FISHERY SURVEY OF THE BRIDGWATER & TAUNTON CANAL

1. INTRODUCTION

1.1 This fishery survey of the Bridgwater & Taunton Canal was undertaken during April and May 1994.

1.2 Whilst the survey forms part of a routine programme of work this investigation was prompted by complaints from anglers about the fishery. The official opening of the Canal to powered craft at the start of June was also seen as a source of potential change and a reason for obtaining baseline data.

2. TOPOGRAPHY AND GEOLOGY

2.1 The Bridgwater & Taunton (B&T) Canal was originally dug in 1827 from Huntworth on the River Parrett to the River Tone in Taunton. In 1841 the canal was extended from Huntworth around the outskirts of Bridgwater to connect with a new dock built for sea going vessels.

2.2 The Canal survived as a waterway after the end of commercial traffic in 1907 because the supply of freshwater was needed to flush silt from the Bridgwater Docks. When the Docks in turn closed in about 1966 the docks were sealed to prevent tidal intrusion. Shortly afterwards a major abstraction of water from the canal to Durleigh reservoir was authorised to boost drinking water supplies in the area.

2.3 When the Docks were sealed the canal overflow at Hamp was upgraded and most of the flow now passes to the River Parrett here, leaving the last 2 kilometres of the Canal in a stagnant condition.

2.4 In the last few years the local authorities have spent considerable sums restoring swing bridges and raising other fixed bridges to provide a navigable headroom. In June 1994 the Canal was officially opened for powered craft.

2.5 The Canal is fed with water from the River Tone in Taunton. Most other watercourses which pass its course are culverted underneath.

2.6 The Canal's water is thus derived from the Tone catchment. The Tone itself drains initially from steep-sided valleys in the Upper Devonian slates and sandstones. Lower down the catchment is less hilly where the geology is based on Permo-Triassic sandstones and conglomerates.

2.7 The course of the B&T Canal and the location of locks and sampling sites are all shown on the map (Appendix 1). APPENDIX 1

3. FLOW AND ABSTRACTION

3.1 The flow of water to the Canal is regulated by an intake structure adjacent to Firepool Lock at Taunton. The flow has to be sufficient to keep the Canal in water and when appropriate to supply the abstraction for Durleigh.

3.2 The only significant abstraction from the Canal is the abstraction of water for Durleigh Reservoir. The licensed quantity is 18 Megalitres per day with a total of 4300 Megalitres per year.

3.3 In practice prolonged dry weather can result in a situation where there is insufficient water to satisfy the needs both of the Canal and the River Tone below Taunton. Further development in Taunton and the needs of lockage in the re-opened Canal may increase the frequency of these events.

4. WATER QUALITY

4.1 Chemical water quality as shown in the 1993 General Quality Assessment is measured at two sampling points on the Canal. The upper site indicates that the water in that reach is in Class C "Fair" whilst the lower site is in Class E "Poor". Ammonia levels are Class A for both sites. At the upper site dissolved oxygen is the class limiting criterion and the lower site both dissolved oxygen and BOD are class limiting.

4.2 Biological water quality is assessed at one site only. There are no recent results available which can be compared with the chemical data.

4.3 There have been no significant water quality problems on the Canal in the last two years.

5. FISHERY SURVEY METHOD

5.1 Sample sites were chosen by dividing the Canal into two kilometre lengths within each of which a one hundred metre length was selected using random numbers. Appendix 2 lists the sample sites with their grid references; the location of all sample sites is shown on the map, Appendix 1. **APPENDIX 2** **APPENDIX 1**

5.2 All the sites were electric fished from a mini-boom boat using pulsed DC fishing equipment operating at six hundred cycles per second. Sites were always fished upstream. All sites were isolated using stop nets.

5.3 All fish over 10 centimetres and many under that size were measured and weighed. Samples of scales were also taken from many fish for future examination. Where there were large numbers of small fish they were sorted by species and counted and weighed in bulk.

5.4 Population estimates of larger fish were obtained where possible by three repeated fishings (runs) using a declining catch method at all sites.

6. RESULTS

6.1 Figures 1 and 2 show respectively the biomass and population of all fish over 10 centimetres in length caught at each site. Each bar on Figures 1 and 2 is subdivided to indicate the species composition. Each species is indicated by a consistent colour and shading style. **FIGURES 1 & 2**

6.2 Figures 3 and 4 show respectively the biomass and population of all fish under 10 centimetres in length caught at each site including those that were counted and weighed in bulk. **FIGURES 3 & 4**

6.3 Figures 5-9 show the length frequency of bream, roach, pike, tench and eels from all sites. Small fish less than 10 centimetres in length which were bulk weighed cannot be shown on these charts and fish of this size are anyway likely to be under represented except in the case of pike and eels. **FIGURES 5-9**

6.4 Actual results used to derive the figures are included within Appendix 2. **APPENDIX 2**

7. DISCUSSION

7.1 The poor water quality results at the lower sampling site are partly explained by the location of the site which is close to the potable water abstraction point and downstream of the canal overflow at Hamp. This reach of the Canal is almost stagnant unless abstraction is occurring. Some works have been undertaken to improve the flow in the lower reaches but significant change is unlikely unless the majority of Canal flow is routed through the Docks so that Hamp overflow becomes an emergency outlet. It is understood that this work is partly dependent on raising the Canal banks in the Huntworth area.

7.2 The total biomass of fish is generally good. There was a slight decline in the middle reaches where the locks are located. Some of this variation may be attributable to the presence and operation of the locks isolating populations.

7.3 There is a pattern in the eel population which appears to reflect the presence of lock barriers with high populations below and low populations above obstructions.

7.4 One of the immediate findings of the survey was the presence of <u>Leucaspius delineatus</u> variously known as motherless minnows, verkhovka, and sun bleak. This species was first identified in this country in 1990 during a fisheries survey of the Kings Sedgemoor Drain. The identity of this species in the Drain and in the Canal was confirmed by Mr Alwyne Wheeler.

7.5 The presence of any new species in a water may significantly change the overall ecology and obvious fears have been expressed about the impact of <u>L. delineatus</u>. A literature search has revealed no evidence that this species has any behavioural traits which are of immediate concern. Some reports from other European countries indeed express concern that the species is endangered!

7.6 Scales of some of the larger L.delineatus suggest that the larger fish of about 6.5 cm may be three years old and it is reasonable to assume the species has been in the Canal for at least that time.

7.7 A sample of L. delineatus was submitted to Mr Wheeler who had kindly offered to determine gut contents. His report indicated that the diet of L. delineatus was small insects and crustaceans. These fish were from one site and caught at one time. There is always the chance that diet will vary in place and time but given that the fish were caught in June there was no evidence that they were feeding on the young of other species which were then abundant. These findings confirm reports in the literature which suggest that the species is a plankton and surface feeder which will obviously compete with other similarly sized fish for space and food. In the context of the Canal as shown in Figure 4 it is outnumbered by roach virtually everywhere and as a proportion of biomass (Figure 3) it is even less important. FIGURE 4 FIGURE 3

7.8 Whilst the density and biomass of roach appear healthy the length frequency plot (Figure 6) reveals an apparent shortage of fish over 15 cms in length. Scale reading has revealed a growth rate somewhat slower than the standard, with fish typically a year older for length than one might expect. Very few fish were over 7 years old. FIGURE 6

7.9 Although bream numbers were patchy the length frequency plot (Figure 5) shows all sizes of fish represented. There were however very few bream fry (Figure 4), which may be a cause for concern. FIGURE 5 FIGURE 4

7.10 Spawning bream were present at most of the sites at the Taunton end during the survey and large dead bream were seen at several. The spawners were rather dispersed and were not seen en masse during the course of the survey.

7.11 Weed cutting was in progress on the Canal during the latter part of this survey and it is possible that during 1994 this could have had an impact on bream recruitment in some reaches by removing the fringe of weed where spawning had occurred.

7.12 The biomass of pike (Figure 1) is high but the length frequency (Figure 7) reveals a well balanced population. Inevitably there may be a suggestion that pike numbers should be reduced but this should be resisted. Pike removal is a contentious issue and the effect would be both unpredictable and potentially counterproductive. FIGURE 1 FIGURE 7

7.13 There have been comments that turbidity in the Canal has increased. This was an anticipated problem when the waterway was opened to powered craft but this is clearly not the primary cause yet. If turbidity has increased it could be due to algal blooms and analysis of phyto- and zooplankton balance could reveal some answers. Any historic information could be especially useful in this respect.

7.14 Increased turbidity could in part explain the success of pike which are known to prey most successfully in low light intensities when shoaling species find it difficult to maintain the integrity of the shoal.

7.15 Tench were only occasionally caught though all sizes were represented (Figure 8). FIGURE 8

7.16 There is some evidence to suggest that the fishery in the Canal has changed from the situation in the past when it had a reputation for numbers of quality fish. Although the Canal is a more stable environment than most rivers, which are subject to the rigours of drought and flood, the factors involved are still complex and it is unlikely that there is a simple explanation for any change which has taken place.

7.17 The most obvious environmental factors which are known to vary are the weather pattern, water and weed management and the routine maintenance of the waterway.

7.18 In comparatively recent times the point of main Canal discharge has altered and there is now a major abstraction of water in the lower reaches. This has had an impact on quality in the lowest reaches though the situation has been similar for twenty five years.

7.19 Weed control practice has altered over the years with, for example, the use of machine cutting from the bank, weed cutting boats, straw treatment, and grass carp. Work has been done both by British Waterways staff and by contractors.

7.20 Weather patterns can have dramatic effects particularly affecting the timing and success of spawning and recruitment.

8. CONCLUSIONS

8.1 Whilst the biomass and density of fish were quite satisfactory there are obviously some problems when the composition of the fish population is studied in more detail. There is clearly a good roach population but the older year classes are poorly represented. Pike numbers are high but all sizes are represented and the population is well structured. The bream population is balanced but there has to be some concern that few fry were evident in this survey.

8.2 The timing and method of weed cutting was clearly a potential problem in fisheries terms during 1994. Weed cutting methods and patterns are also one of the factors which have varied in the recent history of the Canal. Starting the cut later or very much earlier in the year to avoid times when fish are spawning and when fry are vulnerable may prove beneficial. In a given year adopting a more piecemeal and varied approach to weed control methods, timing and location may also help though this is difficult to achieve without a cost factor when work is contracted.

8.3 The arrival of the motherless minnow *Leucaspius delineatus* is not thought to have any direct ecological effect though it will compete for food and space with other species.

8.4 Stocking the Canal with more fish may provide a short term benefit to anglers but is also likely to benefit an already healthy pike population which clearly thrives in the current regime of the Canal.

8.5 Whilst it is tempting to assume that there are clear reasons for change in a fishery the causes may be entirely due to natural causes. In the case of the Canal all the species for which the water is famous are still well represented though at the present time it appears that the relative proportions and size distribution of the major species probably fall short of many anglers' expectation.

BRIDGWATER & TAUNTON CANAL 1994

BIOMASS OF ALL FISH > 10cm LENGTH

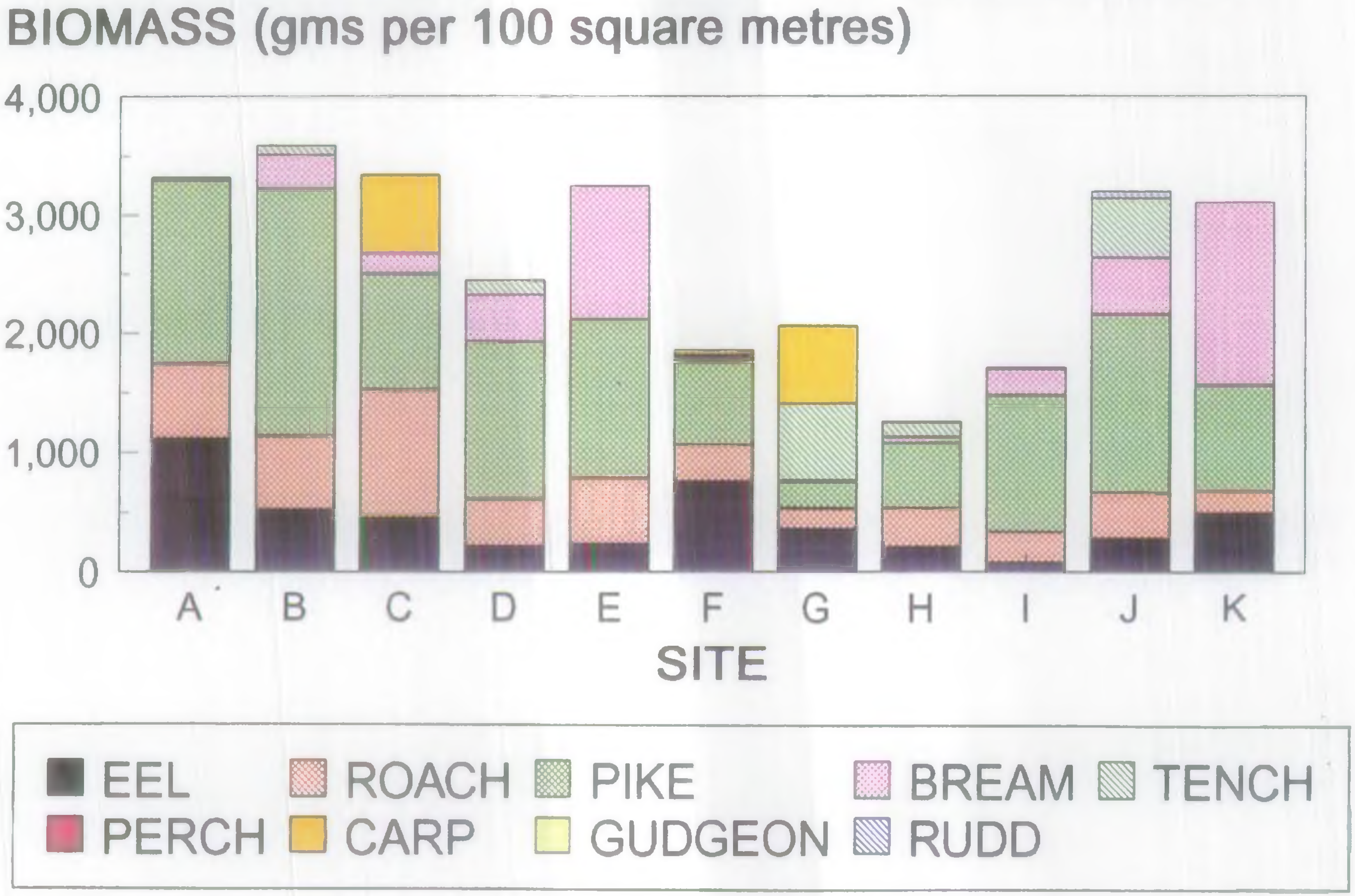


FIGURE 1

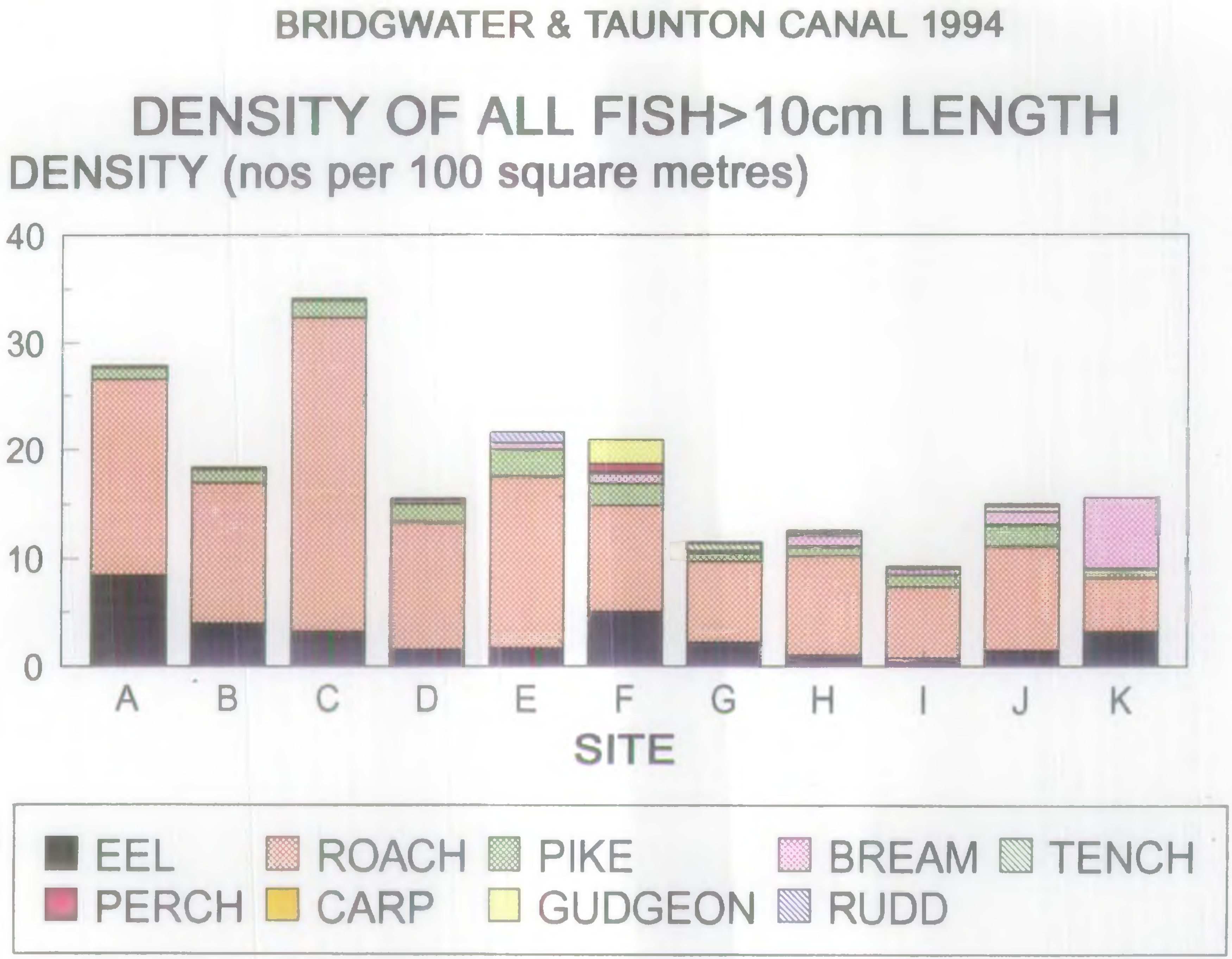
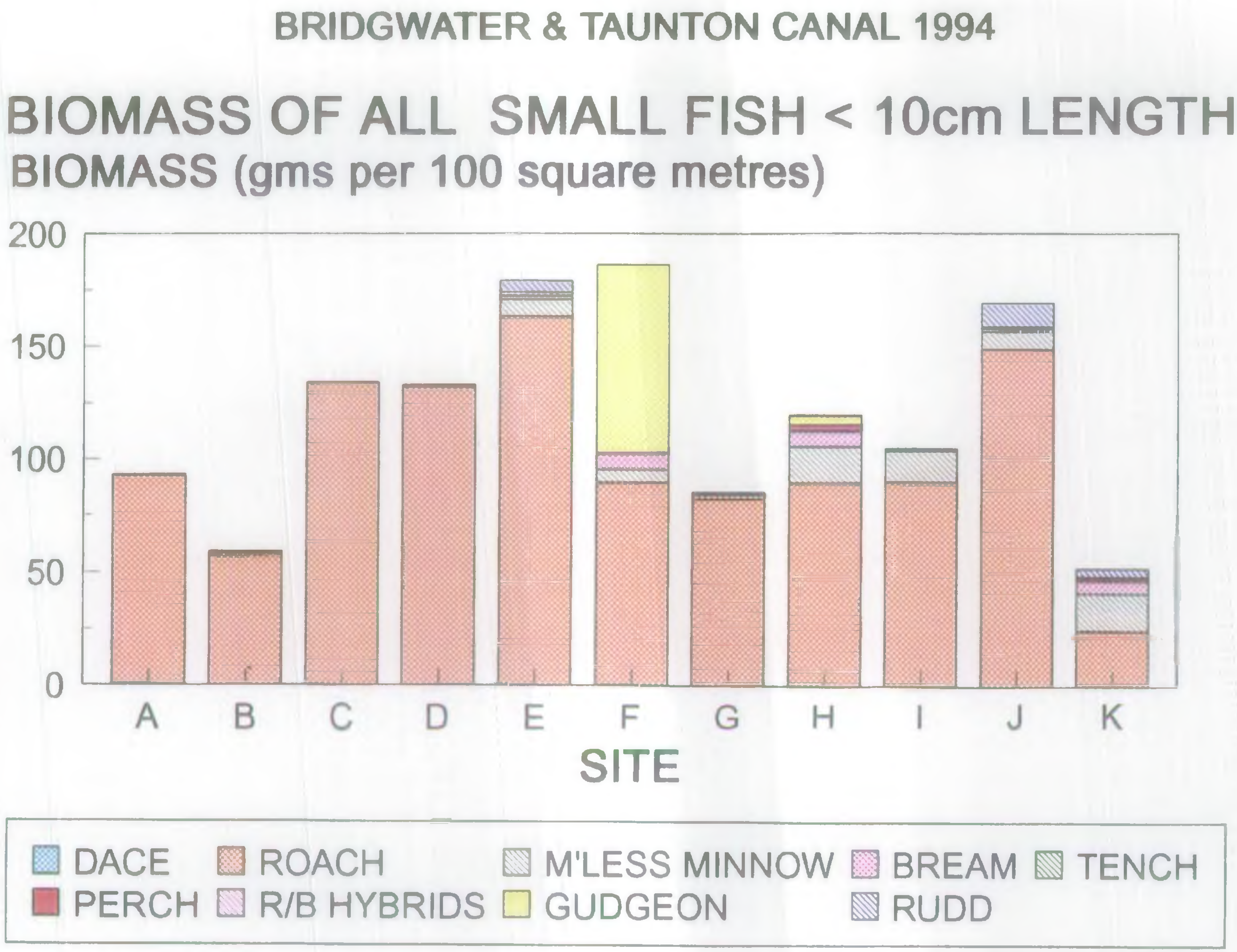

BRIDGWATER & TAUNTON CANAL 1994
DENSITY OF ALL FISH>10cm LENGTH
DENSITY (nos per 100 square metres)
40
30
20
10
0
A
B
C
D
E
F
G
H
I
J
K
SITE
EEL
ROACH
PIKE
BREAM
TENCH
PERCH
CARP
GUDGEON
RUDD

FIGURE 2



BRIDGWATER & TAUNTON CANAL 1994
BIOMASS OF ALL SMALL FISH < 10cm LENGTH
BIOMASS (gms per 100 square metres)
200
150
100
50
0
A
B
C
D
E
F
G
H
I
J
K
SITE
DACE
ROACH
M'LESS MINNOW
BREAM
TENCH
PERCH
R/B HYBRIDS
GUDGEON
RUDD

FIGURE 3

BRIDGWATER & TAUNTON CANAL 1994

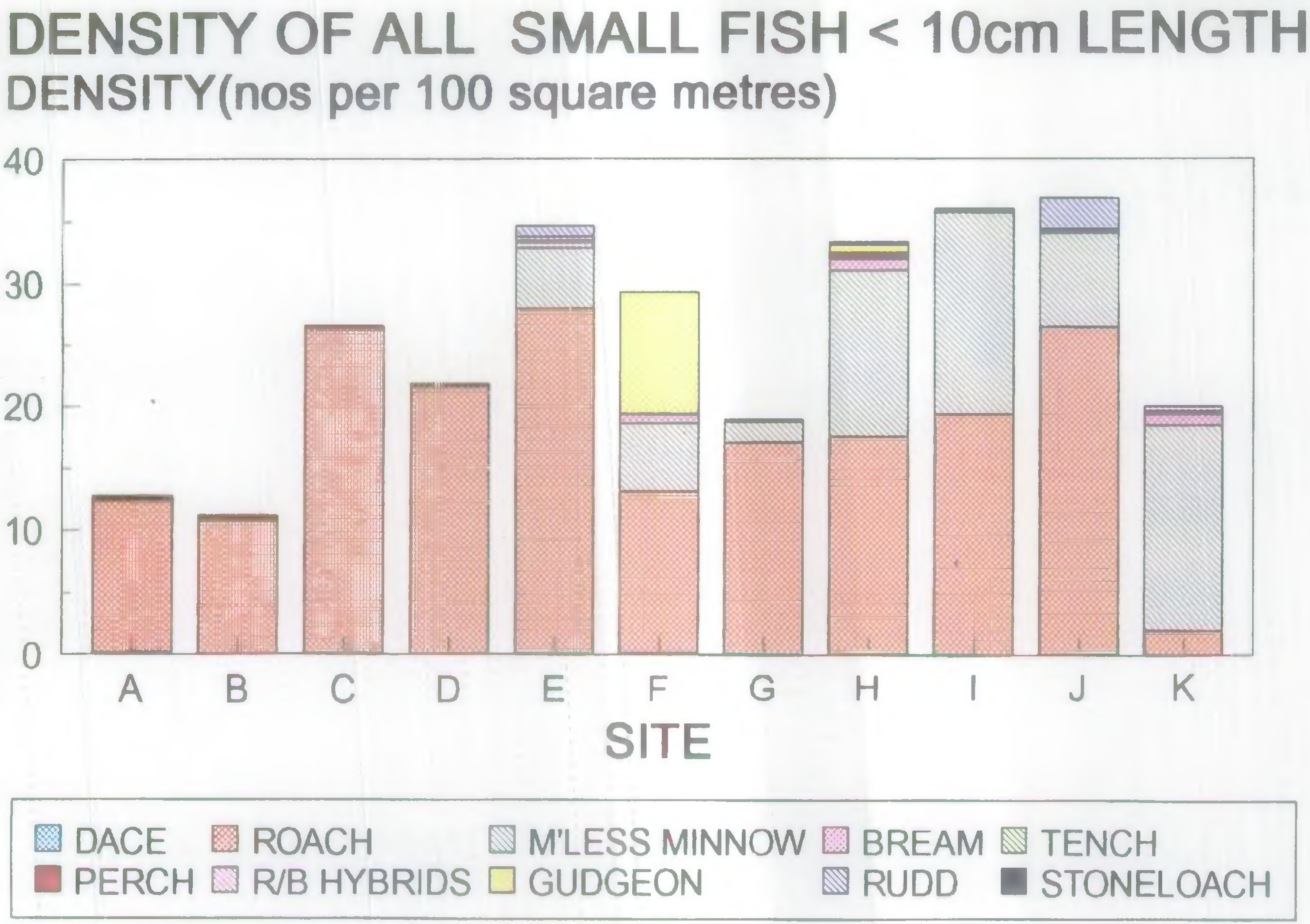


FIGURE 4

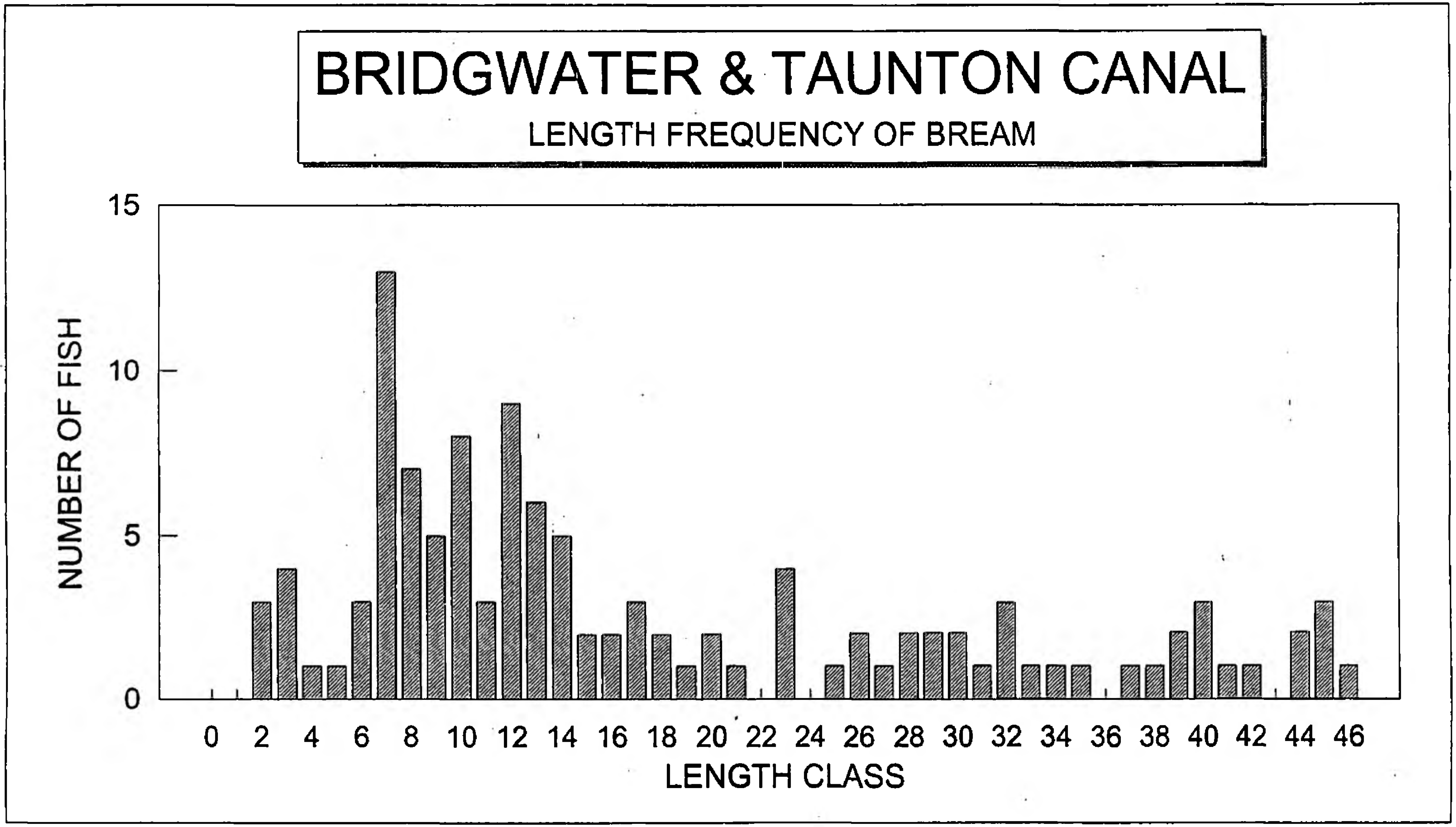

BRIDGWATER & TAUNTON CANAL
LENGTH FREQUENCY OF BREAM
NUMBER OF FISH
0
5
10
15
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
LENGTH CLASS

FIGURE 5

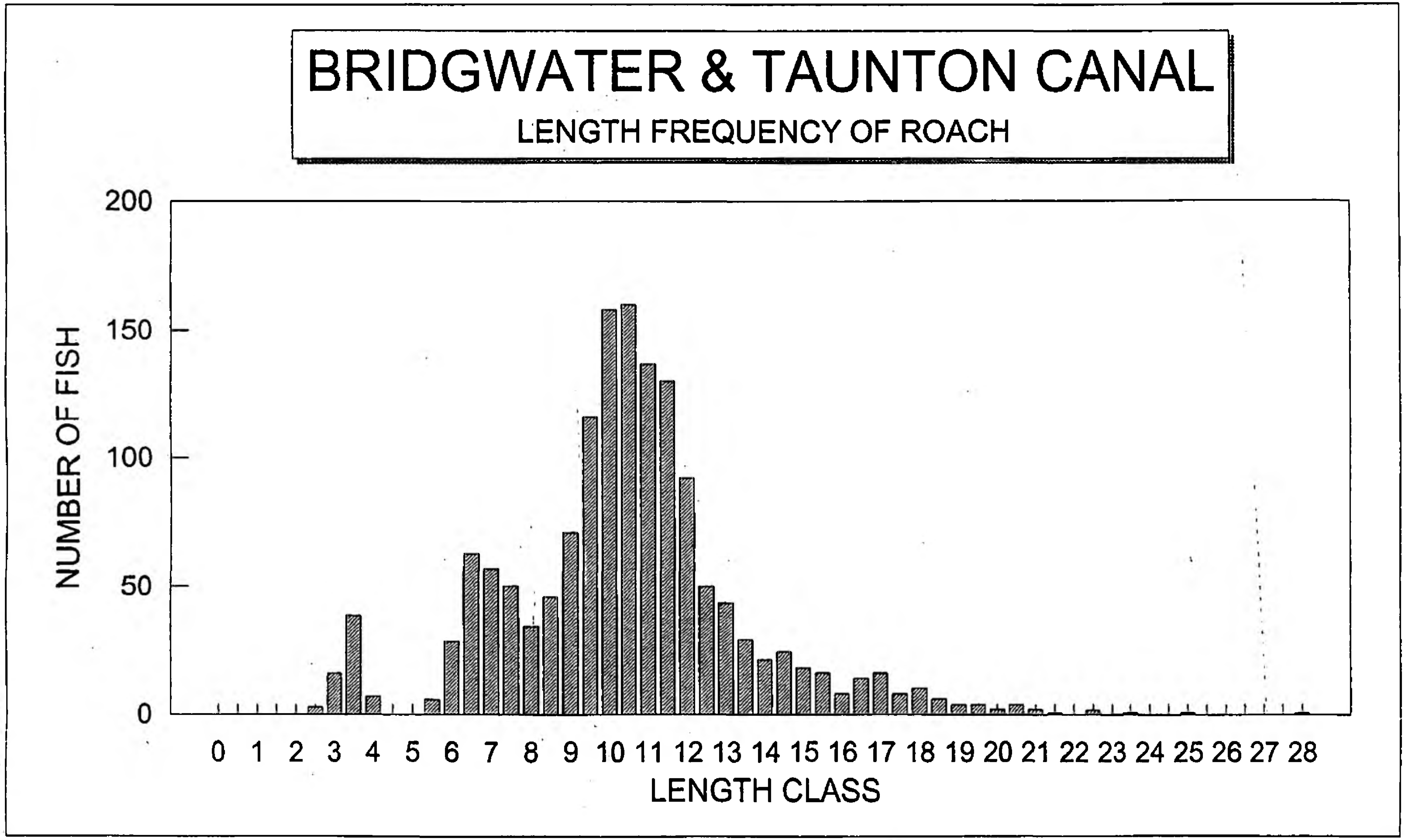

BRIDGWATER & TAUNTON CANAL
LENGTH FREQUENCY OF ROACH
NUMBER OF FISH
200
150
100
50
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
LENGTH CLASS

FIGURE 6

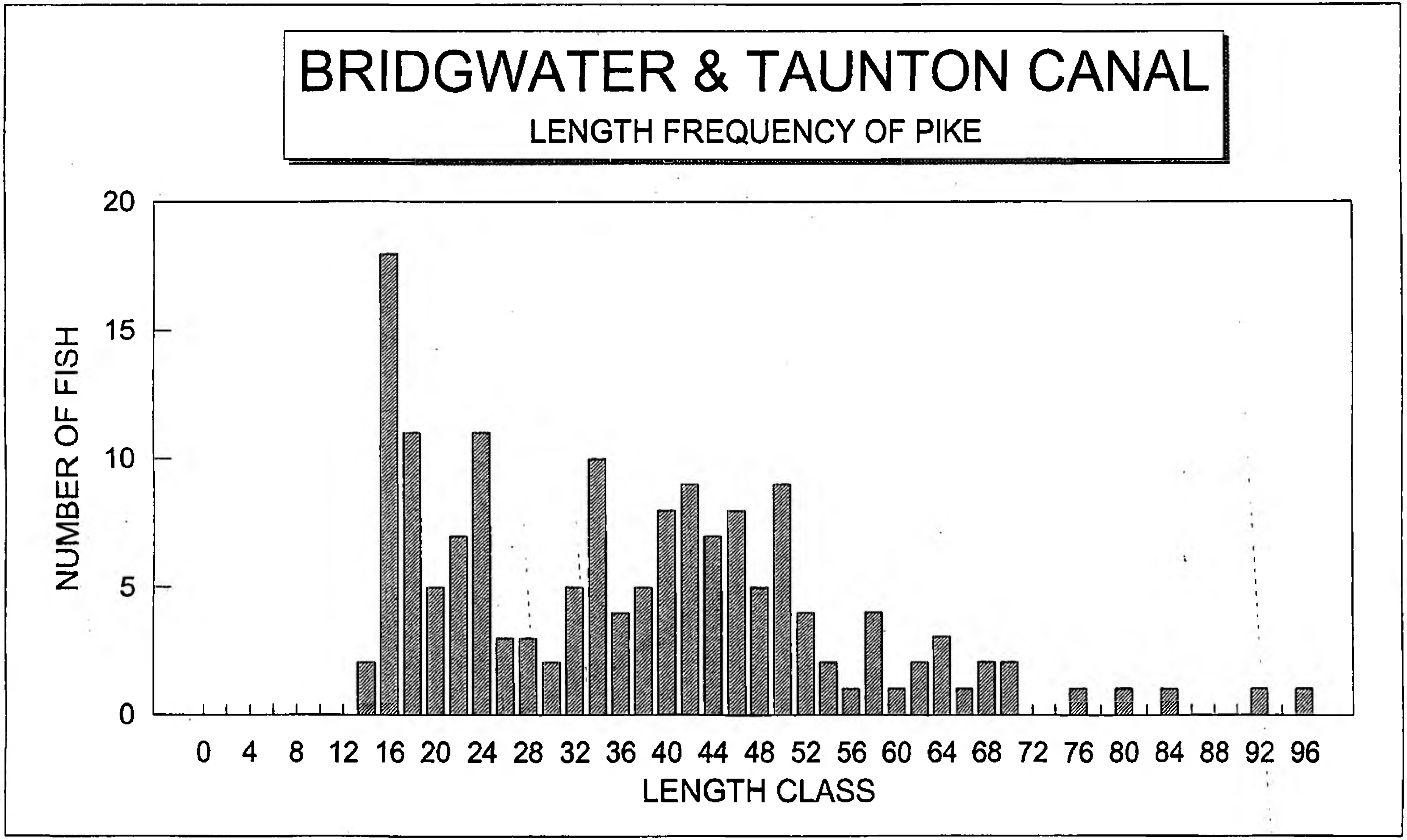

BRIDGWATER & TAUNTON CANAL
LENGTH FREQUENCY OF PIKE
NUMBER OF FISH
0
5
10
15
20
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96
LENGTH CLASS

FIGURE 7

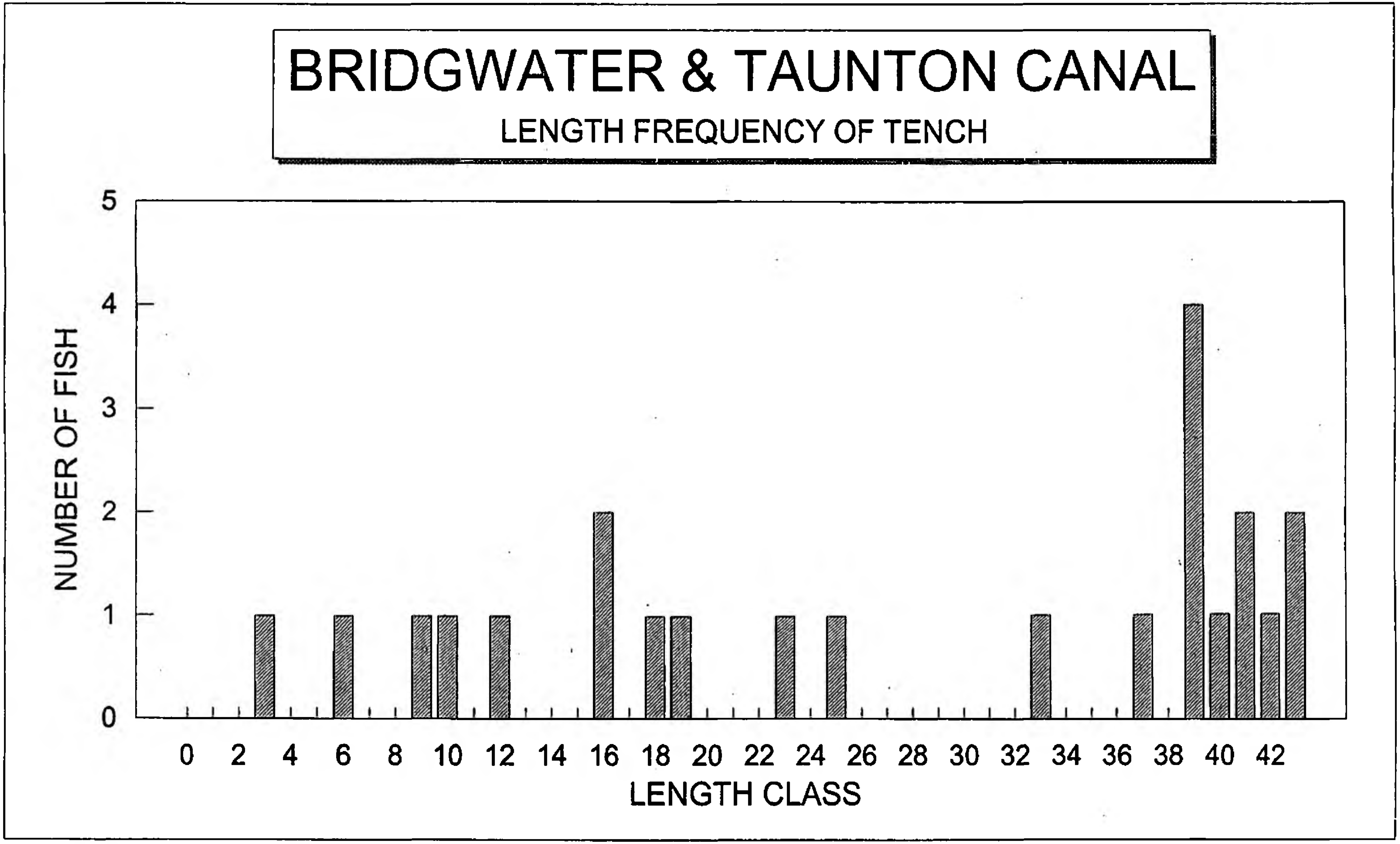

BRIDGWATER & TAUNTON CANAL
LENGTH FREQUENCY OF TENCH
NUMBER OF FISH
0
1
2
3
4
5
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42
LENGTH CLASS

FIGURE 8

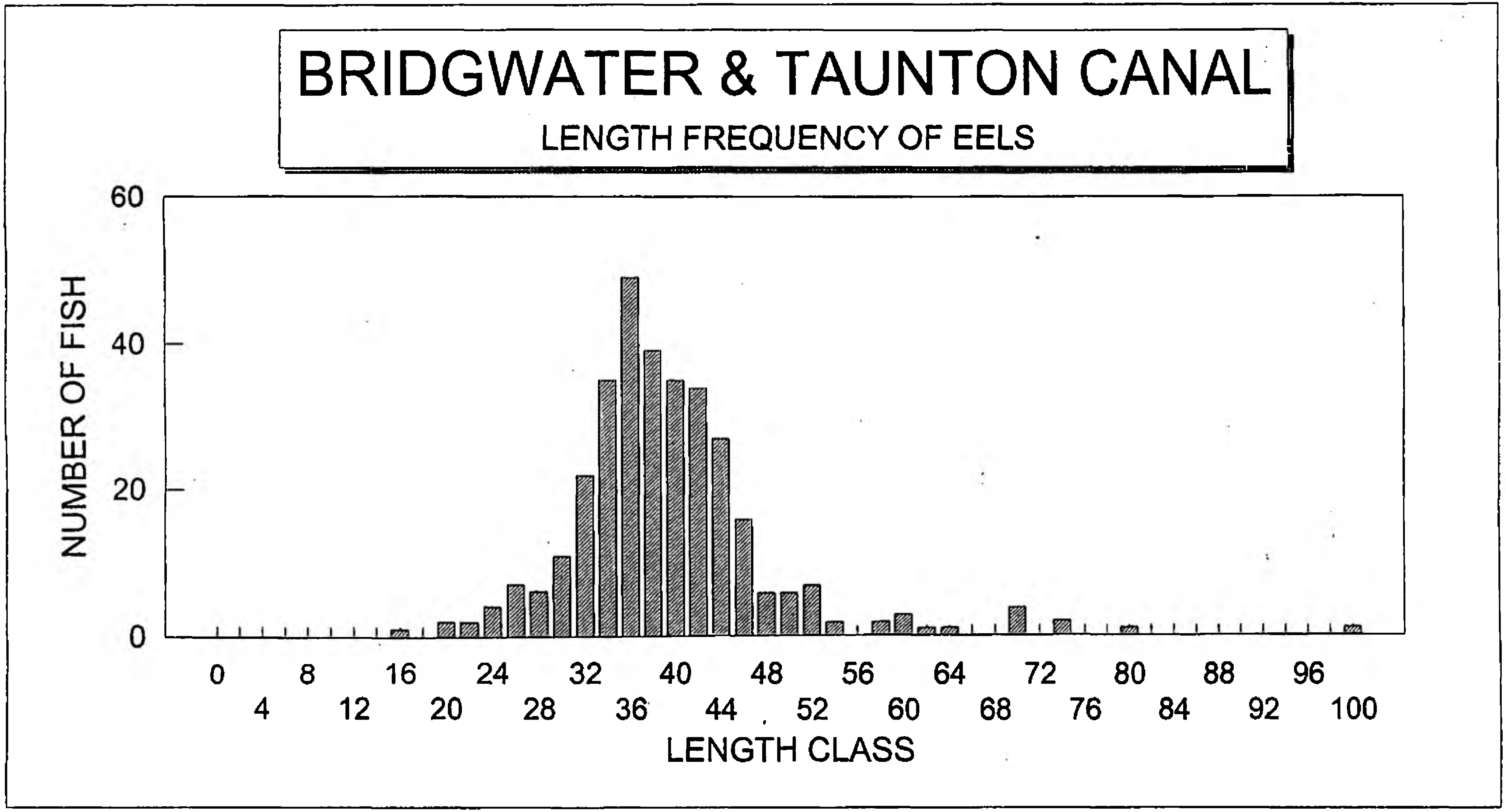
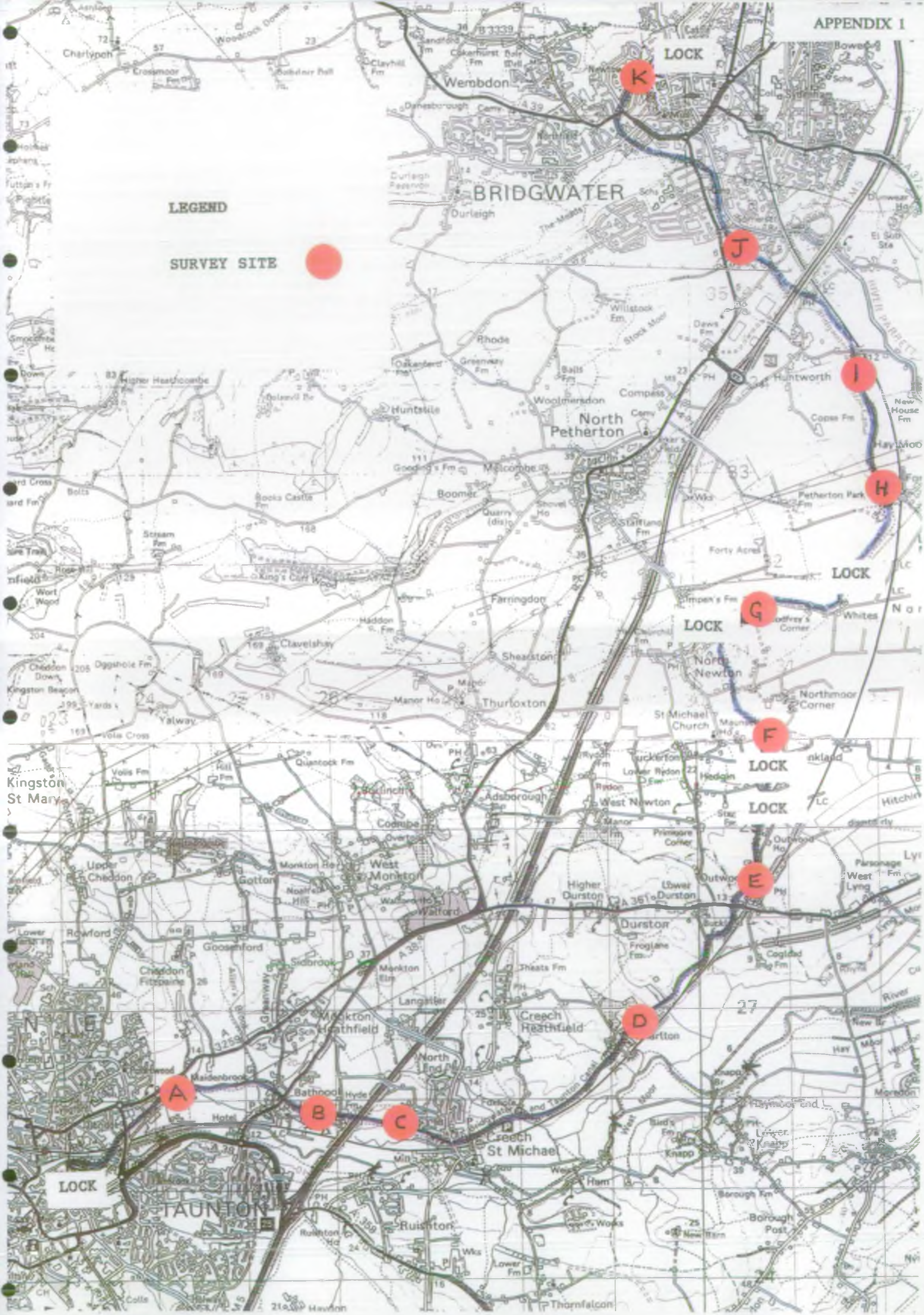

BRIDGWATER & TAUNTON CANAL
LENGTH FREQUENCY OF EELS
NUMBER OF FISH
0
20
40
60
0 8 16 24 32 40 48 56 64 72 80 88 96
4 12 20 28 36 44 52 60 68 76 84 92 100
LENGTH CLASS

FIGURE 9

APPENDIX 1



LEGEND
SURVEY SITE
A
B
C
D
E
F
G
H
I
J
K
LOCK
LOCK
LOCK
LOCK
LOCK
LOCK
BRIDGWATER
TAUNTON
North Petherton
Creech St Michael
Wembdon
Huntworth
North Newton
Durston
Creech Heathfield
Ruishton
Thornfalcon
Kingston St Mary

SPECIES	POPULATION >10 cms	BIOMASS>10 cms gms/100m2	DENSITY>10 cms per 100m2	POPULATION METHOD	PROBABILITY OF CAPTURE	BIOMASS<10 cms gms/100m2	DENSITY<10 cms per 100m2	MEAN WEIGHT (gms)	MEAN CONDITION FACTOR
BT1A	PRIORSWOOD, ST242261, 20/4/94								
DACE	0	0	0	4	0	0.30	0.10		
EEL	84	1116.38	8.40	3	0.69	0	0	132.90	0.20
M'LESS MINNOW	0	0	0	4	0	0.10	0.10		
PERCH	1	6.10	0.10	3	0.50	0	0		
PIKE	11	1554.19	1.10	3	0.69	0	0	1412.90	0.81
RUDD	0	0	0	4	0	0.30	0.10		
ROACH	181	626.26	18.10	3	0.35	92.44	12.30	34.60	1.70
STONELOACH	0	0	0	4	0	0	0.10		
TENCH	1	12.50	0.10	3	1.00	0	0		
TOTALS	*278*	*3315.41*	*27.80*			*93.14*	*12.70*		
BT1B	HYDE LANE, ST258258, 21/4/94								
BREAM	2	283.82	0.23	3	1.00	0	0		
EEL	35	519.89	3.93	3	0.53	0	0	132.20	0.18
GUDGEON	0	0	0	4	0	1.24	0.11		
M'LESS MINNOW	0	0	0	4	0	0.45	0.23		
PIKE	11	2086.91	1.24	3	0.31	0	0	1688.50	0.82
ROACH	116	615.19	13.03	3	0.29	57.48	10.79	47.20	1.73
TENCH	1	83.15	0.11	3	1.00	0	0		
TOTALS	*165*	*3588.96*	*18.54*			*59.17*	*11.13*		
BT1C	U/S CREECH ST MICHAEL, ST267257, 26/4/94								
BREAM	1	176.49	0.10	3	1.00	0.10	0.10		
EEL	31	451.90	3.20	3	0.51	0	0	141.40	0.20
GUDGEON	0	0	0	4	0	0.41	0.10		
MIRROR CARP	1	659.79	0.10	3	1.00	0	0		
PIKE	15	979.33	1.55	3	0.32	0	0	633.30	0.77
ROACH	282	1069.86	29.07	3	0.19	133.69	26.29	36.80	1.73
TOTALS	*330*	*3337.37*	*34.02*			*134.20*	*26.49*		
BT1D	CHARLTON, ST293289, 27/4/94								
BREAM	3	394.79	0.29	3	0.60	0	0		
EEL	16	212.24	1.57	3	0.54	0	0	135.30	0.19
GUDGEON	1	1.37	0.10	3	0.33	0	0		
M'LESS MINNOW	0	0	0	4	0	0.20	0.10		
PIKE	18	1320.71	1.77	3	0.75	0	0	748.40	0.78
RUDD	0	0	0	4	0	0.49	0.10		
ROACH	118	395.65	11.57	3	0.22	131.99	21.57	34.20	1.69
TENCH	1	123.53	0.10	3	0.50	0	0		
TOTALS	*157*	*2448.28*	*15.39*			*132.67*	*21.76*		
BT1E	OUTWOOD, ST306284, 4/5/94								
BREAM	7	1127.14	0.71	3	0.54	1.53	0.51	1578.00	1.95
EEL	17	239.73	1.74	3	0.68	0	0	138.20	0.19
GUDGEON	0	0	0	4	0	1.93	0.31		
M'LESS MINNOW	0	0	0	4	0	7.62	4.90		
PIKE	24	1321.71	2.45	3	0.62	0	0	539.70	0.75
RUDD	1	0.71	0.10	3	1.00	4.78	0.92		
ROACH	154	554.71	15.71	3	0.40	163.29	27.88	35.30	1.72
TENCH	0	0	0	4	0	0.10	0.10		
TOTALS	*203*	*3244.02*	*20.71*			*179.25*	*34.59*		

APPENDIX 2

SPECIES	POPULATION >10 cms	BIOMASS>10 cms gms/100m2	DENSITY>10 cms per 100m2	POPULATION METHOD	PROBABILITY OF CAPTURE	BIOMASS<10 cms gms/100m2	DENSITY<10 cms per 100m2	MEAN WEIGHT (gms)	MEAN CONDITION FACTOR
BT1F	D/S LOWER MAUNSEL LOCK, ST308298, 5/5/94								
BREAM	11	27.85	0.99	3	0.61	7.42	0.72	28.10	1.61
DACE	0	0	0	4	0	0.09	0.09		
EEL	57	768.16	5.14	3	0.64	0	0	149.20	0.18
GUDGEON	24	34.59	2.16	3	0.13	83.44	9.82		
M'LESS MINNOW	0	0	0	4	0	5.86	5.50		
R/B HYBRIDS	0	0	0	4	0	0.27	0.09		
PERCH	9	23.35	0.81	3	0.75	0	0	28.80	1.70
PIKE	22	695.48	1.98	3	0.71	0	0	350.90	0.80
ROACH	108	301.62	9.73	3	0.37	89.24	12.97	31.00	1.65
TENCH	1	7.48	0.09	3	0.33	0	0		
TOTALS	*232*	*1856.53*	*20.90*			*186.33*	*29.20*		
BT1G	D/S KINGS LOCK, ST306314,17/5/94								
BREAM	2	17.60	0.17	3	0.67	0.99	0.17		
COMMON CARP	1	681.16	0.08	3	0.33	0	0		
EEL	28	365.16	2.31	3	0.55	0	0	157.80	0.20
M'LESS MINNOW	0	0	0	4	0	1.90	1.74		
PIKE	10	224.05	0.83	3	0.45	0	0	271.10	0.87
ROACH	89	167.70	7.36	3	0.28	82.14	17.03	22.80	1.21
TENCH	8	631.21	0.66	3	0.41	0	0	954.70	1.91
TOTALS	*107*	*2066.88*	*8.84*			*85.04*	*18.93*		
BT1H	FORDGATE, ST321328, 11/5/94								
BREAM	11	45.16	0.97	3	0.61	7.09	0.97	46.80	1.64
EEL	11	216.04	0.97	3	0.73	0	0	223.90	0.19
GUDGEON	0	0	0	4	0	4.17	0.70		
M'LESS MINNOW	0	0	0	4	0	15.88	13.43		
PERCH	2	9.21	0.18	3	0.50	2.46	0.35		
PIKE	10	551.05	0.88	3	0.71	0	0	628.20	0.77
RUDD	0	0	0	4	0	0.26	0.18		
ROACH	105	320.53	9.21	3	0.44	89.35	17.46	34.80	1.59
TENCH	3	116.66	0.26	3	0.50	0.26	0.09		
TOTALS	*142*	*1258.65*	*12.46*			*119.48*	*33.17*		
BT1I	COXLAND, ST318341, 12/5/94								
BREAM	5	224.29	0.42	3	0.50	0	0.08	533.80	1.75
EEL	8	78.50	0.67	3	0.32	0	0	113.80	0.21
M'LESS MINNOW	0	0	0	4	0	13.61	16.30		
PERCH	1	3.87	0.08	3	1.00	0	0		
PIKE	14	1132.71	1.18	3	0.74	0	0	962.80	0.79
RUDD	3	11.34	0.25	3	0.50	1.13	0.25		
ROACH	79	263.55	6.64	3	0.64	89.69	19.25	39.70	1.64
TOTALS	*110*	*1712.26*	*9.24*			*104.43*	*35.88*		

SPECIES	POPULATION >10 cms	BIOMASS>10 cms gms/100m2	DENSITY>10 cms per 100m2	POPULATION METHOD	PROBABILITY OF CAPTURE	BIOMASS<10 cms gms/100m2	DENSITY<10 cms per 100m2	MEAN WEIGHT (gms)	MEAN CONDITION FACTOR
BT1J	STOCK MOOR RHYNE, ST306355, 18/5/94								
BREAM	14	479.41	1.18	3	0.37	0	0.08	407.50	1.78
EEL	18	286.49	1.51	3	0.67	0	0	189.40	0.19
M'LESS MINNOW	0	0	0	4	0	8.00	7.57		
PERCH	0	0	0	4	0	0.76	0.08		
PIKE	24	1494.45	2.02	3	0.59	0	0	741.00	0.79
RUDD	2	58.40	0.17	3	1.00	10.59	2.52		
ROACH	114	381.28	9.58	3	0.44	148.62	28.39	39.80	1.65
TENCH	6	498.00	0.50	3	0.67	1.34	0.08	987.70	2.11
TOTALS	*178*	*3198.03*	*14.98*			*169.31*	*38.72*		
BT1K	BOWERINGS, ST295375, 19/5/94								
BREAM	71	1543.28	6.46	3	0.14	5.27	0.91	239.10	1.67
EEL	36	501.71	3.27	3	0.82	0	0	153.30	0.19
M'LESS MINNOW	0	0	0	4	0	16.37	16.37		
R/B HYBRIDS	0	0	0	4	0	0.91	0.09		
PERCH	0	0	0	4	0	1.18	0.18		
PIKE	10	877.18	0.91	3	0.71	0	0	964.90	0.77
RUDD	0	0	0	4	0	3.64	0.36		
ROACH	54	182.13	4.91	3	0.40	24.40	2.00	37.10	1.53
TOTALS	*171*	*3104.30*	*15.55*			*51.77*	*19.81*		