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*National Rivers Authority
South Western Region*

DEVON AREA REPORT

River Avon Fisheries Survey 1994

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ENVIRONMENT AGENCY



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RIVER AVON FISHERIES SURVEY 1994

1) INTRODUCTION

A survey of the population of freshwater fish at selected sites in the Avon River system was carried out in August and September 1994. The survey was undertaken as part of a triennial programme to monitor fish stocks in the River Avon. The primary objective of the survey was to assess the distribution and abundance of freshwater fish and to compare with results of previous surveys where possible.

Limited surveys of the Avon system have been carried out in 1962 (Nott), 1978 (Clifton) and 1984. A comprehensive survey of the Avon system was carried out in 1991.

2) METHODS

A total of twenty eight sites were selected throughout the catchment. Twenty four sites were surveyed quantitatively, the remaining four, semi-quantitatively. Site selection was based upon physical accessibility, geographical distribution and habitat characteristics. Site distribution and locations are shown in Figure 1. Site details are given in Table 1.

2.1 Site Clustering

Since 1992, routine sampling has included single-run sites in addition to three-run sites. Sites are clustered on a 'target area' basis - one three-run site is associated with up to four single-run sites. A typical 'cluster' will consist of five sites. The three-run site should be fished first, and should be immediately followed by the single-run sites in that cluster. All sites in a cluster should be fished by the same team of people, with each person performing the same task.

2.2 Fieldwork

All sites were fished using a 240 Volt, 500 Watt generator producing pulsed direct current

(PDC) via a control box. Fishing was carried out in an upstream direction, using a single anode.

a) **Quantitative Surveys.**

Quantitative surveys were carried out using a combination of triple and single shock sites. All sites were between 50 and 100 metres in length, isolated by stop nets. All salmonids were counted, measured (to the nearest mm) and identified by species. The numbers of other species were noted but not removed during the electric fishing process. A subjective assessment of numbers of each species was made using the following abundance indicator :-

Present	-	1-10
Common	-	11-100
Abundant	-	>100

b) **Semi-quantitative Surveys.**

Semi-quantitative sites were fished for a timed period of twenty minutes. Species were handled in the same way as for quantitative sites.

All fish were returned to the watercourse unharmed.

Population estimates for triple shock sites were obtained according to the methods described by Harding, Heathwood et al (1984). For single shock sites, population estimates were made using the multiplication factor ($N/C1$) - where $C1$ = catch one and N = population estimate, derived from the appropriate triple shock site associated with that cluster.

3) RESULTS AND DISCUSSION

The results are given in the form of estimated population densities ($N/100m^2$) in Table 2. Data for salmonid species are split into densities for fry (0+) and combined for age groups of older fish (1++).

Historic salmonid data is presented in Tables 3 and 4 to allow comparison with data collected in this survey. The presence or absence of non-salmonid species are recorded in Table 2. Semi-quantitative data is given in Table 5.

3.1 Salmon (Salmo salar.L.)

Salmon fry were present in the upper middle, middle and lower reaches of the River Avon (sites 3 - 10). Many of the upper reaches (ie upstream of site 3) are inaccessible or beyond the 'normal' range of upstream adult penetration.

The distribution of salmon fry was similar to that recorded in the 1991 survey. The exception being the presence of fry at Didworthy (site 3). Comparative data indicates that spawning success in the Didworthy area is occasional and low fry densities recorded in 1994 suggest that adult salmon are only able to penetrate this far given extreme flows. On average fry abundance recorded across the catchment in 1994 (range 1.28-18.32 per 100m²) was generally less than that recorded in 1991 (range 7.20-39.05 per 100m²). It is likely that the slight decline in abundance between 1991 and 1994 is a natural variation in the population. The lack of reliable data for salmon fry prior to 1991 makes a definitive assessment very difficult. Salmon fry were also present in low numbers in the Badworthy Brook, Bickham Brook and the lower reaches of the Glaze Brook and Cocks Brook.

Salmon parr distribution in the Avon catchment is similar to that of fry. In the River Avon, parr densities recorded in 1994 (range 0 - 5.72 per 100m²) are lower than those recorded in 1991 (range 0 - 13.59 per 100m²). However, catchment wide, the range of parr densities has increased from 0 - 13.59 /100m² to 0 - 22.4 /100m².

Salmon fry and parr were absent from the Bala Brook, Horse Brook, Marridge Stream, Torr Brook, Knapmill Brook, Averton Gifford and Ashford Streams. The absence of salmon from these tributaries may be associated with limited accessibility and a scarcity of suitable habitats.

3.2 Trout (*Salmo trutta*. L)

Trout were present at all sites with the exception of the Knappmill Brook (site 24). Comparison with historic data indicates that there has been no significant change in the distribution or abundance of 0+ trout. 1++ trout abundance has generally shown an increase over the survey data collected in 1991. 1++ distribution has remained virtually unchanged.

The situation is complicated by the presence of sea trout in the system, whose juveniles cannot be distinguished from those of brown trout. It is very likely that in some parts of the catchment juvenile sea trout make a significant contribution to the overall trout population. Sea trout were recorded at most sites in the lower reaches of the main river.

3.3 Other Species

Five species of fish other than salmonids were caught and these are given in the list below :-

Bullhead, (*Cottus gobio* L.)

Eel, (*Anguilla anguilla* L.)

Minnow, (*Phoxinus phoxinus* L.)

Stone loach, (*Noemachilus barbatulus* L.)

Flounder, (*Platichthys flesus*.)

Species diversity declined in an upstream direction. Species were generally more abundant in the lower stretches of the main river.

4) CONCLUSIONS

- i) The abundance of salmon is generally less than that recorded in 1991. It is likely that this is a normal variation within the population.
- ii) Salmon were present at a greater number of sites than previously recorded. This is probably due to extreme flows during 1993 which allowed salmon to penetrate further up the catchment than is normally possible.
- iii) Trout fry abundance and distribution is broadly consistent with that observed in previous surveys.
- iv) Trout parr abundance has increased slightly, distribution has remained unchanged.
- v) The middle and upper-middle reaches of the River Avon are clearly the most productive for salmon.
- vi) Many of the tributaries are not contributing to the overall fish production of the river, the most probable explanation being access problems or lack of suitable habitat.

5) RECOMMENDATIONS

- i) Further surveys are needed to assess what variation in densities should be expected for salmon fry.
- ii) A survey of spawning and nursery habitats should be carried out in order to ascertain availability and condition, and improvements should be implemented where necessary.

REFERENCES

HARDING, A.W; HEATHWOOD, ET AL 1984. The Estimation of Animal Population Size by the Removal Method. The Journal of the Royal Statistical Society Series C (Applied Statistics). Volume 33, No2, 1984.

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CLIFTON, D.K; 1978. River Avon (including Glazebrook Tributary) - Fisheries Survey.

APPENDIX A.

TABLE 1 - SITE DETAIL SHEET

TABLE 2 - SUMMARY SHEET

TABLE 3 - ALL SURVEYS 1962-1994 SALMON DENSITIES

TABLE 4 - ALL SURVEYS 1962-1994 TROUT DENSITIES

TABLE 5 - SEMI-QUANTITATIVE DATA

FIGURE 1 - SITE DISTRIBUTION MAP

TABLE 1

RIVER AVON SITE DETAIL SHEET 1994

<u>WATERCOURSE</u>	<u>SITE No.</u>	<u>SITE NAME</u>	<u>N.G.R.</u>	<u>CLUSTER</u>	<u>LENGTH</u>	<u>MEAN WIDTH</u>
AVON	1	Avon Dam Bridge	SX 680 648	a	63	7.28
	2	Wooleshole Bridge	SX 681 637	a	73	6.79
	3	Didworthy	SX 685 620	A	75	7.27
	4	D/S A38 Road Bridge	SX 698 593	b	68	8.33
	5	Avonwick St.	SX 717 574	b	90	9.06
	6	Bickham Bridge	SX 726 555	*	-	-
	7	U/s Gara Bridge	SX 729 536	B	67	10.67
	8	D/s Topsham Bridge	SX 732 511	*	-	-
	9	U/s Hatchbridge	SX 716 473	*	-	-
	10	Knappmill 1	SX 709 473	*	-	-
BALABROOK	11	Old Hill Settlement	SX 671 629	c	92	3.37
	12	D/s Zeal Bridge	SX 679 625	c	56	4.37
BADWORTHY BROOK	13	Badworthy Bridge	SX 685 617	b	64	2.03
GLAZEBROOK	14	U/s Owley Bridge	SX 677 600	c	85	3.57
	15	Avonwick Mill	SX 687 593	C	65	5.31
HORSEBROOK	16	Horsebrook	SX 710 587	d	75	1.75
BICKHAM BROOK	17	Higher Ford	SX 704 560	E	78	2.4
	18	Bickham House	SX 724 555	a	87	1.71
MARRIDGE STREAM	19	Marridge	SX 719 546	e	77	1.90
COCKS BROOK	20	U/s Newhouse	SX 742 534	e	68	1.98
	21	Fir Plantation	SX 733 533	D	75	1.92
TORR BROOK	22	Coldharbour	SX 746 497	F	78	2.94
	23	Commill	SX 733 484	f	67	3.14
KNAPPMILL BROOK	24	Alleron	SX 709 498	f	103	2.23
	25	Yabbacombe	SX 708 478	g	70	2.84
AVETON GIFFORD STREAM	26	Aveton Gifford	SX 693 479	G	67	1.42
ASHFORD	27	Ashford	SX 688 487	g	84	2.26
CHALLONS COMBE STREAM	28	Easton	SX 677 474	g	77	1.91

* = DIP SITE

TABLE 2

RIVER AVON SUMMARY SHEET 1994

WATERCOURSE	SITE NAME	SITE NO.	N.G.R.	DATE	AREA (m ²)	SALMON DENSITY (100m ²)	
						FRY	PARR
AVON	Avon Dam Bridge	1	SX 680 648	11.08.94	458.64	0.00	0.00
	Wooleshole Bridge	2	SX 681 687	12.08.94	495.67	0.00	0.00
	Didworthy	3	SX 685 620	16.08.94	545.25	1.28	2.75
	D/s A38 Road Bridge	4	SX 698 593	07.09.94	566.44	7.71	5.72
	Avonwick St.	5	SX 717 594	18.08.94	815.04	15.05	4.57
	Bickham Bridge	6	SX 726 555	31.08.94	-	#	#
	U/s Gara Bridge	7	SX 729 536	17.08.94	114.89	18.32	4.76
	D/s Topsham Bridge	8	SX 732 511	23.09.94	-	#	#
	U/s Hatchbridge	9	SX 716 473	23.09.94	-	#	#
	Knappmill 1	10	SX 709 473	07.09.94	-	#	#
BALABROOK	Old Hill Settlement	11	SX 671 629	22.08.94	310.04	0.00	0.00
	D/s Zeal Bridge	12	SX 679 625	22.08.94	244.72	0.00	0.00
BADWORTHY BROOK	U/s Badworthy Bridg	13	SX 685 617	23.08.94	129.92	9.61	22.44
GLAZEBROOK	U/s Owley Bridge	14	SX 677 600	24.08.94	303.45	0.00	0.00
	Avonwick Mill	15	SX 687 589	19.08.94	345.15	3.19	2.32
HORSEBROOK	Horsebrook	16	SX 710 587	24.08.94	131.25	0.00	0.00
BICKHAM BROOK	Higher Ford	17	SX 704 560	31.08.94	187.2	2.14	0.00
	Bickham House	18	SX 724 555	23.08.94	148.77	8.47	6.72
MARRIDGE STREAM	Marridge	19	SX 719 546	02.09.94	146.3	0.00	0.00
COCKS BROOK	U/s Newhouse	20	SX 742 534	02.09.94	134.64	0.00	0.00
	Fir Plantation	21	SX 733 533	30.08.94	144.0	1.39	4.86
TORR BROOK	Coldharbour	22	SX 746 497	08.09.94	229.32	0.00	0.00
	Cornmill	23	SX 733 484	09.09.94	210.38	0.00	0.00
KNAPPMILL BROOK	Alleron	24	SX 709 498	09.09.94	229.69	0.00	0.00
	Yabbacombe	25	SX 708 478	08.09.94	198.8	0.00	0.00
AVETON GIFFORD STREAM	Aveton Gifford	26	SX 693 479	05.09.94	95.24	0.00	0.00
ASHFORD	Ashford	27	SX 688 487	06.09.94	189.84	0.00	0.00
CHALLONS COMBE STREAM	Easton	28	SX 677 474	06.09.94	147.07	0.00	0.68

KEY

- Species present
 @ - Species absent
 B - Bullhead
 D - Dace
 E - Eel
 F - Flounder
 M - Minnow
 S - Stickleback
 RT - Rainbow Trout
 SL - Stone Loach
 ST - Sea Trout

TROUT DENSITY (100m2) OTHER SPECIES

<u>FRY</u>	<u>PARR</u>	
3.31	14.48	
0.38	11.08	
3.48	10.09	E,ST
5.97	14.04	B,E
1.84	3.43	B,E,SL,
#	#	B,E,M,SL,ST
2.10	3.92	B,E,SL,ST,
#	#	B,E,SL,ST,
#	#	B,E,M,SL,ST,
#	#	B,E,M,SL,F.
1.57	32.50	
2.68	20.43	
13.02	43.03	
29.72	34.27	E
5.22	13.04	B,E,SL.
5.98	5.81	B,E
9.23	1.36	B,E
15.33	18.47	B,E,SL
27.34	0.68	B,E.
1.17	13.21	E.
15.28	13.19	B,E,SL.
12.65	23.11	B,E,SL
13.01	29.49	B,E,SL.
10.42	22.41	B,E,SL.
0.00	0.92	B,E,SL,F.
16.80	11.55	E
1.88	10.60	E
2.42	18.66	B,E.

TABLE 3

RIVER AVON - ALL SURVEYS 1962 - 1994. SALMON DENSITIES (100m2)

WATERCOURSE	SITE NAME	SALMON FRY (0+)			
		1962	1978	1984	1991
AVON-	Knappmill (1)	#	-	-	#
	Knappmill (2)	-	-	-	#
	Knappmill (3)	-	-	-	#
	U/s Hatchbridge	-	-	-	7.20
	D/s Topsham Bridge	#	-	-	20.49
	U/s Garra Bridge	-	-	-	39.05
	Bickham Bridge	-	-	-	25.29
	Brushford Bridge	#	-	-	-
	Avonwick St.	-	-	-	21.38
	D/S A38 Bridge	-	-	-	-
	Bridge Farm	#	-	-	-
	Brent Mill Bridge	-	-	-	-
	Island Weir	-	-	-	-
	Lydia Bridge	-	-	-	-
	Didworthy	@	-	-	0.00
	Shipleigh Bridge	-	-	-	-
	Woolholes Bridge	@	-	-	0.00
	Avon Dam Bridge	@	-	-	0.00
	BALA BROOK	D/s Zeal Bridge	@	-	-
Old Hill Settlement		-	-	-	0.00
BADWORTHY BROOK	U/s Badworthy Bridge	-	-	-	0.00
GLAZE BROOK	Glazebrook Weir	#	-	-	-
	Avonwick Mill	-	-	-	12.39
	Pennaton Copse	-	-	0.00	-
	U/s Owley Bridge	-	-	-	0.00
	Owley Bottom	-	-	0.00	-
	Dingy Grove	-	-	0.00	-
	Wishing Pool	-	-	0.00	-
	Tin Stream	-	-	0.00	-
HORSE BROOK	Horsebrook	-	-	-	0.00
BICKHAM BROOK	Bickham House	-	-	-	41.10
	Higher Ford	-	-	-	0.00
MARRIDGE STREAM	Marridge	-	-	-	-
COCKS BROOK	Fir Plantation	-	-	-	1.39
	U/s New House	-	-	-	0.00
TORR BROOK	Cornmill	-	-	-	0.00
	Coldharbour Wood	-	-	-	0.00
KNAPMILL BROOK	Yabbacombe	-	-	-	0.00
	Alleron	-	-	-	0.00
AVETON GIFFORD STREAM	Aveton Gifford	-	-	-	0.00
ASHFORD STREAM	Ashford	-	-	-	0.00
CHALLONS COMBE STREAM	Easton	-	-	-	-

KEY

* = SPECIES PRESENT

= SPECIES ABSENT

PARR (1+) AND OLDER

1994	1962	1978	1984	1991	1994
#	#	-	-	#	#
-	-	-	-	#	-
-	-	-	-	#	-
#	-	-	-	1.15	#
#	#	-	-	7.79	#
18.32	-	-	-	8.59	4.76
#	-	-	-	5.39	#
-	#	-	-	-	-
15.05	-	-	-	13.59	4.57
7.71	-	-	-	-	5.72
-	#	-	-	-	-
-	-	18.61	-	-	-
-	-	56.25	-	-	-
-	-	28.50	-	-	-
1.28	@	-	-	0.00	2.75
-	-	0.00	-	-	-
0.00	@	-	-	0.00	0.00
0.00	@	0.00	-	0.00	0.00
-	-	-	-	-	-
0.00	@	-	-	0.00	0.00
0.00	-	-	-	0.00	0.00
9.61	-	-	-	5.73	22.44
-	#	1.56	-	-	-
3.19	-	-	-	6.35	2.32
-	-	-	0.00	-	-
0.00	-	-	-	0.00	0.00
-	-	-	0.00	-	-
-	-	-	0.00	-	-
-	-	-	0.00	-	-
-	-	-	0.00	-	-
0.00	-	-	-	0.00	0.00
8.47	-	-	-	10.88	6.72
2.14	-	-	-	0.00	0.00
-	-	-	-	-	-
0.00	-	-	-	-	0.00
-	-	-	-	-	-
1.39	-	-	-	0.46	4.88
0.00	-	-	-	0.00	0.00
-	-	-	-	-	-
0.00	-	-	-	0.00	0.00
0.00	-	-	-	0.00	0.00
-	-	-	-	-	-
0.00	-	-	-	0.00	0.00
0.00	-	-	-	0.00	0.00
-	-	-	-	-	-
0.00	-	-	-	0.00	0.00
0.00	-	-	-	0.00	0.00
-	-	-	-	-	-
0.00	-	-	-	-	0.68

TABLE 4

RIVER AVON - ALL SURVEYS 1962 - 1994. TROUT DENSITIES (100m²)

WATERCOURSE	SITE NAME	TROUT FRY (Q+)				1994
		1962	1978	1984	1991	
AVON	Knapmill (1)	#	-	-	#	#
	Knapmill (2)	-	-	-	#	-
	Knapmill (3)	-	-	-	#	-
	U/s Hatchbridge	-	-	-	1.94	#
	D/s Topsham Bridge	#	-	-	8.96	#
	U/s Garra Bridge	-	-	-	7.72	2.10
	Bickham Bridge	-	-	-	3.12	#
	Brushford Bridge	#	-	-	-	-
	Avonwick St.	-	-	-	8.45	1.84
	Bridge Farm	#	-	-	-	-
	Brent Mill Bridge	-	-	-	-	-
	Island Weir	-	-	-	-	-
	Lydia Bridge	-	-	-	-	-
	Didworthy	#	-	-	4.11	3.48
	Shipley Bridge	-	-	-	-	-
	Woolholes Bridge	#	-	-	0.18	0.38
Avon Dam Bridge	#	-	-	2.09	3.31	
BALA BROOK	D/s Zeal Bridge	#	-	-	2.14	2.68
	Old Hill Settlement	-	-	-	0.91	1.57
BADWORTHY BROOK	U/s Badworthy br	-	-	-	48.32	13.02
GLAZE BROOK	Glazebrook Weir	@	-	-	-	-
	Avonwick Mill	-	-	-	7.86	5.22
	Pennaton Copse	-	-	10.15	-	-
	U/s Owley Bridge	-	-	-	30.31	29.72
	Owley Bottom	-	-	25.37	-	-
	Dingy Grove	-	-	31.08	-	-
	Wishing Pool	-	-	10.68	-	-
Tin Stream	-	-	0.00	-	-	
HORSE BROOK	Horsebrook	-	-	-	11.23	5.98
BICKHAM BROOK	Bickham House	-	-	-	70.72	15.33
	Higher Ford	-	-	-	21.71	9.23
COCKS BROOK	Fir Plantation	-	-	-	21.73	15.28
	U/s New House	-	-	-	1.27	1.17
TORR BROOK	Cornmill	-	-	-	16.14	13.01
	Coldharbour Wood	-	-	-	10.19	12.65
KNAPMILL BROOK	Yabbacombe	-	-	-	17.12	0.00
	Alleron	-	-	-	0.00	10.42
AVETON GIFFORD STREAM	Aveton Gifford	-	-	-	20.70	16.80
ASHFORD STREAM	Ashford	-	-	-	1.45	1.88
CHALLONS COMBE STREAM	Easton	-	-	-	-	2.42

KEY

= SPECIES PRESENT

@ = SPECIES ABSENT

PARR (1+) AND OLDER

1962	1978	1984	1991	1994
#	-	-	#	#
-	-	-	#	-
-	-	-	#	-
-	-	-	0.58	#
#	-	-	4.23	#
-	-	-	5.10	3.92
-	-	-	3.35	#
#	-	-	-	-
-	-	-	7.79	3.43
#	-	-	-	-
-	17.50	-	-	-
-	23.21	-	-	-
-	35.50	-	-	-
#	-	-	9.59	10.09
-	14.58	-	-	-
#	-	-	3.57	11.08
#	23.35	-	17.44	14.48
#	-	-	10.72	20.43
-	-	-	17.36	32.25
-	-	-	-	-
-	-	-	26.21	43.03
#	54.69	-	-	-
-	-	-	14.56	13.04
-	-	13.53	-	-
-	-	-	18.70	34.27
-	-	19.90	-	-
-	-	44.59	-	-
-	-	22.33	-	-
-	-	7.14	-	-
-	-	-	3.30	5.81
-	-	-	18.13	18.47
-	-	-	0.52	1.36
-	-	-	-	-
-	-	-	2.77	13.19
-	-	-	10.16	13.21
-	-	-	-	-
-	-	-	16.89	29.49
-	-	-	9.73	23.11
-	-	-	-	-
-	-	-	0.00	0.92
-	-	-	4.51	22.41
-	-	-	-	-
-	-	-	2.30	11.55
-	-	-	-	-
-	-	-	2.18	10.60
-	-	-	-	-
-	-	-	-	18.66

TABLE 5

RIVER AVON FISH SURVEY 1994 - SEMI - QUANTATATIVE RESULTS

<u>WATERCOURSE</u>	<u>SITE NAME</u>	<u>N G R</u>	<u>SALMON</u> <u>O+</u>
AVON	U/s Bickham Bridge	SX 726 - 555	65
AVON	* D/s Topsham Bridge	SX 732 - 511	11
AVON	* U/S Hatch Bridge	SX 716 - 473	7
AVON	Knappmill	SX 709 - 473	33

* = Sites surveyed under high flows(Avon Dam on spill)

TROUT

OTHER

<u>1++</u>	<u>0+</u>	<u>1++</u>	<u>SPECIES</u>
21	4	10	B,E,SL,ST
16	7	3	B,E,SL,ST
1	3	2	B,E,SL,ST,MW,ST
8	6	5	B,E,FL,MW,SL

KEY

B = Bullhead

E = Eel

FL = Flounder

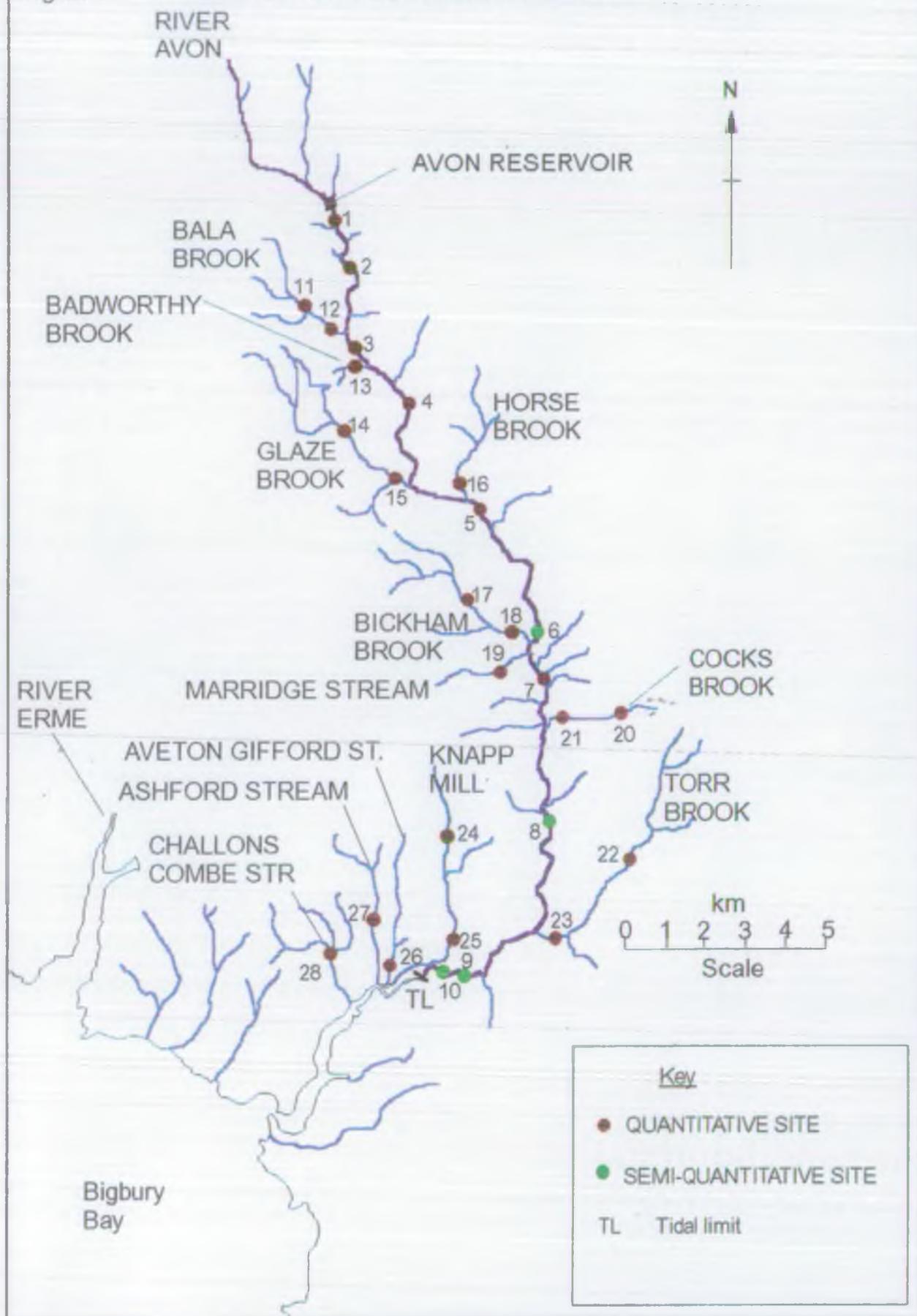
MW = Minnow

SL = Stoneloach

ST = Seatrout

Figure 1

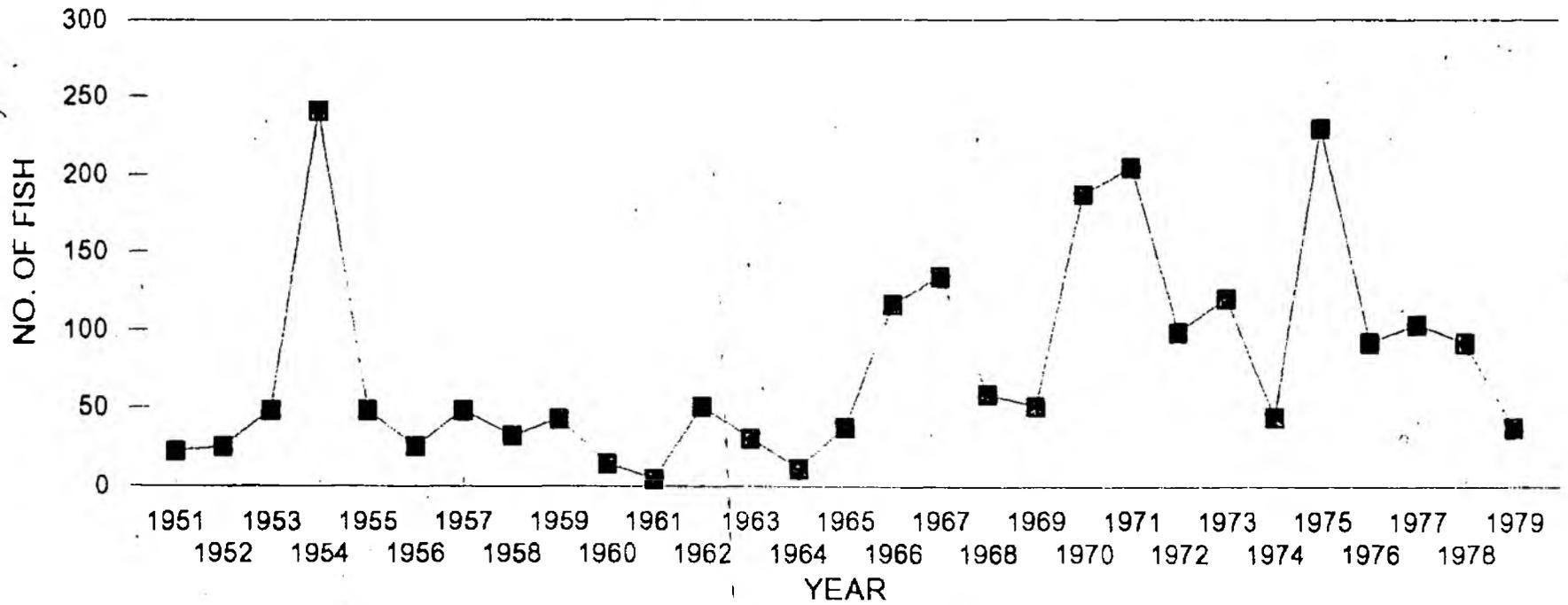
RIVER AVON ELECTRIC FISHING SITES 1994



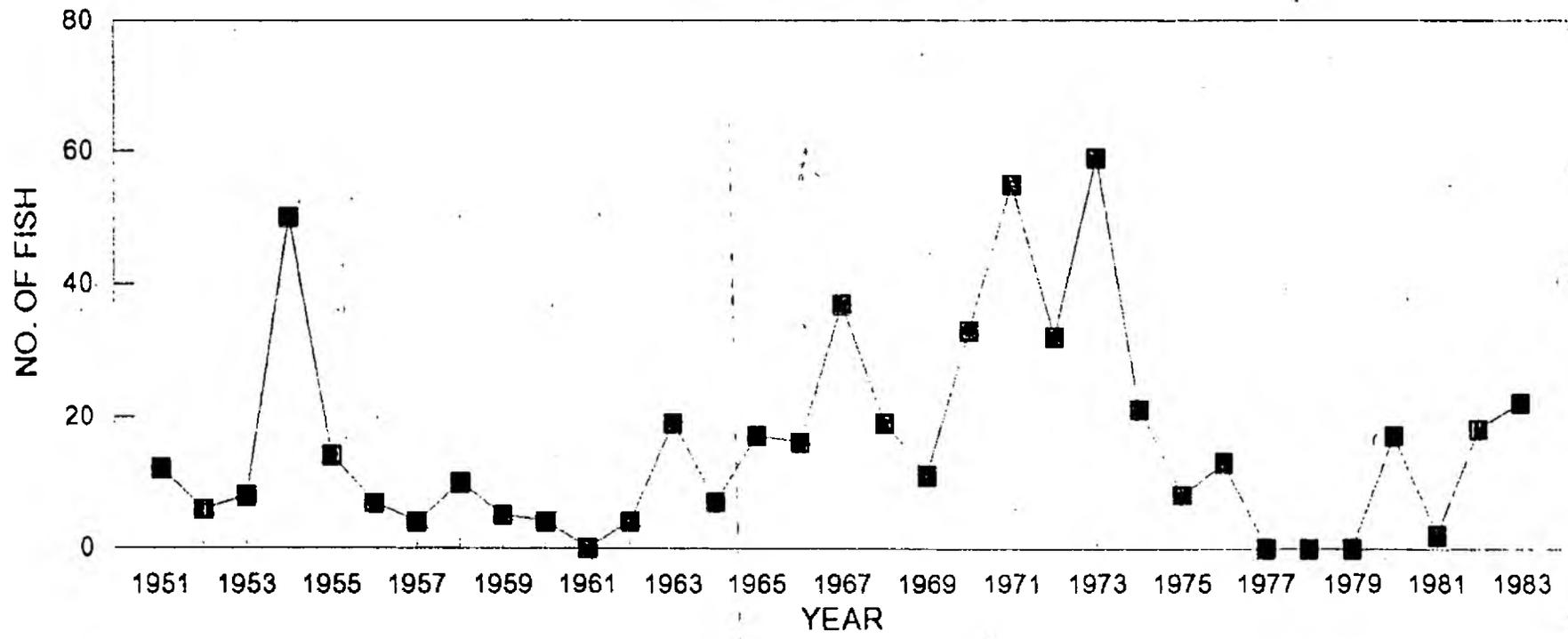
APPENDIX B

SALMON ROD AND NET CATCH DATA

AVON (NET)
SALMON

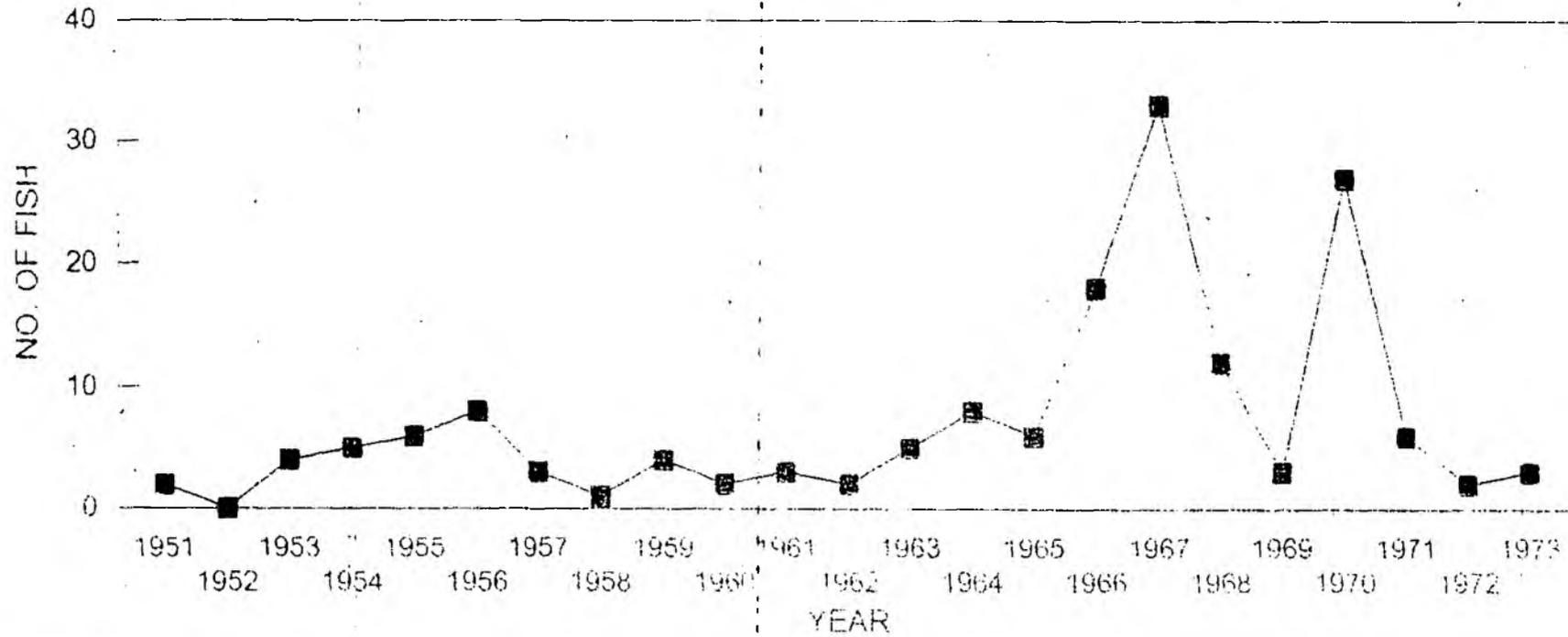


AVON (FE)
SALMON



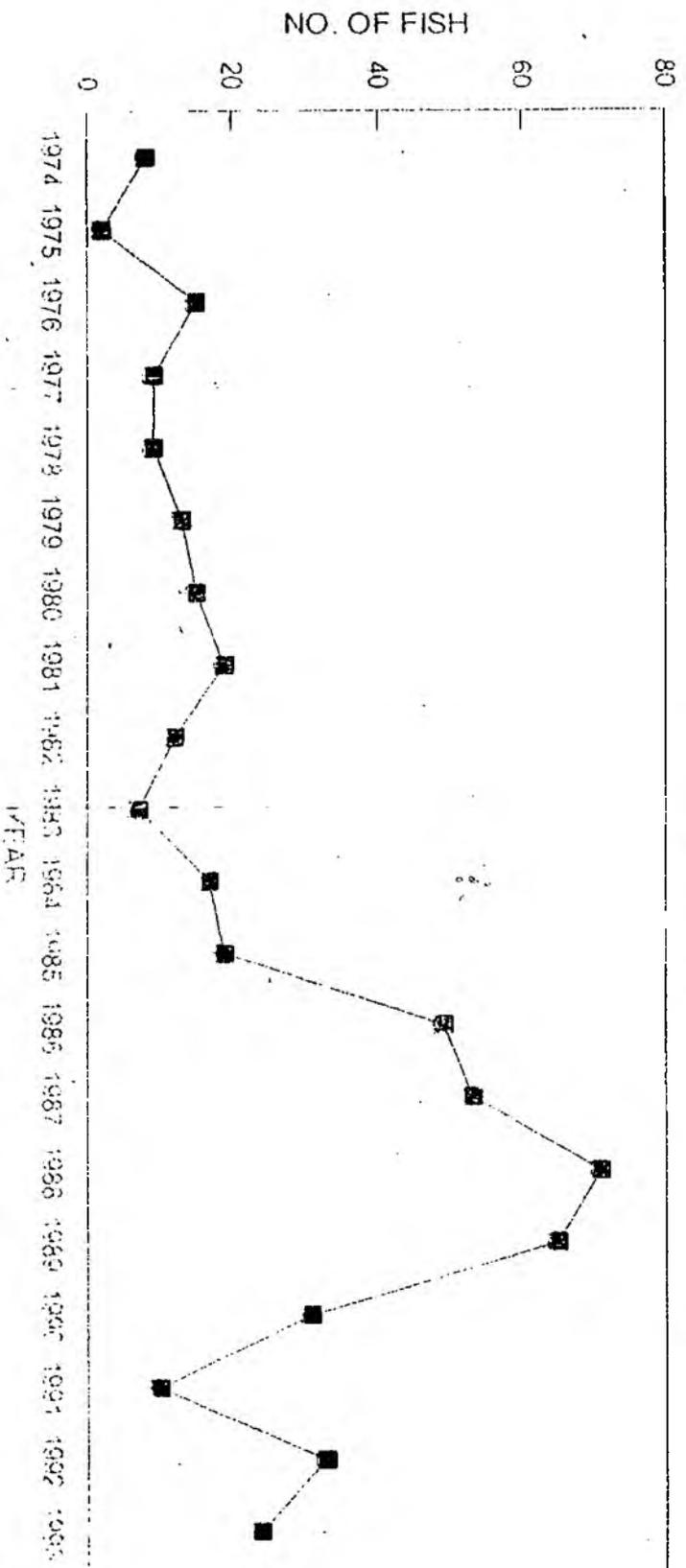
AVON & ERME ROD CATCH

SALMON



AVON ROD CATCH

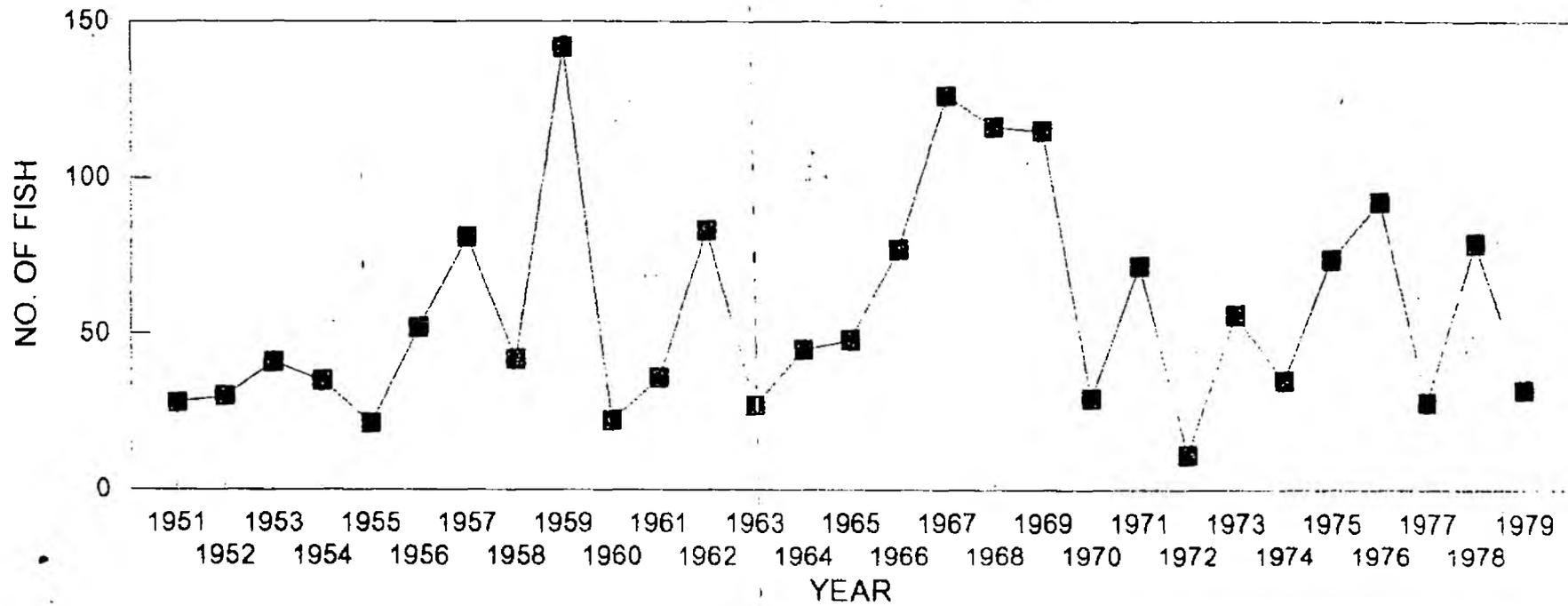
SALMON



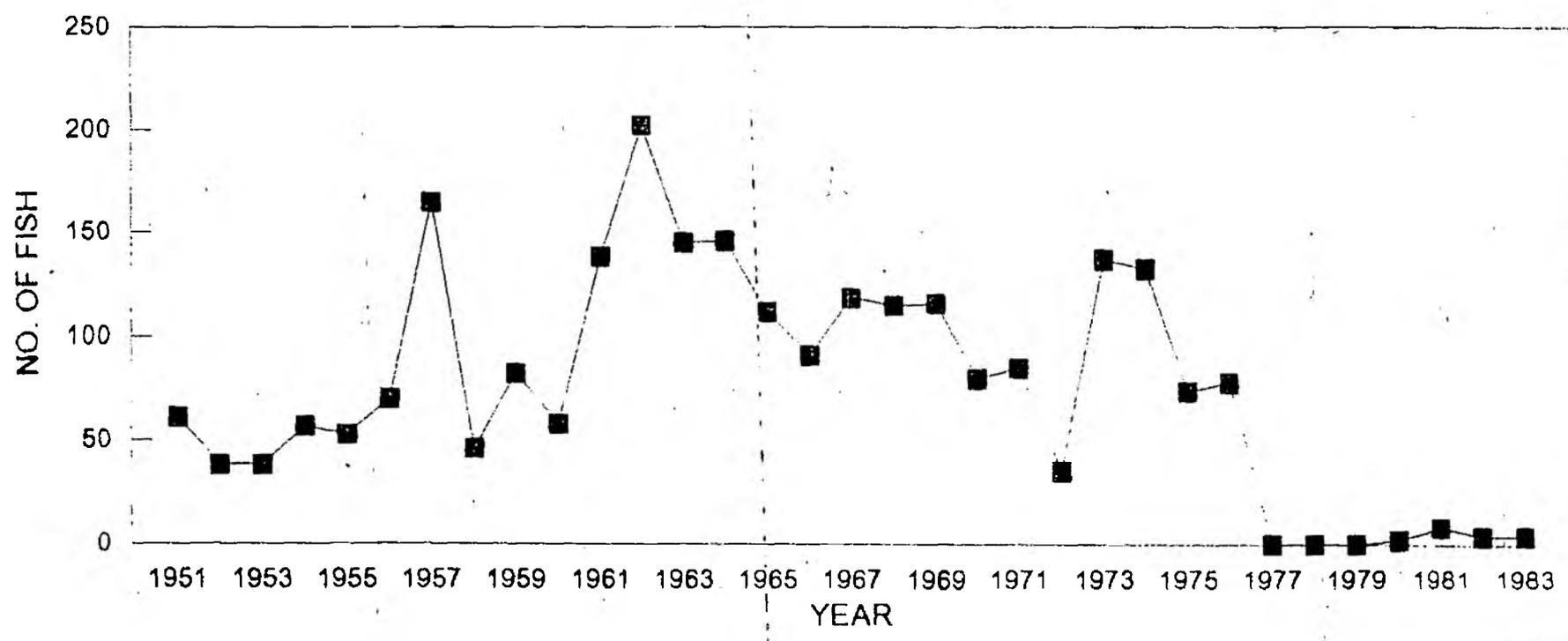
APPENDIX C

SEATROUT ROD AND NET CATCH

AVON (NET)
SEA TROUT

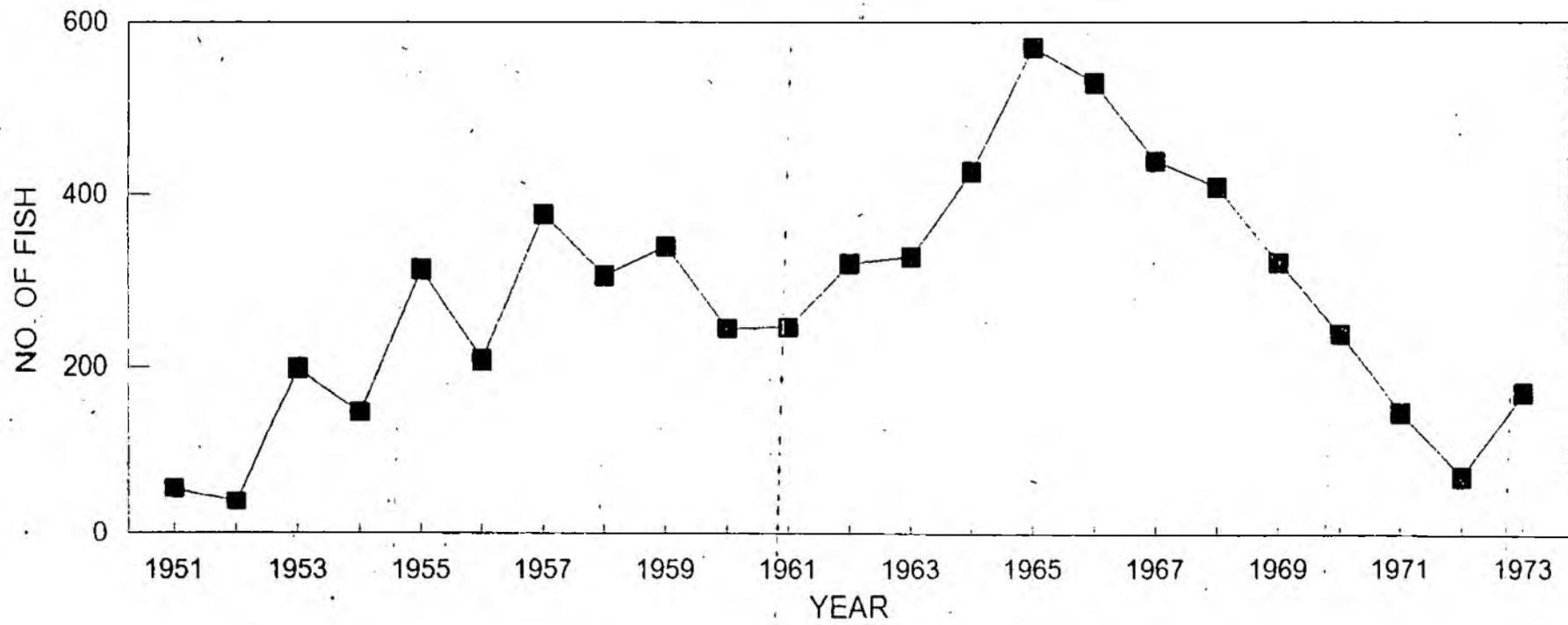


AVON (FE)
SEA TROUT



AVON & ERME ROD CATCH

SEA TROUT



AVON ROD CATCH

SEA TROUT

