FISH POPULATIONS OF THE UPPER RIVER WEY & TRIBUTARIES

Mid-Thames Fisheries

February 1990

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1 SUMMARY

The Wey South, Wey North and combined River Wey from the confluence at Tilford downstream to Unstead was subject to a fisheries survey undertaken by Mid Thames Fisheries during the period from March 1986 to August 1988.

The survey comprises 18 sites on the main river as far downstream as Unstead (SU992453) and included 12 representative sites covering sections of the Cranleigh Waters, Tillingbourne, Hoe Stream and Ockham Mill Stream. Three sites on the unclassified Whitmoor Vale Stream tributary were also included.

Of the 27 EEC designated sites surveyed, only 4 reached their target biomass of 20gm^{-2} for a cyprinid fishery and 1 for a 15gm^{-2} salmonid fishery as set by Thames Water (see section 3.2). The length of each habitat unit complying with these targets is as follows:-

Habitat Code	Complied(km)	Total(km)
WSH	2	28
WNE	3	15.3
WNH	0	8
WEF	5	18
CGJ	0	6.4
CGF	3	11.8
TIA	0	11.9
SBJ	4	12.6

The main species found were dace, Leuciscus leuciscus, chub, Leuciscus cephalus, roach, Rutilus rutilus, gudgeon, Gobio gobio, perch, Perca fluviatilis, and pike, Esox lucius. Populations of wild brown trout, Salmo trutta, were also encountered on both branches of the Wey, Tillingbourne and Whitmoor Vale Stream. Minor species such as minnow, Phoxinus phoxinus, stone loach, Noemacheilus barbatulus, bullhead, Cottus gobio, and stickleback, Gasterosteus aculeatus, were recorded as being present at most sites.

2 INTRODUCTION

Although a considerable amount of information on fish stocks in the River Wey system has been gathered from a number of sources, this survey represents the first comprehensive study of this river system.

The Upper Wey South has proved to be an excellent salmon, Salmo salar, nursery site and also supports good numbers of small wild brown trout Salmo trutta as well as low numbers of escapee rainbow trout, Oncorhynchus mykiss. This section has been monitored by Central Fisheries Staff as part of the Salmon Rehabilitation Scheme and five of their sites have been included. Further downstream from Frensham Manor (SU836410) to Tilford the river is actively managed as a "put and take" trout fishery, from which coarse fish are regularly culled. The northern branch, although supporting good numbers of quality coarse fish, is also mainly preserved for trout fishing. The combined river down to Eashing (SU947438) is controlled by clubs and syndicates for both coarse and game angling. Trout are stocked by Frensham and Pepperharrow Fly Fishers and coarse fish by the Farnham A.S.

From Eashing downstream to the limit of this survey the Wey is managed as a coarse fishery and rights are controlled by the Godalming Angling Society. All of the main tributaries support coarse fisheries with the exception of the Tillingbourne which has several small trout fishing syndicates.

From Godalming downstream the river is navigable and the main river interweaves with the Wey Navigation. The lower and canalised sections will be covered in a separate survey.

2.1 Description of Watercourse

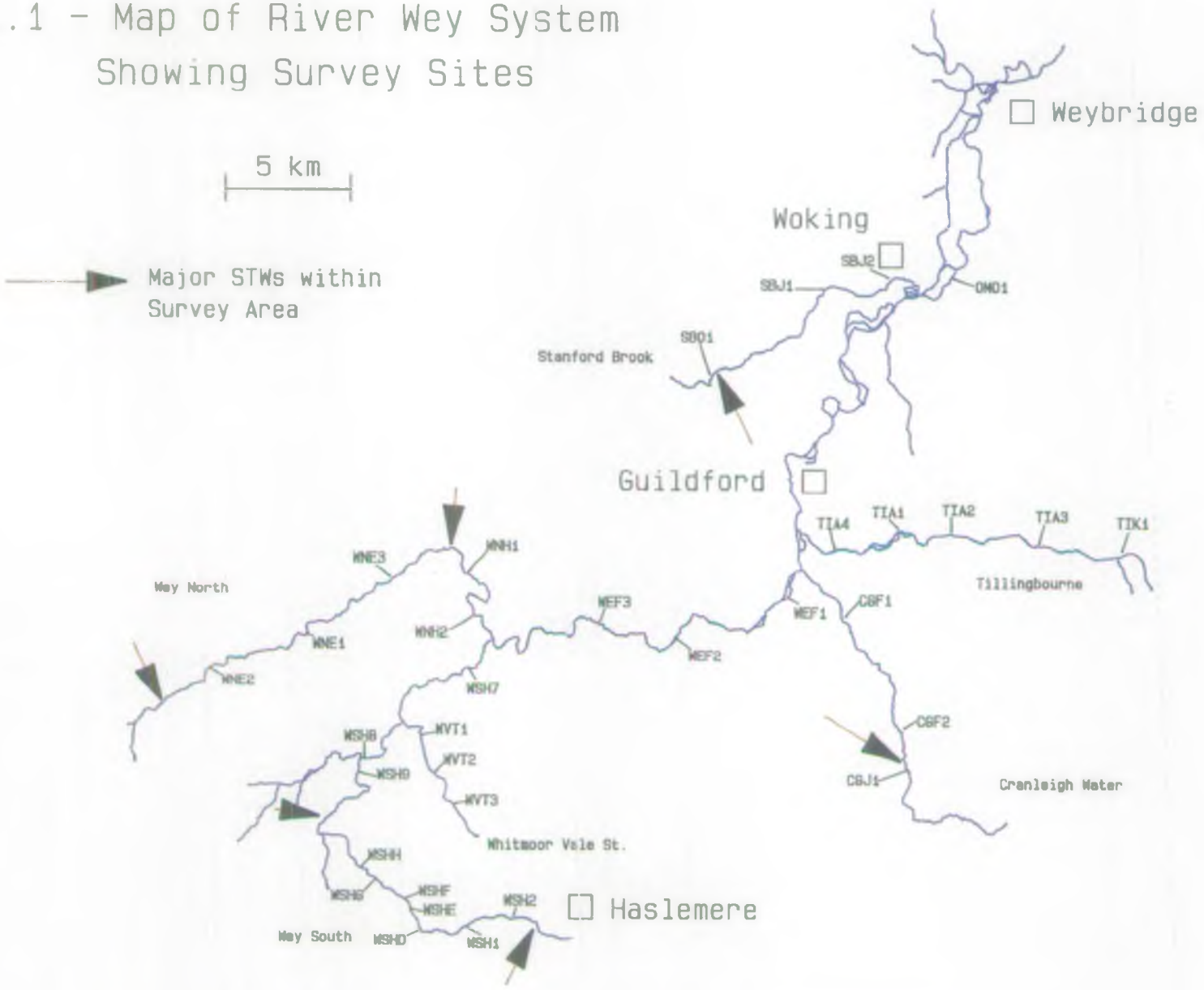
A map of the Wey system is shown in Fig.1.1 annotated with the reference ascribed to each site surveyed. The major discharge points are also indicated.

The upper reaches of the River Wey has two separate branches, the Wey North and Wey South.

The Wey North rises from the chalk aquifer near Alton (SU707394) and flows east through Farnham to the confluence at Tilford (SU873436), a distance of approximately 33km. Originating from springs in lower greensand near Haslemere (SU912295), the Wey South flows 37km initially west towards Liphook, before sweeping north to Tilford. The combined river meanders a further 65km in a north-easterly direction through the towns of Godalming, Guildford, Woking and Byfleet before entering the Thames at Weybridge (TQ074658), just below Shepperton weir.

The main tributaries are the Cranleigh Waters, Tillingbourne, Stanford Brook, also known as the Hoe Stream, Ockham Mill Stream, Whitmoor Vale Stream and Slea.

Fig 1.1 - Map of River Wey System
Showing Survey Sites



The Cranleigh Waters originates from a series of springs on the southern slops of the North Downs which then flow south before combining to swing in a north-westerly direction, entering the Wey at Peasmarsh. The Tillingbourne also rises from springs in the North Downs, initially flowing north through a series of ponds then west to join the Wey at Shalford. Rising from Brackelsham beds near Pirbright, the Stanford Brook meanders approximately 15km east to its confluence with the Wey near Woking. The unclassified Whitmoor Vale Stream flows down from its source near Hindhead to enter the river Wey at Frensham via the Great Pond. The Ockham Mill Stream comprises of four small streams converging just upstream of Ockham Mill and flowing on for approximately 1km to its confluence with the Wey south of Wisley. One tributary not included in this survey is the Slea which, despite its extensive catchment, is not a significant fishery.

2.2 Geology

The geology of the catchment is mainly lower greensand but the Wey North flows through seams of chalk, upper greensand and gault clay. The Cranleigh Waters flows predominantly through a Weald clay catchment, which, together with the large residential area of Cranleigh near its head waters, can make the stream prone to flash flooding.

2.3 Hydrology

The National River Authorities Hydrological Services section have provided water flow data for the Wey from their gauging station at Tilford (SU875433). The average daily mean discharge for the period 1982 to 1988 is presented in Fig.2.1. During this six year period the mean discharge varied between 2 and 9 cumecs.

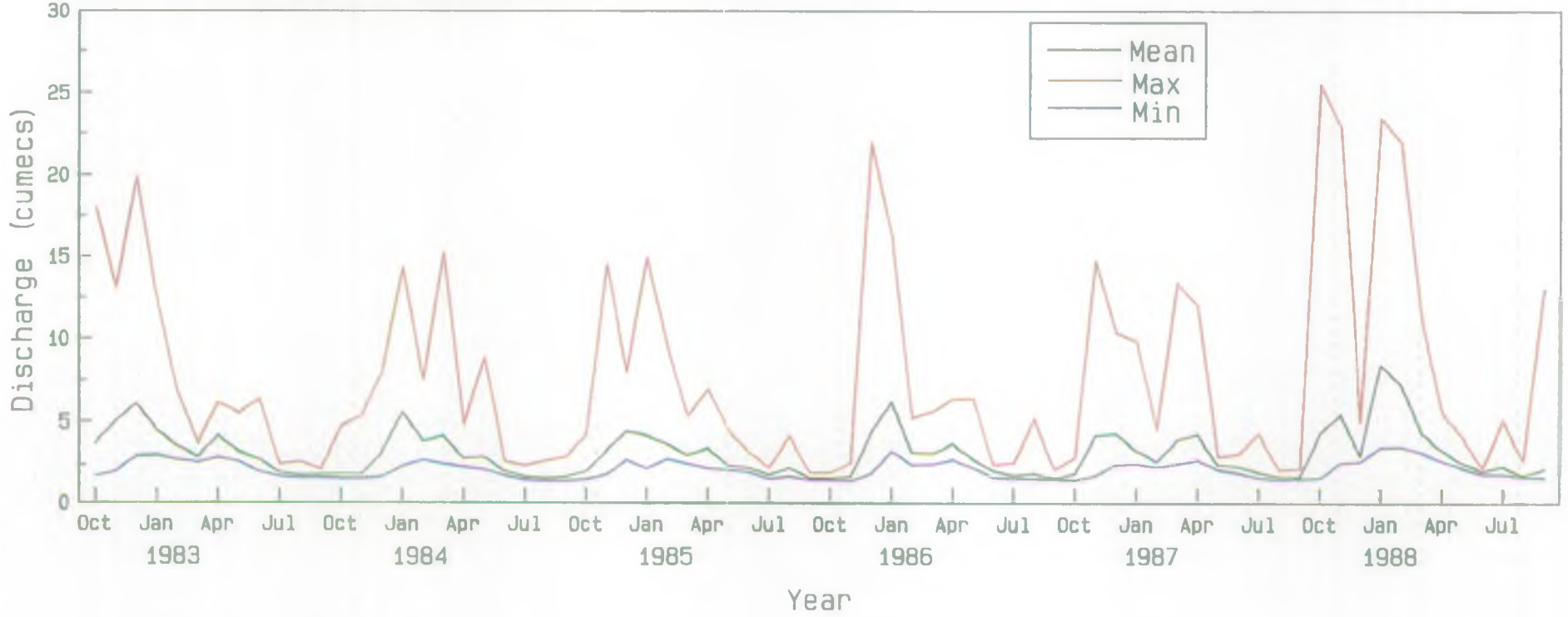
2.4 Main Discharges

The main sewage treatment works discharging into the Upper Wey catchment are at Haslemere (SU879325) and Bordon (SU803362) on the Wey South and Alton (SU729398) and Farnham (SU854477) on the northern branch. Two major works on the tributaries are at Hockford (SU960542), on the Stanford Brook and the Cranleigh works (TQ040394) on the Cranleigh Waters.

All of these Thames Water, South and West Division, works were meeting their current consent conditions with the exception of Farnham, which was failing in respect of ammonia and suspended solids.

There are four major trout farms that discharge into the Wey catchment. Hammer Trout Farm (SU858320) is located on the Wey South just below Haslemere. Silk Mill Trout Farm (SU918408) discharges into the Royal Brook, flowing through several ponds before entering the combined Wey at Pepperharrow. On the Tillingbourne tributary, Frog Island Trout Farm (TQ080479) is spring fed and discharges downstream of Gomshall while the Tillingbourne Trout Farm (TQ040480) is located just downstream of Albury.

Fig. 2.1 River Wey at Tilford
Average Daily Mean Discharge



2.5 Fish Mortalities

The only pollution incident in the last ten years resulting in a major fish mortality occurred in 1982 when approximately 250 litres of chlorine was spilt into the Wey South at Haslemere killing an estimated 1400 fish as far downstream as Radford Park in Liphook. Sporadic incidents involving farm waste have led to minor mortalities on the Cranleigh Waters.

2.6 Fisheries Management Work

Mid Thames Fisheries has stocked large numbers of grayling, Thymallus thymallus, culled from the Kennet system in an attempt to encourage this species. A small resident population has existed in the Tilford area since the 1930s but introductions further downstream, although popular with the angling clubs, supplied relatively short-term sport. Small brown trout have been stocked in the upper reaches of the Wey South following the 1982 chlorine pollution and also the Wey North at Alton and Farnham. Angling clubs and syndicates have also been responsible for stocking brown and rainbow trout on an annual "put and take" basis as far downstream as Eashing. Central Fisheries staff have used the upper Wey South extensively as a salmon nursery area and have collected several years survey data. These results revealed that a healthy population of wild brown trout exists, negating any requirement for future stocking.

Introductions of coarse fish have been undertaken mainly by angling clubs, particularly the Godalming Angling Society, who have stocked many thousands of mixed coarse fish below Eashing.

3 AIMS AND OBJECTIVES

3.1 Overall Aims of Surveys

The National Rivers Authority (**NRA**) has a statutory obligation to maintain, improve and develop inland fisheries. To assist in meeting this obligation, NRA Thames Region fisheries staff have engaged upon a 5 year rolling programme of riverine fish population surveys to establish baseline data for each major watercourse in the Thames catchment.

3.2 River Classification

River water quality is classified according to the National Water Council River Quality Objectives (RQO) 1978 (as amended by Thames Water Authority 1987).

Under the European Community Directive 78/659/EEC, river zones are designated as capable of supporting either salmonid or cyprinid fish.

Further details of the N.W.C. classification system and the E.C. Directive appear in Appendices I -III.

The NRA Thames Region have developed a site code classification system based upon the RQO and the EC Directive. A description of this appears in Appendix VII.

Fish biomass targets are applied within the NRA, Thames Region, with respect to EC designated fisheries, viz -

Cyprinid - $20gm^{-2}$
Salmonid - $15gm^{-2}$

The RQO and EC directives assigned to the Wey catchment are as follows (EEC designation in parentheses; C=cyprinid, S=salmonid):

Wey South : Source to Hammer Vale Bridge - 2b
: Hammer Vale Bridge to Tilford - 2a/1b(C)
Wey North : Source to Mill Court Bridge - 1b
: Mill Court to Farnham Park Trib. - 1b(S)
: Farnham Park Trib to Tilford - 2a/1b(C)
Wey : Tilford to Weybridge - 1b(C)

Cranleigh Waters : Water Bridge to Cranleigh STW - 2a(C)
: Cranleigh STW to Wey 1b(C)

Tillingbourne: Source to Sutton Brook - 1a
: Sutton Brook to Wey - 1a(S)

Stanford Brook : Source to Rickford Mill - 2b
: Rickford Mill to Wey - 2a(C)

Ockham Mill Stream : Source to Wey - 2b

Whitmoor Vale Stream : Unclassified

3.3 Specific Aims

The specific aim of this survey was to obtain baseline data on the fish populations of the middle and upper reaches of the Wey and its tributaries as part of the NRA's monitoring program.

4 METHODS

4.1 Site Selection

A total of 33 sites were selected and fished between March 1986 and August 1988. Sites were selected to represent local environmental conditions within the defined water quality zones, taking into account topography, known water quality impacts and access considerations.

4.2 Capture and Data Acquisition

At each site, a stretch of river of at least 100m in length was enclosed by stop-nets. Catch-depletion electrofishing techniques, using pulsed DC equipment developed in-house, were applied at each site. 3 runs were made at most of the sites, but only 2 at narrow sites when the depletion was particularly good. In addition, a qualitative assessment was made upstream and downstream of each site to assess whether the chosen site was representative of a longer stretch of river.

At each of the sites, all fish captured were enumerated by species and their fork length measured to the nearest mm. When catches were relatively low (<40 per species), all fish were also weighed to the nearest g. With larger catches, subsamples of up to 40 fish of each species were weighed. Samples of scales, taken from the shoulder region, were also removed and stored for later age estimation.

Minor species, such as bullhead Cottus gobio, stone loach Noemacheilus barbatulus, stickleback Gasterosteus aculeatus, and minnow Phoxinus phoxinus, were generally noted only as present or absent except on very small streams where large numbers were found and considered to be an important part of the biomass.

Details of the major physical characteristics of each site, such as weed and bankside cover, depth, temperature, conductivity and substrate type were also recorded. These details appear in the relevant site report (section 5.1 et seq.).

All data acquired in the field were entered into a Husky Hunter datalogger. This was later downloaded to an IBM compatible microcomputer for subsequent analysis.

4.3 Data Analysis

All data were processed on the microcomputer using the Fisheries Information (FINS) software developed by Thames NRA. Graphics were generated using Freelance plus v.3.0.

4.4 Health Examination

A sample of fish species from each site was retained and externally examined for parasites and symptoms of disease. It was considered unnecessary to submit specimens for more autopsy.

4.5 Macroinvertebrates

NRA Biology staff are engaged upon a biological monitoring programme of the main watercourses in the Thames region. Data on the macroinvertebrates from this source are presented in this report. The species composition of invertebrates tend to reflect the physico-chemical variations which occur in a river and this provides a means of assessing the aquatic environment on a continuous basis.

A system of quantifying this data has been developed based on the Biological Monitoring Working Party (BMWP) scoring system, which relates the scored result to the RQO.

4.6 Water Quality

River water quality data is collected at strategically located Reach Assessment Points by the NRA pollution control department, formerly the Regulation and Monitoring division of Thames Water. Listed below are the sampling points falling within the survey area.

Cranleigh Waters at Elmbridge, Cranleigh. TQ039391 PWER.0004
Cranleigh Waters at Run Common, Wonersh. TQ036419 PWER.0006
Ockham Mill Stream at Ockham. TQ056579 PWER.0014
Stanford Brook at Rickford Mill. SU965546 PWER.0016
Tillingbourne above Albury. TQ053479 PWER.0017
Tillingbourne above trout farm, Albury. TQ039480 PWER.0018
Tillingbourne at Shere. TQ073478 PWER.0050
Wey North at Moor Park Bridge. SU861466 PWER.0024
Wey North at Mill Court Bridge. SU756417 PWER.0023
Wey South at Hammer Vale Bridge. SU873326 PWER.0026
Wey South above Bordon STW. SU802361 PWER.0025
Wey South at Linford Bridge. SU809367 PWER.0027
Wey South at Radford Bridge. SU842323 PWER.0028
Wey above Godalming STW. SU993455 PWER.0029
Wey at Tilford gauging station. SU874434 PWER.0036
Wey at Somerset bridge. SU921439 PWER.0046

5 RESULTS

Results are presented in the following manner:

a. Site level - the physical parameters noted at each site together with a brief summary of the findings. The structure of the fish popluation in terms of biomass, density and length-frequency are presented graphically. The sites appear in geographical order working from the top of each component watercourse (see fig.1.1).

b. Survey level - a summary of biomass and length at each age for the principal species.

c. Parasitology.

d. Water quality.

e. Macroinvertebrates.

5.1 Site Results

The results for each site are described in the following pages.

5.1.1 Site WSH2 Hammer Crossing

NGR SU868325 Date Samp07/03/86

Length(m) 105 Width(m) 3.0 Area(sq.m) 315

Mean depth(m) 0.5 Temp 6.0 Conductivity 0000

SUBSTRATE(%)

Bare 0 Mud & Silt 90 Gravel 8 Stones 2

MACROPHYTES(%)

Emergent 0 Floating 0 Submerged 0

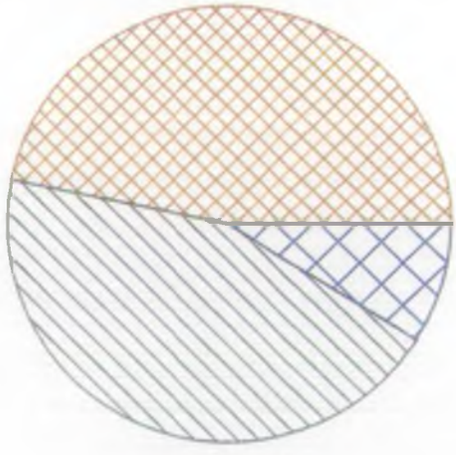
SHADE(%) 50

Hammer Bottom Crossing was the highest upstream section surveyed. The majority of the river bed was soft sand with very few aquatic plants present.

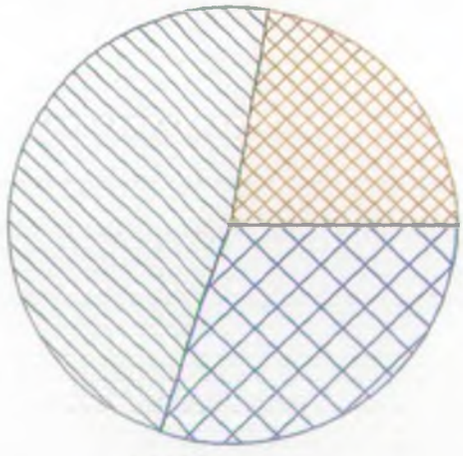
With very poor habitat, a surprisingly high biomass of 14.0gm^{-2} was recorded, comprising again of escapee rainbows and a small number of large non-indigenous brown trout. Some stretches a short distance upstream with more suitable habitat, but not so representative as a whole, are known to hold small wild brown trout.

FIG 5.1a: SITE WSH2 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
Brown trout	6.5	0.025
Rainbow trout	6.2	0.053
Salmon	1.2	0.034
TOTAL	14.0	0.112

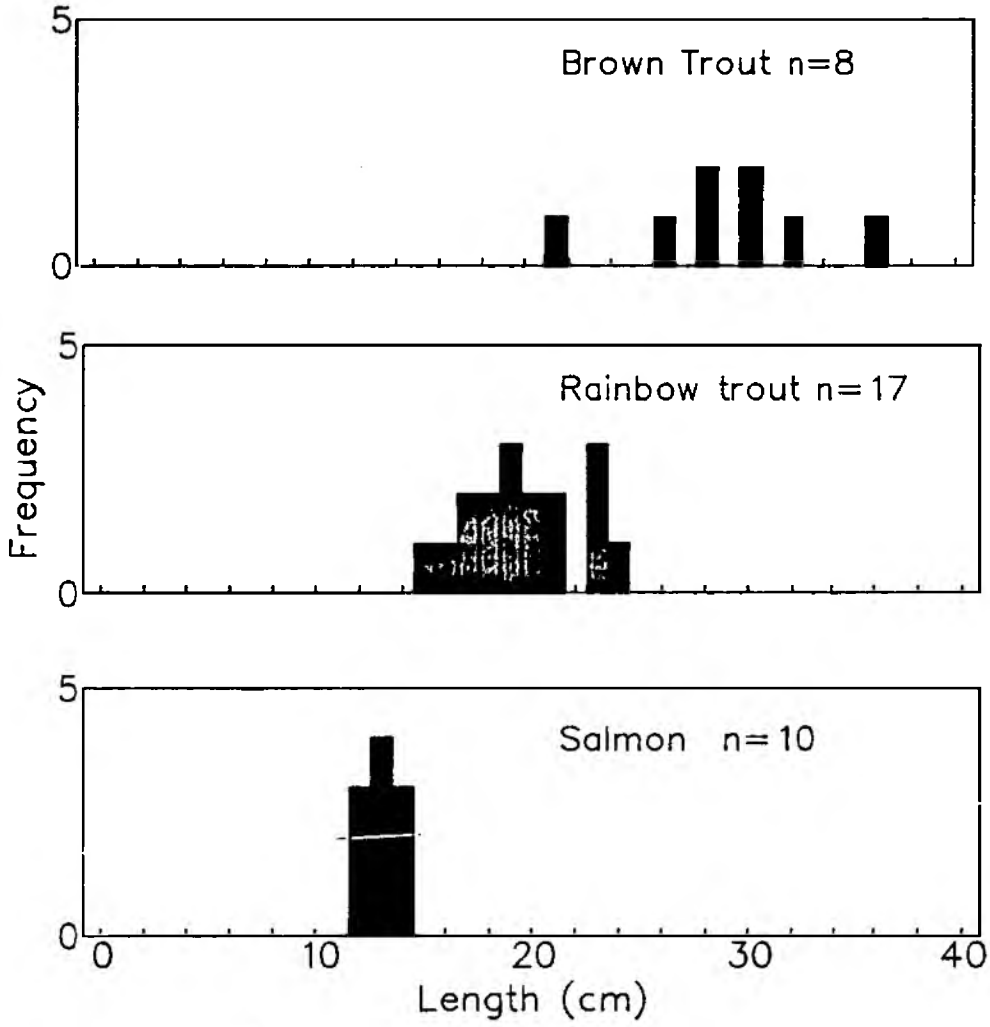


Biomass



Density

Fig 5.1b: Site WSH2 – Length Frequency By Species



5.1.2 Site WSH1 Hammer Trout Farm

NGR SU863323 Date Samp04/03/86

Length(m) 150 Width(m) 3.7 Area(sq.m) 555

Mean depth(m) 0.6 Temp 2.0 Conductivity 0000

SUBSTRATE(%)

Bare 0 Mud & Silt 65 Gravel 35 Stones 0

MACROPHYTES(%)

Emergent 5 Floating 0 Submerged 0

SHADE(%) 70

This section was immediately downstream of a small weir, adjacent to Hammer trout farm. The site is in a regular salmon stocking area with no fishery interest.

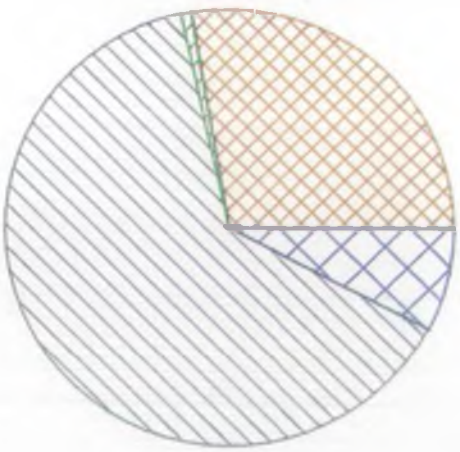
The substrate was mostly soft sand with some exposed gravel just below the weir. Macrophytes were scarce, but some Ranunculus was present on the gravely shallows. Catch efficiency was impaired by poor visibility after heavy overnight rainfall.

The total biomass of 27.5gm^{-2} was dominated by rainbow trout which have escaped from the trout farm. Despite the presence of rainbows, reasonable numbers of native browns and introduced salmon were found.

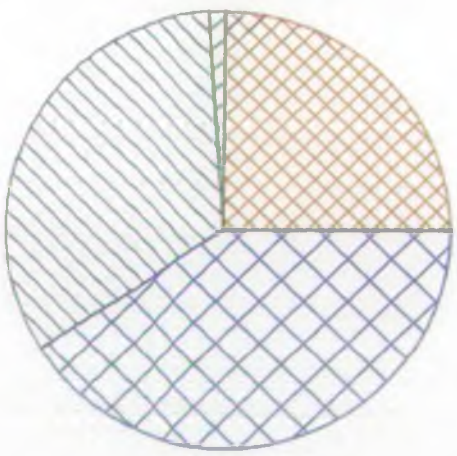
The river here, including site WSH2, suffered a major fish mortality in 1982 following a chlorine spillage in Haslemere.

FIG 5.2a: SITE WSH1 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
Brown trout	7.6	0.042
Roach	0.2	0.002
Rainbow trout	17.6	0.056
Salmon	2.1	0.069
TOTAL	27.5	0.169

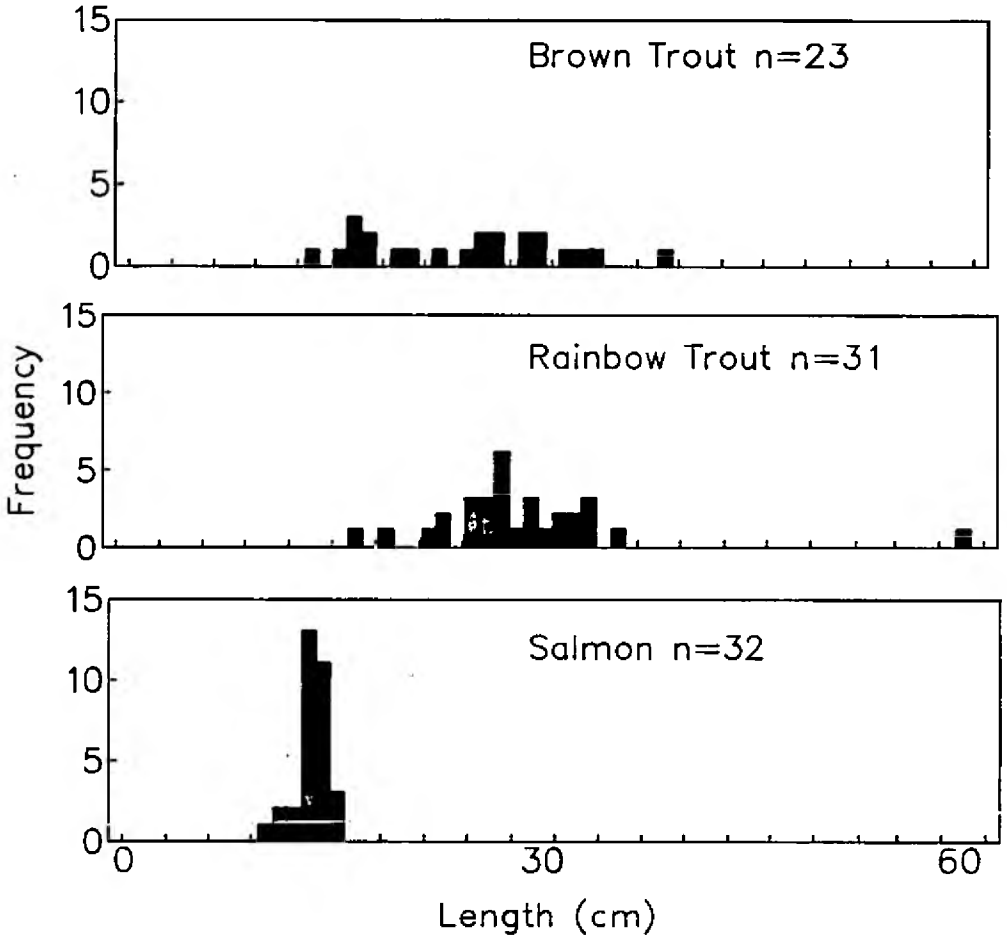


Biomass



Density

Fig 5.2b: Site WSH1 – Length Frequency by species



5.1.3 Site WSHD A3 Roadbridge, Liphook

NGR SU842322 Date Samp05/12/86

Length(m) 100 Width(m) 5.0 Area(sq.m) 500

Mean depth(m) 0.5 Temp 9.0 Conductivity 0000

SUBSTRATE(%)

Bare 0 Mud & Silt 0 Gravel 0 Stones 0

MACROPHYTES(%)

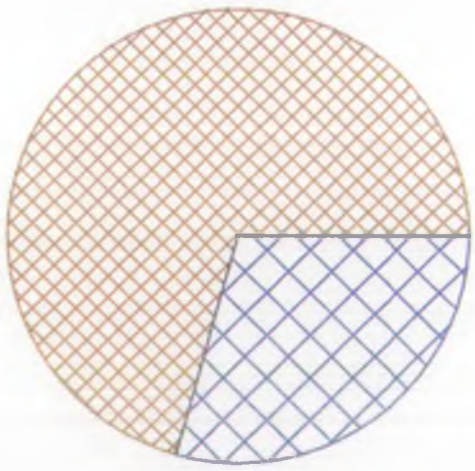
Emergent 0 Floating 0 Submerged 0

SHADE(%) 0

1986 Salmon data. Upstream of the A3 road bridge at Liphook. The habitat on all five salmon sites was similar, with a substrate of coarse gravel riffles and sandy glides. Macrophytes were limited to occasional beds of Ranunculus and Callitriche. The total biomass of 9.2gm^{-2}, included 6.4gm^{-2} of small, wild brown trout. This was not as high as the other salmon sites further downstream but was still quite respectable.

FIG 5.3a: Site WSHD – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
BROWN TROUT	6.4	0.130
SALMON	2.6	0.090
TOTAL	9.0	0.220



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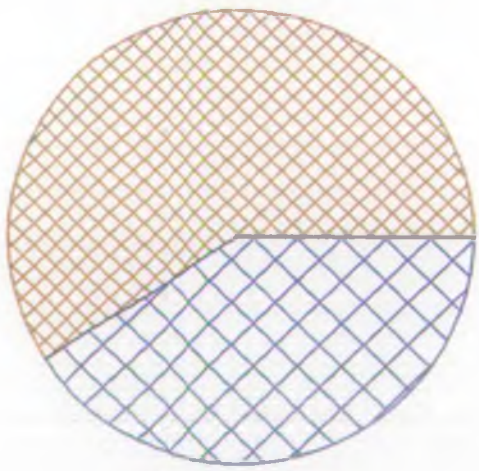
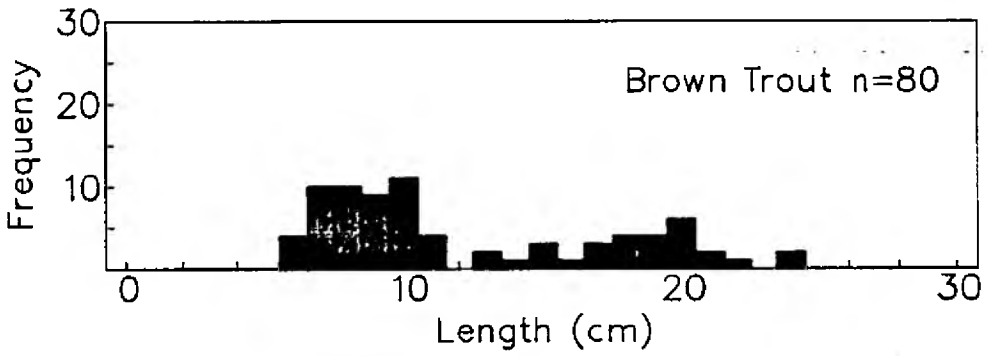
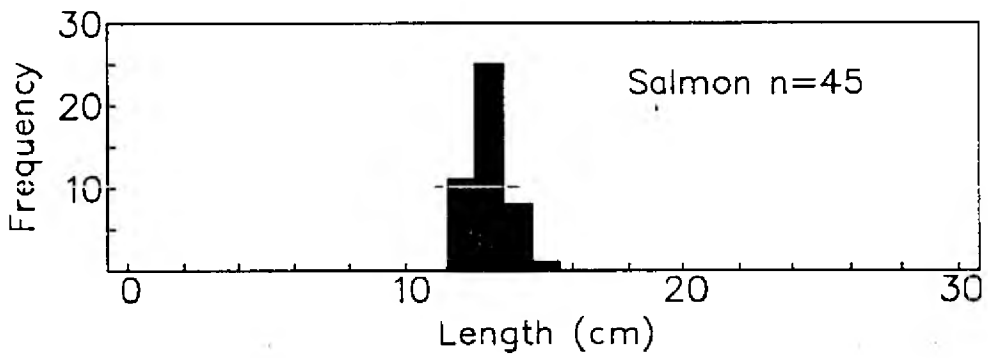


Density

Fig 5.3b: Site WSHD-Length Frequency By Species





5.1.4 Site WSHE Heronwater

NGR SU839328 Date Samp05/12/86

Length(m) 100 Width(m) 5.0 Area(sq.m) 500

Mean depth(m) 0.5 Temp 9.0 Conductivity 0000

SUBSTRATE(%)

Bare 0 Mud & Silt 10 Gravel 90 Stones 0

MACROPHYTES(%)

Emergent 5 Floating 0 Submerged 0

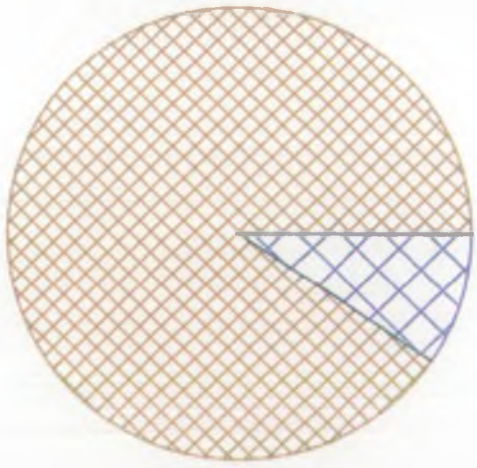
SHADE(%) 25

1986 Salmon Data. This site was 1km below the A3 road bridge at Heronwater. The physical characteristics of the river here were very similar to WSHD but afforded slightly more shade.

The total biomass of 14.4 gm^{-2} although still not up to the target (20 gm^{-2}) for a class 2/1B coarse fishery, supported a good head of small wild brown trout and stocked salmon parr.

FIG 5.4a: Site WSHE – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
BROWN TROUT	6.4	0.130
SALMON	2.6	0.090
TOTAL	9.0	0.220



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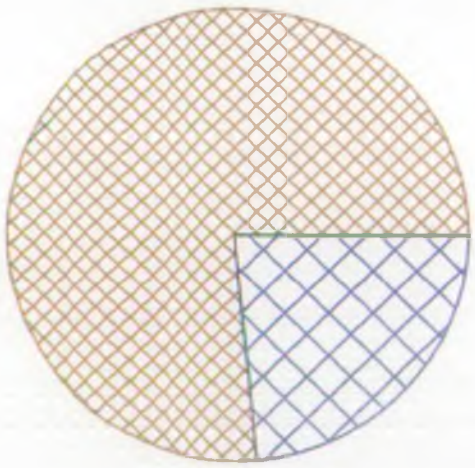
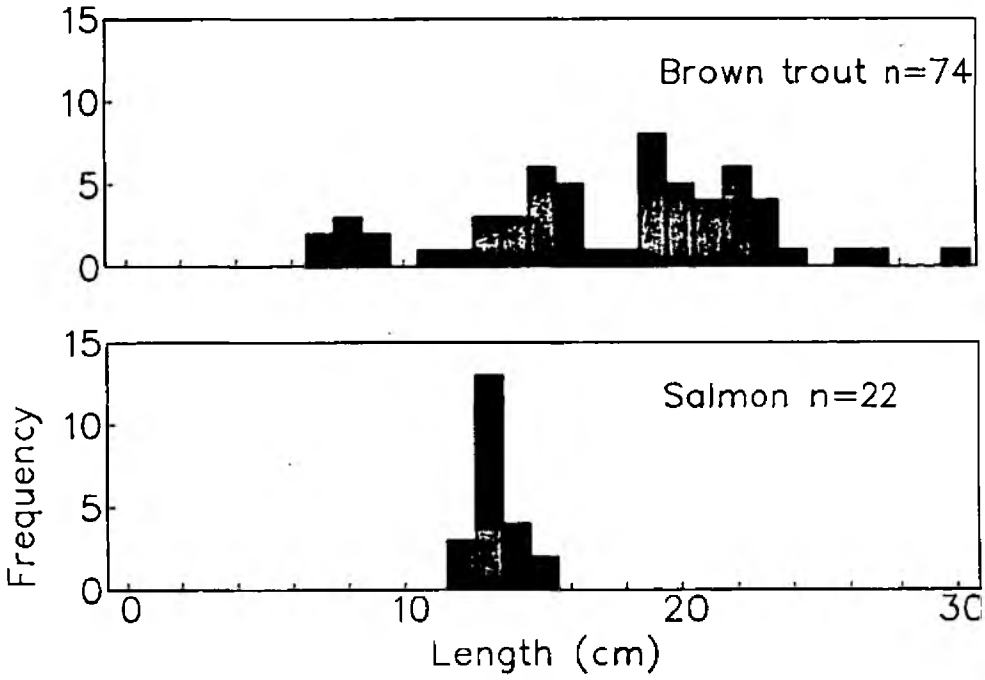


Density

Fig 5.4b: Site WSHE Length Frequency By Species



5.1.5 Site WSHF Bramshott

NGR SU837333 Date Samp23/10/86

Length(m) 100 Width(m) 5.7 Area(sq.m) 570

Mean depth(m) 0.5 Temp 9.0 Conductivity 0071

SUBSTRATE(%)

Bare 0 Mud & Silt 65 Gravel 33 Stones 2

MACROPHYTES(%)

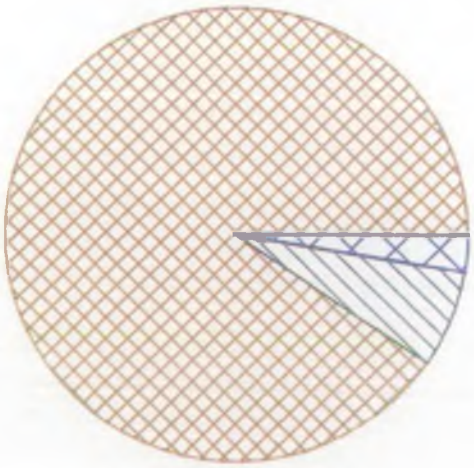
Emergent 15 Floating 0 Submerged 0

SHADE(%) 45

1986 Salmon data. This site at Bramshott revealed a preponderance of small trout, giving a total biomass of 18.7gm^{-2}.

FIG 5.5a: Site WSHF – Biomass and Density

	Biomass (gm-2)	Density (nm-2)
BROWN TROUT	16.6	0.302
RAINBOW TROUT	1.3	0.005
SALMON	0.5	0.016
TOTAL	18.4	0.323



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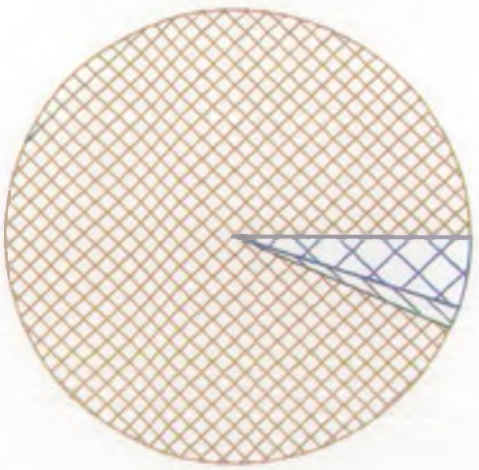
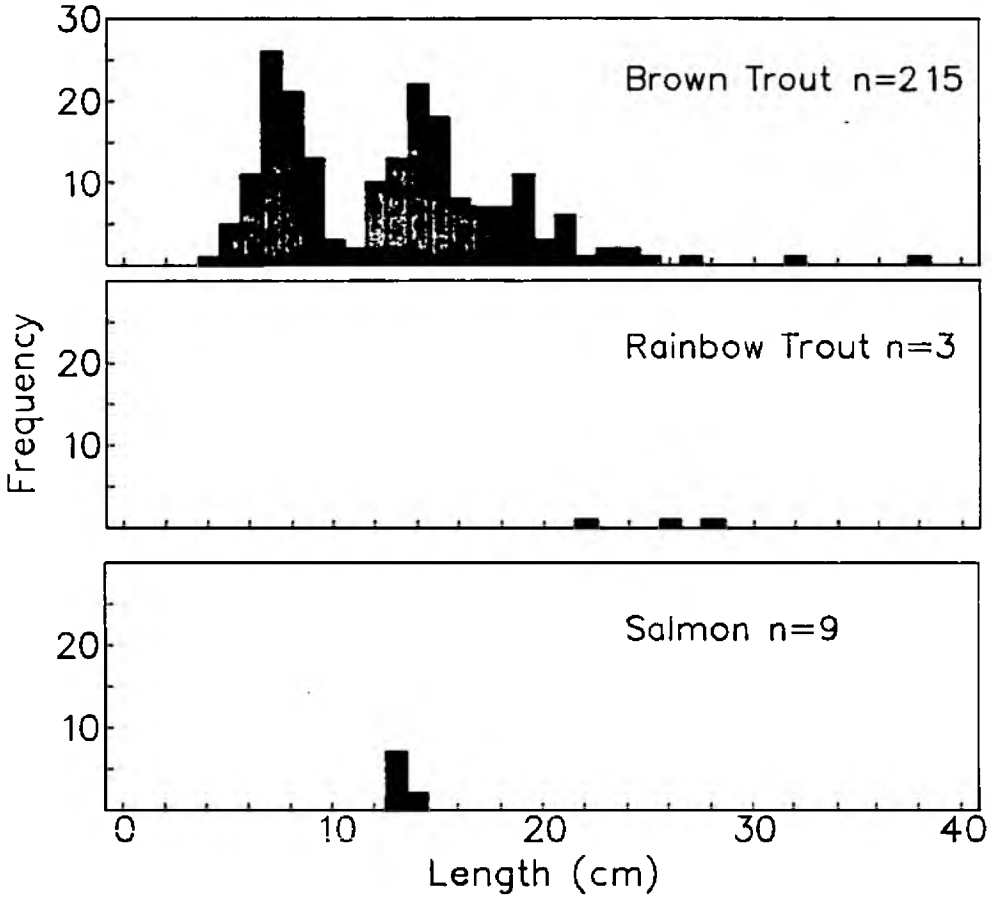


Density

Fig 5.5b: Site WSHF_Length Frequency By Species



5.1.6 Site WSHG Upper Hatch Farm

NGR SU817346 Date Samp21/10/86

Length(m) 100 Width(m) 5.7 Area(sq.m) 570

Mean depth(m) 2.0 Temp 10.0 Conductivity 0079

SUBSTRATE(%)

Bare 0 Mud & Silt 5 Gravel 55 Stones 40

MACROPHYTES(%)

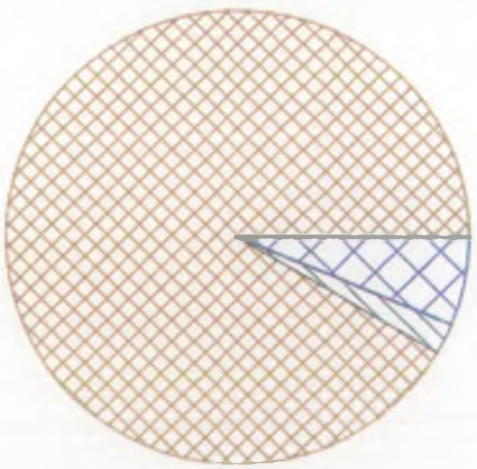
Emergent 5 Floating 0 Submerged 0

SHADE(%) 95

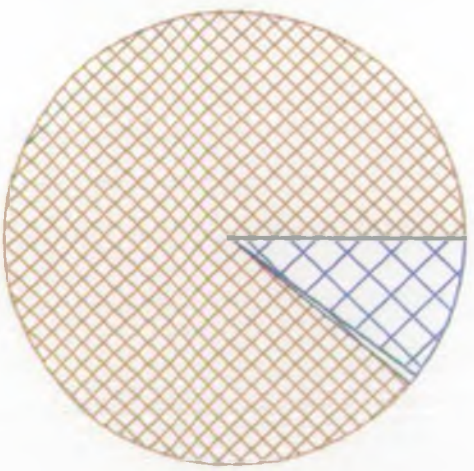
1986 salmon data. This site was the upper of two at Hatch Farm near Passfield. A heavily shaded stretch with long gravel and stone riffles. The excellent biomass of 19.1gm $^{-2}$ was just below target with a total density of 0.3 nm $^{-2}$.

FIG 5.6a: Site WSHG – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
BROWN TROUT	17.5	0.258
RAINBOW TROUT	0.4	0.002
SALMON	1.2	0.030
TOTAL	19.1	0.299

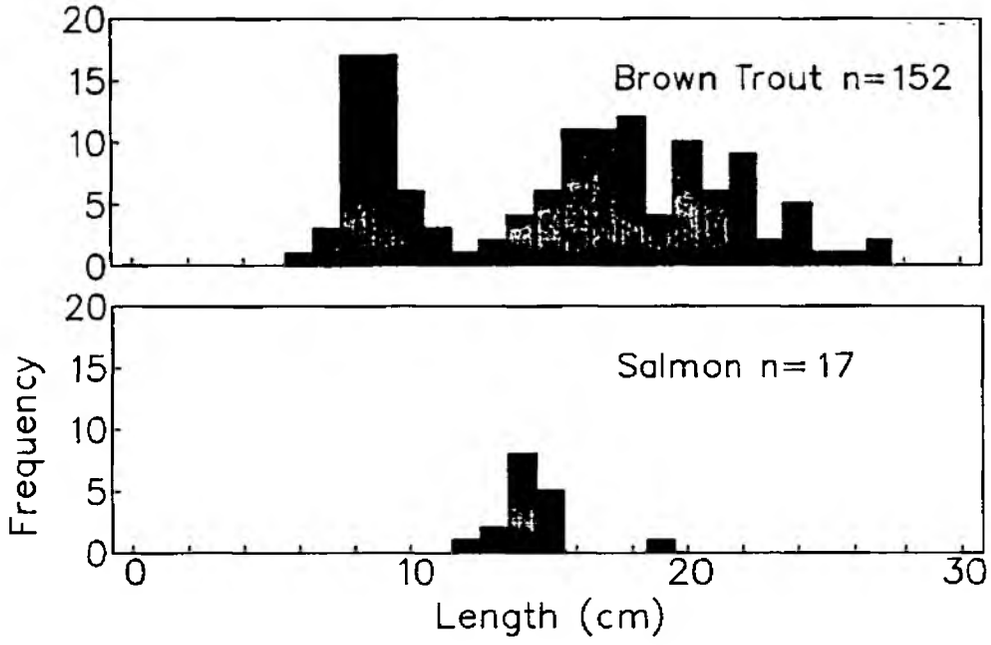


Biomass



Density

Fig 5.6b: Site WSHG Length Frequency By Species



5.1.7 Site WSHH Lower Hatch Farm

NGR SU815349 Date Samp21/10/86

Length(m) 100 Width(m) 6.0 Area(sq.m) 600

Mean depth(m) 0.5 Temp 10.0 Conductivity 0079

SUBSTRATE(%)

Bare 0 Mud & Silt 99 Gravel 0 Stones 0

MACROPHYTES(%)

Emergent 3 Floating 0 Submerged 0

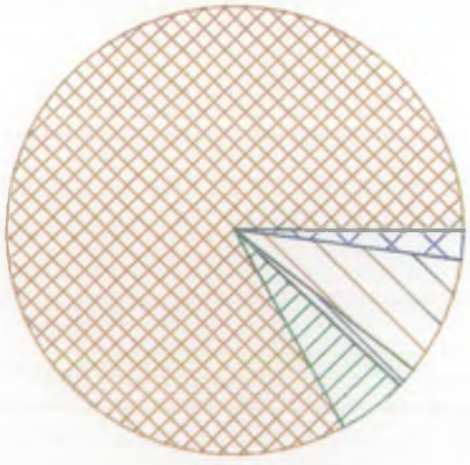
SHADE(%) 75

1986 salmon data. This site, also at Hatch Farm but further downstream, differs from WSHG in that the gradient of the river is less and consequently the substrate has far more sand and silt. The lack of suitable spawning areas is reflected in the recorded biomass of 13.1gm^{-2}.

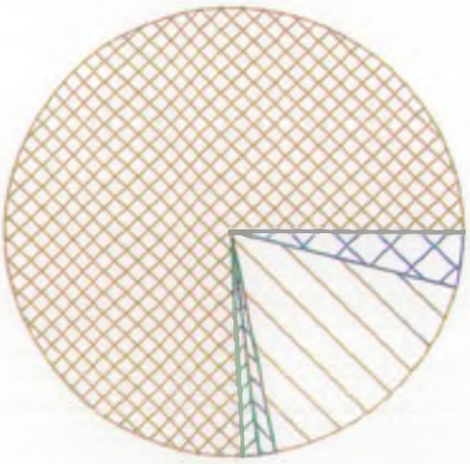
This stretch appears to be near the upstream limit for coarse fish habitation, with numbers of gudgeon Gobio gobio (19) and a single roach Rutilus rutilus recorded present.

FIG 5.7a: Site WSHH – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
BROWN TROUT	10.9	0.135
ROACH	0.6	0.002
RAINBOW TROUT	0.2	0.002
GUDGEON	1.1	0.032
SALMON	0.0	0.007
TOTAL	13.1	0.180

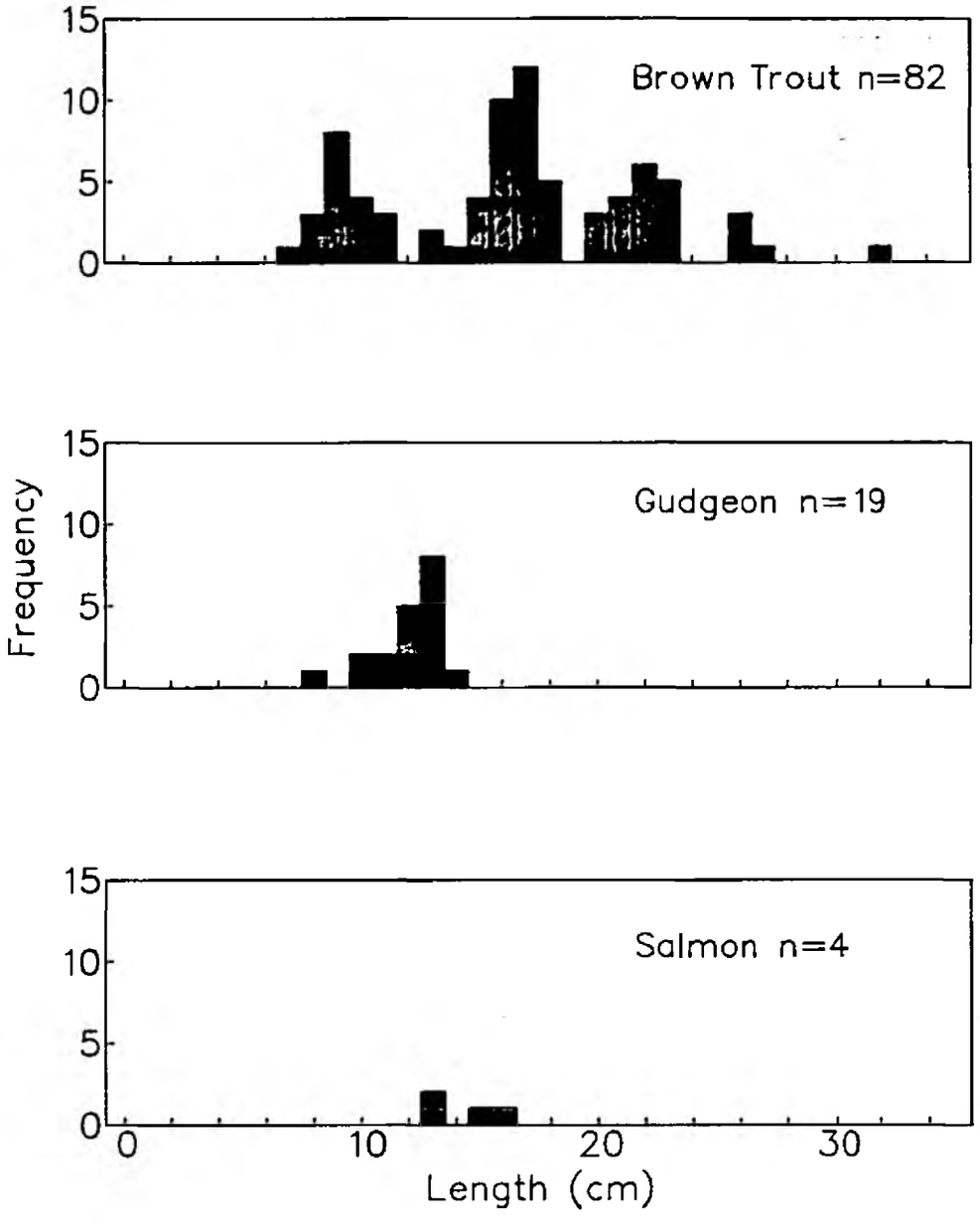


Biomass



Density

Fig 5.7b: site WSHH Length Frequency By Species



5.1.8 Site WSH9 Mellow Farm, u/s Slea

NGR SU818386 Date Samp24/04/87

Length(m) 120 Width(m) 5.0 Area(sq.m) 600

Mean depth(m) 0.7 Temp 12.0 Conductivity 0340

SUBSTRATE(%)

Bare 10 Mud & Silt 50 Gravel 40 Stones 0

MACROPHYTES(%)

Emergent 5 Floating 0 Submerged 5

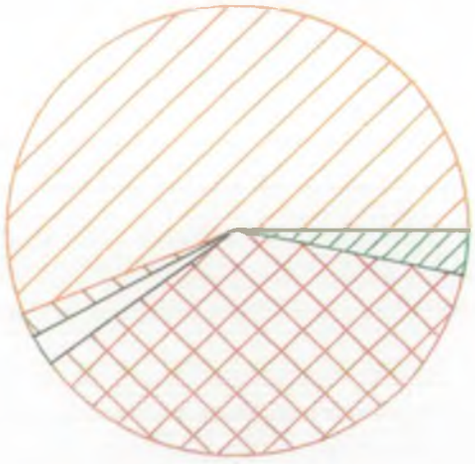
SHADE(%) 20

Upstream of the Slea confluence at Mellow Farm, this site was in contrast to WSH8 with pools interspersed with shallow gravel riffles and reasonable cover.

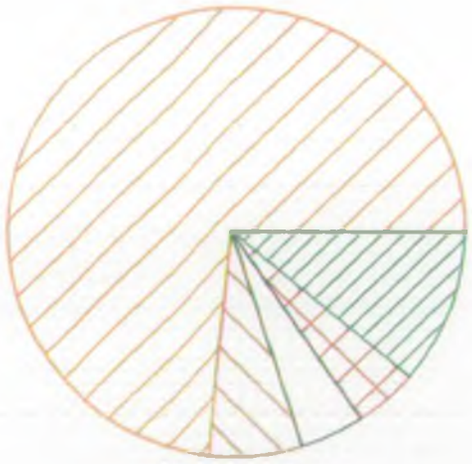
Despite the much improved habitat over the downstream site the results were disappointing with a recorded biomass of 5.5gm^{-2}, of which a single 1.2kg pike Esox lucius made up 37% of the total.

FIG 5.8a: SITE WSH9 – Biomass and Density

	Biomass (gm-2)	Density (nm-2)
DACE	3.1	0.033
GUDGEON	0.1	0.003
PERCH	0.1	0.002
PIKE	2.0	0.002
ROACH	0.2	0.005
TOTAL	5.5	0.045

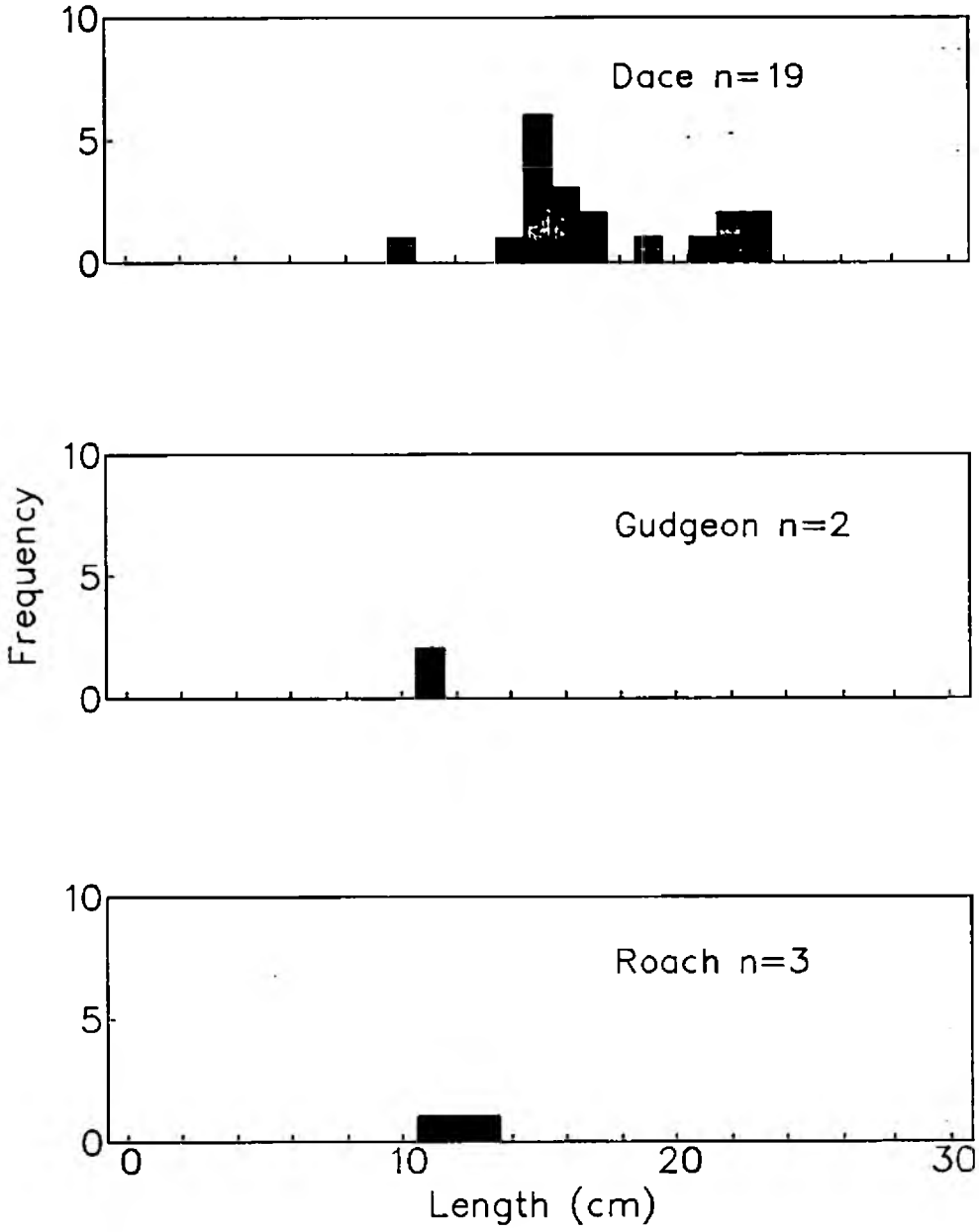


Biomass



Density

Fig 5.8b: Site WSH9 Length Frequency By Species



5.1.9 Site WSH8 Mellow Farm, d/s Slea

NGR SU824388 Date Samp24/04/87

Length(m) 150 Width(m) 8.0 Area(sq.m) 1200

Mean depth(m) 1.2 Temp 12.0 Conductivity 0340

SUBSTRATE(%)

Bare 20 Mud & Silt 80 Gravel 0 Stones 0

MACROPHYTES(%)

Emergent 2 Floating 0 Submerged 0

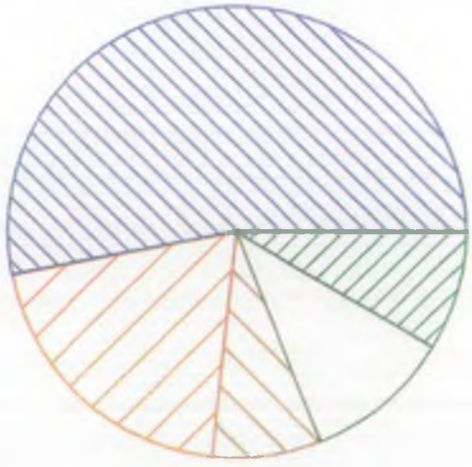
SHADE(%) 5

This site at Mellow Farm, was just downstream of the River Slea confluence. A comparatively deep and featureless stretch, the substrate was mainly sand with little weed or bankside cover.

The poor habitat may well have contributed to the biomass result of 2.5gm^{-2}, however, all the major species were found with the exception of trout and pike. Bullhead, stone loach and minnow were recorded as being present.

FIG 5.9a: Site WSH8 – Biomass and Density

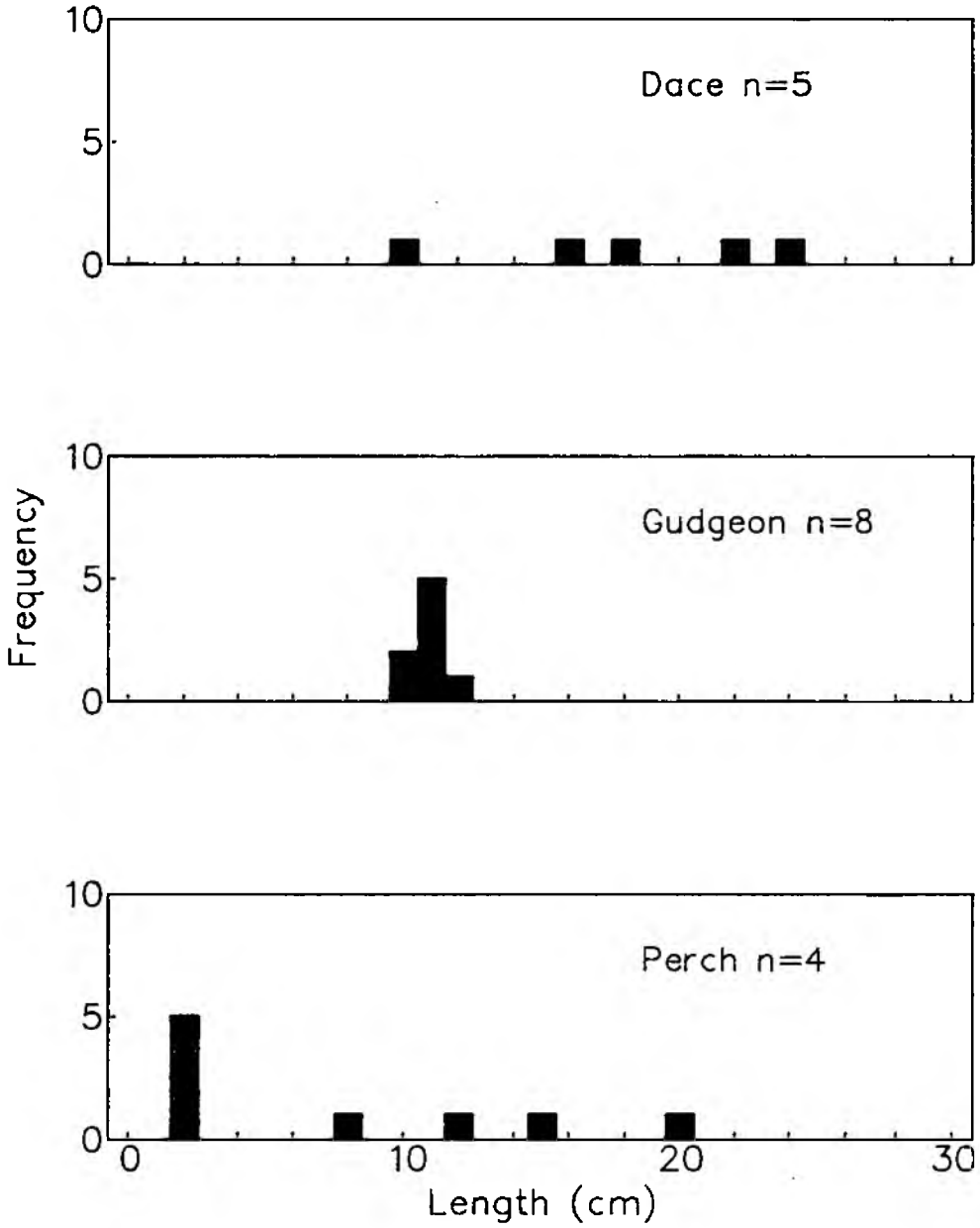
	Biomass (gm−2)	Density (nm−2)
CHUB	1.3	0.001
DACE	0.5	0.004
GUDGEON	0.2	0.007
PERCH	0.3	0.003
ROACH	0.2	0.001
TOTAL	2.5	0.016



Biomass

Density

Fig 5.9b: Site WSH8 Length Frequency By Species



5.1.10 Site WSH7 Home Farm

NGR SU859421 Date Samp18/02/87

Length(m) 140 Width(m) 9.0 Area(sq.m) 1260

Mean depth(m) 0.8 Temp 4.0 Conductivity 0303

SUBSTRATE(%)

Bare 0 Mud & Silt 65 Gravel 35 Stones 0

MACROPHYTES(%)

Emergent 10 Floating 0 Submerged 0

SHADE(%) 50

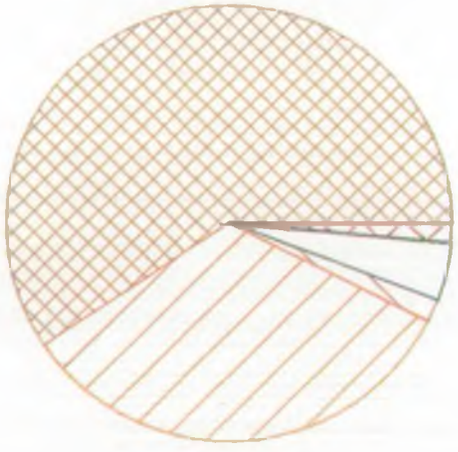
Downstream of Home Farm on the Wey South, this section is controlled by the Frensham Fly Fishers. The river here is actively managed as a trout fishery and coarse fish are regularly removed.

The substrate was mainly soft sand (typical of the lower reaches of the south arm) with some gravel on the shallow ford at the top end. There were very few macrophytes apart from some Callitriche on the shallows.

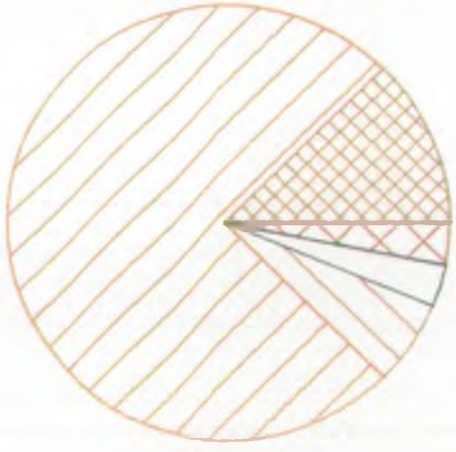
The poor biomass of $3.3gm^{-2}$ is probably representative of the stretch from Tilford down to Frensham, where the river bed is particularly unstable and provides precious little suitable habitat for successful recruitment. During the spring and summer months, higher biomasses could be expected as a result of the club's trout stocking programme.

FIG 5.10a: Site WSH7 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
Brown trout	1.9	0.004
Dace	1.1	0.024
Gudgeon	0.1	0.002
Perch	0.1	0.001
Pike	0.0	0.001
TOTAL	3.3	0.032

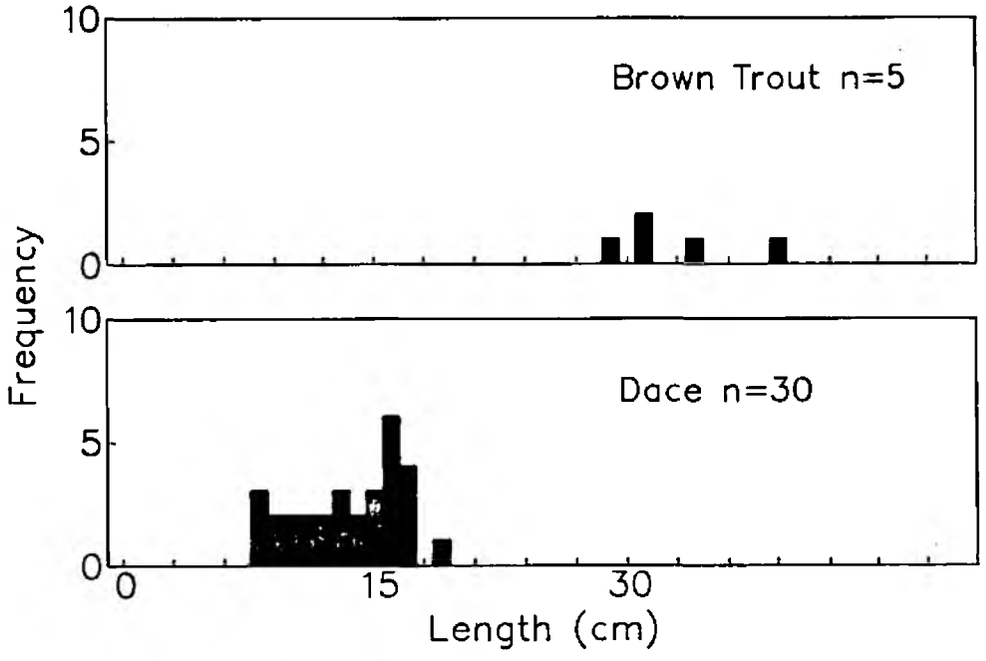


Biomass



Density

Fig 10b: Site WSH7 Length Frequency By Species



5.1.11 Site WNE2 Mill Court

NGR SU756418 Date Samp27/10/86

Length(m) 146 Width(m) 7.0 Area(sq.m) 1022

Mean depth(m) 0.3 Temp 10.0 Conductivity 0760

SUBSTRATE(%)

Bare 0 Mud & Silt 40 Gravel 60 Stones 0

MACROPHYTES(%)

Emergent 25 Floating 0 Submerged 20

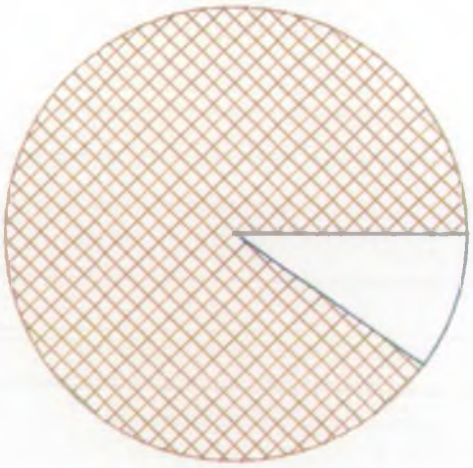
SHADE(%) 50

This section at Mill Court was the highest upstream site surveyed on the Wey North. Bordered by two small weirs, the site consisted of several pools with gravel shallows between them. Beds of Ranunculus were present in the less shaded areas.

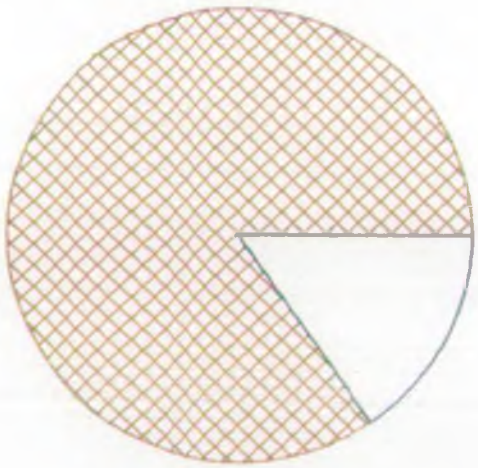
The biomass of 11.3gm^{-2} was made up by a comparatively small number of large brown trout (up to 2kg) plus two common carp Cyprinus carpio, presumably escapees from an upstream pond. There were large numbers of stone loach, bullhead and minnow present.

FIG 5.11a: Site WNE2 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
BROWN TROUT	10.2	0.011
COMMON CARP	1.1	0.002
TOTAL	11.3	0.013

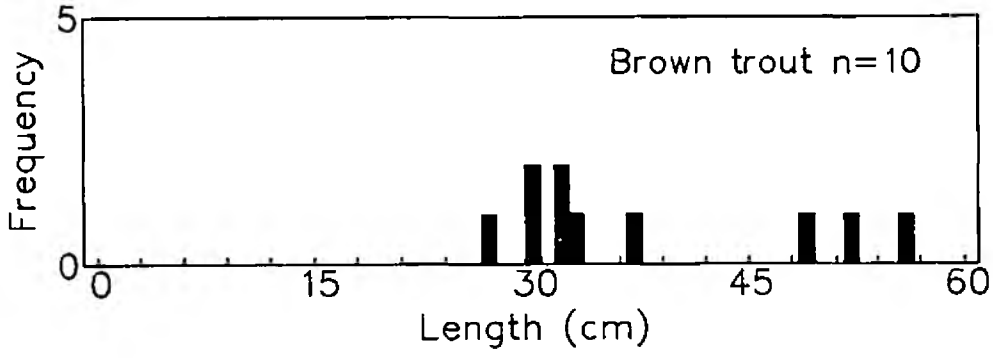


Biomass



Density

Fig 5.11b: Site WNE2 Length-Frequency By Species



5.1.12 Site WNE1 Iron Bridge

NGR SU798439 Date Samp08/10/86

Length(m) 180 Width(m) 6.8 Area(sq.m) 1224

Mean depth(m) 0.7 Temp 13.0 Conductivity 0740

SUBSTRATE(%)

Bare 0 Mud & Silt 50 Gravel 50 Stones 0

MACROPHYTES(%)

Emergent 15 Floating 0 Submerged 30

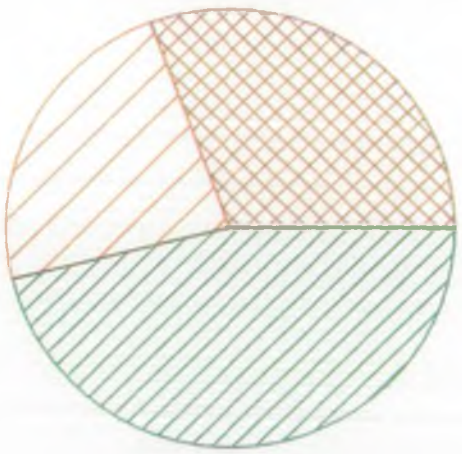
SHADE(%) 0

This site, on the northern arm of the river, was 50m downstream of the Iron Bridge on the Bentley Fly Fishers' water. The river here runs through an open meadow and the farmer had recently cleared all bankside cover. The substrate was mainly composed of gravel, with substantial beds of Ranunculus on the shallows and Sparganium around the margins of the pools. Some filamentous algae was present during this period of low flow.

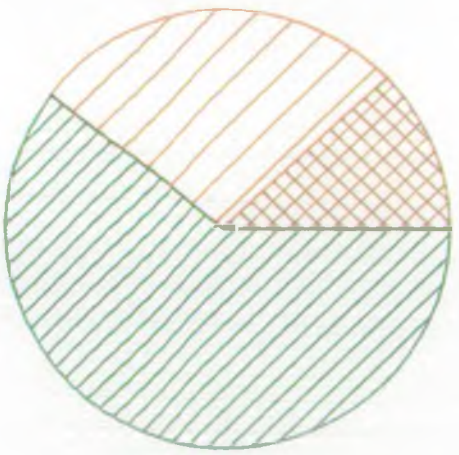
The biomass of $12.7gm^{-2}$ was made up by a comparatively small number of large individual specimens giving a density of $0.058nm^{-2}$. The brown trout in particular were quite large, as were the dace Leuciscus leuciscus. The phenomenon of large individuals with a low density appears to be fairly typical for the northern arm. Fishery management work undertaken on other stretches has revealed numbers of specimen roach to 1kg and chub Leuciscus cephalus to over 2kg.

FIG 5.12a: Site WNE1 – Biomass and Density

	Biomass (gm-2)	Density (nm-2)
Brown trout	3.9	0.007
Dace	2.9	0.016
Roach	5.9	0.035
TOTAL	12.7	0.058

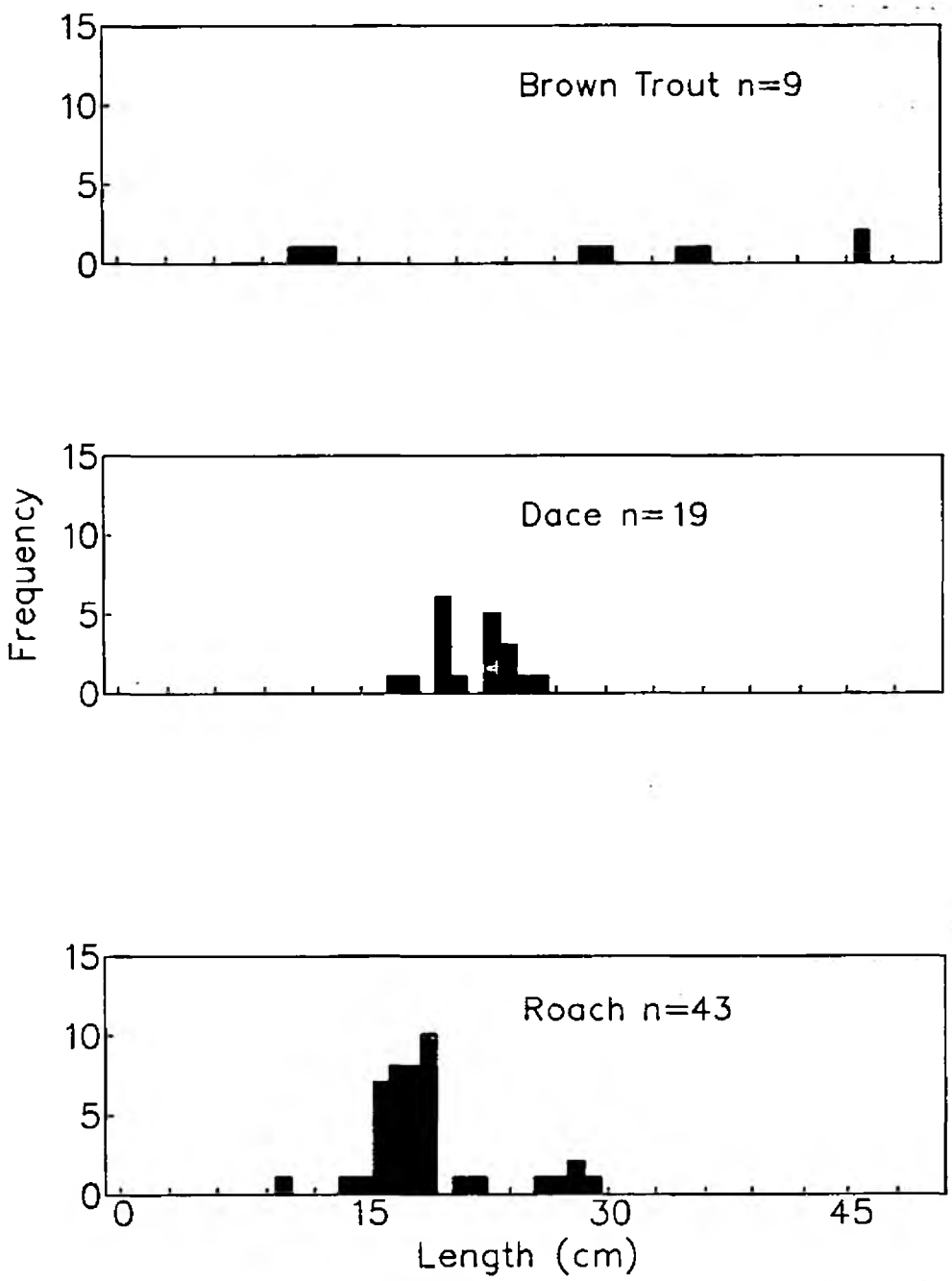


Biomass



Density

Fig 5.12b: Site WNE1 Length Frequency by Species



5.1.13 Site WNE3 Coxheath Bridge

NGR SU827458 Date Samp14/04/87

Length(m) 109 Width(m) 6.5 Area(sq.m) 709

Mean depth(m) 0.7 Temp 9.0 Conductivity 0595

SUBSTRATE(%)

Bare 30 Mud & Silt 10 Gravel 60 Stones 0

MACROPHYTES(%)

Emergent 5 Floating 0 Submerged 0

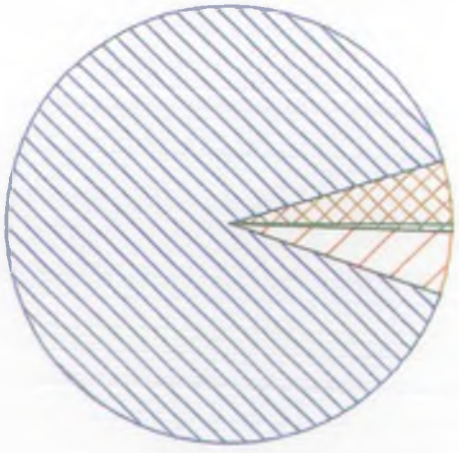
SHADE(%) 2

This section of the river at Coxheath bridge proved to be the most productive on the Wey North. The substrate was predominantly gravel, the flow was swift due to the constricted channel.

The total biomass of 36.8gm^{-2} was dominated by chub in weight and number.

FIG 5.13a: Site WNE3 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
Brown trout	1.7	0.010
Chub	33.1	0.045
Dace	1.7	0.008
Roach	0.2	0.001
TOTAL	36.8	0.064



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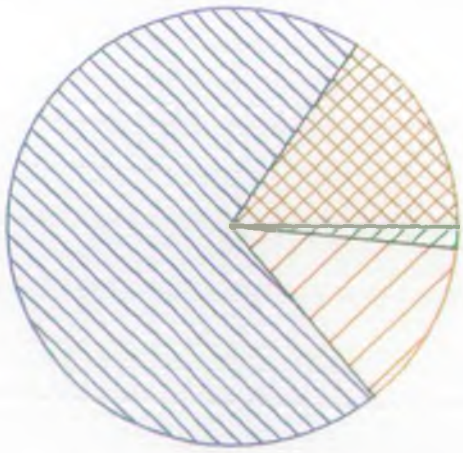
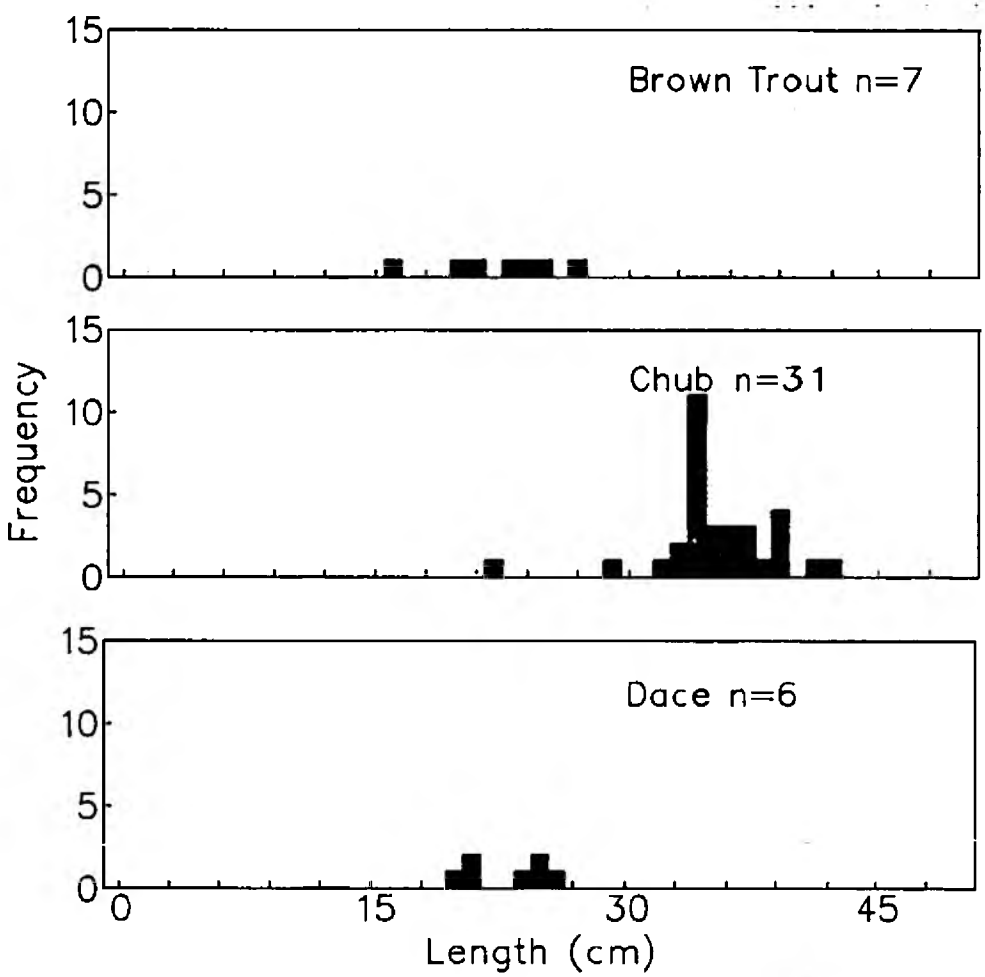


Density

Fig 5.13b: Site WNE3 Length Frequency By Species



5.1.14 Site WNH1 Moor Park Bridge

NGR SU861467 Date Samp17/09/86

Length(m) 106 Width(m) 8.3 Area(sq.m) 880

Mean depth(m) 1.2 Temp 10.0 Conductivity 0000

SUBSTRATE(%)

Bare 40 Mud & Silt 60 Gravel 0 Stones 0

MACROPHYTES(%)

Emergent 30 Floating 20 Submerged 30

SHADE(%) 5

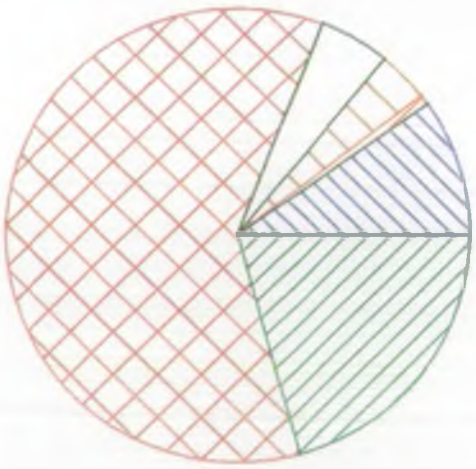
This site, 100m upstream of Moor Park bridge was, at the time of the survey, leased to the Haslemere Angling Society. It has subsequently been dredged.

The section surveyed was devoid of bankside vegetation. However, large beds of Sparganium provided plenty of cover.

Over 50% of the total biomass of 19.4gm^{-2} was pike, however, there were reasonable numbers of roach and gudgeon present. The notable lack of dace was a surprise as reports from the angling club suggested that large numbers might be caught.

FIG 5.14a: Site WNH1 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
Chub	1.9	0.008
Dace	0.1	0.005
Gudgeon	0.7	0.034
Perch	1.0	0.001
Pike	11.7	0.007
Roach	4.0	0.034
TOTAL	19.4	0.089



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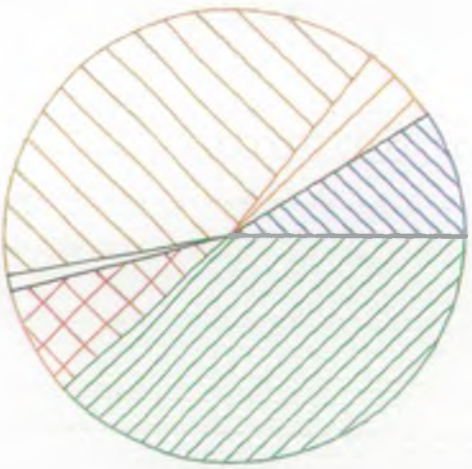
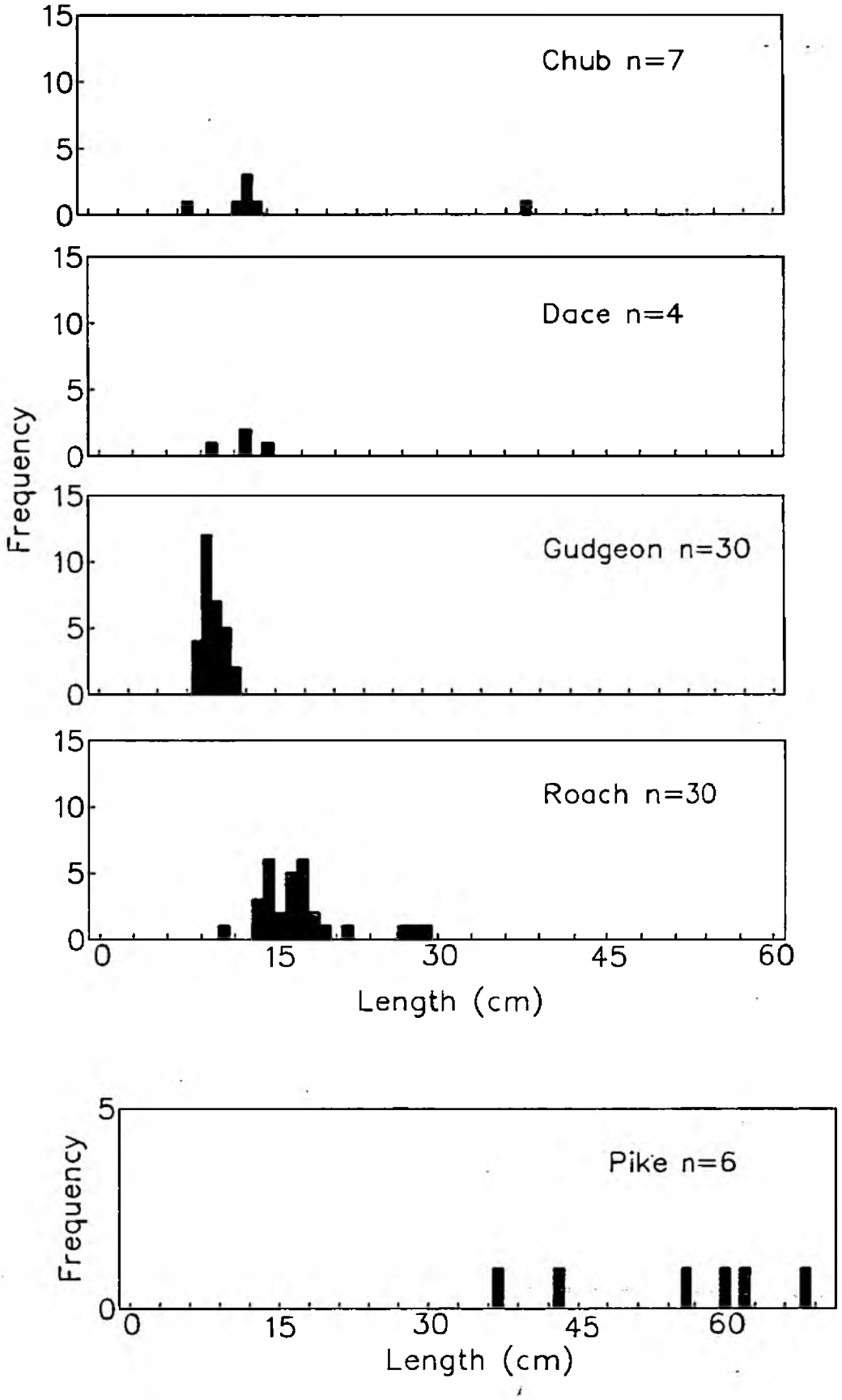


Density

Fig. 5.14b: Site WNH1 Length Frequency By Species



5.1.15 Site WNH2 Sheephatch Bridge

NGR SU869443 Date Samp18/02/87

Length(m) 98 Width(m) 8.0 Area(sq.m) 784

Mean depth(m) 0.8 Temp 4.0 Conductivity 0648

SUBSTRATE(%)

Bare 0 Mud & Silt 20 Gravel 80 Stones 0

MACROPHYTES(%)

Emergent 20 Floating 0 Submerged 0

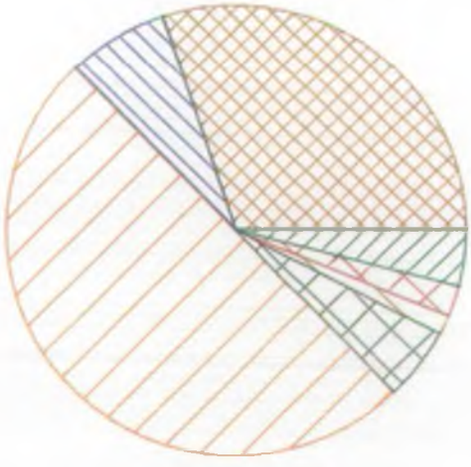
SHADE(%) 70

Just downstream of Sheephatch bridge, this was the furthest downstream site on the northern arm. The river here is also leased to the Frensham Fly Fishers and coarse fish are regularly culled and trout stocked.

This section here has a comparatively steep gradient, consequently the river is shallow and fast flowing with long riffles over gravel. Although the biomass was low (6.5gm $^{-2}$) most species typical of the Wey were represented. The presence of reasonable numbers of wild brown trout and dace was encouraging.

FIG 5.15a: Site WNH2 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
BROWNTROUT	1.9	0.013
CHUB	0.4	0.005
DACE	3.1	0.073
GRAYLING	0.3	0.003
GUDGEON	0.1	0.003
PIKE	0.1	0.001
ROACH	0.3	0.004
TOTAL	6.3	0.102



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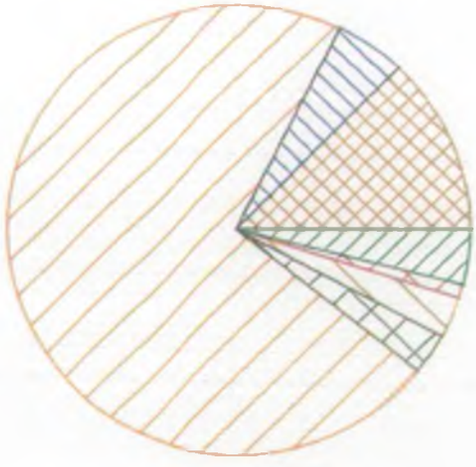
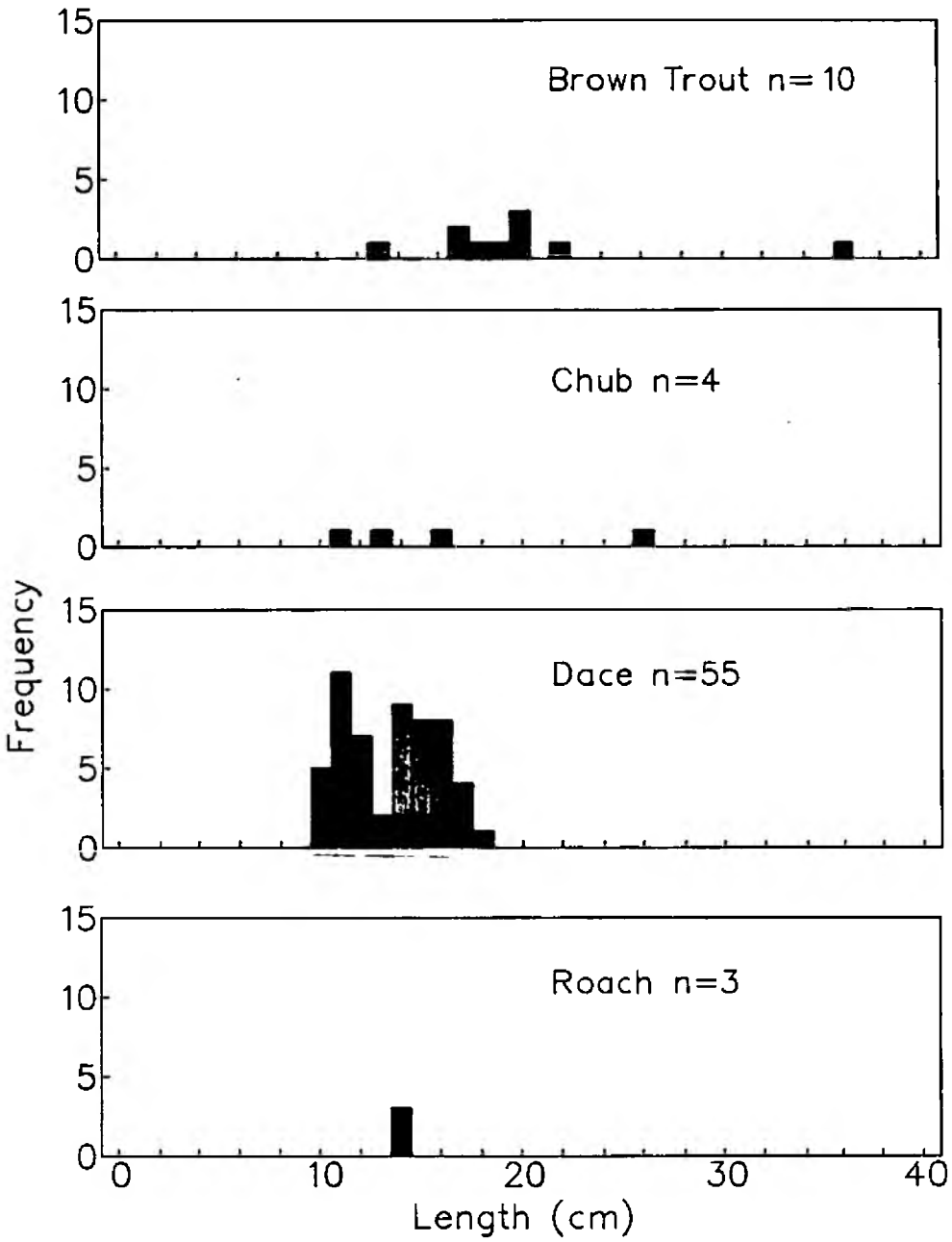


Density

Fig 5.15b: Site WNH2 Length Frequency By Species



5.1.16 Site WEF3 Somerset Bridge

NGR SU920441 Date Samp12/08/88

Length(m) 95 Width(m) 5.0 Area(sq.m) 475

Mean depth(m) 1.0 Temp 15.0 Conductivity 0480

SUBSTRATE(%)

Bare 0 Mud & Silt 60 Gravel 40 Stones 0

MACROPHYTES(%)

Emergent 10 Floating 45 Submerged 20

SHADE(%) 10

Leased by the Farnham Angling Society for coarse fishing, this site was approximately 300m upstream of Somerset Bridge at Elstead. Despite a reasonable habitat containing a diverse population of macrophytes and stable bed conditions, the survey failed to produce a single fish. A further stretch was electrofished before deep water made wading impossible. Results were poor, with only two pike taken.

Feedback from the angling club suggested that although sport had not been spectacular of late, reasonable bags of roach and the odd large chub have been taken. It is difficult to speculate why the survey results were so disappointing with such an apparently suitable environment. Further investigations are planned to try and establish the reasons for this anomaly.

FIG 5.16a: Site WEF3 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
TOTAL	0.0	0.000

5.1.17 Site WEF2 Eashing Bridge

NGR SU948439 Date Samp05/06/87

Length(m) 90 Width(m) 12.3 Area(sq.m) 1107

Mean depth(m) 1.0 Temp 14.0 Conductivity 0419

SUBSTRATE(%)

Bare 0 Mud & Silt 20 Gravel 80 Stones 0

MACROPHYTES(%)

Emergent 40 Floating 10 Submerged 15

SHADE(%) 40

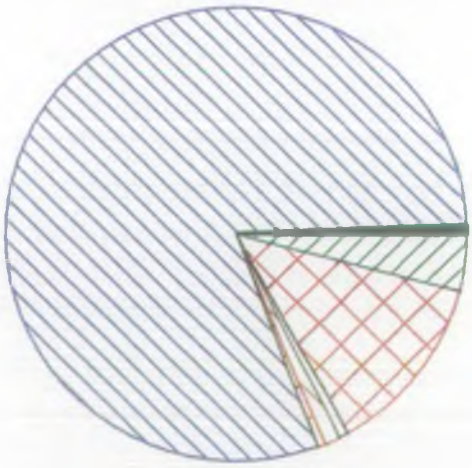
This stretch of the river at Eashing is leased by the Godalming Angling Society and has been a site of regular coarse fish stocking over many years. The site was a long, shallow, comparatively fast flowing section over a predominantly gravel bed, 150m below the Roman bridge. There was a high biomass of macrophytes present, which included Schoenoplectus, Ranunculus, and Callitriche.

As expected, the bulk of the catch was large chub (many of which were sexually ripe) making up over 80% of the total biomass of 51.9gm^{-2}.

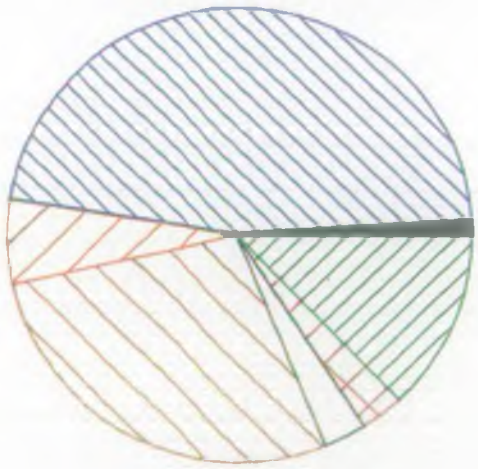
Habitat improvements were undertaken by the angling club in 1979 in the form of a series of hurdles along the margins of this previously unproductive straight. The river channel is quite wide here and the substrate was mainly soft sand. Although the hurdles have long since disappeared, clear evidence of there effectiveness is still to be seen, with long gravel glides and abundant weed growth.

FIG 5.17a: Site WEF2 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
Barbel	0.3	0.001
Chub	41.6	0.047
Dace	0.3	0.006
Gudgeon	0.6	0.028
Perch	0.3	0.003
Pike	6.7	0.003
Roach	2.1	0.013
TOTAL	51.9	0.101

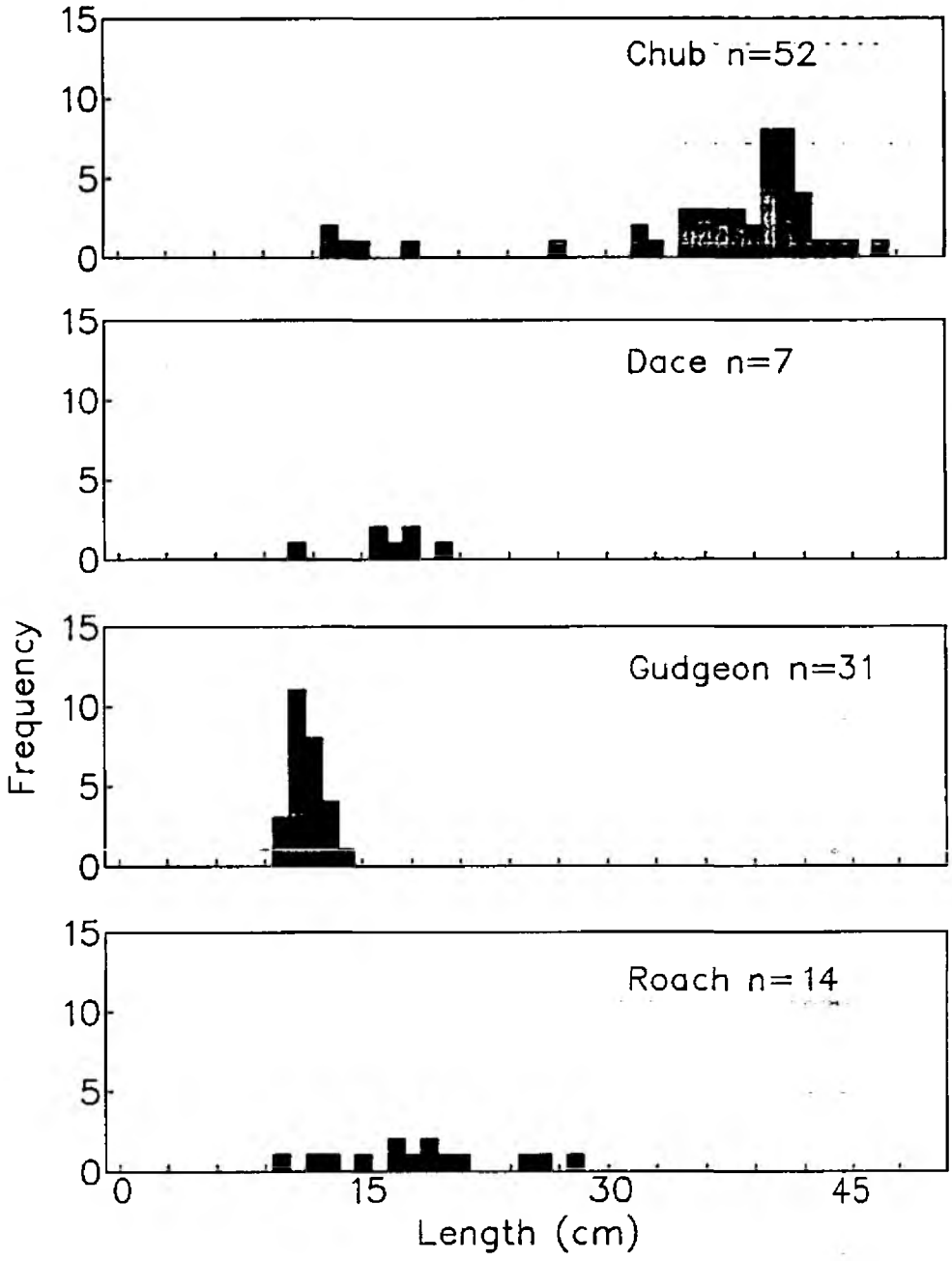


Biomass



Density

Fig. 5.17b: Site WEF2 Length Frequency By Species



5.1.18 Site WEF1 Unstead Bridge

NGR SU992454 Date Samp27/04/87

Length(m) 110 Width(m) 7.0 Area(sq.m) 770

Mean depth(m) 1.2 Temp 14.0 Conductivity 0437

SUBSTRATE(%)

Bare 0 Mud & Silt 20 Gravel 75 Stones 5

MACROPHYTES(%)

Emergent 5 Floating 0 Submerged 10

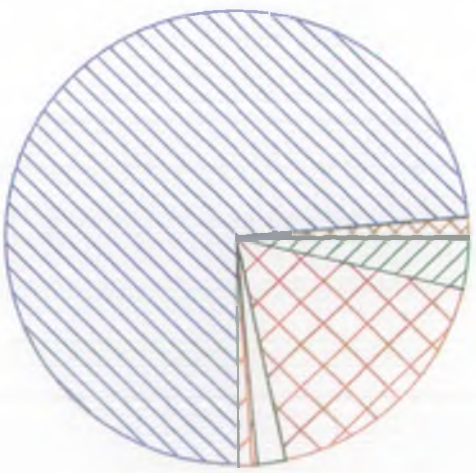
SHADE(%) 20

The furthest downstream site on the combined river was on the Unstead backwater. The course of the natural river runs parallel with the Wey Navigation Canal. The river channel was only 7.0m wide on average, with a strong flow, making wading very difficult in the deeper areas. The predominantly gravel substrate, combined with excellent cover, provided a very suitable environment for the ten species recorded.

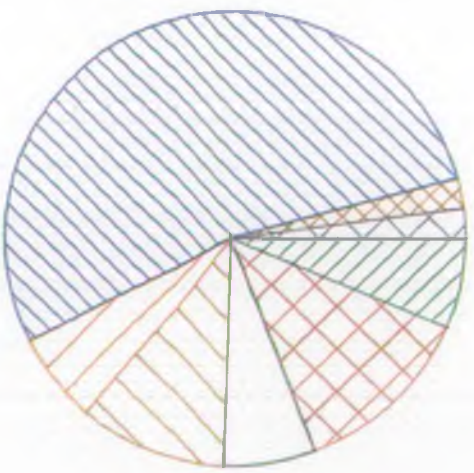
Although just short of the target of $20gm^{-2}$, the biomass of $18.5gm^{-2}$ was considered to be reasonable taking into account the difficult sampling conditions. The bulk of the catch was chub with the only surprise being a 24.7cm brown trout.

FIG 5.18a: Site WEF 1 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
BLEAK	0.0	0.001
BROWNTROUT	0.3	0.001
CHUB	13.7	0.025
DACE	0.2	0.003
GUDGEON	0.1	0.005
PERCH	0.4	0.003
PIKE	3.3	0.006
ROACH	0.7	0.003
TOTAL	18.5	0.047

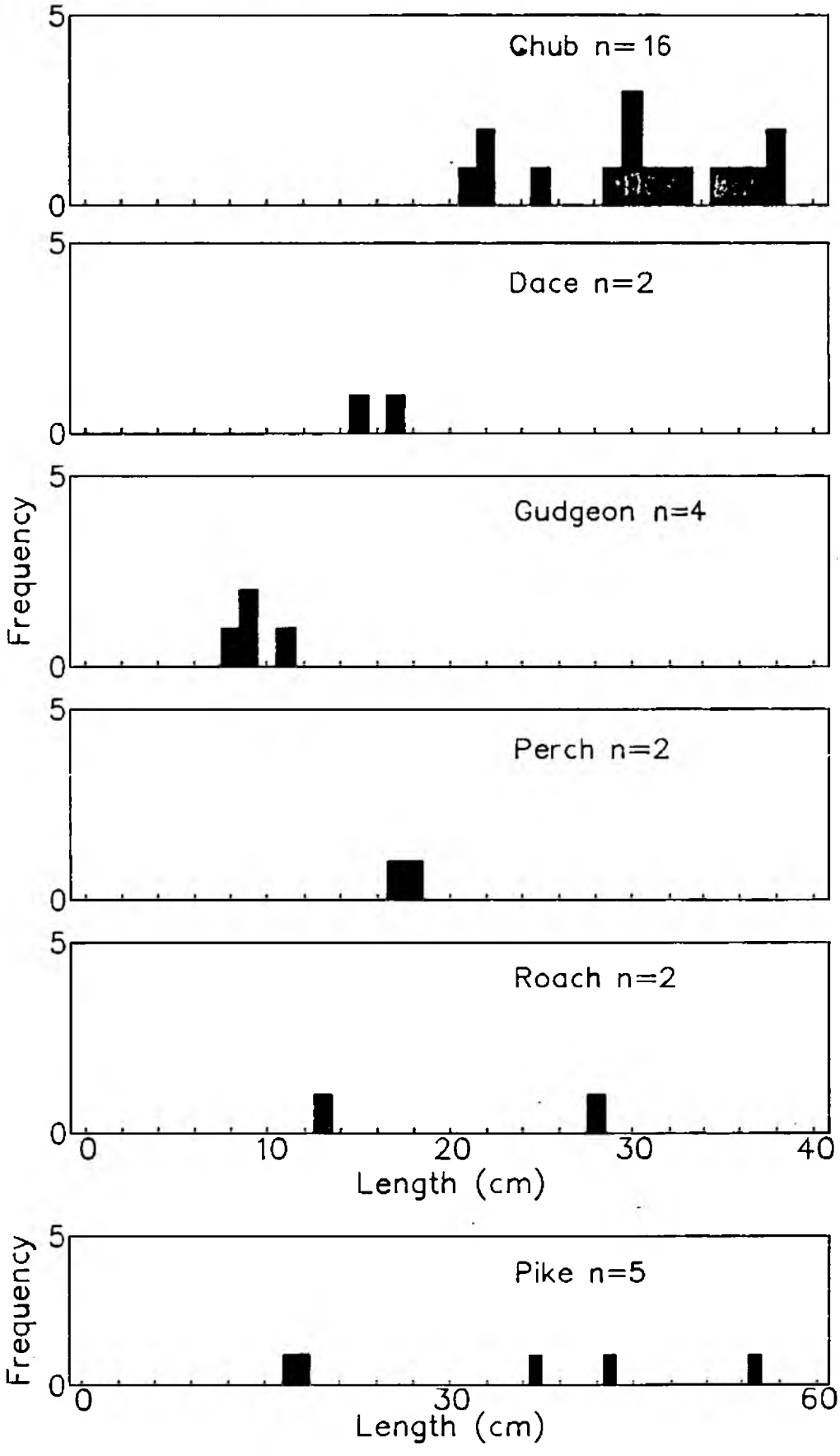


Biomass



Density

Fig 5.18b: Site WEF 1 Length Frequency By Species



5.1.19 Site WVT3 Barford Mill

NGR SU855373 Date Samp23/03/88

Length(m) 110 Width(m) 1.0 Area(sq.m) 110

Mean depth(m) 0.5 Temp 10.0 Conductivity 0169

SUBSTRATE(%)

Bare 0 Mud & Silt 50 Gravel 50 Stones 0

MACROPHYTES(%)

Emergent 0 Floating 5 Submerged 10

SHADE(%) 10

Upstream of Barford Mill pond, this site was just downstream of a recently excavated pond. It was the highest upstream section surveyed on the Whitmoor Vale Stream, there was less gradient than on the two downstream sites and consequently lower flows and larger silt deposits. It also meandered far more and was, on average, deeper.

The total biomass was $8.5gm^{-2}$ and was exclusively brown trout. Bullhead, stone loach and stickleback were present in greater numbers than in the downstream sites.

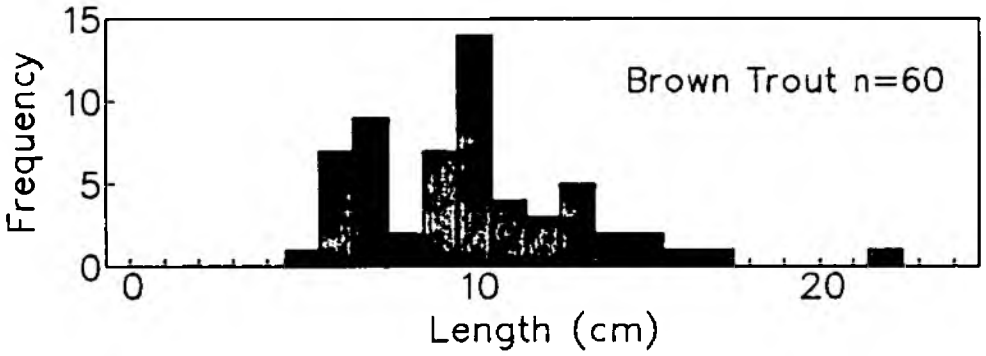
FIG 5.19a: Site WVT3 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
BROWN TROUT	8.5	0.391
TOTAL	8.5	0.392

Biomass

Density

Fig 5.19b: Site WVT3 Length Frequency By Species



5.1.20 Site WVT2 Robinswood

NGR SU846385 Date Samp23/03/88

Length(m) 100 Width(m) 1.5 Area(sq.m) 150

Mean depth(m) 0.2 Temp 10.0 Conductivity 0229

SUBSTRATE(%)

Bare 0 Mud & Silt 10 Gravel 45 Stones 45

MACROPHYTES(%)

Emergent 0 Floating 0 Submerged 10

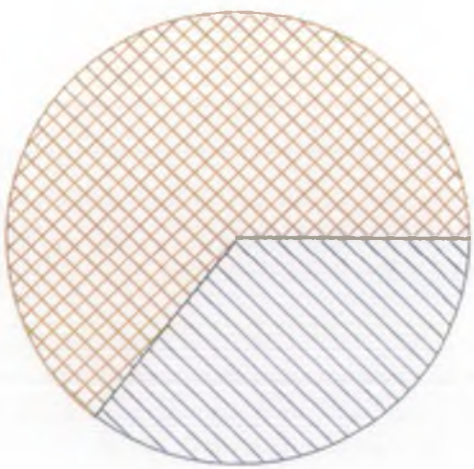
SHADE(%) 90

Also downstream of some recently dug, on stream ponds, this site at Robinswood was chosen to evaluate their impact on the fish populations. Cutting through a steep valley, the substrate was predominantly gravel and stone.

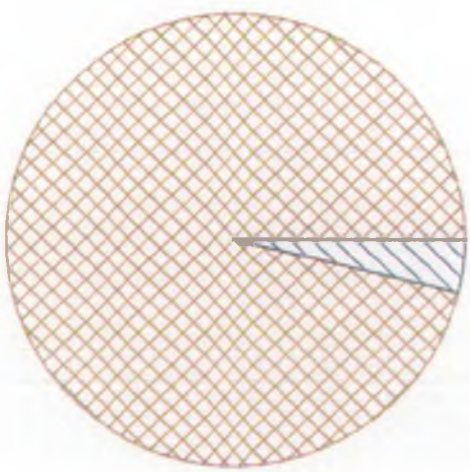
The total biomass of 28.2gm^{-2} was boosted by the 10.0gm^{-2} of large rainbows that have obviously dropped down from the ponds above. However, the 18.2gm^{-2} of brown trout revealed a healthy native population.

FIG 5.20a: Site WVT2 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
BROWN TROUT	18.2	0.507
RAINBOW TROUT	10.0	0.020
TOTAL	28.2	0.580

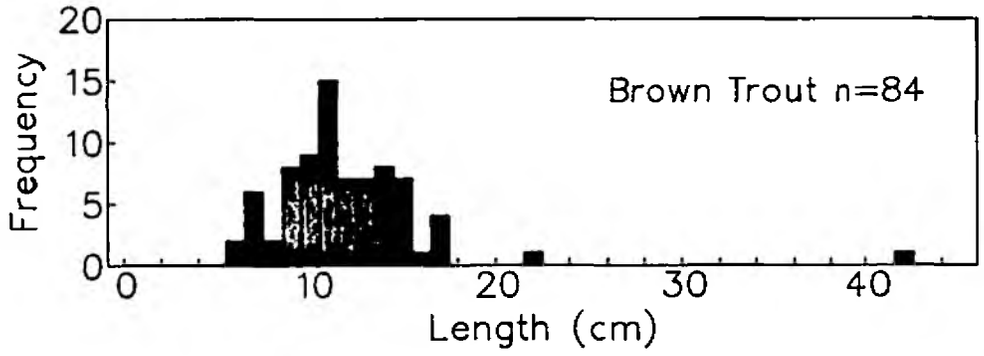


Biomass



Density

Fig 5.20b: Site WVT2 Length Frequency By Species



5.1.21 Site WVT1 Lash Cottage

NGR SU853381 Date Samp09/03/88

Length(m) 90 Width(m) 1.5 Area(sq.m) 135

Mean depth(m) 0.2 Temp 8.0 Conductivity 0184

SUBSTRATE(%)

Bare 0 Mud & Silt 5 Gravel 60 Stones 35

MACROPHYTES(%)

Emergent 0 Floating 0 Submerged 10

SHADE(%) 80

This site on the Whitmoor Vale Stream was immediately downstream of the road bridge at Churt adjacent to Lash Cottage. The stream was very shallow and fast flowing over a substrate of gravel and stone.

The population was exclusively small wild brown trout with a total density of 0.593nm^{-2} and biomass of 12.4gm^{-2}.

FIG 5.21a: SITE WVT1 – Biomass and Density

	Biomass (gm-2)	Density (nm-2)
BROWN TROUT	12.4	0.550
TOTAL	12.4	0.550

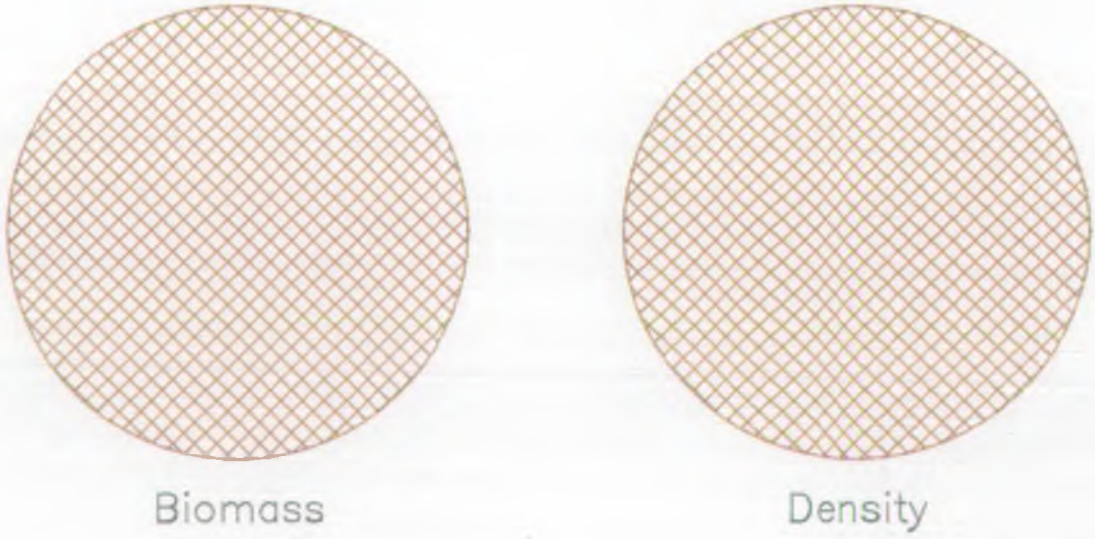
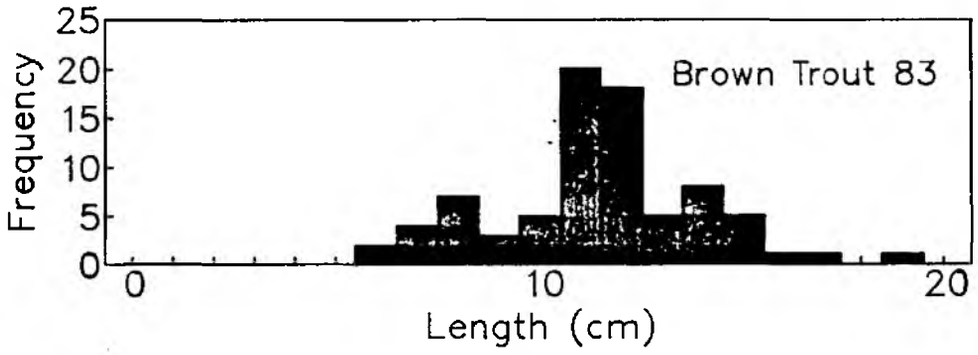


Fig 5.21b: Site WVT1 Length Frequency By Species



5.1.22 Site CGJ1 West Cranleigh Nursery

NGR TQ041387 Date Samp21/05/87

Length(m) 90 Width(m) 2.7 Area(sq.m) 243

Mean depth(m) 0.2 Temp 10.0 Conductivity 0583

SUBSTRATE(%)

Bare 0 Mud & Silt 95 Gravel 0 Stones 5

MACROPHYTES(%)

Emergent 0 Floating 0 Submerged 5

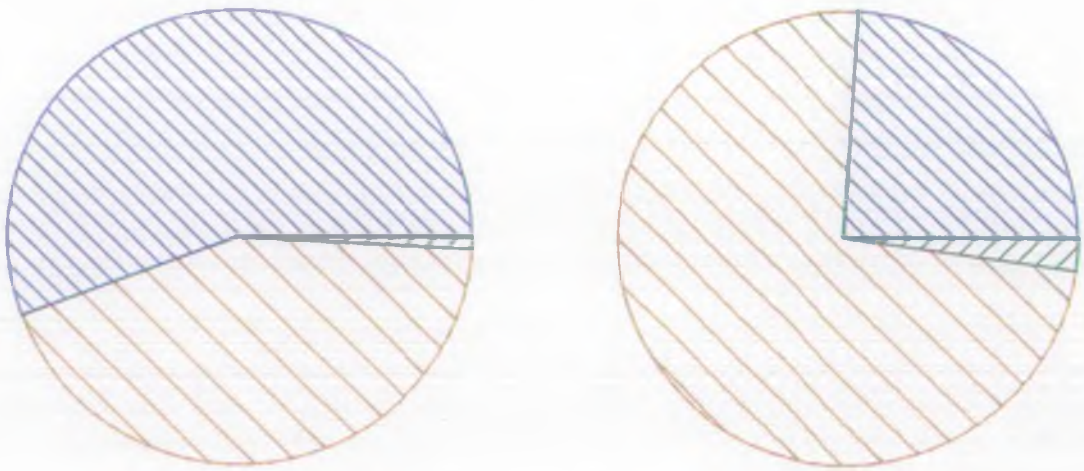
SHADE(%) 80

This section, upstream of Cranleigh sewage works at West Cranleigh Nurseries, was the highest upstream site surveyed on this tributary.

The river here was small with little flow and few aquatic macrophytes. The poor habitat was reflected in the recorded biomass of only 5.5gm $^{-2}$.

FIG 5.22a: Site CGJ1 – Biomass and Density

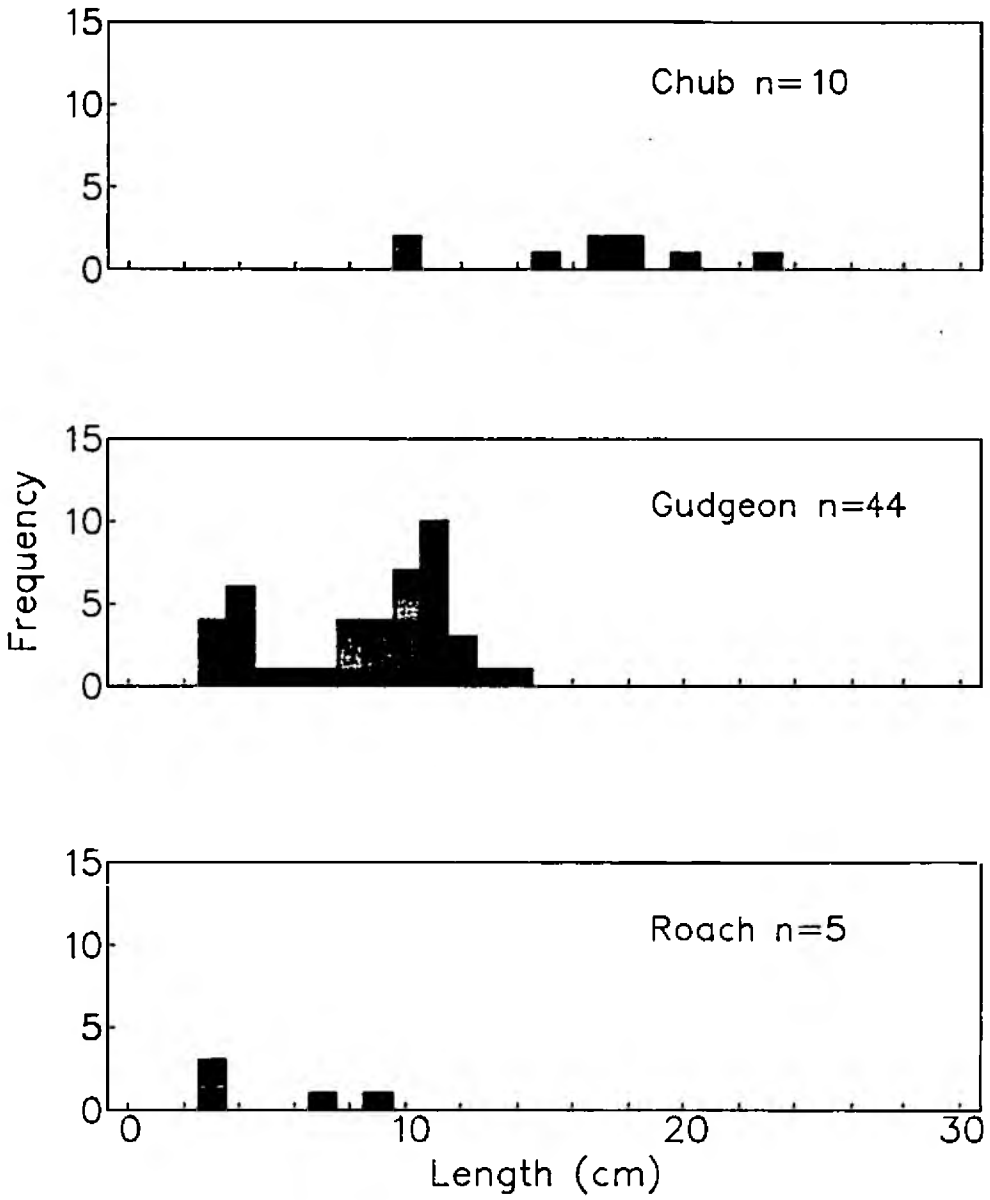
	Biomass (gm−2)	Density (nm−2)
Chub	3.1	0.042
Gudgeon	2.4	0.129
Roach	0.0	0.004
TOTAL	5.5	0.246



Biomass

Density

FIG 5.22b: Site CGJ1 Length Frequency By Species



5.1.23 Site CGF2 Run Common

NGR TQ036419 Date Samp12/05/87

Length(m) 137 Width(m) 5.0 Area(sq.m) 685

Mean depth(m) 0.5 Temp 13.0 Conductivity 0549

SUBSTRATE(%)

Bare 0 Mud & Silt 70 Gravel 10 Stones 0

MACROPHYTES(%)

Emergent 25 Floating 0 Submerged 5

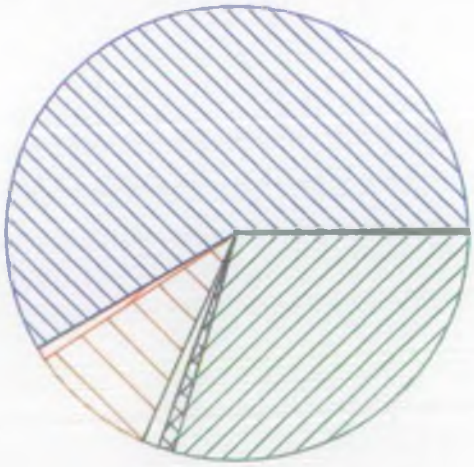
SHADE(%) 80

Downstream of Run Common bridge and just below a small weir, this section of the Cranleigh Waters proved to be the most productive of the survey. The river here is shallow with a predominantly clay substrate. Macrophytes present included Nuphar, Alisma, Sparganium and Potamogeton crispus.

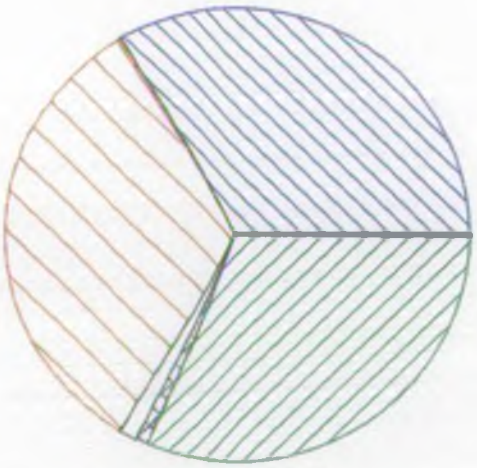
The fish population comprised mainly small chub, roach and gudgeon in approximately equal numbers, giving a total density of 2.25nm^{-2} and biomass of 97.5gm^{-2}. These unusually high results were probably due to the combination of shallow water and spawning congregations.

FIG 5.23a: Site CGF2 – Biomass and Density

	Biomass (gm–2)	Density (nm–2)
Bream	0.2	0.001
Chub	56.8	0.706
Dace	0.8	0.006
Gudgeon	8.8	0.700
Perch	1.2	0.026
Rudd	1.1	0.017
Roach	28.5	0.661
Tench	0.0	0.001
TOTAL	97.5	2.251

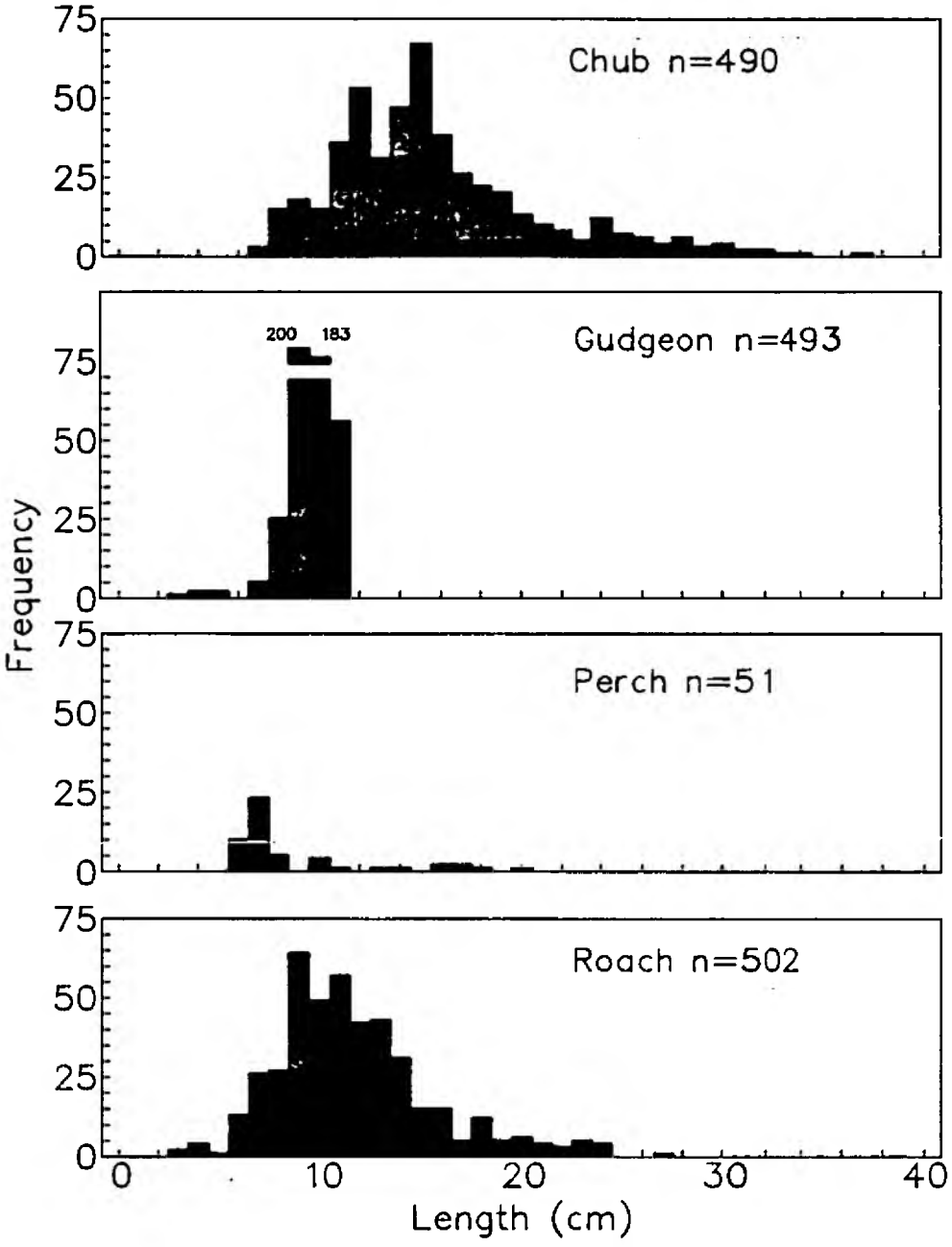


Biomass



Density

Fig 5.23b: Site CGF2 Length Frequency By Species



5.1.24 Site CGF1 Birtley

NGR TQ018434 Date Samp28/04/87

Length(m) 115 Width(m) 7.1 Area(sq.m) 817

Mean depth(m) 1.3 Temp 15.0 Conductivity 0430

SUBSTRATE(%)

Bare 30 Mud & Silt 40 Gravel 30 Stones 0

MACROPHYTES(%)

Emergent 10 Floating 10 Submerged 10

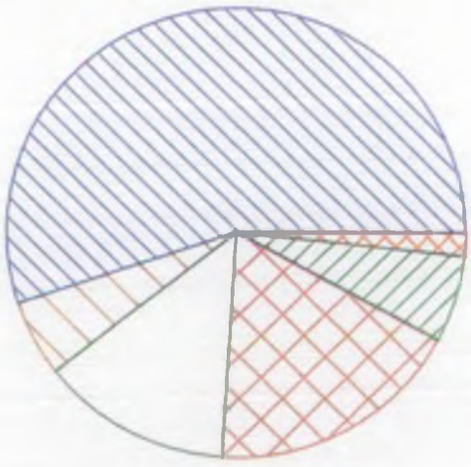
SHADE(%) 15

200m upstream of the iron bridge at Birtley , this section of the Cranleigh Waters is leased to the Shamley Green Angling Society. The survey site was fairly deep with a sluggish flow. The substrate was predominantly silt with a thin layer of gravel overlying clay. Beds of Nuphar and Sparganium were present on the silted bends but in general marginal emergents find steep banks of this clay catchment a poor environment.

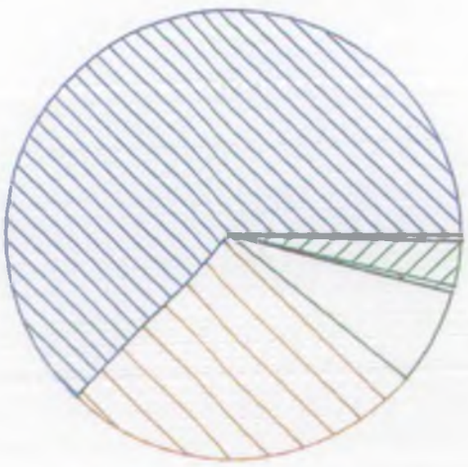
Although the biomass of 11.6gm^{-2} was not up to target the density of 0.25nm^{-2} reflected the proliferation of 2+ and 3+ chub.

FIG 5.24a: Site CGF1 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
Chub	6.4	0.137
Gudgeon	0.6	0.057
Perch	1.5	0.015
Pike	2.1	0.001
Roach	0.7	0.007
Tench	0.2	0.001
TOTAL	11.6	0.250

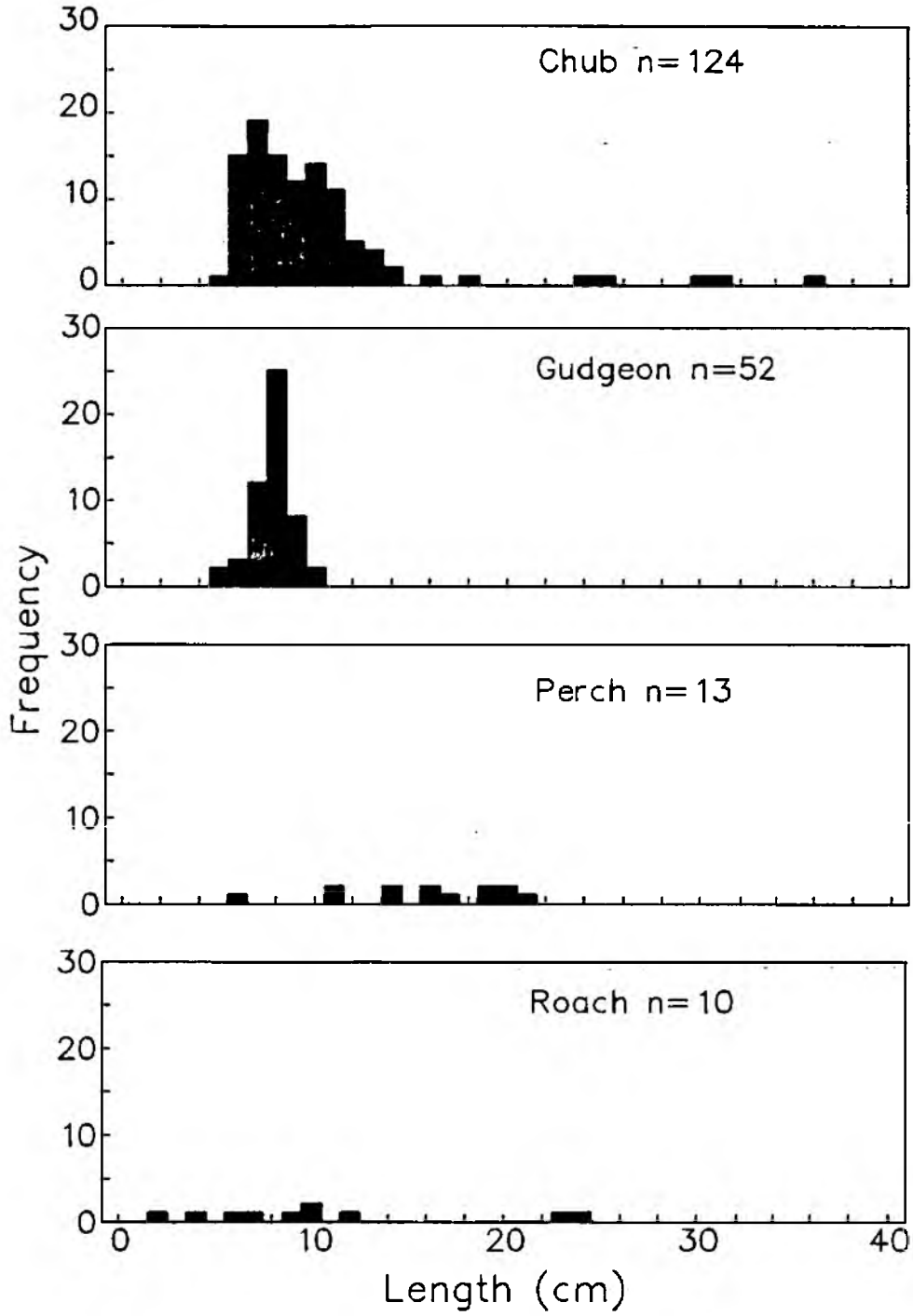


Biomass



Density

Fig 5.24b: Site CGF1 Length Frequency By Species



5.1.25 Site TIK1 Wotton

NGR TQ123470 Date Samp21/04/88

Length(m) 70 Width(m) 1.7 Area(sq.m) 119

Mean depth(m) 0.2 Temp 12.0 Conductivity 0123

SUBSTRATE(%)

Bare 0 Mud & Silt 50 Gravel 50 Stones 0

MACROPHYTES(%)

Emergent 15 Floating 5 Submerged 10

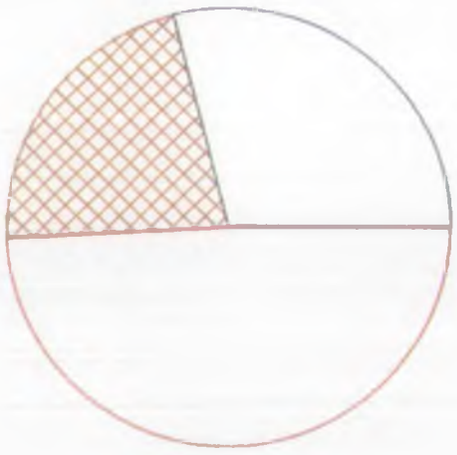
SHADE(%) 5

The most upstream site on the Tillingbourne was at Wotton. The river here is very small with a substrate of gravel and silt. Macrophytes present included Callitriche, Berula, Glyceria and Rorippa.

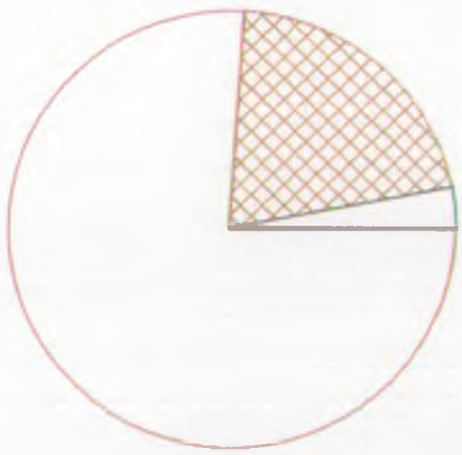
Due to the physical size of the river, it was decided to record the weights of stone loach and bullheads caught, rather than just note them as present. The total recorded biomass of 8.0gm^{-2} was dominated by stone loach and bullheads, with only 1.7gm^{-2} of small brown trout recorded. Large numbers of brook lampreys Lampetra planeri were also found.

FIG 5.25a: SITE TIK 1 – Biomass and Density

	Biomass (gm-2)	Density (nm-2)
Bullhead	2.3	0.017
Brown trout	1.7	0.117
Stone Loach	3.9	0.425
TOTAL	7.9	0.559

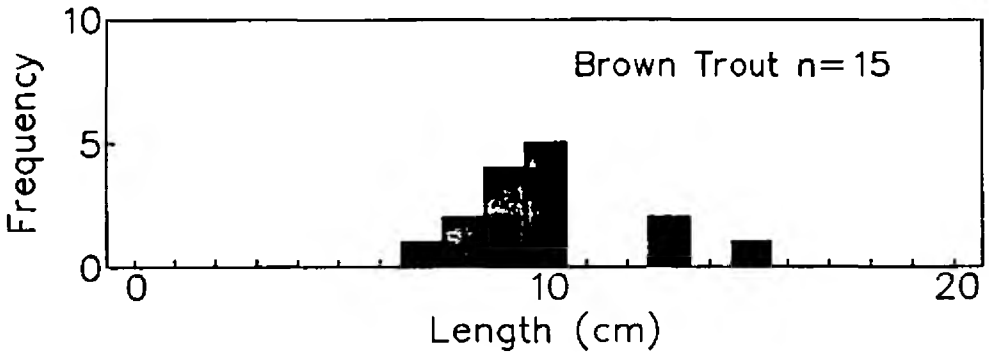


Biomass



Density

Fig 5.25b: Site TIK 1 – Length Frequency by species



5.1.26 Site TIA3 Wonham Way Bridge

NGR TQ088477 Date Samp27/04/88

Length(m) 80 Width(m) 3.0 Area(sq.m) 240

Mean depth(m) 0.2 Temp 11.0 Conductivity 0263

SUBSTRATE(%)

Bare 0 Mud & Silt 85 Gravel 15 Stones 0

MACROPHYTES(%)

Emergent 15 Floating 0 Submerged 5

SHADE(%) 90

Upstream of Wonham Way bridge at Gomshall this site was approximately 1km downstream of Frog Island Trout Farm. The river here is narrow and heavily shaded with a predominantly mud and silt substrate. Recorded macrophytes included Ranunculus and Callitriche.

No minor species were found and the biomass of 3.5gm^{-2} was exclusively small brown trout. Surprisingly no escapees from the trout farm were captured.

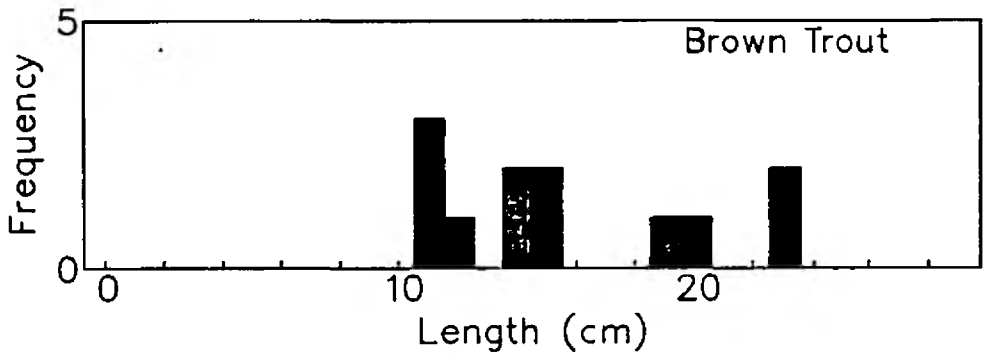
FIG 5.26a: Site TIA3 – Biomass and Density

	Biomass (gm–2)	Density (nm–2)
BROWN TROUT	3.5	0.058
TOTAL	3.5	0.058

Biomass

Density

Fig 5.26b: Site TIA3 Length Frequency By Species



5.1.27 Site TIA2 Albury

NGR TQ054480 Date Samp27/04/88

Length(m) 129 Width(m) 5.7 Area(sq.m) 735

Mean depth(m) 0.4 Temp 11.0 Conductivity 0343

SUBSTRATE(%)

Bare 0 Mud & Silt 70 Gravel 30 Stones 0

MACROPHYTES(%)

Emergent 5 Floating 0 Submerged 10

SHADE(%) 40

Situated just upstream of Albury village, the upper half of the site was wide and shallow with a mainly silty bed. This section was heavily shaded by mature alders with very few aquatic plants. In contrast the bottom part was approximately half the width with more depth and a faster flow, exposing gravel with small beds of Ranunculus. The only other macrophyte present was Callitriche in the silty margins. There was little bankside cover.

Results obtained were disappointing with a biomass of 3.8gm^{-2} consisting of small brown trout. Bullhead and stone loach were recorded present in low numbers.

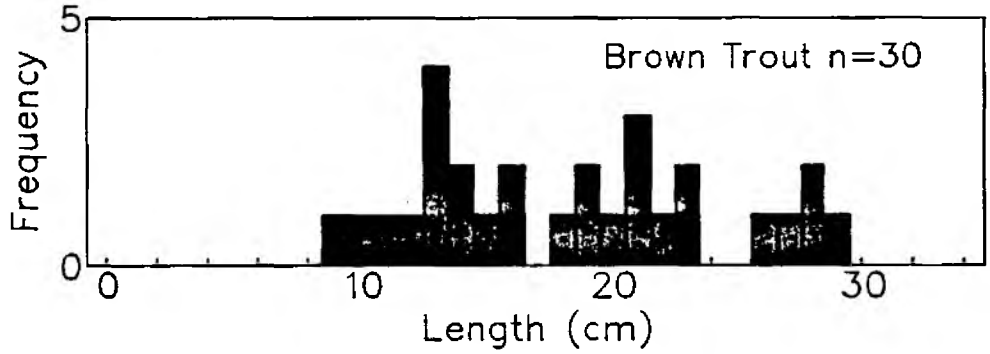
FIG 5.27a: Site TIA2 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
BROWN TROUT	3.8	0.041
TOTAL	3.8	0.041

Biomass

Density

Fig 5.27b: Site TIA2 Length frequency By Species



5.1.28 Site TIA1 Tillingbourne Trout Farm

NGR TQ038481 Date Samp28/04/88

Length(m) 191 Width(m) 3.5 Area(sq.m) 669

Mean depth(m) 0.4 Temp 10.0 Conductivity 0319

SUBSTRATE(%)

Bare 0 Mud & Silt 60 Gravel 40 Stones 0

MACROPHYTES(%)

Emergent 0 Floating 0 Submerged 0

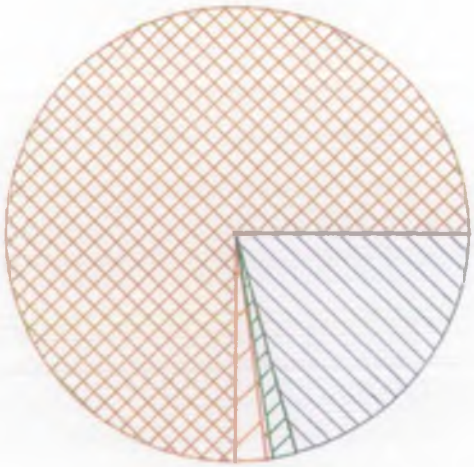
SHADE(%) 85

This site was on a carrier that by-passes the Tillingbourne Trout Farm at Chilworth. The steep gradient ensured long gravel riffles interspersed by occasional pools. Heavy shading severely restricted macrophyte growth.

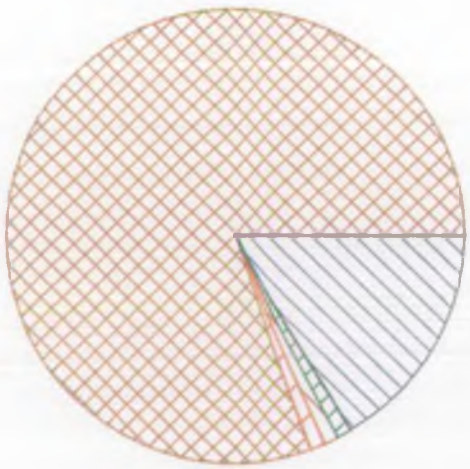
The population consisted mainly of small brown trout ($4.2gm^{-2}$) with a few escapee rainbows. The total biomass of $5.6gm^{-2}$ also included roach, dace and gudgeon in low numbers.

FIG 5.28a: Site TIA1 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
BROWN TROUT	4.2	0.079
DACE	0.1	0.001
GUDGEON	0.0	0.001
ROACH	0.1	0.001
RAINBOW TROUT	1.2	0.016
TOTAL	5.6	0.098

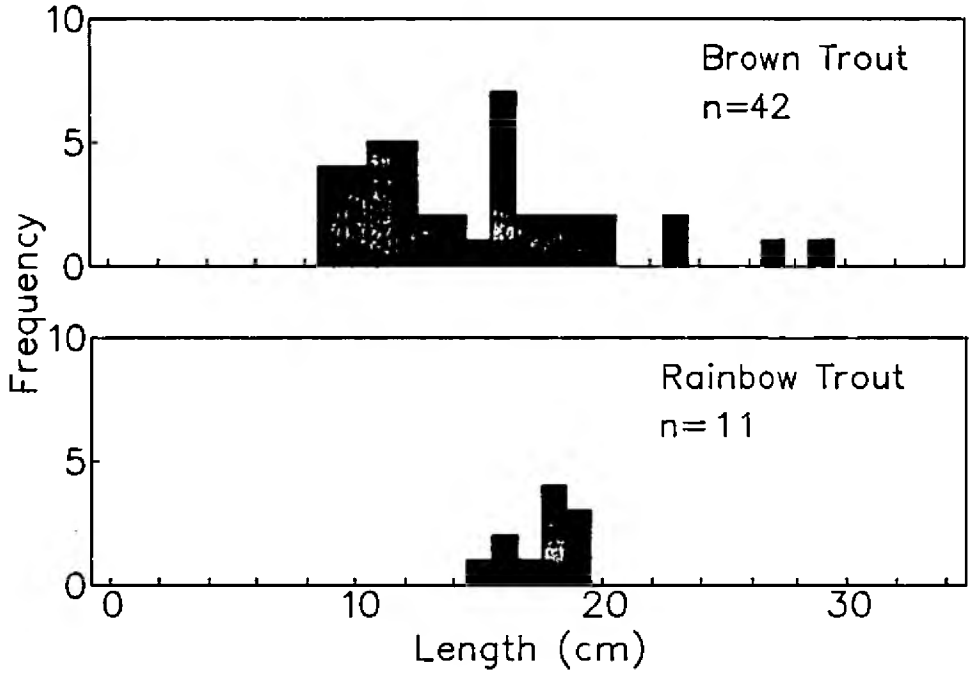


Biomass



Density

Fig. 5.28b:- Site TIA 1- Length Frequency For Species



5.1.29 Site TIA4 Shalford

NGR TQ008473 Date Samp13/05/88

Length(m) 100 Width(m) 6.0 Area(sq.m) 600

Mean depth(m) 0.7 Temp 13.0 Conductivity 0324

SUBSTRATE(%)

Bare 0 Mud & Silt 80 Gravel 20 Stones 0

MACROPHYTES(%)

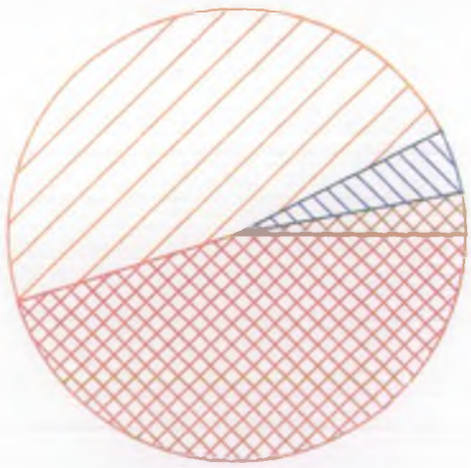
Emergent 35 Floating 0 Submerged 5

SHADE(%) 50

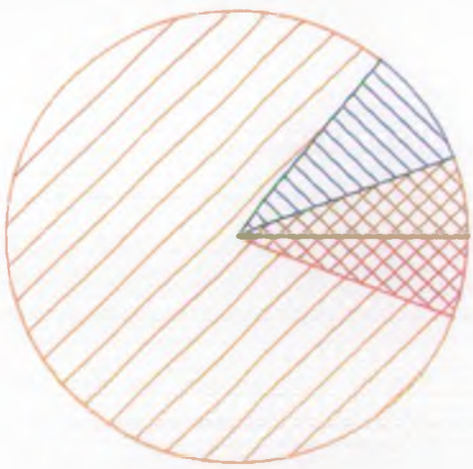
The bottom site on the Tillingbourne was just upstream of Shalford, on the water fished by the Tillingbourne Fly Fishers. The stretch surveyed was comparatively deep and slow flowing over mainly soft silt. The north bank of the river afforded a wealth of cover, whereas the south bank bordered a grass meadow. There was a diverse population of submerged macrophytes that included Ranunculus, Myriophyllum, Elodea and Potamogeton crispus.
The fish population was dominated by dace and the disappointing biomass of 4.0gm^{-2} included a single 1.8kg eel Anguilla anguilla (a rare catch in the Wey system above Guildford) which made up 45% of that total. An investigation of other stretches to ascertain whether the results were representative was impossible due to numbers of fallen trees following the October storm.

FIG 5.29a: SITE TIA4 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
BROWN TROUT	0.1	0.002
CHUB	0.2	0.003
DACE	1.9	0.028
EEL	1.8	0.002
TOTAL	4.0	0.035

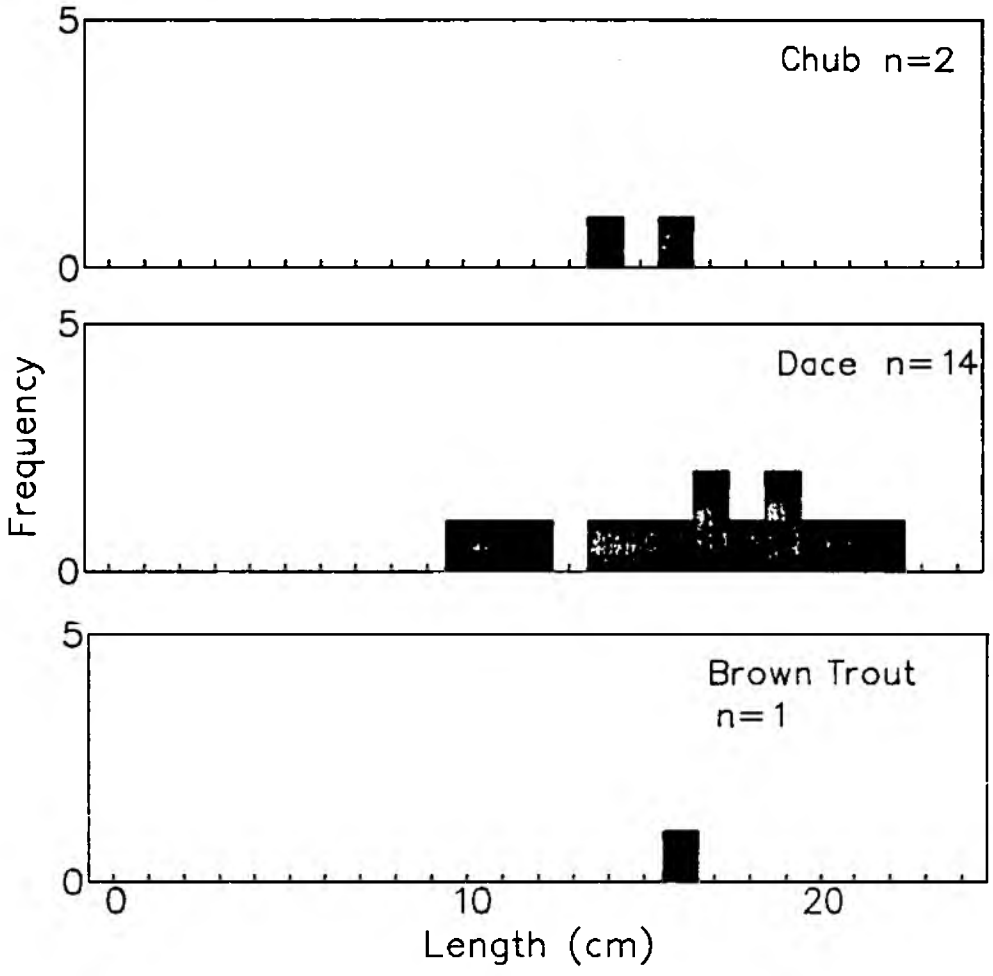


Biomass



Density

Fig 5.29b: Site TIA4 Length Frequency By Species



5.1.30 Site SB01 Hockford, u/s STW

NGR SU960540 Date Samp16/05/88

Length(m) 110 Width(m) 4.0 Area(sq.m) 440

Mean depth(m) 1.0 Temp 15.0 Conductivity 0373

SUBSTRATE(%)

Bare 0 Mud & Silt 98 Gravel 2 Stones 0

MACROPHYTES(%)

Emergent 0 Floating 0 Submerged 0

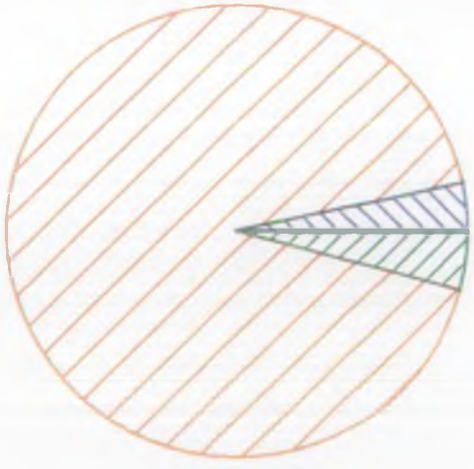
SHADE(%) 70

The top site on the Stanford Brook was approximately 200m upstream of Hockford sewage works outfall. Meandering through a deep cut channel with a silt and clay substrate, this section was heavily shaded. Macrophytes were consequently absent.

The poor aquatic environment was reflected in the total recorded biomass of 1.65gm^{-2}, which was dominated by small dace, although catch efficiency was impaired by poor visibility due to the turbid nature of the stream.

FIG 5.30a: Site SB01– Biomass and Density

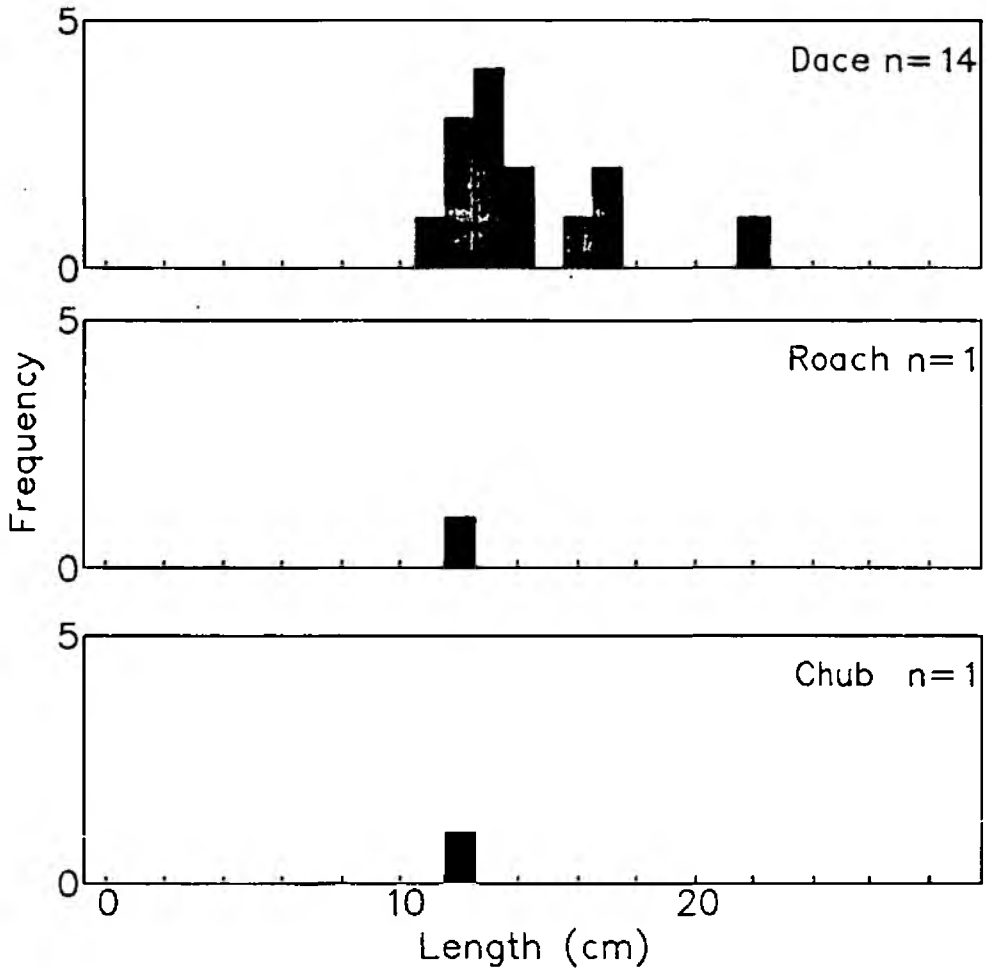
	Biomass (gm–2)	Density (nm–2)
CHUB	0.1	0.002
DACE	1.5	0.032
ROACH	0.1	0.002
TOTAL	1.6	0.002



Biomass

Density

Fig 5.30b:Site SB01 Length Frequency By Species



5.1.31 Site SBJ1 Woking Leisure Centre

NGR TQ008578 Date Samp18/05/88

Length(m) 80 Width(m) 5.5 Area(sq.m) 440

Mean depth(m) 0.5 Temp 13.0 Conductivity 0495

SUBSTRATE(%)

Bare 0 Mud & Silt 80 Gravel 0 Stones 20

MACROPHYTES(%)

Emergent 5 Floating 5 Submerged 0

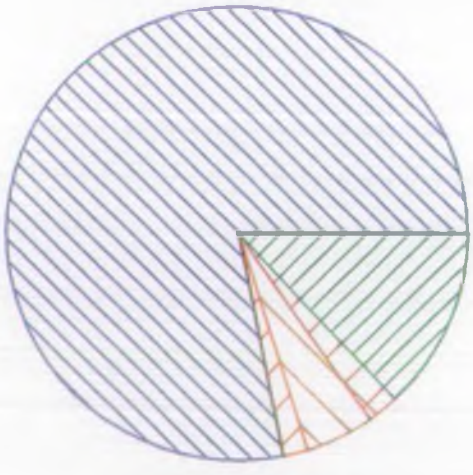
SHADE(%) 40

The middle site on the Stanford Brook runs through a park adjacent to the Woking Leisure Centre. The substrate was predominantly bare mud and silt with some coarse gravel and stone outcrops on the shallower sections. Despite its turbidity, the river supported macrophytes including Sparganium, Myriophyllum and Nuphar. The banks were typically steep and high.

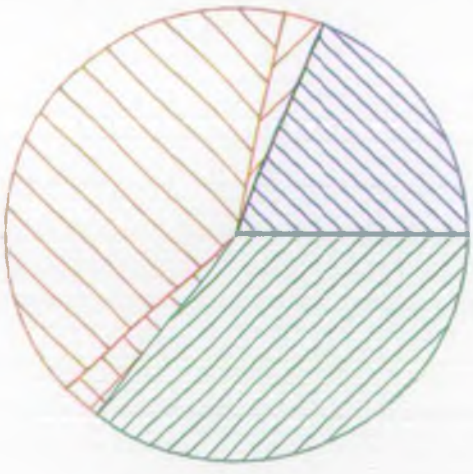
The chub dominated biomass of $25.9gm^{-2}$ at a density of $0.19nm^{-2}$ was surprisingly high. Roach and gudgeon were also well represented. A low infestation of black spot Posthodiplostomum sp. was noted on the chub and roach.

FIG 5.31a: Site SBJ1 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
CHUB	20.2	0.034
DACE	0.5	0.005
GUDGEON	1.3	0.073
PIKE	0.6	0.005
ROACH	3.3	0.064
TOTAL	25.9	0.186

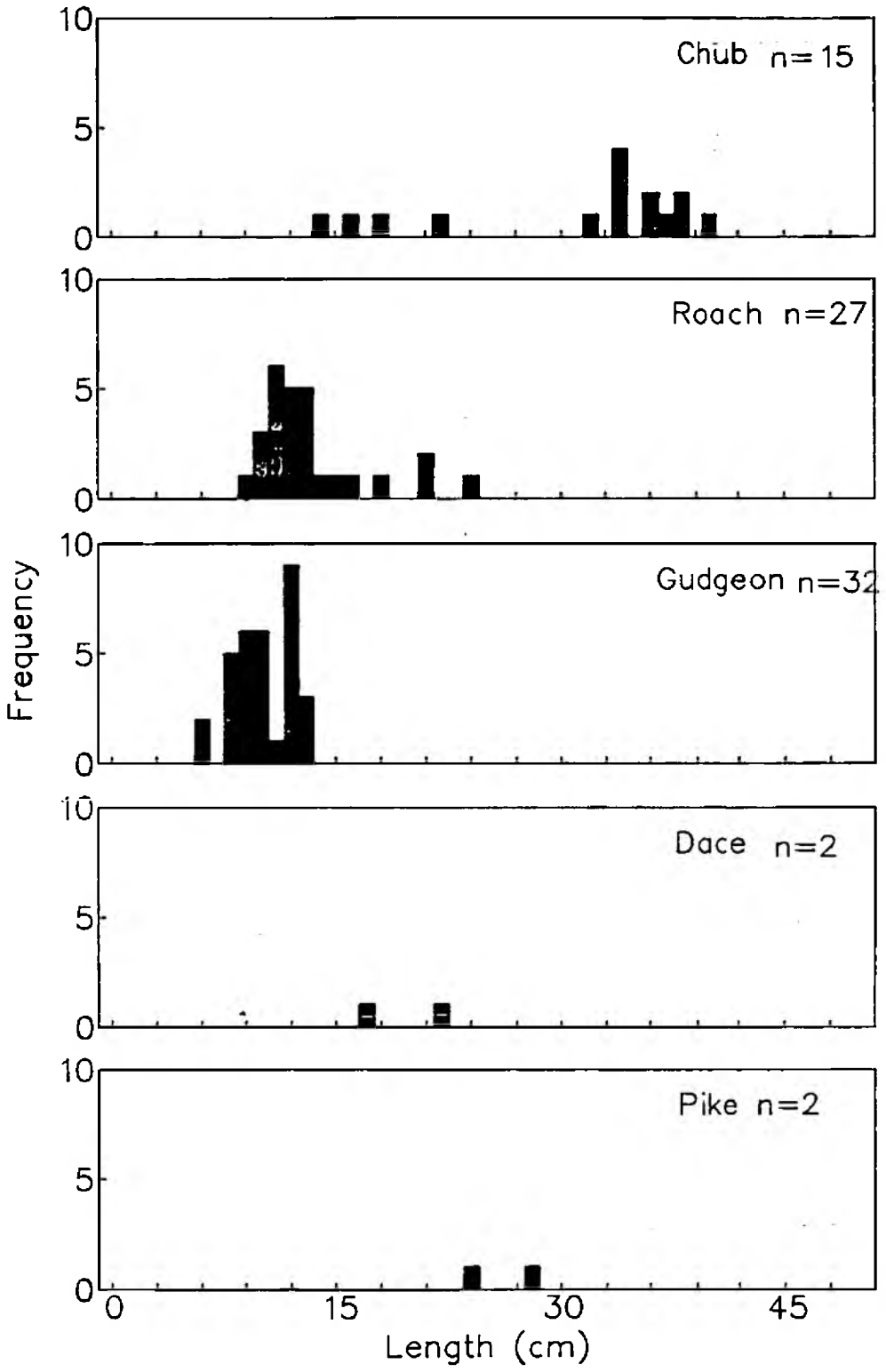


Biomass



Density

Fig 5.31b: Site SBJ1 Length Frequency By Species



5.1.32 Site SBJ2 Pyrford Court

NGR TQ032578 Date Samp19/05/88

Length(m) 80 Width(m) 7.0 Area(sq.m) 560

Mean depth(m) 1.0 Temp 12.0 Conductivity 0315

SUBSTRATE(%)

Bare 0 Mud & Silt 80 Gravel 20 Stones 0

MACROPHYTES(%)

Emergent 20 Floating 10 Submerged 0

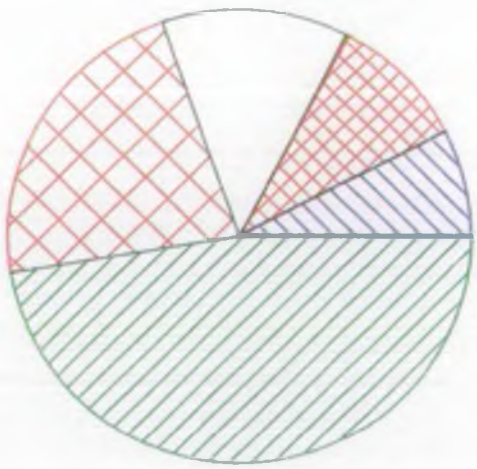
SHADE(%) 75

Adjacent to the lake at Pyrford, this bottom site on the Stanford Brook was very overgrown and heavily shaded. The mainly clay substrate only supported small beds of Sparganium

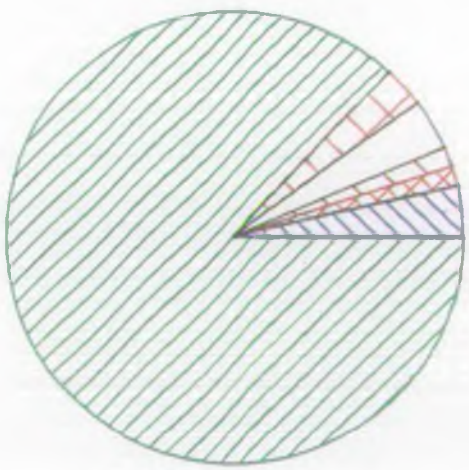
Almost 50% of the total biomass of 7.3gm^{-2} was made up by small roach. Two pike contributed 22% of that total and very few of the expected chub and gudgeon were recorded . Low numbers of black spot on the roach was also noted at this site.

FIG 5.32a: Site SBJ2 – Biomass and Density

	Biomass (gm−2)	Density (nm−2)
CHUB	0.6	0.005
EEL	0.7	0.002
GUDGEON	0.0	0.002
PERCH	1.0	0.005
PIKE	1.6	0.004
ROACH	3.5	0.120
TOTAL	7.3	0.140

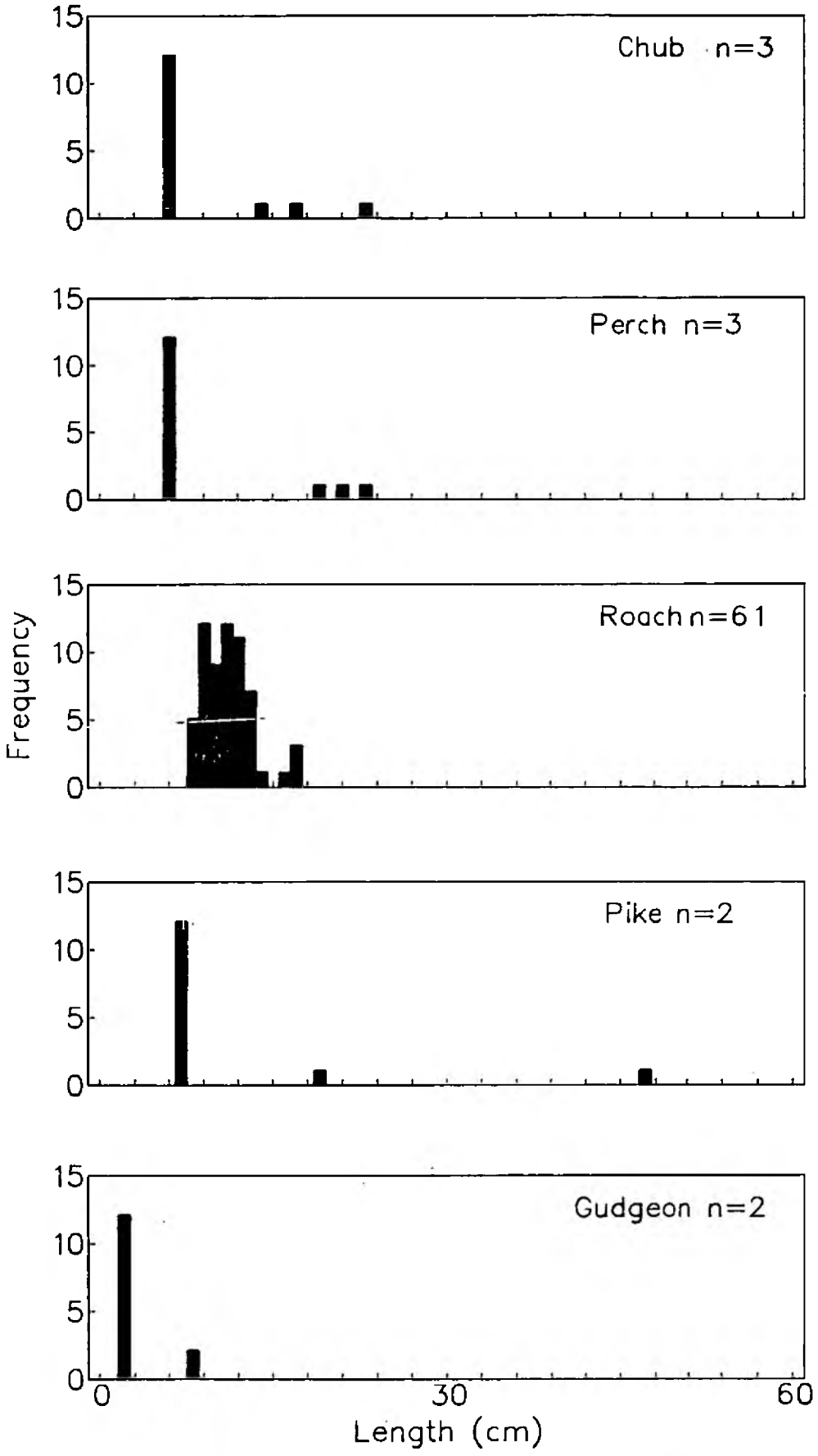


Biomass



Density

Fig 5.32b: Site SBJ2 Length Frequency By Species



5.1.33 Site OMO1 Ockham Mill

NGR TQ057581 Date Samp11/08/88

Length(m) 81 Width(m) 4.0 Area(sq.m) 324

Mean depth(m) 0.7 Temp 17.0 Conductivity 0481

SUBSTRATE(%)

Bare 0 Mud & Silt 70 Gravel 30 Stones 0

MACROPHYTES(%)

Emergent 50 Floating 10 Submerged 40

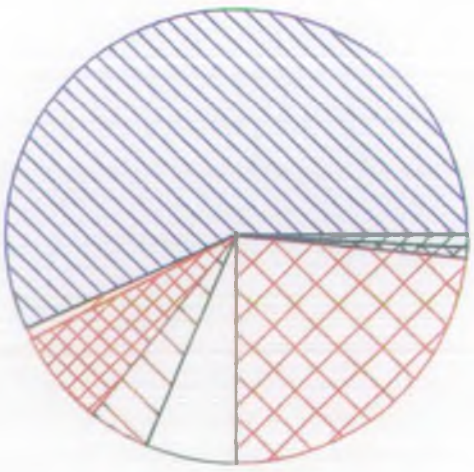
SHADE(%) 10

The survey site on the Ockham Mill Stream was approximately 300m downstream of the mill. Despite the sandy substrate this stretch was rich in marginal emergents which included Rorippa, Acorus, Myosotis, Typha, Schoenoplectus, and Sagittaria. The river also supported beds of Callitriche and filamentous alga.

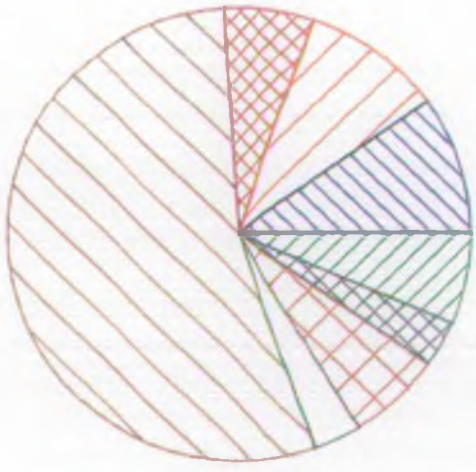
A total of eight different fish species were represented in the biomass of 13.1gm^{-2}, of which over 50% was made up by three large chub. Considerable numbers of fry were observed during the operation but were not susceptible to capture by the electrofishing techniques.

FIG 5.33a: Site OMO1– Biomass and Density

	Biomass (gm–2)	Density (nm–2)
Chub	7.3	0.009
Dace	0.1	0.009
Eel	0.9	0.006
Gudgeon	0.6	0.050
Perch	0.8	0.003
Pike	3.0	0.006
Rudd	0.1	0.003
Roach	0.1	0.006
TOTAL	13.1	0.123

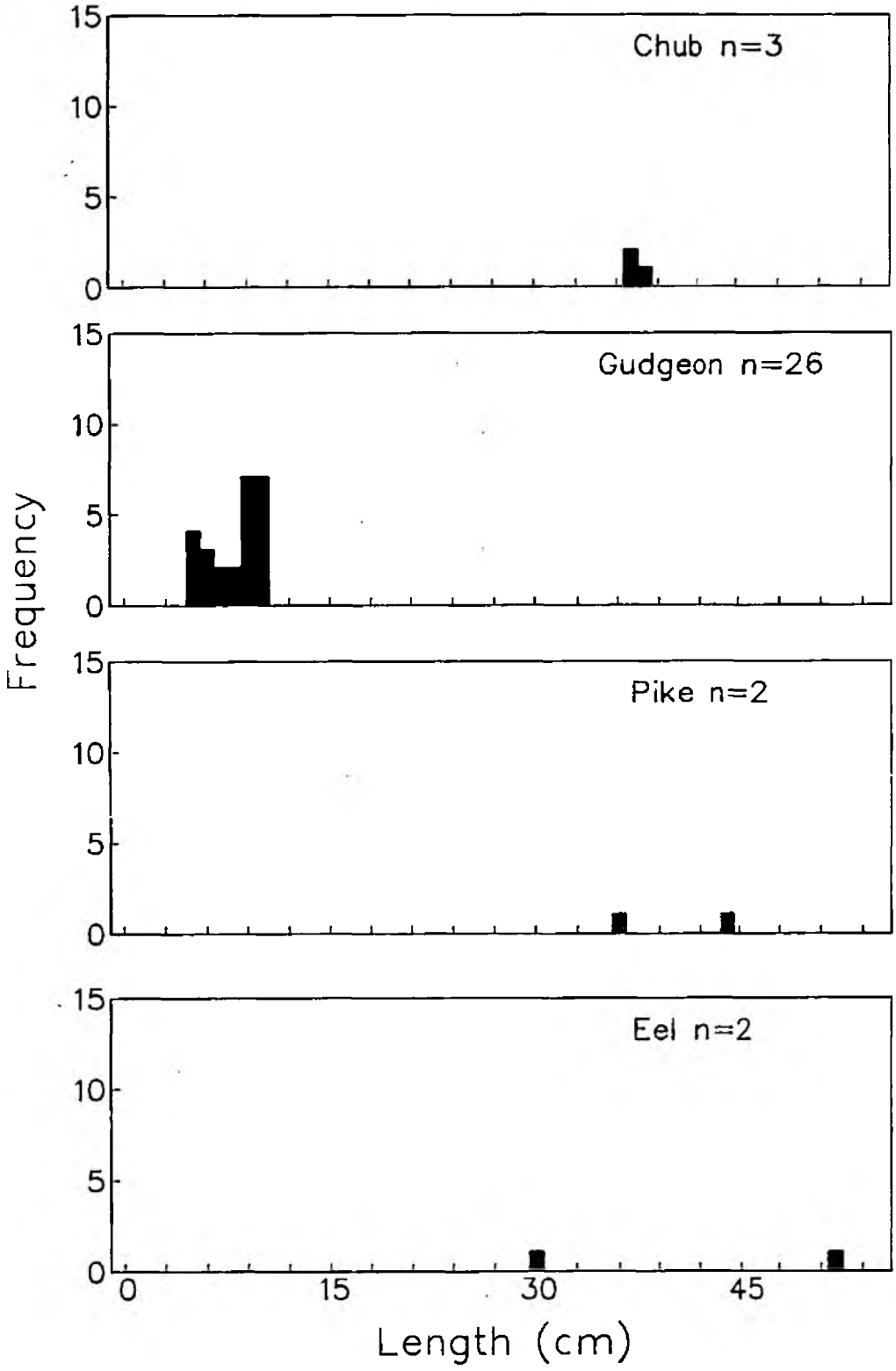


Biomass



Density

Fig 5.33b: Site OMO1 Length Frequency By Species



5.2 Survey Results

5.2.1 Biomass

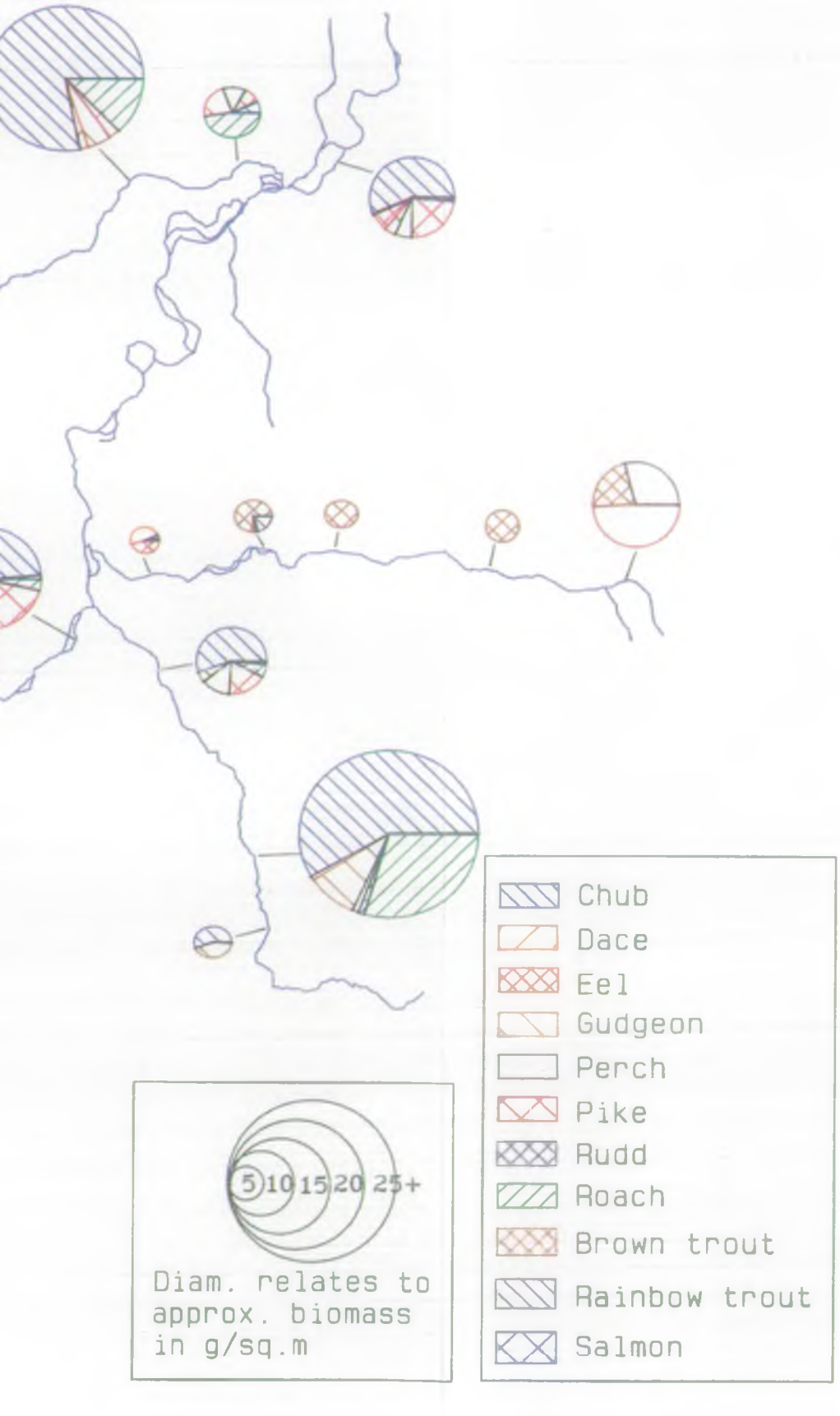
Because of the diversity of the rivers within each of the water quality based habitat units, it was not thought appropriate to average the biomasses. A schematic summary is shown in Fig 5.34.

Of the 27 EEC designated sites surveyed ,only 4 reached their target biomass of $20gm^{-2}$ for a cyprinid fishery and 1 for a $15gm^{-2}$ salmonid fishery as set by Thames Water. These sites represent a compliance with target for each habitat unit as follows:-

Habitat Code	Complied(km)	Total(km)
WSH	2	28
WNE	3	15.3
WNH	0	8
WEF	5	18
CGJ	0	6.4
CGF	3	11.8
TIA	0	11.9
SBJ	4	12.6

Fig 5.34 - Summary of Biomass for Each Site

(n.b. Sites in upper Wey South are combined)


5 10 15 20 25+
Diam. relates to approx. biomass in g/sq.m
Chub
Dace
Eel
Gudgeon
Perch
Pike
Rudd
Roach
Brown trout
Rainbow trout
Salmon

5.2.2 Age & Growth

Insufficient numbers of most species of fish were captured at each site to allow meaningful estimates of growth for individual sites. Estimations of average length for age were therefore calculated by combining data in each habitat unit following careful examination of the results to ensure that there were no serious anomalies. These are shown in figs 5.35 to 5.39 compared, where possible, with a "standard" derived by Hickley & Dexter (1979).

Fig 5.35: Brown trout – Age vs Length

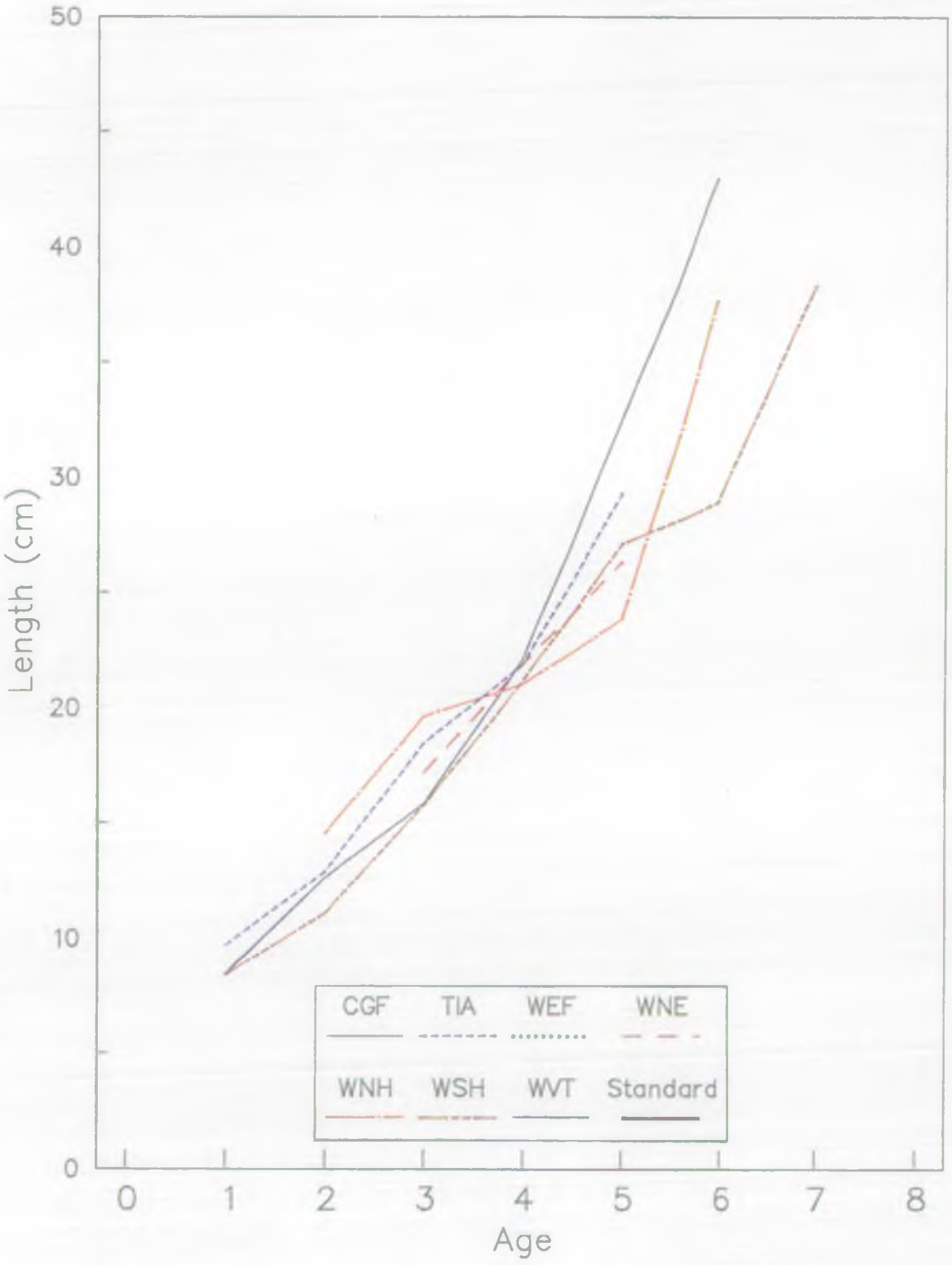


Fig 5.36: Chub – Age vs Length

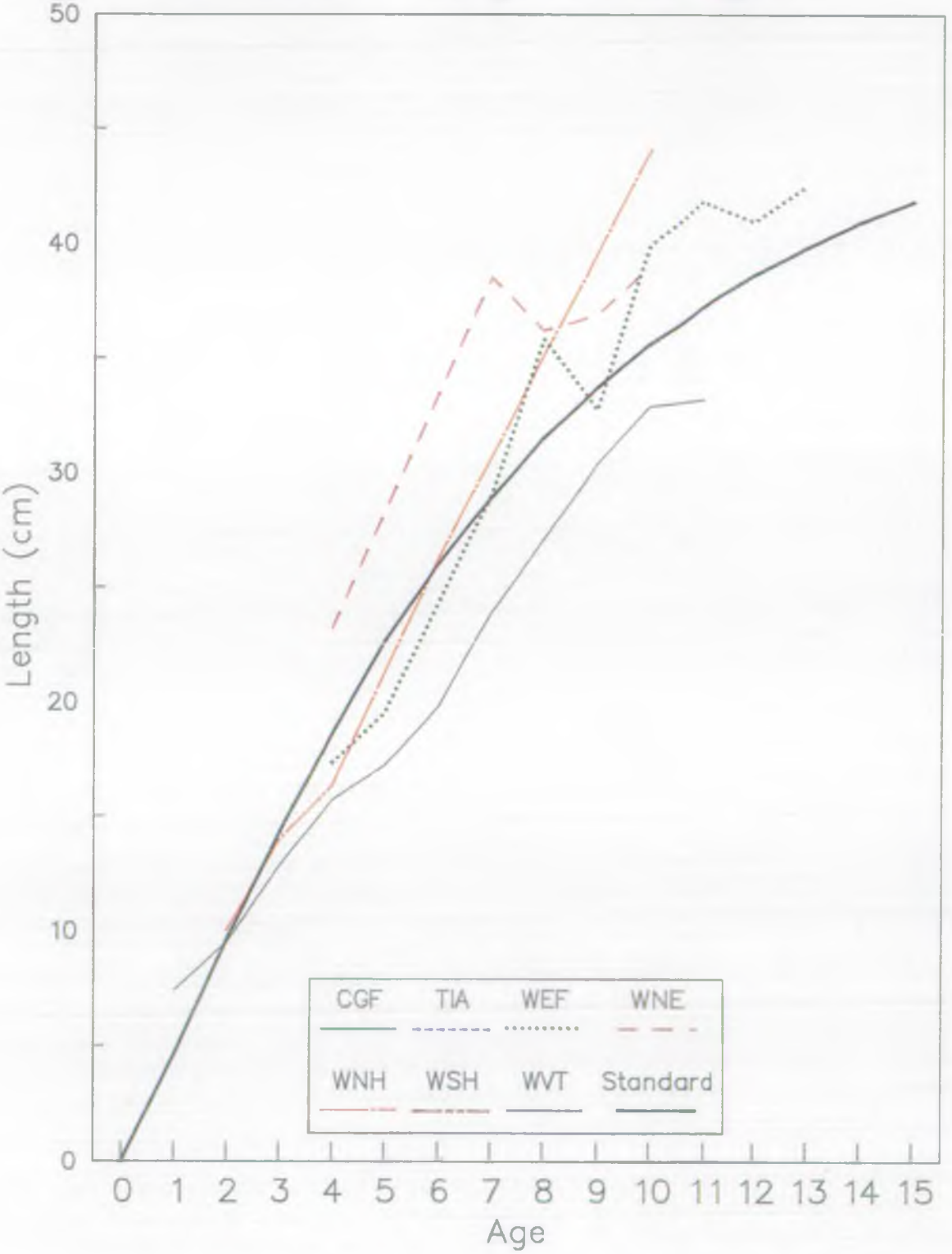


Fig 5.37: Dace – Age vs Length

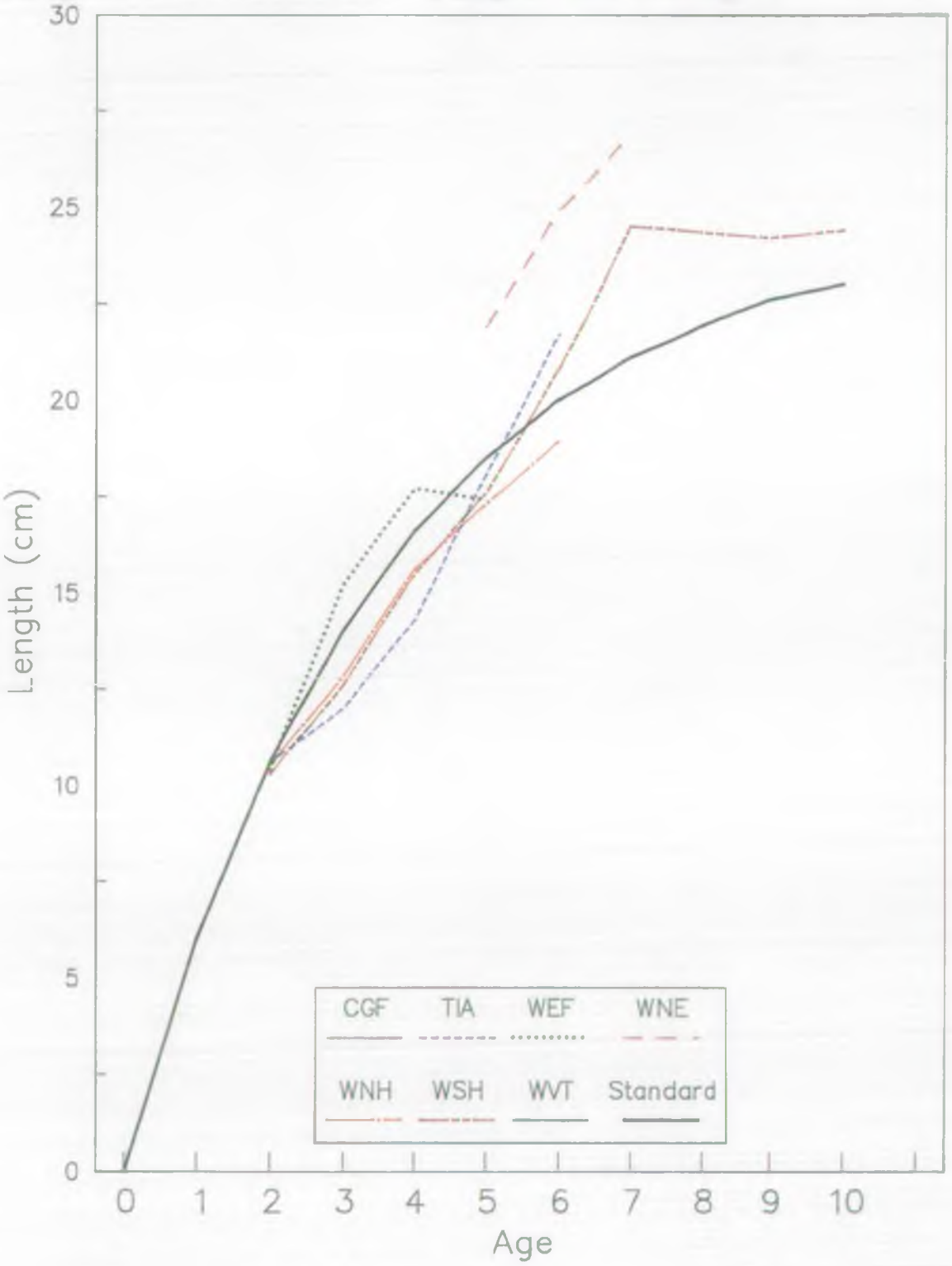


Fig 5.38: Gudgeon – Age vs Length

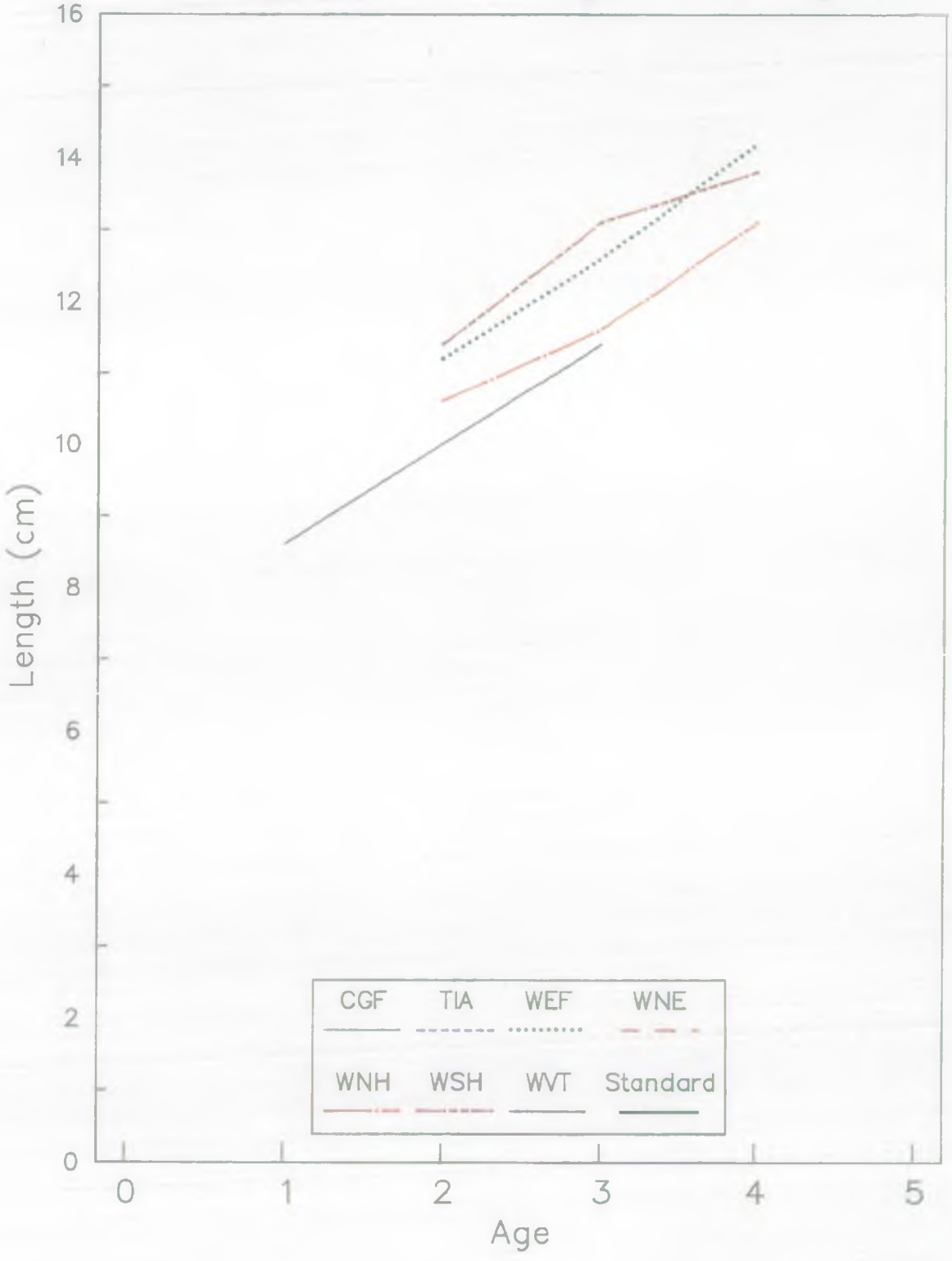
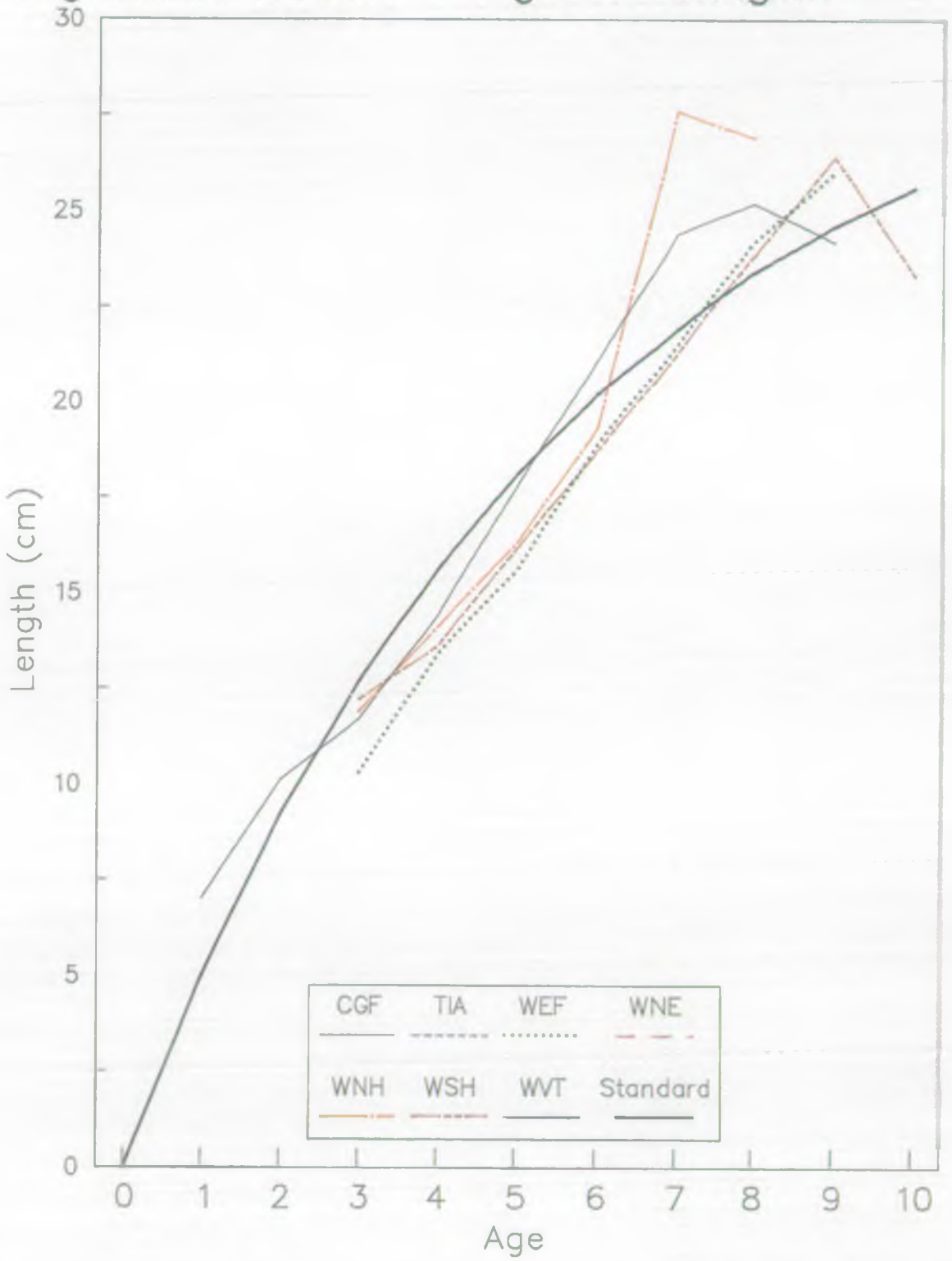


Fig 5.39: Roach – Age vs Length



5.3 Fish Health

All fish captured on this survey appeared to be in good condition. External examinations on subsamples revealed low numbers of Argulus foliaceus and Piscicola geometra. A low infestation of black spot Posthodiplostomum cuticola was observed on chub and roach captured from the Stanford Brook. No fish were retained for detailed parasitology.

5.4 Water Quality

Reach Assessment Points. Compliance with RQO
Sites sampled between 1-3-86 and 31-8-88

Site	RQO	Pass/fail	Parameters failing
Cranleigh Waters at Run Common	1B	Fail	BOD/ammonia
Stanford Brook at Rickford Mill	2A	Pass	
Tillingbourne above trout farm	1A	Fail	BOD
Wey North at Mill Court	1B	Pass	
Wey North at Moor Park	2A	Pass	
Wey South at Hammer Vale	2A	Pass	
Wey South at Lindford Bridge	2A	Pass	
Wey South at Radford Bridge	2A	Pass	
Wey at Somerset Bridge	1B	Pass	

5.5 Macroinvertebrates

Site	NGR	Last Biology	RQO	TWABI Indicated RQO
Cranleigh Waters at Run Common Wonersh	TQ036419	19/7/88	1B	3
Cranleigh Waters at Elmbridge Cranleigh	TQ039391	24/4/87 20/6/88	2 2	1B/2 2
Ockham Mill St. at Ockham Mill	TQ056579	24/4/87 22/6/88	2/1B 2/1B	1B 1B
Tillingbourne East Shalford Lane	TQ012475	16/6/87	1A	1B
Wey at Eashing Bridge	SU964438	20/6/88	1B	1B
Wey(N) at Railway Station Alton	SU723396	19/05/87 17/09/87	1B 1B	2 2
Wey(N) at Mill Court Bridge Wyck	SU756417	4/11/86 18/8/87	1B 1B	1B 1B
Wey(N) at Moor Park Bridge Farnham	SU861466	4/11/86 18/8/87	2/1B 2/1B	1B 1B/2
Wey(S) at Lindford Br. Bordon	SU809367	4/11/86 19/08/87	2/1B 2/1B	1B 1B
Wey(S) at Hammer Vale Br Haslemere	SU873326	4/11/86 19/8/87	2/1B 2/1B	1B/2 1B/2
Whitmoor Vale Stream at Robins Wood	SU846388	31/3/88	1B	1B
Whitmoor Vale Stream at Churt Lane	SU852381	31/3/88	1B	2
Whitmoor Vale Stream above Barford Pond	SU853373	31/3/88	1B	1B

6 DISCUSSION

Biomass and density results obtained from the upper reaches of the Wey South, although not generally achieving the required target of 20gm^{-2}, were satisfactory and reflected a healthy population of the wild brown trout that inhabit this stream. Stocked salmon parr made a considerable proportion of the biomass on this section. The only site to exceed its target was at Hammer Trout farm (WSH1) which was boosted by the presence of escapee rainbow trout. It should be noted that the Wey South has an EEC designation as a coarse fishery. This is based on its RQO status and manifestly not on the physical habitat.

The Wey South catchment drains a large area of Lower Greensand. The vast quantities of sand produced by the process of erosion do not pose problems in the river's upper reaches or in the Whitmoor Vale Stream, where steep gradients and high velocities prevent deposition. However, below Lindford, where the Wey becomes wider and slower, siltation increasingly occurs. Indeed, a commercial dredging operation once existed above Godalming, the extracted material used in the building industry.

This change in size and pace affects the substrate. The predominantly stone and gravel bed which supports a diverse macrophyte and invertebrate community, is replaced by one of soft, unstable sand. As a consequence weed growth is severely restricted, and cover and food sources limited. Despite the presence of coarse fish, biomass and density figures at sites WSH7-9 were low - an indication of the impoverished habitat.

A number of attempts have been made to overcome the problems associated with siltation. At site WEF2, downstream of Eashing, Godalming A.S. placed a series of wicker hurdles in the margins of a long and previously unproductive straight. This work was carried out in 1979. Although the hurdles have long since disappeared, clear evidence of their effectiveness remains today. Long gravel glides harbouring beds of Ranunculus sp. have replaced the bare sand bed and areas of silt in the margins have been stabilized, allowing colonization by emergent species.

On the Wey North, sites WNE2 and WNE1 narrowly failed to meet their biomass targets of 15gm^{-2}. Site WNE3, at Coxheath Bridge, attained a biomass 36.7gm^{-2} mainly due to a population of large chub. The river here is strongly influenced by the chalk catchment and clear water and abundant weed growth provide an excellent aquatic environment.

Downstream of Farnham, sites WNH1 and WNH2 had biomasses of 19.4 and 6.5gm^{-2}. The two sites differed that upstream was fairly slow and deep, the downstream fast with shallow glides and riffles. Although the biomass was low on the bottom site good numbers of wild brown trout were captured. The latter is managed as a trout fishery from which the coarse fish are regularly culled.

On the combined Wey site WEF3, at Somerset bridge, only a single small pike was captured on a first visit. Therefore because of concern about the efficiency, the site was re-surveyed at a later date, but with the same result. This section is leased to Farnham Angling Society and reports from the club indicated that roach, dace, pike and the odd large chub might be expected. The river here is fairly deep and wide and, at the time of the surveys, flowing strongly impairing catch efficiency. However, no indication of poor water quality or habitat can explain this anomalous result. A further 3km downstream at Eashing site WEF2 produced 52.gm^{-2} of which approximately 80% were large chub. The exceptional chub biomass could possibly be the result of an upstream migration to suitable spawning areas as many of the fish were ripe. The bottom site WEF1 at Unstead was just short of its target at 18.5gm^{-2}, but nevertheless supported a well balanced fish community

The unclassified Whitmoor Vale Stream was included in this survey as it was known to support brown trout and crayfish and was under threat from the construction of on stream ponds. All three sites surveyed produced excellent numbers of small wild brown trout.

Results from the Tillingbourne were disappointing. The middle and upper reaches, despite appearing to be particularly suitable for brown trout recruitment, failed to reach their target of 15gm^{-2}. Although low in numbers, brown trout were present at all sites. Water Quality is not considered to be a problem, data collected from the Reach Assessment Point upstream of the Tillingbourne Trout Farm failed its RQO in respect of BOD on the 15-9-86. This anomalous result was thought to be due to heavy rain as two other samples taken during this period were well within target.

The Cranleigh Waters produced some interesting results. The river runs through a clay catchment and is prone to flash flooding and has indifferent water quality. The upstream site CGJ1 above Cranleigh STW returned a predictably low biomass of 5.5gm^{-2}, a consequence of the poor habitat however, site CGF2 at Run Common, proved to be the most productive of the whole survey, with a biomass of 97.5gm^{-2} and a density of 2.2nm^{-2}. These results were surprising as water and macroinvertebrate data suggested this section would provide an impoverished habitat. It was particularly encouraging to see large numbers of small chub and roach. The site was sampled in May so a migration to this comparatively shallower section could, in part, account for the unusually high biomass. The bottom site, CGF1, although not attaining its target, also produced a proliferation of small two and three year old chub.

Results obtained from the Stanford Brook varied considerably over the three sites surveyed. The upstream site SBO1 was predictably poor with a biomass of less than 2, probably due to the deeply cut channel and soft unproductive substrate. Conversely, site SBJ1 produced a chub dominated biomass of 25.9gm^{-2}, although roach and gudgeon were also well represented. A lack of chub probably accounted for the low

biomass ($7.3gm^{-2}$) found on the bottom site at Pyrford Court (SBJ2). However, good numbers of small roach were again found

Eight different species of fish were recorded at the Ockham Mill Stream site OMO1. This stream supports a diverse macrophyte community and the recorded biomass of $13.1gm^{-2}$ was considered to be excellent for such a small stream.

Growth rates varied considerably between the various habitat units. On the combined Wey, chub and dace growth rates compared favourably with the Hickley and Dexter standard as can be seen from figures 5.36 and 5.37. The low densities and rich environment of the Wey North above Farnham are reflected in the excellent growth achieved, conversely it can also be seen that chub captured from the densely stocked Cranleigh Waters were well below standard. Figure 5.39 depicts the roach growth curves which compare well to the standard. A similar pattern emerges for brown trout (fig. 5.35), where the high densities of the upper Wey south and Whitmoor Vale Stream restrict growth in contrast the fewer specimens captured from the Tillingbourne.

Pike were found in most sites as far upstream as WNH1 on the Wey North and WSH9 on the southern branch. They were also present in all the tributaries except the Tillingbourne and Whitmoor Vale Stream. A similar distribution was found for perch.

Despite the cyprinid classification allotted to the upper reaches of the Wey South the river supports an exclusive population of salmonids. This is a reflection of the excellent habitat and good water quality found here. With the expanding areas of Haslemere and Bordon at its head waters, the effluents from their respective sewage treatment works must be maintained or improved if this rare and valuable fish community is to survive.

7 CONCLUSIONS

The upper Wey South and Whitmoor Vale Stream supports a wild population of small brown trout. This represents a rare fish community within the Thames catchment.

From Lindford down to Tilford the poor substrate of soft, shifting sand has a profound effect on fish density, with little cover and available food, particularly for fry.

The Wey North and combined river constitute a well balanced cyprinid fishery. Further investigations will be required in the Somerset bridge area to establish why there is an apparent lack of fish.

The Cranleigh Waters and Stanford brook both produced encouraging results, particularly with the high numbers of chub and roach found.

Results obtained from the Tillingbourne were disappointing considering the good water quality and apparently suitable habitat. Much of the stream is too fast and shallow to support numbers of cyprinids and the recruitment of brown trout was considerably less successful than might have been expected

In general the upper and middle reaches of the river Wey and its tributaries support a diverse and healthy fish fauna, despite the biomasses of much of the river failing to achieve their target. It would appear that the physical characteristics and available habitat are the major limiting factors. Unfortunately the current biomass targets are based solely on RQO and take no account of the fundamentally mportant nature of the habitat.

8 RECOMMENDATIONS

(a) There is considerable potential for habitat improvement measures on the combined river and lower reaches of the Wey South. Vast quantities of sand are deposited here, severely restricting the diversity of food and shelter. Work is required to identify those areas which would readily benefit from enhancement of the habitat by means, principally of groynes or channel narrowing.

Those banks vulnerable to erosion would benefit from stabilizing with, for example, Nicospan, large rocks and boulders, or sub-surface wooden stakes. These would provide valuable habitats for invertebrates and fry. Unproductive pools could be dredged and widened to form "sand traps". These could be re-dredged on a rolling program, providing holding areas during spate conditions and protecting the more sensitive stretches from further siltation.

(b) The natural brown trout of the upper Wey South and Whitmoor Vale Stream represent rare fish communities within the Thames catchment. As such they will require protection from over stocking of hatchery reared fish and in the case of the Whitmoor Vale Stream from the construction and widening of on stream ponds. The water quality must be, at the very least, maintained to its present standard taking into account the increasing amount of development in the area.

(c) Tributaries such as the Stanford Brook and Cranleigh Waters, although of only limited fishery interest are important nursery streams, particularly for chub and roach and will therefore need sympathetic land drainage management and protection from the deleterious effects of poor water quality.

9 REFERENCES

Council of the European Communities Directive of 18th July 1978. On the quality of freshwaters needing protection or improvement in order to support fish life. 78/659/EEC; OJ L222, 14th August 1987.

Hickley P. and Dexter K.F., 1979. A comparative index for quantifying growth in length of fish. Fishery Management 10(4), 147-151.

APPENDIX I

CLASSIFICATION OF RIVER QUALITY

River Class	Quality criteria	Remarks	Current potential uses
	Class limiting criteria (95 percentile)		
1A	(i) Dissolved oxygen saturation greater than 80%. (ii) Biochemical oxygen demand not greater than 3mg/l. (iii) Ammonia not greater than 0.4 mg/l. (iv) Where the water is abstracted for drinking water, it complies with requirements for A2** water. (v) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures not available).	(i) Average BOD probably not greater than 1.5 mg/l. (ii) Visible evidence of pollution should be absent.	(i) Water of high quality suitable for potable supply abstractions and for all other abstractions. (ii) Game or other high class fisheries. (iii) High amenity value.
1B	(i) DO greater than 60% saturation. (ii) BOD not greater than 5 mg/l. (iii) Ammonia not greater than 0.9 mg/l. (iv) Where water is abstracted for drinking water, it complies with the requirements for A2** water. (v) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures not available).	(i) Average BOD probably not greater than 2 mg/l. (ii) Average ammonia probably not greater than 0.5 mg/l. (iii) Visible evidence of pollution should be absent. (iv) Waters of high quality which cannot be placed in Class 1A because of high proportion of high quality effluent present or because of the effect of physical factors such as canalisation, low gradient or eutrophication. (v) Class 1A and Class 1B together are essentially the Class 1 of the River Pollution Survey. (RPS)	Water of less high quality than Class 1A but usable for substantially the same purposes.
2	(i) DO greater than 40% saturation. (ii) BOD not greater than 9 mg/l. (iii) Where water is abstracted for drinking water, it complies with the requirements for A3** water. (iv) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures not available).	(i) Average BOD probably not greater than 5mg/l. (ii) Similar to Class 2 of RPS. (iii) Water not showing physical signs of pollution other than humic colouration and a little foaming below weirs.	(i) Waters suitable for potable supply after advanced treatment. (ii) Supporting reasonably good coarse fisheries. (iii) Moderate amenity value.
3	(i) DO greater than 10% saturation. (ii) Not likely to be anaerobic. (iii) BOD not greater than 17 mg/l*.	Similar to Class 3 of RPS.	Waters which are polluted to an extent that fish are absent or only sporadically present. May be used for low grade industrial abstraction purposes. Considerable potential for further use if cleaned up.
4	Waters which are inferior to Class 3 in terms of dissolved oxygen and likely to be anaerobic at times.	Similar to Class 4 of RPS.	Waters which are grossly polluted and are likely to cause nuisance.
X	Do greater than 10% saturation.		Insignificant watercourses and ditches not usable, where objective is simply to prevent nuisance developing.

(a) Under extreme weather conditions (e.g. flood, drought, freeze up), or when dominated by plant growth, or by aquatic plant decay, rivers usually in Classes 1, 2 and 3 may have BODs and dissolved oxygen levels, or ammonia content outside the stated levels for those Classes. When this occurs the cause should be stated along with analytical results.

(b) The BOD determinations refer to 5 day carbonaceous BOD (ATU). Ammonia figures are expressed as NH_4.

(c) In most instances the chemical classification given above will be suitable. However the basis of the classification is restricted to a finite number of chemical determinands and there may be a few cases where the presence of a chemical substance other than those used in the classification markedly reduces the quality of the water. In such cases, the quality classification of the water should be downgraded on the basis of the biota actually present, and the reasons stated.

(d) EIFAC (European Inland Fisheries Advisory Commission) limits should be expressed as 95% percentile limits.

* This may not apply if there is a high degree of re-aeration.

** EEC category A2 and A3 requirements are those specified in the EEC Council Directive of 16 June 1975 concerning the Quality of Surface Water intended for Abstraction of Drinking Water in the Member States.

APPENDIX II

Internal Thames \ N.R.A Unit Parameters

River Quality Objectives

Class 1A – High quality waters

1. Suitable for potable supply at defined abstraction points,and
2. Suitable for all other abstractions,and
3. Suitable for game or any other high class fisheries,(complying with the requirements of Directive 78/659/EEC for salmonid waters),and
4. Of high amenity value.

Class 1B – High quality waters

1. Used for the transport of high proportions of sewage effluent, trade effluent or urban run-off,and
2. Suitable for potable supply at defined abstraction points,and
3. Suitable for all other abstractions,and
4. Suitable for game or any other high class fisheries,(complying with the requirements of Directive 78/659/EEC for salmonid waters),and
5. Of high amenity value.

Class 2A – Fair quality waters

1. Suitable for potable supply after advanced treatment at defined abstraction points,and
2. Suitable for agricultural uses,and
3. Capable of supporting good coarse fisheries,(complying with the requirements of Directive 78/659/EEC for cyprinid waters),and
4. Of moderate amenity value.

Class 2B – Fair quality waters

1. Suitable for potable supply after advanced treatment at defined abstraction points,and
2. Suitable for agricultural uses,and
3. Capable of supporting reasonably good coarse fisheries,and
4. Of moderate amenity value.

Class 3 – Poor quality waters

1. Suitable for low grade industrial use,and
2. Not anaerobic or likely to cause a nuisance,and
3. Capable of supporting a restricted aquatic flora and fauna.

N.B.Not required to be capable of supporting a viable fishery.

Class 4 – Bad quality waters

1. Likely to cause a nuisance.
2. Flora and fauna absent or restricted to pollution tolerant organisms.

Class X – Insignificant watercourses

1. Watercourses,not usable,and not placed in Classes 1A to 4 above.
2. Capable of supporting a restricted flora and fauna,and
3. Not likely to cause a nuisance.

APPENDIX III

EXTRACT FROM E.E.C. DIRECTIVE 78 / 659

LIST OF DETERMINANDS

Determinand	*Salmonid Waters*		*Cyprinid Waters*	
	G	*I*	*G*	*I*
(a) Temperature (max) (b) Temperature rise		⩽21.5°C ⩾1.5°C		⩽28°C ⩾ 3°C
Dissolved oxygen (mg/l)	50% > 9 100% > 7	50% > 9	50% > 8 100% > 5	50% > 7
pH		6 – 9		6 – 9
Suspended solids (mg/l)	⩽ 25		⩽ 25	
B.O.D.(A.T.U.) (mg/l)	⩽ 5•		⩽ 8 •	
Nitrates (mg/l)	⩽ 0.2•		⩽0.5•	
Non–ionized ammonia (mg/l)	< 0.005	< 0.025	<0.005	< 0.025
Total ammonium (mg/l NH_4)	< 0.04	< 1	< 0.2	< 1
Total residual chlorine (mg/l HClO)		< 0.005		< 0.005
Zinc (mg/l)		< 0.3		< 1
Copper (mg/l)	< 0.04		< 0.04	

• The revised G–values that have been set by the U.K.Government

Appendix IV. NRA Fish Survey Site Coding System

The following habitat codes are used by Thames NRA fisheries and are based on RQO and EEC legislation criteria:

1. EEC Designated Watercourses

Code	Description
A	1A Salmonid
B	1A Coarse
C	1A/1B Salmonid
D	1A/1B Cyprinid
E	1B Salmonid
F	1B Coarse
G	2/1B Salmonid
H	2/1B Coarse
I	2 Salmonid
J	2 Cyprinid

2. ROO Watercourses

Code	Description
K	1A
L	1A/1B
M	1B
N	2/1B
O	2
P	3/2
Q	3
R	4/3
S	4
T	Unclassified

A 2 digit code for a watercourse is combined with the above and an individual site number to provide an unique 4 digit code for each site. Thus WNH1 = WN, Wey North; H, 2/1B cyprinid; 1, individual site.