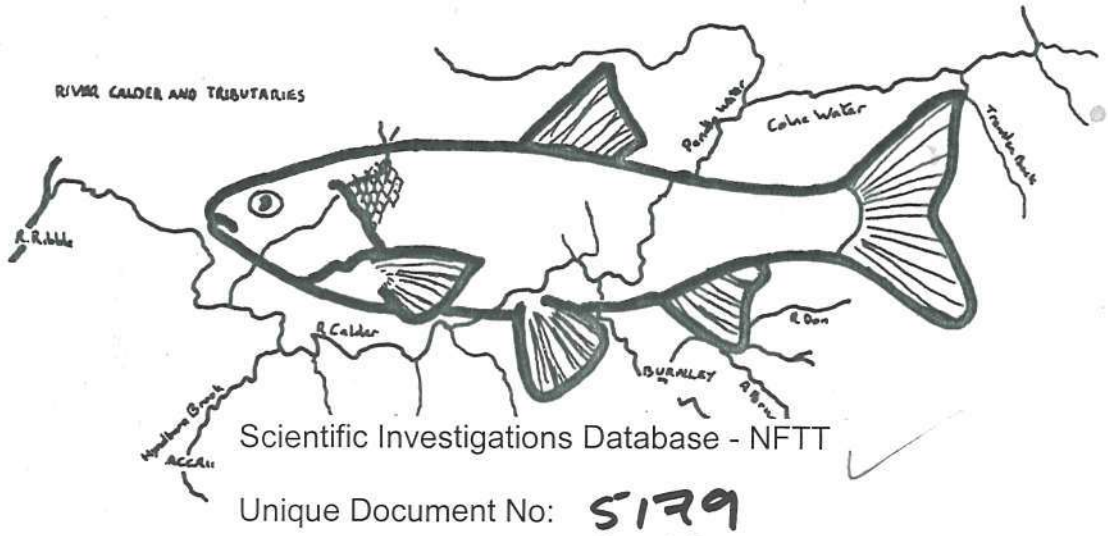
FC CALD D3.3.C (35)

NORTH WEST WATER AUTHORITY
RIVERS DIVISION
SCIENTISTS DEPARTMENT
TECHNICAL SUPPORT GROUP

ELECTROFISHING SURVEY OF THE RIVER CALDER AND ITS TRIBUTARIES APRIL 1978



B. Williams

Contact details:
Post:
Ecological Appraisal Team Leader
Name:
Liz Locke
Address:
Environment Agency, Lutra House, Dodd Way, Off Seedlee Road, Walton Summit, Bamber Bridge, Preston, Lancs, PR5 8BX

REF. NO. TS/BS/78-3

JUNE 78

N.W.W.A. RIVERS DIVISION

SCIENTISTS DEPARTMENT

BIOLOGY SOUTH

ELECTROFISHING SURVEY OF THE RIVER CALDER AND ITS TRIBUTARIES APRIL 1978

1. INTRODUCTION

An electrofishing survey was undertaken in the period April 24th - 28th as part of the detailed biological study of the Calder Catchment being carried out by this department in early 1978. The preliminary results of the invertebrate survey had indicated a water quality good enough to support at least coarse fish throughout most of the catchment, despite popular belief to the contrary. In addition it was already well known that good catches of coarse fish had been taken by anglers upstream of the confluence with the Ribble but since this fishery is considered to be transient due to the effects of storm sewage during periods of high rainfall, accurate details of the fish species present were not available. The effects of storm sewage were demonstrated all too well in early June after the initial fishing survey had been carried out when several thousands of fish were killed in the Lower Calder and River Ribble downstream of the Calder following exceptionally heavy rainfall in the Burnley and Accrington areas. Following this mortality four of the main river sites were revisited to investigate the effects on the fisheries.

The sites to be fished were selected to indicate broadly the fishing status of the major sections of the main river and its larger tributaries and by no means intended to describe the fishing status of the whole catchment in detail. The results on the distributions of fish species are discussed, in general, in relation to the major polluting influences on the catchment. The results of the second survey are given and discussed separately in Appendix I.

The assistance of Fisheries Department was essential in these surveys and was

much appreciated.

2. METHODS

The twenty five sites visited are shown in Fig. I and listed - Table 1. Sites 1 - 5 were sampled using an AC generator from a boat and fishing downstream to a stop net. Sites 6 - 25 were fished using pulsed D.C. with hand held electrodes wading upstream through a suitable section of the stream. The numbers of each species of fish caught were recorded, and scales were removed from measured individuals of all species other than sticklebacks, eels, stoneloach, minnows and bullheads.

3. RESULTS AND DISCUSSION

Only the distribution of fishes are dealt with here; the age/length relationships will be discussed at a later date. The numbers of different species recorded at each site are shown in Table 1 which also details their size range, length of river sampled and the estimated efficiency of capture. From these results the likely distribution of fish throughout the catchment is shown in Fig. 2.

3.1.1. Main River Calder

Upstream of Black Clough good numbers of brown trout up to 19 cms were found, but the fishery potential is limited by the small size of the stream which rarely exceeds two metres in width. The entry of Black Clough caused a deterioration in the main river and though brown trout were found in the vicinity of Easden Clough, they did not extend very far upstream of that point and it seems likely that the section of river between Black Clough and Easden Clough was fishless. From Easden Clough downstream to Burnley brown trout were found in only small numbers though minnows and stoneloach were numerous in Townley Park. The productivity of the stretch of river from confluence with Black Clough to Burnley is known to be restricted by the effects of the mine water discharge into Black Clough and a much better fishery would definitely exist if that problem was alleviated.

Downstream of Burnley the character of the fishery was changed with the disappearance of brown trout and the occurrence of large numbers of gudgeon. Minnows, roach and stoneloach were also found and this section of river can be regarded as supporting a marginal coarse fishery. This change is no doubt due to the combined effects of storm sewer overflows from Burnley and the influence of the River Brun. Further downstream however, at Gawthorpe Hall, no fish at all were found. This probably reflects the effects of the discharge from Burnley Sewage Works.

At Altham Bridge, another marginal fishery with six species of coarse fish, was demonstrated showing that the river had undergone some degree of self purification. This fishery possibly persists down to the confluence with Hyndburn Brook but the entry of effluent from Padiham Sewage Works at Altham Bridge is likely to restrict it to the section of river upstream of that discharge. However, when this is finally diverted to the new Martholme works, a fishery will almost certainly exist all the way down to the confluence with Hyndburn Brook. The section of river between Hyndburn Brook and Sabden Brook was sampled at Martholme, downstream of the old railway viaduct and a very restricted fish population was found; only minnows occurred in appreciable numbers although stoneloach and roach were observed. Between Sabden Brook and the confluence with the River Ribble a good mixed coarse fishery was demonstrated with eight species present above Whalley Weir and seven below it. Their presence indicates a considerable improvement in the condition of the river, brought about by the combination of self purification and the entry of Sabden Brook.

3.1.2. River Calder Tributaries

As expected no fish were found in Black Clough; it is affected by a mine water discharge which results in the virtual elimination of all forms of life. The large number of brown trout found in Easden Clough demonstrated the excellent potential of these small streams for breeding and how unfortunate it is that the main river fish stock is limited by the effects of the mine water discharge.

Everage Clough, which flows into the main river in Townley Park was found to support a sparse trout population along with may stoneloach. The reason for the fish population of this stream being so restricted is not clear; information on possible polluting sources would be appreciated.

3.2.1. Colne Water and Pendle Water

In the Colne Water upstream of Colne Sewage Works, brown trout, stoneloach and minnows were found and the indications were that a reasonable trout fishery exists. In the stretch downstream of Colne Sewage Works the river was virtually fishless which reflects the deterioration in water quality caused by the discharge from that works. In Pendle Water upstream of Colne Water five species were found with brown trout up to 30 cm in length but after its confluence with Colne Water the water quality deteriorated to such an extent that only stoneloach and eels were found. This condition probably exists down to the confluence with the River Calder.

3.2.2. Tributaries of Colne and Pendle Waters

Trawden Beck was found to be fishless at the point sampled despite an excellent invertebrate fauna which indicated that a productive trout fishery could be maintained. This stream was polluted by a spillage of sulphuric acid some three years ago which killed all the fish present. The beck was sampled in this survey upstream of high weir which would effectively prevent upstream movement of the fish subsequently introduced in re-stocking. The absence of fish also indicated that no natural recruitment has occurred from upstream and it is felt that the excellent fishery potential of this stretch is being wasted. If brown trout were introduced to establish a breeding population, the assumed fishery downstream of the weir would definitely benefit as a result of recruitment.

Catlow Brook was sampled at two points; downstream of Coldwell reservoir, where a marginal trout fishery was indicated; and (as Walverdon Water) upstream of Pendle water where only stoneloach and eels were found. This deterioration is attributed to the effects of unsatisfactory storm overflows from local sewers.

3.3.1. Rivers Brun and Don

Very few fish were obtained in the upper section of the River Brun where a high biotic index (9 - 10 A) indicated that more fish than the sparse trout population found should exist. It is known that this section of river has been subject to pollution by caustic soda on at least two occasions, (the latest occurring immediately after this survey was carried out), so that the fish stock has been seriously depleted and not subsequently replaced. The section of river immediately prior to its confluence with the River Don receives a discharge of colliery spoil heap drainage, which apparently has a dramatic polluting effect since the river was found to be fishless from here to the River Calder. There appeared to be little beneficial effect from the River Don, which was found to support a marginal trout fishery throughout its length to the confluence with Swinden Water. Swinden Water upstream of the River Don also showed a marginal trout fishery. The dominance of stoneloach in both these streams however indicates that organic enrichment limits their potential as trout fisheries and further information on the sources of this organic load would be appreciated.

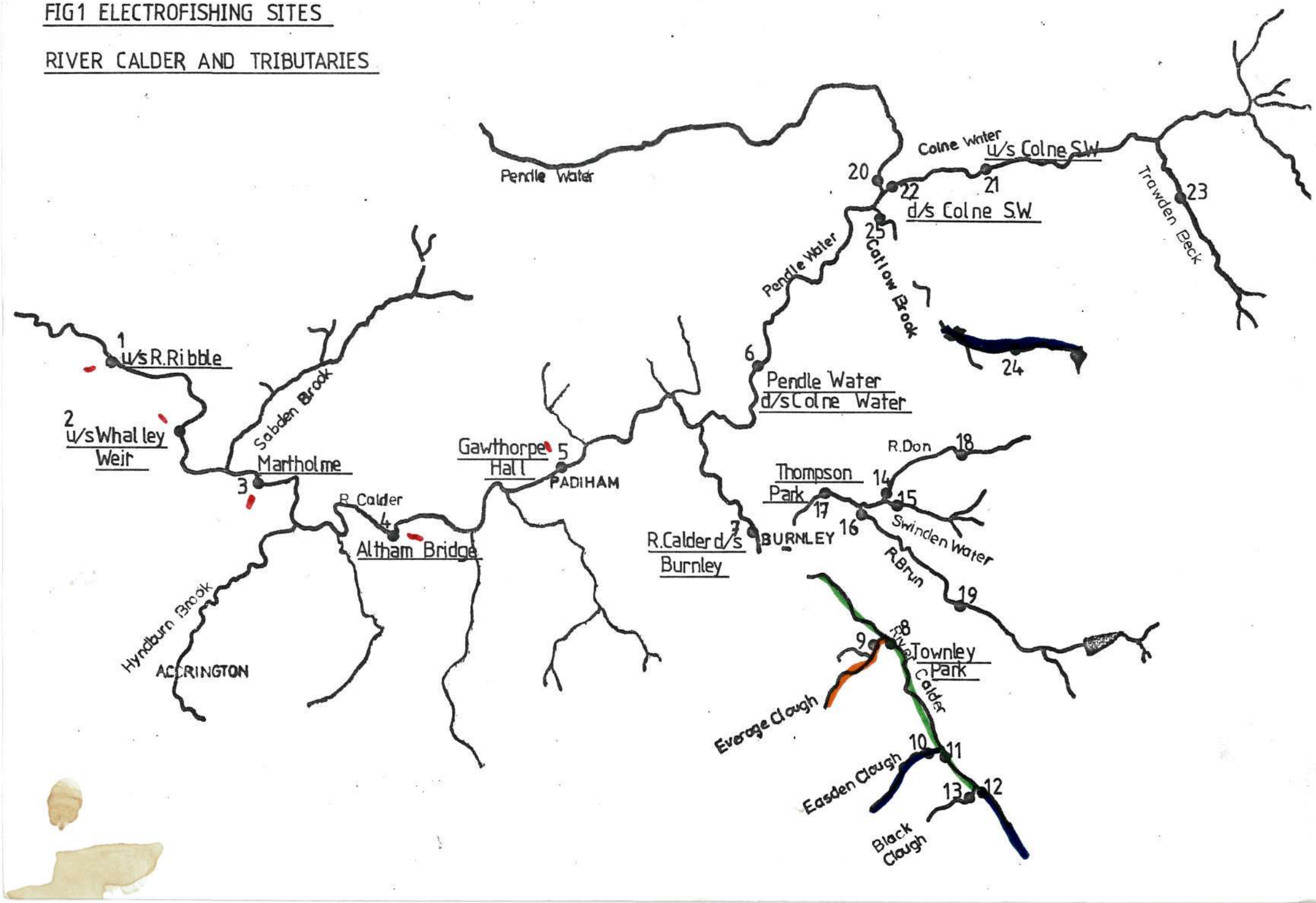
Table 1

Site No.	Location	Grid Ref.	Length Fished(m)	Species	Number	Size Range(cms)	Estimated Efficiency of Capture	Assessment
1	R.Calder, Nethertown	725 363	150	Gudgeon Chub Dace Minnow Eel Roach BrownTrout	25 24 20 7 3 1 1	9.5 - 14.6 10.1 - 43.2 11.5 - 22.6 Not measured 50 15.0 19.0	Approximately 20% capture of all fish observed made difficult by width of river.	Good Coarse Fishery
2	R.Calder u/s Whalley Weir	740 351	100	Dace Chub Minnow Gudgeon Roach Rudd Eel BrownTrout	16 10 7 6 5 2 2 1	11.0 - 20.4 8.8 - 27.4 Not measured 10.7 - 11.5 8.7 - 10.7 8.3 & 9.3 20 & 50 Not measured	As 1 above	Fairly good Coarse fishery
3	R.Calder Martholme	752 339	75	Minnow Stoneloach Unidentified (probably roach)	>50 1 1	Not measured Not measured Not measured	Less than 10% Water very coloured.	No fishery
4	R.Calder Altham Bridge.	774 331	75	Dace Pike Eel Roach Gudgeon Stoneloach	7 4 3 2 1 1	13.9 - 20.7 Not measured Not measured 11.9 & 14.5 11.5 Not measured	As 3 above	Permanent Coarse Fishery probably exists only upstream of Sewage Works Discharge.
5	R.Calder Gawthorpe Hall.	805 342	100	None	-	-	As above	No fishery
6	Pendle Water d/s Colne Water	837 360	50	Stoneloach Eel Stickleback	21 3 Numerous	Not measured Not measured Not measured	Approximately 50%. Water very coloured	No fishery. Stoneloach dominant.

Site No.	Location	Grid Ref.	Length Fished (m)	Species	Number	Size Range (cms)	Estimated Efficiency of Capture	Assessment
7	R.Calder d/s Burnley	832 357	50	Gudgeon Minnow Stickleback Roach Stoneloach	104 40 7 1 1	7.0 - 10.0 6.5 - 8.0 Not measured Not measured Not measured	Good	Restricted Coarse Fish
8	R.Calder Townley Pk.	858 312	40	Minnow Stoneloach BrownTrout	55 31 7	Not measured Not measured 10.5 - 19.3	Good	Restricted Trout Fishery
9	Everage Clough u/s R.Calder	857 311	20	Stoneloach BrownTrout	41 2	Not measured 17.4 & 17.8	Good	Dominated by Stonelcach. Size of stream limits fishing potential.
10	Easden Clough u/s R.Calder	869 290	50	BrownTrout	80	6.0 - 19.0	Good	Excellent nursery stream but too small for a fishery.
11	R.Calder u/s Easdan Clough	870 290	50	BrownTrout	11	7.1 - 19.2	Efficiency limited by ochreous colour.	Restricted trout fishery probably limited to immediate vicinity of Easden Clough. No fish found u/s of first riffle
12	R.Calder u/s Bl. Clo.	875 284	30	BrownTrout	81	8.5 - 19.4	Very good.	Too small to be regarded as a fishery. Excellent nursery stream.
13	Black Clough u/s R.Calder	874 284	25	None	-	-	Limited by colour.	No fishery.
14	R.Don u/s Swinden Water	860 337	25	Stoneloach Minnow BrownTrout Bullhead	66 8 4 1	Not measured Not measured 11.9 - 23.6 Not measured	Good	Restricted trout fishery dominated by stoneloach.

FIG 1 ELECTROFISHING SITES

RIVER CALDER AND TRIBUTARIES

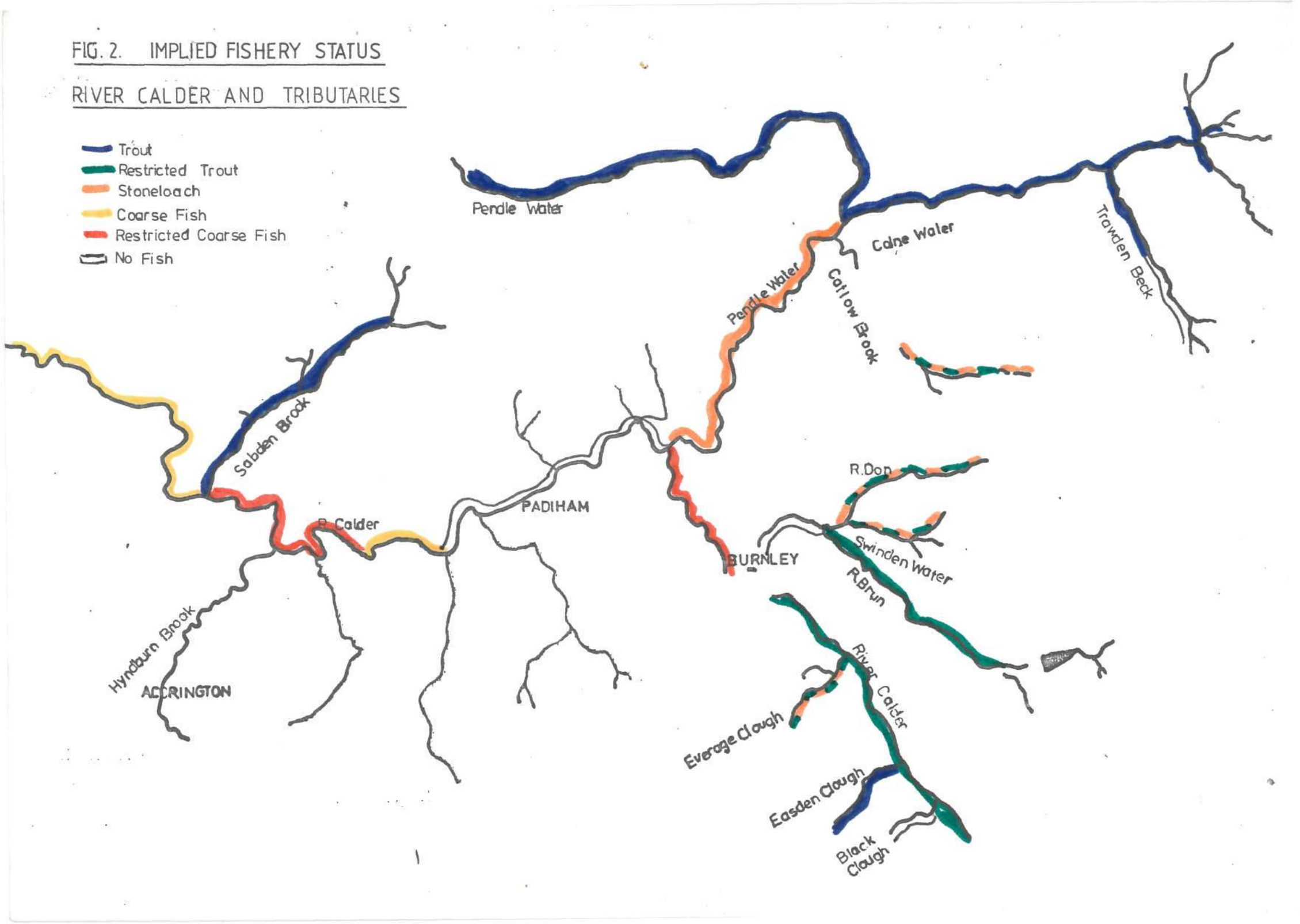


Site No.	Location	Grid Ref.	Length Fished(m)	Species	Number	Size Range (cms)	Estimated Efficiency of Capture	Assessment
15	Swinden Water u/s R.Don	860 335	20	Stoneloach Minnow BrownTrout Bullhead	30 14 2 2	Not measured Not measured 15.6 - 23.4 Not measured	Good	Restricted trout fishery dominated by stoneloach.
16	R.Brun u/s R.Don (d/s Rowley Tip)	857 334	25	None	-	-	Limited by colour	No fishery
17	R.Brun Thompson Park	844 334	25	Not identified (bullhead or gudgeon)	1	-	Limited by colour	No fishery.
18	R.Don (Thursden Brook)	876 344	20	Bullhead Stoneloach Minnow BrownTrout	42 39 11 5	Not measured Not measured Not measured 9.9 - 24.0	Good	Restricted Trout Fishery.
19	R.Brun Salterford Bridge	873 316	50	BrownTrout	3	19.8 - 22.3	Very good.	Trout fishery restricted by intermitten pollution. Excellent potential.
20	Pendle Water u/s Colne Water	859 392	30	Stoneloach Minnow Bullhead BrownTrout Eel	>50 >50 10 10 5	Not measured Not measured Not measured 9.1 - 29.8 Not measured	Good	Trout fishery.
21	Colne Water u/s Colne SW	893 397	30	Minnow BrownTrout Stoneloach	>50 17 2	Not measured 11.0 - 33.5 Not measured	Very good	Good trout fishery.
22	Colne Water u/s Pendle Water (d/s Colne S.W.)	860 391	30	Stoneloach	1	Not measured	Limited by colour	Virtually fishless.

Site No.	Location	Grid Ref.	Length Fished(m)	Species	Number	Size Range (cms)	Estimated Efficiency of Capture	Assessment
23	Trawden Beck	910 394	30	None	-	-	-	Excellent potential as nursery stream but no stock present following pollution.
24	Catlow Brook d/s Coldwell Reservoir.	885 363	30	Minnow Stoneloach BrownTrout	<50 <50 33	Not measured Not measured	Good	Marginal trout fishery limited by size of stream
25	Walverdon Water u/s Pendle Water	855 387	30	Stnneloach Eel	12 3	Not measured Not measured	Good	No fishery . Stoneloach dominant.

FIG. 2. IMPLIED FISHERY STATUS

RIVER CALDER AND TRIBUTARIES



APPENDIX I

INVESTIGATION OF THE EFFECTS OF STORM SEWAGE ON FISH DISTRIBUTION IN THE RIVER CALDER

Following the main electro-fishing survey of the River Calder and its tributaries, a fish mortality was reported in the lower river and Ribble downstream of the Calder (1st June, 1978). This was attributed to the effects of storm sewage which was discharged to the River Calder following heavy rainfall in the Burnley and Accrington areas. Such incidents have occurred on previous occasions and are regarded as the major factor limiting the establishment of fish in the River Calder. Susequently some of the main river sites were re-sampled after this recent mortality and the results are compared with information on the occurrence and distribution of fish from the original survey.

Results:

The sites which were re-sampled are listed in Table 2 below. Each was fished using the same methods and as far as possible over the same length as in the initial survey. The numbers of each species caught are also listed along with the results of the previous survey for comparison.

Table 2.

Site	No. of each species	
	Before Mortality (24th & 25th April 1978)	Following Mortality (19th June 1978)
1. R.Calder Nethertown d/s Whalley Weir G.R. 725 363		
	Gudgeon 25	4
	Chub 24	2
	Dace 20	13
	Minnow 7	0
	Eel 3	Many(not counted)
	Roach 1	0
	Brown Trout 1	0
	Unidentifed Fry 0	Many
	Total Species 7	5
2. R.Calder u/s Whalley Weir G.R. 740 351		
	Dace 16	3
	Chub 10	1
	Minnow 7	0
	Gudgeon 6	3
	Roach 5	0
	Rudd 2	0
	Eel 2	0
	Brown Trout 1	0
	Total Species 8	3
4. R.Calder Altham Bridge G.R. 774 331		
	Dace 7	0
	Pike 4	4
	Eel 3	4
	Roach 2	0
	Gudgeon 1	0
	Total Species 6	2
7. R.Calder d/s Burnley		
	Gudgeon 104	3
	Minnow 40	20
	Stickleback 7	4
	Roach 1	6
	Stoneloach 1	0
	Eel 0	1
	Total Species 5	5

As can be seen from the results all four sites showed a decrease in numbers of species and individuals compared with the previous data and on first inspection it would appear that the two downstream sites were most severely affected. Indeed the rainfall figures for the period immediately preceding the mortality indicate that much heavier falls were experienced in the Accrington Area than around Burnley so it is likely that the greater proportion of the storm sewage probably originated in the Accrington Area and entered the Calder via Hyndburn Brook, creating a greater polluting effect at the lower two sites. Although it would appear that a considerable reduction in the fish populations has occurred there, the presence of some fish at these sites is significant, for it clearly demonstrates that if an extensive mortality of Calder fish did occur, then it did not affect the whole population. It might be that fish found in the lower Calder soon after the mortality had moved in from upstream of the confluence with the River Ribble, but in that case it is unlikely that they could have travelled upstream of Whalley Weir.

The results at Altham Bridge were disappointing since Dace had definitely been seen in the area after the mortality occurred but none turned up in the second survey. In fact it was reported that the Dace population had moved upstream, out of the fishing site and in this respect it is significant to report that the appearance of the effluent from Padiham Sewage Works, which discharges in the middle of the stretch fished at this point, was much worse than on the previous occasion. It is likely that this could have a more serious effect on the river than was realised when the sites were originally selected. Thus it is possible that there had been a redistribution of the fish in the area rather than any marked reduction in the population. In any subsequent surveys carried out before the flow to this works is diverted to Martholme, it is therefore recommended that separate sites, upstream and downstream of this discharge, be sampled.

The changes of fish species and numbers at the site downstream of Burnley are broadly consistent with the reductions shown elsewhere, particularly at the lower sites confirming the effects of storm sewage. However, although the large population of gudgeon appeared to have been eliminated, the presence of considerable numbers of minnows and roach would indicate that the effects here may have been less severe.

In view of the large mortality which was apparent in the River Ribble, (if it is accepted that the effects of storm sewage were responsible for this mortality), it might at first seem puzzling that any survivors at all were found in the lower Calder. The two main factors which are likely to lead to a mortality due to storm sewage are low dissolved oxygen levels due to the Biochemical Oxygen Demand, and high ammonia levels - the toxicity of which is affected by the pH value of the water. Thus there are several possible explanations of the suggestion that most of the fish affected were not only found in the River Ribble but were largely fish that had been resident in the Ribble rather than the Calder.

1. The full effects of the BOD were not exerted until the "plug" of pollution had passed into the Ribble due to the lag period which would occur as the dissolved oxygen was gradually stripped from the water by the oxygen demand.

2. The relative pH values of the Calder and Ribble might have been such that the ammonia became more toxic in the River Ribble.

3. Some of the fish in the River Calder found areas where there was no mixing of the polluted water with the relatively clean river water allowing them to survive the passage of a "plug" of pollution.

4. The fish in the Calder were more resistant to deterioration in water quality as a result of being subjected to the normal fluctuations in water quality in this river.

5. A combination of any or all of the above.

It is improbable, but it cannot be discounted, that a separate pollution incident occurred simultaneously in the River Ribble.