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ENVIRONMENT AGENCY

SOUTH WEST REGION

FISHERIES TECHNICAL REPORT

River Meavy Salmon and Sea Trout
Populations - Assessment of the
Impact of Flows

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River Meavy salmon and sea trout populations - assessment of the impact of flows.

Introduction.

The potential impacts of the existence and operation of Burrator Reservoir on the salmon and sea trout populations of the River Meavy and Plym system as a whole were recognised in the Roadford Operational and Environmental Study, Halcrows 1992. This report included a recommendation that an investigation of the Meavy salmon stocks in relation to flows should be undertaken. This recommendation was accepted while the above report was still in draft, and an intensive survey of juvenile salmonid populations commenced in 1991. Annual electrofishing surveys have continued until 1997. These surveys formed part of the River Meavy Alleviation of Low Flows Project which commenced in 1993, in response to a regional low flows study which identified the Meavy as one of the top twenty sites affected by artificially depleted low river flows.

Electric fishing surveys

The first electrofishing survey of the River Plym system was undertaken in 1971 (14 sites). The next survey was in 1982 (14 sites) and then in 1989 (15 sites). The 1989 survey became the first of the current triennial programme of routine surveys which was repeated in 1992 and 1995. Intensive annual surveys of the River Meavy commenced in 1991 and were incorporated in the routine surveys in 1992. In 1993 a suite of ten sites was established on the Meavy which were sampled in early and late summer each year until 1995. In 1996 a very limited survey was undertaken due to resource limitations but the full suite of sites was surveyed again in 1997. The next routine survey is due in 1998.

A map of the sites sampled in the 1995 routine survey is given in Figure 1. This includes the Meavy sites.

Results

The results of all electric fishing surveys over the period 1971 to 1997 are presented in Tables 1 to 4 for salmon 0+, salmon >0+, trout 0+ and trout >0+ respectively.

Salmon 0+

It is clear that there is considerable annual variation in salmon 0+ densities. It is also clear that densities in the Meavy are generally much higher than in the Plym. Salmon fry have never been recorded in the Plym upstream of the Meavy confluence. In most years good populations were recorded throughout the Meavy, and densities in the middle reaches around Gratton have been exceptionally high. However, salmon fry have only rarely been found at the Burrator site which is between the dam and the confluence of the Sheepstor Brook (approx. 400m downstream of the dam). In some years (1992, 1997) salmon fry were not present in the upper reaches of the Meavy below Burrator reservoir. This was particularly marked in 1992, when salmon fry were only found in the lower reaches from Hoo Meavy downstream and densities were relatively low even at these sites. In 1989 a poor density at Yeo Farm suggests that populations in the upper



reaches were also below average in that year. The limited data in 1996 is also suggestive of poor fry populations in the upper reaches.

The early and late summer surveys in 1993, 1994 and 1995 provide an indication of summer survival rates. It appears that summer survival of salmon fry in 1993 was very high but was somewhat lower in 1994 and 1995. Starting densities were generally higher in the latter years which may account for a greater degree of density dependent loss. Even in 1994 and 1995 the loss rates do not appear to be abnormal and salmon fry densities at the end of summer are still very good.

Salmon >0+

The distribution of salmon parr (>0+) in the River Plym system is similar to that of salmon fry. Populations of parr are generally very good in the Meavy with densities higher than elsewhere in the system. Densities in the Meavy show considerable annual variation, although parr are very rarely absent from any site, even Burrator. Particularly poor densities occurred throughout the Meavy in one year; 1993. Salmon parr populations in the Meavy normally consist predominantly of 1+ fish with some 2+ fish present; eg. 1995 routine survey data (Appendix 1). However, in 1993 the low population was dominated by 2+ fish (Appendix 2). This was also the case in 1997 for sites upstream of Gratton, albeit to a lesser extent (Appendix 3).

Trout

Trout are common and widespread throughout the River Plym system. Good densities of both 0+ and older fish have been found regularly in the Meavy and in the Plym itself. Densities in the Meavy do not exhibit the same degree of temporal or spatial variation as for salmon, indeed the populations appear to have remained remarkably stable over the years. Because it is not possible to distinguish between the progeny of sea trout and those of resident brown trout, it is difficult to assess spawning success for the individual components.

Hydrometric data

Burrator reservoir was commissioned in 1898 and the compensation flow was set at 400 gallons per minute (2.62 MI/d). This is very low by current standards, representing a fraction of the theoretical Q95 at the site (14 MI/d). Sheepstor Brook joins the Meavy approximately 400m downstream of the dam, providing a significant boost to flows in the Meavy (Q95= 1.73 MI/d). Other tributaries join the Meavy further downstream, notably the Lovaton Brook.

Apart from the compensation water gauge there is no flow gauging on the Meavy. In order to estimate the extent to which the compensation water is supplemented by natural inflows downstream during the summer period, and to rank the severity of drought years, flow statistics for the Sheepstor Brook have been estimated using data from the Bellever Gauging Station of the upper River Dart. These statistics are presented in Table 2.

Daily records of water level in Burrator are available from 1980. These have been used to estimate daily rates of water spilling from Burrator into the Meavy. Daily spill rates for 1980 to 1997 are presented in Figure 2.

Impact of flow on fish populations

Summer low flows

From Table 5 it can be seen that the four most severe summer droughts since 1971 have occurred in 1976, 1984, 1989 and 1995. During the summers of 1984, 1989 and 1995 Burrator did not spill (Figure 2) and it is fair to assume that this is also the case for 1976. Hence flows in the Meavy in these years would have consisted of the compensation water plus minor inputs from tributaries downstream.

There are no data on fish populations from which to assess the impacts of the 1976 and 1984 droughts. However, there were surveys in 1989 and 1995. The results for 1989 indicate that populations of juvenile salmon were below average but within the range of densities recorded during the period 1971 to 1997. Salmon fry densities were much lower in 1992 and salmon parr densities were much lower in 1993 (both non drought years). Trout densities in 1989 were well within the normal range for both 0+ and older fish, suggesting that the low summer flows did not have an adverse impact. The 1995 results provide densities at the beginning and end of summer, which are more useful in detecting the impact of a summer drought. Loss rates for both 0+ and older salmon were not abnormal and densities at the end of summer were good. The same is true for the trout populations, again suggesting that summer low flows did not have an adverse impact.

Winter (spawning) flows

Salmon fry densities recorded in the Meavy show that recruitment was poor in 1992, 1997 and to a lesser extent in 1989. Results for salmon parr suggest that 1996 was also a poor year for fry recruitment as parr populations in 1997 consisted predominantly of 2+ fish in the upper reaches of the Meavy below Burrator. This situation also occurred in 1993 following poor fry recruitment in 1992. Salmon fry recruitment was good in 1982, 1993, 1994 and 1995. Good recruitment in 1995 was reflected in good 2+ densities in 1997, which made up for the lack of 1+ fish.

Examination of the Burrator spill records for the period 1980 to 1997 (Figure 2) reveals that in most years Burrator reservoir fills and spills at some time during the 'winter period'. However it can be seen that the timing of spill varies quite considerably and in some years there is little or no spill during the December - January period. The most extreme case is 1980/81 when the reservoir did not spill from late October 1980 right through until early October in 1981. Less extreme cases are 1981/82 (no spill in January), 1988/89 (a little spill in early December but nothing more until late February), 1990/91 (no spill in December but spill throughout January), 1991/92 (a little spill in early December but nothing further until early April), 1995/96 (no spill in December but spill throughout January) and 1996/97 (spill in early December but nothing further until late February).

In relating salmon fry recruitment to Burrator spill in the previous winter it can be seen that a pattern emerges. Poor recruitment appears to be related to a lack of spill during the period mid - December to mid - February (ie. 1988/89, 1991/92 and 1996/97). On this basis 1981 would also have been a poor recruitment year but the only confirmation of this is a poor parr density at Yeo Farm in 1982. Apparent poor recruitment in 1996 was associated with lack of spill in December only, which suggests that in some years the critical period for spill may be quite short. Conversely spill in either December or January appears to have been sufficient to give reasonable recruitment in 1982 and 1991.

The best recruitment years (1993, 1994 and 1995) are clearly related to prolonged periods of heavy spill throughout December and January in the previous winter. The implication is that spill during this period provides adequate flows in the Meavy for successful salmon spawning. Variation in stock abundance from year to year will clearly affect the availability of salmon at spawning time. This may be reflected in the observation that in some years December flows are more favourable and in others January flows are sufficient to allow adequate spawning.

Discussion

The above analysis of salmonid populations in the Meavy in relation to flows demonstrates that salmon recruitment is dependent on the timing and extent of spill from Burrator in the previous December - January period. Spill at this time of the year is required to provide adequate flows in the Meavy downstream of Burrator reservoir for successful salmon spawning.

Summer flow conditions appear to have little effect on salmonid populations. Only in the drought of 1989 is there any indication that salmonid populations may have been affected. Salmon fry and parr populations were below average but trout populations remained normal. Low densities of salmon fry may be better explained by a lack of recruitment following poor spawning flows in the previous winter. Salmonid populations and survival rates in another drought year (1995) were not affected by low flows. This is perhaps surprising in view of the low compensation flow from Burrator reservoir.

There is no evidence for any detrimental effect of summer or winter flows on trout populations. However, juvenile populations are made up of progeny from both sea trout and brown trout and it is not possible to distinguish between them. It is possible that any lack of spawning success for sea trout is compensated by brown trout recruitment.

Alleviation measures

The importance of spill from Burrator for salmon spawning success was identified in 1995 and formed the basis of a proposal to install a pipeline to facilitate releases of water from Burrator into the River Meavy. This pipeline is now in place and was first used in 1997 to make trial releases in December. An annual volume of 900 MI/d is available subject to reservoir storage level and the pipework is designed to allow releases of up to 100 MI/d. The water will be used in future years to make special releases during the period mid - December to end January and thus improve the reliability of salmon spawning success.

Conclusions and recommendations

1. Salmon spawning success in the River Meavy downstream of Burrator reservoir is dependent on adequate spill from the reservoir during the period mid - December to end January.
2. There is no evidence for a similar impact on sea trout spawning success.
3. Summer low flows do not appear to affect salmonid populations in the Meavy, even in drought years.
4. It is recommended that the Burrator water bank is used every year to enhance spawning flows during the period mid - December to end January. Regular releases at a rate of 100 MI/d per day should be made when natural spill is inadequate.
5. The comprehensive programme of electric fishing surveys over the period 1991 to 1997 have made this analysis of flow effects possible. It is recommended that surveys are continued in 1998 to follow the 1997 salmon year class to the parr stage.
6. Electric fishing surveys in 1998 will also allow an assessment of the effectiveness of the spawning releases made in December 1997. It is recommended that consideration should be given to monitoring in future years to assess the effectiveness of any further spawning releases.

References

Halcrow (1992). Roadford Operational and Environmental Study - Final Report. Sir William Halcrow and Partners Ltd.

Figure 1.

Routine & A.L.F. Electric-fishing Sites in the Rivers Plym and Meavy Catchments 1995

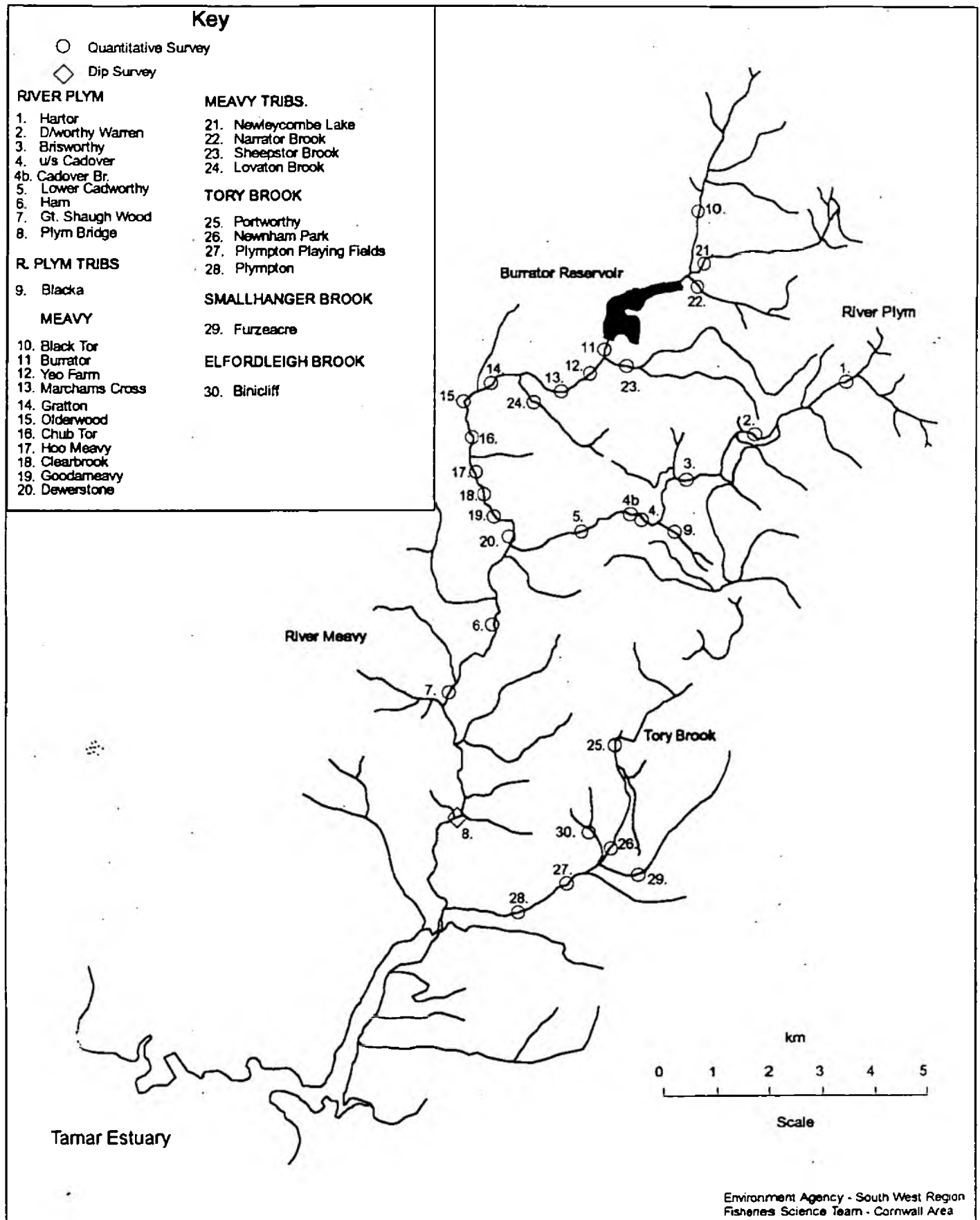


TABLE 1.

SUMMARY OF HISTORICAL ELECTRIC-FISHING RESULTS FOR THE RIVERS PLYM & MEAVY.

27.08.97

RIVER/Site	1971 SALMON 0+	1982 SALMON 0+	1989 SALMON 0+	1991 SALMON 0+	1992 SALMON 0+	1993 SALMON 0+	1994 SALMON 0+	1995 SALMON 0+	1996 SALMON 0+	1997 SALMON 0+
PLYM										
Hartor	-	0.0	0.0	-	0.0	-	-	(0.0)	-	-
D/Worthy Warren	0.0	0.0	0.0	-	0.0	-	-	(0.0)	-	-
Brisworthy	-	0.0	0.0	-	0.0	-	-	(0.0)	0.0	-
u/s Cadover Br.	-	-	-	-	0.0	0.0	-	(0.0)	-	-
Cadover	0.0	-	-	-	-	-	-	(0.0)	-	-
Lower Cadworthy	0.0	0.0	0.0	-	0.0	-	-	(0.0)	-	-
Ham	6.9	14.0	15.9	-	3.2	-	-	(18)	6.5	-
Bickleigh	0.2	-	-	-	-	-	-	-	-	-
Gt. Shaugh Wood	-	6.9	5.3	-	0.9	-	-	(28.8)	-	-
Plym Bridge	3.5	62.2	36.3	-	P	-	-	(P)	-	-
Tecalemit	2.3	-	-	-	-	-	-	-	-	-
Blacka	-	-	-	-	0.0	-	-	(0.0)	-	-
Glen Holt Stm.	0.0	-	-	-	-	-	-	-	-	-
Happy Valley Stm.	1.1	-	-	-	-	-	-	-	-	-
MEAVY										
Black Tor	-	-	-	-	0.0	-	-	(0.0)	-	-
Burrator	-	-	-	0.0	0.0	0.0 / 5.1	0.0 / 0.0	(32.1) / 23.7	-	0.0
Yeo Farm	-	58.4	2.1	11.7	0.0	13.2 / 19.0	21.6 / 42.8	(38.1) / 24.6	-	0.0
Marchams Bridge	44.8	-	-	-	-	-	-	-	P	-
Marchams Cross	-	-	-	47.0	0.0	24.7 / 2.2	38.3 / 20	(96.2) / 46.7	-	0.0
Meavy	-	-	-	29.6	0.0	-	-	-	-	-
Grafton	53.6	162.7	55.1	35.6	0.0	223.8 / 206.8	540.7 / 248.4	(413.1) / 238.4	P	5.2
Oldenwood	-	-	-	10.8	0.0	161.3 / 176.2	97.4 / 92.1	(134.7) / 60.1	-	83.2
Chub Tor	-	110.3	16.7	48.8	0.0	41.2 / 50.8	286.9 / 103.5	(104.5) / 49.6	-	15.4
Hoe Meavy	-	-	-	69.6	7.7	45.8 / 43.9	234.9 / 100.5	(172.4) / 59.7	-	1.0
U/S Clear Brook	-	-	-	-	-	-	-	/120.2	-	158.4
Clear Brook	-	139.9	8.9	19.3	5.5	25.6 / 29.5	58.1 / 19.9	(29.3) /	-	-
D/S Clear Brook	-	-	-	-	-	-	-	/ 29.0	P	10.8
Goodameavy	14.9	170.4	78.6	47.5	19.5	32.2 / 25.8	54.1 / 50.1	(243.3) / 62.5	-	89.3
Dewerstone	-	-	-	41.9	10.0	25.6 / 20.4	46.7 / 62	(106.3) / 87.1	56.1	30.4
Newleycombe Lak **	-	-	-	-	0.0	-	-	(0.0)	-	-
Narrator	-	-	0.0	-	0.0	-	-	(0.0)	-	-
Sheepstor	0.0	0.0	0.0	-	0.0	-	-	(0.0)	-	-
Lovaton	0.0	0.0	1.0	0.0	0.0	-	-	(0.0)	-	-
TORY BROOK										
Portworthy	-	-	-	-	0.0	-	-	(0.0)	-	-
Newnham Park	-	-	-	-	0.0	-	-	(0.0)	-	-
Plympton Playing Fie	-	-	-	-	1.4	-	-	(0.0)	-	-
Plympton	-	-	-	-	0.0	-	-	(0.0)	-	-
Furzeacre	-	-	-	-	0.0	-	-	(0.0)	-	-
Binnicliffe	-	-	-	-	0.0	-	-	(0.0)	-	-

KEY

Densities are given in numbers of fish per 100 square metres.

Densities given in brackets are those obtained from surveys carried out in the early summer, those adjoining, from early autumn.

* = Sites located u/s Dewerstone Falls (R. Plym).

** = Sites located u/s Burrator reservoir.

P = Species found during DIP survey

A = Species not found during DIP survey

Environment Agency - Southwest Area
Fisheries Science Team - Cornwall Area

TABLE 2.		SUMMARY OF HISTORICAL ELECTRIC-FISHING RESULTS FOR THE RIVERS PLYM & MEAVY.										27.08.97
RIVER/Site	1971 SALMON	>= 1982 SALMON	>= 1989 SALMON	>= 1991 SALMON	>= 1992 SALMON	>= 1993 SALMON	>= 1994 SALMON	>= 1995 SALMON	>= 1996 SALMON	>= 1997 SALMON	>= 1+	
PLYM												
Harfor	-	0.0	0.0	-	0.0	-	-	(0.0)	-	-	-	
Ditworthy Warren	0.0	0.0	0.0	-	0.0	-	-	(0.0)	-	-	-	
Brisworthy	-	0.0	0.0	-	0.0	-	-	(0.0)	0.0	-	-	
u/s Cadover Br.	-	-	-	-	0.0	0.0	-	(0.0)	-	-	-	
Cadover	0.0	-	-	-	-	-	-	(0.0)	-	-	-	
Lower Cadworthy	0.0	0.0	0.0	-	0.0	-	-	(0.0)	-	-	-	
Ham	13.4	20.5	16.2	-	8.8	-	-	(26.4)	22	-	-	
Bickleigh	5.2	-	-	-	-	-	-	-	-	-	-	
Great Shaugh Wood	-	6.9	5.7	-	4.8	-	-	(2.8)	-	-	-	
Plym Bridge	3.8	9.6	7.4	-	P	-	-	(P)	-	-	-	
Tecalemit	3.6	-	-	-	-	-	-	-	-	-	-	
Blacka	-	-	-	-	0.0	-	-	(0.0)	-	-	-	
Glen Holt Stm.	1.0	-	-	-	-	-	-	-	-	-	-	
Happy Valley Stm.	1.6	-	-	-	-	-	-	-	-	-	-	
MEAVY												
Black Tor	-	-	-	-	0.0	-	-	(0.0)	-	-	-	
Burrator	-	-	-	19.2	6.5	(0.0) 0.0	(10.6) 8.0	(0.9) 1.3	-	-	7.3	
Yeo Farm	-	4.4	9.7	17.8	12.0	(0.0) 0.3	(13.6) 8.3	(17.1) 14.8	-	-	15.7	
Marchams Bridge	27.0	-	-	-	-	-	-	-	P	-	-	
Marchams Cross	-	-	-	16.5	18.4	(4.4) 1.2	(6.4) 2.4	(23.8) 10.5	-	-	4.9	
Meavy	-	-	-	13.2	19.8	-	-	-	-	-	-	
Gratton	17.5	24.7	6.3	19.9	15.9	(0.4) 0.4	(33.9) 12.8	(48.9) 37.5	P	-	17.0	
Olderwood	-	-	-	18.6	11.6	(2.3) 0.3	(31.9) 16.7	(25.1) 38.4	-	-	16.9	
Chub Tor	-	19.7	3.1	16.4	2.2	(0.5) 0.9	(8.9) 9.8	(26.5) 9.1	-	-	7.7	
Hoo Meavy	-	-	-	5.4	10.6	(3.7) 0.6	(13.7) 5.2	(16.2) 3.1	-	-	7.6	
U/S Clear Brook	-	-	-	-	-	-	-	18.5	-	-	30.8	
Clear Brook	-	24.3	17.8	28.0	19.4	(11.2) 2.9	(36.4) 28.6	(41.9)	-	-	-	
D/S Clear Brook	-	-	-	-	-	-	-	14.0	P	-	17.3	
Goodameavy	21.1	52.4	40.3	33.4	43.1	(14.1) 7.2	(32.7) 33.4	(41.7) 38.0	-	-	29.8	
Dewerstone	-	-	-	18.9	15.0	(3.8) 2.2	(26.2) 15.6	(17.4) 19.0	27.4	-	14.3	
Newleycombe Lake	-	-	-	-	0.0	-	-	(0.0)	-	-	-	
Narrator	-	-	0.0	-	0.0	-	-	(0.0)	-	-	-	
Sheepstor	0.0	0.0	0.0	-	1.6 (Stocked Fish)	-	-	(0.0)	-	-	-	
Lovaton	0.0	10.2	0.5	0.8	0.8	-	-	(0.8)	-	-	-	
TORY BROOK												
Portworthy	-	-	-	-	0.0	-	-	(0.0)	-	-	-	
Newnham Park	-	-	-	-	0.0	-	-	(0.0)	-	-	-	
Plympton Playing Fiel	-	-	-	-	0.0	-	-	(0.0)	-	-	-	
Plympton	-	-	-	-	0.7	-	-	(0.0)	-	-	-	
Furzeacre	-	-	-	-	0.0	-	-	(0.0)	-	-	-	
Binnicliffe	-	-	-	-	0.0	-	-	(0.0)	-	-	-	

KEY

Densities are given in numbers of fish per 100 square metres.
Densities given in brackets are those obtained from surveys carried out in the early summer, those adjoining, from early autumn.
* = Sites located u/s Dewerstone Falls (R. Plym).
** = Sites located u/s Burrator reservoir.
P = Species found during DIP survey
A = Species not found during DIP survey

TABLE 3.

SUMMARY OF HISTORICAL ELECTRIC-FISHING RESULTS FOR THE RIVERS PLYM & MEAVY.

27.08.97

RIVER/Site	1971 TROUT 0+	1982 TROUT 0+	1989 TROUT 0+	1991 TROUT 0+	1992 TROUT 0+	1993 TROUT 0+	1994 TROUT 0+	1995 TROUT 0+	1996 TROUT 0+	1997 TROUT 0+
PLYM										
Hartor	-	19.6	13.7	-	27.6	-	-	(12.2)	-	-
D/Worthy Warren	ns	13.6	13.2	-	24.0	-	-	(53.9)	-	-
Brisworthy	-	42.0	12.2	-	20.3	-	-	(9.3)	10.2	-
w/s Cadover Br.	-	-	-	-	16.1	41.3	-	(50.8)	-	-
Cadover	ns	-	-	-	-	-	-	(49.8)	-	-
Lower Cadworthy	ns	46.6	3.6	-	16.1	-	-	(6.2)	-	-
Ham	ns	48.2	4.8	-	2.1	-	-	(5.3)	13.6	-
Bickleigh	ns	-	-	-	-	-	-	-	-	-
Gt. Shaugh Wood	-	11.9	1.2	-	0.8	-	-	(1.4)	-	-
Plym Bridge	ns	5.7	3.5	-	P	-	-	(P)	-	-
Tecalemit	ns	-	-	-	-	-	-	-	-	-
Blacka	-	-	-	-	51.0	-	-	(25.9)	-	-
Glen Holt Strm.	ns	-	-	-	-	-	-	-	-	-
Happy Valley Strm.	ns	-	-	-	-	-	-	-	-	-
MEAVY										
Black Tor	-	-	-	-	15.2	-	-	(0.0)	-	-
Burrator	-	-	-	7.3	30.8	(23.0) 29.7	(25.5) 20.2	(46.4) 19.6	-	46.7
Yeo Farm	-	66.5	24.0	16.9	36.4	(7.0) 11.1	(12.2) 17.2	(41.4) 14.1	-	26.5
Marchams Bridge	ns	-	-	-	-	-	-	-	P	-
Marchams Cross	-	-	-	12.8	21.4	(5.8) 27.5	(45.0) 13.7	(37.7) 21.2	-	53.0
Meavy	-	-	-	66.1	64.7	-	-	-	-	-
Gratton	ns	207.4	42.3	84.3	31.2	(10.7) 14.2	(99.7) 43.6	(118.5) 41.7	P	140.1
Oldenwood	-	-	-	57.4	36.7	(20.1) 13.8	(45.8) 22.1	(19.2) 17.5	-	31.4
Chub Tor	-	142.9	30.6	83.2	23.1	(15.1) 15.1	(69.7) 42.5	(68.1) 38.4	-	94.6
Hoo Meavy	-	-	-	18.4	19.6	(24.8) 11.7	(33.0) 27.8	(25.2) 10.0	-	89.5
U/S Clearbrook	-	-	-	-	-	-	-	27.9	-	77.2
Clear Brook	-	154.7	21.9	17.6	15.9	(19.2) 23.6	(36.3) 18.0	(23.5)	-	-
D/S Clearbrook	-	-	-	-	-	-	-	26.6	P	64.3
Goodameavy	ns	117.4	31.6	17.2	10.3	(20.5) 10.1	(38.3) 21.4	(20.7) 12.0	-	25.5
Dewerstone	-	-	-	36.4	11.9	(17.4) 6.8	(38.3) 32.2	(24.9) 16.1	74.8	50.4
Newleycombe Lak	-	-	-	-	23.3	-	-	(14.8)	-	-
Narrator	-	-	5.9	-	11.5	-	-	(53.8)	-	-
Sheepstor	ns	106.7	7.2	-	29.6	-	-	(4.1)	-	-
Lovalton	ns	295.9	148.1	104.5	78.8	-	-	(194.8)	-	-
TORY BROOK										
Portworthy	-	-	-	-	0.0	-	-	(0.0)	-	-
Nawnham Park	-	-	-	-	0.0	-	-	(0.0)	-	-
Plympton Playing Fie	-	-	-	-	1.3	-	-	(0.0)	-	-
Plympton	-	-	-	-	0.0	-	-	(0.0)	-	-
Furzeacre	-	-	-	-	37.3	-	-	(36.7)	-	-
Binnicliffe	-	-	-	-	11.0	-	-	(69.7)	-	-

KEY

Densities are given in numbers of fish per 100 square metres.

Densities given in brackets are those obtained from surveys carried out in the early summer, those adjoining, from early autumn.

* = Sites located w/s Dewerstone Falls (R. Plym).

** = Sites located w/s Burrator reservoir.

P = Species found during DIP survey

A = Species not found during DIP survey

Environment Agency - Southwest Area
Fisheries Science Team - Cornwall Area

TABLE 4.		SUMMARY OF HISTORICAL ELECTRIC-FISHING RESULTS FOR THE RIVERS PLYM & MEAVY.										27.08.97
RIVER/Site		1971 TROUT >=1+	1982 TROUT >=1+	1989 TROUT >=1+	1991 TROUT >=1+	1992 TROUT >=1+	1993 TROUT >=1+	1994 TROUT >=1+	1995 TROUT >=1+	1996 TROUT >=1+	1997 TROUT >=1+	
PLYM												
Hartor	*	-	67.0	58.1	-	41.1	-	-	(45.8)	-	-	
Ditsworthy Warren	*	19.2	42.9	27.5	-	12.1	-	-	(34.3)	-	-	
Brisworthy	*	-	30.5	25.8	-	10.1	-	-	(20.8)	15.5	-	
u/s Cadover Br.	*	-	-	-	-	4.3	22.6	-	(21.1)	-	-	
Cadover	*	12.3	-	-	-	-	-	-	(23.4)	-	-	
Lower Cadworthy	*	1.0	23.9	10.5	-	6.6	-	-	(17.5)	-	-	
Ham	*	12.0	17.5	13.6	-	8.7	-	-	(20.2)	17.3	-	
Bickleigh	*	5.6	-	-	-	-	-	-	-	-	-	
Great Shaugh Wood	*	-	12.3	5.1	-	7.1	-	-	(3.4)	-	-	
Plym Bridge	*	5.5	6.5	6.8	-	P	-	-	(P)	-	-	
Tecalemit	*	12.7	-	-	-	-	-	-	-	-	-	
Blacka	*	-	-	-	-	22.5	-	-	(32.9)	-	-	
Glen Holt Strm.	*	12.5	-	-	-	-	-	-	-	-	-	
Happy Valley Strm.	*	3.8	-	-	-	-	-	-	-	-	-	
MEAVY												
Black Tor	**	-	-	-	-	13.6	-	-	(25.6)	-	-	
Burrator	*	-	-	-	17.1	15.4	(17.4) / 29.5	(27.3) 22.6	(44.6) 43.1	-	25.2	
Yeo Farm	*	-	21.6	16.3	19.8	23.7	(21.1) / 23.4	(22.6) 17.2	(19.3) 15.5	-	19.5	
Marchams Bridge	*	9.4	-	-	-	-	-	-	-	P	-	
Marchams Cross	*	-	-	-	21.1	12.7	(24.4) / 14.4	(27.6) 18.3	(22.0) 19.0	-	29.6	
Meavy	*	-	-	-	5.9	17.8	-	-	-	-	-	
Grafton	*	8.8	43.5	28.4	17.3	15.9	(6.5) / 3.2	(6.4) 4.1	(3.4) 11.3	P	11.8	
Olderwood	*	-	-	-	15.4	25.4	(14.8) / 12.5	(19.6) 12.1	(13.7) 29.9	-	11.5	
Chub Tor	*	-	26.8	39.1	40.8	14.9	(18.5) / 8.5	(20.5) 25.3	(39.3) 25.2	-	22.8	
Hoo Meavy	*	-	-	-	13.9	14.8	(8.1) / 6.8	(13.9) 10.4	(21.2) 24.5	-	12.3	
U/S Clearbrook	*	-	-	-	-	-	-	-	28.3	-	20.7	
Clear Brook	*	-	33.0	20.1	12.5	14.1	(15.9) / 27.1	(23.6) 26.9	(12.8)	-	-	
D/S Clearbrook	*	-	-	-	-	-	-	-	17.4	P	18.3	
Goodameavy	*	25.0	21.3	26.2	12.1	16.7	(12.1) / 8.5	(14.2) 15.7	(21.6) 10.7	-	15.5	
Dowerstone	*	-	-	-	22.7	27.2	(12.3) / 15.0	(24.8) 17.4	(25.4) 25.1	21.7	23.5	
Newleycombe Lake	**	-	-	-	-	21.6	-	-	(44.0)	-	-	
Narrator	**	-	-	46.7	-	19.4	-	-	(25.6)	-	-	
Sheepstor	*	40.0	69.1	54.9	-	30.0	-	-	(51.8)	-	-	
Lovaton	*	18.5	52.6	23.8	32.0	22.1	-	-	(31.1)	-	-	
TORY BROOK												
Portworthy	*	-	-	-	-	0.0	-	-	(0.0)	-	-	
Newnham Park	*	-	-	-	-	0.0	-	-	(0.0)	-	-	
Plympton Playing Field	*	-	-	-	-	0.5	-	-	(0.0)	-	-	
Plympton	*	-	-	-	-	3.9	-	-	(0.0)	-	-	
Furzeacre	*	-	-	-	-	16.1	-	-	(13.1)	-	-	
Binnicliffe	*	-	-	-	-	10.0	-	-	(10.5)	-	-	

KEY

Densities are given in numbers of fish per 100 square metres.

Densities given in brackets are those obtained from surveys carried out in the early summer, those adjoining, from early autumn.

* = Sites located u/s Dowerstone Falls (R. Plym).

** = Sites located u/s Burrator reservoir.

P = Species found during DIP survey

A = Species not found during DIP survey

Environment Agency - Southwest Area
Fisheries Science Team - Cornwall Area

Table 5

Sheepstor Brook at Confluence with Meavy natural flow derived:

MLF V1.3r MF at Bellever SX 657 775 (1.106 m³/s)

MLF V1.3r MF at Sheepstor Brook at confluence with Meavy SX 551 676 (0.114 m³/s)

ratio = 0.103.

Bellever gauged record multiplied by ratio of 0.103 for the period 1970 to 1996.

Seasonal statistics for the period May to Sept for derived Sheepstor natural flow record:

Year	MF	Q95
1971	0.047	0.017
1972	0.070	0.017
1973	0.071	0.022
1974	0.132	0.025
1975	0.043	0.017
1976	0.023	0.010
1977	0.050	0.016
1978	0.044	0.019
1979	0.068	0.023
1980	0.068	0.022
1981	0.083	0.013
1982	0.048	0.018
1983	0.065	0.015
1984	0.036	0.013
1985	0.083	0.031
1986	0.092	0.033
1987	0.056	0.023
1988	0.093	0.031
1989	0.039	0.012
1990	0.044	0.022
1991	0.076	0.026
1992	0.075	0.020
1993	0.110	0.030
1994	0.070	0.022
1995	0.034	0.013
1996	0.052	0.018
1997	0.073	0.030

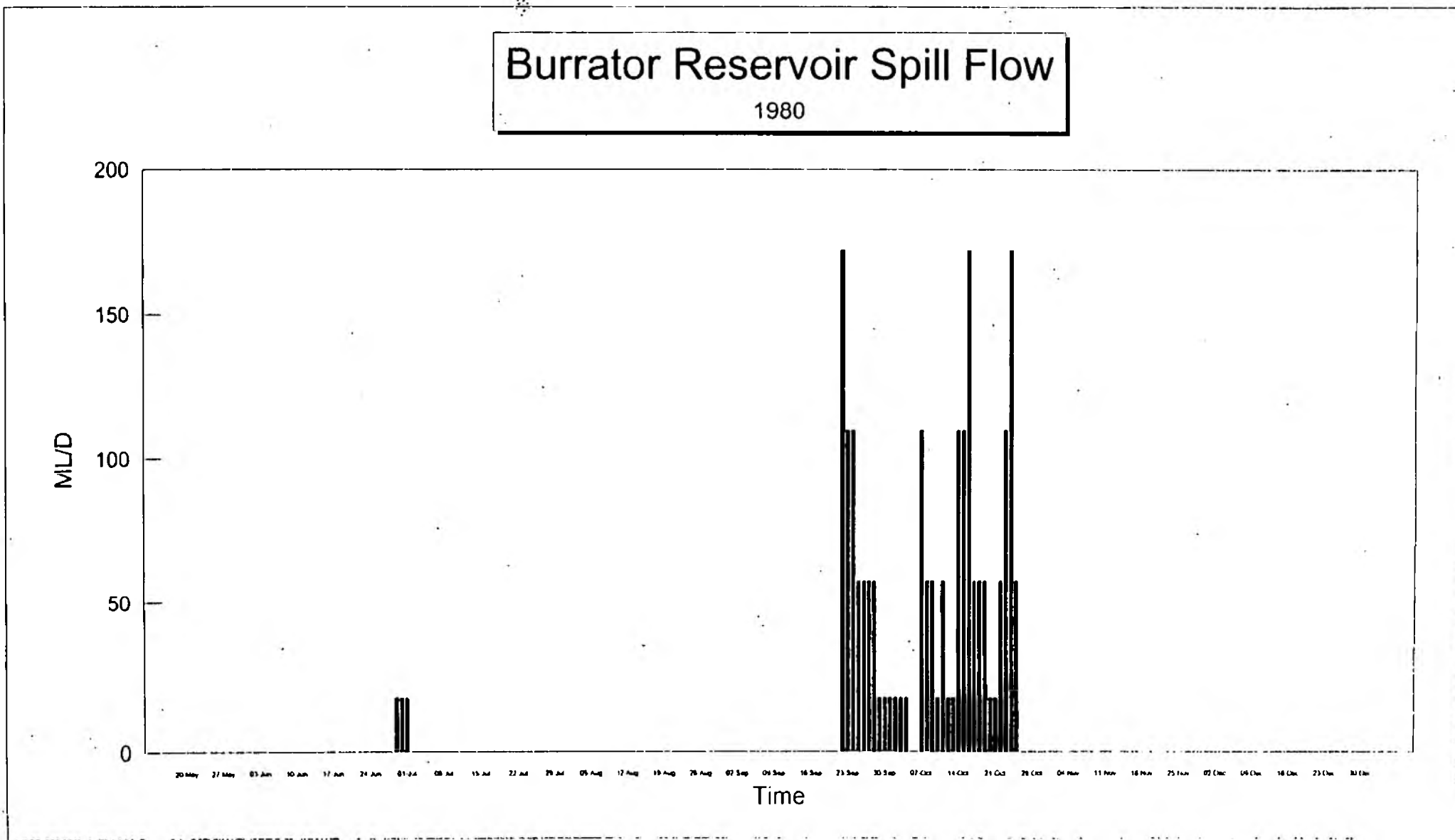
Ranked by Q95 ascending

Year	MF	Q95
1976	0.023	0.010
1989	0.039	0.012
1995	0.034	0.013
1984	0.036	0.013
1981	0.083	0.013
1983	0.065	0.015
1977	0.050	0.016
1975	0.043	0.017
1972	0.070	0.017
1971	0.047	0.017
1996	0.052	0.018
1982	0.048	0.018
1978	0.044	0.019
1992	0.075	0.020
1994	0.070	0.022
1973	0.071	0.022
1990	0.044	0.022
1980	0.068	0.022
1987	0.056	0.023
1979	0.068	0.023
1974	0.132	0.025
1991	0.076	0.026
1997	0.073	0.030
1993	0.110	0.030
1988	0.093	0.031
1985	0.083	0.031
1986	0.092	0.033

Ranked by MF ascending

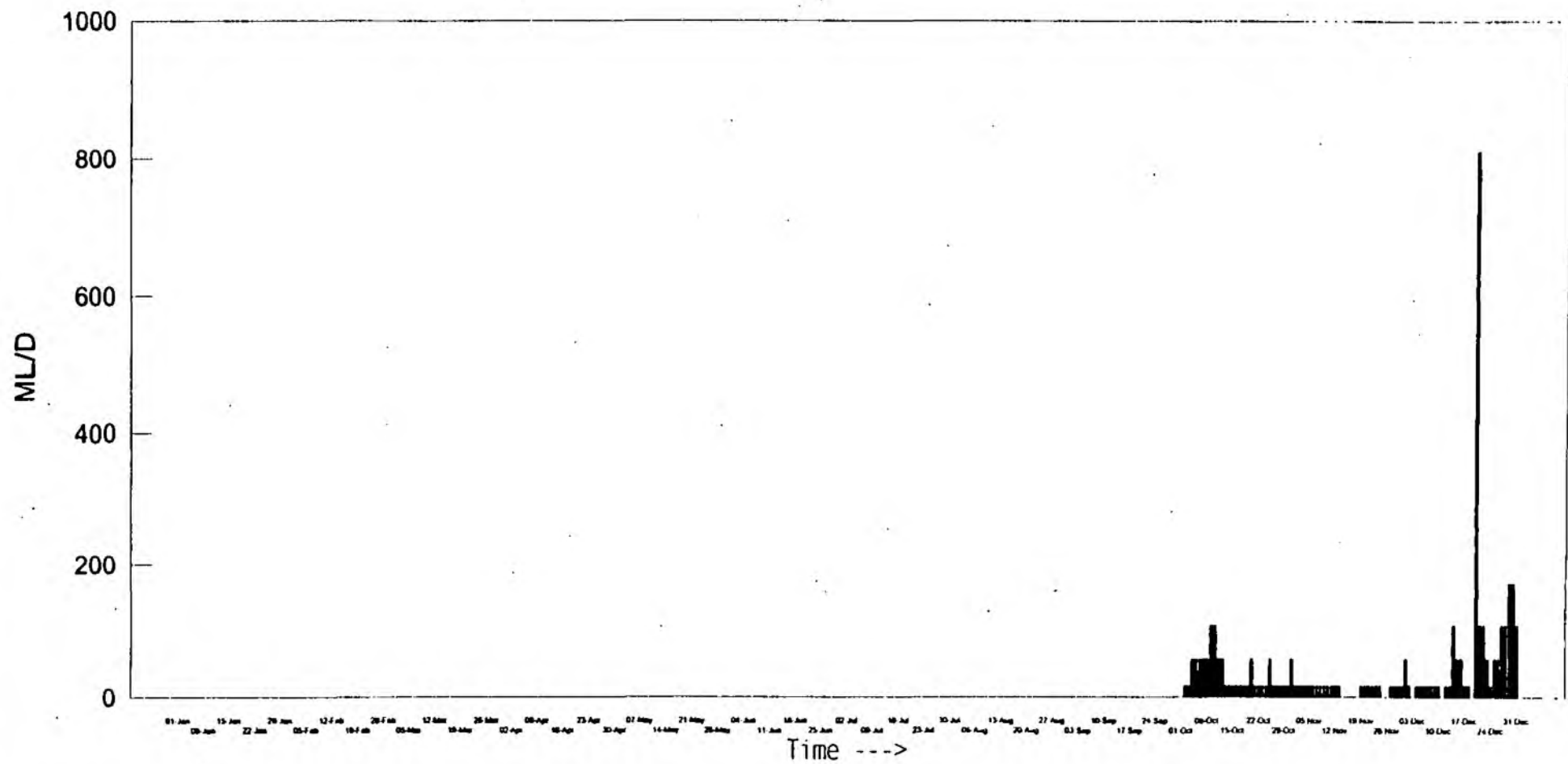
Year	MF	Q95
1976	0.023	0.010
1995	0.034	0.013
1984	0.036	0.013
1989	0.039	0.012
1975	0.043	0.017
1978	0.044	0.019
1990	0.044	0.022
1971	0.047	0.017
1982	0.048	0.018
1977	0.050	0.016
1996	0.052	0.018
1987	0.056	0.023
1983	0.065	0.015
1979	0.068	0.023
1980	0.068	0.022
1994	0.070	0.022
1972	0.070	0.017
1973	0.071	0.022
1997	0.073	0.030
1992	0.075	0.020
1991	0.076	0.026
1981	0.083	0.013
1985	0.083	0.031
1986	0.092	0.033
1988	0.093	0.031
1993	0.110	0.030
1974	0.132	0.025

Figure 2



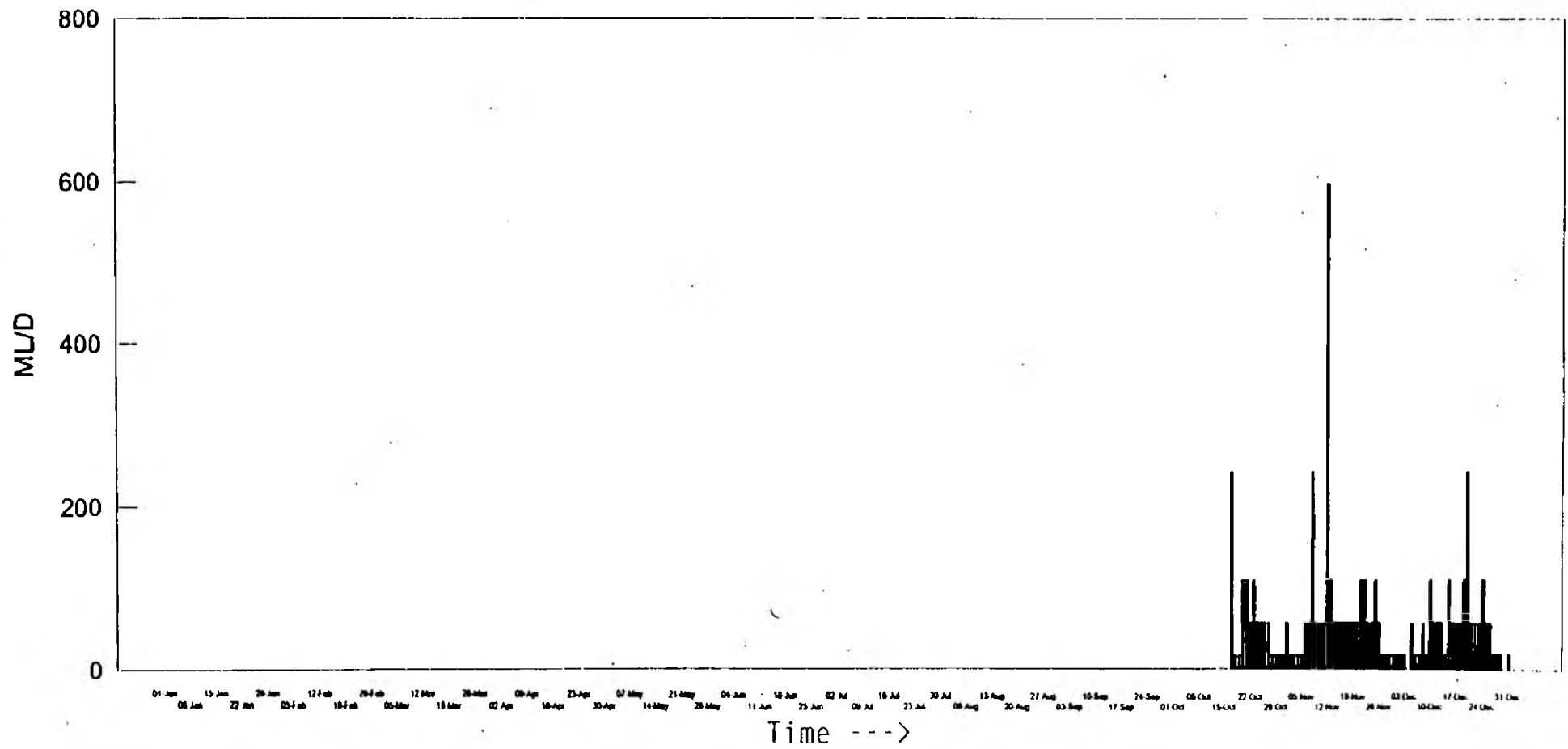
Burrator Reservoir Spill Flow

1981



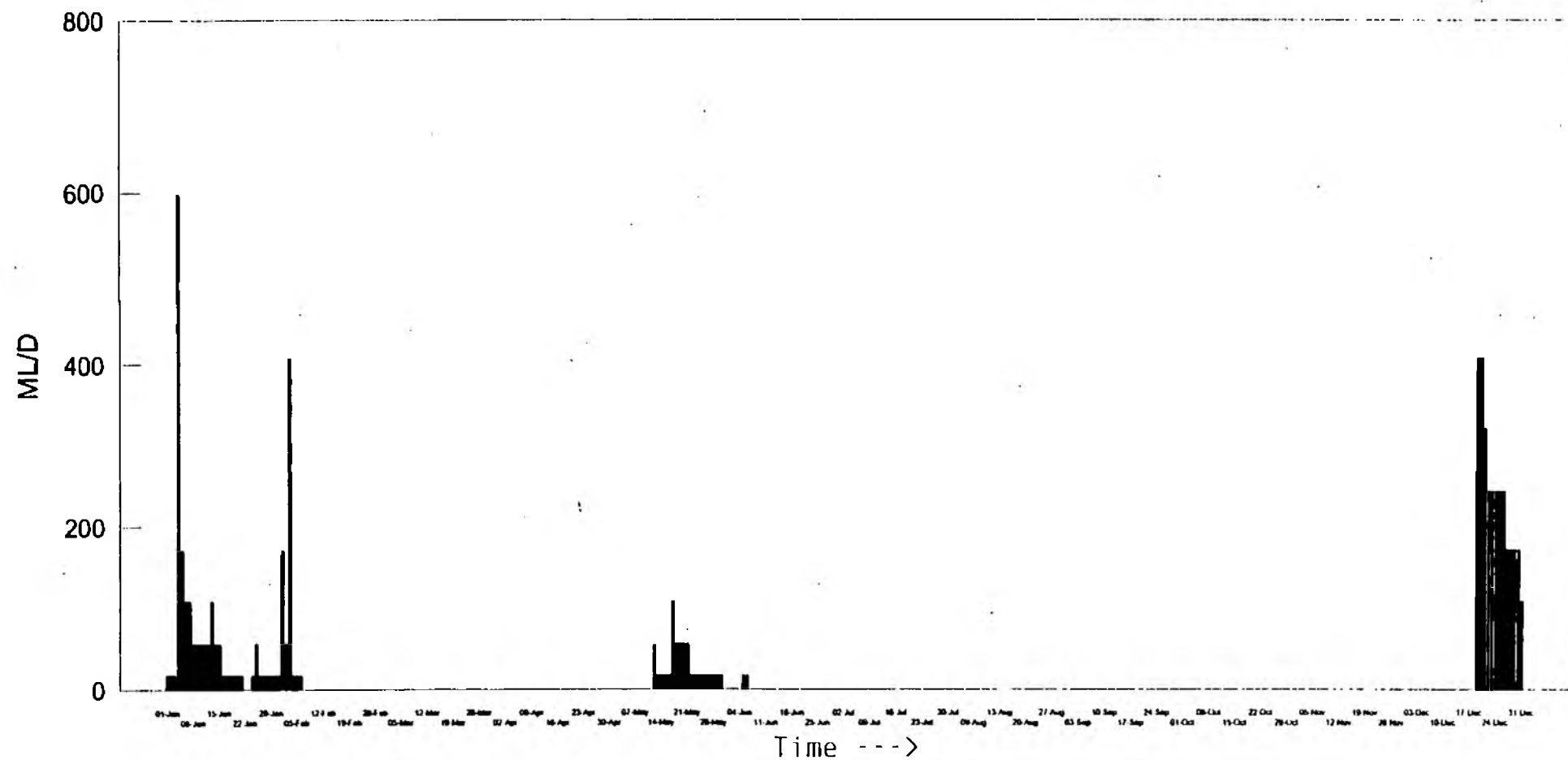
Burrator Reservoir Spill Flow

1982



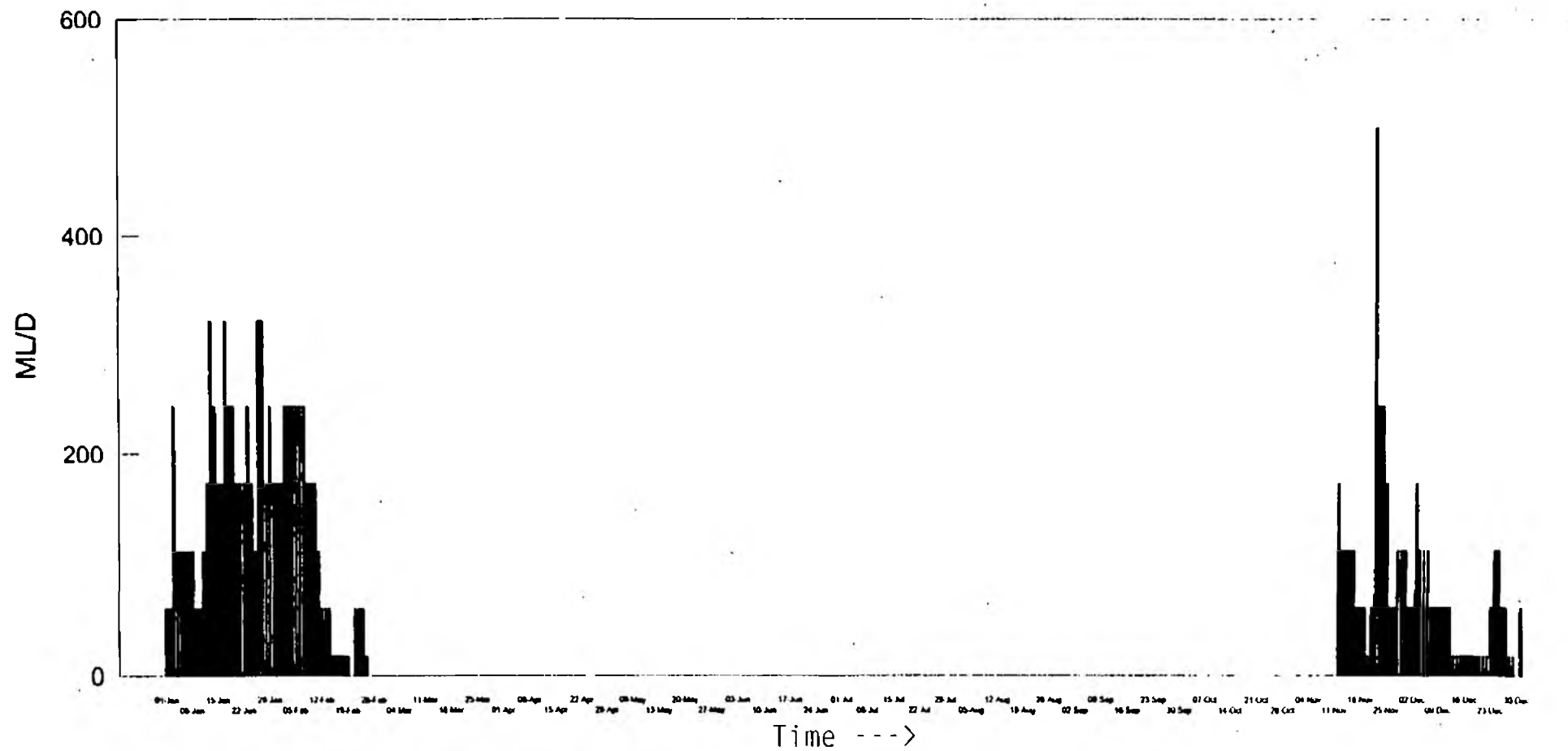
Burrator Reservoir Spill Flow

1983



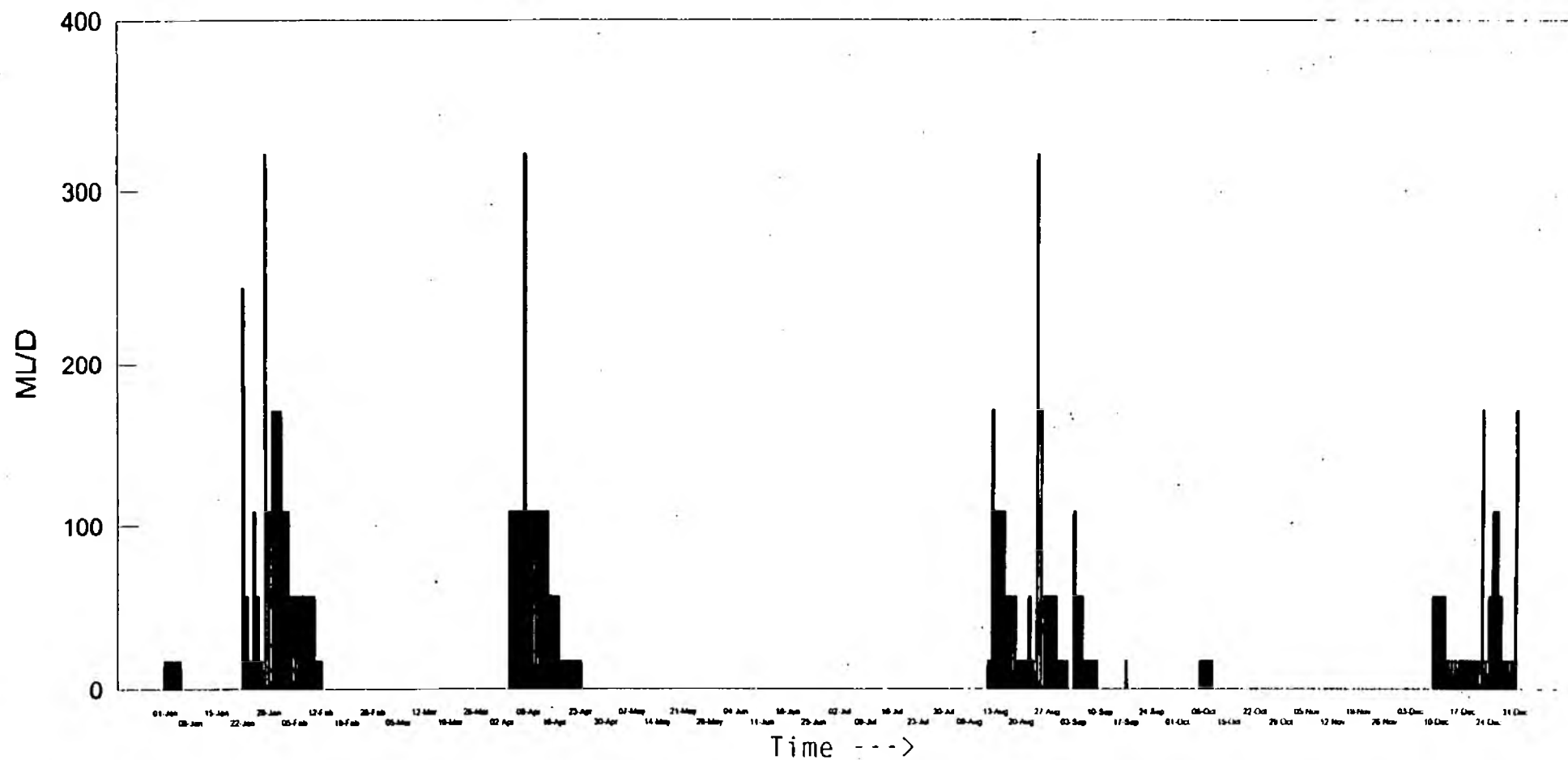
Burrator Reservoir Spill Flow

1984



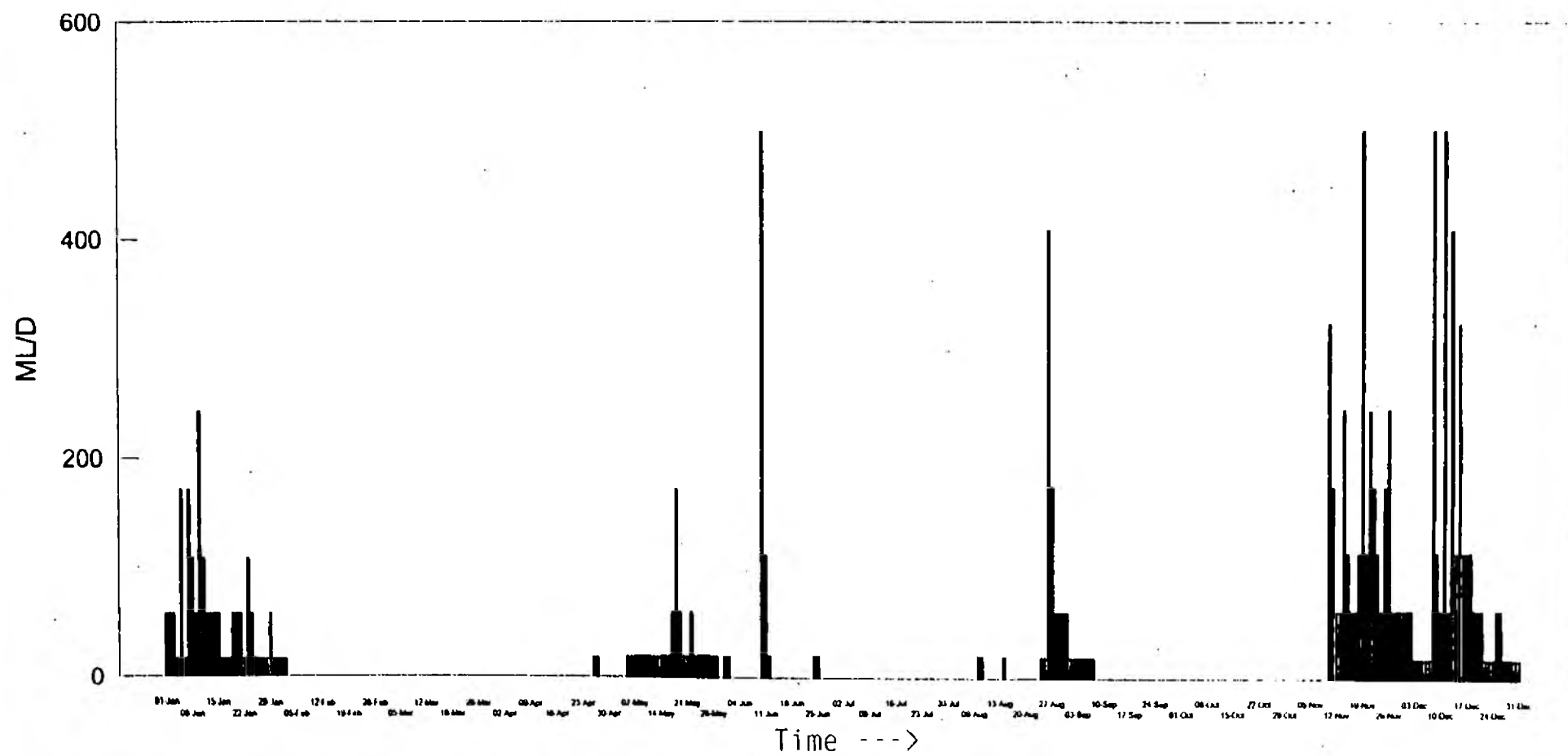
Burrator Reservoir Spill Flow

1985



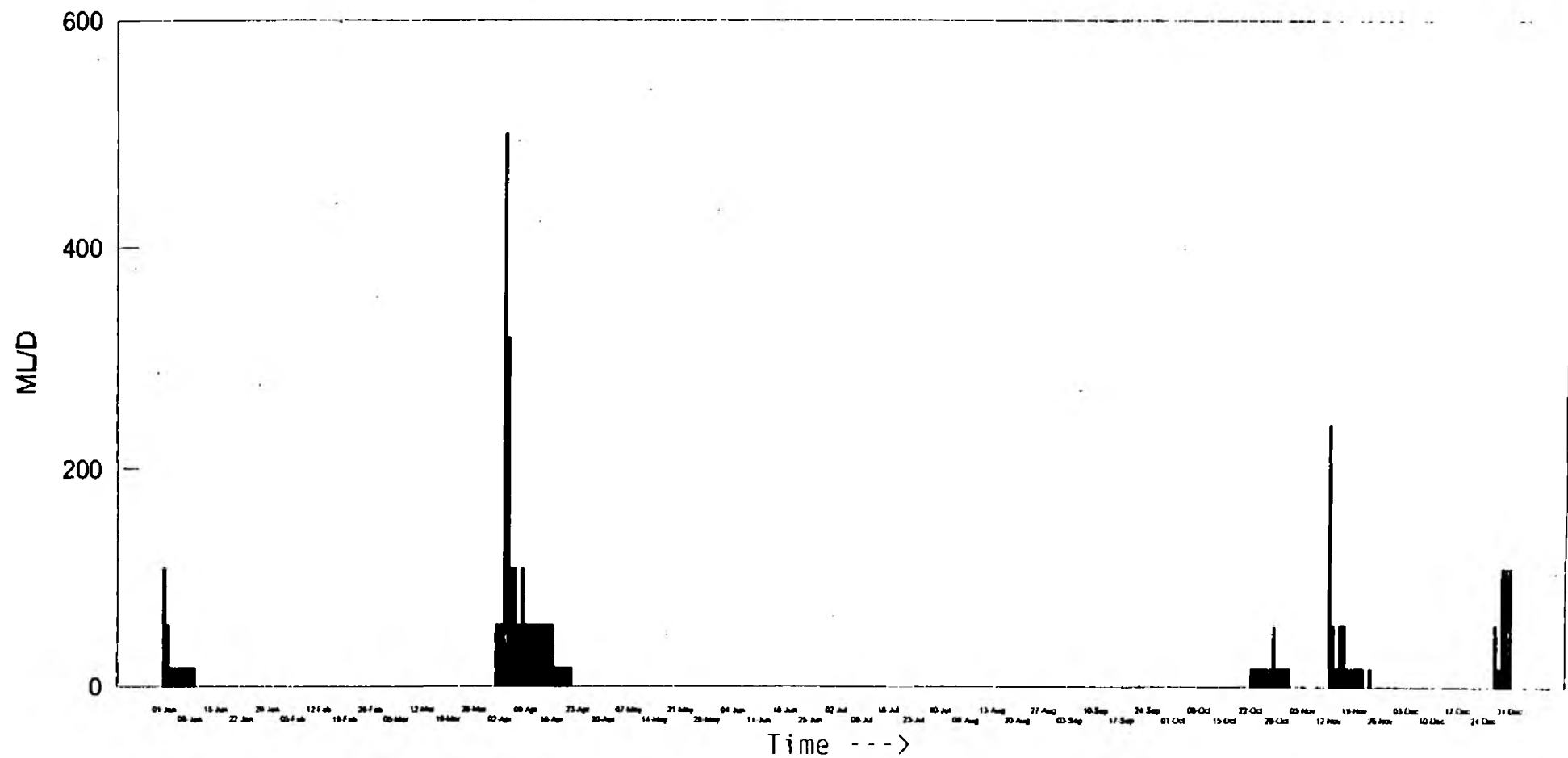
Burrator Reservoir Spill Flow

1986



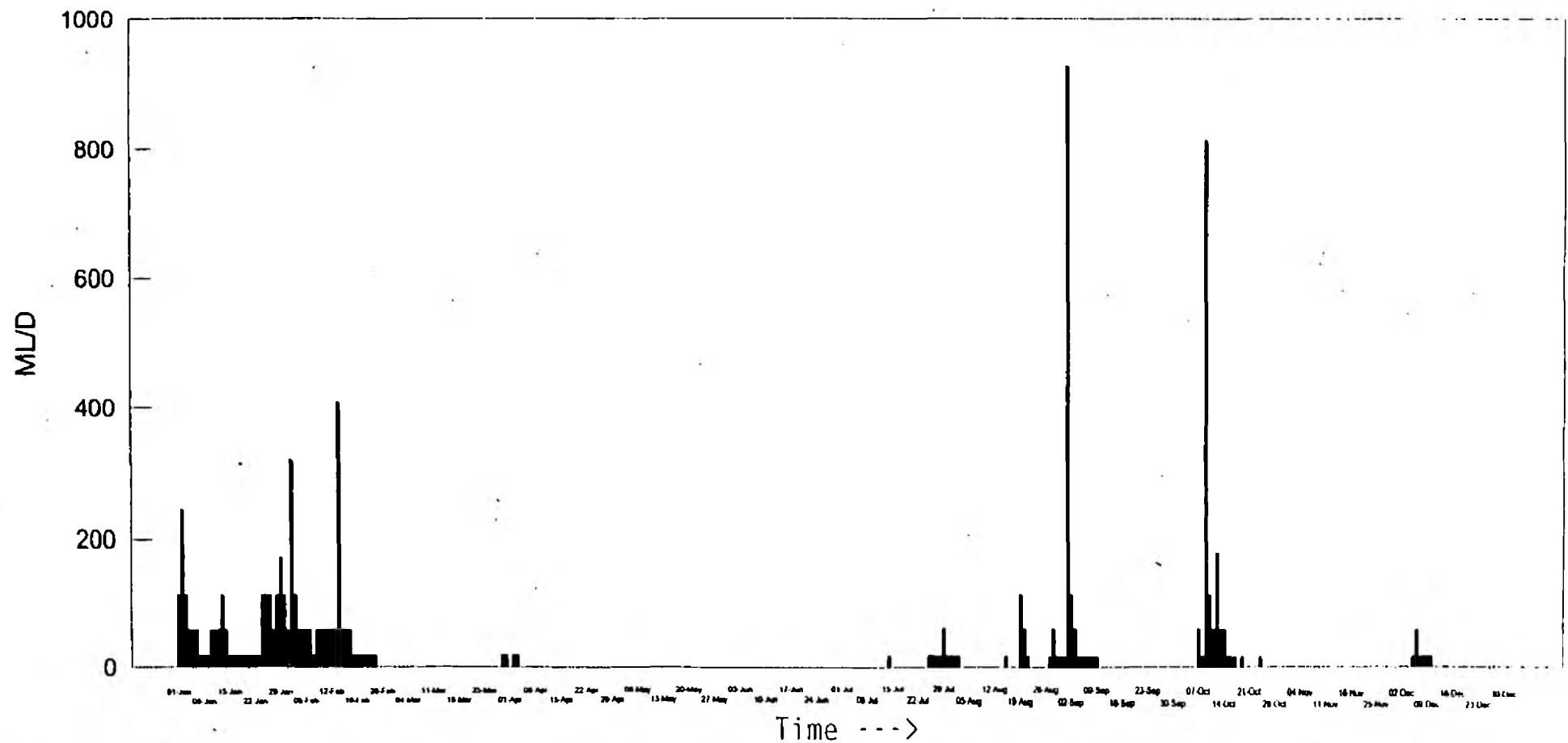
Burrator Reservoir Spill Flow

1987



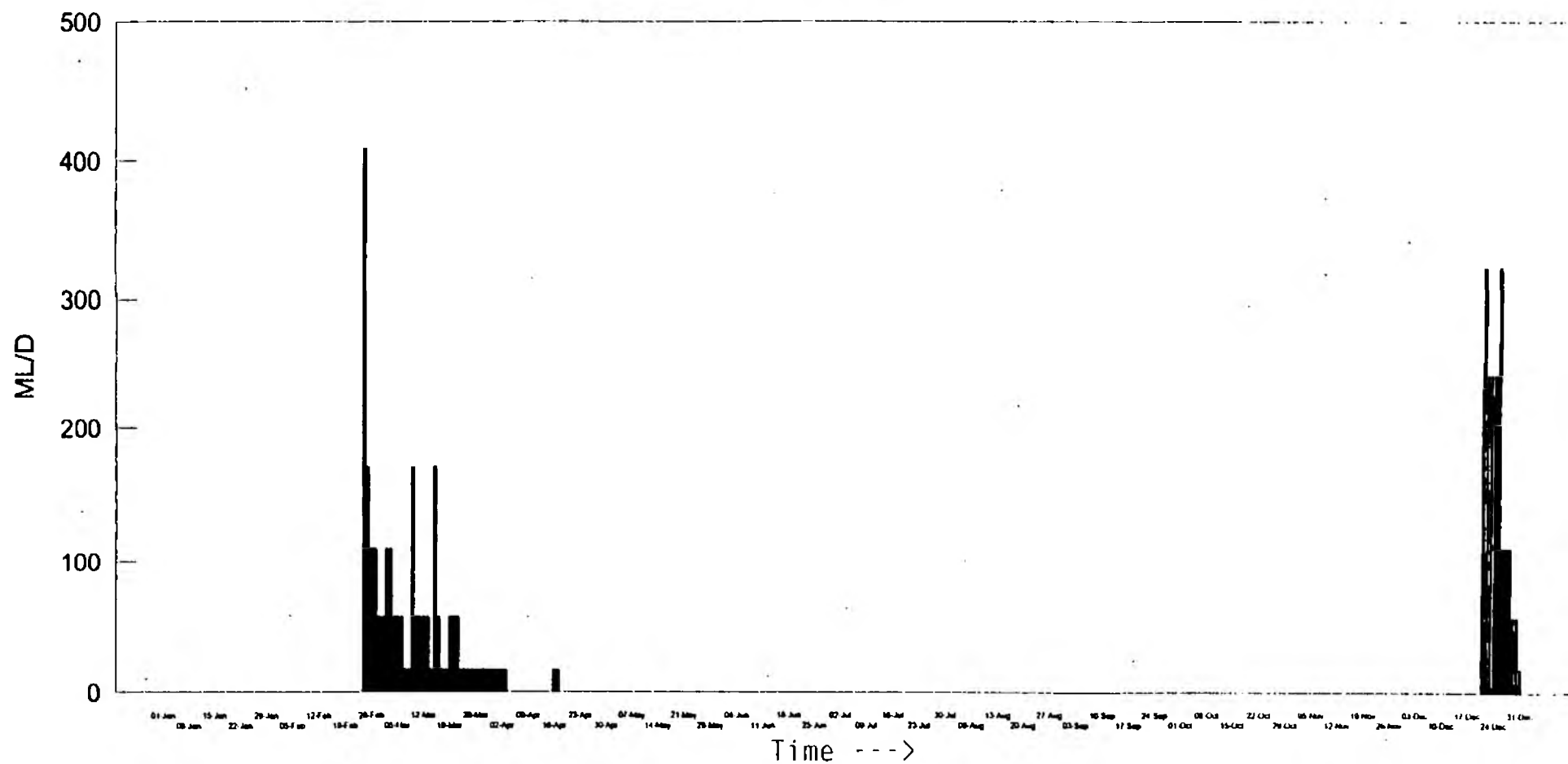
Burrator Reservoir Spill Flow

1988



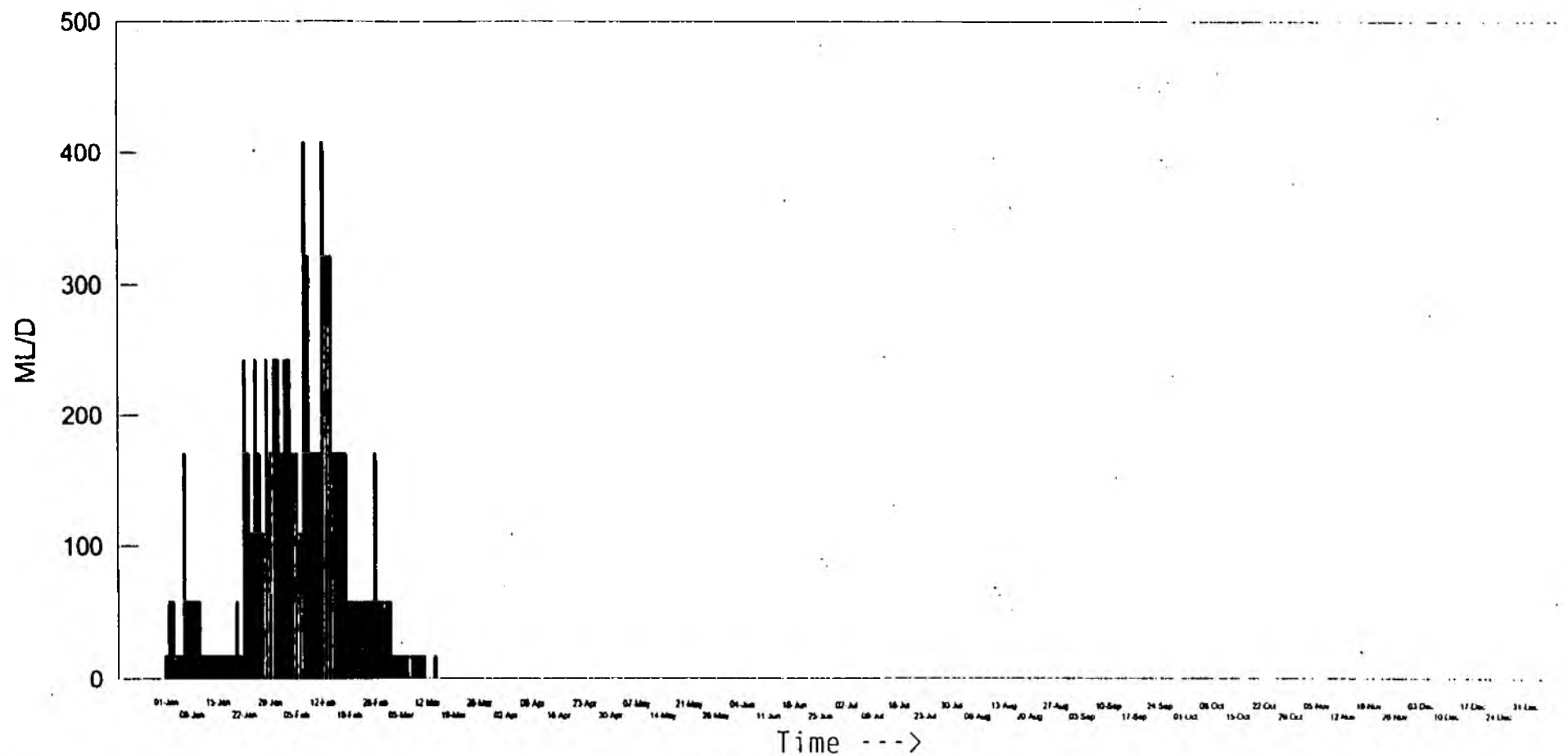
Burrator Reservoir Spill Flow

1989



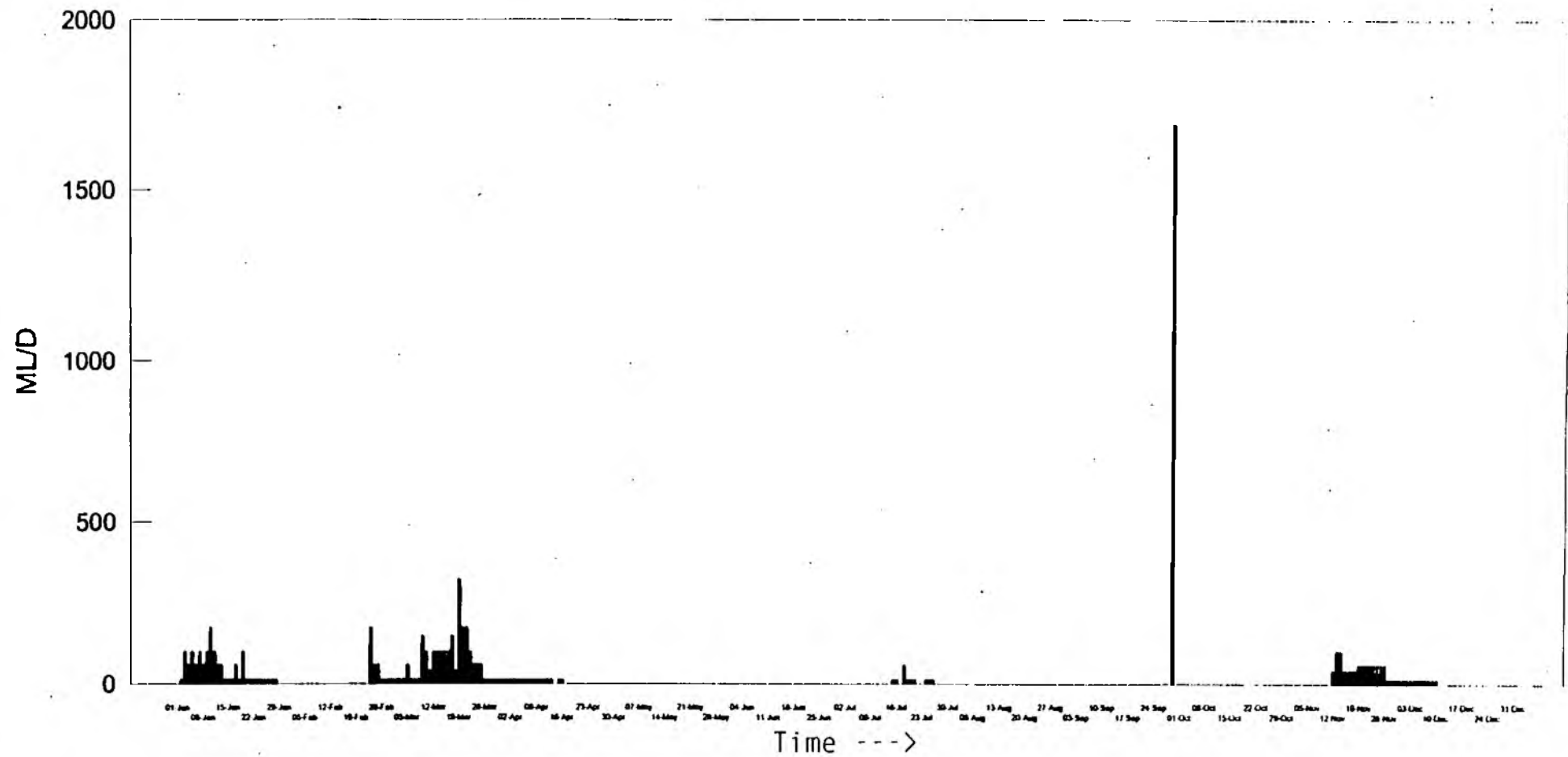
Burrator Reservoir Spill Flow

1990



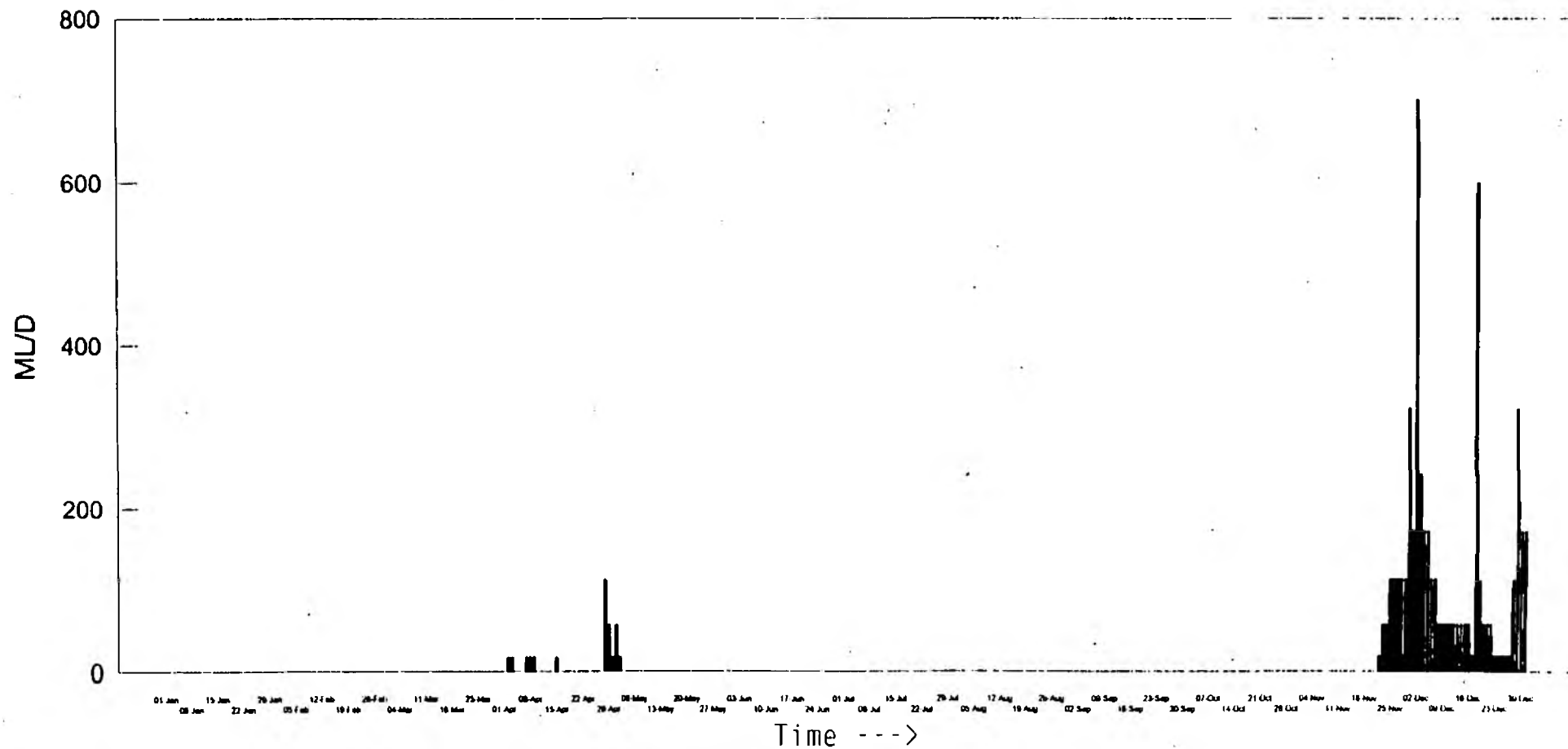
Burrator Reservoir Spill Flow

1991



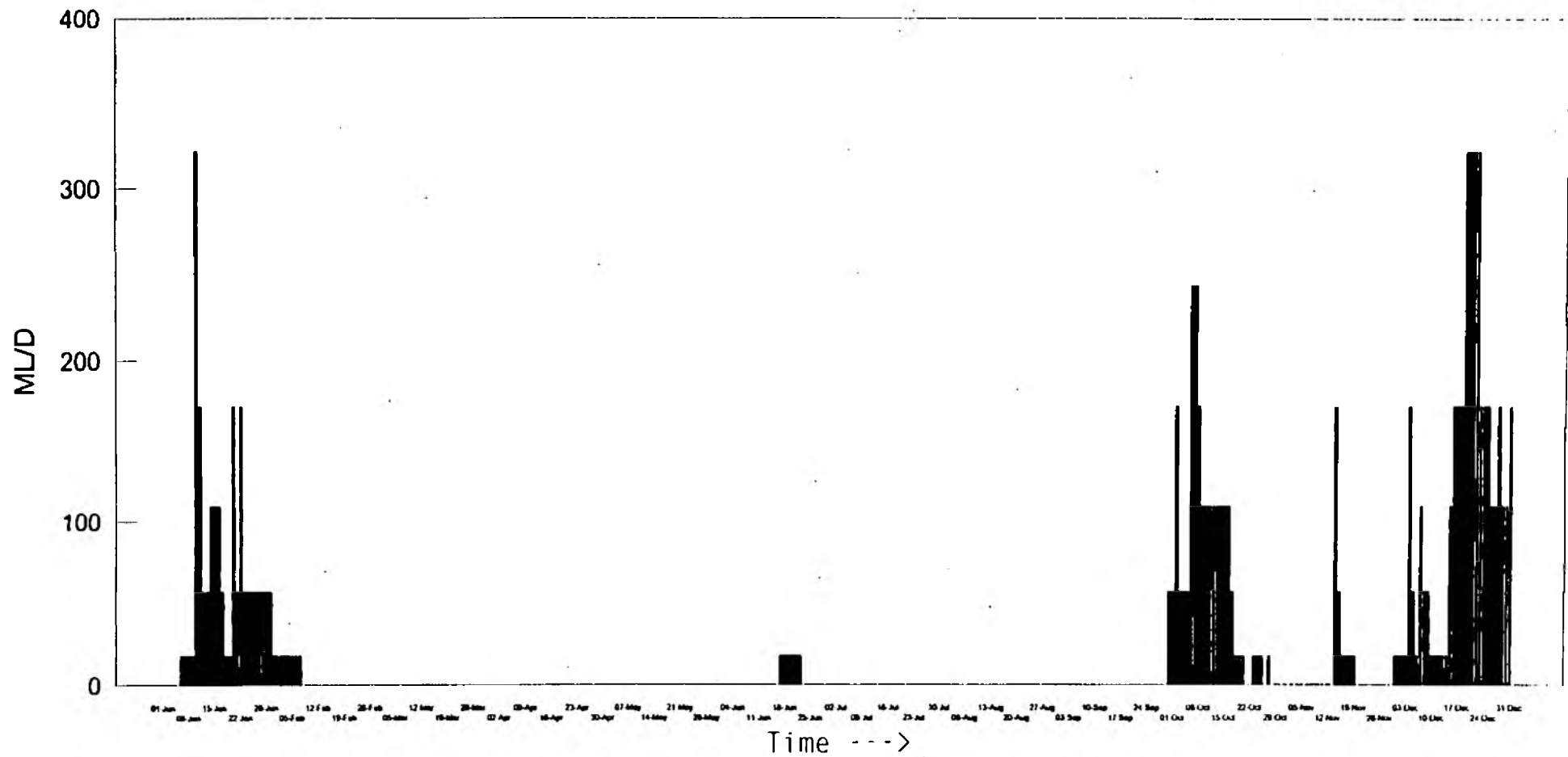
Burrator Reservoir Spill Flow

1992



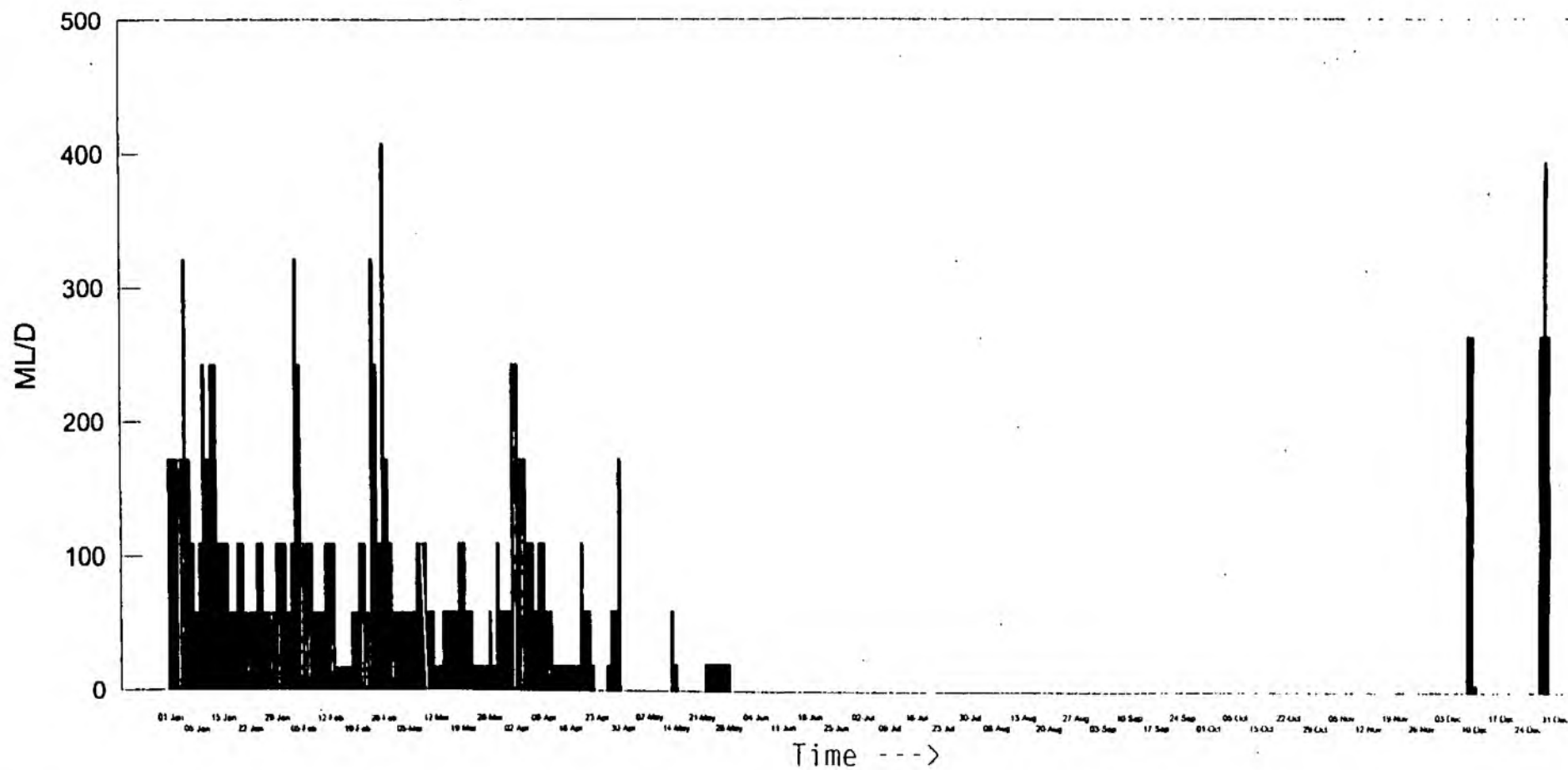
Burrator Reservoir Spill Flow

1993



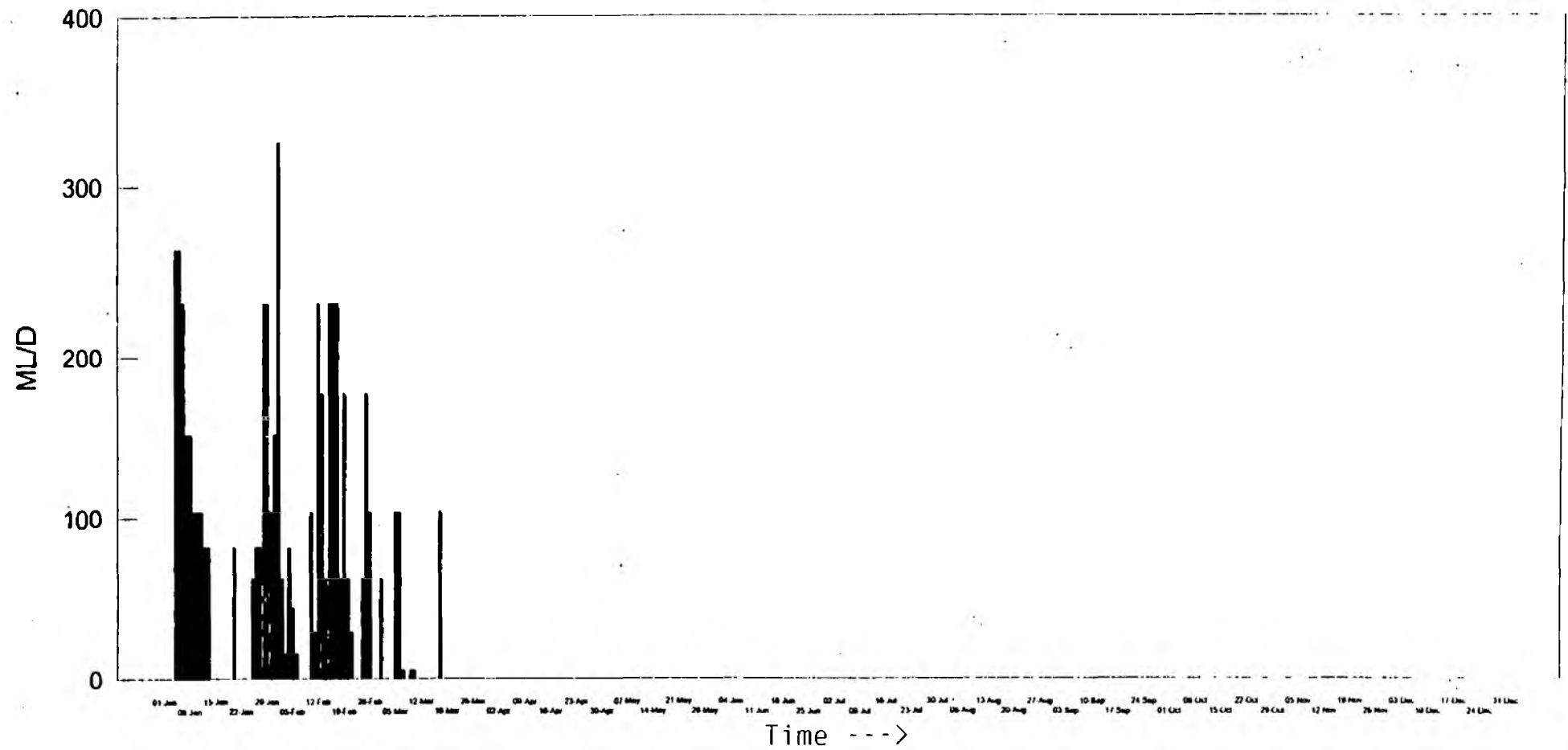
Burrator Reservoir Spill Flow

1994



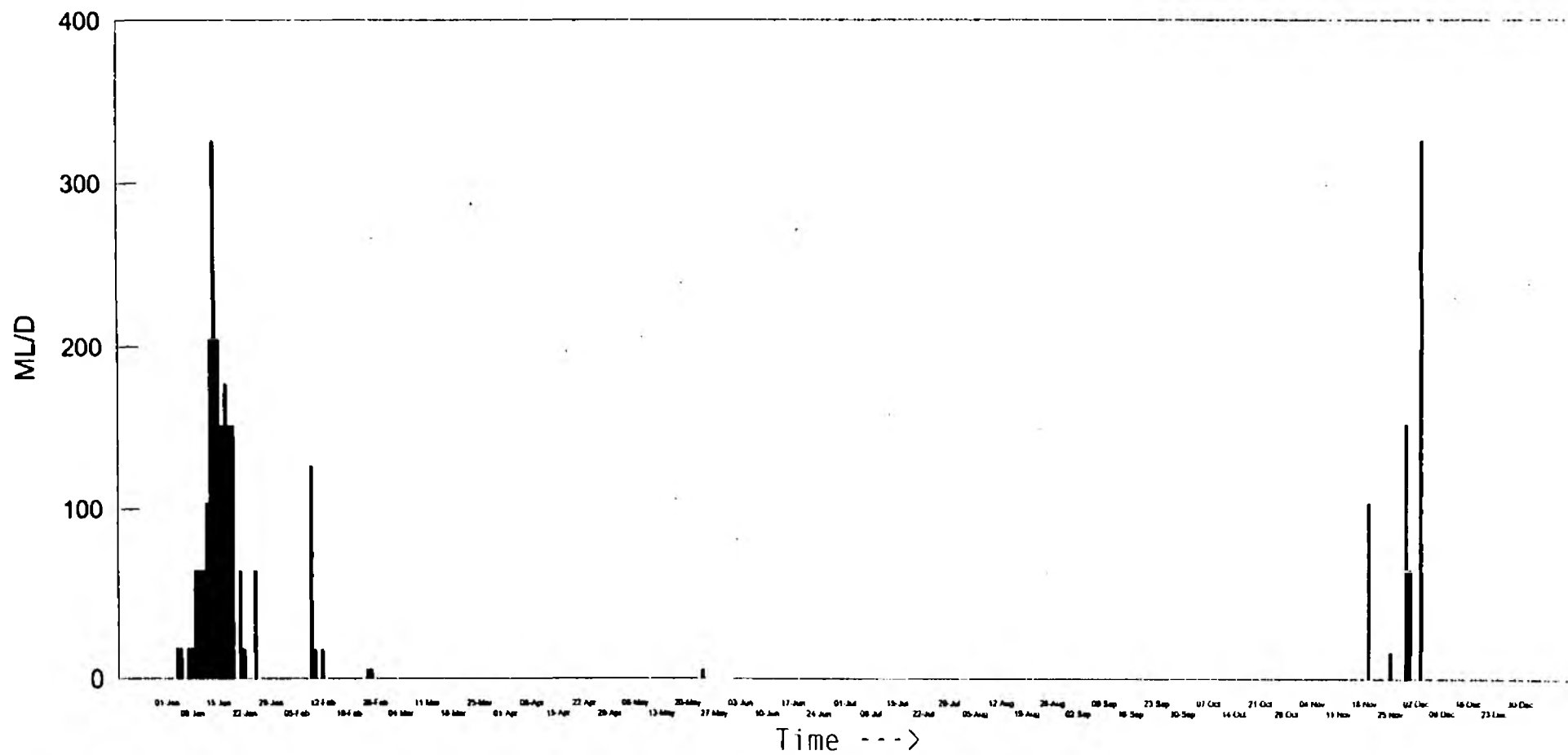
Burrator Reservoir Spill Flow

1995



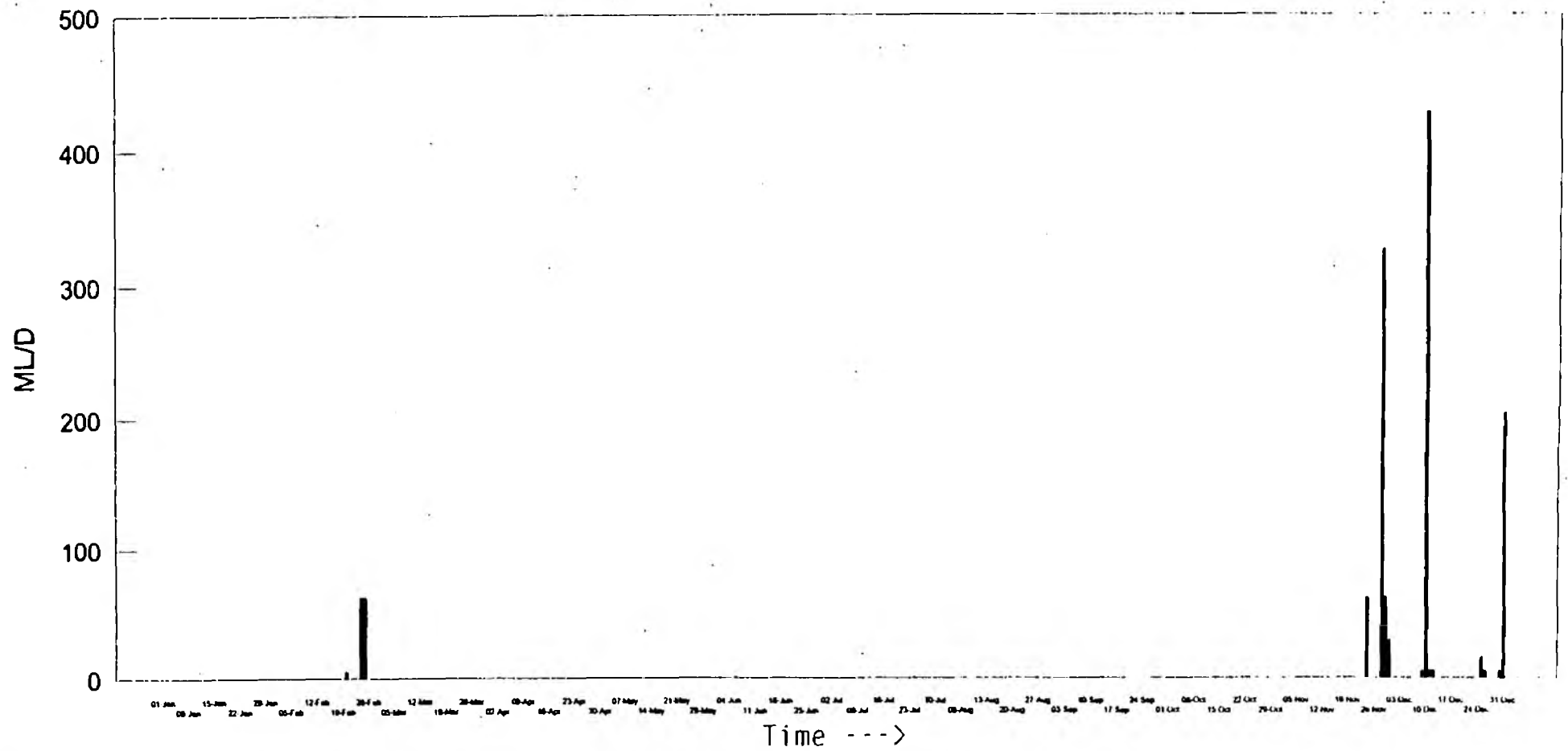
Burrator Reservoir Spill Flow

1996



Burrator Reservoir Spill Flow

1997



APPENDIX 1. A.L.F. & ROUTINE ELECTRIC-FISHING SURVEYS :PLYM CATCHMENT AND MEAVY SUB-CATCHMENT 1995.

SITE NO.	ACTUAL CLUSTER	DATE	RIVER	SITE	SPECIES	AGE	NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX N/C1 NLOW/C1	POPULATION DENSITIES		
							C1	C2	C3	N	N HIGH	N LOW		N	N HIGH	N LOW
1	AA	14/06/95	PLYM	HARTOR	SALMON	0+	0	0	0							
						1+	0	0	0							
						2+	0	0	0							
						3+	0	0	0							
						=>1+	0	0	0							
					TROUT	0+	29	10	2	42.0	45	41	1.45	12.2	13.0	11.9
						1+	55	20	9	88.0	99	84	1.50	25.5	28.7	24.3
						2+	4	1	2	7.0			1.50	2.0		
						3+	29	3	6	38.0			1.50	11.0		
						>4+	17	3	2	23.0	26	22	1.50	6.7	7.5	6.4
						=>1+	105	27	19	158.0	169	153	1.50	45.8	49.0	44.3
							SECTION LENGTH		73.4m							
							SECTION WIDTH		4.7m							
							SECTION AREA		345m2							
2	AA	13/06/95	PLYM	DITSWORTHY WARREN	SALMON	0+	0									
						1+	0									
						2+	0									
						3+	0									
						=>1+	0									
					TROUT	0+	91			132.0			1.45	53.9		
						1+	47			70.5			1.50	28.8		
						2+	2			3.0			1.50	1.2		
						3+	7			10.5			1.50	4.3		
						>4+	0									
						=>1+	56			84.0			1.50	34.3		
					EEL		SECTION LENGTH		72m							
							SECTION WIDTH		3.4m							
							SECTION AREA		244.8m2							
3	AA	13/06/95	PLYM	BRISWORTHY	SALMON	0+	0									
						1+	0									
						2+	0									
						3+	0									
						=>1+	0									
					TROUT	0+	36			52.2			1.45	9.3		
						1+	58			87			1.50	15.5		
						2+	4			6			1.50	1.1		
						3+	10			15			1.50	2.7		
						=>4+	6			9			1.50	1.6		
						=>1+	78			117			1.50	20.8		
					EEL		SECTION LENGTH		75.0m							
							SECTION WIDTH		7.5m							
							SECTION AREA		562.5m2							

SITE NO.	ACTUAL CLUSTER	DATE	RIVER	SITE	SPECIES	AGE	NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX	POPULATION DENSITIES		
							C1	C2	C3	N	N HIGH	N LOW	N/C1 NLOW/C1	N	N HIGH	N LOW
4a	AB	20/06/95	PLYM	U/S CADOVER BRIDGE	SALMON	0+	0									
						1+	0									
						2+	0									
						3+	0									
						=>1+	0									
					TROUT	0+	193			397.6		2.06		50.9		
						1+	69			101.4		1.47		13.0		
						2+	40			58.8		1.47		7.5		
						3+	3			4.4		1.47		0.6		
						=>4+	0									
						=>1+	112			164.6		1.47		21.1		
					EEL	C			SECTION LENGTH SECTION WIDTH SECTION AREA	94.2m 8.3m 781.9m ²						
4b	AB	15/06/95	PLYM	CADOVER BRIDGE	SALMON	0+	0									
						1+	0									
						2+	0									
						3+	0									
						=>1+	0									
					TROUT	0+	97	49	27	200.0	233	184	2.06	49.8	58.0	45.8
						1+	36	11	5	53.0	60	52	1.47	13.2	14.9	12.9
						2+	26	7	4	38.0	44	37	1.47	9.6	11.0	9.2
						3+	2	0	0	2.0			1.47	0.5		
						=>4+	0	0	0							
						=>1+	64	18	9	94.0	101	91	1.47	23.4	25.1	22.7
					EEL	C			SECTION LENGTH SECTION WIDTH SECTION AREA	51.5m 7.8m 401.7m ²						
5	AB	20/06/95	PLYM	LOWER CADWORTHY FARM	SALMON	0+	0									
						1+	0									
						2+	0									
						3+	0									
						=>1+	0									
					TROUT	0+	15			30.9		2.08		6.2		
						1+	33			48.5		1.47		9.8		
						2+	23			33.8		1.47		6.8		
						3+	3			4.4		1.47		0.9		
						=>4+	0									
						=>1+	59			68.7		1.47		17.5		
					EEL SEATROUT	C			SECTION LENGTH SECTION WIDTH SECTION AREA	71.8m 6.9m 495.4m ²						

SITE ACTUAL DATE RIVER
NO. CLUSTER

6 AC 03/07/95 PLYM

SITE

HAM

SPECIES AGE

SALMON 0+
1+
2+
3+
=>1+

TROUT 0+
1+
2+
3+
=>4+
=>1+

BULLHEAD C
EEL C
SEATROUT P
478mm(2.1

7 AC 30/06/95 PLYM

GREAT SHAUGH
WOOD

SALMON 0+
1+
2+
3+
=>1+

TROUT 0+
1+
2+
3+
=>4+
=>1+

BULLHEAD C
EEL C

8 27/06/95 PLYM

PLYM BRIDGE

DIP

9 08/06/95 BLACKA BROOK

BLACKA

SALMON 0+
1+
2+
3+
=>1+

TROUT 0+
1+
2+
3+
=>4+
=>1+

EEL P

NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX	POPULATION DENSITIES		
C1	C2	C3	N	N HIGH	N LOW	N/C1 NLOW/C1	N	N HIGH	N LOW
58	27	22	132	181	115	2.28	18.0	24.7	15.7
104	45	20	183	201	174	1.72	24.9	27.4	23.7
9	0	2	11			1.72	1.5		
0	0	0							
113	45	22	194	212	185	1.72	26.4	28.9	25.2
29	6	3	39	42	38	1.34	5.3	5.7	5.2
52	27	18	117	160	103	2.08	15.9	21.8	14.0
18	4	5	28	40	27	2.08	3.8	5.5	3.7
1	1	0	2			2.08	0.3		
0	0	0							
71	32	23	148	184	134	2.08	20.2	25.1	18.3

SECTION LENGTH 89.5m
SECTION WIDTH 8.2m
SECTION AREA 733.9m²

1+), 520(3.1+), 550(3.1sm+1+1sm+), 457(3.1+), 457(3.1sm+), 580(3.1.2sm+)

62			141.4			2.28	28.8		
8			13.8			1.72	2.8		
0									
0									
8			13.8			1.72	2.8		
5			6.7			1.34	1.4		
7			14.6			2.08	3.0		
0									
1			2.1			2.08	0.4		
0									
8			16.6			2.08	3.4		

SECTION LENGTH 56.5m
SECTION WIDTH 8.7m
SECTION AREA 491.6m²

0									
0									
0									
0									
0									
26	11	3	41.0	48	40	1.58	25.9	30.4	25.3
33	3	2	39.0	40	38	1.18	40.7	25.3	24.1
11	1	0	13.0	14	12	1.18	8.2	8.9	7.6
0	0	0							
0	1	0	1.0			1.18	0.6		
44	5	2	52.0	53	51	1.18	32.9	33.5	32.3

SECTION LENGTH 68.7m
SECTION WIDTH 2.3m
SECTION AREA 158m²

SITE ACTUAL DATE RIVER
NO. CLUSTER
10 AE 09/06/95 MEAVY

SITE
BLACK TOR

SPECIES AGE
SALMON 0+
1+
2+
3+
=>1+

TROUT 0+
1+
2+
3+
=>4+
=>1+

11 AD 05/06/95 MEAVY

BURRATOR

SALMON 0+
1+
2+
3+
=>1+

TROUT 0+
1+
2+
3+
=>4+
=>1+

EEL P

12 AD 05/06/95 MEAVY

YEO FARM

SALMON 0+
1+
2+
3+
=>1+

TROUT 0+
1+
2+
3+
=>4+
=>1+

EEL P
STICKLEBACK P

NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX	POPULATION DENSITIES		
C1	C2	C3	N	N HIGH	N LOW	N/C1 NLOW/C1	N	N HIGH	N LOW
0									
0									
0									
0									
0									
0									
10			16.1			1.61	8.5		
11			17.7			1.61	9.4		
7			11.3			1.61	6.0		
2			3.2			1.61	1.7		
30			48.3			1.61	25.6		

SECTION LENGTH 45m
SECTION WIDTH 4.2m
SECTION AREA 189m2

35			82.3			2.35	32.1		
0									
1			2.2			2.16	0.9		
0									
1			2.2			2.16	0.9		
56			118.7			2.12	46.4		
29			65.0			2.24	25.4		
16			35.8			2.24	14.0		
1			2.2			2.24	0.9		
5			11.2			2.24	4.4		
51			114.2			2.24	44.6		

SECTION LENGTH 40m
SECTION WIDTH 6.4m
SECTION AREA 256.0m2

49			115.2			2.35	38.1		
22			47.5			2.16	15.7		
2			4.3			2.16	1.4		
24			51.8			2.16	17.1		
59			125.1			2.12	41.4		
9			20.2			2.24	6.7		
11			24.6			2.24	8.1		
3			6.7			2.24	2.2		
3			6.7			2.24	2.2		
26			58.2			2.24	19.3		

SECTION LENGTH 52.1m
SECTION WIDTH 5.8m
SECTION AREA 302.2m2

SITE NO.	ACTUAL CLUSTER	DATE	RIVER	SITE	SPECIES	AGE
13	AD	06/06/95	MEAVY	MARCHAMS CROSS	SALMON	0+ 1+ 2+ 3+ =>1+
					TROUT	0+ 1+ 2+ 3+ =>4+ =>1+
					EEL	P
14	AG	27/06/95	MEAVY	GRATTON	SALMON	0+ 1+ 2+ 3+ =>1+
					TROUT	0+ 1+ 2+ 3+ =>4+ =>1+
					EEL	P
15	AG	27/06/95	MEAVY	OLDERWOOD	SALMON	0+ 1+ 2+ 3+ =>1+
					TROUT	0+ 1+ 2+ 3+ =>4+ =>1+
					EEL	C

NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX	POPULATION DENSITIES		
C1	C2	C3	N	N HIGH	N LOW	N/C1 N LOW/C1	N	N HIGH	N LOW
138	80	46	324.0	382	294	2.35	96.2	113.5	87.3
36	18	12	78.0	114	68	2.18	23.2	33.9	20.2
1	1	0	2.0			2.16	0.6		
0	0	0							
37	19	12	80.0	115	71	2.16	23.8	34.2	21.1
60	29	19	127.0	162	114	2.12	37.7	48.1	33.9
14	8	9	31.0			2.24	9.2		
11	8	6	26.0			2.24	7.7		
2	2	2	6.0			2.24	1.8		
6	4	1	11.0			2.24	3.3		
33	23	18	74.0			2.24	22.0		

SECTION LENGTH 48.8m
SECTION WIDTH 6.9m
SECTION AREA 336.7m²

915		1747.7		1.91	413.1
119		207.1		1.74	48.9
0					
0					
119		207.1		1.74	48.9
280		501.2		1.79	118.5
8		14.2		1.78	3.4
0					
0					
0					
8		14.2		1.78	3.4

SECTION LENGTH 49.2m
SECTION WIDTH 8.6m
SECTION AREA 423.1m²

210		401.1		1.91	134.7
37		64.4		1.74	21.6
5		8.7		1.74	2.9
1		1.7		1.74	0.6
43		74.8		1.74	25.1
32		57.3		1.79	19.2
12		21.4		1.78	7.2
8		14.2		1.78	4.6
3		5.3		1.78	1.8
0					
23		40.9		1.78	13.7

SECTION LENGTH 58.4m
SECTION WIDTH 5.1m
SECTION AREA 297.8m²

SITE NO.	ACTUAL CLUSTER	DATE	RIVER	SITE	SPECIES	AGE	NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX N/C1 NLOW/C1	POPULATION DENSITIES							
							C1	C2	C3	N	N HIGH	N LOW		N	N HIGH	N LOW					
16	AG	23/06/95	MEAVY	CHUB TOR	SALMON	0+	222	108	50	425.0	457	404	1.91	104.5	112.3	99.3					
						1+	62	25	10	103.0	114	97	1.74	25.3	28.0	23.8					
						2+	0	1	2	3.0			1.74	0.7							
						3+	0	0	0												
						=>1+	62	26	12	108.0	122	102	1.74	26.5	30.0	25.1					
					TROUT	0+	155	62	35	277.0	301	263	1.79	68.1	74.0	64.7					
						1+	65	25	17	119.0	140	110	1.78	29.3	34.4	27.0					
						2+	21	6	4	32.0	39	31	1.78	7.9	9.6	7.6					
						3+	3	3	0	8.0			1.78	1.5							
						=>4+	1	1	0	2.0			1.78	0.5							
					=>1+	90	35	21	160.0	180	151	1.78	39.3	44.2	37.1						
					EEL STICKLEBACK SEA TROUT	P P 370mm (UR)	SECTION LENGTH SECTION WIDTH SECTION AREA		47.3m 8.6m 406.8m												
17	AH	21/06/95	MEAVY	HOO MEAVY	SALMON	0+	501	183	101	849.0	881	826	1.69	172.4	179.0	167.8					
						1+	35	21	9	74.0	100	67	2.22	15.0	20.3	13.6					
						2+	1	0	2	3.0			2.22	0.6							
						3+	0	0	0												
						=>1+	36	21	11	80.0	115	71	2.22	16.2	23.4	14.4					
					TROUT	0+	83	26	11	124.0	133	120	1.49	25.2	27.0	24.4					
						1+	34	10	9	57.0	72	53	1.53	11.5	14.6	10.8					
						2+	21	8	3	33.0	40	32	1.53	6.7	8.1	6.5					
						3+	6	0	1	7.0			1.53	1.4							
						=>4+	7	0	0	7.0			1.53	1.4							
					=>1+	68	18	13	104.0	114	99	1.53	21.1	23.2	20.1						
								SECTION LENGTH SECTION WIDTH SECTION AREA		58.6m 8.4m 492.2m2											
					SEATROUT			424mm(2.2SM+), 412mm(US.US))													
18	AH	22/06/95	MEAVY	CLEAR BROOK	SALMON	0+	56			94.6			1.69	29.3							
						1+	55			122.1			2.22	37.8							
						2+	6			13.3			2.22	4.1							
						3+	0														
						=>1+	61			135.4			2.22	41.9							
					TROUT	0+	51			76.0			1.49	23.5							
						1+	19			29.1			1.53	9.0							
						2+	7			10.7			1.53	3.3							
						3+	1			1.5			1.53	0.5							
						=>4+	0														
					=>1+	27			41.3			1.53	12.8								
								SECTION LENGTH SECTION WIDTH SECTION AREA		43.7m 7.4m 323.4m											
					EEL	C															

SITE ND.	ACTUAL CLUSTER	DATE	RIVER	SITE	SPECIES	AGE	NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX N/C1 NLOW/C1	POPULATION DENSITIES		
							C1	C2	C3	N	N HIGH	N LOW		N	N HIGH	N LOW
19	AF	22/06/95	MEAVY	GOODAMEAVY	SALMON	0+	488			883.3			1.81			243.3
						1+	100			147.0			1.47			40.5
						2+	3			4.4			1.47			1.2
						3+	0									
						=>1+	103			151.4			1.47			41.7
					TROUT	0+	41			75.0			1.83			20.7
						1+	21			47.0			2.24			12.9
						2+	10			22.4			2.24			6.2
						3+	4			9.0			2.24			2.5
						=>4+	0									
						=>1+	35			78.4			2.24			21.6

[illegible]

SITE NO.	ACTUAL CLUSTER	DATE	RIVER	SITE	SPECIES	AGE
25		30/06/95	TORY BROOK	PORTWORTHY	SALMON	0+ 1+ 2+ 3+ =>1+
					TROUT	0+ 1+ 2+ 3+ =>4+ =>1+
26		29/06/95	TORY BROOK	NEWNHAM PARK	SALMON	0+ 1+ 2+ 3+ =>1+
					TROUT	0+ 1+ 2+ 3+ =>4+ =>1+
27		29/06/95	TORY BROOK	PLYMPTON PLAYING FIELDS	SALMON	0+ 1+ 2+ 3+ =>1+
					TROUT	0+ 1+ 2+ 3+ =>4+ =>1+
					EEL	A

NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX	POPULATION DENSITIES		
C1	C2	C3	N	N HIGH	N LOW	N/C1 NLOW/C1	N	N HIGH	N LOW

0
0
0
0
0

0
0
0
0
0
0
0

SECTION LENGTH 70m
SECTION WIDTH 4.5m
SECTION AREA 315m²

0
0
0
0
0

0
0
0
0
0
0
0

SECTION LENGTH 64.3m
SECTION WIDTH 5.2m
SECTION AREA 334.4m²

0
0
0
0
0

0
0
0
0
0
0
0

SECTION LENGTH 88.5m
SECTION WIDTH 3.4m
SECTION AREA 300.9m²

SITE NO.	ACTUAL CLUSTER	DATE	RIVER	SITE	SPECIES	AGE
28		29/06/95	TORY BROOK	PLYMPTON	SALMON	0+ 1+ 2+ 3+ =>1+
					TROUT	0+ 1+ 2+ 3+ =>4+ =>1+
					FLOUNDER	C
					EEL	C
29	AI	30/06/95	SMALLHANGER BROOK	FURZEACRE BR.	SALMON	0+ 1+ 2+ 3+ =>1+
					TROUT	0+ 1+ 2+ 3+ =>4+ =>1+
					EEL	P
30	AI	29/06/95	ELFORDLEIGH BROOK	BINICLIFFE	SALMON	0+ 1+ 2+ 3+ =>1+
					TROUT	0+ 1+ 2+ 3+ =>4+ =>1+
					BULLHEAD	C
					EEL	C

NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX	POPULATION DENSITIES		
C1	C2	C3	N	N HIGH	N LOW	N/C1 N LOW/C1	N	N HIGH	N LOW

0
0
0
0
0
0
0
0
0
0
0

SECTION LENGTH 70m
SECTION WIDTH 3.7m
SECTION AREA 259m²

0
0
0
0
0

23			38.2			1.66	36.7		
8			9.1			1.14	8.8		
3			3.4			1.14	3.3		
1			1.1			1.14	1.1		
0									
12			13.7			1.14	13.1		

SECTION LENGTH 43.4m
SECTION WIDTH 2.4m
SECTION AREA 104.2m²

0
0
0
0
0

29	11	8	53.0	71	48	1.66	69.7	93.4	63.2
4	0	0	4.0			1.14	5.3		
3	0	1	4.0			1.14	5.3		
0	0	0				1.14			
0	0	0				1.14			
7	0	1	8.0			1.14	10.5		

SECTION LENGTH 40m
SECTION WIDTH 1.9m
SECTION AREA 76m²

Environment Agency - Southwest Region
Fisheries Science Team - Cornwall Area

APPENDIX 2. ELECTRIC-FISHING SURVEY : PLYM CATCHMENT - 1993

SITE N	ACTUAL CLUSTER	RIVER	SITE	DATE	SPECIES	AGE	
1	A	MEAVY	BURRATOR	27/05/93	SALMON	0+	
						1+	
						2+	
						>=3+	
						>=1+	
					TROUT	0+	
						1+	
						2+	
						3+	
						>=4+	
						>=1+	
					EEL		C
2	A	MEAVY	YEO FARM	28/05/93	SALMON	0+	
						1+	
						2+	
						>=3+	
						>=1+	
					TROUT	0+	
						1+	
						2+	
						3+	
						>=4+	
						>=1+	
					EEL		C
3	A	MEAVY	MARCHAMS CROSS	24/05/93	SALMON	0+	
						1+	
						2+	
						>=3+	
						>=1+	
					TROUT	0+	
						1+	
						2+	
						3+	
						>=4+	
						>=1+	
					EEL		C

08/02/94

NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX N/C1	POP. DENSITIES(No./100m2)		
C1	C2	C3	N	N HIGH	N LOW		N	N HIGH	N LOW
0			0				0		
0			0				0		
53			73.7			1.41	23		
16			28.8			1.8	9		
10			18			1.8	5.6		
5			9			1.8	2.8		
31			55.8			1.8	17.4		
	SECTION LENGTH		51.8m						
	SECTION WIDTH		6.2m						
	SECTION AREA		321m2						
30	9	5	45	53	44	1.5	13.2	15.5	12.9
0	0	0	0				0		
17	5	1	24	26	23	1.41	7	7.6	6.7
21	13	6	46	77	40	1.8	13.5	22.5	11.7
14	1	2	18	20	17	1.8	5.3	5.8	5
3	1	1	5			1.8	1.5		
2	2	0	4			1.8	1.2		
40	17	9	72	88	66	1.8	21.1	25.7	19.3
	SECTION LENGTH		57						
	SECTION WIDTH		6						
	SECTION AREA		342						
56			84			1.5	24.7		
2			2			1	0.6		
13			13			1	3.8		
15			15			1	4.4		
14			19.7			1.41	5.8		
28			50.4			1.8	14.8		
11			19.8			1.8	5.8		
6			10.8			1.8	3.2		
1			1.8			1.8	0.5		
46			82.8			1.8	24.4		
	SECTION LENGTH		50						
	SECTION WIDTH		6.8						
	SECTION AREA		340						

SITE N	ACTUAL CLUSTER	RIVER	SITE	DATE	SPECIES	AGE	NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX N/C1	POP. DENSITIES(No./100m2)		
							C1	C2	C3	N	N HIGH	N LOW		N	N HIGH	N LOW
4	B	MEAVY	GRATTON	02/06/93	SALMON	0+	650	251	157	1175	1221	1139	1.8	223.8	232.6	217
						1+	0	0	0	0			2	0		
						2+	1	1	0	2			2	0.4		
						>=3+										
						>=1+	1	1	0	2			2	0.4		
					TROUT	0+	36	13	5	56	63	54	1.56	10.7	12	10.3
						1+	11	12	8	31			2.62	5.9		
						2+	2	0	1	3				0.6		
						3+										
						>=4+										
						>=1+	13	12	9	34			2.62	6.5		
						EEL										
						STICKLEBACK	C									
							P									
5	B	MEAVY	OLDERWOOD	03/06/93	SALMON	0+	397			714.6			1.8	161.3		
						1+	0		0				0			
						2+	5		10			2	2.3			
						>=3+										
						>=1+	5		10			2	2.3			
					TROUT	0+	57			88.9			1.56	20.1		
						1+	13			34.1			2.62	7.7		
						2+	10			26.2			2.62	5.9		
						3+	2			5.2			2.62	1.2		
						>=4+										
						>=1+	25			65.5			2.62	14.8		
						EEL										
							C									
6	B	MEAVY	CHUB TOR	04/06/93	SALMON	0+	97			174.6			1.8	41.2		
						1+	1		2			2	0.5			
						2+										
						>=3+										
						>=1+	1		2			2	0.5			
					TROUT	0+	41			64			1.56	15.1		
						1+	25			65.5			2.62	15.4		
						2+	4			10.5			2.62	2.5		
						3+	0			0			2.62	0		
						>=4+	1			2.6			2.62	0.6		
						>=1+	30			78.6			2.62	18.5		
						EEL										
							C									
						STICKLEBACK	P									

SITE N	ACTUAL CLUSTER	RIVER	SITE	DATE	AGE	NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX N/C1	POP. DENSITIES(No./100m2)			
						C1	C2	C3	N	N HIGH	N LOW		N	N HIGH	N LOW	
7	C	MEAVY	HOO MEAVY	08/06/93	SALMON	0+	146	81	22	270	291	258	1.85	45.8	49.4	43.8
						1+	9	7	3	19			2.44	3.2		
						2+	0	3	0	3			2.44	0.5		
						>=3+										
						>=1+	9	10	3	22			2.44	3.7		
					TROUT	0+	94	32	14	146	157	140	1.55	24.8	26.7	23.8
						1+	15	7	9	31			2.4	5.3		
						2+	4	2	5	11			2.4	1.9		
						3+	0	2	0	2			2.4	0.3		
						>=4+	1	2	1	4			2.4	0.7		
						>=1+	20	13	15	48			2.4	8.1		
								SECTION LENGTH			71.8					
								SECTION WIDTH			8.2					
					EEL			SECTION AREA			589					
SEA TROUT			C			45.6 (2.1sm+), 49.9 (3.1+1sm+), 55.9 (UR1+1sm+), 45, 60										
8	C	MEAVY	CLEARBROOK	08/06/93	SALMON	0+	48			88.8			1.85	25.6		
						1+	6			14.6			2.44	4.2		
						2+	10			24.4			2.44	7		
						>=3+										
						>=1+	16			39			2.44	11.2		
					TROUT	0+	43			66.7			1.55	19.2		
						1+	14			33.6			2.4	9.7		
						2+	7			16.8			2.4	4.8		
						3+	1			2.4			2.4	0.7		
						>=4+	1			2.4			2.4	0.7		
						>=1+	23			55			2.4	15.9		
								SECTION LENGTH			51					
								SECTION WIDTH			6.8					
					EEL			SECTION AREA			347					
9	D	MEAVY	GOODAMEAVY	10/06/93	SALMON	0+	55			91.9			1.67	32.2		
						1+	13			21.7			1.67	7.6		
						2+	11			18.4			1.67	6.5		
						>=3+										
						>=1+	24			40.1			1.67	14.1		
					TROUT	0+	43			58.5			1.36	20.5		
						1+	13			29.8			2.29	10.5		
						2+	2			4.6			2.29	1.6		
						3+										
						>=4+										
						>=1+	15			34.4			2.29	12.1		
								SECTION LENGTH			46.7					
								SECTION WIDTH			6.1					
					EEL			SECTION AREA			285					
			P													

SITE N	ACTUAL CLUSTER	RIVER	SITE	DATE	SPECIES	AGE	NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX N/C1	POP. DENSITIES(No./100m2)							
							C1	C2	C3	N	N HIGH	N LOW		N	N HIGH	N LOW					
10	D	MEAVY	DEWERSTONE	22/06/93	SALMON	0+	60	28	7	100	110	95	1.67	25.6	28.2	24.4					
						1+	2	0	1	3			1.67	0.8							
						2+	7	3	2	12			1.67	3.1							
						>=3+															
						>=1+	9	3	3	15			1.67	3.8							
					TROUT	0+	50	16	1	68	70	67	1.36	17.4	17.9	17.2					
						1+	13	6	3	23	37	22	2.29	5.9	9.5	5.6					
						2+	7	10	8	25			2.29	6.4							
						3+	1	0	0	1			2.29	0.3							
						>=4+															
						>=1+	21	16	11	48			2.29	12.3							
					EEL SEA TROUT																

KEY

P = PRESENT (0-10)
C = COMMON (11-100)
A = ABUNDANT (101+)

Fisheries Science Team - Cornwall Area
Environment Agency - South Western Region

APPENDIX 3.
ELECTRIC-FISHING SURVEY :

RIVER MEAVY A.L.F. SURVEY RESULTS.

19/12/97

SIT NO.	ACTUAL CLUSTER	SURVEY TYPE	RIVER	SITE	DATE	SPECIES	AGE	NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX N/C1	POP. DENSITIES(No./100m2)		
								C1	C2	C3	N	N HIGH	N LOW		N	N HIGH	N LOW
1	A	1 RUN	MEAVY	BURRATOR	09/06/97	SALMON	0+	0			0.0				0.0		
							1+	1			2.4			2.43	0.9		
							2+	7			17.0			2.43	6.4		
							>=3+	0			0.0			2.43	0.0		
							>=1+	8			19.4			2.43	7.3		
						TROUT	0+	65			125.5			1.93	46.9		
							1+	19			34.6			1.82	12.9		
							2+	10			18.2			1.82	6.8		
							3+	7			12.7			1.82	4.8		
							>=4+	1			1.8			1.82	0.7		
							>=1+	37			67.3			1.82	25.2		
						EEL	P				SECTION LENGTH	41.8 m					
						3SP-STICKLEBACK	P				SECTION WIDTH	6.4 m					
											SECTION AREA	267.5 m2					
2	A	1 RUN	MEAVY	YEO FARM	05/06/97	SALMON	0+	0			0.0				0.0		
							1+	8			19.4			2.43	5.5		
							2+	15			36.5			2.43	10.3		
							>=3+	0			0.0				0.0		
							>=1+	23			55.9			2.43	15.7		
						TROUT	0+	49			94.6			1.93	26.6		
							1+	23			41.9			1.82	11.8		
							2+	8			14.6			1.82	4.1		
							3+	5			9.1			1.82	2.6		
							>=4+	2			3.6			1.82	1.0		
							>=1+	38			69.2			1.82	19.5		
						EEL	P				SECTION LENGTH	58.2 m					
						3SP-STICKLEBACK	C				SECTION WIDTH	6.1 m					
											SECTION AREA	355.02 m2					
3	A	3 RUN	MEAVY	MARCHAMS CROSS	04/06/97	SALMON	0+	0	0	0	0				0.0		
							1+	2	0	0	2				0.6		
							2+	5	6	4	15				4.3		
							>=3+	0	0	0	0				0.0		
							>=1+	7	6	4	17			2.43	4.9		
						TROUT	0+	95	39	27	183	212	169	1.93	53.0	61.4	49.0
							1+	47	13	14	82	101	74		23.8	29.3	21.4
							2+	4	4	3	11				3.2		
							3+	4	1	0	5				1.4		
							>=4+	1	0	0	1				0.3		
							>=1+	56	18	17	102	125	94	1.82	29.6	36.2	27.2
						OTHER SPECIES:											
						3SP-STICKLEBACK	C				SECTION LENGTH	50 m					
						EEL	C				SECTION WIDTH	6.9 m					
											SECTION AREA	345.0 m2					

SIT NO.	ACTUAL CLUSTER	SURVEY TYPE	RIVER	SITE	DATE	SPECIES	AGE	NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX N/C1	POP. DENSITIES(No./100m2)							
								C1	C2	C3	N	N HIGH	N LOW		N	N HIGH	N LOW					
4	B	1 RUN	MEAVY	GRATTON	05/06/97	SALMON	0+	14			25.1		1.79	5.2								
							1+	37			74.0		2	15.4								
							2+	4			8.0		2	1.7								
							>=3+	0			0.0		2	0.0								
							>=1+	41			82.0		2	17.0								
						TROUT	0+	363			675.2		1.86	140.1								
							1+	29			53.4		1.84	11.1								
							2+	2			3.7		1.84	0.8								
							3+	0			0.0		1.84	0.0								
							>=4+	0			0.0		1.84	0.0								
							>=1+	31			57.0		1.84	11.8								
						EEL									48.2 m							
							3SP-STICKLEBACK	P							10 m							
																SECTION WIDTH						
																SECTION AREA			482 m2			
						5	B	1 RUN	MEAVY	OLDERWOOD	05/06/97	SALMON	0+	209			374.1		1.79	83.2		
													1+	36			72.0		2	16.0		
2+	2			4.0									2	0.9								
>=3+	0			0.0									2	0.0								
>=1+	38			76.0									2	16.9								
TROUT	0+	76			141.4								1.86	31.4								
	1+	23			42.3								1.84	9.4								
	2+	5			9.2								1.84	2.0								
	3+	0			0.0								1.84	0.0								
	>=4+	0			0.0								1.84	0.0								
	>=1+	28			51.5								1.84	11.5								
OTHER SPECIES:-																						
	EEL	P													72.5 m							
												SECTION LENGTH			6.2 m							
												SECTION WIDTH										
												SECTION AREA			449.5 m2							
6	B	3 RUN	MEAVY	CHUB TOR	06/06/97							SALMON	0+	38	14	10	68	86	62	1.79	15.4	19.4
						1+	17	12	2	33	45		31		7.5	10.2	7.0					
						2+	1	1	0	2					0.5							
						>=3+	0	0	0	0					0.0							
						>=1+	18	13	2	34	47		32	2	7.7	10.6	7.2					
						TROUT	0+	225	104	49	419	449	400	1.86	94.6	101.4	90.3					
							1+	44	18	7	73	83	69		16.5	18.7	15.6					
							2+	10	6	4	20				4.5							
							3+	1	0	1	2				0.5							
							>=4+	0	1	0	1				0.2							
							>=1+	55	25	12	101	118	94	1.84	22.8	26.6	21.2					
						EEL									52.1 m							
							3SP-STICKLEBACK	P							8.5 m							
																SECTION LENGTH						
																SECTION WIDTH						
																SECTION AREA			442.9 m2			

SIT NO.	ACTUAL CLUSTER	SURVEY TYPE	DATE	SPECIES	AGE	NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX N/C1	POP. DENSITIES(No./100m2)		
						C1	C2	C3	N	N HIGH	N LOW		N	N HIGH	N LOW
7	*	3 RUN	MEAVY	HOO MEAVY	10/06/97	SALMON	0+	2	1	1	4	2	1.0		
							1+	17	8	2	28		7.3	8.9	7.1
							2+	0	0	1	1		0.3		
							>=3+	0	0	0	0		0.0		
							>=1+	17	8	3	29	1.71	7.6	10.2	7.3
				TROUT	0+	164	87	44	341	381	319	2.08	89.5	100.0	83.7
					1+	11	6	8	25				6.6		
					2+	4	2	6	12				3.1		
					3+	6	2	0	8				2.1		
					>=4+	0	2	0	2				0.5		
					>=1+	21	12	14	47			2.24	12.3		
				OTHER SPECIES:-		EEL	C	SECTION LENGTH		45.9 m					
						SEA TROUT	P	SECTION WIDTH		8.3 m					
						(48.3cm 2.1sm+, 53.9 cm 2.1.1sm+)		SECTION AREA		381.0 m2					
8	*	3 RUN	MEAVY	U/S CLEARBROOK STW	11/06/97	SALMON	0+	217	105	104	597	2.75	158.4	195.0	139.5
							1+	44	44	22	110		29.2		
							2+	4	1	1	6		1.6		
							>=3+	0	0	0	0		0.0		
							>=1+	48	45	23	116	2.42	30.8		
				TROUT	0+	102	55	49	291	414	245	2.85	77.2	109.8	65.0
					1+	26	18	6	57	82	50		15.1	21.8	13.3
					2+	8	4	2	14				3.7		
					3+	4	1	0	5				1.3		
					>=4+	2	0	0	2				0.5		
					>=1+	40	23	8	78	97	71	1.95	20.7	25.7	18.8
				OTHER SPECIES:-		EEL	C	SECTION LENGTH		63.9 m					
								SECTION WIDTH		5.9 m					
								SECTION AREA		377.0 m2					
9	*	3 RUN	MEAVY	D/S CLEARBROOK STW	16/06/97	SALMON	0+	20	11	12	43	2.15	10.8		
							1+	32	20	16	68		17.1		
							2+	0	1	0	1		0.3		
							>=3+	0	0	0	0		0.0		
							>=1+	32	21	16	69	2.16	17.3		
				TROUT	0+	100	63	37	256	325	226	2.56	64.3	81.6	50.7
					1+	22	13	7	49	86	42		12.3	21.6	10.5
					2+	10	3	3	17	33	16		4.3	8.3	4.0
					3+	1	2	0	3				0.8		
					>=4+	1	1	0	2				0.5		
					>=1+	34	19	10	73	104	65	2.15	18.3	26.1	16.3
				OTHER SPECIES:-		EEL	P	SECTION LENGTH		53.1 m					
						SEA TROUT	P	SECTION WIDTH		7.5 m					
						(43.3cm UR.UR)		SECTION AREA		398.3 m2					

SIT NO.	ACTUAL CLUSTER	SURVEY RIVER TYPE	SITE	DATE	SPECIES	AGE
10	D	1 RUN MEAVY	GOODAMEAVY	13/06/97	SALMON	0+ 1+ 2+ ≥3+ ≥1+

TROUT	0+ 1+ 2+ 3+ ≥4+ ≥1+
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OTHER SPECIES: EEL P

11	D	3 RUN MEAVY	DEWERSTONE	12/06/97	SALMON	0+ 1+ 2+ ≥3+ ≥1+
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TROUT	0+ 1+ 2+ 3+ ≥4+ ≥1+
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OTHER SPECIES:

EEL C

KEY TO OTHER SPECIES:

A = ABUNDANT
C = COMMON
P = PRESENT

NUMBER OF FISH CAUGHT			POPULATION ESTIMATES			INDEX N/C1	POP. DENSITIES(No/100m2)		
C1	C2	C3	N	N HIGH	N LOW		N	N HIGH	N LOW
239			368.1			1.54	89.3		
65			107.9			1.66	26.2		
7			11.6			1.66	2.8		
0			0.0			1.66	0.0		
72			119.5			1.66	29.0		
55			105.1			1.91	25.5		
28			45.9			1.64	11.1		
6			9.8			1.64	2.4		
3			4.9			1.64	1.2		
2			3.3			1.64	0.8		
39			64.0			1.64	15.5		
SECTION LENGTH			66.5 m						
SECTION WIDTH			6.2 m						
SECTION AREA			412.3 m2						

80	25	13	123	134	118	1.54	30.4	33.1	29.1
29	16	2	48	56	47		11.9	13.8	11.6
6	2	1	9				2.2		
0	0	0	0				0.0		
35	18	3	58	66	56	1.66	14.3	16.3	13.8
107	46	28	204	231	190	1.91	50.4	57.0	46.9
40	16	4	62	68	60		15.3	16.8	14.8
16	4	5	27	43	25		6.7	10.6	6.2
2	2	1	5				1.2		
0	0	0	0				0.0		
58	22	10	95	107	90	1.64	23.5	26.4	22.2
SECTION LENGTH			50 m						
SECTION WIDTH			8.1 m						
SECTION AREA			405 m2						

Fisheries Science Team - Cornwall Area
Environment Agency - Southwest Region.