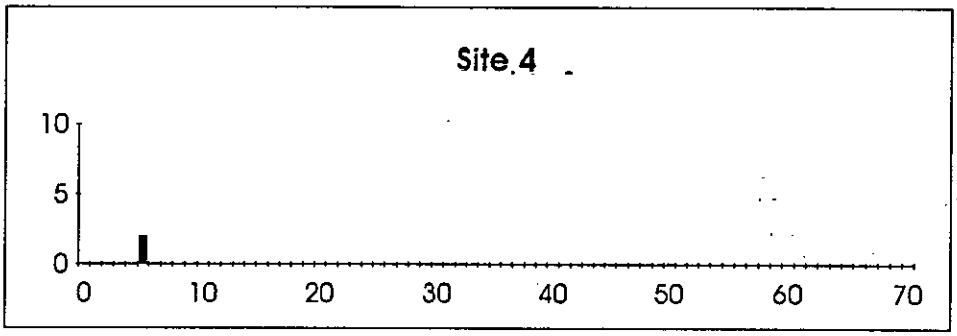
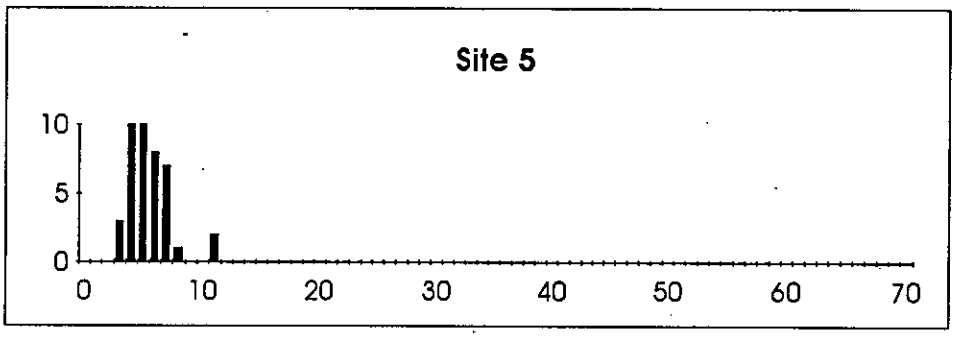
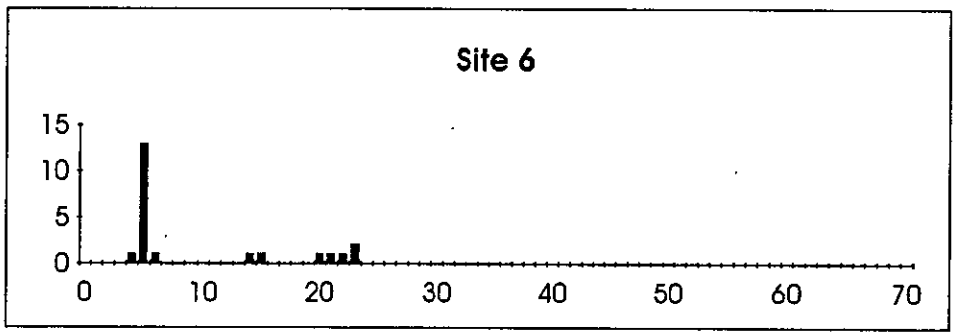


Fig. 22. Length frequency distribution of chub in each section of the River Tees in September 1992. All lengths in cm.









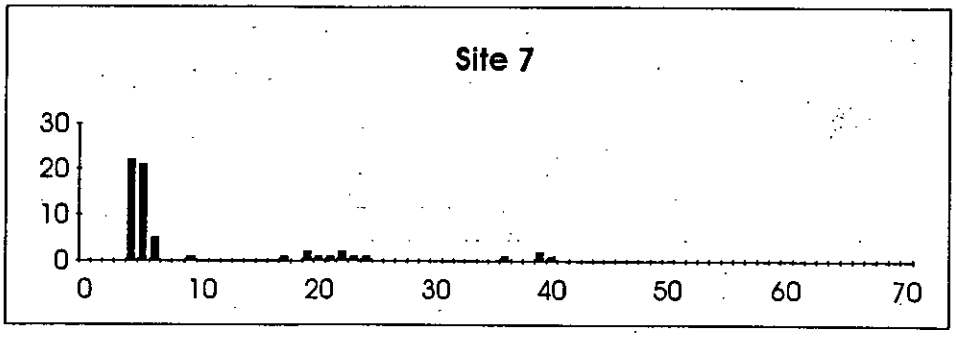


Fig. 22. Continued.

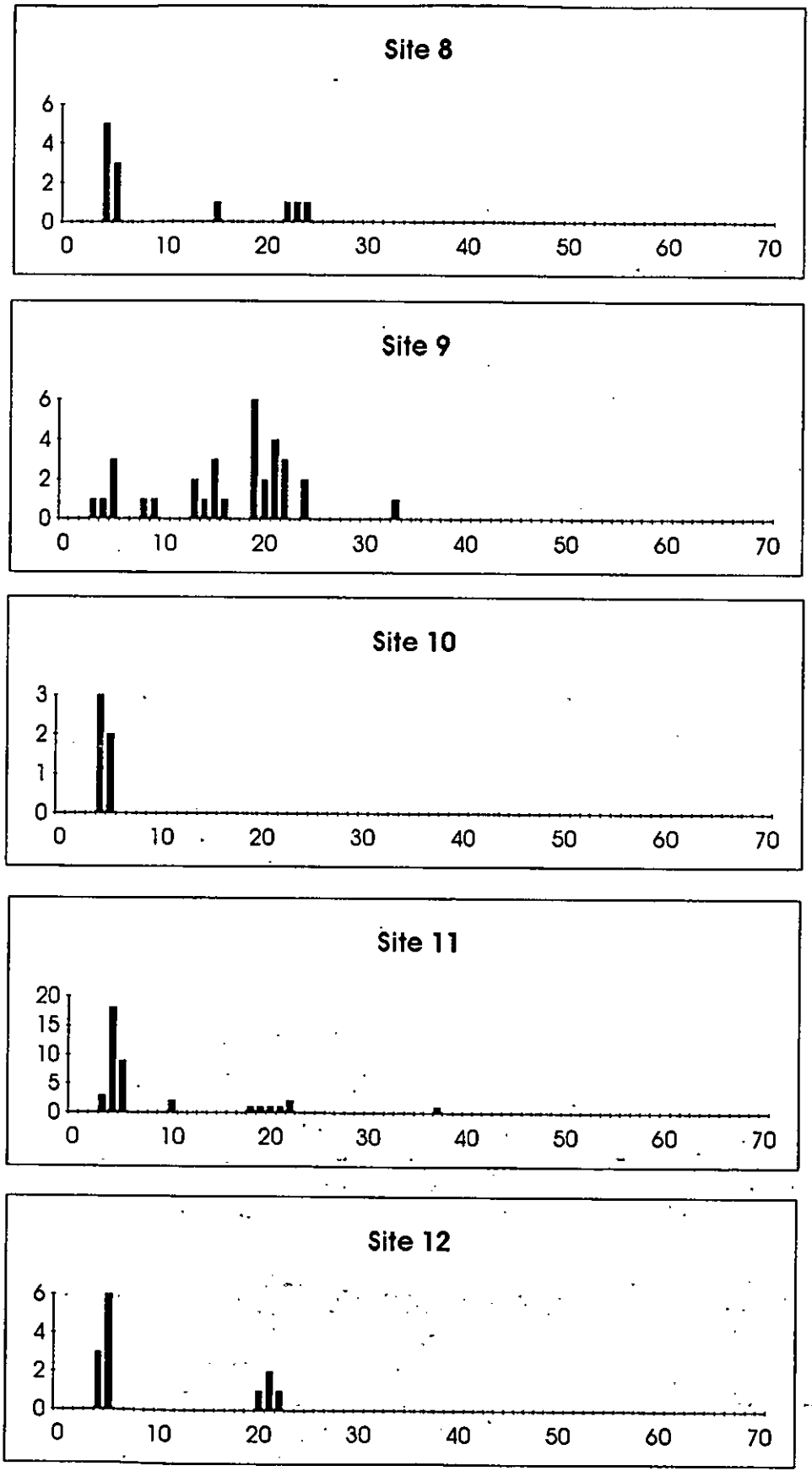


Fig. 22. Continued.

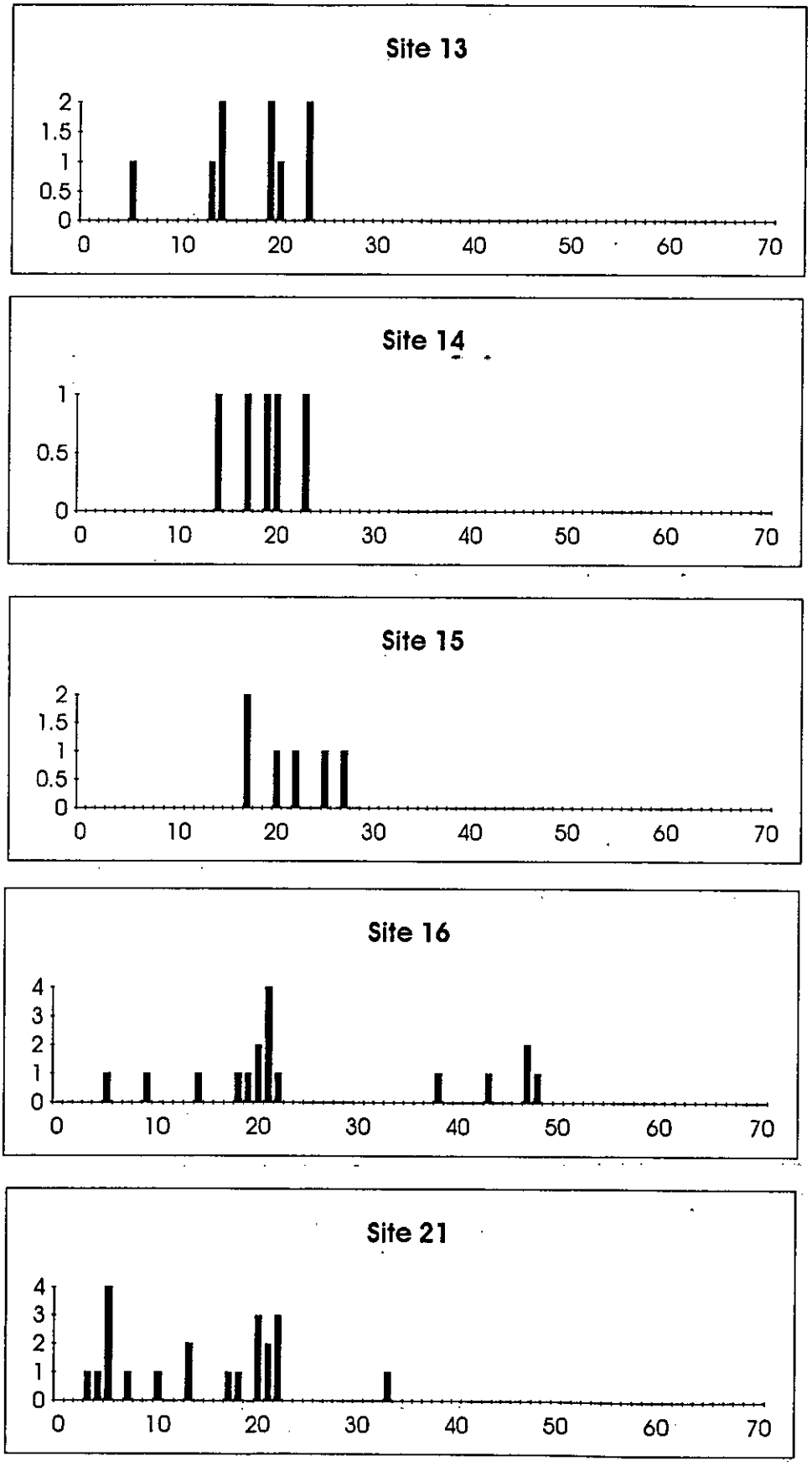


Fig. 23. Length frequency distribution of roach in each section of the River Tees in September 1992. All lengths in cm.

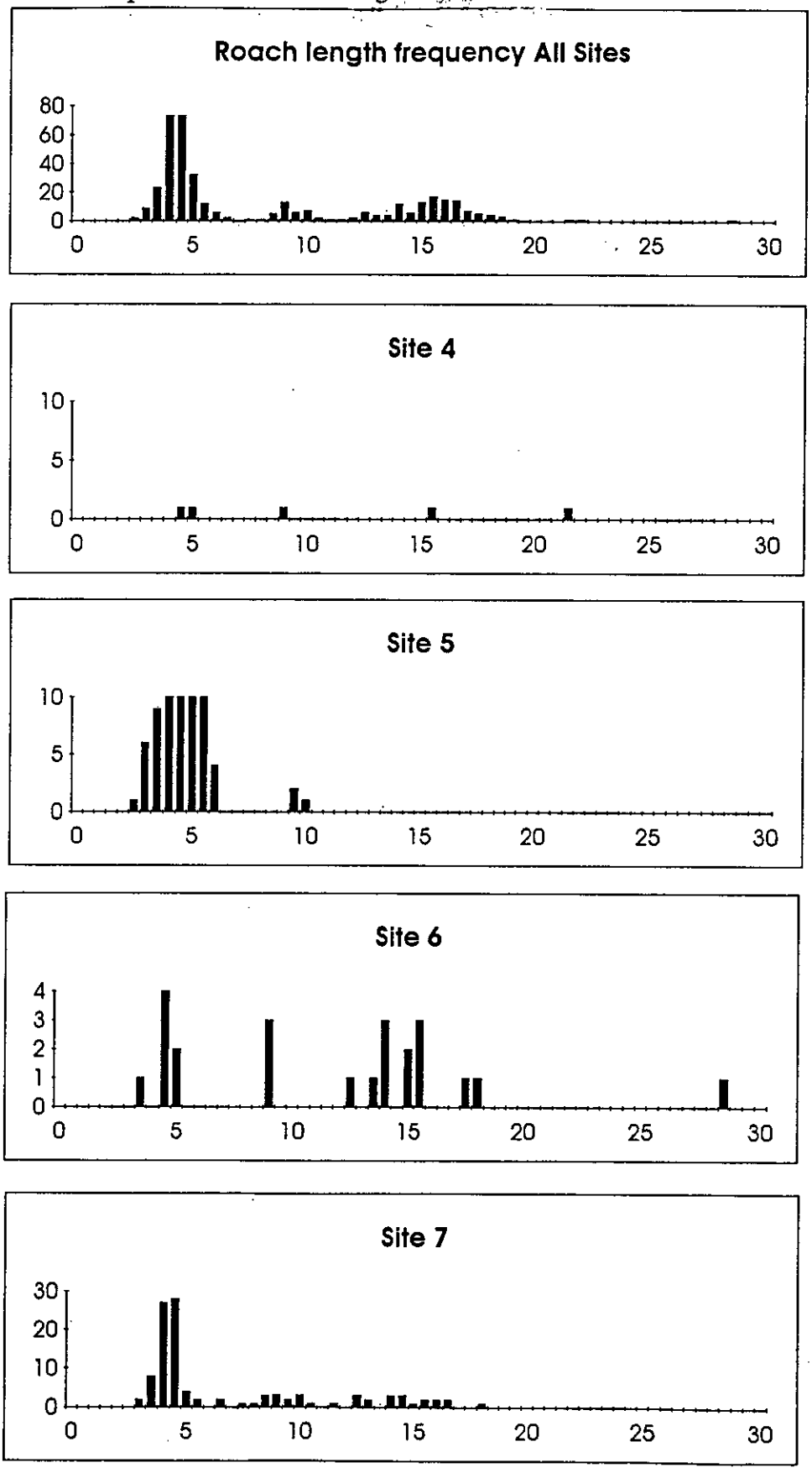


Fig. 23. Continued.

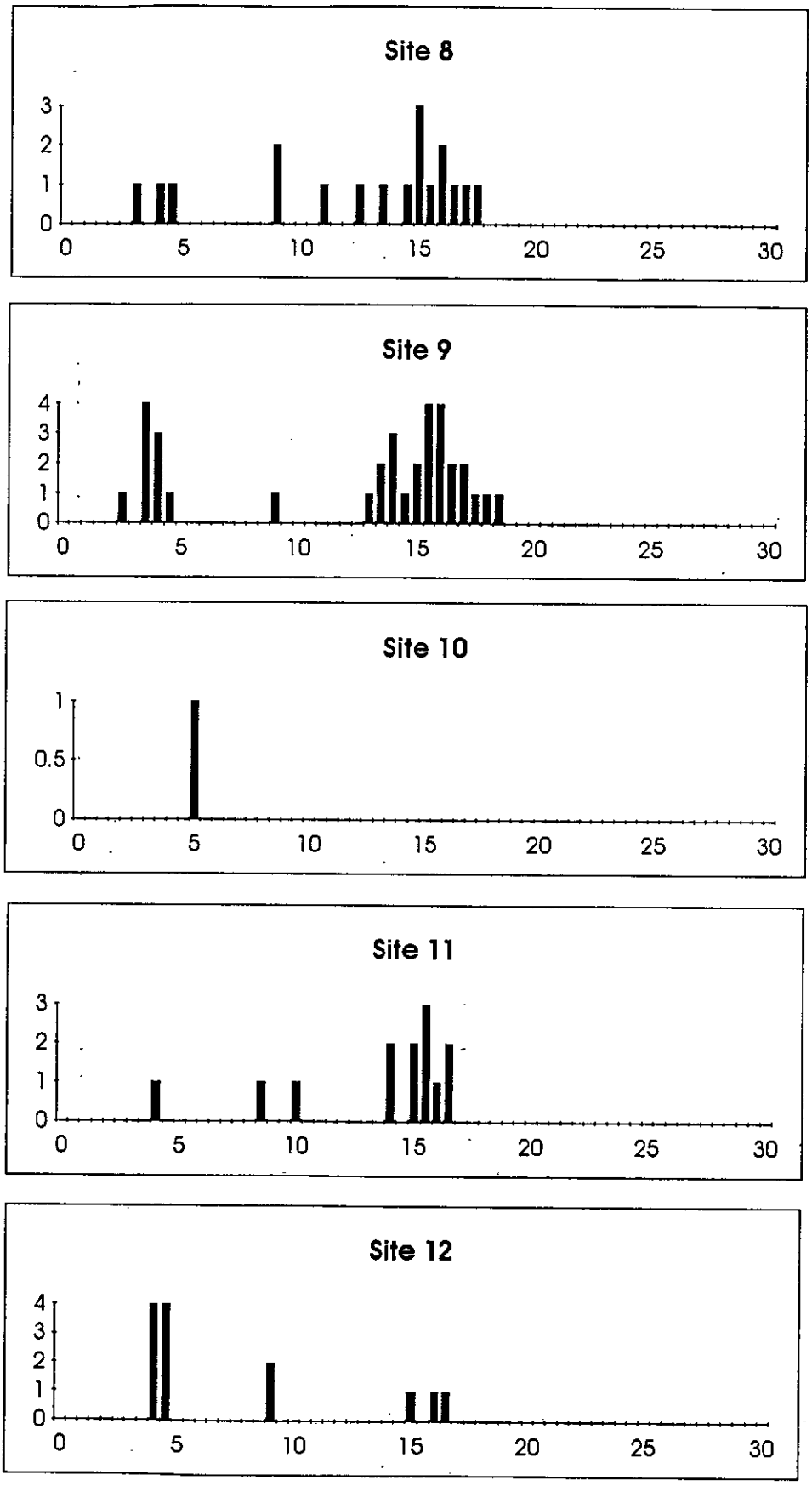


Fig. 23. Continued.

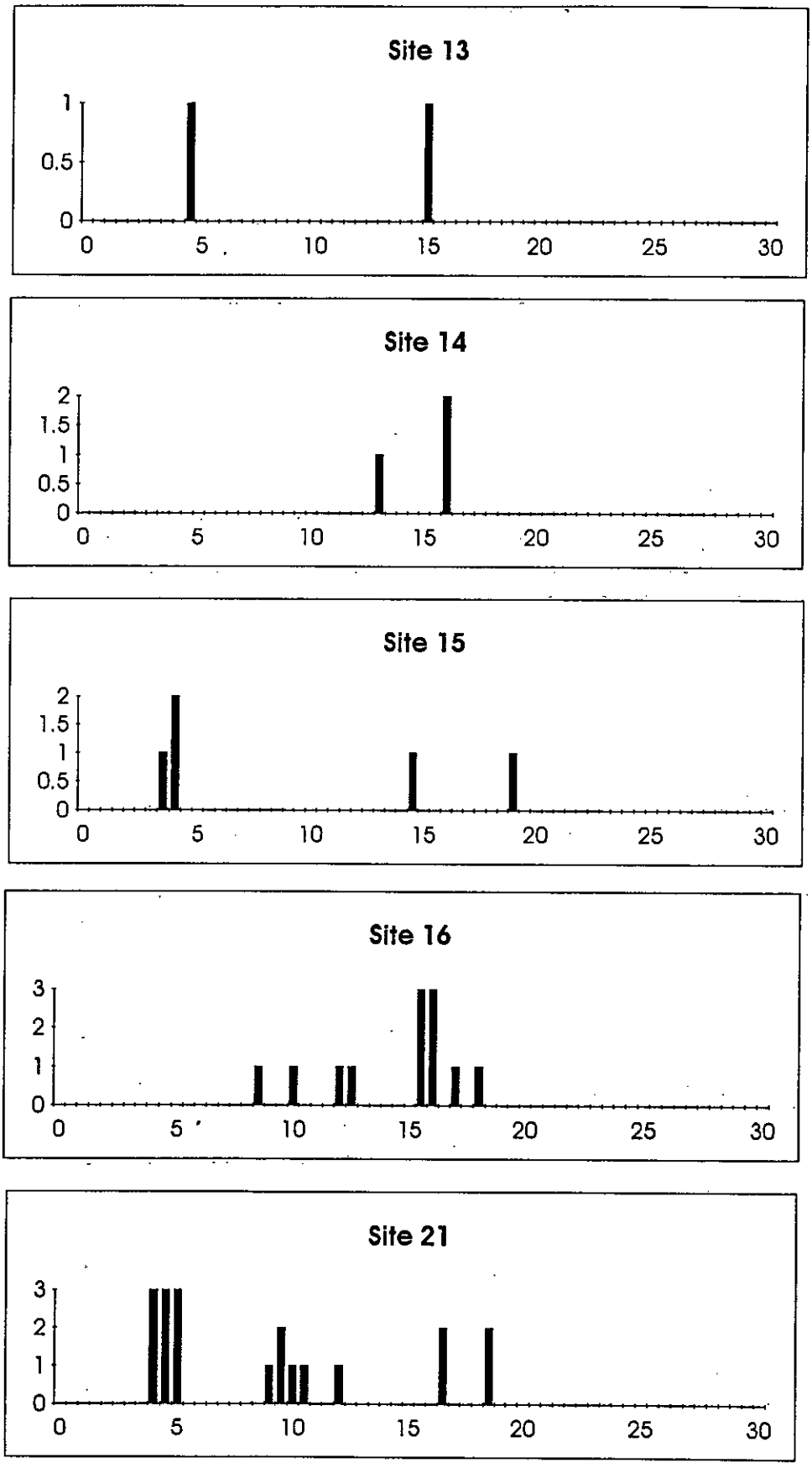


Fig. 23. Continued.

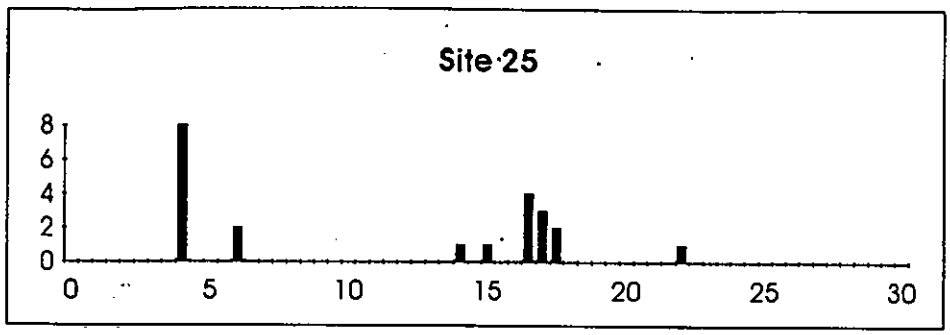


Fig. 24. Length frequency distribution of gudgeon in each section of the River Tees in September 1992. All lengths in cm.

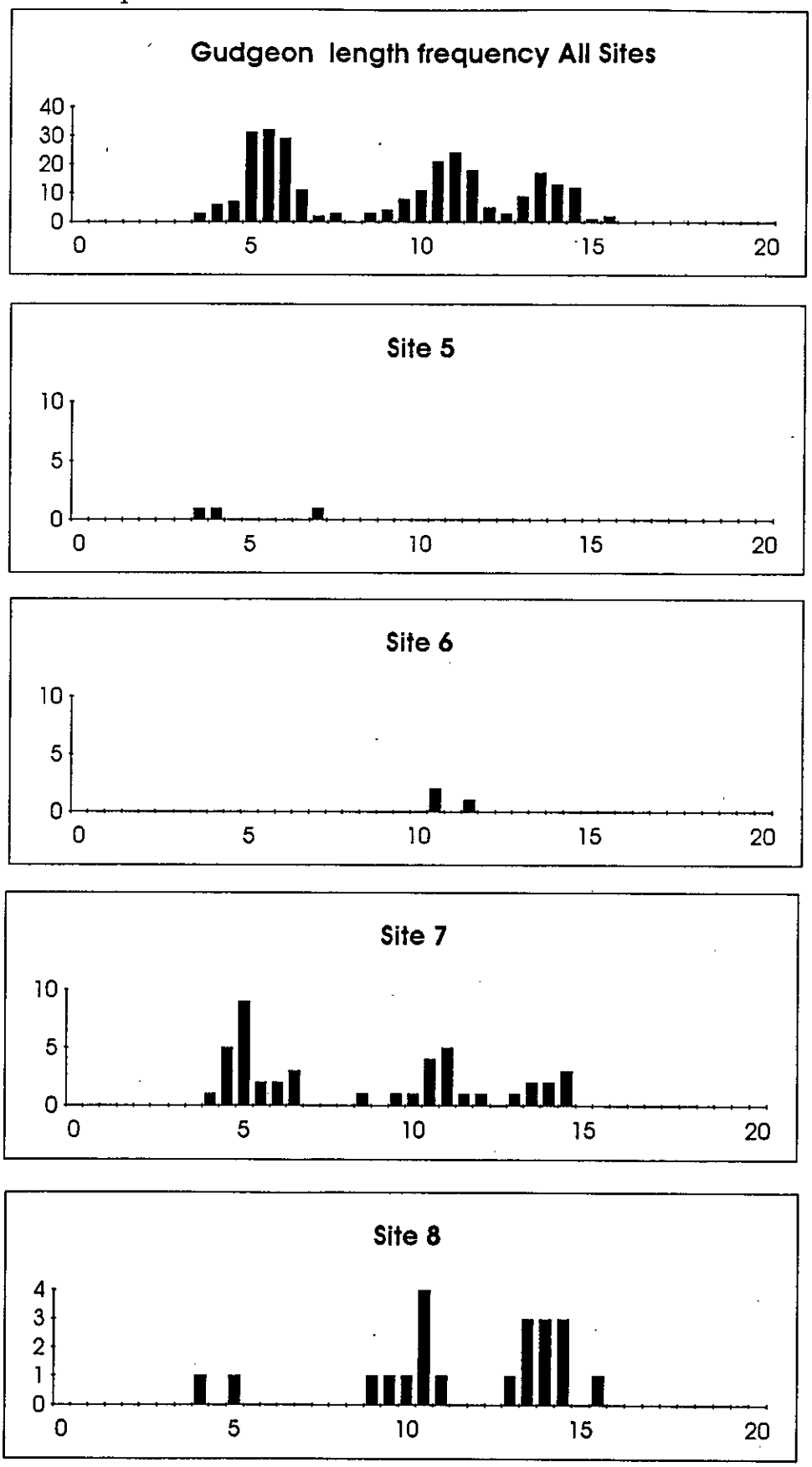


Fig. 24. Continued.

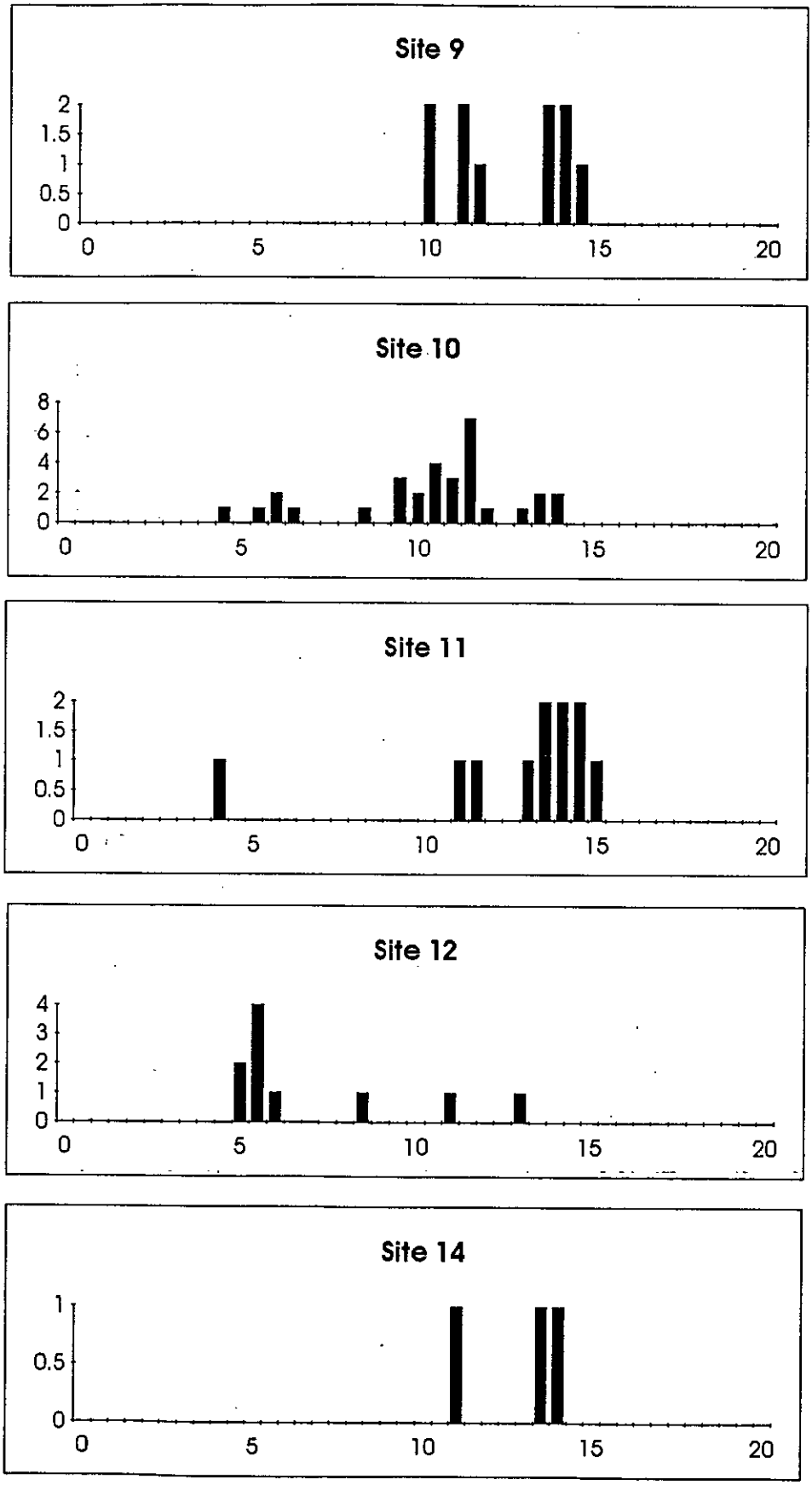
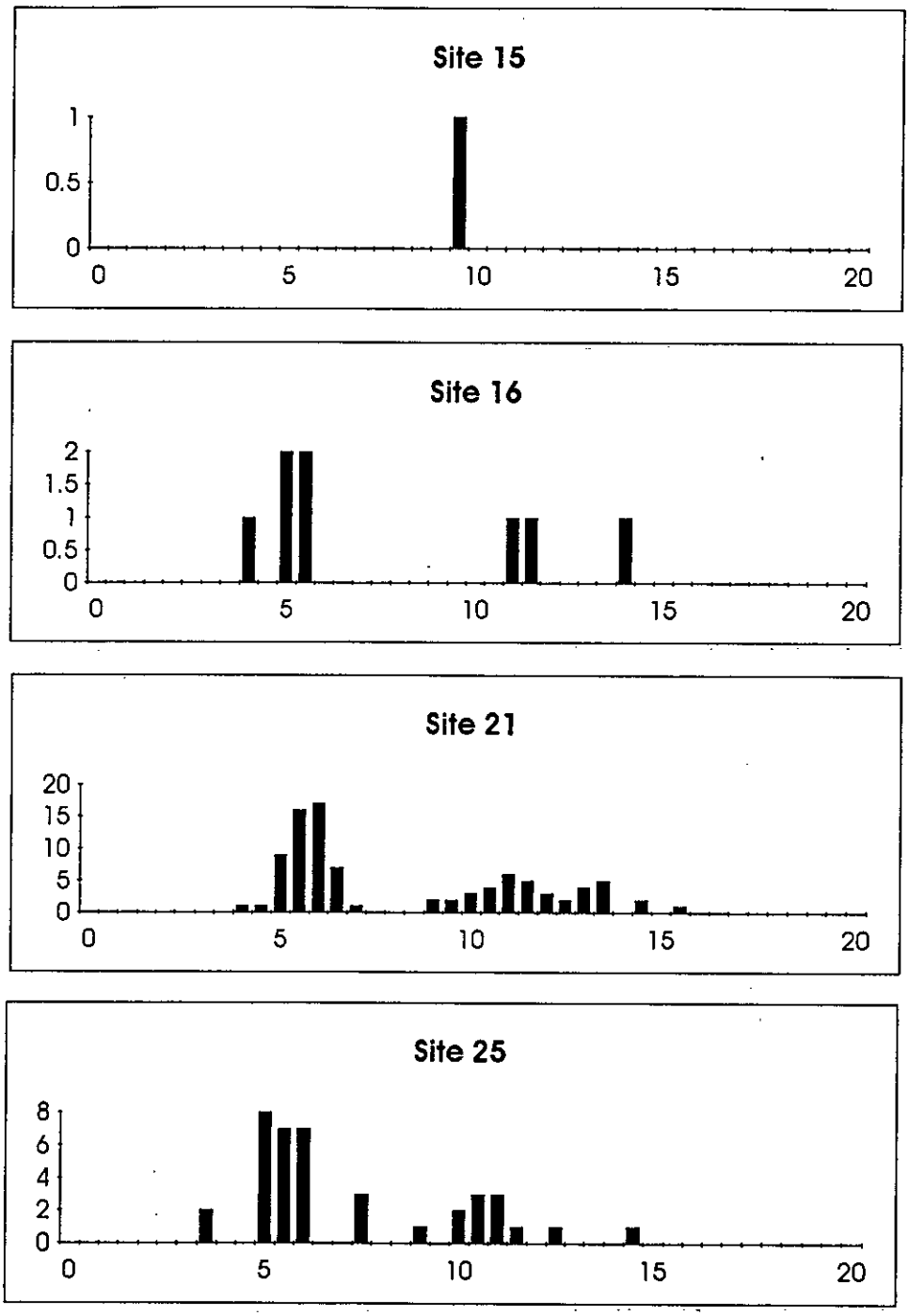


Fig. 24. Continued.



2.3.6 Length weight relationship

Regression analysis of length on weight for each species was carried out. The regression equation is

$LogW = a + blogL$

where W = weight (g), a = intercept constant, b = slope and L = length (cm). The values of a, b and r^2 (an indication of the goodness of fit) for each species are given in Table 4. (Graphs are given in Appendix 2). These relationships are similar to those found in 1991.

Table 4 Values of the length weight regression for major species in the R. Tees, 1992.

Species	a	b	r^2
Chub	-1.93	3.04	98.3
Dace	-2.29	3.35	96.5
Flounder	-1.78	2.91	98.1
Gudgeon	-2.25	3.33	91.5
Roach	-2.11	3.28	97.6
Trout	-1.80	2.91	94.4

2.3.7 Year class strengths

The length frequency histograms for each age group of chub, dace, roach, gudgeon and trout are shown in Figs 25-29. Although the same proportion of each age group was not necessarily aged, high numbers of a particular age group can be interpreted as belonging to a good year class.

Chub of age class 3+ show good numbers and this agrees with results from the previous year when 2+ fish were strongly represented. The size range found was similar to the previous year as was the range of ages, up to 15+ this year and 14+ previously. Few representatives of the 5-7+ age classes were found which is in broad agreement with the previous year (Fig. 25).

High numbers of 0+ dace were found in the survey and these have been omitted from Fig. 26 as it was difficult to make out other modal size groups as they were depressed. It is expected that the 1992 spawning will be a good year class. The 1989 year class reported as strong last year as 2+ fish is now evident as 3+ fish, although other statements made last year do not agree with this year's results. For instance the 1+ group of 1991 looked strong but fewer than expected 2+ fish were found in 1992. Also poor numbers of 3+ fish were found in 1991 but reasonable numbers of 4+ fish were indicated in 1992. When data has been collected for several years these

anomalies will be overcome and it will be possible to be more precise about the relative strengths of each year class. Fish of 8+ were found for the first time in this survey (Fig. 26).

Very few roach of 4+ or older were found in the survey. Large numbers of 3+ fish were found which agrees with the findings of a strong 2+ class in 1991 (Fig. 27).

As in 1991, very few trout were caught. Six age classes were found. A sea trout was recorded at Site 9 which was 25.1 cm in length and aged 4+ (2 years in the river, two at sea) (Fig. 28).

The 0+ and 1+ age classes are clear in the length frequency histogram of gudgeon but the 2+ and 3+ ages overlap considerably (Fig. 29).

Length age graphs for each of the major species are given in Appendix 3.

Fig. 25 Length by age for chub in the R. Tees, 1992.

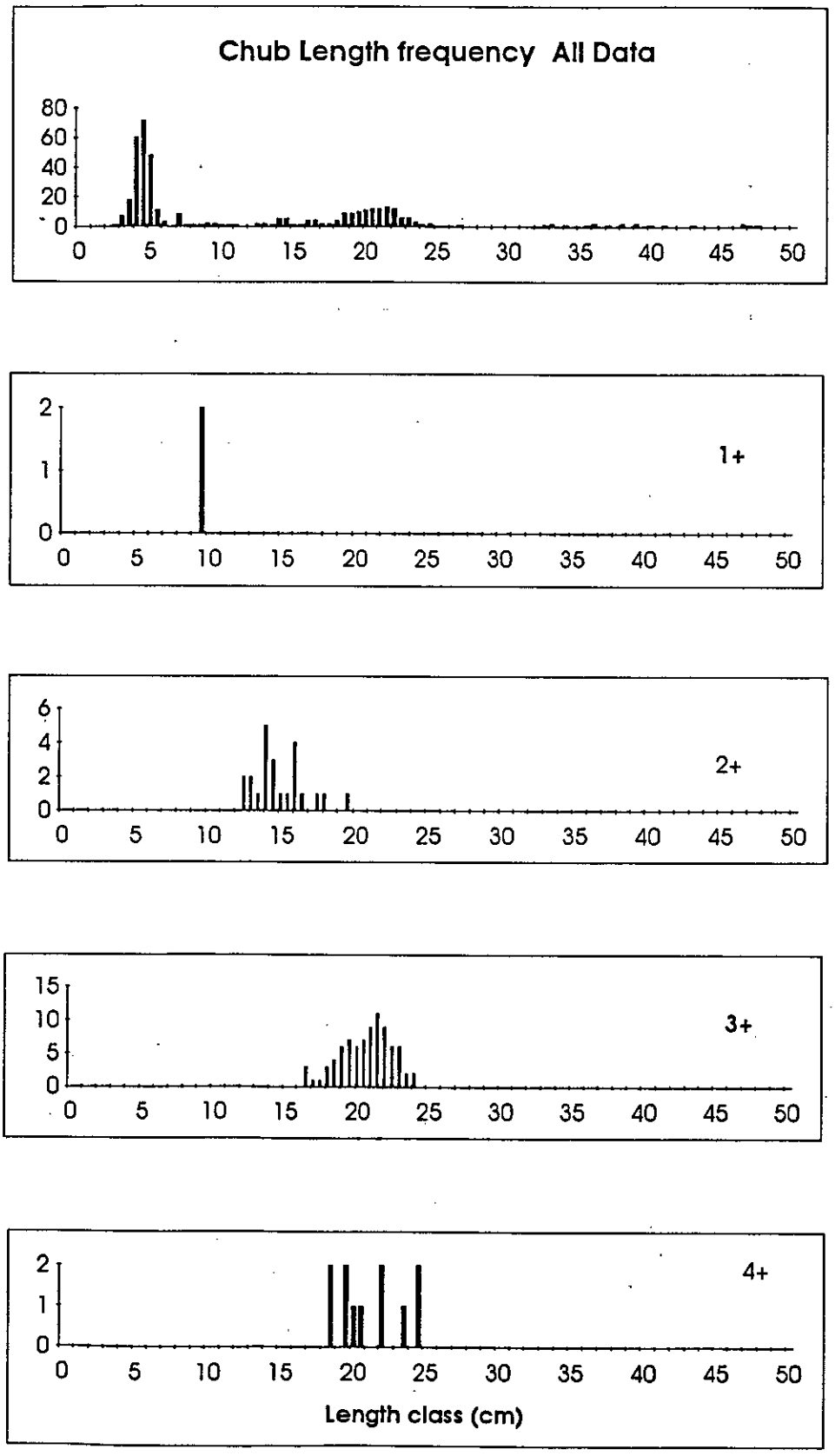


Fig. 25 Continued.

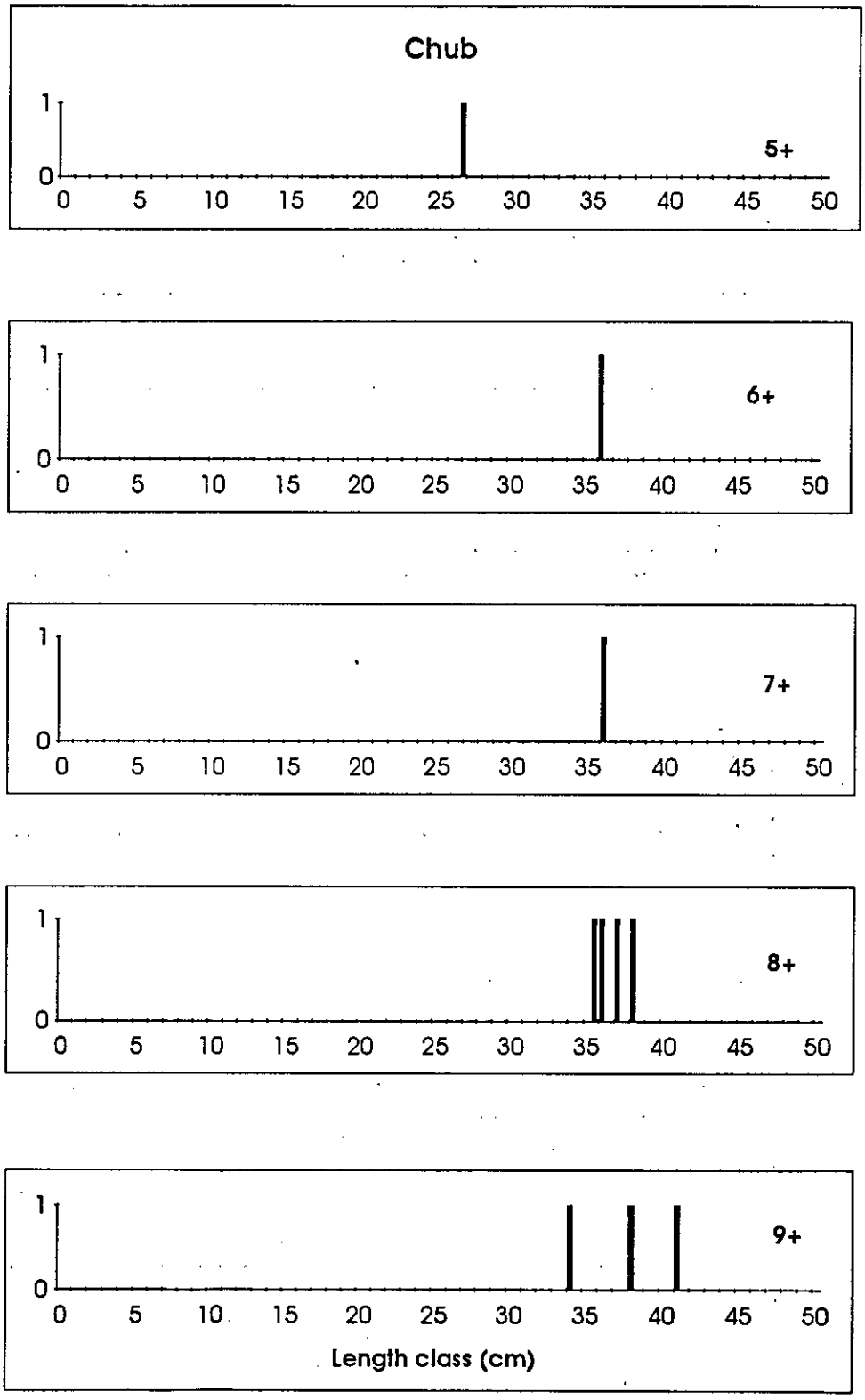


Fig. 25 Continued.

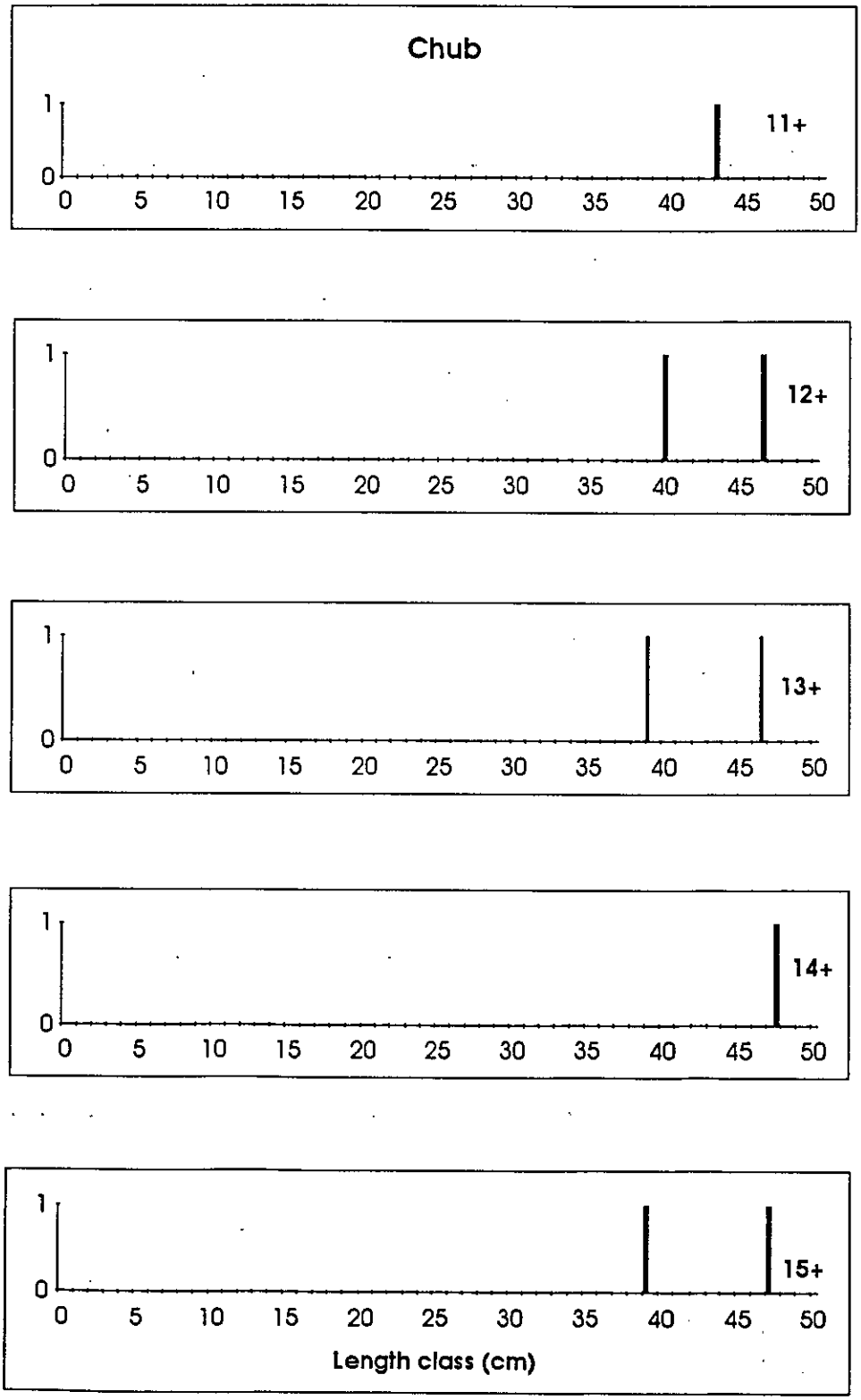


Fig. 26 Length by age for dace in the R. Tees, 1992.

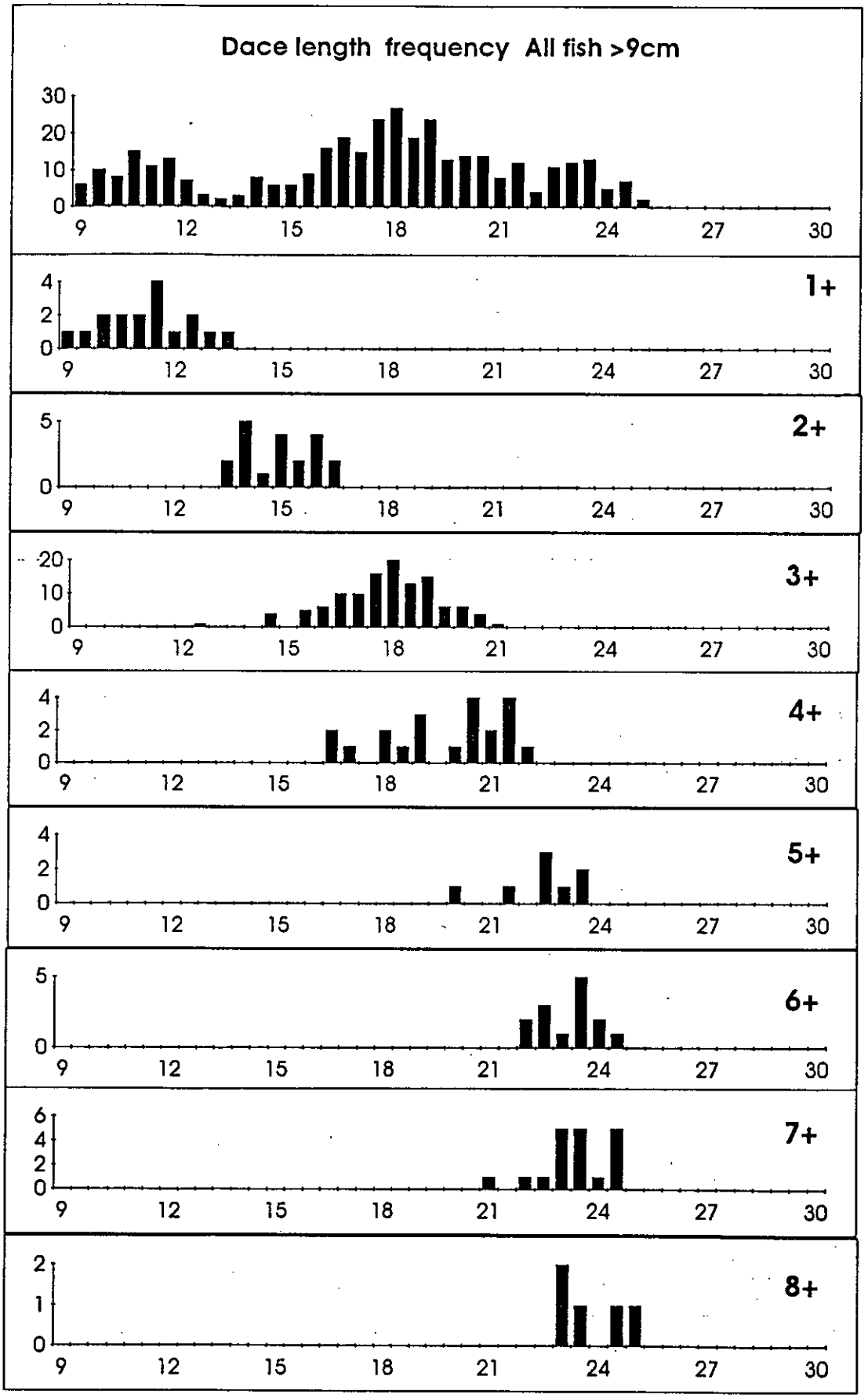


Fig. 27. Length by age for roach in the R. Tees, 1992.

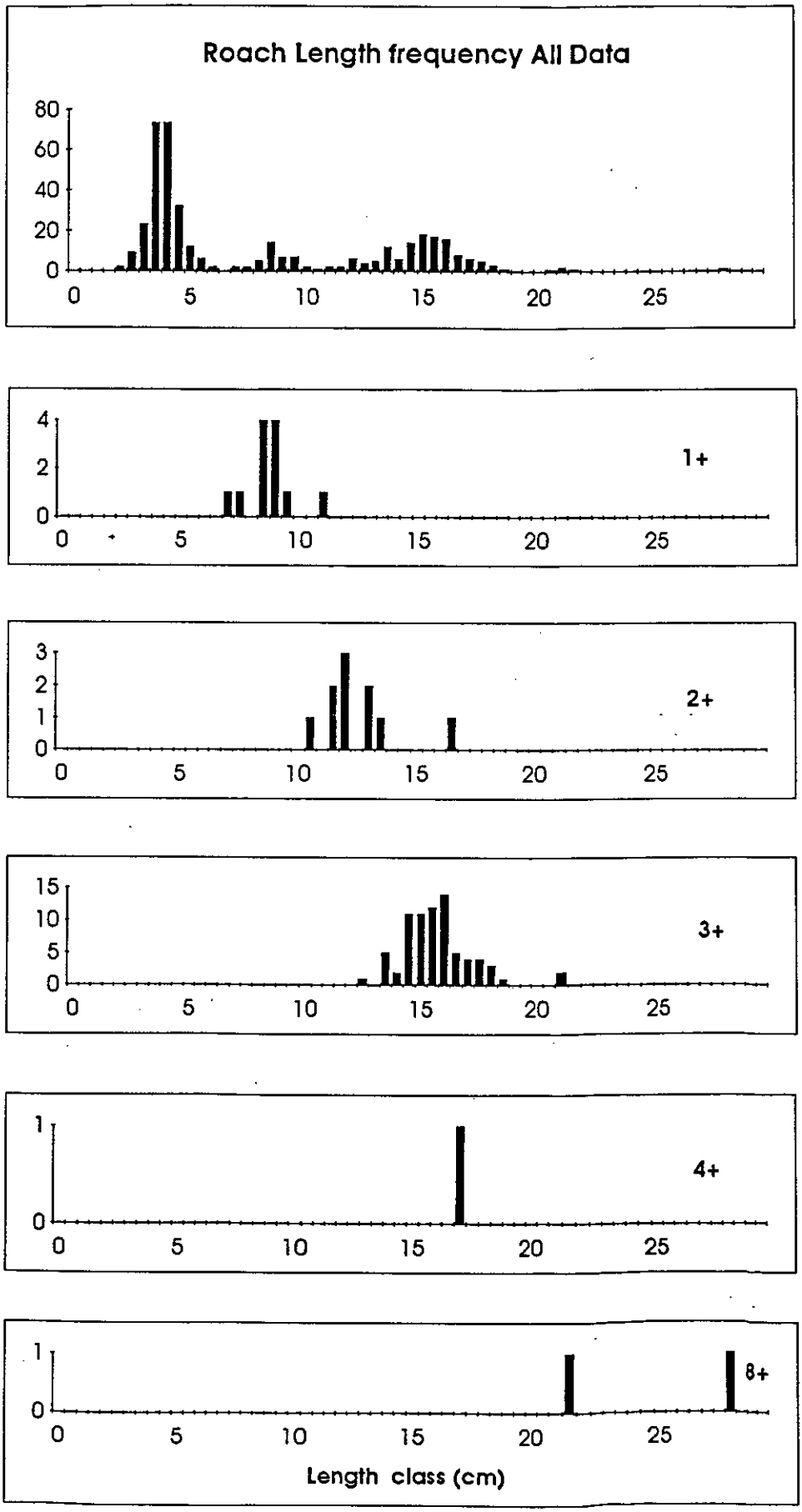


Fig. 28 Length by age for trout in the R. Tees, 1992.

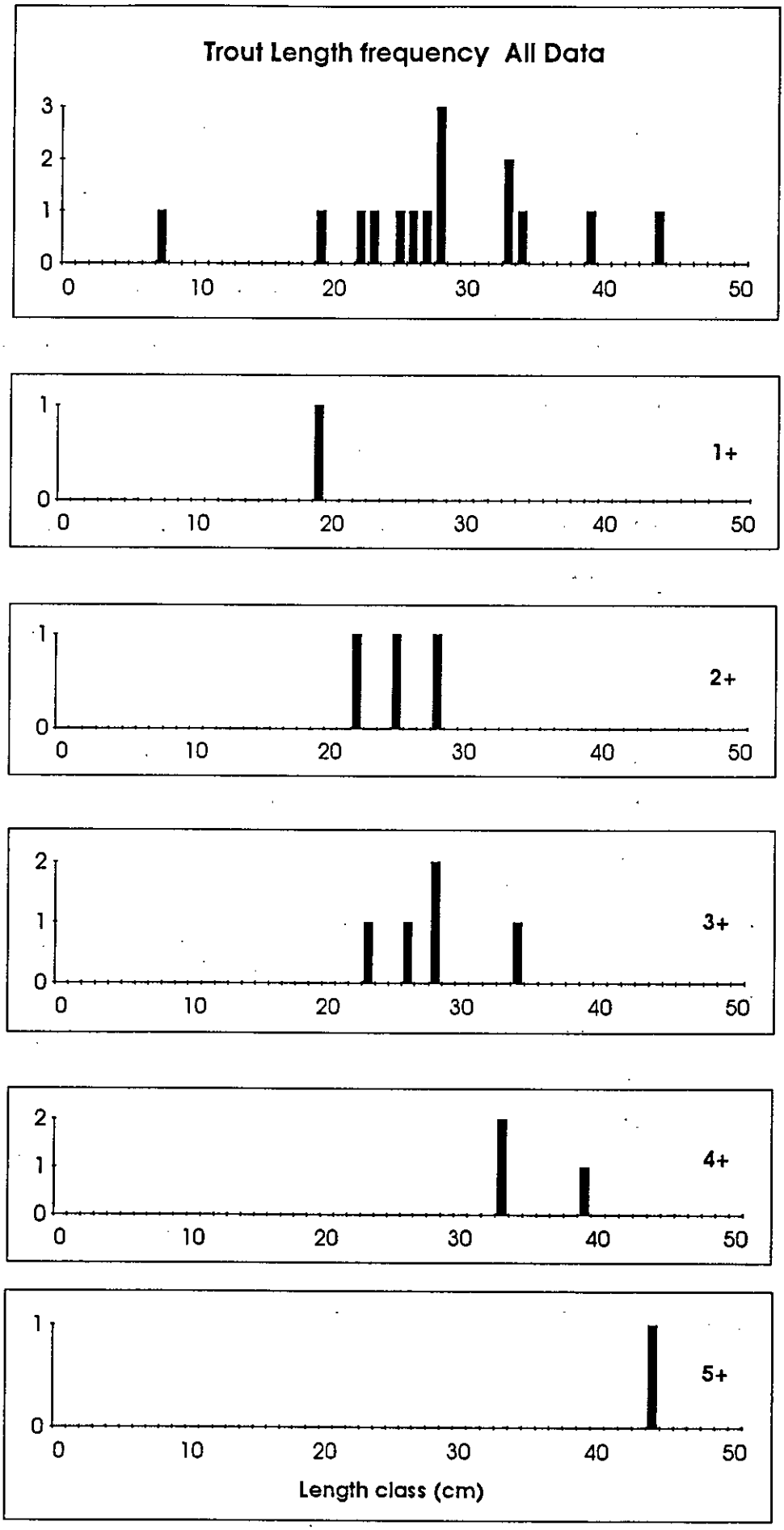
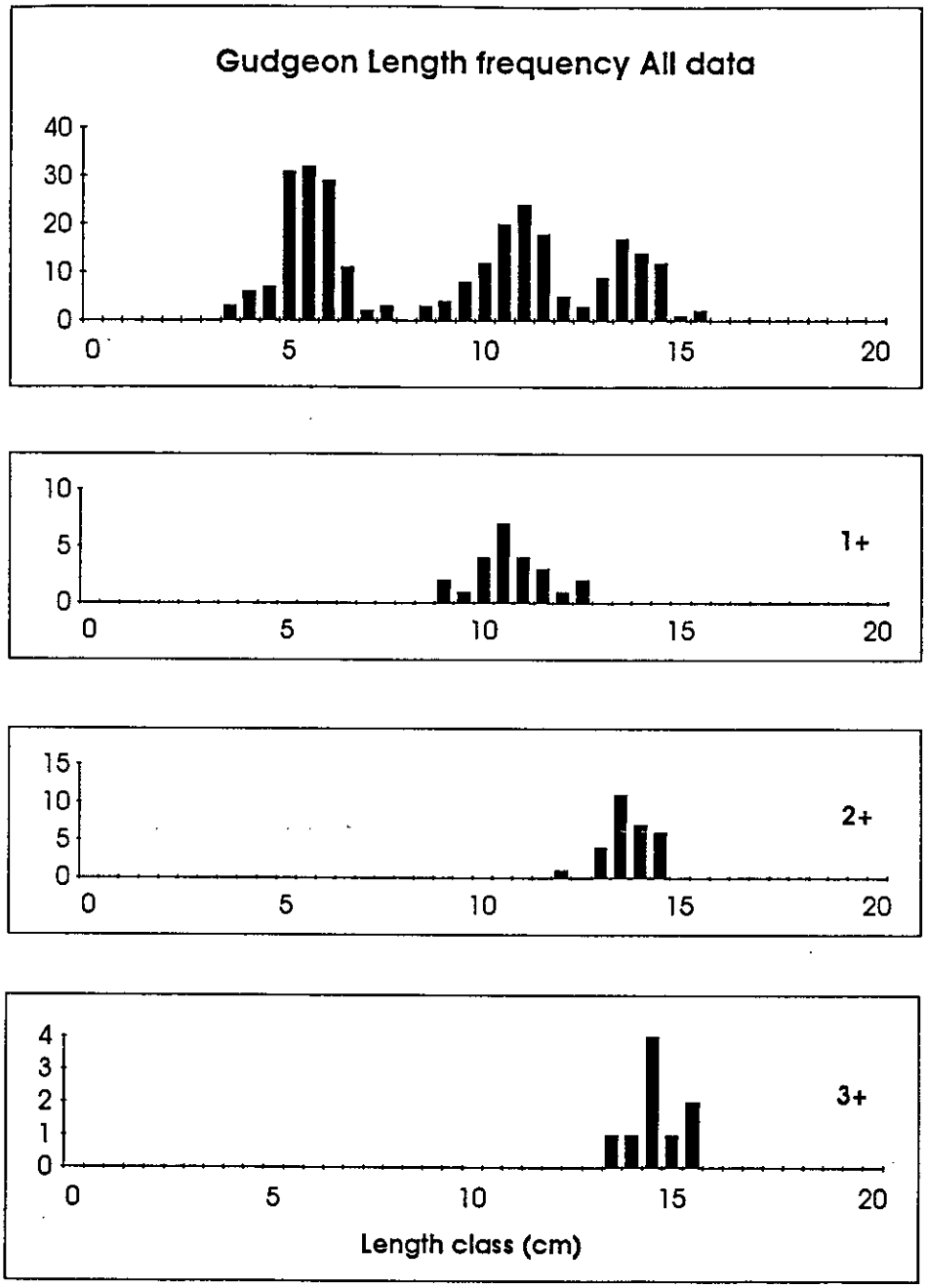


Fig. 29 Length by age for gudgeon in the R. Tees, 1992.



3. TEMPERATURE

3.1 Introduction

The problems reported last year have been resolved and all three loggers are functioning correctly and logging temperature continuously. The next interrogation is due in March 1993.

Monthly means and means of daily ranges are given in Table 5. The monthly means for the R. Frome in Dorset are given for comparison.

The logger at Stockton Marina may have to be closed down to allow construction work to proceed.

Loggers and temperature probes are available for installation into off river supplementation units when they are constructed.

Table 5. Monthly means (^{0}C) and mean of daily ranges in the River Tees at a) Low Moor, b) Ingleby Barwick and c) Stockton. n = number of days that data were collected.

	Low Moor		Ingleby Barwick		Stockton		Frome
	Mean	Range	Mean	Range	Mean	Range	Mean
December 91	-	-	-	-	10.9	2.87	6.7
January 92	-	-	1.8	0.65	8.8	3.63	6.5
Feb	5.7	1.17	4.3	0.77	7.1	2.19	6.8
March	6.5	1.25	6.4	0.81	8.6	1.61	7.4
April	8.6	1.28	8.7	0.99	9.3	2.16	10.6
May	15.1	2.55	15.0	1.24	13.7	4.69	13.3
June	18.8	2.28	18.4	1.17	16.2	4.04	16.7
July	18.0	1.81	18.0	0.99	16.9	3.23	17.4
August	16.2	1.73	16.4	0.99	16.1	3.21	17.0
September	12.6	1.31	12.7	0.71	13.1	0.91	14.6
October	7.7	0.87	7.8	0.62	9.5	2.44	11.9
November	5.2	1.10	5.1	1.06	6.7	0.81	8.3

The mean monthly temperatures at Low Moor and Ingeby Barwick are similar. Both are recording river temperatures although the latter is tidally affected. There is a difference, however, in the monthly means of daily ranges. Low Moor has a wider range of temperature than Ingleby Barwick where the deeper water partially caused by the tidal influence buffers the daily temperature range. The higher mean daily temperature ranges at Stockton are caused by the fact that the logger is recording river temperature at low tide and sea temperature at high tide.

Results to date show that the temperature of the Tees is warmer than a southern chalk stream (the R. Frome in Dorset) during the summer (May to August/September). Thus at the time of major growth of fish, temperatures in the Tees are high and good growth could be expected.

4. ANGLING DATA

4.1 Historical Data

The match records of Yarm A.A. are the most detailed for the river and have been analysed for between-year and within-year variation (see 1991 report) using total catch data for each match. Information on the distribution of fish at different times of the year can be obtained from these records by analysing catches from different pegs. There are many factors, apart from distribution of fish and habitat characteristics, which determine the catch from a particular peg. These include the ability of the individual anglers and state of tide. Before the pegs are ranked, the performance of individual anglers was assessed.

4.2 Methods

4.2.1 Match records

The two methods under consideration for collecting match statistics were outlined in the 1991 report. Briefly, these involved either collecting data by survey forms completed by the anglers or processing one or two individual's catch. On balance it was decided to adopt the former approach in that it gives a broad outline of the fishing on the whole river rather than a detailed analysis of one or two catches. In 1992 the anglers proved to be reliable at filling in the match survey forms.

4.2.2 Ranking of anglers

This was achieved in several different ways: a) by calculating the mean weight per match fished; b) by converting all match weights to a percentage of the winning weight (to correct for days when little was caught thus preventing a one off heavy weight from over influencing the resultant ranking); c) by splitting the year into seasons to find out whether some anglers are more productive at certain times of the year.

4.2.3 Ranking of pegs

Initially, the rankings were based on the mean weight of fish caught at each peg. Only pegs used in more than one third of the matches were used in the analysis. As with the anglers, the year was split into three seasons and the rankings recalculated.

4.3 Results

4.3.1 Between year variation

The mean catch per angler per match was calculated and added to those of previous years (Table 6). Recovery from the "Hargreaves pollution" appears complete. This year's mean catch of 71 ounces is the third highest recorded by Yarm A.A. since 1977 and has continued the trend of increasing mean weight after the pollution.

Table 6. Results of angling matches 1977-1992. $\bar{x}$ = mean catch per angler per match (ounces) ± 95% confidence limits.

Year	$\bar{x}$
1977/78	59.4 ± 6.0
1978/79	68.3 ± 6.6
1979/80	76.2 ± 8.6
1980/81	58.3 ± 8.2
1981/82	85.5 ± 11.7
1982/83	66.1 ± 7.7
1983/84	25.1 ± 3.6
1984/85	14.8 ± 2.9
1985/86	22.6 ± 3.0
1986/87	20.4 ± 3.1
1987/88	27.4 ± 4.0
1988/89	30.9 ± 4.0
1989/90	47.5 ± 5.7
1990/91	62.1 ± 7.1
1991/92	71.3 ± 6.4

4.3.2 Ranking of anglers

Preliminary analysis of the data showed wide confidence limits on the mean catches of anglers attending few matches. It was decided to limit the analysis to those anglers attending at least one third of the annual number of matches. The analysis proved to be of limited value in that there were no consistent anglers appearing high in the rankings more than twice in 14 seasons. In fact there were 12 anglers ranked one in 14 seasons. Analysis by season gave no clearer picture of anglers' ability. In each of the periods, summer, autumn and winter there were 13 different anglers ranked one in 14 seasons. It did show that anglers' ability changed with the season in that in 11 out of the 13 years there was a different angler ranked one in each season.

4.3.3 Ranking of pegs

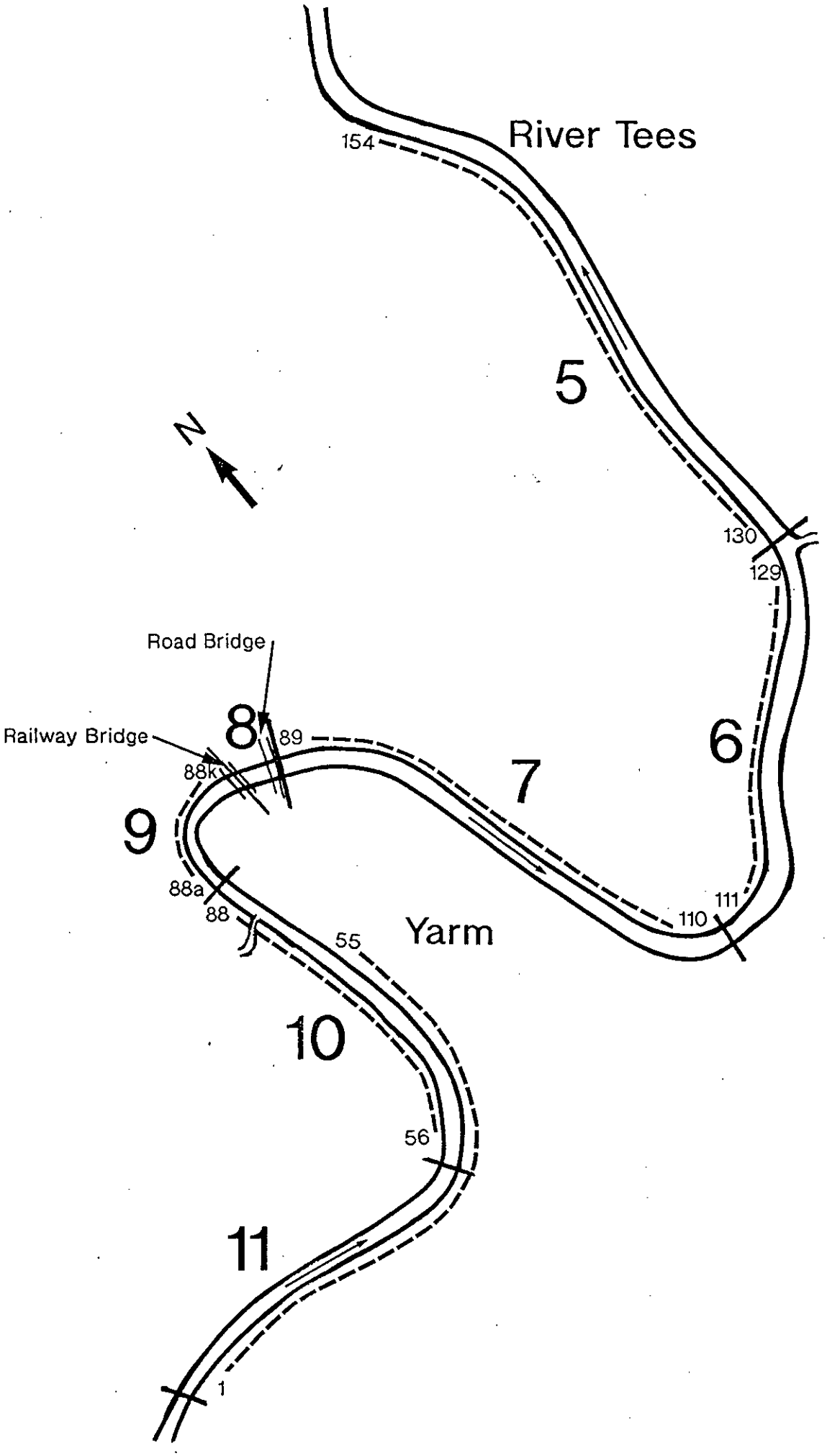
Yarm A.A. fish matches on the R. Tees in the vicinity of Yarm from Section 11 (downstream of Aislaby) to Section 5 (Eaglescliffe golf course) (Fig. 30). There are several complications including the fact that all pegs are not necessarily used in each match. The inclusion of a particular peg will depend on the number of anglers fishing and the secretary's perception of whether a peg will fish well or not. Some pegs are seen to produce fish at certain times of the year and not others. Pegs thought to be poor on the day are not used unless there is a full complement of anglers.

Preliminary analysis based only on the top ranked peg in each season of each year indicated that Section 11 was consistently the best in the summer (June 16 - Sept 15) and Sections 9 and 10 consistently produced the winning peg in both autumn (Sept 16 - Dec 15) and winter (Dec 15 - Mar 16). Since the acquisition of the "Alphabets stretch" in 1988 (Pegs 88-88K in Section 9) there has been only one occasion in autumn and winter when the top ranked peg was not in this stretch. This stretch does not rank highly in summer (Fig. 30).

4.4 Discussion

The differences in catch of fish from pegs at different times of the year show that over a relatively short length of river there is movement of fish from one section to another. This is particularly noticeable for dace which comprise the bulk of the weights caught in matches. There is an area of the river which is consistently producing dace each winter, Sections 9 and 10, and within this section there is one short stretch that appears to hold a very high density ("Alphabets" stretch). It is vital that the source of these fish is known and it is hoped that a marking excercise in 1993 may elucidate this.

Fig. 30 Position of angling pegs relative to electrofished sections.



5. COSTS OF WORK DURING THE REPORTING PERIOD (APRIL 1992-FEBRUARY 1993)

Costs of the work are in accordance with the tender document accepted by the Authority namely £28,500.

6. ANTICIPATED COSTS OF THE WORK IN THE PERIOD UP TO FEBRUARY 1994

Costs for the next reporting period are expected to be in line with the tender proposal dated February 1991 plus an inflation adjustment.

7. PROGRAMME FOR THE NEXT REPORTING PERIOD

A detailed survey will again be conducted to increase the data base before the construction of the barrage. A survey of adults will be undertaken in September. Fry will be sampled in July to confirm the positions of the spawning areas of dace in the tidal Tees. Collection of temperature data will be continued at the three monitoring points if possible and a logger set up in ORSUS when completed. Data from angling matches will again be collected and the analysis of past match records will be continued.

8. FACTORS LIKELY TO AFFECT COMPLETION OF THE WORK ACCORDING TO THE TIMETABLE

Adverse weather conditions is the only likely factor to be considered. Although conditions may delay the sampling programme in the short term, it is unlikely that the completion date of the project will be affected.

9. ACKNOWLEDGEMENTS

Our thanks go to Diana Morton for production of the text.

Appendix 1. Site descriptions and details of fish caught.

SECTION 1

Date fished	5/6 September 1992
Area	The Holmes and downstream
Length	1300 m
NGR	NZ446159 - NZ448161
State of tide	Flooding to high slack tide and then ebbing
Time	11.00-13.30
Fishing method	Gill net
Site description	River lined with reeds. Meadows, few trees.

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)		
Dace *Leuciscus leuciscus* (L.)		
Flounder *Platichthys flesus* (L.)		
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)	1	15.5
Minnow *Phoxinus phoxinus* (L.)		
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)		
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.		

SECTION 2

Date fished	5/6 September 1992
Area	Bend below pipe bridge to upstream limit of The Holmes
Length	780 m
NGR	NZ441157 - NZ446159
State of tide	Flooding to high slack tide and then ebbing
Time	11.00-13.30, 11.00-overnight
Fishing method	Gill net Traps
Site description	River lined with reeds. Meadows, few trees.

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)		
Dace *Leuciscus leuciscus* (L.)	1	24.8
Flounder *Platichthys flesus* (L.)		
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)		
Minnow *Phoxinus phoxinus* (L.)		
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)		
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.		

SECTION 3

Date fished	5/6 September 1992
Area	Bend below Great Holme to bend below pipe bridge
Length	800 m
NGR	NZ434154 - NZ441157
State of tide	Flooding to high slack tide and then ebbing
Time	11.15-13.45, 10.45-overnight
Fishing method	Gill net Trap
Site description	River lined with reeds. Meadows, few trees.

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)		
Dace *Leuciscus leuciscus* (L.)	1	17.5
Flounder *Platichthys flesus* (L.)		
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)		
Minnow *Phoxinus phoxinus* (L.)		
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)		
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.		

SECTION 4

Date fished	6 September 1992
Area	The Rings and Great Holmes
Length	2280 m
NGR	NZ431147 - NZ434154
State of tide	Ebbing
Time	14.30-15.30
Fishing method	Boom boat
Site description	High banks with meadows and few trees. River lined with reeds.

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	2	4.6-5.0
Dace *Leuciscus leuciscus* (L.)	23	5.0-23.5
Flounder *Platichthys flesus* (L.)		
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)		
Minnow *Phoxinus phoxinus* (L.)		
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	5	4.5-21.2
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.		

SECTION 5

Date fished	9 September 1992
Area	Downstream of R. Leven - start of The Rings
Length	1840 m
NGR	NZ365105 - NZ431147
State of tide	Flooding
Time	10.00-11.50 and 12.45-14.00
Fishing method	Boom boat
Site description	High banks with meadows. Some trees and shrubs on the banks, very few overhanging the water. High wooded banks at the bottom of the section.

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	95	2.8-10.8
Dace *Leuciscus leuciscus* (L.)	136	4.2-15.7
Flounder *Platichthys flesus* (L.)	21	12.0-34.6
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)	3	3.4-6.6
Minnow *Phoxinus phoxinus* (L.)	4	4.0-7.4
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	108	2.4-9.8
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.	5	4.1-5.2
Trout (brown) *Salmo trutta* L.	2	23.0-27.1

SECTION 6

Date fished	9 September 1992
Area	River Leven - large bend upstream
Length	1240 m
NGR	NZ423122 - NZ430130
State of tide	Flooding - high slack
Time	15.00-16.15
Fishing method	Boom boat
Site description	High banks. Overhanging trees on south bank. Open land on north bank.

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	22	3.4-22.6
Dace *Leuciscus leuciscus* (L.)	106	4.8-24.3
Flounder *Platichthys flesus* (L.)	3	14.2-24.5
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)	3	10.3-11.2
Minnow *Phoxinus phoxinus* (L.)	3	3.8-4.3
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	23	3.3-28.5
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.	5	4.1-5.2
Trout (brown) *Salmo trutta* L.	1	33.1

SECTION 7

Date fished	10 September 1992
Area	Upstream of Section 6 - Yarm road bridge
Length	1140 m
NGR	NZ418132 - NZ423122
State of tide	Flooding
Time	09.00-10.30
Fishing method	Boom boat
Site description	High banks. Yarm on south bank. Open meadows on north bank.

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	62	3.2-39.7
Dace *Leuciscus leuciscus* (L.)	284	4.0-23.5
Flounder *Platichthys flesus* (L.)	5	11.5-21.5
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)	44	3.8-14.4
Minnow *Phoxinus phoxinus* (L.)	8	3.7-7.8
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	107	2.8-17.7
Salmon adult *Salmo salar* L.	1	67.8
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.	3	4.2-5.1
Trout (brown) *Salmo trutta* L.	1	24.9

SECTION 8

Date fished	9 September 1992
Area	Yarm road bridge - Yarm railway bridge
Length	80 m
NGR	NZ417132 - NZ418132
State of tide	Ebbing
Time	17.00-17.30
Fishing method	Boom boat
Site description	High banks. Gravel bar on south bank. Water otherwise deep.

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	12	3.2-23.1
Dace *Leuciscus leuciscus* (L.)	34	5.3-23.0
Flounder *Platichthys flesus* (L.)	5	14.1-24.3
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)	21	3.7-15.5
Minnow *Phoxinus phoxinus* (L.)	1	6.8
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	18	2.7-17.2
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.		

SECTION 9

Date fished	10 September 1992
Area	Yarm railway bridge - upstream to outfall on north bank
Length	300 m
NGR	NZ415131 - NZ417132
State of tide	Low tide - flooding
Time	14.15-15.30
Fishing method	Boom boat
Site description	Flood defence construction on south bank. On north, high bank with bushes and herbacious vegetation.

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	32	2.5-32.8
Dace *Leuciscus leuciscus* (L.)	246	4.0-24.9
Flounder *Platichthys flesus* (L.)	17	10.2-29.8
Grayling *Thymallus thymallus* (L.)	1	11.3
Gudgeon *Gobio gobio* (L.)	10	9.6-14.1
Minnow *Phoxinus phoxinus* (L.)		
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	34	2.3-18.5
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.	1	25.1

SECTION 10

Date fished	8 September 1992
Area	Upstream of section 9 - downstream of section 11
Length	560 m
NGR	NZ415122 - NZ415131
State of tide	Ebbing
Time	18.00-19.00
Fishing method	Boom boat
Site description	High banks. Thin line of trees and shrubs on the north bank, more open on the south bank.

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	5	3.2-4.5
Dace *Leuciscus leuciscus* (L.)	34	4.7-11.3
Flounder *Platichthys flesus* (L.)	4	17.7-22.0
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)	31	4.4-14.0
Minnow *Phoxinus phoxinus* (L.)		
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	1	4.8
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.		

SECTION 11

Date fished	7 September 1992
Area	Aislaby at The Cabins - bend downstream
Length	840 m
NGR	NZ407123 - NZ415122
State of tide	Flooding
Time	11.15-12.10
Fishing method	Boom boat
Site description	High banks. Wooded area

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	39	2.6-36.6
Dace *Leuciscus leuciscus* (L.)	19	5.3-20.6
Flounder *Platichthys flesus* (L.)	20	10.7-27.7
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)	11	3.8-14.8
Minnow *Phoxinus phoxinus* (L.)		
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	13	3.6-16.4
Salmon adult *Salmo salar* L.	1	66.0
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.		

SECTION 12

Date fished	7 September 1992
Area	Aislaby at The Cabins - middle of 1st bend upstream
Length	440 m
NGR	NZ405120 - NZ407123
State of tide	Flooding - high slack
Time	10.30-11.00 and 13.00-13.40
Fishing method	Boom boat
Site description	High banks, meadows with few overhanging trees

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	13	3.8-21.8
Dace *Leuciscus leuciscus* (L.)	92	4.3-23.2
Flounder *Platichthys flesus* (L.)	2	17.6-22.9
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)	10	4.6-12.7
Minnow *Phoxinus phoxinus* (L.)	1	5.9
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	13	3.6-16.1
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.		

SECTION 13

Date fished	7 September 1992
Area	Upstream of Aislaby, end of Section 12 - next bend upstream
Length	600 m
NGR	NZ404114 - NZ405120
State of tide	Flooding - high slack - ebbing
Time	14.00-15.15
Fishing method	Boom boat
Site description	High banks, meadows with few overhanging trees

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	9	4.8-22.5
Dace *Leuciscus leuciscus* (L.)	35	4.5-18.5
Flounder *Platichthys flesus* (L.)	3	19.2-23.0
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)		
Minnow *Phoxinus phoxinus* (L.)		
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	2	4.2-14.8
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.	1	21.3

SECTION 14

Date fished	7 September 1992
Area	End of Section 13 - next bend upstream
Length	1040 m
NGR	NZ401105 - NZ404114
State of tide	Ebbing
Time	15.45-16.45
Fishing method	Boom boat
Site description	High banks, more wooded than sections 12 and 13. Deep water

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	5	14.0-22.7
Dace *Leuciscus leuciscus* (L.)	31	4.4-23.0
Flounder *Platichthys flesus* (L.)	2	20.5-27.7
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)	3	10.6-14.0
Minnow *Phoxinus phoxinus* (L.)		
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	3	12.6-15.9
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.	4	25.5-43.8

SECTION 15

Date fished	8 September 1992
Area	Pumping station - bend downstream. Lower limit opposite upstream limit of section 14.
Length	580 m
NGR	NZ395103 - NZ401105
State of tide	High slack
Time	14.50-16.10
Fishing method	Boom boat
Site description	High banks, wooded section. Shallow water with gravel banks

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	6	16.2-26.4
Dace *Leuciscus leuciscus* (L.)	101	3.9-21.7
Flounder *Platichthys flesus* (L.)	2	25.6-31.4
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)	1	9.2
Minnow *Phoxinus phoxinus* (L.)		
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	5	3.3-18.9
Salmon adult *Salmo salar* L.	1	59.7
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.		

SECTION 16

Date fished	8 September 1992
Area	Lower Worsall - pumping station
Length	400 m
NGR	NZ392103 - NZ395103
State of tide	Ebbing
Time	16.40-17.30
Fishing method	Boom boat
Site description	Banks less steep. Open meadows upstream with tree cover increasing downstream. Shallow water.

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)		
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	17	4.2-47.2
Dace *Leuciscus leuciscus* (L.)	135	4.4-24.3
Flounder *Platichthys flesus* (L.)	1	21.4
Grayling *Thymallus thymallus* (L.)	1	22.1
Gudgeon *Gobio gobio* (L.)	8	3.9-13.7
Minnow *Phoxinus phoxinus* (L.)	4	6.2-7.1
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	12	8.4-17.8
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.		

SECTION 21

Date fished	11 September 1992
Area	Downstream of ford below Low Moor weir
Length	260 m
NGR	NZ365106 - NZ376104
State of tide	Not affected by the tide
Time	13.30-14.15
Fishing method	Twin anode wading
Site description	High banks with some trees on the south bank. Open meadows. A small number of willows overhanging the water on the north bank. Water generally up to 80 cm with deeper pools under overhanging trees. Substratum cobbles/gravel with fine organic sediment in areas of low flow.

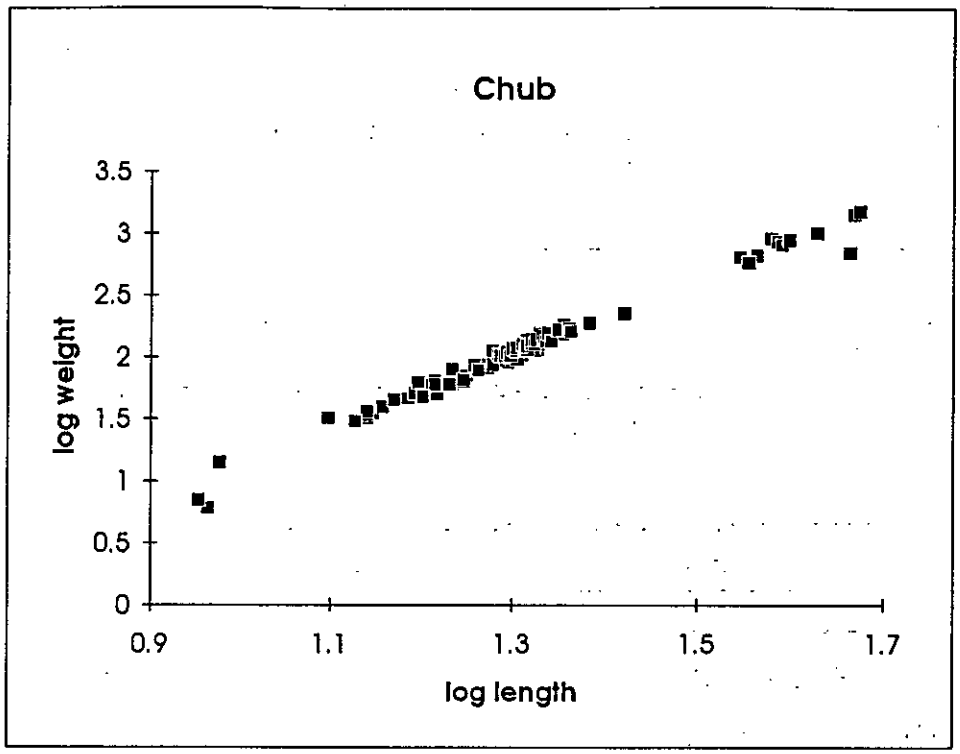
Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)	8	3.5-14.7
Bullhead *Cottus gobio* L.		
Chub *Leuciscus cephalus* (L.)	21	3.0-32.9
Dace *Leuciscus leuciscus* (L.)	229	4.4-18.7
Flounder *Platichthys flesus* (L.)		
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)	91	3.7-15.1
Minnow *Phoxinus phoxinus* (L.)	22	3.0-6.8
River Lamprey *Lampetra fluviatilis* (L.)	1	33.0
Roach *Rutilus rutilus* (L.)	19	3.6-18.5
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)	1	5.7
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.	5	7.0-32.9

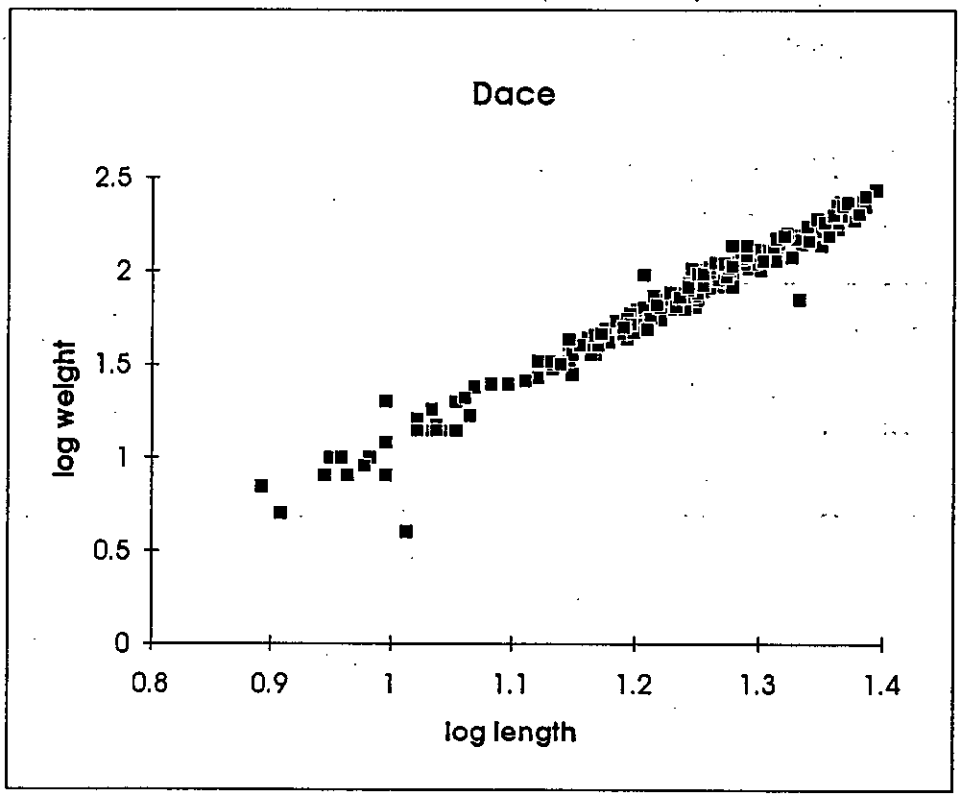
SECTION 25

Date fished	11 September 1992
Area	Lower Dinsdale toll bridge - first bend upstream
Length	350 m
NGR	NZ350113 - NZ345114
State of tide	Not influenced by the tide
Time	10.00-12.00
Fishing method	Single anode wading and from boat
Site description	Fast flowing over bedrock. Gravel banks present in places usually near the bank. Very high wooded banks. Fallen trees in the water often with associated macrophyte debris.

Species	No. of individuals	Size range (cm)
Barbel *Barbus barbus* (L.)	1	47.0
Bullhead *Cottus gobio* L.	1	6.8
Chub *Leuciscus cephalus* (L.)	16	4.0-38.0
Dace *Leuciscus leuciscus* (L.)	59	5.6-24.4
Flounder *Platichthys flesus* (L.)		
Grayling *Thymallus thymallus* (L.)		
Gudgeon *Gobio gobio* (L.)	39	3.3-14.2
Minnow *Phoxinus phoxinus* (L.)	66	1.9-6.5
River Lamprey *Lampetra fluviatilis* (L.)		
Roach *Rutilus rutilus* (L.)	22	3.6-18.5
Salmon adult *Salmo salar* L.		
Stone loach *Barbatula barbatula* (L.)		
Three spined stickleback *Gasterosteus aculeatus* L.		
Trout (brown) *Salmo trutta* L.		

Appendix 2. Length weight relationships for major fish species in the R. Tees, 1992.





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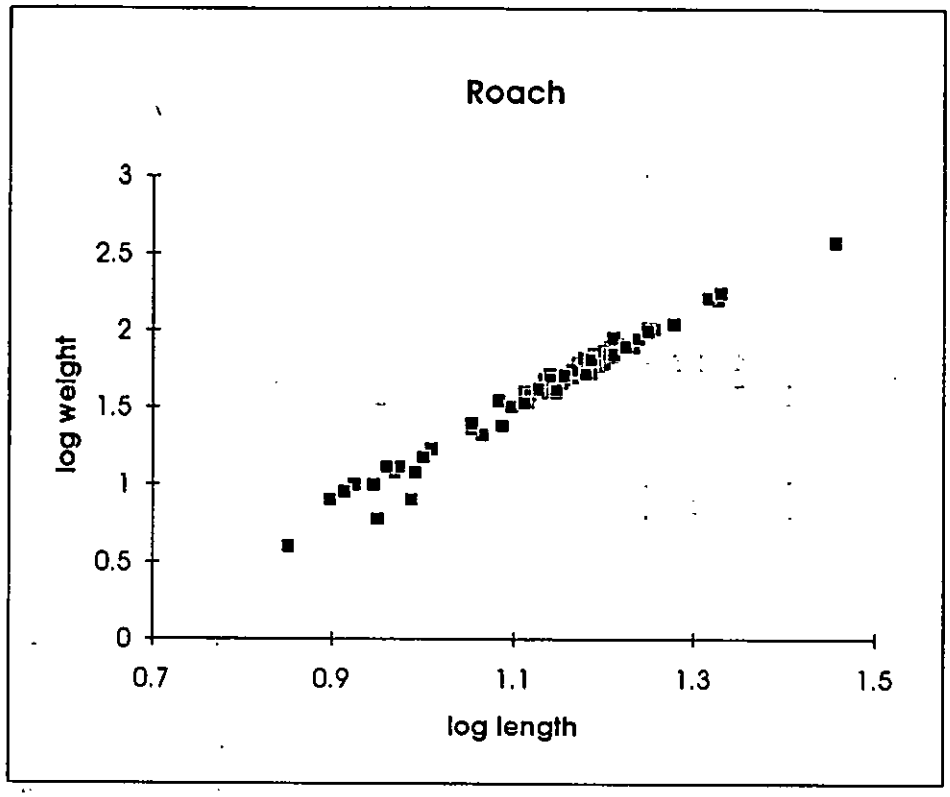

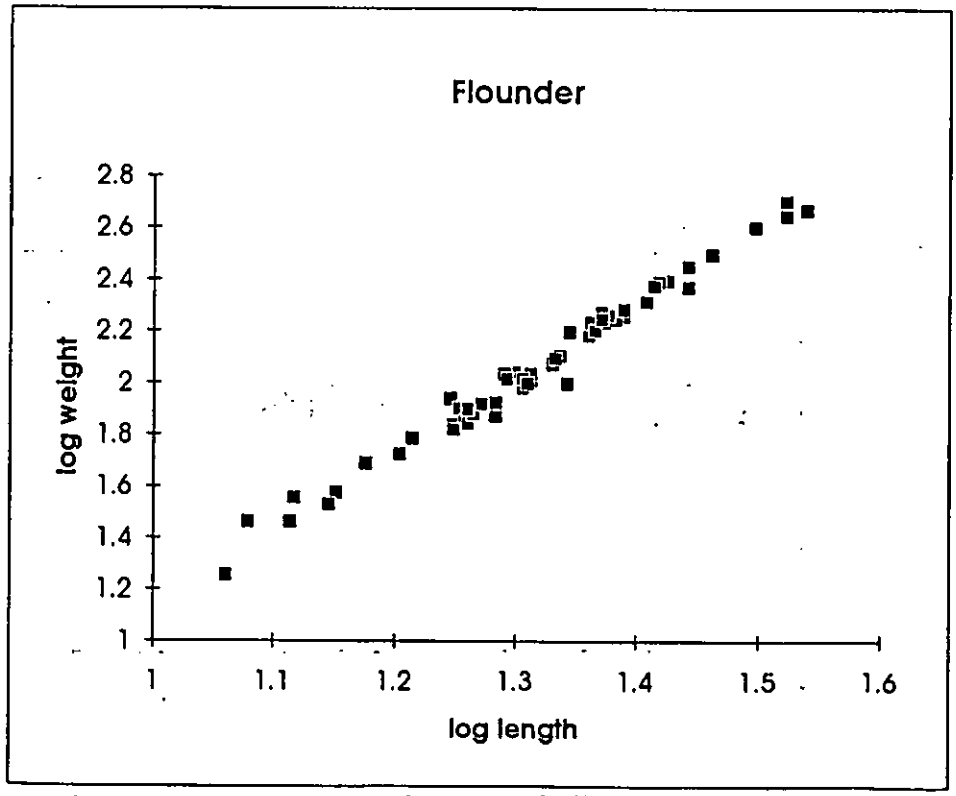

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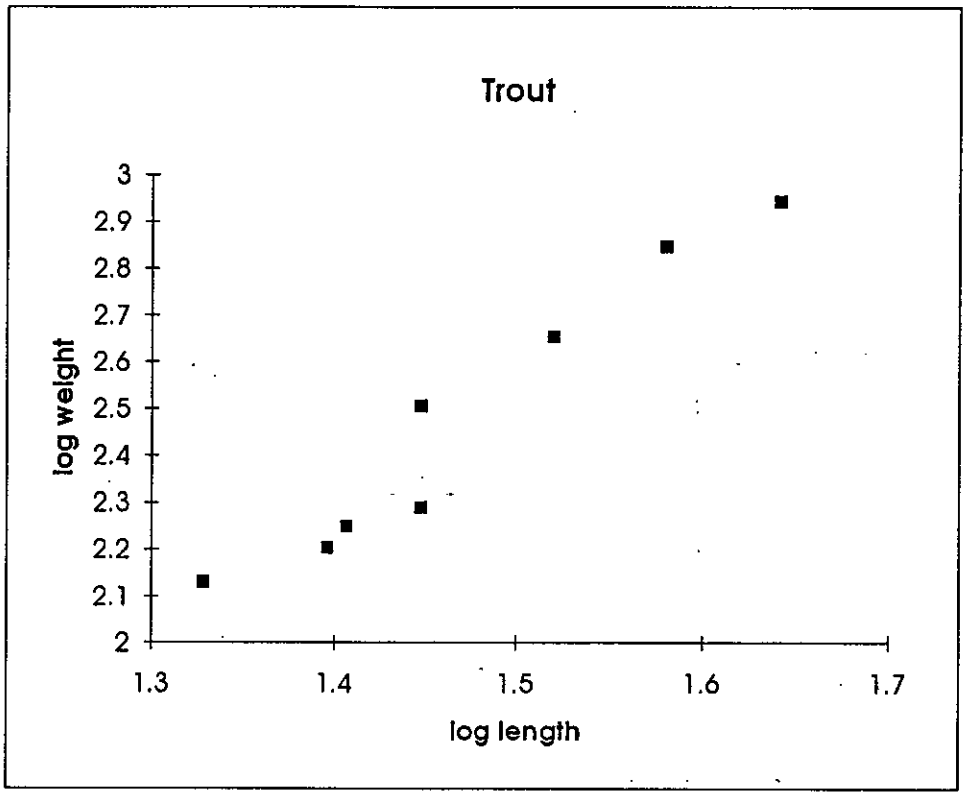
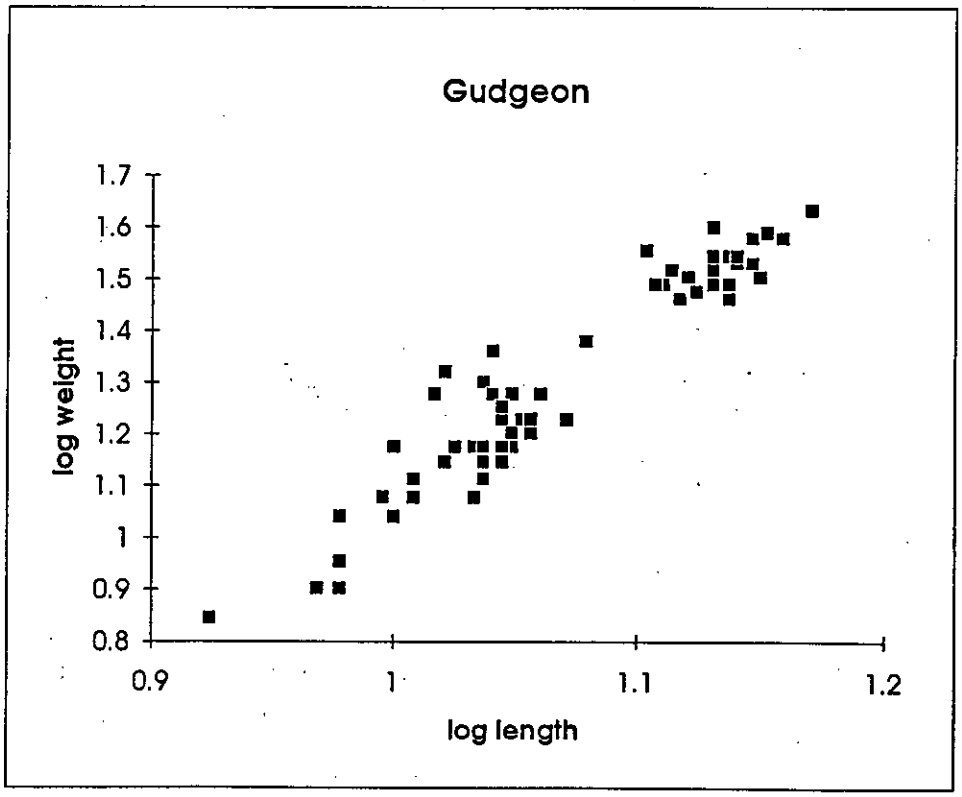
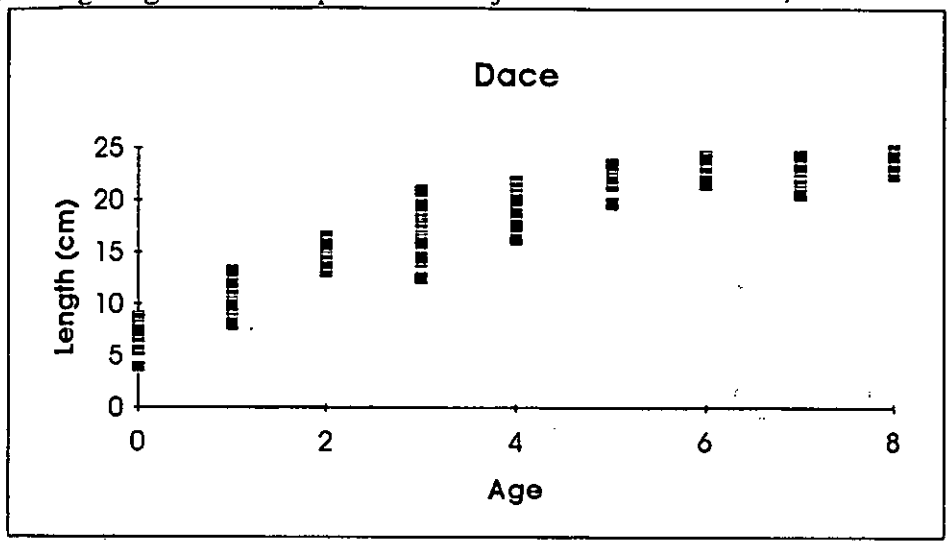
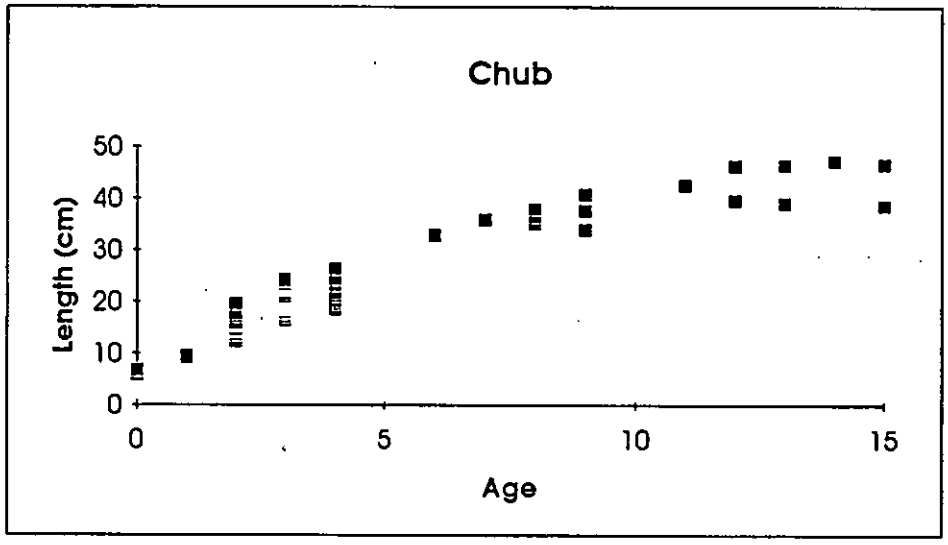
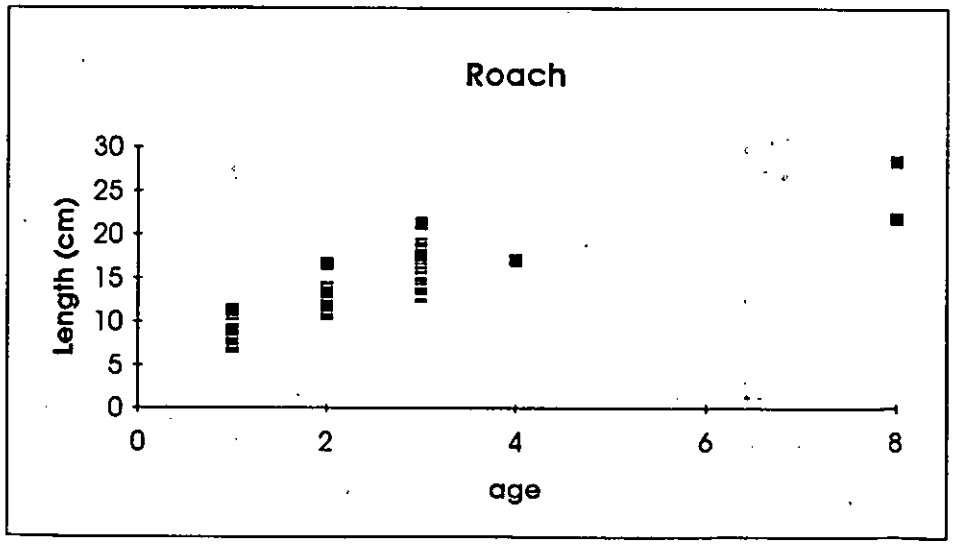




Appendix 3. Length age relationships for the major fish in the R. Tees, 1992.







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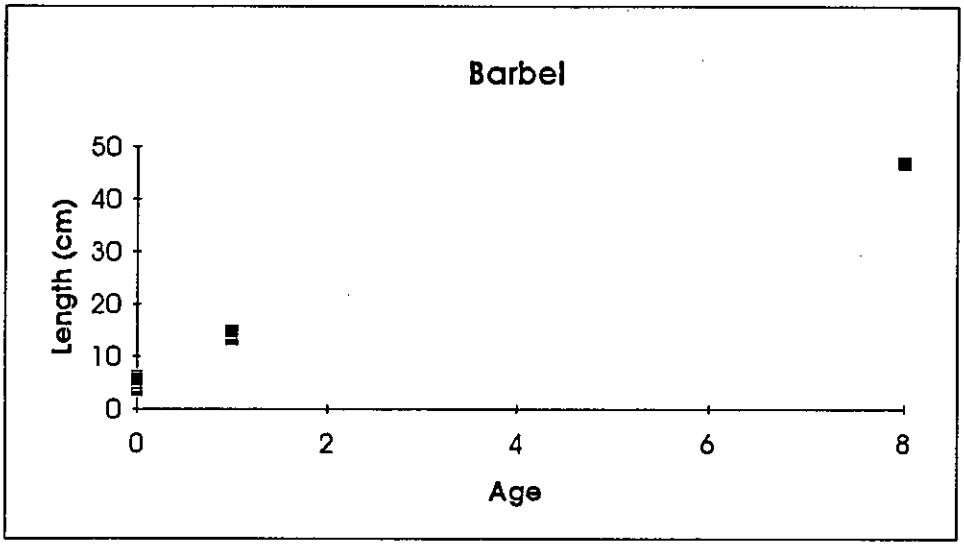

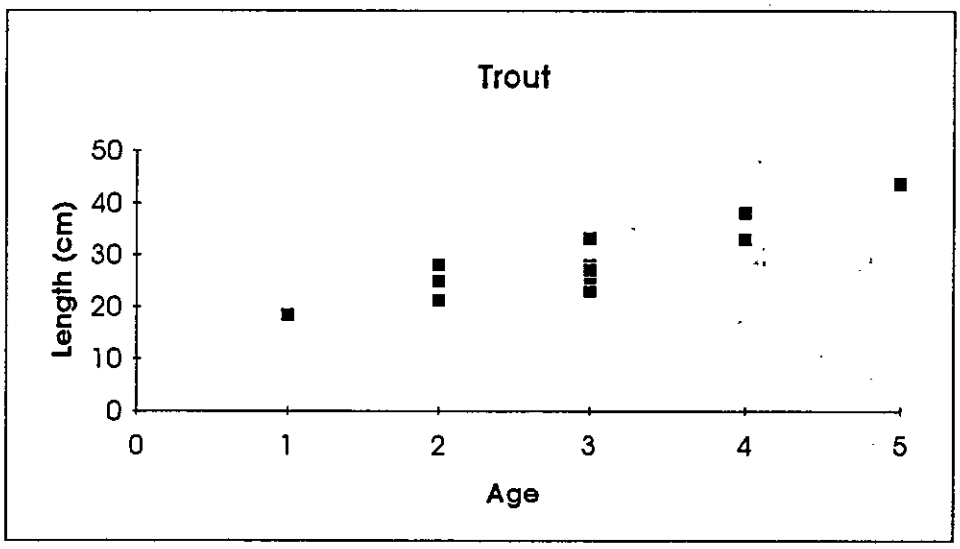

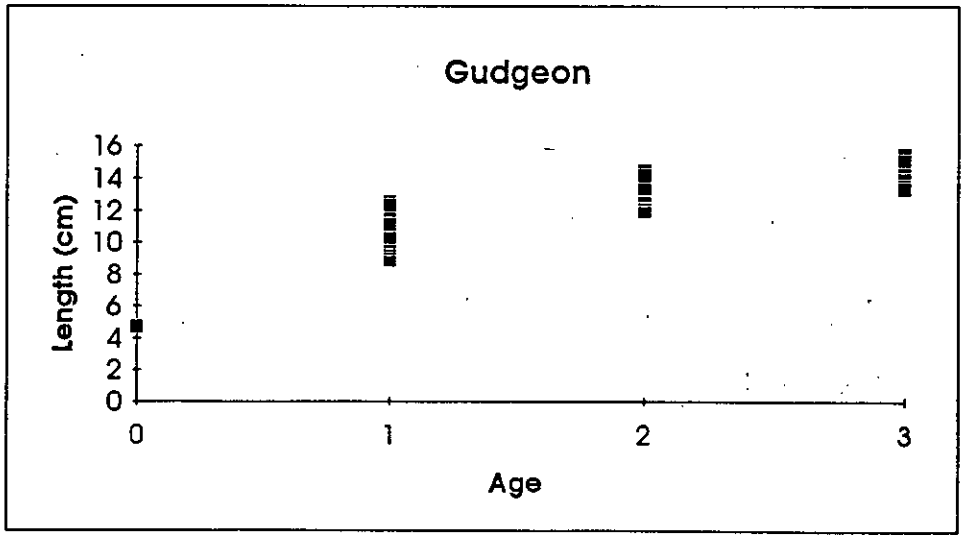


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