Institute of Freshwater Ecology

The 1997 East Stoke Salmon Counter Records

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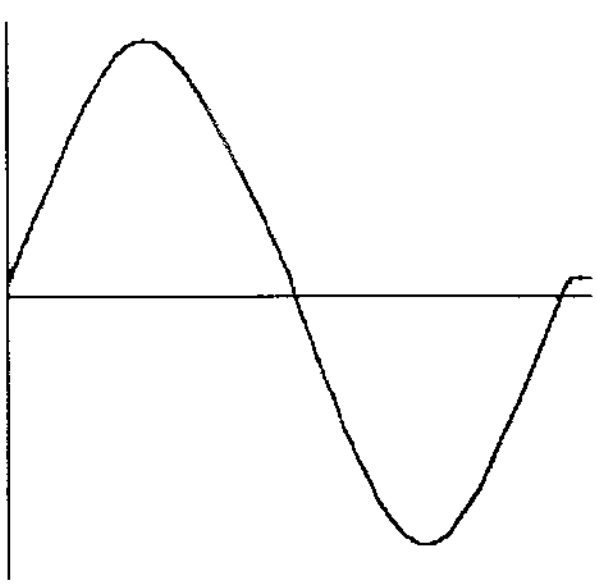

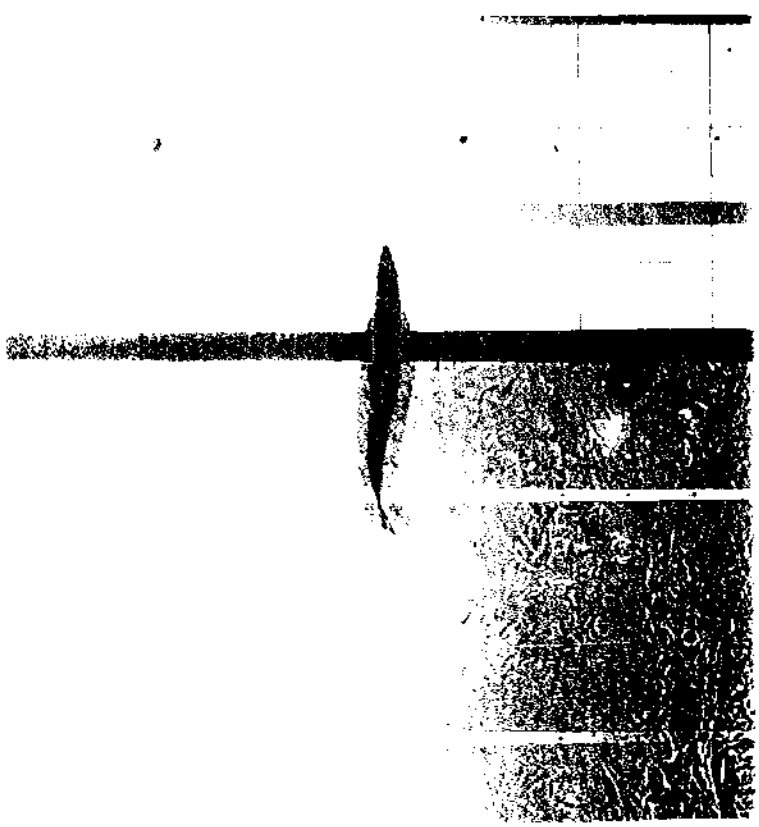

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CONFIDENTIALITY STATEMENT

Abstract

Data obtained during 1997 from the IFE East Stoke Salmon Counter are summarised. Data on the numbers and sizes of salmon ascending the counter are presented and a brief summary of the run and hydrological characteristics for 1997 are given.

Introduction

The data in this report represent the 25th consecutive year of the FBA/IFE East Stoke counter's operation recording the upstream movement of Atlantic salmon (*Salmo salar* L.) in the River Frome. As such the data probably represents the longest data set of hourly & daily information about the movement of the Atlantic Salmon in England and Wales and, with the exception of the Pitlochry counter in Scotland, the longest data run on this information in the UK. With the Frome now being one of the last southern chalk streams to have a truly wild population of salmon, we consider the continuing monitoring of numbers of salmon on the River Frome vital. Data from the adult salmon counter, together with the data on smolt migration now being obtained, should allow a stock/ recruitment model to be produced for the Frome salmon. This should allow both the critical mortality phase of the salmon to be ascertained together with intelligent management of the stock.

It should be noted that changes to the time base for data presentation have been completed this year. Data are now presented for the period February to January inclusive rather than the more usual calendar year of January to December inclusive. Past data and personal observations having indicated that the upstream movement numbers in January are caused by the continued migration of fish from the previous calendar year migrating to spawn, not fish migrating to spawn in 11 months time.

1997 Data Report

Verification of the data entailed editing 4597 counter records, evaluating 6361 computer waveform traces and viewing events on 2424 hours of video tape. Accuracy of assessment of the computer traces was carried out by comparing identity from computer traces with identity observed from video tapes. An average of 92% accuracy was achieved.

Figure (1) shows daily counts together with mean daily discharge data. Data from the counter are presented for both gross upstream and gross downstream counts as well as the nett upstream count. It should ne noted that downstream counts are not subtracted from January, February or March data as a large proportion of these are likely to be kelts dropping back downstream rather than vacillating upstream migrants. Whilst nett numbers equate to the estimated numbers of salmon ascending the river, gross numbers are included to allow comparison with data obtained prior to 1983 when total downstream numbers were not recorded.

Figure (2) shows a comparison of the 1997 nett upstream data with the previous three years. The run started well with cumulative numbers being higher than for the previous three years until May. Thereafter the run declined until in July it was lower than for the previous three years. By the end of the year however the numbers running had increased resulting in a total nett upstream count of 1157 for the year. This, whilst slightly lower than the total for 1996, is the second highest total since 1990 when the low runs began. The main characteristic of the run this year however was the large migration in November. Over half the total years run occurred in this month, with most of these fish moving over a three day period. On one day over 200 fish ascended the weir in 24 hours. Gross numbers are still however well below the long-term (25 year) average of 2384 and also slightly below

the average for the "low run" years of 1991 onward of 1218.

The proportion of the run ascending after the end of September was 59%. This is around the average percentage for the last five years but slightly above the long term (25 year) average.

Length-frequency information (obtained from video records) is shown in Figure (3) for the period March to November 1997. This year again saw periods where time constraints resulted in video surveillance not being carried out on the weir. Figure (4) shows approximate periods covered by video surveillance. During the period when surveilance was carried out for smolt assessement, the entire tape was viewed, not just the times when the counter detected fish. During that period the only fish (larger than 45 cm.) seen on video which was not recorded by the counter was one small salmonid of 46 cm. All other large fish seen were counted. Problems with poor background conditions often made identification and measurement impossible and on many of this years tapes, even when identification has been possible, it has not been possible to get accurate length information. As a consequence only 95 fish were measured this year, all between April and August. Of the fish that were measured however several were over 90 cm long (the approximate lower quartile length of 3 sea-winter salmon) and two very large fish of over 104 cm were measured.

Figures 5 to 16 show data from the hourly data base for each month. As well as nett upstream salmon numbers in an hour, hourly averages (4 * 15 minute readings) of water depth, air temperature, water temperature and light level are also shown. Graphs of this data clearly show the clarity of detail available with the hourly time-base.

In figures showing daily counter and discharge data the discharge data are mean daily data obtained from Environment Agency (EA) records measured at the East Stoke flume and weir (values are in cumecs). Figures showing hourly averages are river depth readings at the East Stoke flume from IFE data (data values are in arbitrary units *i.e.* not converted to cumecs).

River discharge levels in 1997 were below the long-term (1966-1996) inter-quartile range for most of the year. March and August just came above the lower quartile, but it was not until November that the flows increased above the median. By December however the flow has increased to above the upper quartile of the long term. Figure (17) shows mean monthly discharge data for 1997 together with mean (1966 - 1996) 5, 25, 75 & 95 percentile discharge data (collated and calculated from EA records). Figure 18 shows the mean annual discharge data for the Frome (together with the 5 year average) for 1966 to 1997 (calculated from EA data).

Historic Data

This year it has been possible to allocate some resources to updating the historic data set of information from the counter. Prior to 1989 all the hourly data for the counter was held as paper copy only, this year we have been able to have all this data entered into the computer held data set. At the same time the process of changing the time base of the data, from January - December to February - January, has been completed. Work is in progress to integrate the records of environmental variables into the hourly data set and also to convert the IFE depth data (for which there are hourly values) to discharge. Once this is completed the entire data set will be archived to a computer Compact Disk (CD).

Future Research

Whilst funding for the counter remains uncertain no firm commitment can be made to the continuance of the monitoring of the Frome salmon numbers. Likewise, although we intend to continue the monitoring of the smolt numbers in 1998, the future of that monitoring beyond 1998 is also uncertain.

Aspects which we hope to investigate in 1998 include, gaining further information about the age structure of the autumn run and further work on the numbers of sea trout migrating in the river and the associated errors they cause to the salmon number assessment.

Work will start in 1998 into an assessment of the genetics of the Frome salmon. The key objectives of the three year project being:
A). To estimate the genetic changes in salmon populations in the river between 1973 and 1997.
B). Investigate into the age-related genetic differentiation among the salmon.
C). To determine the within river genetic variation in the stock and relates it to the adult age structure.

Bibliography

In any project involving long term monitoring, publications relating to the results from the research are likely to be low. When monitoring a fish such as the Atlantic salmon, where a single generation may take up to six years to complete, this is especially true. However, as this report marks the 25th year of recording on the River Frome, a bibliography of papers and reports stemming from both the adult and smolt projects are included below.

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11. Welton, J.S., Beaumont, W.R.C. & Dear, B.E. (1993) The status of Atlantic salmon (*Salmo salar* L.) in the River Frome, Dorset. Report to the Ministry of Agriculture, Fisheries and Food, 37 pp.

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Report to NRA, 7 pp.

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17. Welton, J.S., Beaumont, W.R.C. & Ladle, M. (1996) Smolt trapping using acoustic techniques. Progress report to NRA, 2 pp.

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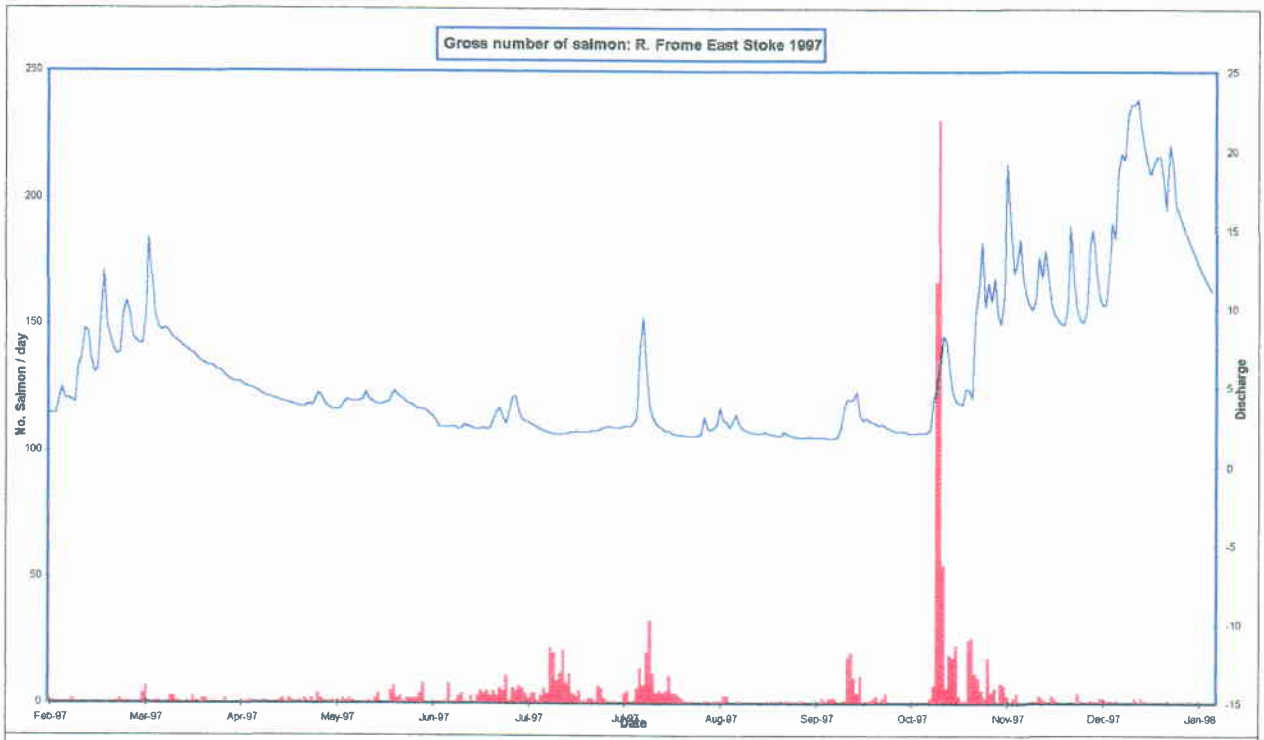
Figure 1:

INSTITUTE OF FRESHWATER ECOLOGY: EAST STOKE SALMON COUNTER DATA 1997

MONTH

Month	Feb-97	Mar-97	Apr-97	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	Jan-98	Total
Gross U/S	7	32	24	51	101	171	148	10	84	665	26	7	1326
Gross D/S	0	0	5	9	9	38	36	1	7	55	9	0	229
Nett U/S	7	32	19	42	92	133	112	9	77	610	17	7	1157



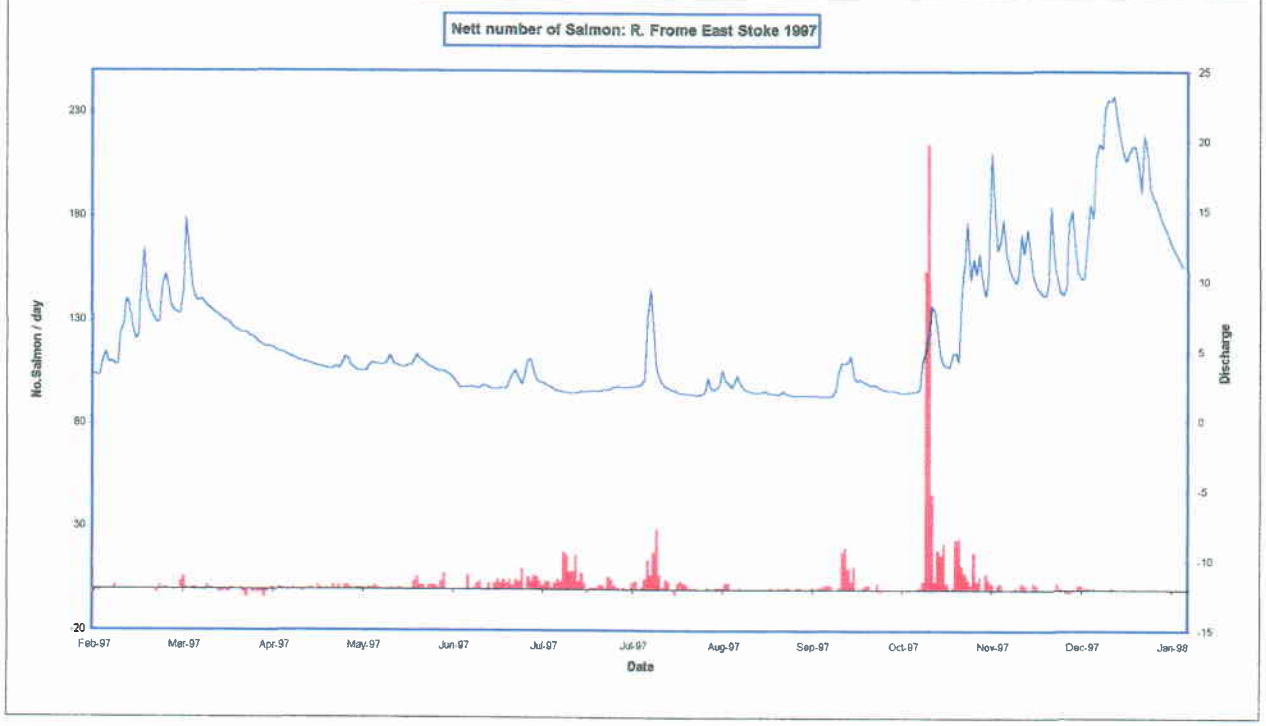
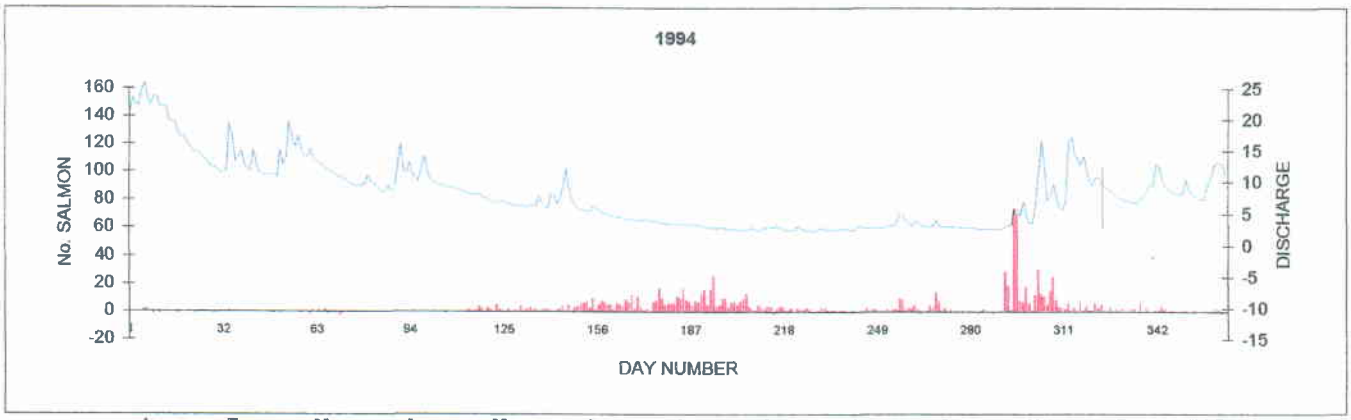
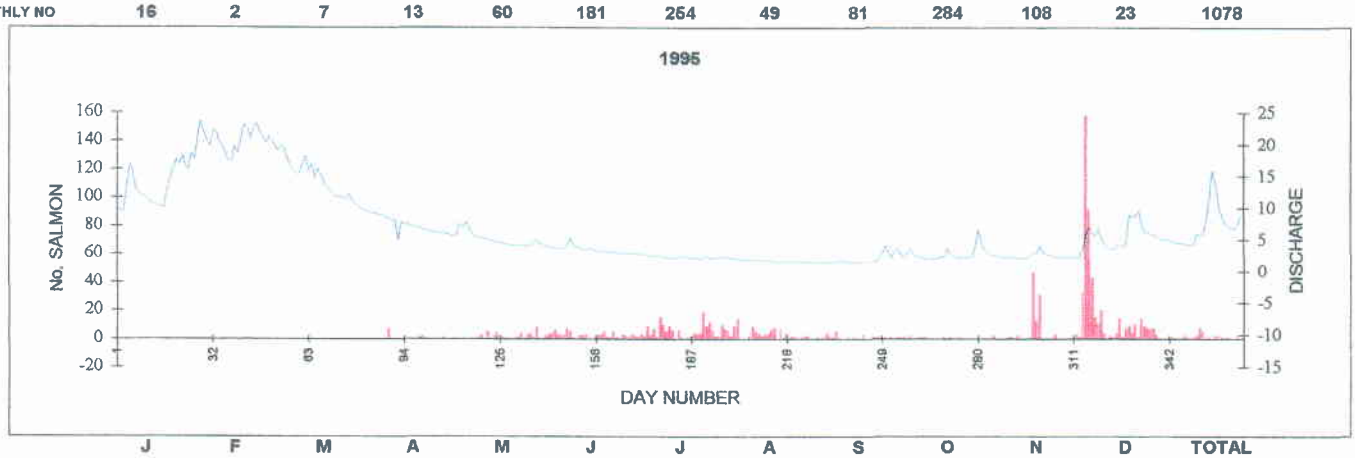


Figure 2:

RIVER FROME: NETT UPSTREAM SALMON MOVEMENT

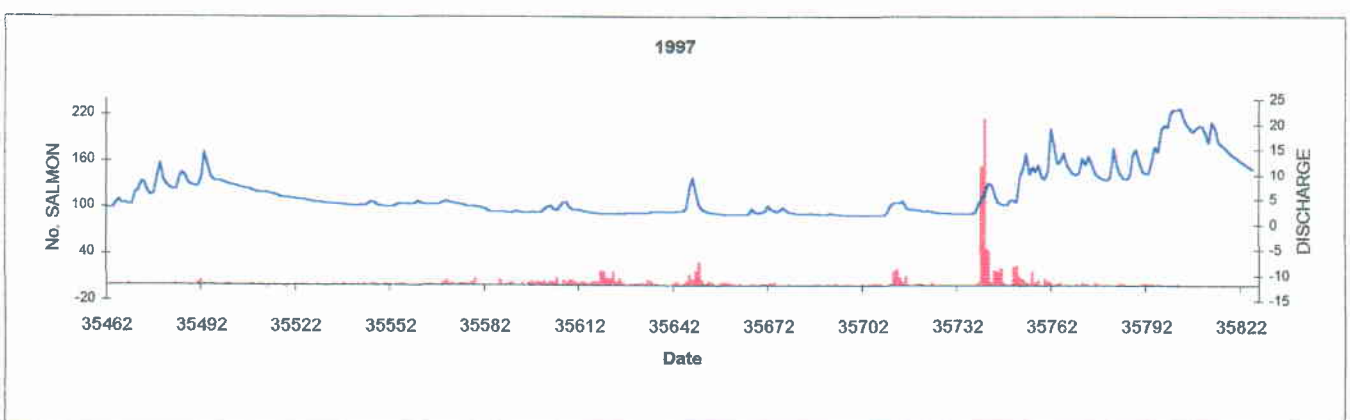


NETT MONTHLY NO	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
	16	2	7	13	60	181	264	49	81	284	108	23	1078



NETT MONTHLY NO	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
	1	0	10	5	69	106	148	54	16	96	459	52	1016

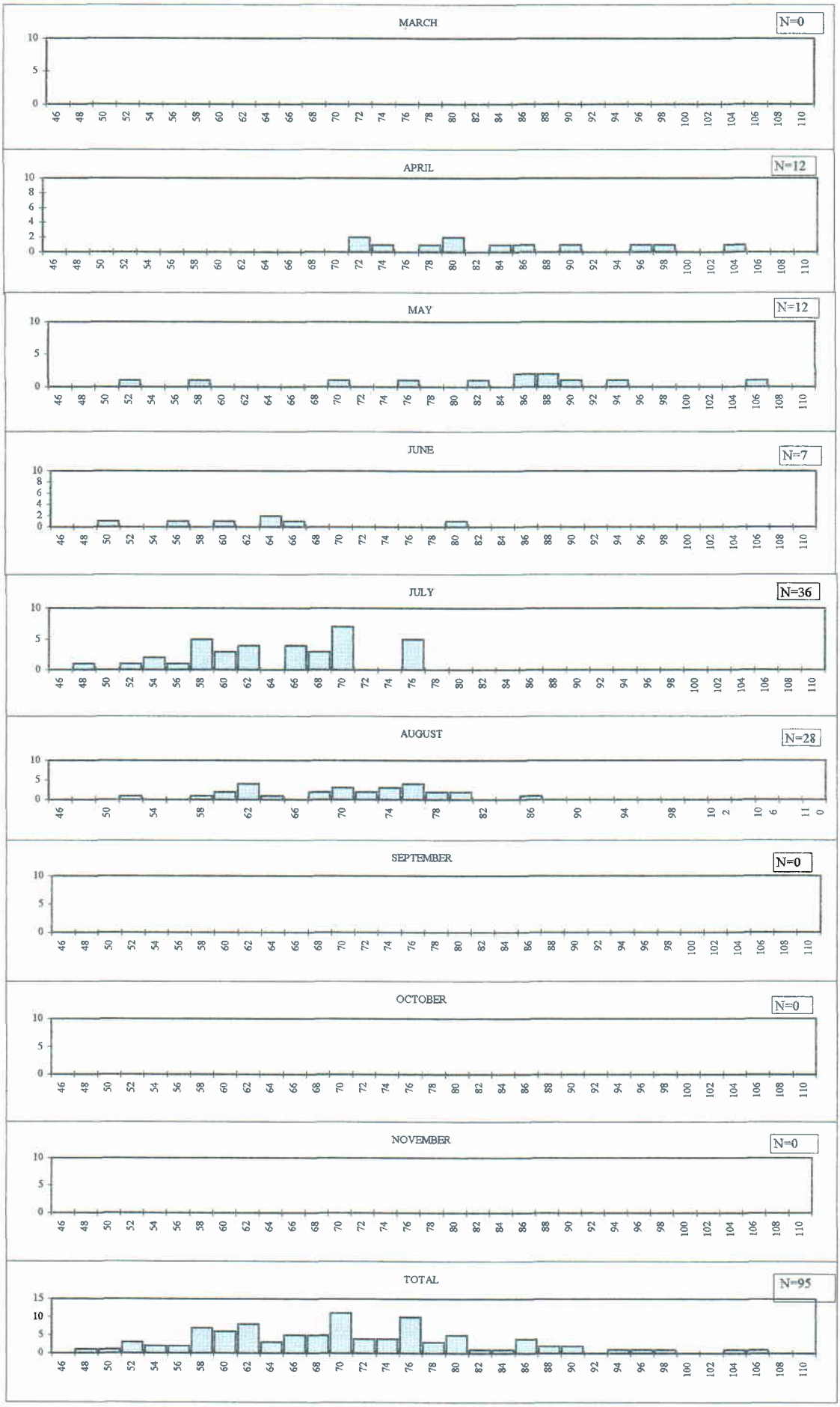
NETT MONTHLY NO	[J]	F	M	A	M	J	J	A	S	O	N	D	J	TOTAL
	[29]	1	14	9	56	54	223	62	11	381	466	47	27	1351



NETT MONTHLY NO	F	M	A	M	J	J	A	S	O	N	D	J	TOTAL
	7	32	19	42	92	133	112	9	77	610	17	7	1157

Figure 3:

Salmon Lengths 1997



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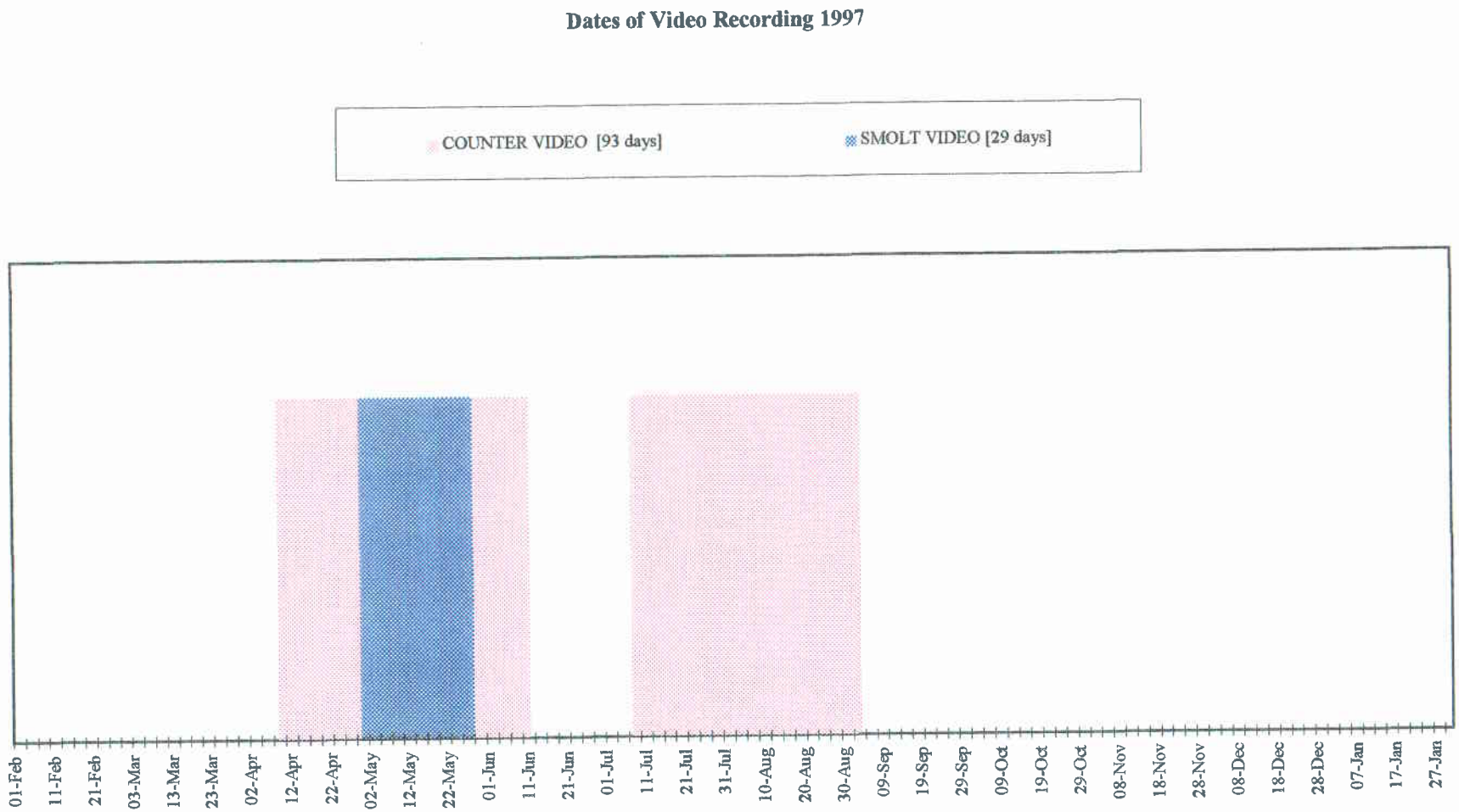
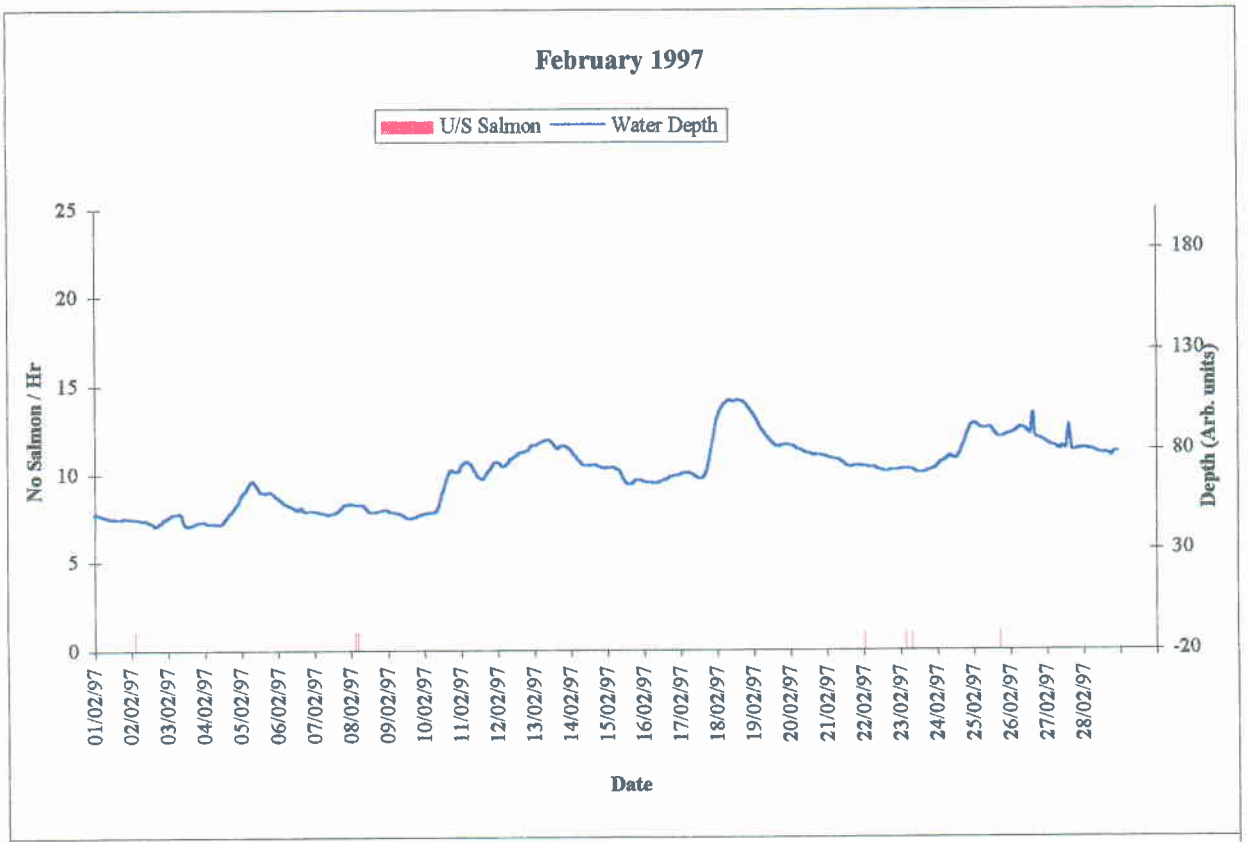
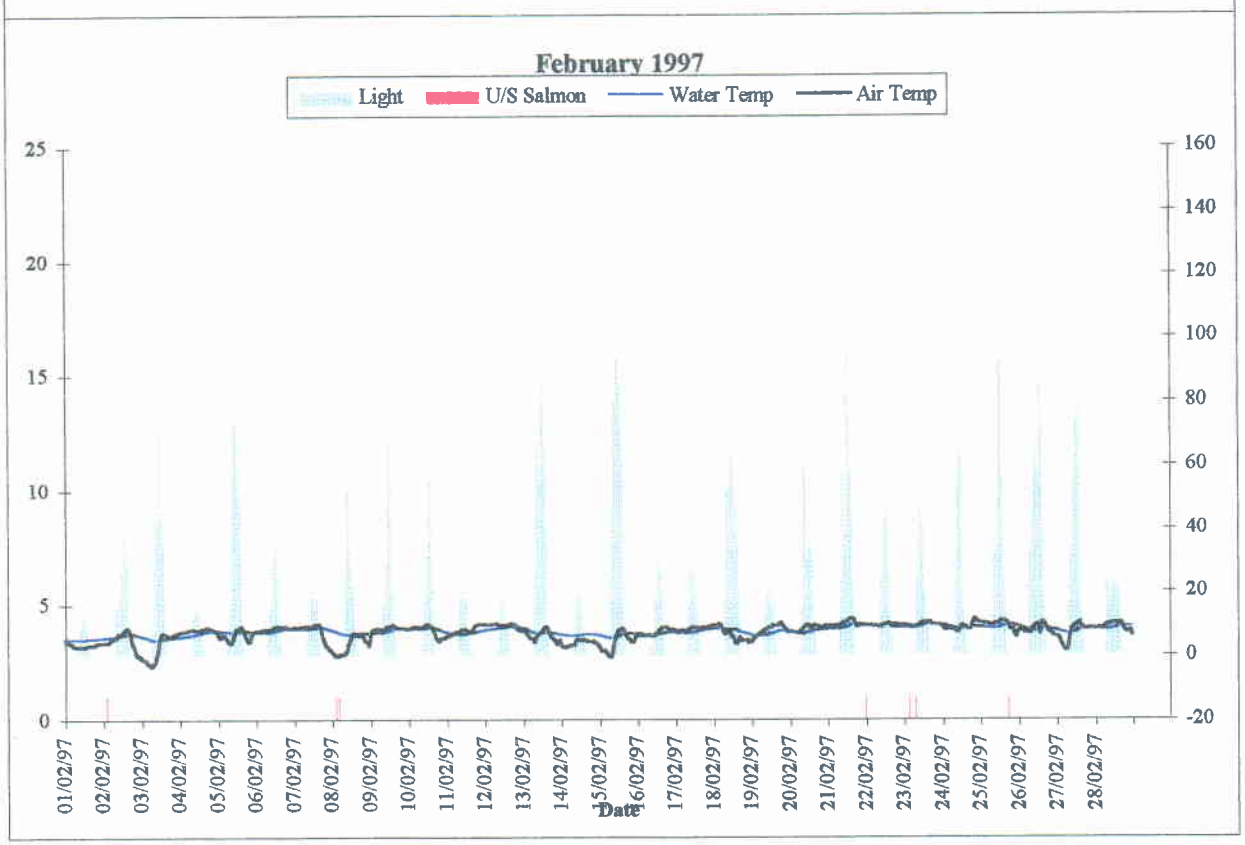

Dates of Video Recording 1997
COUNTER VIDEO [93 days]
SMOLT VIDEO [29 days]
01-Feb
11-Feb
21-Feb
03-Mar
13-Mar
23-Mar
02-Apr
12-Apr
22-Apr
02-May
12-May
22-May
01-Jun
11-Jun
21-Jun
01-Jul
11-Jul
21-Jul
31-Jul
10-Aug
20-Aug
30-Aug
09-Sep
19-Sep
29-Sep
09-Oct
19-Oct
29-Oct
08-Nov
18-Nov
28-Nov
08-Dec
18-Dec
28-Dec
07-Jan
17-Jan
27-Jan

Figure 5:


February 1997
U/S Salmon
Water Depth
No Salmon / Hr
Depth (Arb. units)
Date


February 1997
Light
U/S Salmon
Water Temp
Air Temp
Date

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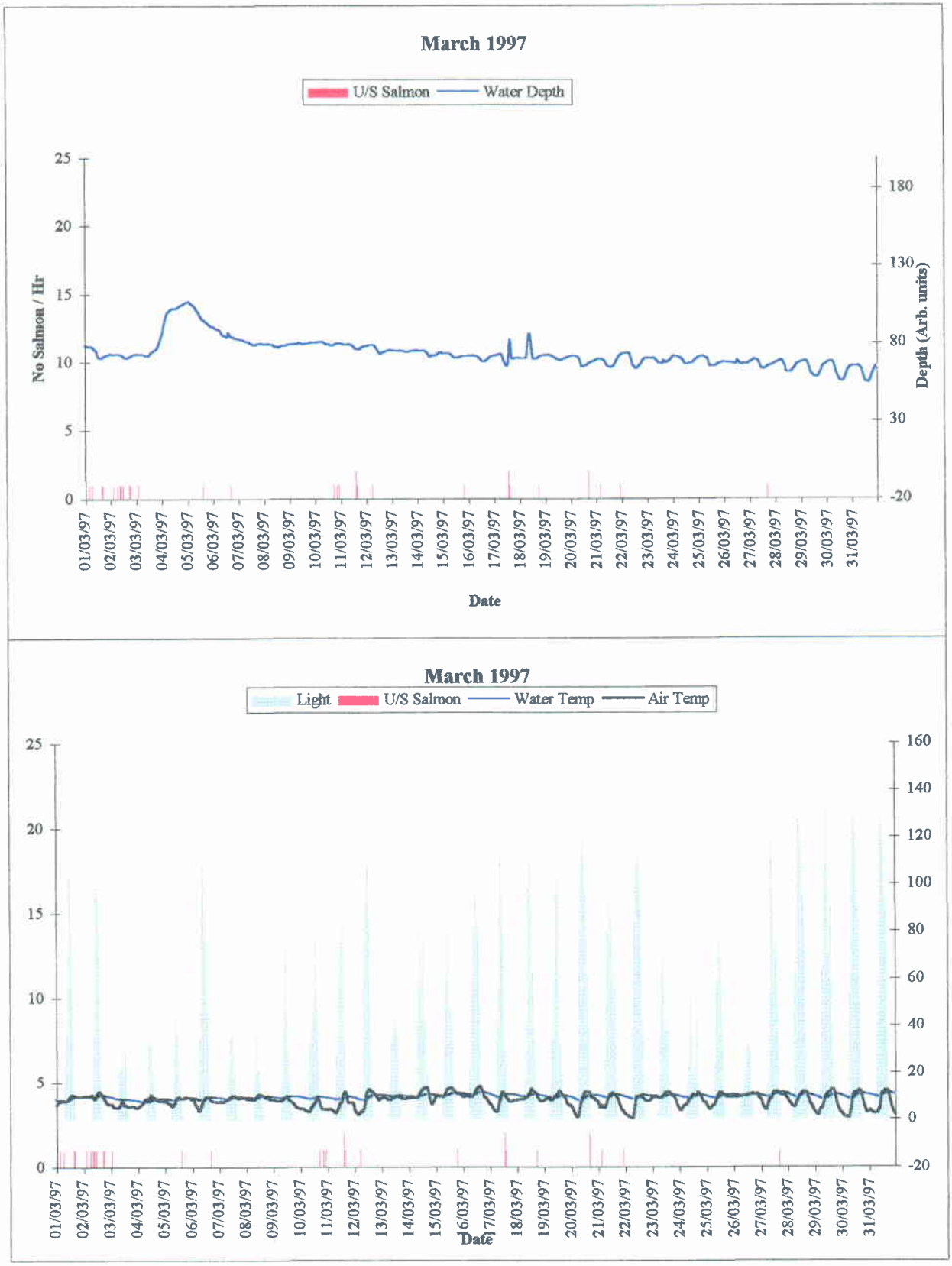
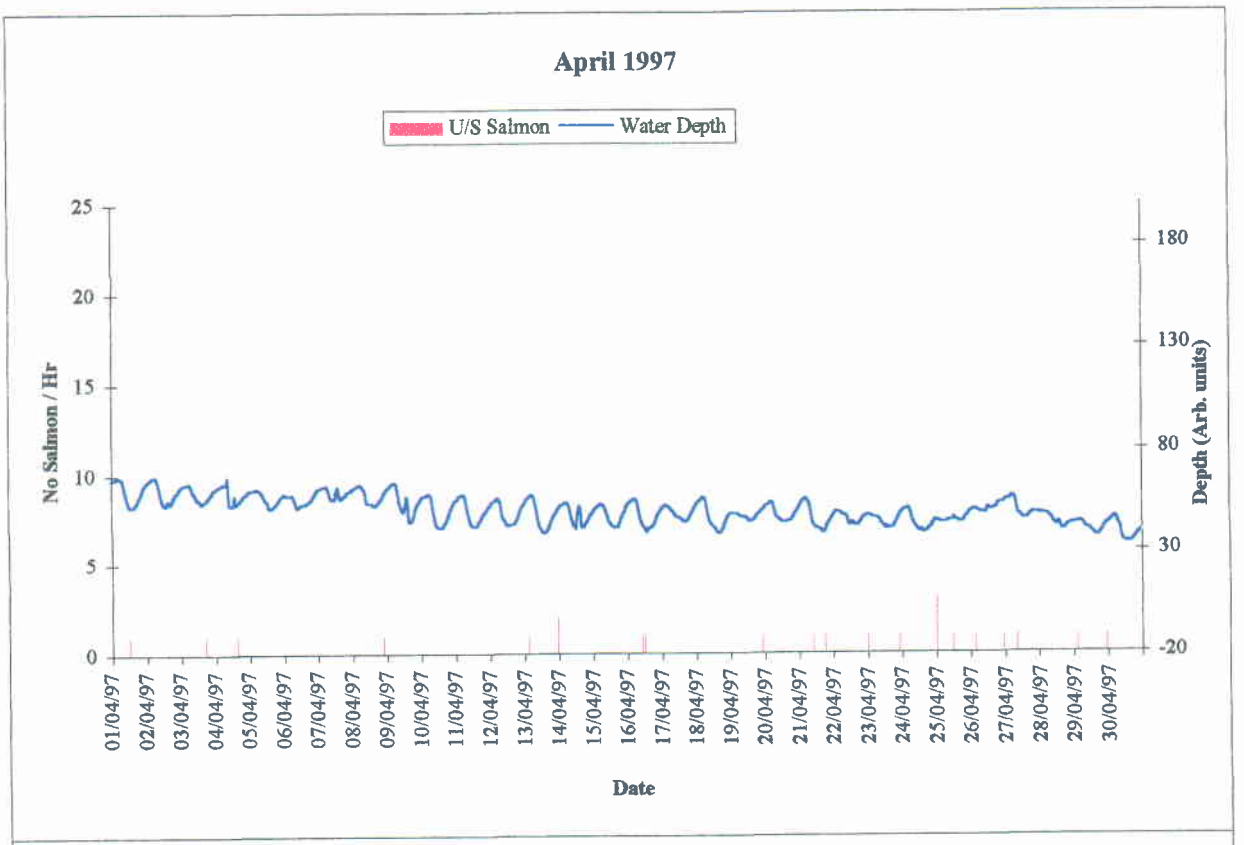

March 1997
U/S Salmon
Water Depth
No Salmon / Hr
Depth (Arb. units)
Date
March 1997
Light
U/S Salmon
Water Temp
Air Temp
Date

Figure 7:


April 1997
U/S Salmon
Water Depth
No Salmon / Hr
Depth (Arb. units)
Date

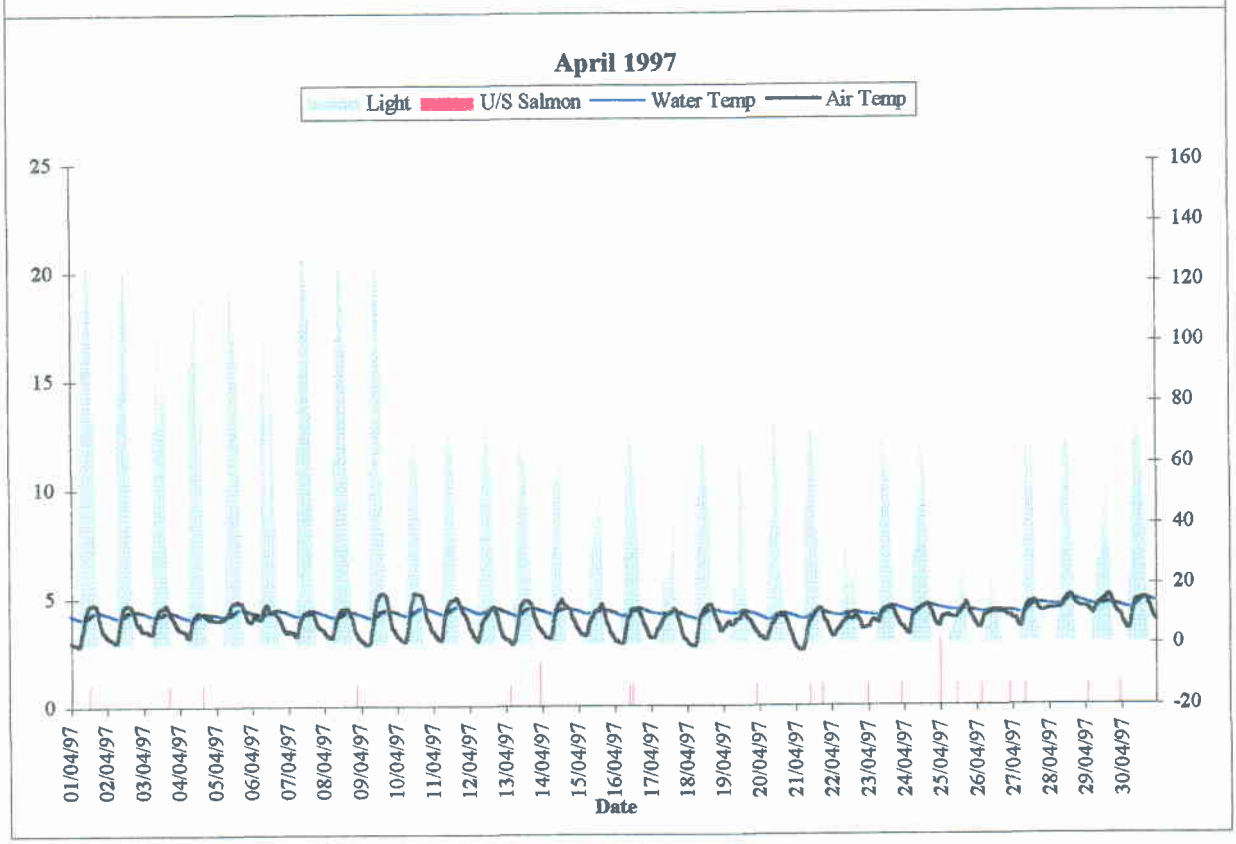

April 1997
Light
U/S Salmon
Water Temp
Air Temp
Date

Figure 8:

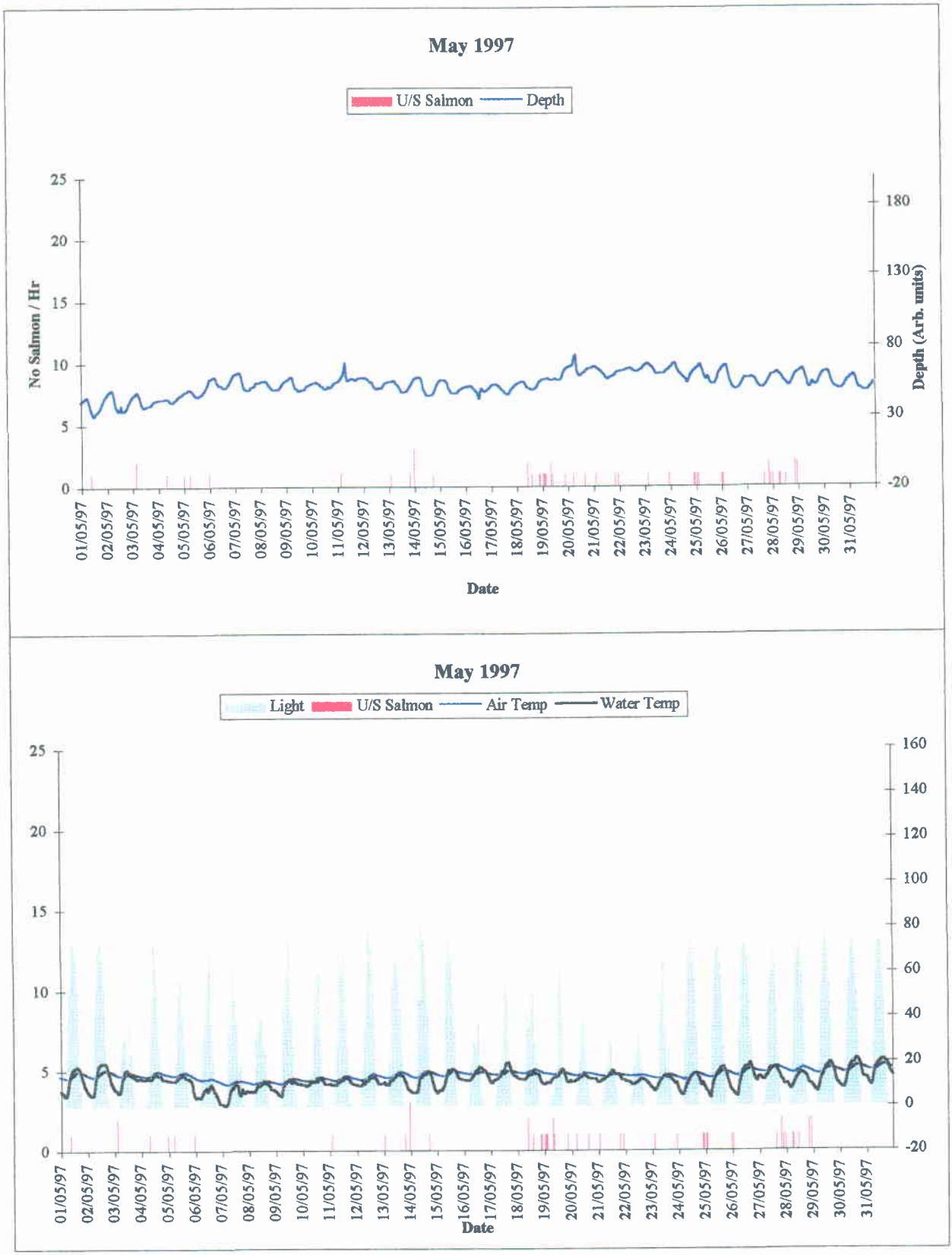
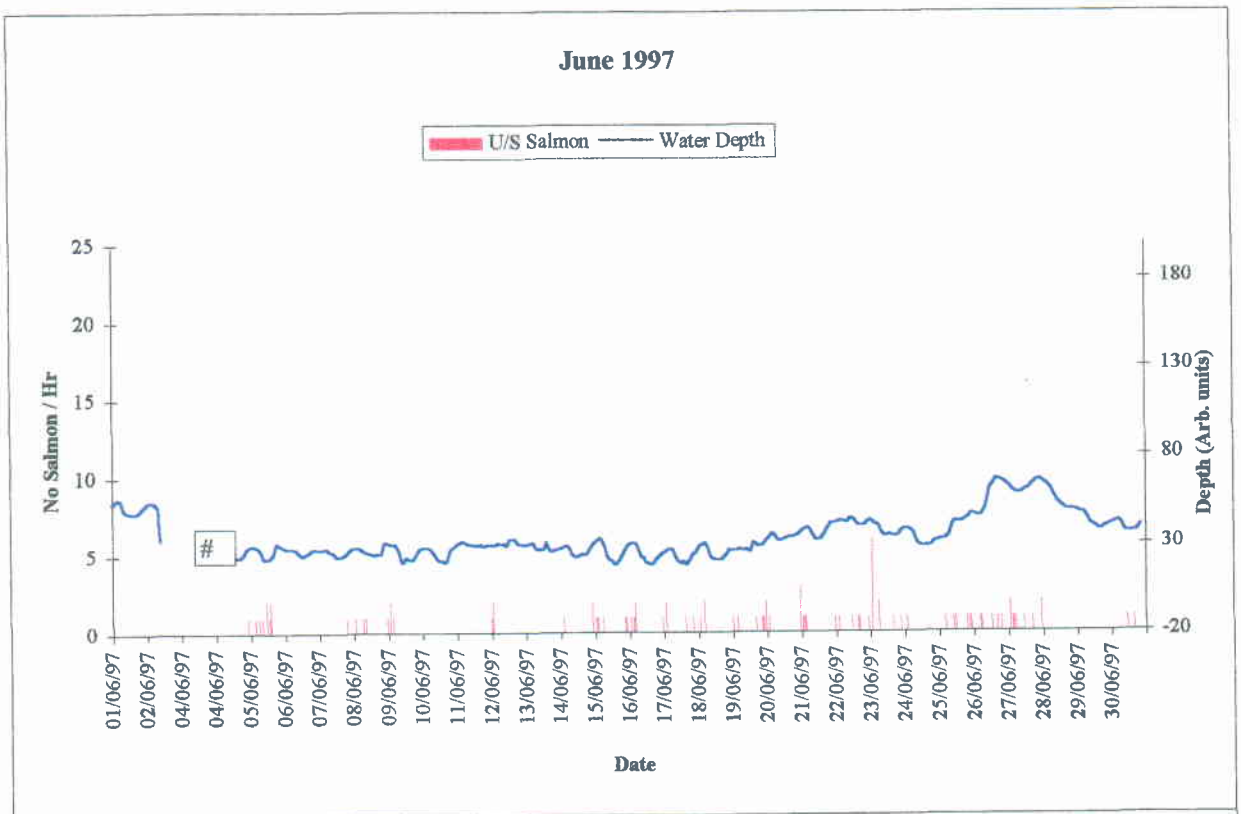
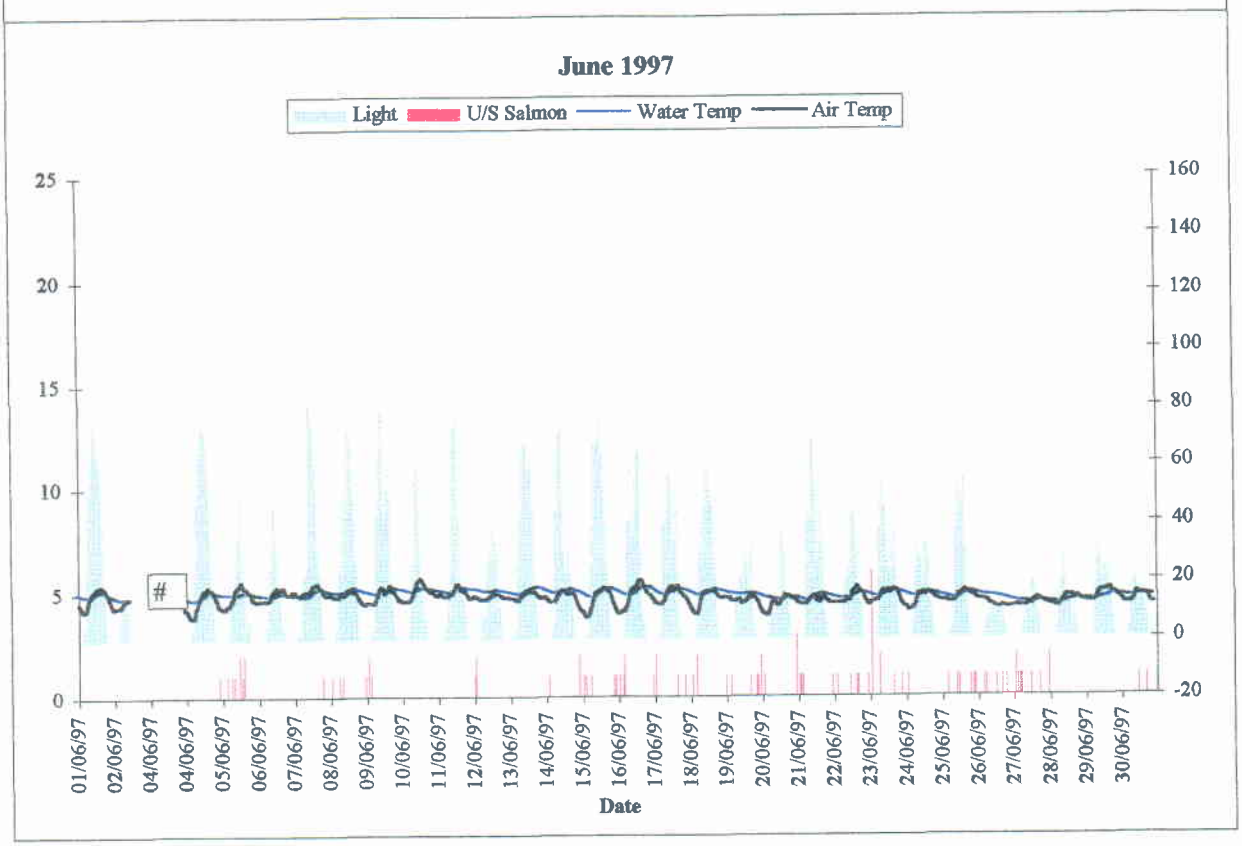

May 1997
U/S Salmon
Depth
No Salmon / Hr
Depth (Arb. units)
Date
May 1997
Light
U/S Salmon
Air Temp
Water Temp
Date

Figure 9:





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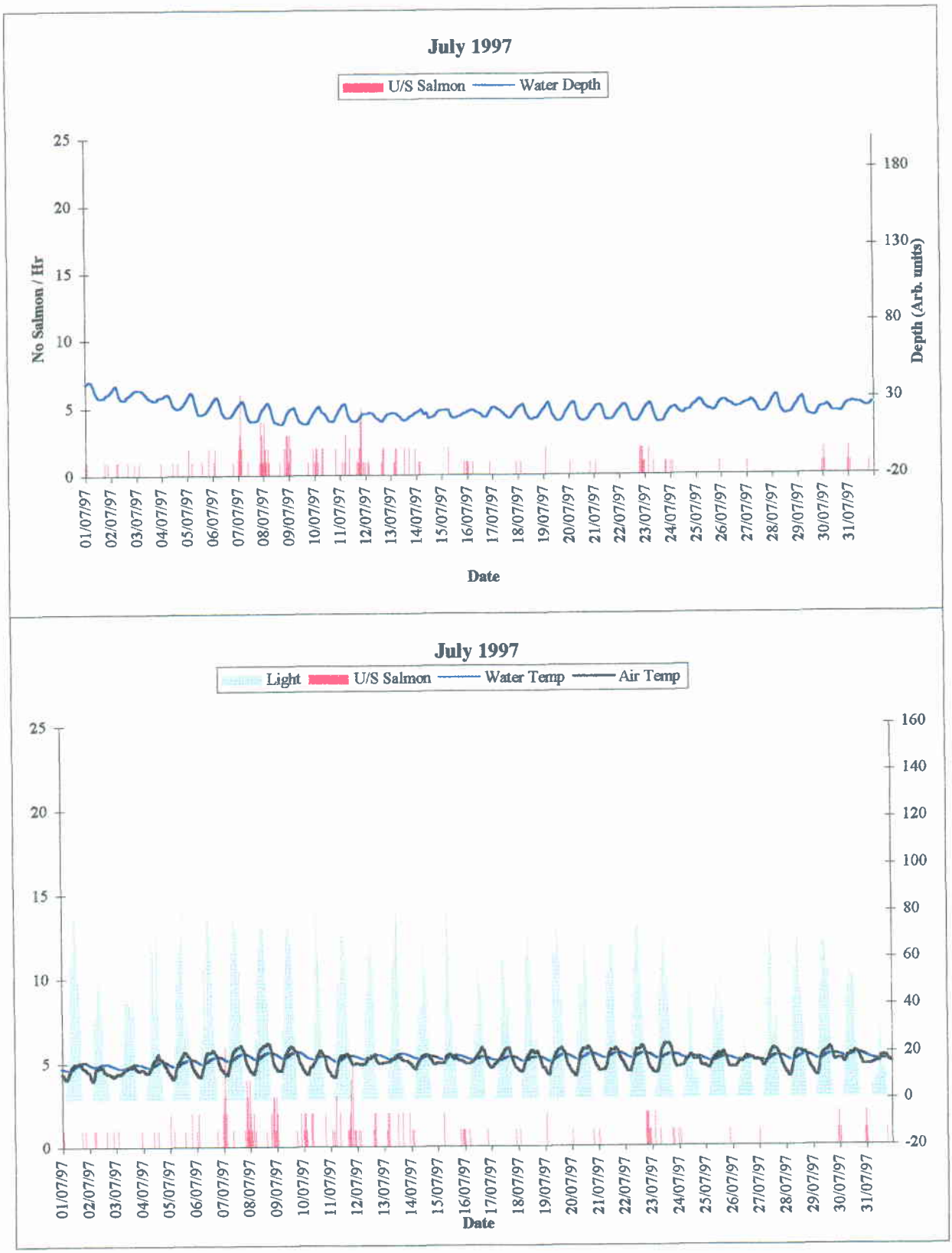
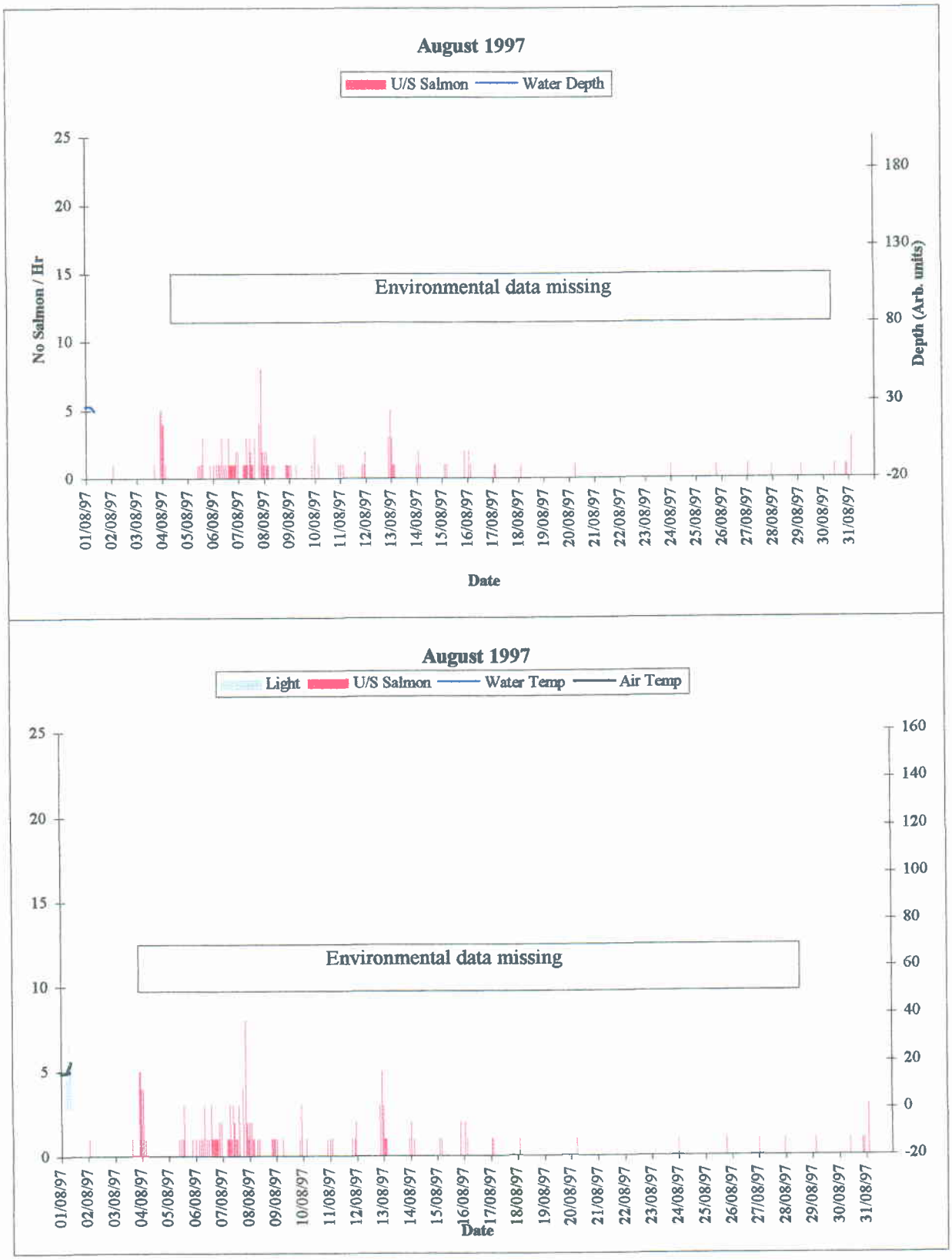

July 1997
U/S Salmon
Water Depth
No Salmon / Hr
Depth (Arb. units)
Date
July 1997
Light
U/S Salmon
Water Temp
Air Temp
Date

Figure 11:



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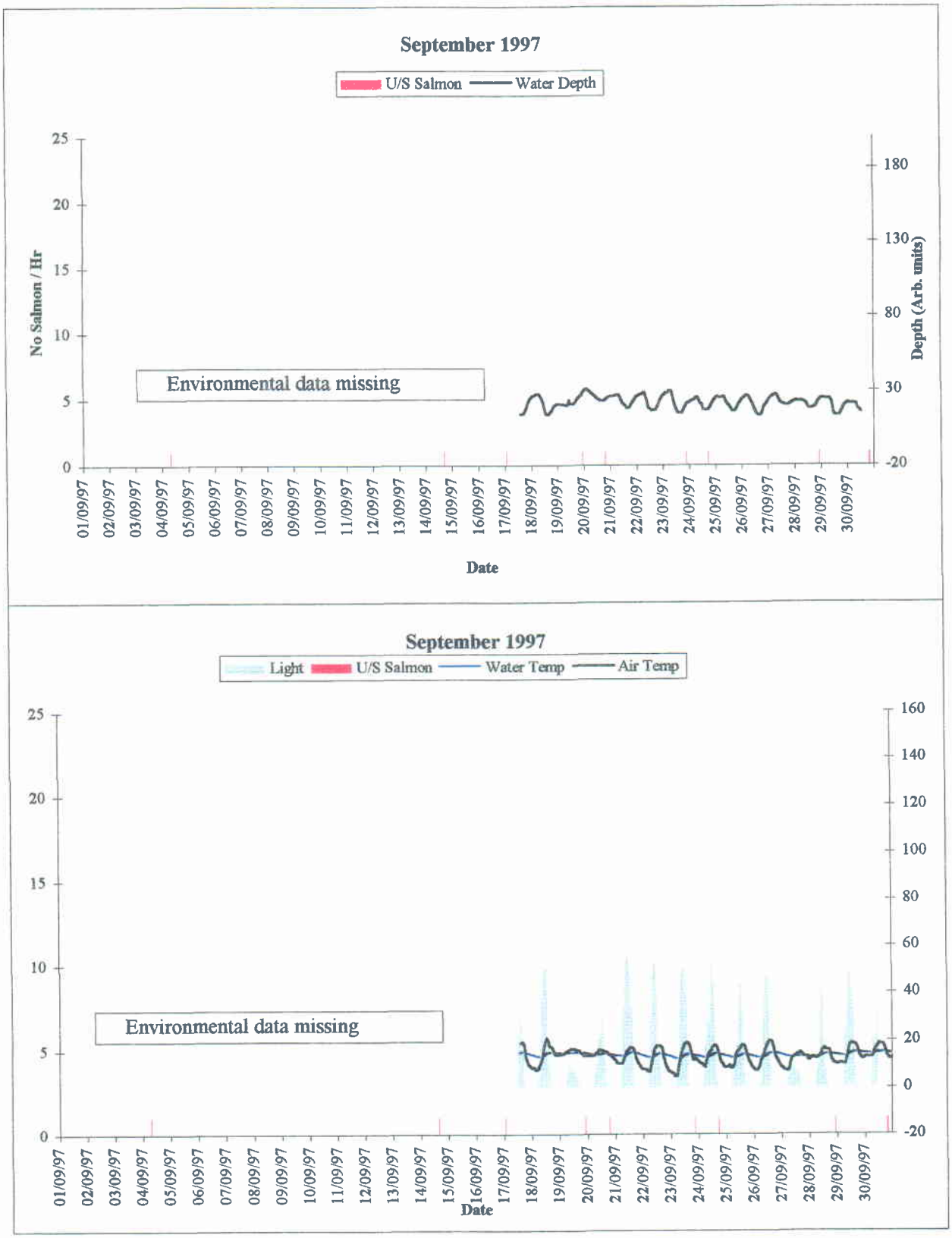

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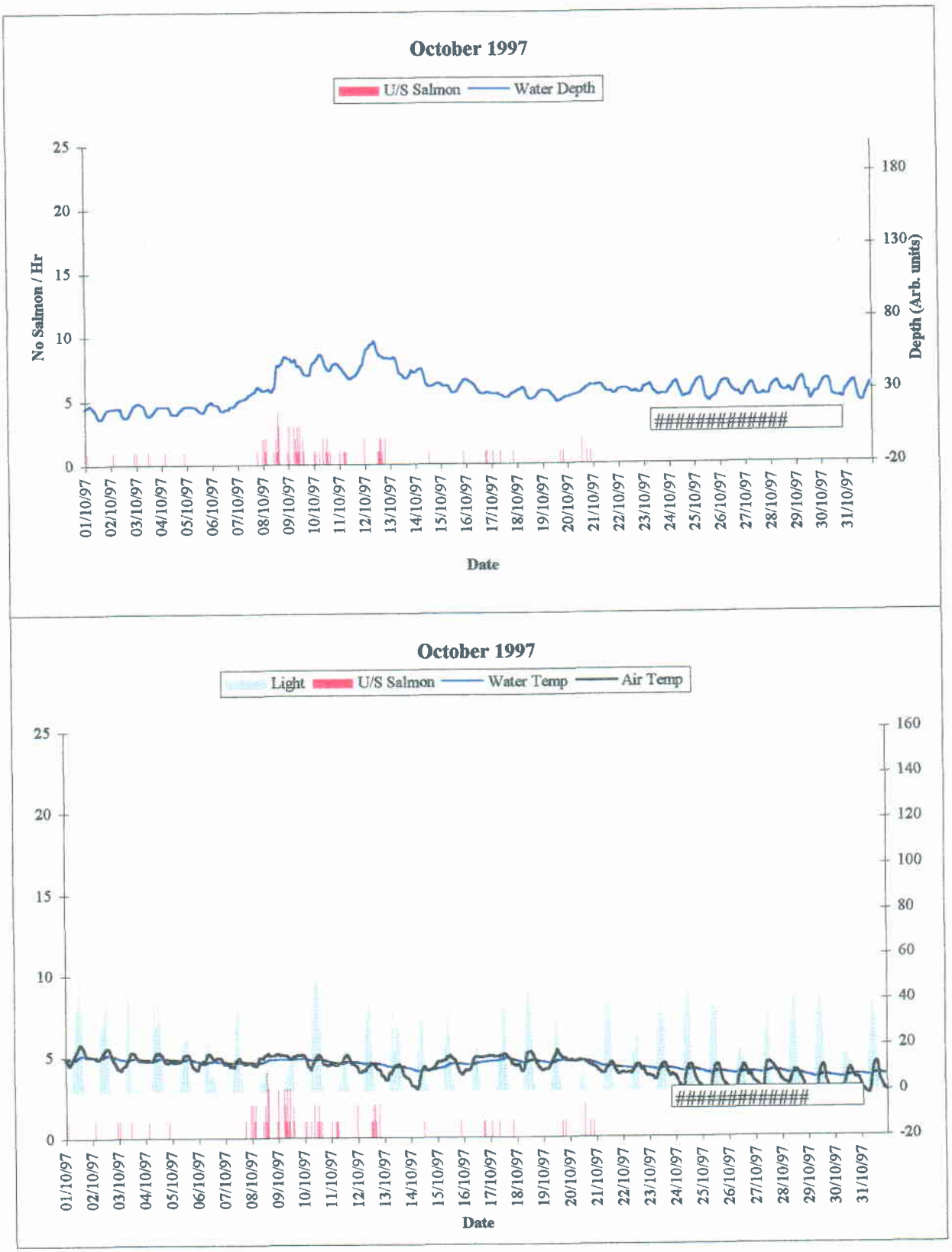

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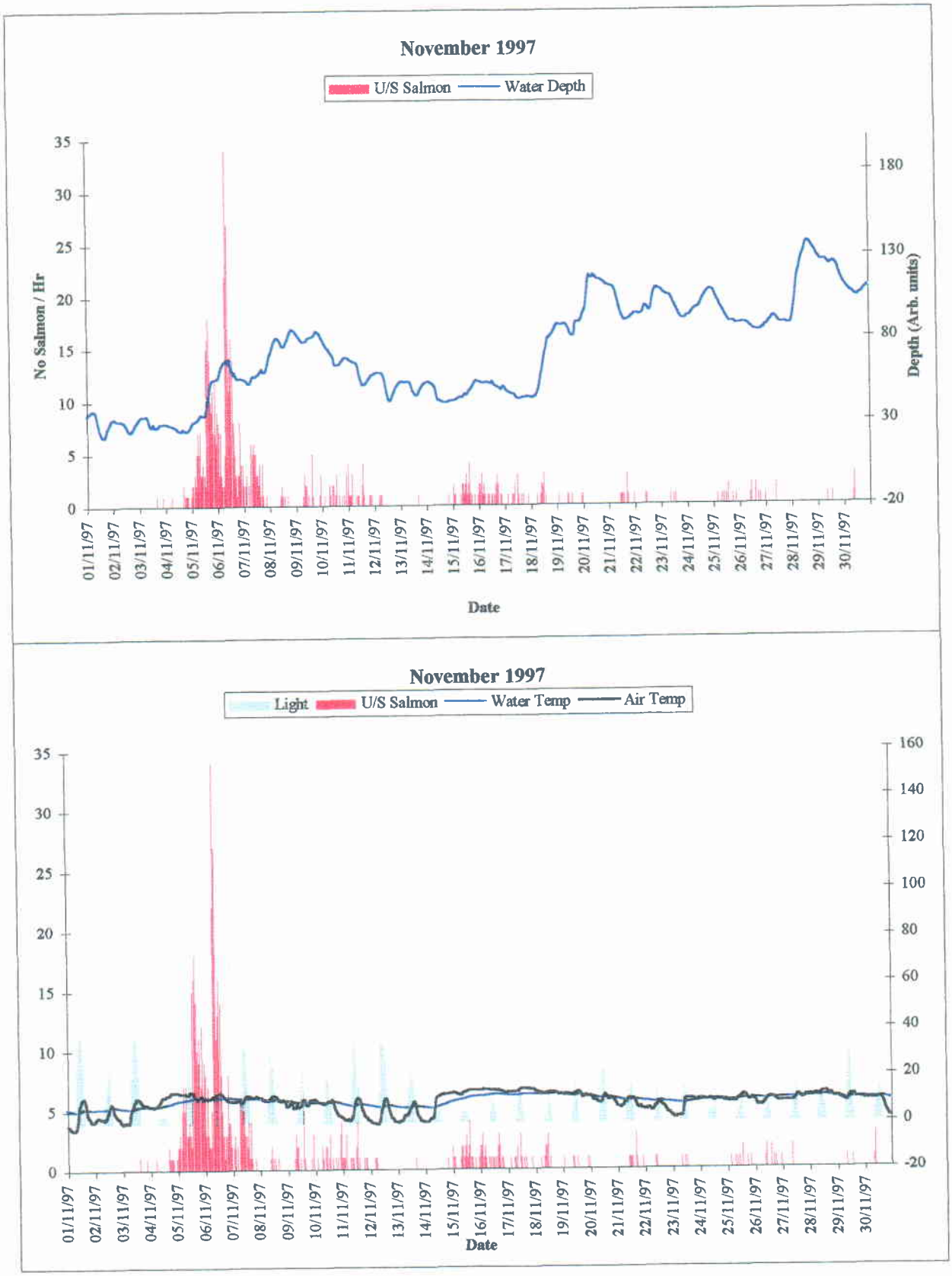
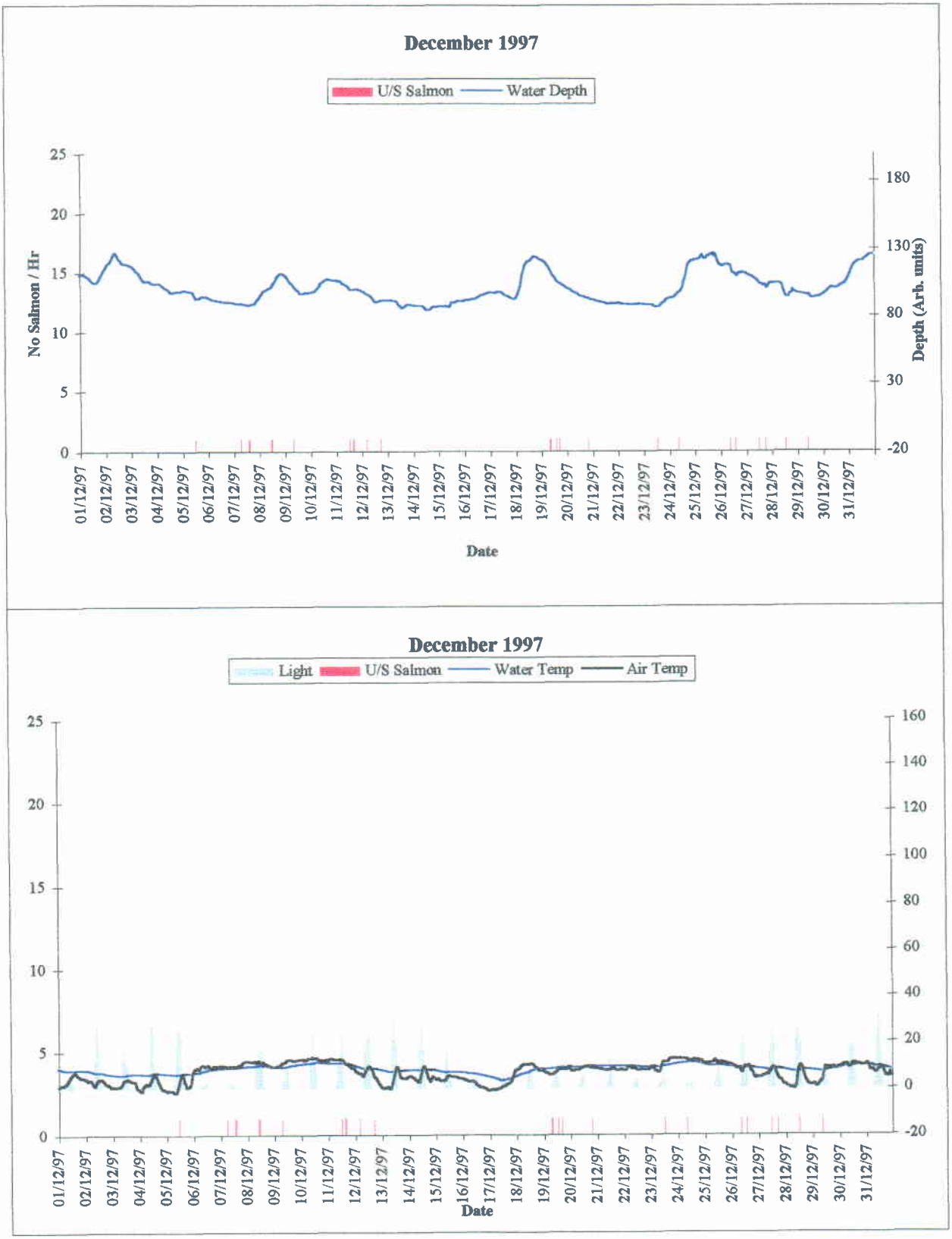

November 1997
U/S Salmon
Water Depth
No Salmon / Hr
Depth (Arb. units)
Date
November 1997
Light
U/S Salmon
Water Temp
Air Temp
Date

Figure 15:



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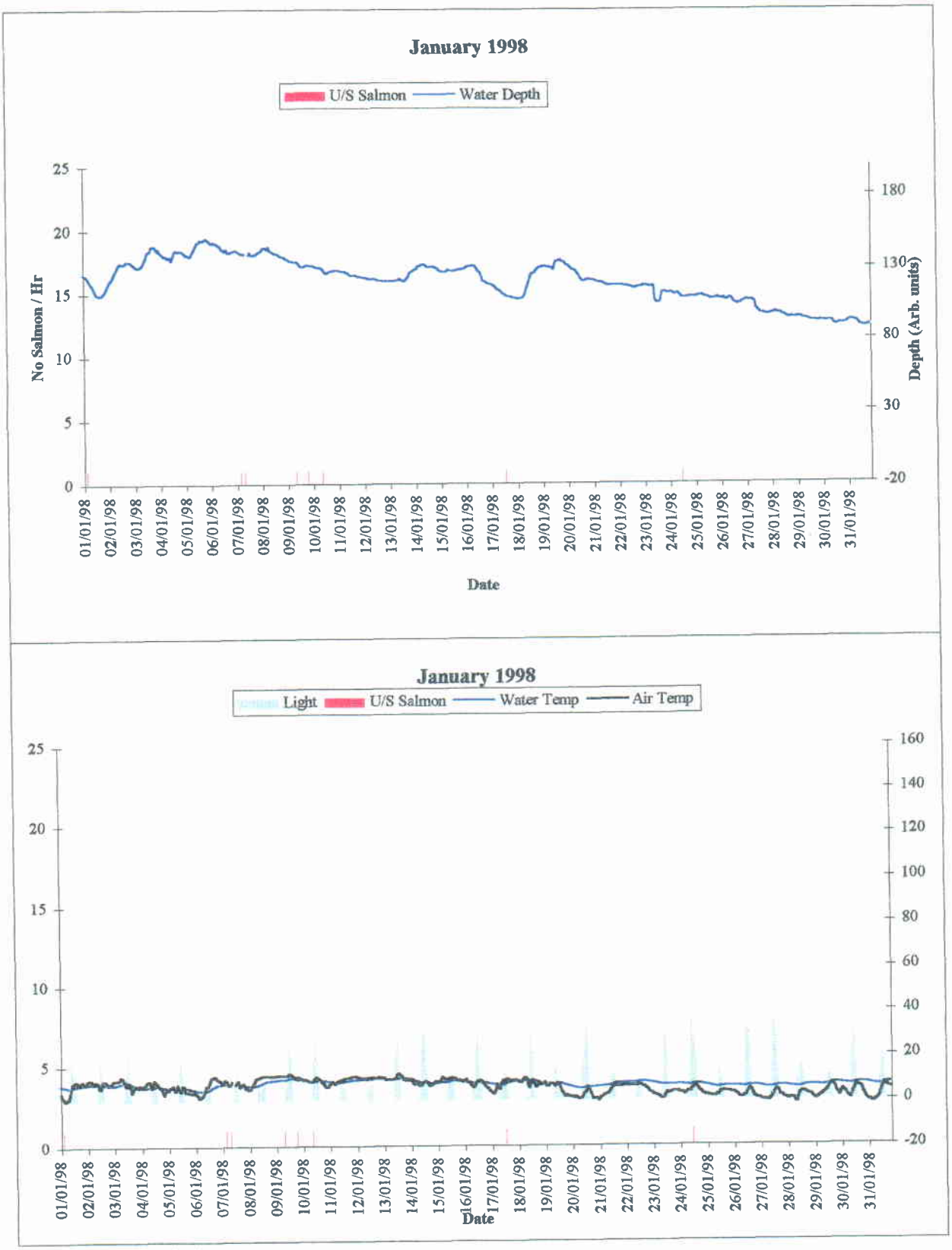

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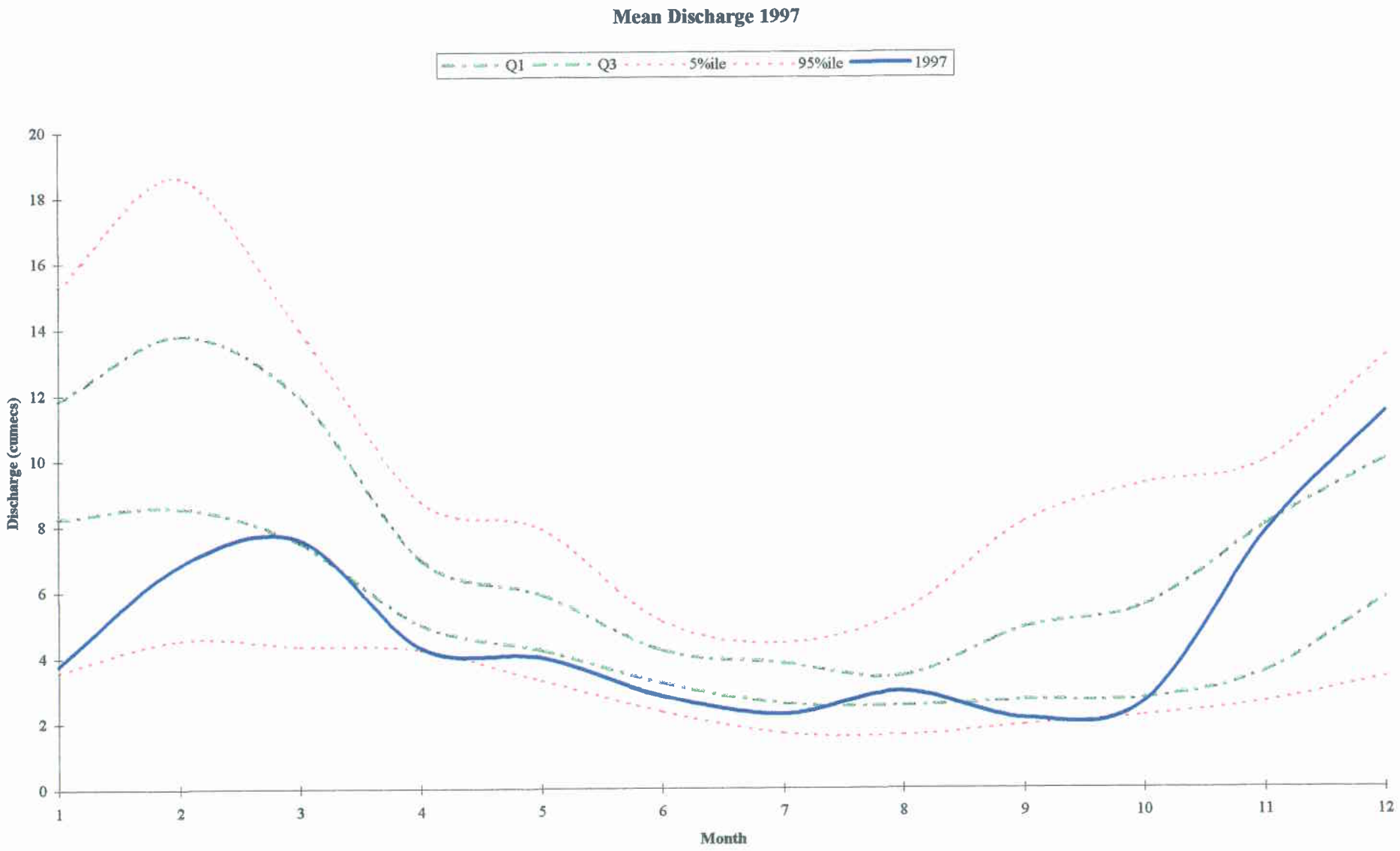
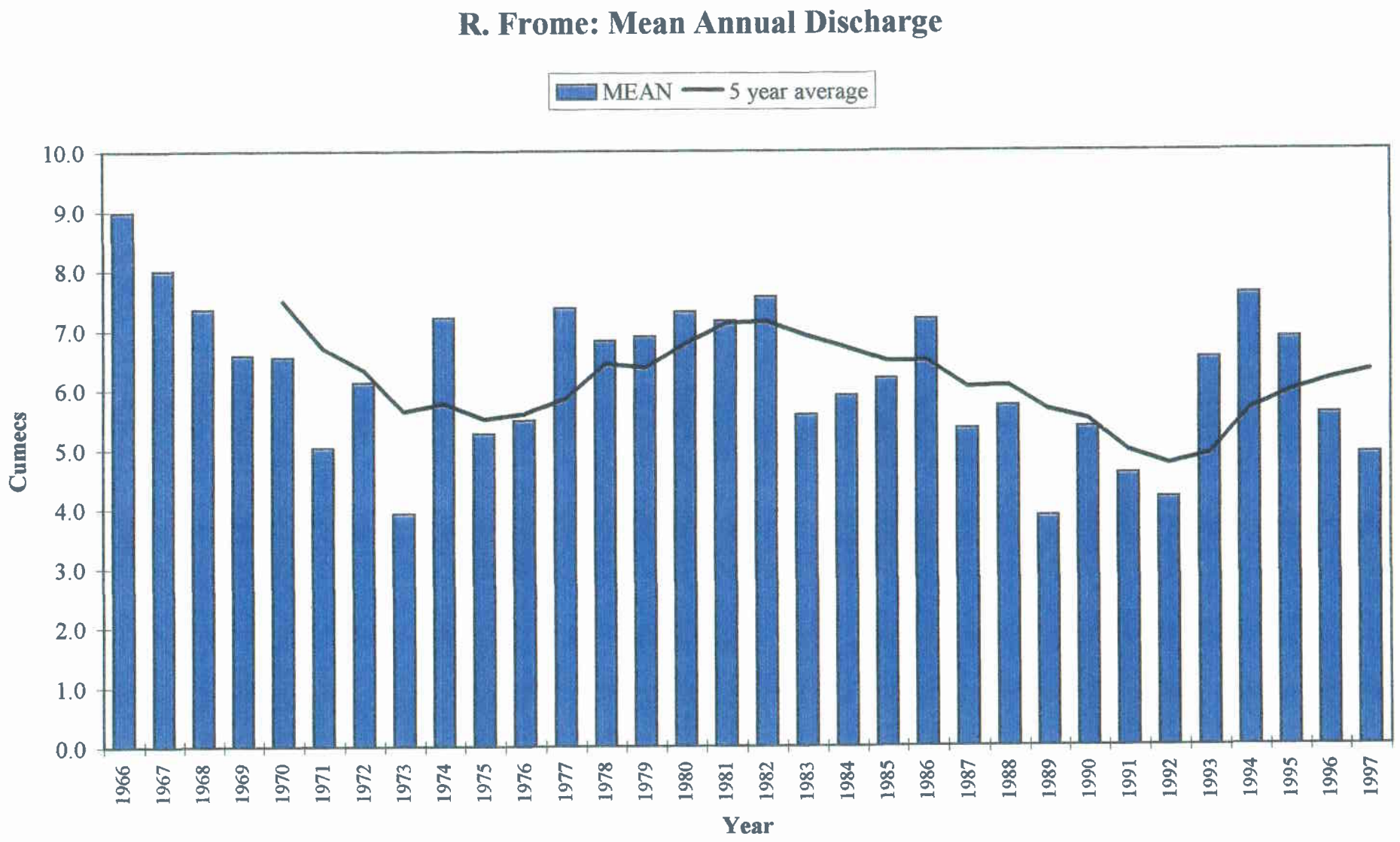

Mean Discharge 1997
Q1
Q3
5%ile
95%ile
1997
Discharge (cumecs)
0
2
4
6
8
10
12
14
16
18
20
1
2
3
4
5
6
7
8
9
10
11
12
Month

Figure 18:


R. Frome: Mean Annual Discharge
MEAN
5 year average
Cumecs
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
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