NRA FISHERIES 58

FISHERY SURVEY OF THE DONIFORD STREAM 1994

1. INTRODUCTION

1.1 This fishery survey of the Doniford Stream was undertaken during September 1994.

1.2 The river was last surveyed in November 1983 when a number of sea trout were found in the lower reaches of both the Doniford Stream and its major tributary the Monksilver Stream or River Willet. In this latest survey two new sites were added to represent the headwaters and the number of sites downstream was somewhat reduced.

1.3 It was hoped that sea trout would have entered the system before the survey took place. A very dry autumn resulted in very low flows and no sea trout were found at some of the sites where they were expected. Survey of two sites was therefore delayed until flows increased. In the event when the rain came it was unceasing and the sites became unfishable. A quick visit to one site did reveal two sea trout which had entered the river as expected as soon as flows increased.

2. TOPOGRAPHY AND GEOLOGY

2.1 The catchment consists of a central area of low ground with high plateaux on each side. On the east is the scarp and plateau of the Quantock hills, composed of very hard Devonian gritstone (Trentishoe Grits) which is quarried for road stone at Triscombe. On the west are the Brendon hills, deeply dissected by the Monksilver Stream and consisting of hard Devonian slates (Morte slates and Ilfracombe Beds, the latter with a few limestone beds).

2.2 The central area of low ground, traversed by the Doniford Stream itself, is occupied by younger and softer Permo-Triassic strata. The Wiveliscombe Sandstones and Vexford Breccias form a lower aquifer and the Budleigh Salterton Pebble Beds and Otter Sandstone comprise an upper aquifer. Between these two aquifers lies the impermeable Littleham Mudstone and above them the equally impermeable Mercia Mudstone.

2.3 The sandstones in particular store large quantities of groundwater which provides valuable base flow to the streams in summer, arising from numerous small springs. All the Permo-Triassic strata occupy a rift valley or "graben" which was downthrown by the same earth movements that raised the Quantock and Brendon Hills.

3. FLOW AND ABSTRACTION

3.1 A gauging station at Swill Bridge provides flow data for the Doniford Stream. Records indicate an average daily flow of

1.0 cumecs. Further details on the available statistics are included as Appendix 3. **APPENDIX 3**

3.2 There have been three significant licences granted for abstraction from surface waters since 1983. One licence involves the impoundment of a small tributary very close to the spring head. The other two licences relate to the main Doniford Stream and are both subject to a low flow condition.

4. WATER QUALITY

4.1 Chemical water quality as shown in the 1993 General Quality Assessment is measured at four sites on the Doniford Stream and two on the Monksilver Stream. The quality at five of the sites is in classes A or B "Good". One site which represents the main section of the Doniford Stream is in Class C "Fair" with BOD the class limiting criterion. Dissolved oxygen levels at all sites is within the class A category.

4.2 Biological water quality is assessed at two sites on the Doniford and one on the Monksilver. The most recent available results are from 1991/2. At both Doniford sites biological quality was good and very close to that predicted from the physical habitat using the RIVPACS model. On the Monksilver Stream the most recent results showed a slight deterioration on the previous year and fell short of the RIVPACS prediction.

4.3 The Doniford Stream is designated under the EEC Freshwater Fish Directive as "salmonid" from Flaxpool to the sea and the Monksilver is designated "salmonid" from Birds Hill to the Doniford confluence.

4.4 Since the 1983 survey Triscombe Quarry, on the headwaters of the Flaxpool tributary, has reopened subject to strict discharge consent conditions. Although there have been minor problems the impact is generally minimal.

4.5 There have been no significant water quality problems on the Doniford Stream in the last two years.

5. FISHERY SURVEY METHOD

5.1 New sample sites were chosen by dividing the watercourse into two kilometre lengths within each of which a one hundred metre length was selected using random numbers. Where survey sites existed in 1983 a sample site was selected to represent each two kilometre reach. 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 by wading using pulsed DC equipment operating at 600 cycles per second. Sites were always fished upstream and 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 Figure 5 shows the length frequency of brown trout for both the Doniford Stream itself and the Monksilver Stream. **FIGURE 5**

6.4 Figure 6 shows a comparison of fish densities obtained in 1983 compared with 1994 at five sites which were fished on both occasions. Stream widths were not measured in 1983 and the 1994 width figures have been used to provide the best estimate in calculating the 1983 site areas. **FIGURE 6**

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

7. DISCUSSION

7.1 Where sites coincided with those fished during 1983 brown trout numbers found in the 1994 survey are similar to those obtained in 1983 (Figure 6). The apparent exception is at Leigh, DO1B. Here 100 metres were fished in 1994 but only 30 metres in 1983. There is only one large pool in the middle of the site and it is likely that the 1983 survey did not include two long riffles where few fish were caught in 1994. **FIGURE 6**

7.2 As the Doniford Stream system is used by sea trout some of the small brown trout are likely to be sea trout parr especially in the lower reaches.

7.3 The length frequency of brown trout (Figure 5) suggests that the number of trout of the year is small in 1994. The figures may be biased as there are numerous small nursery tributaries which were not surveyed. The sites at Pit Lane and Pond Wood are probably representative of this habitat. **FIGURE 5**

7.4 Some five years ago the main Doniford Stream was seriously polluted with slurry and there was some limited restocking of

brown trout after the stream quality improved. This survey suggests that the stream has fully recovered with good numbers of trout and the associated minor species in the affected reaches.

7.5 This survey has confirmed that sea trout are unlikely to be present in this system unless flows have increased as a result of autumn or early winter rain. It emphasises the need for a full discharge to tidal waters to provide the necessary attraction.

7.6 It was disappointing to note that significant tree planting at Orchard Wyndham between the two survey dates has not obviously improved the density of resident trout at least within the surveyed reach.

7.7 One or two rainbow trout were found at each Monksilver site in 1983. In 1994 there were similar numbers at Orchard Wyndham, MO1D, with a big increase at Catwell House, MO1E (Figure 2). It seems likely that some of these fish are escapees from the fish farm at Combe Sydenham. There is inevitably competition for space with native trout and it would obviously be beneficial if the amount of rainbows escaping could be reduced.

FIGURE 2

8. CONCLUSIONS

8.1 The Doniford system is an important natural trout fishery with good numbers of brown trout and a run of sea trout. There are also good stocks of eels and bullheads with brook lampreys present at some sites.

8.2 More information is needed on the behaviour of sea trout in the West Somerset streams so that habitat and discharge features of importance can be identified and safeguarded.

8.3 A mechanism for identifying important streams for fisheries needs to be developed given that in many instances EEC Freshwater Fish designation would introduce unrealistic demands for water sampling.

8.4 The apparently consistent stock densities between the two surveys in 1983 and 1994 emphasises the likely effectiveness on the Doniford of systems of prediction based on habitat such as Habscore.

8.5 The source of rainbows on the Monksilver needs to be identified with a view to reducing the numbers present and allowing more space for native fish.

DONIFORD STREAM CATCHMENT 1994
BIOMASS OF ALL FISH > 10 cm LENGTH

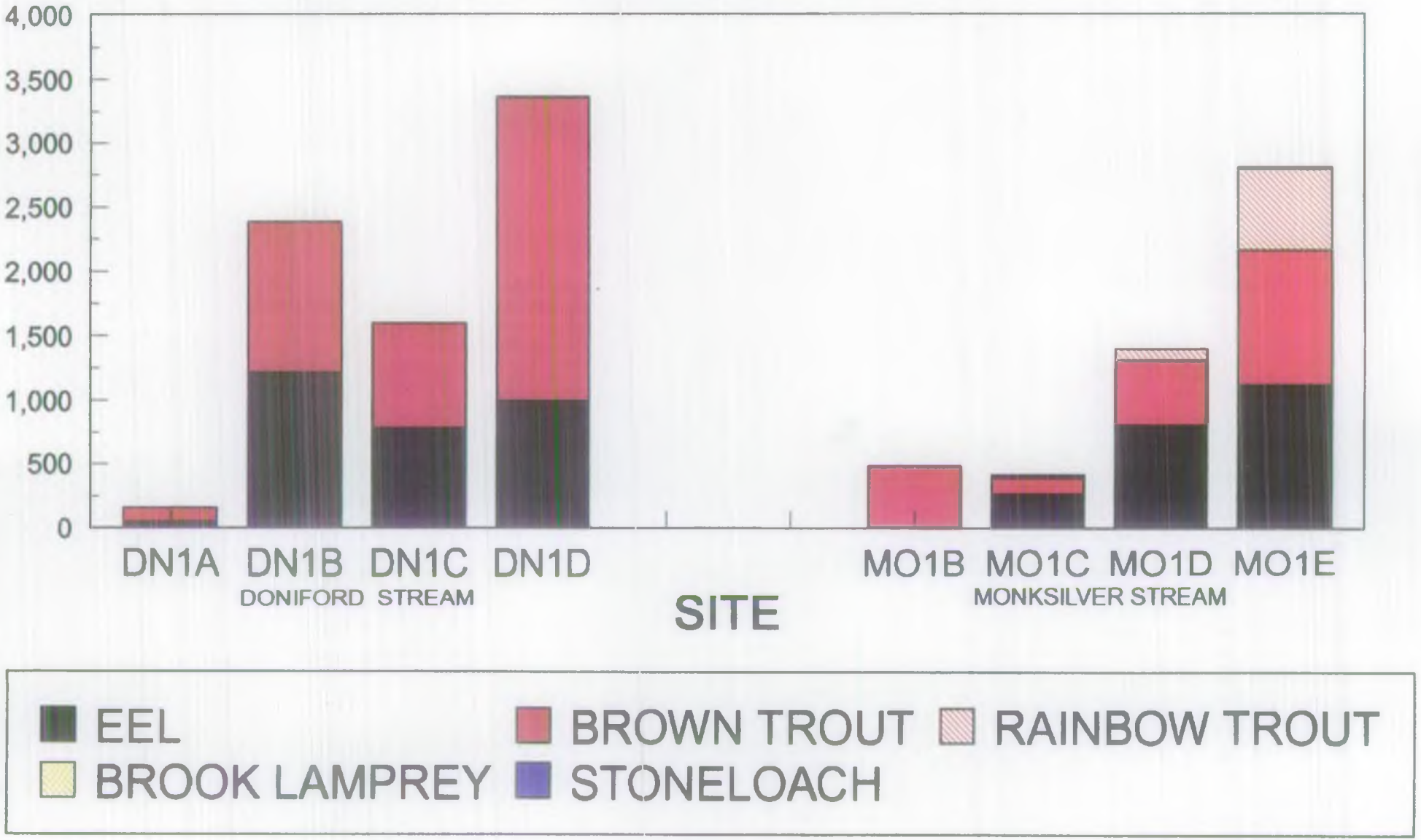


FIGURE 1

DONIFORD STREAM CATCHMENT 1994
DENSITY OF ALL FISH > 10 cm LENGTH

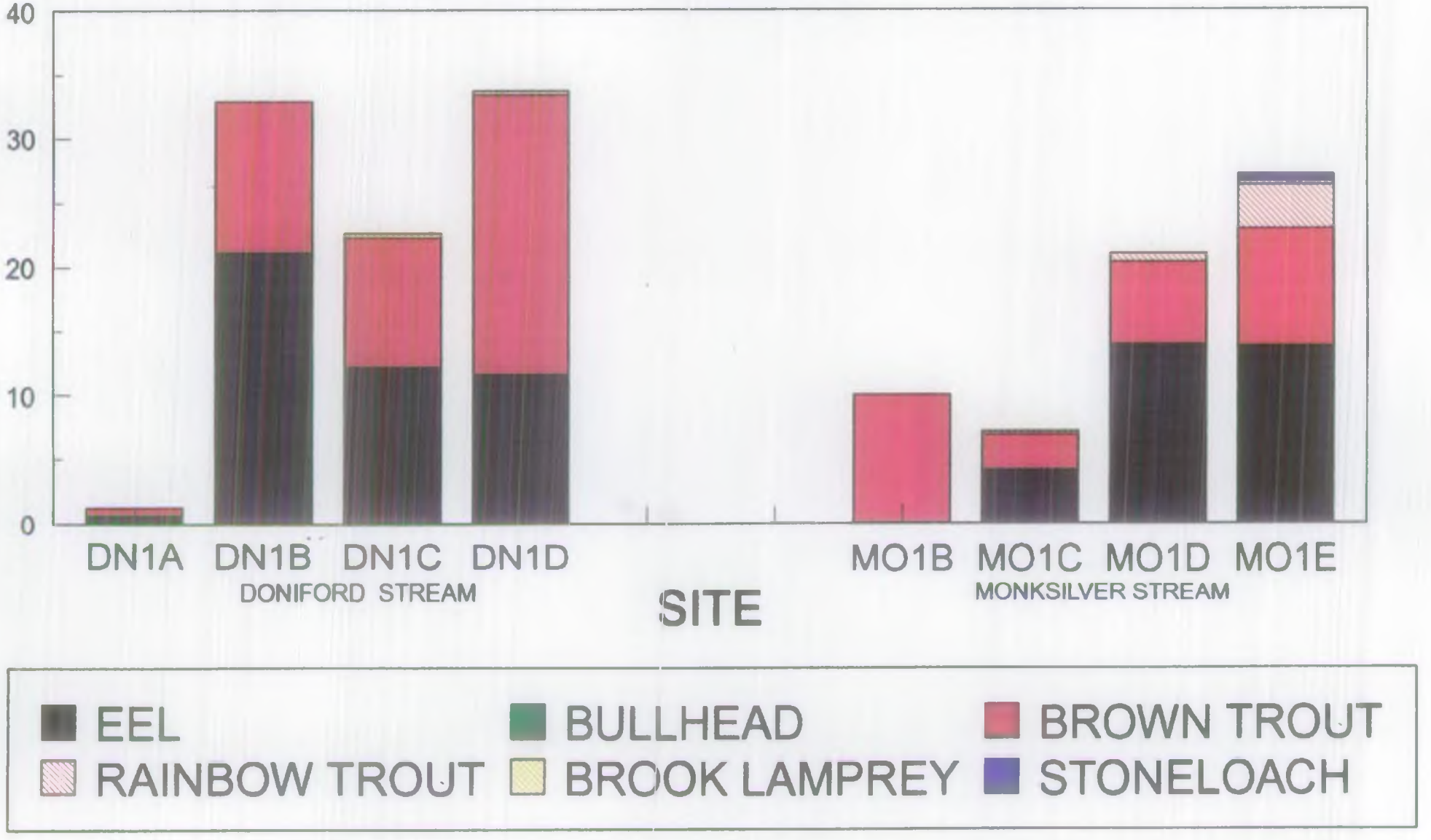


FIGURE 2

DONIFORD STREAM CATCHMENT 1994
BIOMASS OF ALL FISH < 10 cm LENGTH

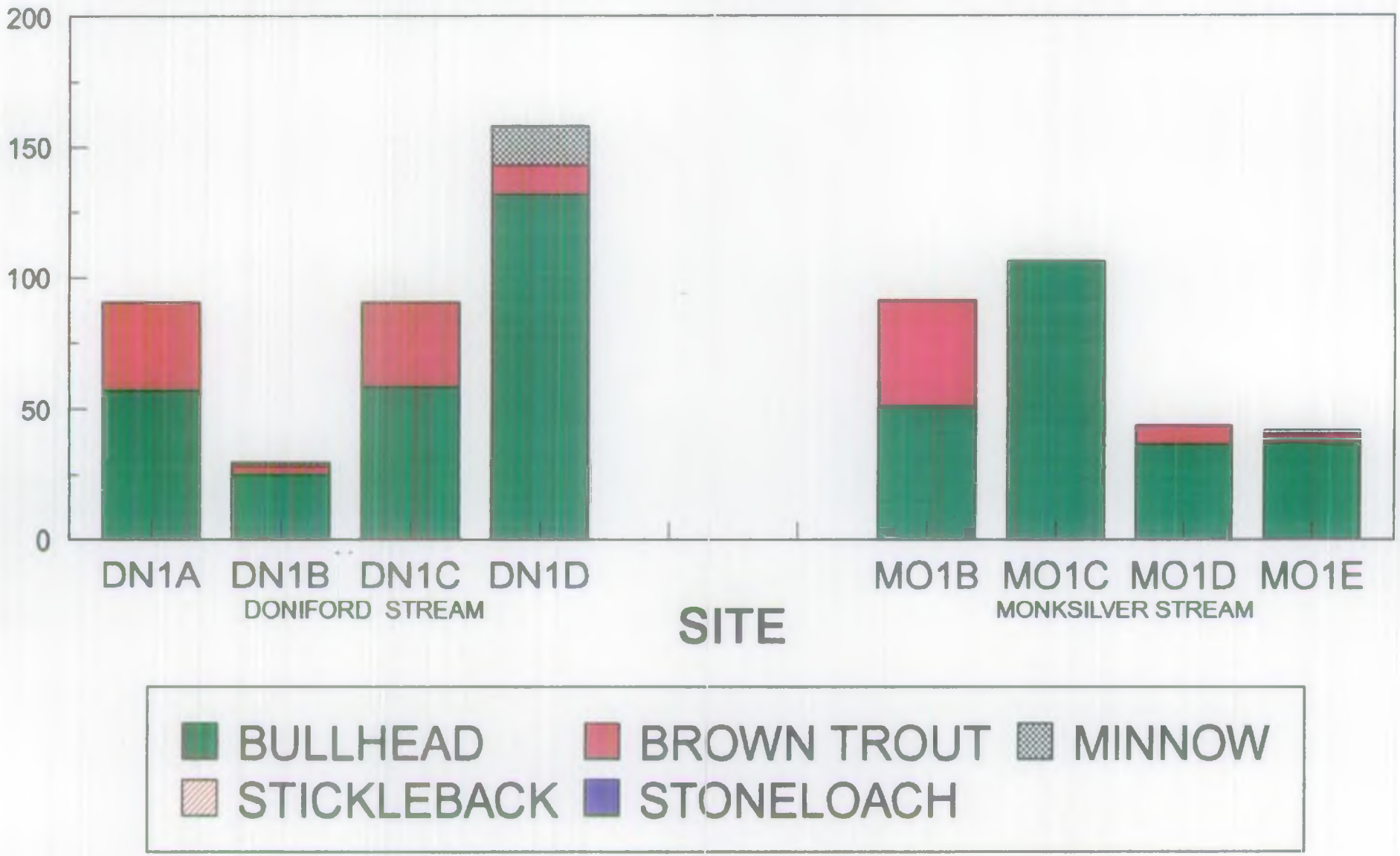


FIGURE 3

DONIFORD STREAM CATCHMENT 1994
DENSITY OF ALL FISH < 10 cm LENGTH

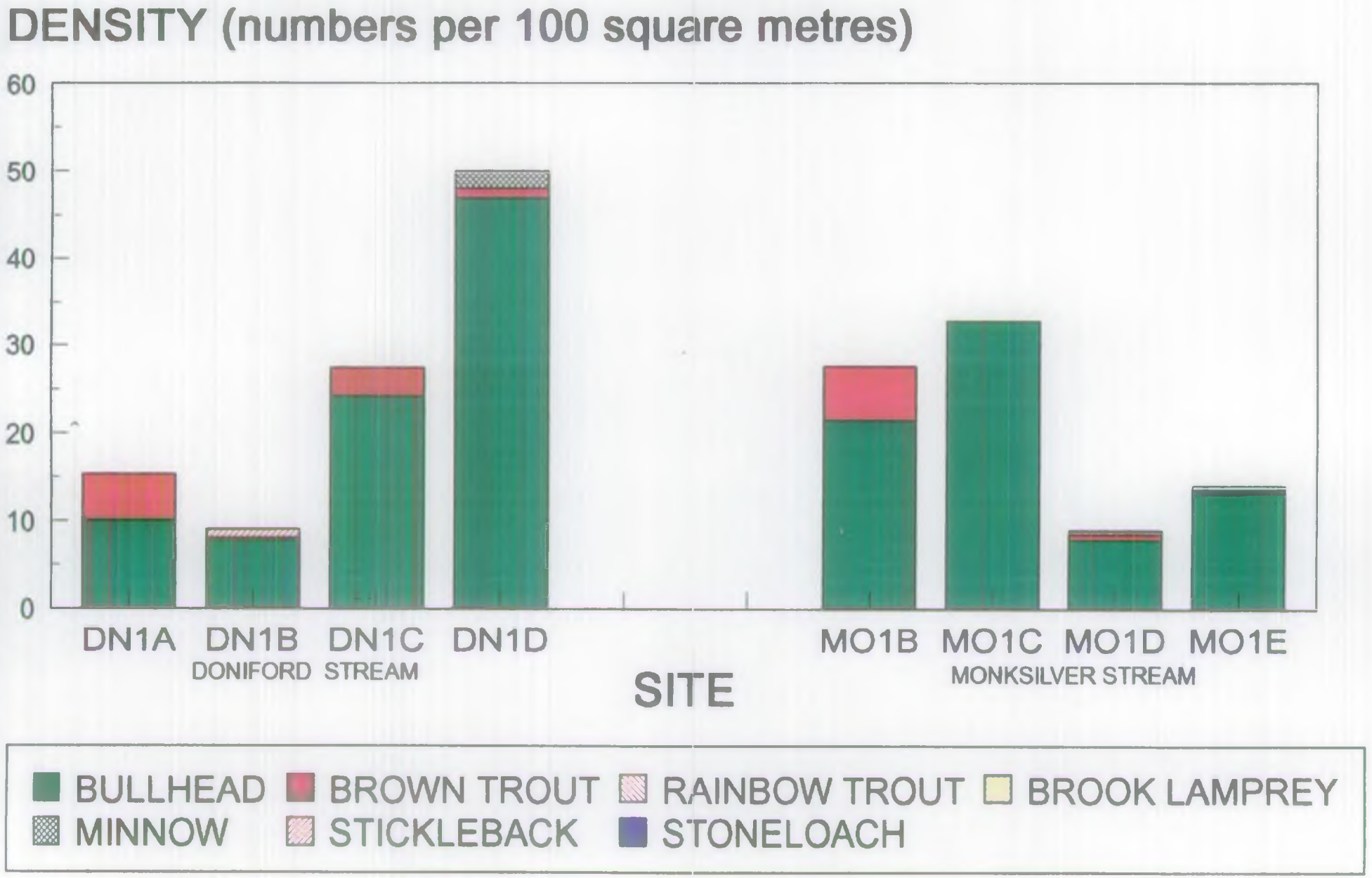


FIGURE 4

DONIFORD STREAM CATCHMENT

LENGTH FREQUENCY OF BROWN TROUT

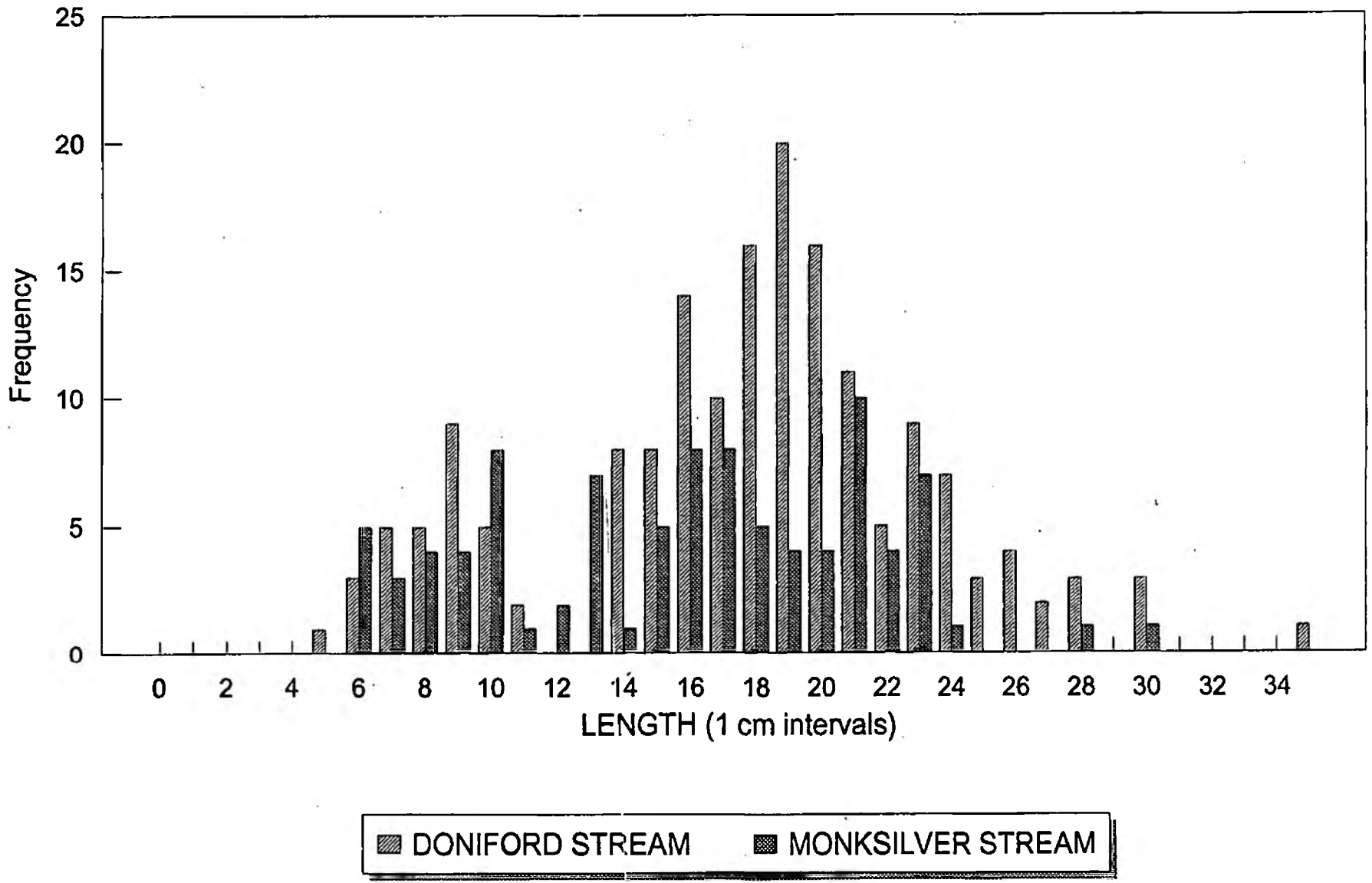


FIGURE 5

DONIFORD STREAM CATCHMENT 1983 & 1994

COMPARISON OF BROWN TROUT DENSITY

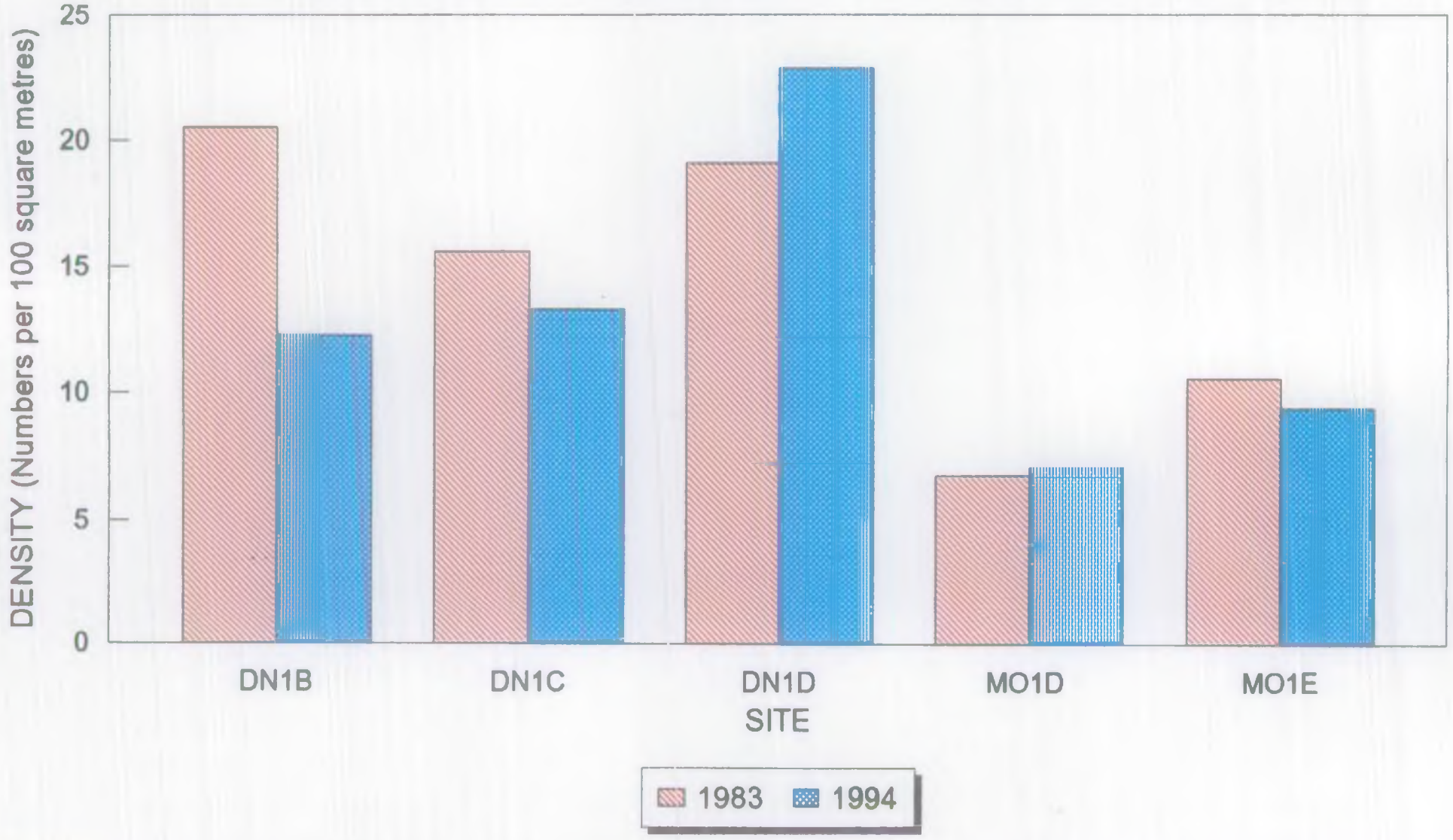
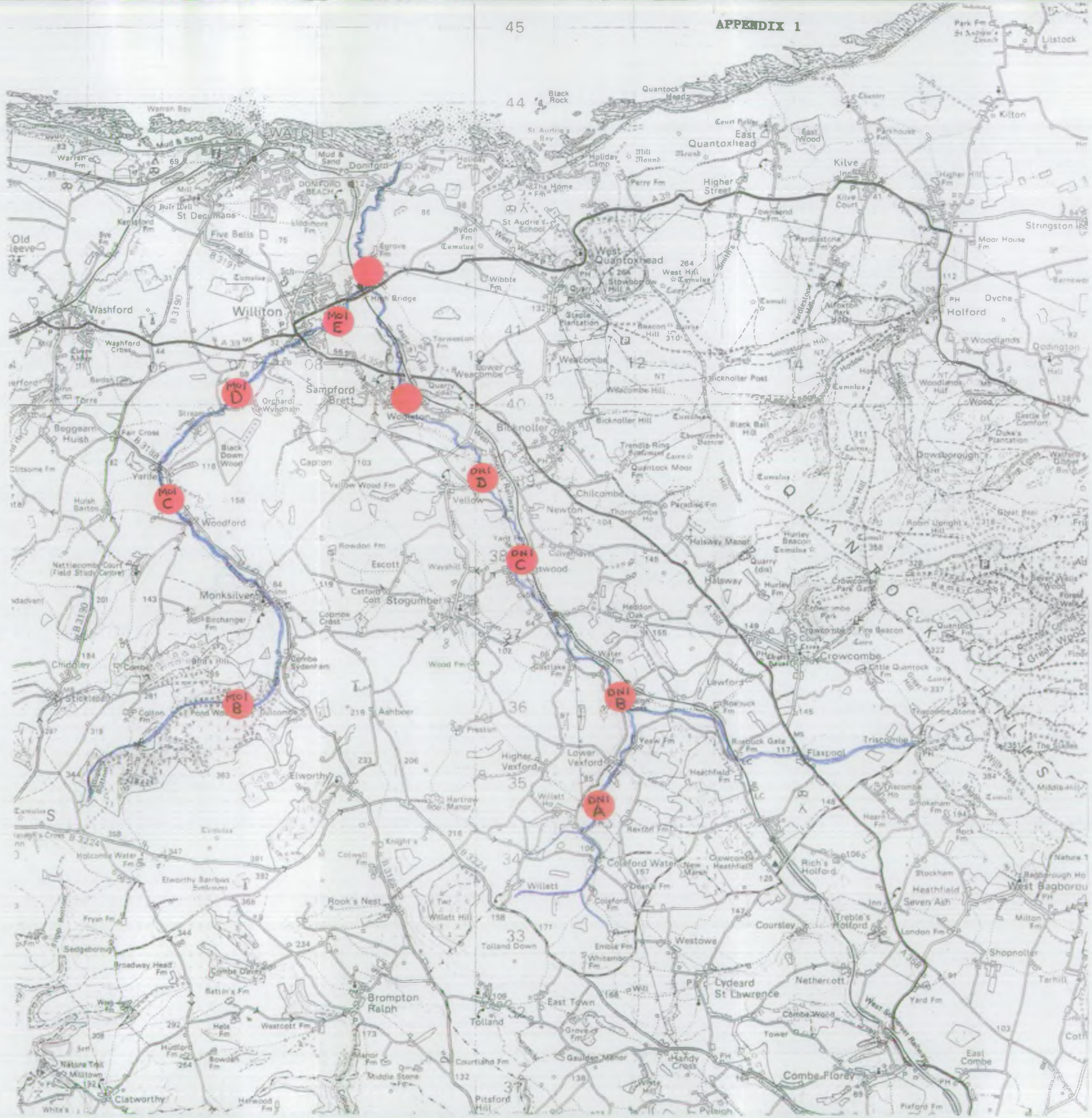


FIGURE 6

APPENDIX 1



Mo1 E
Mo1 D
Mo1 C
Mo1 B
DN1 D
DN1 C
DN1 B
DN1 A
WATCHET
Warren Bay
Mud & Sand
Doniford
DONIFORD BEACH
St Decumans
Five Bells
Washford
Williton
Old Cleeve
Beggearn Huish
Sampford Brett
Orchard Wyndham
Black Down Wood
Capton
Yarde
Woodford
Huish Barton
Nettlecombe Court (Field Study Centre)
Monksilver
Stogumber
Escott
Rowdon Fm
Yellow Wood Fm
Vellow
Bicknoller
Lower Weacombe
Weacombe
Chilcombe
Newton
Culverhays
Combe Sydenham
Chidgley
Stickpath
Colton Fm
Elworthy
Ashbeer
Higher Vexford
Lower Vexford
Willett
Coleford Water
Tolland Down
Tolland
Brompton Ralph
Clatworthy
Rook's Nest
Combe Davey
Pitsford Hill
East Town
Lydeard St Lawrence
Westowe
Coursley
Nethercott
Combe Florey
Crowcombe
Lawford
Flaxpool
Triscombe
Halsway Manor
Halsway
Rich's Holford
Treble's Holford
Seven Ash
Heathfield
West Bagborough
Shopnoller
East Combe
West Quantoxhead
East Quantoxhead
Quantock's Heads
St Audrie's Bay
Black Rock
Kilve
Kilton
Lilstock
Stringston
Holford
Dyche
Dodington
Woodlands
Dowsborough
Higher Street
Bicknoller Post
QUANTOCK HILLS
West Somerset Railway
A 39
A 358
B 3190
B 3188
B 3224
45
44

SPECIES	EST POPULATION >CUTOFF	BIOMASS>CUTOFF gms/100m2	DENSITY>CUTOFF per 100m2	POPULATION METHOD	PROBABILITY OF CAPTURE	BIOMASS<CUTOFF gms/100m2	DENSITY<CUTOFF per 100m2	MEAN WEIGHT (gms)	MEAN CONDITION FACTOR
DN1A	**PIT LANE ST114347 13/9/94**								
BH	0	0	0	MIN EST	0	57.00	10.00		
BT	1	114.71	0.59	C & S	1.00	33.35	5.29		
EE	1	47.65	0.59	C & S	0.50	0	0		
TOTALS		*162.35*	*1.18*			*90.35*	*15.29*		
DN1B	**LEIGH ST117360 13/9/94**								
BH	0	0	0	MIN EST	0	24.77	7.74		
BT	37	1170.87	11.94	C & S	0.68	3.23	0.32	98.10	1.17
EE	65	1211.94	20.97	C & S	0.33	0	0	57.80	0.16
S3	0	0	0	MIN EST	0	1.26	0.97		
TOTALS		*2382.81*	*32.90*			*29.26*	*9.03*		
DN1C	**KINGSWOOD ST105379 21/9/94**								
BH	0	0	0	MIN EST	0	58.15	24.07		
BT	27	618.00	10.00	C & S	0.79	32.00	3.33	61.80	1.24
EE	33	777.33	12.22	C & S	0.53	0	0	63.60	0.18
LA	1	1.11	0.37	C & S	0.33	0	0		
TOTALS		*1596.44*	*22.59*			*90.15*	*27.41*		
DN1D	**CURDON MILL ST100390 29/9/94**								
BH	0	0	0	MIN EST	0	131.47	46.84		
BT	83	2381.13	21.84	C & S	0.90	11.37	1.05	108.10	1.17
EE	44	995.79	11.58	C & S	0.68	0	0	86.00	0.20
LA	1	2.89	0.26	C & S	0.50	0	0		
MI	0	0	0	MIN EST	0	14.95	2.11		
TOTALS		*3359.82*	*33.68*			*157.79*	*50.00*		

APPENDIX 2

SPECIES	EST POPULATION >CUTOFF	BIOMASS>CUTOFF gms/100m2	DENSITY>CUTOFF per 100m2	POPULATION METHOD	PROBABILITY OF CAPTURE	BIOMASS<CUTOFF gms/100m2	DENSITY<CUTOFF per 100m2	MEAN WEIGHT (gms)	MEAN CONDITION FACTOR
MO1B	**POND WOOD ST070360 11/10/94**								
BH	0	0	0	MIN EST	0	50.76	21.43		
BT	21	490.00	10.00	C & S	0.68	40.24	6.19	49.00	1.07
TOTALS		*490.00*	*10.00*			*91.00*	*27.62*		
MO1C	**HOUSEPIECE COPSE ST061387 4/10/94**								
BH	0	0	0	MIN EST	0	106.00	32.73		
BT	9	133.64	2.73	C & S	0.75	0	0	49.00	1.26
EE	14	264.30	4.24	C & S	0.52	0	0	62.30	0.17
LA	1	0	0.30	C & S	0.33	0	0		
RT	1	25.45	0.30	C & S	1.00	0	0		
TOTALS		*423.39*	*7.58*			*106.00*	*32.73*		
MO1D	**ORCHARD WYNDHAM ST070402 5/10/94**								
BH	1	0	0.36	C & S	0.50	36.14	7.86		
BT	18	518.14	6.43	C & S	0.86	7.64	0.71	80.60	1.17
EE	39	795.32	13.93	C & S	0.55	0	0	57.10	0.16
LA	0	0	0	C & S	0	0	0.36		
RT	2	85.00	0.71	C & S	1.00	0	0		
TOTALS		*1398.46*	*21.07*			*43.79*	*8.93*		
MO1E	**D/S CATWELL HOUSE ST082410 25/10/94**								
BH	0	0	0	MIN EST	0	36.75	13.13		
BT	29	1041.28	9.06	C & S	0.78	3.13	0.31	114.90	1.27
EE	44	1117.88	13.75	C & S	0.21	0	0	81.30	0.17
LA	1	3.44	0.31	C & S	1.00	0	0		
RT	11	633.53	3.44	C & S	0.92	0	0	184.30	1.16
SL	2	10.63	0.63	C & S	0.33	1.88	0.63		
TOTALS		*2806.75*	*27.19*			*41.75*	*14.06*		

Gauging Station Summary

DONIFORD STREAM AT SWILL BRIDGE

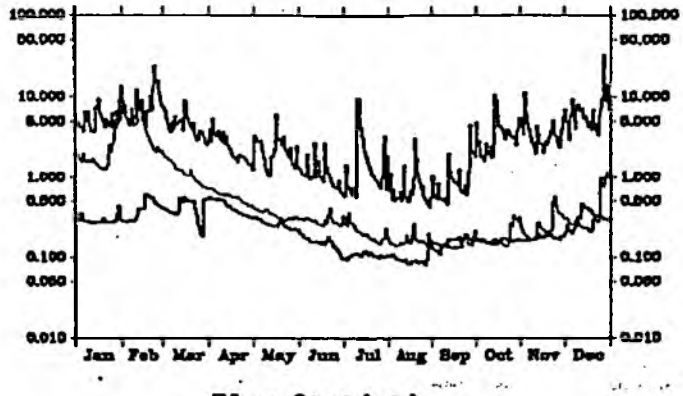
Station Number
051001

Gauged Flows
1967-1991

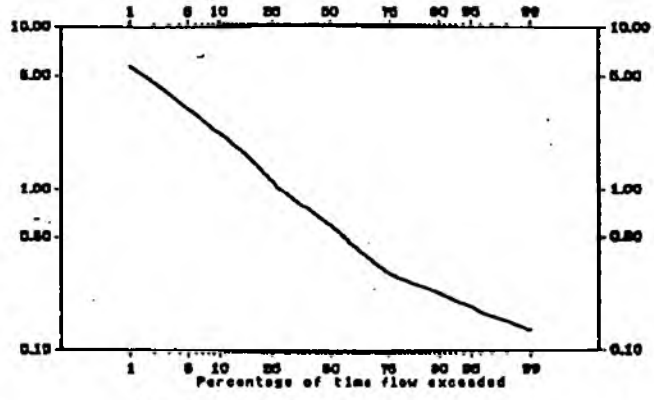
Measuring Authority: NRA - Wessex

Grid Reference: 31 (ST) 088 428

Daily Flow Hydrograph (m^3s^{-1})
Max. and min. daily mean flows from 1967 to 1991 excluding those for the featured year (1990)



Flow Duration Curve (m^3s^{-1})



Flow Statistics

Units: m^3s^{-1} unless otherwise stated

Mean flow	0.99	
Mean flow (ls^{-1}/km^2)	13.07	
Mean flow ($10^6m^3/yr$)	31.3	
Peak flow & date	62.3	27 Dec 1979
Highest daily mean & date	32.4	27 Dec 1979
Lowest daily mean & date	0.081	27 Aug 1976
10 day minimum & end date	0.087	23 Aug 1976
60 day minimum & end date	0.099	28 Aug 1976
10% exceedance	2.258	
50% exceedance	0.594	
95% exceedance	0.186	
Mean annual flood	25.1	
Bankfull flow	68.00	

Catchment Characteristics

Catchment area (km^2)	75.8
Level stn. (mOD)	9.30
Max alt. (mOD)	491
IH Baseflow index	0.61
FSR slope (m/km)	9.48
1941-70 rainfall (mm)	975
FSR stream freq. (junctions/km^2)	
FSR percentage urban	

Factors Affecting Flow Regime

- Natural to within 10% at the 95 percentile flow.

Rainfall and Runoff

	Rainfall (mm) (1967-1989) Mean	Max/Yr		Min/Yr		Runoff (mm) (1967-1991) Mean	Max/Yr		Min/Yr	
Jan	98	180	1971	20	1987	68	126	1982	18	1976
Feb	79	155	1978	7	1986	73	154	1978	15	1976
Mar	83	154	1981	12	1973	55	115	1982	19	1983
Apr	54	137	1983	8	1976	33	69	1987	15	1976
May	66	129	1985	16	1989	25	77	1985	9	1976
Jun	55	137	1971	7	1975	16	30	1972	5	1976
Jul	54	125	1960	8	1976	13	61	1960	4	1976
Aug	63	145	1970	22	1972	10	16	1978	4	1976
Sep	79	186	1976	12	1971	10	26	1974	5	1990
Oct	95	209	1976	7	1976	21	116	1976	6	1990
Nov	85	168	1978	27	1988	52	79	1967	6	1976
Dec	104	184	1979	51	1988	55	124	1982	15	1990
Annual	915	1054	1982	645	1975	412	577	1982	187	1975

Station and Catchment Description

Flat V weir. Prior to 1982 velocity-area station with rock control. High flows measured from bridge downstream.

Drains Devonian/Triassic sandstones between Quantock and Brendon Hills. Land use rural.

Summary of Archived Data

Gauged Flows and Rainfall

Key:

		All rainfall	Some or no rainfall
All daily, all peaks	A	a	
All daily, some peaks	B	b	
All daily, no peaks	C	c	
Some daily, all peaks	D	d	
Some daily, some peaks	E	e	
Some daily, no peaks	F	f	
No gauged flow data	*	-	

	01234	56789
1960s	-----	--AAA
1970s	AAAAA	AAAAA
1980s	AAAEe	aAAAA
1990s	aa	

Naturalised Flows

Key:

All daily, all monthly	A
Some daily, all monthly	B
Some daily, some monthly	C
Some daily, no monthly	D
No daily, all monthly	E
No daily, some monthly	F
No naturalised flow data	-

No naturalised flow data available.