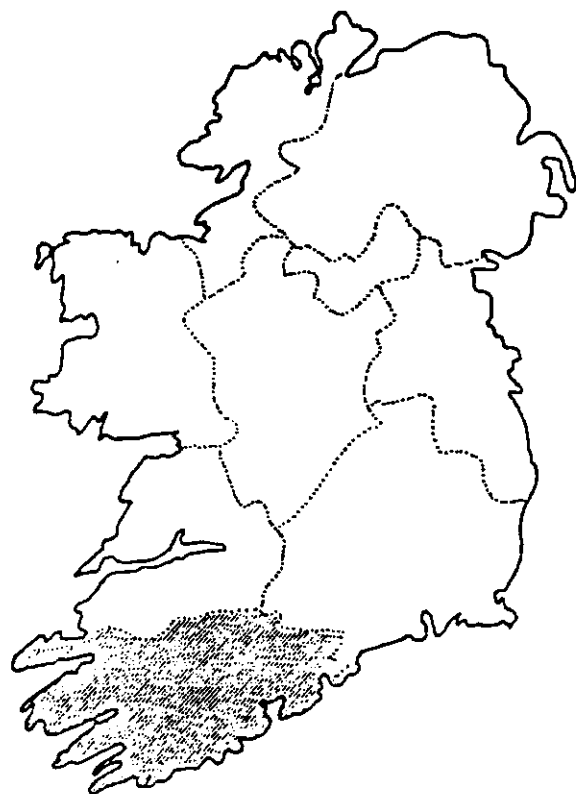


A STATISTICAL ANALYSIS OF RIVER FLOWS



THE **SOUTHERN** WATER RESOURCE REGION

M. MacCárthaigh

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WATER RESOURCES DIVISION

AN FORAS FORBARTHA

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IMPORTANT

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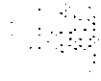
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CHAPTER ONE

INTRODUCTION

Uses of River Flow Information

1.1 Information on the magnitude and frequency of occurrence of river flows is required for various evaluations, both economic and environmental, in relation to such things as water abstractions for domestic and industrial use, the formulation of licence conditions for effluent discharge during low flow, the design of bridges and drainage works and flood prevention and alleviation during flood flows. In order to make these evaluations, flow records covering a considerable length of time must be available. Information is very often required at locations where no gauging has been carried out.

1.2 This publication is designed to provide details of the magnitude and frequency of occurrence of river flows based on records from gauging stations operated by various organisations for diverse purposes. The Office of Public Works operates a large number of gauging stations in connection with arterial drainage and flood alleviation, the Electricity Supply Board operates gauging stations in connection with hydroelectric power generation and Local Authorities operate gauging stations in connection with water supply and pollution control.

1.3 Data on stream flow are obtained by recording the water level at a gauging station on the river and by relating this level to the corresponding rate of flow. The precision of water level measurements and the sensitivity of the site to changes in water level when flow rate varies are factors which govern the accuracy and reliability of the data. Since the main uses of this publication will be in connection with water supply and pollution control, the emphasis is on low river flows. Since 1975, much effort has gone into improving the quality of data at the lower end of the range of river flows in order to produce an accurate estimate of the resource during extreme conditions.

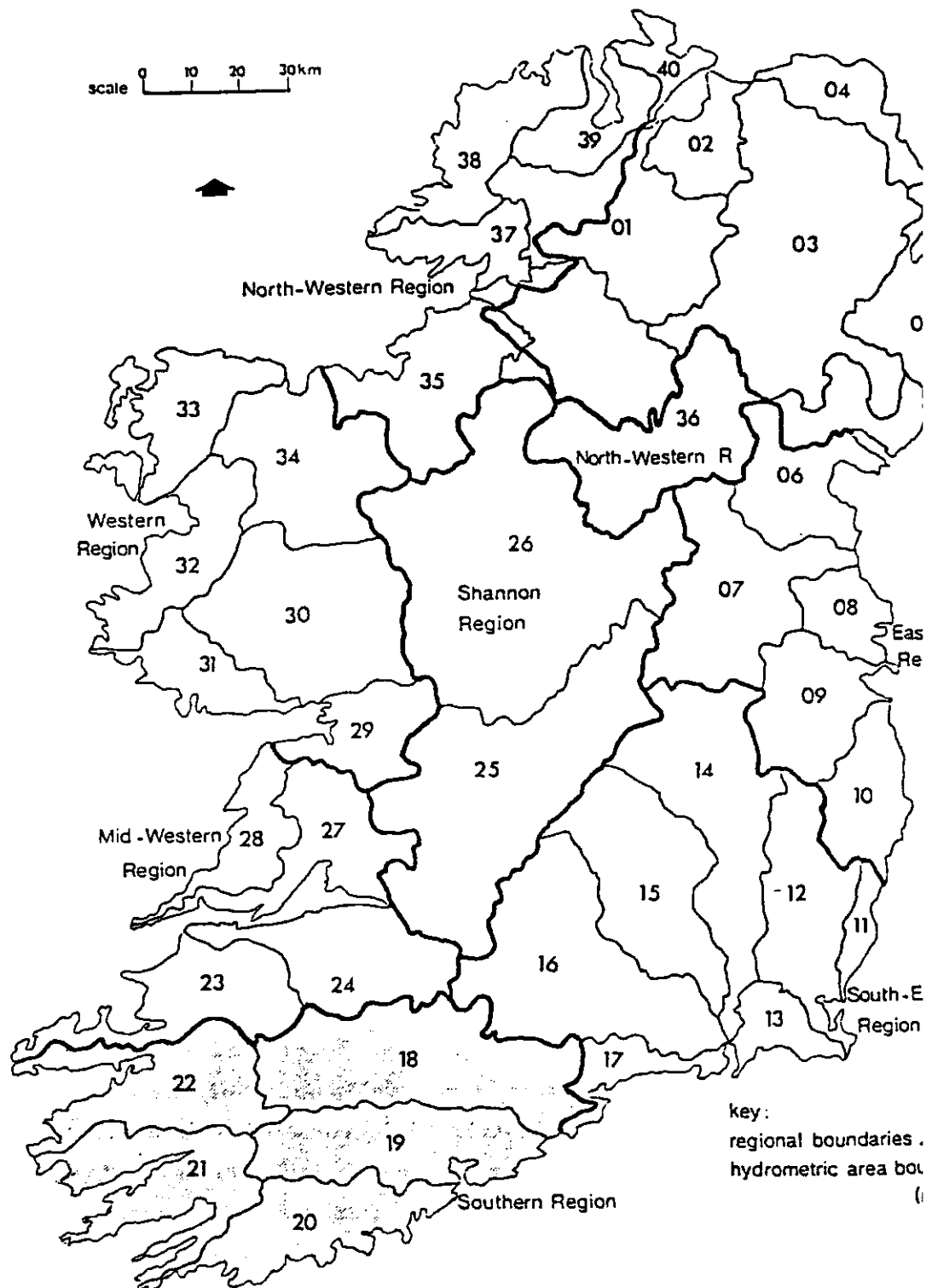


FIG. 1 WATER RESOURCE REGIONS AND HYDROMETRIC AREAS OF IRELAND

Scope

1.4 This publication covers the Southern Water Resource Region, specifically hydrometric areas 18 to 22 inclusive (i.e. the catchment areas of all streams entering tidal waters between East Point, Co. Waterford and Clogher Head, Co. Kerry). This region is shown shaded in Figure 1. Data are presented for selected stations for a stated period of record at the station and for the calendar year 1981. Where available, data for the calendar year 1976 and distribution curves of 7-day sustained low flows plotted on EV1 (Extreme Value Type 1 or 'Gumbel') probability paper are also presented. Extensive flow measurement surveys were carried out in the South during the summer of 1976, 1981, 1983 and 1984 in order to improve the reliability of data analysis and hence the selection of some of these years for detailed study.

1.5 Gauging Stations included in this Publication

Details of the gauging stations referred to are given in Table 1 and the distribution of these stations is shown in Figure 2.

TABLE 1
DETAILS OF GAUGING STATIONS IN THIS PUBLICATION

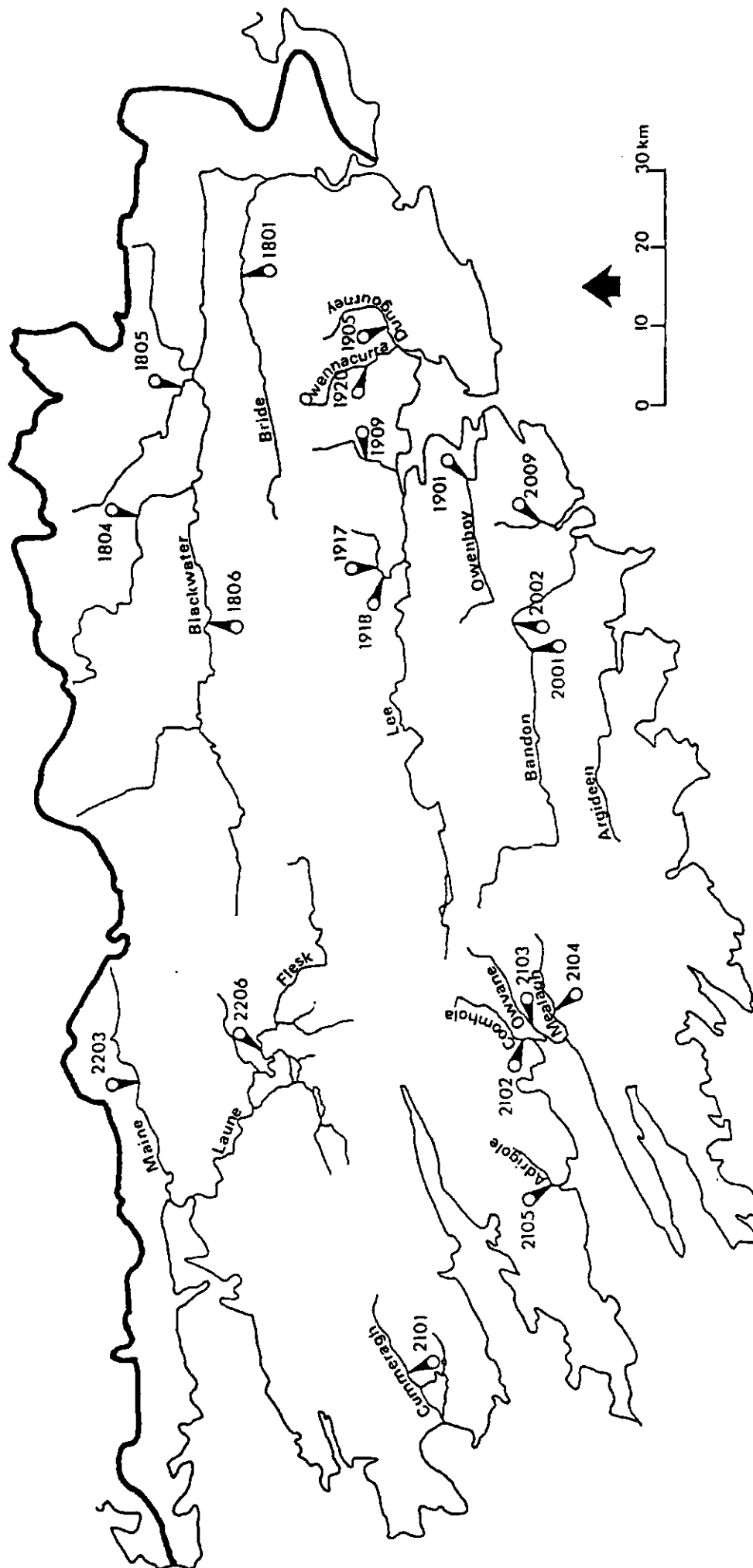
Station	River	Gauge Owner	National Grid Ref.	Area Sq km
<u>BLACKWATER CATCHMENT</u>				
1801 Mogeely	Bride	OPW	W956942	335
1804 Ballynamona	Awbeg	OPW	R656076	324
1805 Downing Br.	Funshion	OPW	R822020	363
1806 CSET Mallow	Blackwater	CSE	W525973	1,058
<u>OWENBOY CATCHMENT</u>				
1901 Ballea	Owenboy	OPW	W709635	106
<u>LEE CATCHMENT</u>				
1917 Bawnnafinny	Blarney	COR	W606754	89
1918 Tower	Shournagh	COR	W726766	160

TABLE 1 (Cont'd.)

Station	River	Gauge Owner	National Grid Ref.	Area Sq km
<u>OWENNACURRA CATCHMENT</u>				
1905 Buckley's Br.	Dungourney	COR	W888737	51
1920 Ballyedmond	Owennacurra	COR	W859766	75
<u>GLASHABOY CATCHMENT</u>				
1909 Brookhill	Butlerstown	COR	W736763	41
<u>BANDON CATCHMENT</u>				
2001 Bandon	Bandon	OPW	W493553	406
2002 Curranure	Bandon	OPW	W528573	431
<u>STICK CATCHMENT</u>				
2009 Belgooly	Stick	COR	W663540	37
<u>CUMMERAGH CATCHMENT</u>				
2101 Cumberagh Weir	Cummeragh	ESB	V546695	18
<u>COOMHOLA CATCHMENT</u>				
2102 Coomhola	Coomhola	COR	V998548	65
<u>OWVANE CATCHMENT</u>				
2103 Ballylickey	Owvane	COR	W010536	75
<u>MEALAGH CATCHMENT</u>				
2104 Inchiclough	Mealagh	COR	W027511	46
<u>ADRIGOLE CATCHMENT</u>				
2105 Adrigole	Adrigole	COR	V812506	27
<u>MAINE CATCHMENT</u>				
2203 Riverville	Maine	OPW	Q923063	272
<u>LAUNE CATCHMENT</u>				
2206 Flesk	Flesk (Laune)	ESB	V970892	325

COR = Cork County Council
OPW = Office of Public Works

ESB = Electricity Supply Board
CSE = Comhlucht Siuicre Eireann



DISTRIBUTION OF SELECTED GAUGING STATIONS

CHAPTER TWO

MEASURES OF LOW FLOW

2.1 Definition of Terms

Daily Mean Flow	The mean of instantaneous discharges throughout a 24-hour period.
Surface Runoff	Surface Runoff is that water which travels over the ground surface to a channel and which does not contribute to baseflow.
Base-flow	Base flow is the contribution to stream flow from groundwater.
Dry Weather Flow Rate (DWF)	The annual minimum daily mean flow with a probability of exceedance of 0.98 (i.e. with a return period of 50 years).
95-Percentile Flow Rate	The daily mean flow with a probability of exceedance of 0.95 in the long-term.
N-Day Sustained Low Flow Rate	The lowest daily mean flow rate which is exceeded for N consecutive days in a given year.

The DWF and N-day sustained low flow rates of a given return period may be computed from the series of annual values of these statistics.

Low Flow

2.2 River flow is comprised of a) surface runoff from precipitation, and b) base-flow derived from groundwater storage. During a period of drought, when river flows decrease, the proportion of flow arising from

runoff decreases. In the absence of rainfall, the magnitude of the baseflow component also continues to decrease with time, but at a diminishing rate. At the end of a long period of drought, the river flow may be attributed totally to baseflow with no effective contribution from surface runoff. Depending upon the length of the drought period and the antecedent aquifer condition, a range of extreme low flow rates may be experienced.

Minimum Flow

2.3 A low flow condition which is clearly of importance is the lowest flow ever experienced. This condition is not easily defined, but in the south it must be very similar to that experienced immediately before the end of the drought in 1975 or 1976. The minimum flow is therefore an unusual event. The Dry Weather Flow is defined as the annual minimum daily mean flow rate with a return period of 50 years.

Ninety-five Percentile Flow

2.4 Where pollution control is concerned, interest is more often centred on low flows of a more common occurrence. The practice in relation to the effects of an effluent discharge is that computation is based on detailed hydrometric data, the critical flow being that which is exceeded at least 95% of the time (or, on average, on all but 18 days per annum). This measure of flow is sensitive to the length of record. It is considered, however, that with 10 or 12 years of record results are stable. Unfortunately, many flow records are currently of less than 10 years duration.

Sustained Low Flows

2.5 Another measure of low flow is the 7-day sustained low, i.e. the lowest flow which is not exceeded for 7 consecutive days in any year. This can be represented by its expected value, the average of the annual

series of minimum 7 consecutive day flows (and can be thought of as the driest week in the average summer) or by the 7-day S.L.F. with a specified probability of recurrence (e.g. the 7-day S.L.F. with a return period of 10 or 15 years). At the end of a long period of drought, the daily variation in the rate of river flow is so small that 7-day S.L.F. values tend, in dry years, to merge with the minimum flow values. It is not practicable to measure and record these very small variations with precision and thus to separate the minimum flow value from the 7-day S.L.F. value.

NOTE: The 7-day sustained low flow values are computed from the sequence of daily mean flows. For each year the series of overlapping 7-day periods is inspected and the maximum daily mean flow value occurring during each period is determined. The 7-day period with the minimum of such upper limits constitutes the driest week in the year while the maximum flow during this week constitutes the 7-day sustained low flow value for the year in question.

In this publication an extreme value distribution, specifically the Type 1 distribution (EV1) has been fitted to annual 7-day sustained low flow values by the method of maximum likelihood. The relationship between the reduced variate y of the EV1 distribution and the 7-day sustained low flow rates of specific return periods is expressed algebraically as given below. The advantage of fitting such a distribution is that flow may be expressed as a linear function of the reduced variate y thus permitting a more simplified analysis to be carried out.

In plots of these distributions shown later, the annual 7-day sustained low flow rates are expressed in terms of their mean. There is one scale for ordinates - values of 7-day sustained low flow - and two scales for abscissae - one for probability of exceedance (P) and one for return period in years (T). On the ordinate scale, the annual values of the 7-day sustained low flow are shown as multiples of the mean annual S.L.F. value.

T and P are related by:-

$$P = (T - 1)/T \dots\dots (1)$$

or $T = 1 / (1-P) \dots\dots (2)$

The EVI (Gumbel) distribution is specified as follows:-

	Let x = flow rate
then	y (reduced variate) = $(x - U)/a \dots\dots(3)$
where	U is a location parameter, and a is a scale parameter.
from (3)	$x = U + ay$
	P (Prob. of exceedance) = $\exp(-\exp(-y)) \dots\dots(4)$
or	$y = -\ln(-\ln(P)) \dots\dots (5)$
	from (1) and (5)
	$y = -\ln(-\ln((T - 1)/T))$

(The shape of the fitted EVI distribution depends upon the skewness of the sample data).

Plot y - Gumbel distrib vs S.L.F

CHAPTER THREE

ANALYSIS OF DATA

Low Flow Analysis

3.1 This chapter contains a short analysis of low flow data. The analysis comprises comparisons of the various measures of low flow, magnitude and probability of occurrence.

Minimum Flow

3.2 Within the Southern Water Resources Region, one of the stations examined, Station 2101 Cummeragh has a record length of 43 years and is operated by the Electricity Supply Board. Records commenced at station 2103 Ballylickey, a station operated by Cork County Council, in July 1976. The remaining stations included in Table 2 are operated by the Office of Public Works. The analysis at these latter stations was confined to the available processed results post-1972, or post-1971 in the case of 2203 Riverville.

3.3 At the 8 stations included in Table 2 the lowest flow occurred in the years 1975 or 1976. When the analyses of records for Station 2101 Cummeragh is restricted to the period 1972-1986, the 1976 low flow appears to have a return period of 25 years, of the same order as that computed for those stations for which only a short record is available. However when the records at Station 2101 Cummeragh are examined for the period 1943-1986, the return period of the 1976 low flow is estimated at 77 years. The catchment area to Station 2101 Cummeragh, at 46.6 km^2 , is small in comparison to the other stations included in Table 2, and because of the presence of lakes in the catchment it would not be a good representative catchment for comparison purposes. However, it can be inferred that the 1975/76 low flows in this area could have a return period of up to 50 years.

TABLE 2

Table of (a) 95-Percentile Flow Values and (b) 7-Day Sustained Low Flows

with Return Periods of 15 Years*

Expressed as a Multiple of the Dry Weather Flow Rate

Station No.	Location	River	Area sq km	Period of Record	Years of Record Used	Min. DMF in Period		Return Period Years	95%tile Flow	7-Day SLF with 15 Year Return Period Expressed in Terms of Qm
						Qm	$\frac{3}{m}$ /s		Expressed in Terms of Qm	
<u>BLACKWATER CATCHMENT</u>										
1801	Mogeely	Bride	335	75 - 85 -	11	0.52	20.2	1.6	1.3	
1804	Ballynamona	Awbeg	324	72 - 82 ✓	11	0.69	20.2	1.7	1.1	
1805	Downing Br	Funshion	363	72 - 82 ✓	11	1.3	20.2	1.5	1.1	
<u>BANDON CATCHMENT</u>										
2001	Bandon	Bandon	406	72 - 82 ✓	11	0.51	20.0	2.1	1.3	
2002	Curranure	Bandon	431	75 - 82 ✓	8	0.55	14.8	2.3	1.3	
<u>CUMMERAGH CATCHMENT</u>										
2101	Cummeragh Weir	Cummeragh	47	43 - 86 -	43	0.17	25.0*	2.9	1.2*	
<u>OWVANE CATCHMENT</u>										
2103	Ballylickey	Owvane	75	76 - 85 -	9	0.04	16.5	3.3	1.2	
<u>MAINE CATCHMENT</u>										
2203	Riverville	Maine	272	71 - 81 /	11	0.45	20.2	1.8	1.1	

* Note: For Comparison Purposes the Return Period and the 7-day SLF data for Station 2101 Cummeragh are based on data for the period 1972-1986.

Ninety-five Percentile Flow and 7-Day SLF

3.4 The relationships between the lowest daily mean flow rate in the period of record (assumed equal to the Dry Weather Flow) and:-

- (a) the 95-percentile flow rate,
- (b) the 7-day SLF with return period of 15 years*

were examined for the gauging stations listed in Table 2. This table shows the 95-percentile flow rate and the 7-day SLF as multiples of the estimated Dry Weather Flow rate for selected stations.

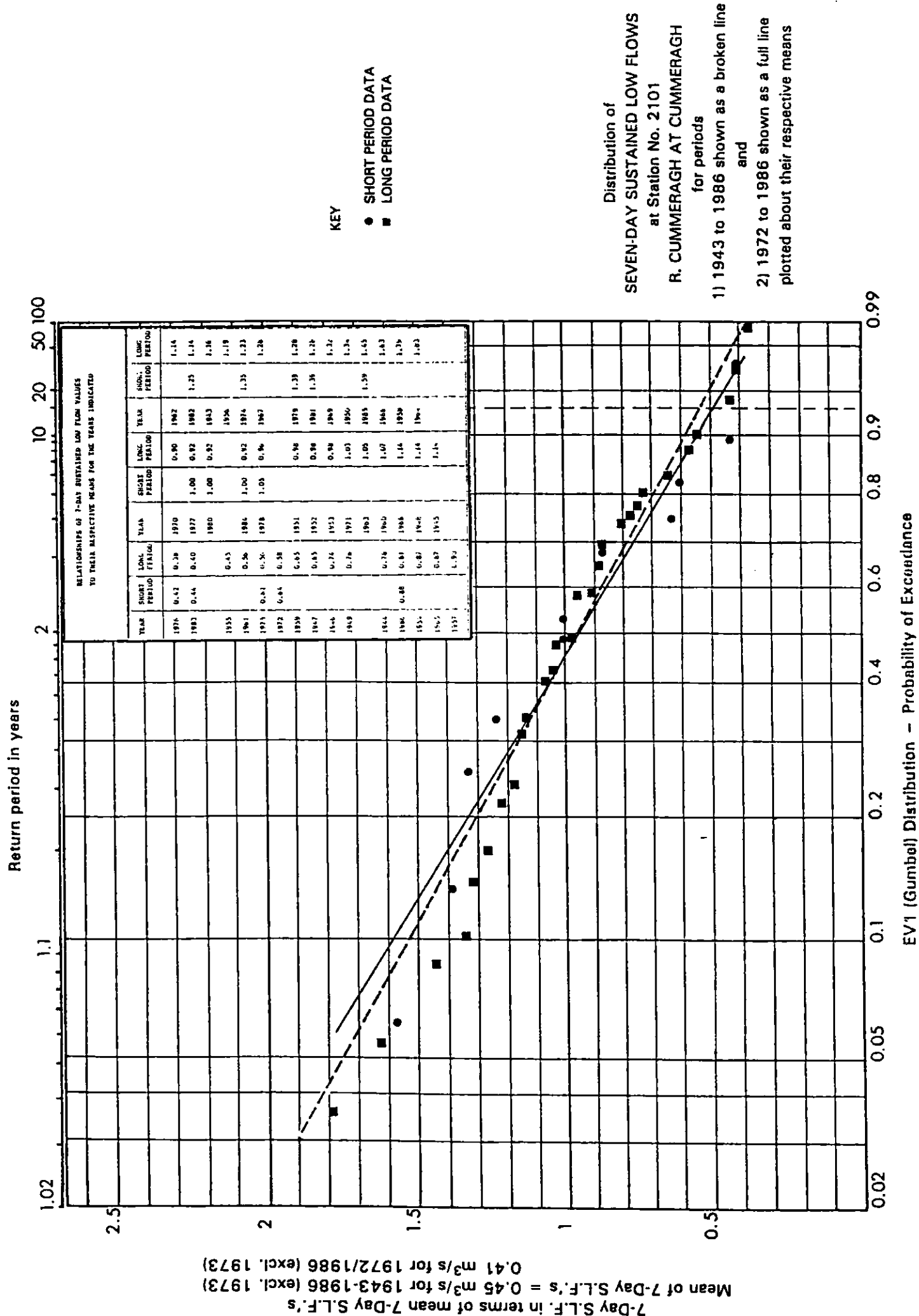
3.5 It can be seen from Table 2 that the 95-percentile flow (Q95) varies between 1.5 and 3.3 times the estimated Dry Weather Flow (Qm) and that the 7-day sustained low flow with a 15-year period (Q7d) is within the range of 1.1 to 1.3 times Qm.

3.6 In general the 95% flow rate is about twice the dry weather flow rate.

Relationship of Return Period to Length of Record:

3.7 Figure 3 shows plots of the distribution of the annual series of 7-day sustained low flows for Station 2101 Cummeragh. The plot contains two lines, one based on data for the full period of record and the other on data for the period 1972-1986. The flow values are shown as proportions of the mean of the values for the 14 years of record (in the case of 1972-1986) or 43 years of record (in the case of 1943-1986). Data for 1973 was not included in either case as there were large gaps in the record in 1973. The plotting positions were obtained from Table 1.16, Volume 1 of the Flood Studies Report, NERC (1977) and may also be estimated by Gringorten (1963). A scale for the expected return period (in years) of the flows plotted here is shown along the upper border of the plot. In the case of Station 2101 Cummeragh the lowest flow occurred in 1976. The effect of having differing lengths of record on the shape of

* The 7-day SLF with a return period of 15 years has been estimated by interpolation in the EVI plot of annual 7-day SLF values. The return periods of specific 7-day SLF rates can be estimated from the EVI plot presented later.



COMPARISON OF SHORT AND LONG-TERM PLOTS OF 7-DAY LOW FLOWS

the distribution curve and on the estimated return period of the lowest value may be seen from the plots in Figure 3. As the period of record increases, irregularities in the plot tend to be smoothed out. It should be noted that the estimated return period of the lowest flow depends upon the length of record and increases from approximately 25 years with 14 years of record to approximately 77 years with 43 record years available.

NOTE: LONG AVERAGE RAINFALL AND MEAN FLOW RATE

The long average rainfall was based on an isohyetal contour map (1941 - 1970) prepared by the meteorological service. The mean flow rate is the average of the annual flow rates for a stated period of record and is expressed in m^3/s and in mm/yr on the catchment. At a number of stations discrepancies were observed between values as computed for the long average rainfall and the mean flow rate and these merit further investigation, e.g. Station 2102 Coomhola.

CHAPTER FOUR

PRESENTATION OF DATA

Introduction

4.1 Data on low flow in the Southern Region are presented in station number order. In particular, data are provided on:

- a) mean rainfall,
- b) mean flow rates,
- c) extreme flow rates,
- d) tables of exceedance percentiles (from which 95% flow rates may be abstracted),
- e) flow-duration curves, and
- f) sustained low flow values.

These data are presented to provide users of river flow data having various differing requirements with a source of information suited to their particular needs. The data is presented with two or four A4 sheets per station, labelled Sheet A, B, C and D. Details of the format of each sheet are given hereunder.

Content of Data Sheets

4.2 In the following:

mean flow rates are the average of the daily mean flow values over the stated period of record;

extreme flow rates are expressed as the lowest and highest recorded daily mean flow in the stated period of record; (in some cases lower flows have been gauged and where applicable these are also shown);

the tables of exceedance percentiles show the daily mean flow rate which was equalled or exceeded for the given percentage of days in the stated period;

flow-duration curves are log-normal plots of exceedance percentiles.

distribution plots of 7-day sustained low flows are log-EV1 plots of the exceedance probabilities of 7-day low flows for a stated period.

Format of Data Sheets

4.3 The following data are presented for each station:

SHEET A - DATA FOR A STATED PERIOD OF RECORD

1. Station Number.
2. Station and river names.
3. Body Responsible
4. National Grid Reference of station.
5. Catchment area (km^2) to station.
6. Long average rainfall 1941-1970 (mm/yr) based on isohyeta contour maps prepared by the Meteorological Service.
7. Stated period of record (calendar years).
8. Mean flow rate (m^3/s and equivalent in mm rain/yr) for the stated period of record.
9. Minimum and maximum daily mean flow rates (m^3/s) and the dates of occurrence.
10. Table of exceedance percentiles for the stated period of record.

11. Flow-Duration Curve for the stated period of record based on the table of exceedance percentiles.

SHEET B - DATA FOR 1981

12. Table of 3-, 7-, 15- and 30-day sustained low flows for the calendar year 1981.
13. Table of the means of annual values of 3-, 7-, 15- and 30-day sustained low flows for the stated period of record.
14. Table of exceedance percentiles for the calendar year 1981.
15. Flow Duration Curves for the stated period of record and for the calendar year 1981 based on the tables of exceedance percentiles.

SHEET C (SUPPLEMENT) - DATA FOR 1976

Where information for the calendar year 1976 is available, the following data are included:-

16. Table of 3-, 7-, 15- and 30- day sustained low flows for the calendar year 1976.
17. Table of minima of annual values of 3-, 7-, 15- and 30-day sustained low flows for the stated period of record.
18. Table of exceedance percentiles for the calendar year 1976.
19. Flow-Duration Curves for the stated period of record and for the calendar year 1976.

SHEET D (SUPPLEMENT) - DISTRIBUTION OF 7-DAY SUSTAINED LOW FLOWS

Where information is available, a fourth page is added containing a plot of the annual values of 7-day sustained low flows for a stated period of record on EV1 (Gumbel) paper.

In this plot sustained low flows are expressed in terms of the mean of the annual sustained low flow values. In the ordinate scale, the annual values of the 7-day Sustained Low Flows are shown as multiples of the mean annual SLF value. For the abscissa there are two scales, one showing probability of exceedance (P) and one for return period in years (T).

STATION DATA

BRIDE at MOGEELY

Body Responsible: OPW

N. G. R.: W 956 942

Catchment Area to Station: 335.0 sq km
 Long Average Rainfall [1941-1970]: 1202 mm/yr

Data based on continuous water level records for the period :
 1-Jan-75 to 31-Dec-85

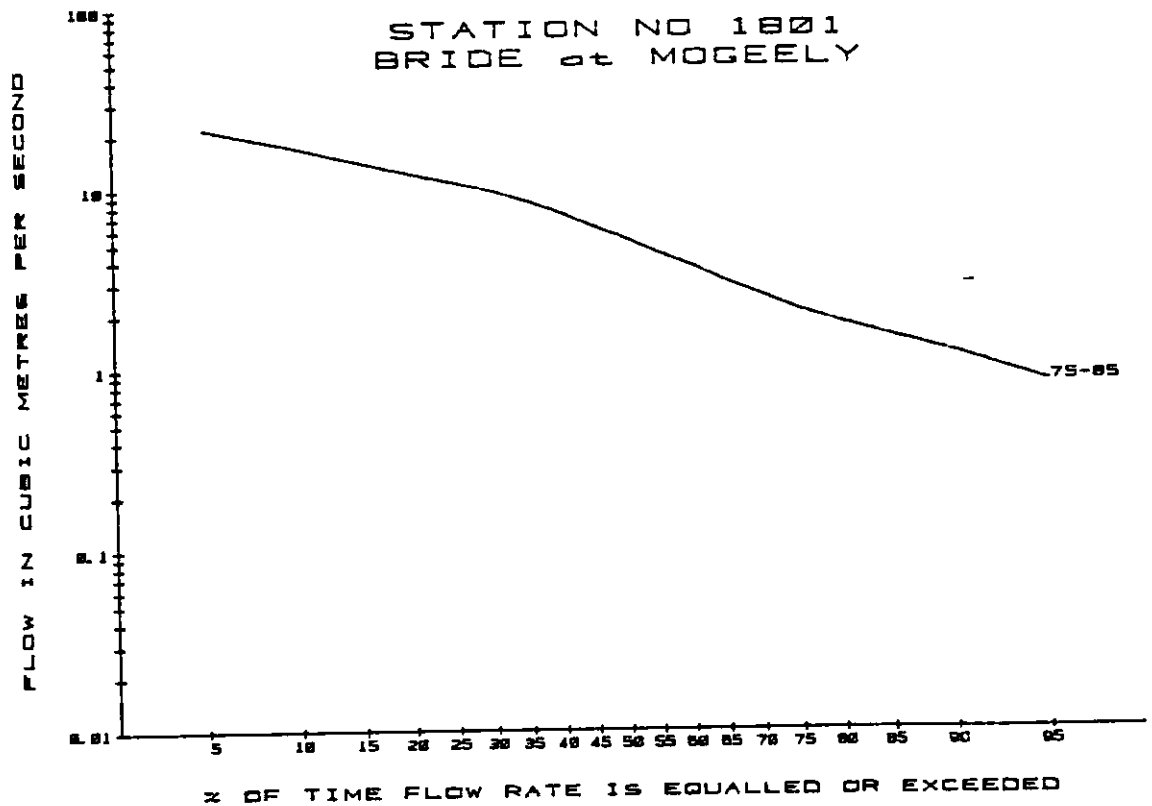
Mean Flow Rate: 7.65 [720 mm/yr rainfall on catchment]

Daily Mean Flows: minimum 0.520 on 18-Sep-76
 maximum 62.60 on 23-Oct-75

TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	22.00	30%	9.72	75%	2.08
10%	17.10	40%	7.25	80%	1.77
15%	14.10	50%	5.20	85%	1.49
20%	12.20	60%	3.69	90%	1.21
25%	10.82	70%	2.53	95%	0.83

** All flow rates above are in cubic metres per second. **



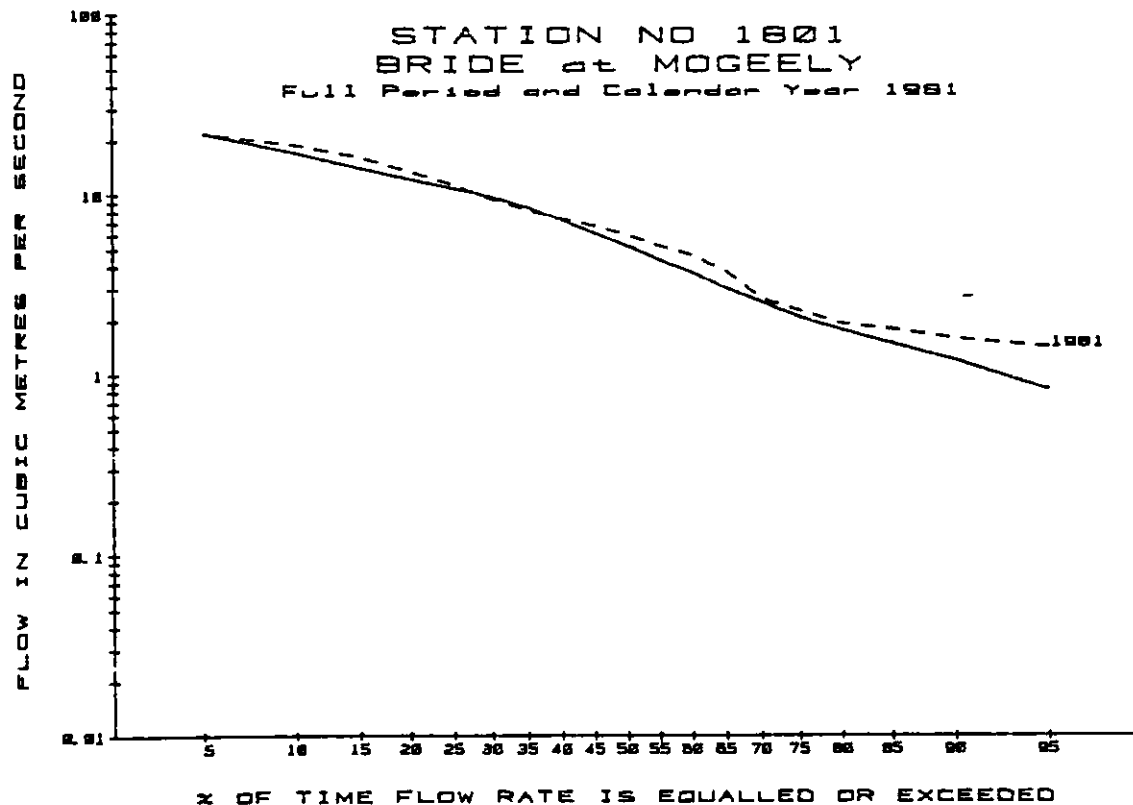
BRIDE at MOGEEELY

Data based on continuous water level records for the period :
1-Jan-75 to 31-Dec-85

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	1.235	1.340	1.53	1.71	
1975-1985	1.134	1.230	1.43	1.74	[Average]

TABLE OF EXCEEDANCE PERCENTILES					
Year 1981 Only					
5%	22.00	30%	9.39	75%	2.27
10%	18.90	40%	7.35	80%	1.92
15%	16.20	50%	5.97	85%	1.79
20%	13.40	60%	4.61	90%	1.60
25%	11.35	70%	2.65	95%	1.42

** All flow rates above are in cubic metres per second. **



BRIDE at MOGEELY

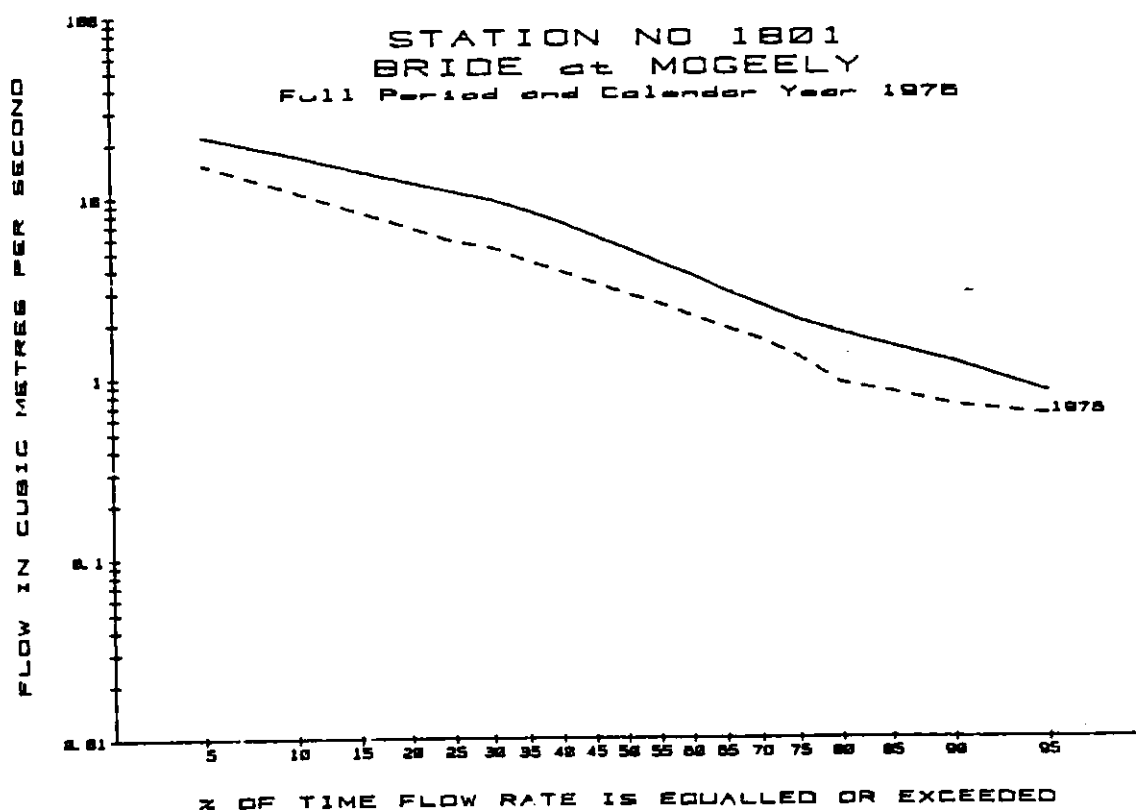
Data based on continuous water level records for the period :
1-Jan-75 to 31-Dec-85

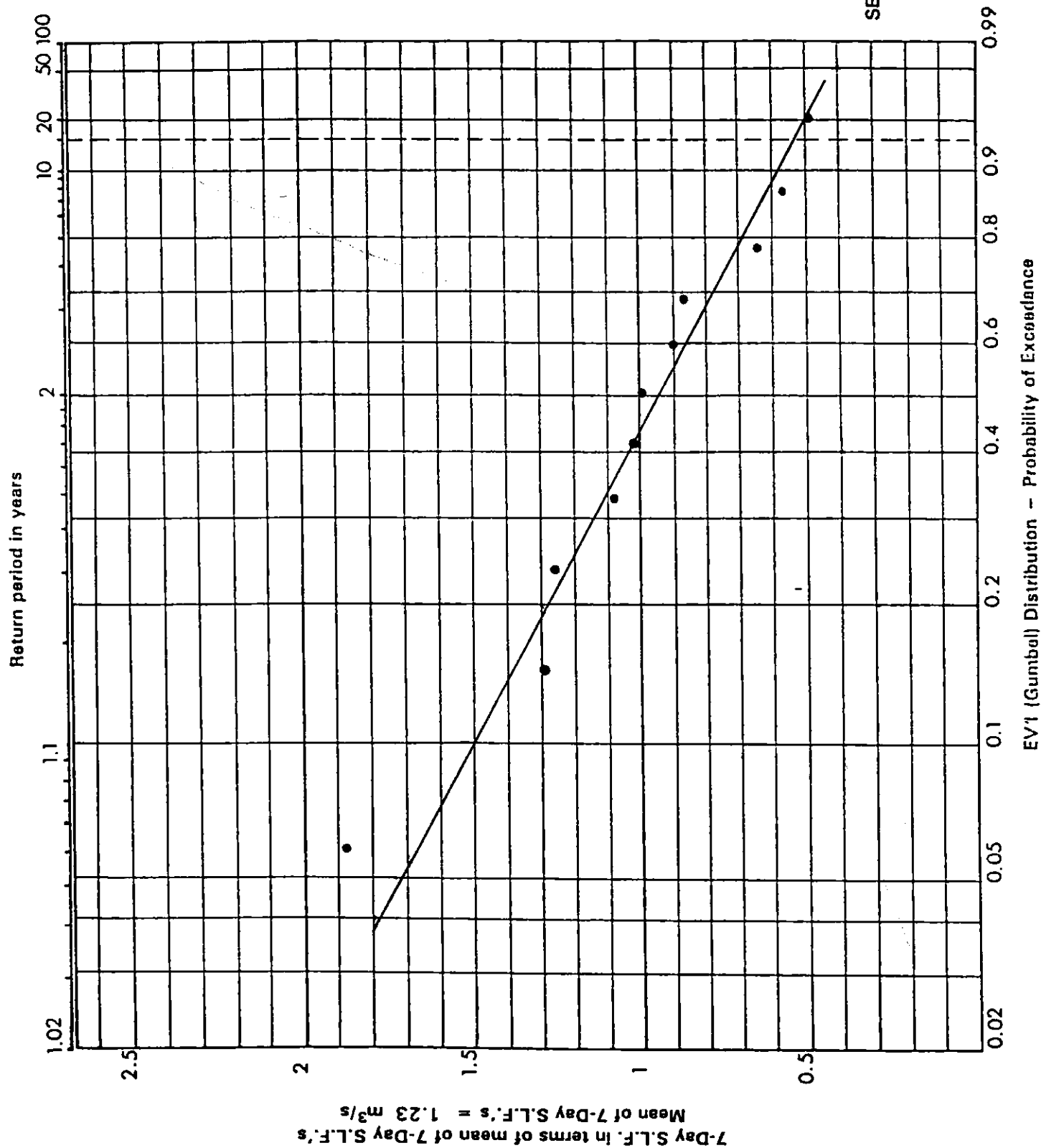
PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1976	0.530	0.600	0.69	0.72	[Min]
1975-1985	0.530	0.600	0.69	0.72	

TABLE OF EXCEEDANCE PERCENTILES

Year 1976 Only					
5%	15.40	30%	5.30	75%	1.30
10%	10.80	40%	3.88	80%	0.93
15%	8.40	50%	2.92	85%	0.83
20%	6.90	60%	2.20	90%	0.70
25%	5.76	70%	1.63	95%	0.62

** All flow rates above are in cubic metres per second. **





Distribution of
SEVEN-DAY SUSTAINED LOW FLOWS
at Station No. 1801
R. BRIDE AT MOGEELEY
for period 1975 to 1985

BLACKWATER at BALLYNAMONA

Body Responsible: OPW

N. G. R.: R 656 076

Catchment Area to Station: 324.0 sq km
 Long Average Rainfall [1941-1970]: 1064 mm/yr

Data based on continuous water level records for the period :
 1-Jan-72 to 31-Dec-82

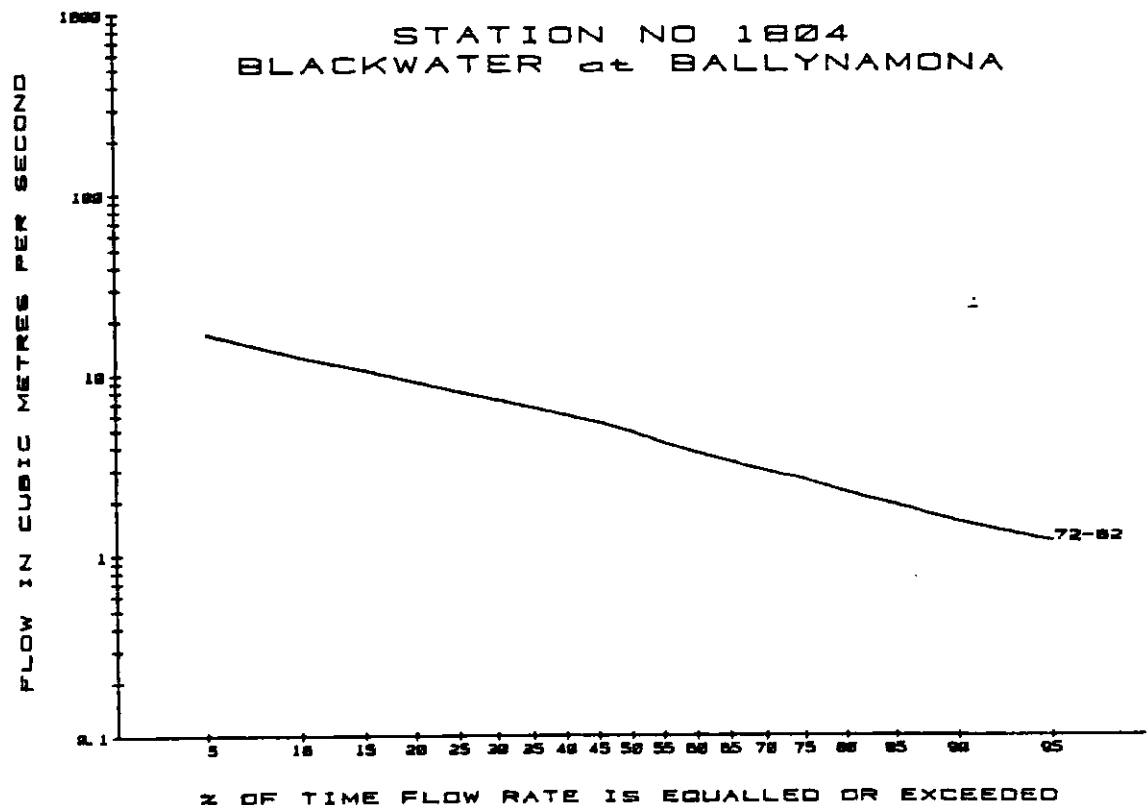
Mean Flow Rate: 6.29 [612 mm/yr rainfall on catchment]

Daily Mean Flows: minimum 0.690 on 15-Sep-75
 maximum 33.00 on 3-Nov-80

TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	17.00	30%	7.31	75%	2.64
10%	12.60	40%	6.01	90%	2.24
15%	10.70	50%	4.86	95%	1.91
20%	9.23	60%	3.72	90%	1.54
25%	8.11	70%	2.93	95%	1.20

** All flow rates above are in cubic metres per second. **



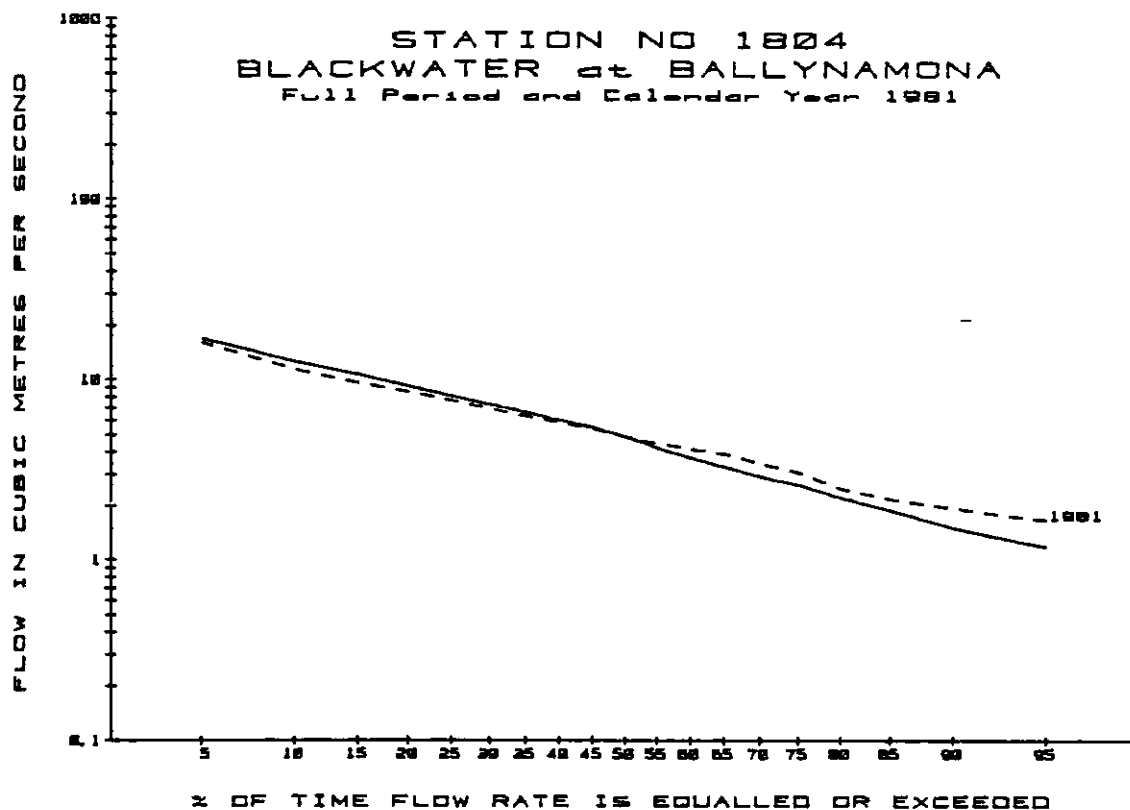
BLACKWATER at BALLYNAMONA

Data based on continuous water level records for the period :
1-Jan-72 to 31-Dec-82

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	1.410	1.480	1.74	2.24	
1972-1982	1.580	1.670	1.83	2.17	[Average]

TABLE OF EXCEEDANCE PERCENTILES					
Year 1981 Only					
5%	16.10	30%	6.94	75%	3.09
10%	11.40	40%	5.80	80%	2.52
15%	9.62	50%	4.85	85%	2.21
20%	8.58	60%	4.17	90%	1.98
25%	7.68	70%	3.47	95%	1.69

** All flow rates above are in cubic metres per second. **



BALCKWATER at BALLYNAMONA

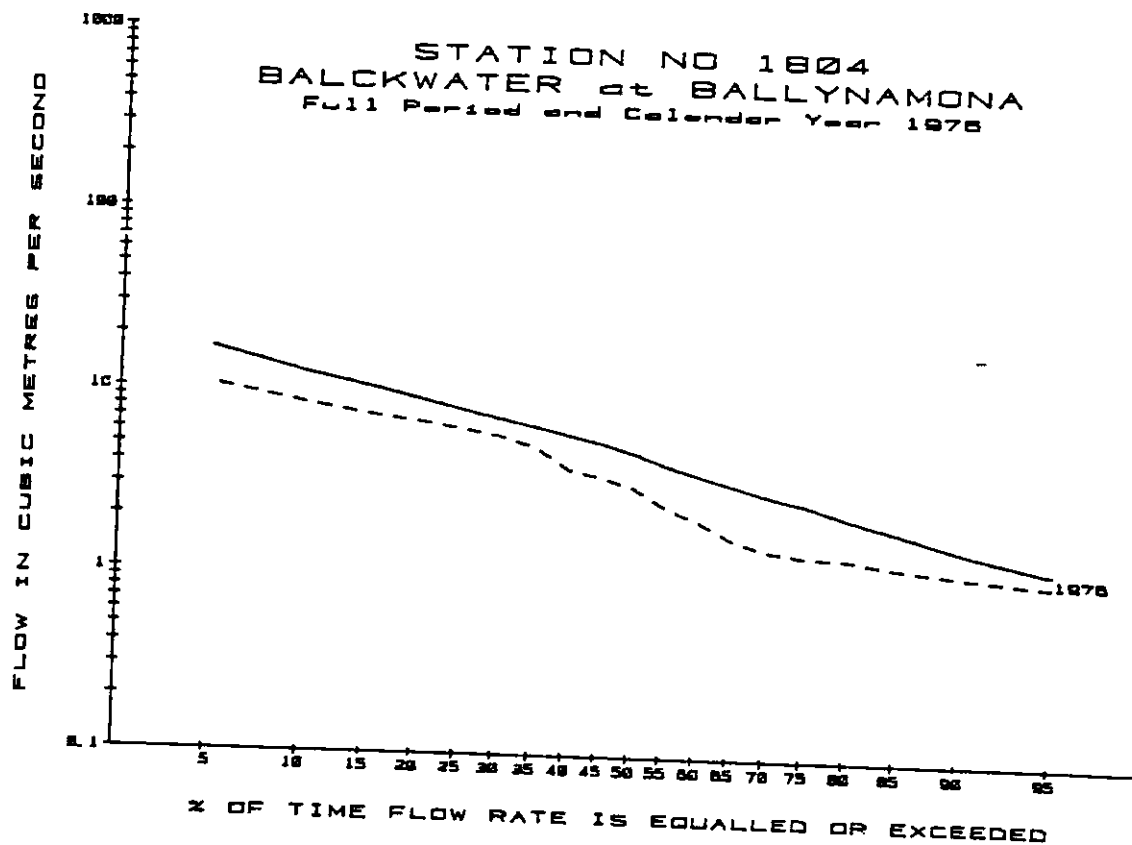
Data based on continuous water level records for the period :
1-Jan-72 to 31-Dec-82

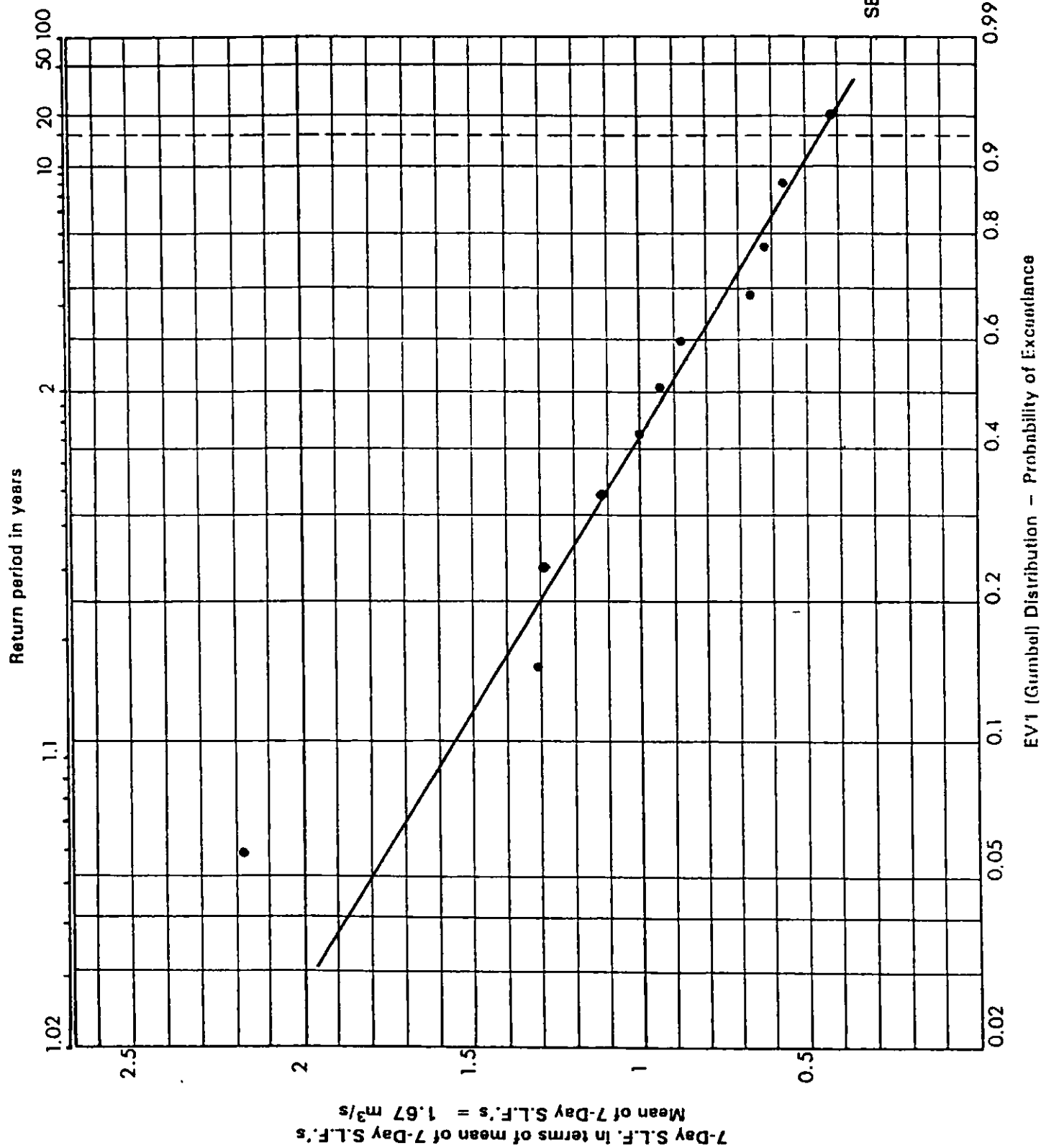
PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1976	0.900	1.040	1.13	1.13	
1972-1982	0.690	0.690	0.76	0.80	[Min]

TABLE OF EXCEEDANCE PERCENTILES

Year 1976 Only					
5%	10.70	30%	5.85	75%	1.37
10%	8.53	40%	3.88	80%	1.34
15%	7.49	50%	3.13	85%	1.22
20%	6.91	60%	2.09	90%	1.13
25%	6.37	70%	1.46	95%	1.02

** All flow rates above are in cubic metres per second. **





Sheet D

Distribution of
SEVEN-DAY SUSTAINED LOW FLOWS
at Station No. 1804
R. AWBEG AT BALLYNAMONA
for period 1972 to 1982

BLACKWATER at DOWNING BRIDGE

Body Responsible: OPW

N.G.R.: R 822 020

Catchment Area to Station: 363.0 sq km
 Long Average Rainfall [1941-1970]: 1190 mm/yr

Data based on continuous water level records for the period :
 1-Jan-72 to 31-Dec-82

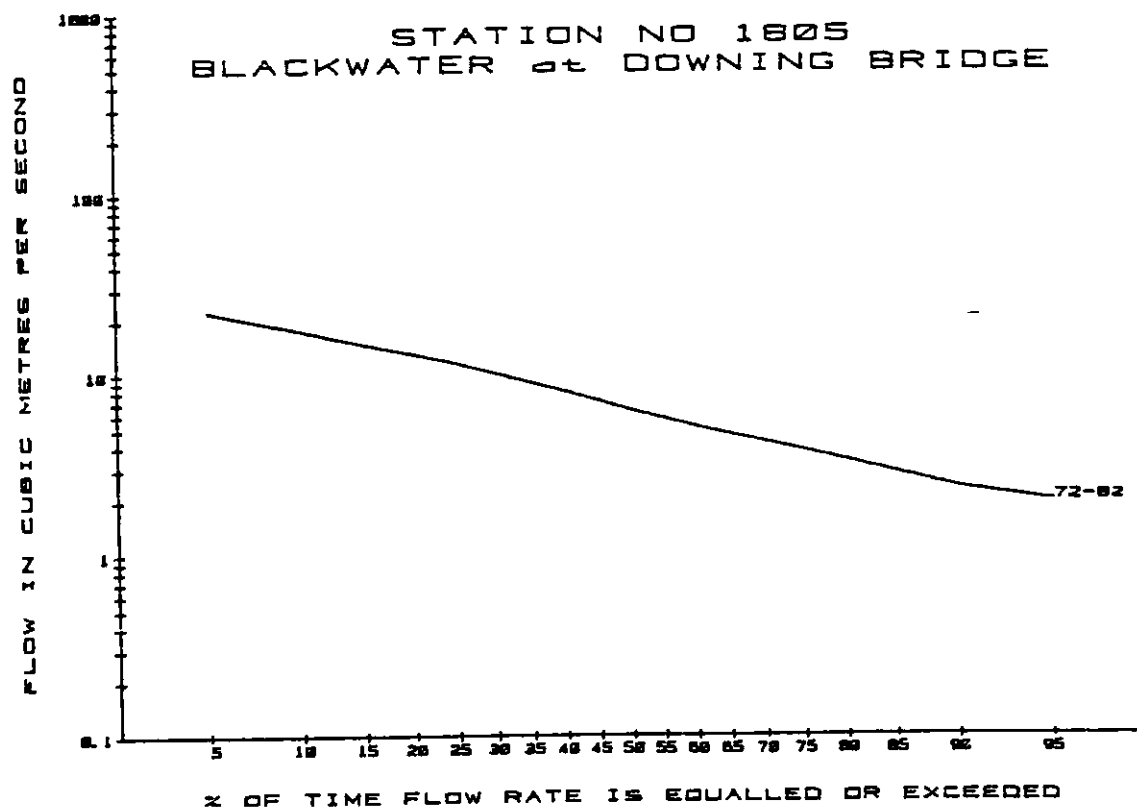
Mean Flow Rate: 8.59 [746 mm/yr rainfall on catchment]

Daily Mean Flows: minimum 1.300 on 4-Sep-76
 maximum 56.60 on 1-Dec-73

TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	22.50	30%	10.20	75%	3.78
10%	17.70	40%	8.06	80%	3.33
15%	14.80	50%	6.32	85%	2.86
20%	13.10	60%	5.12	90%	2.36
25%	11.60	70%	4.21	95%	1.99

** All flow rates above are in cubic metres per second. **



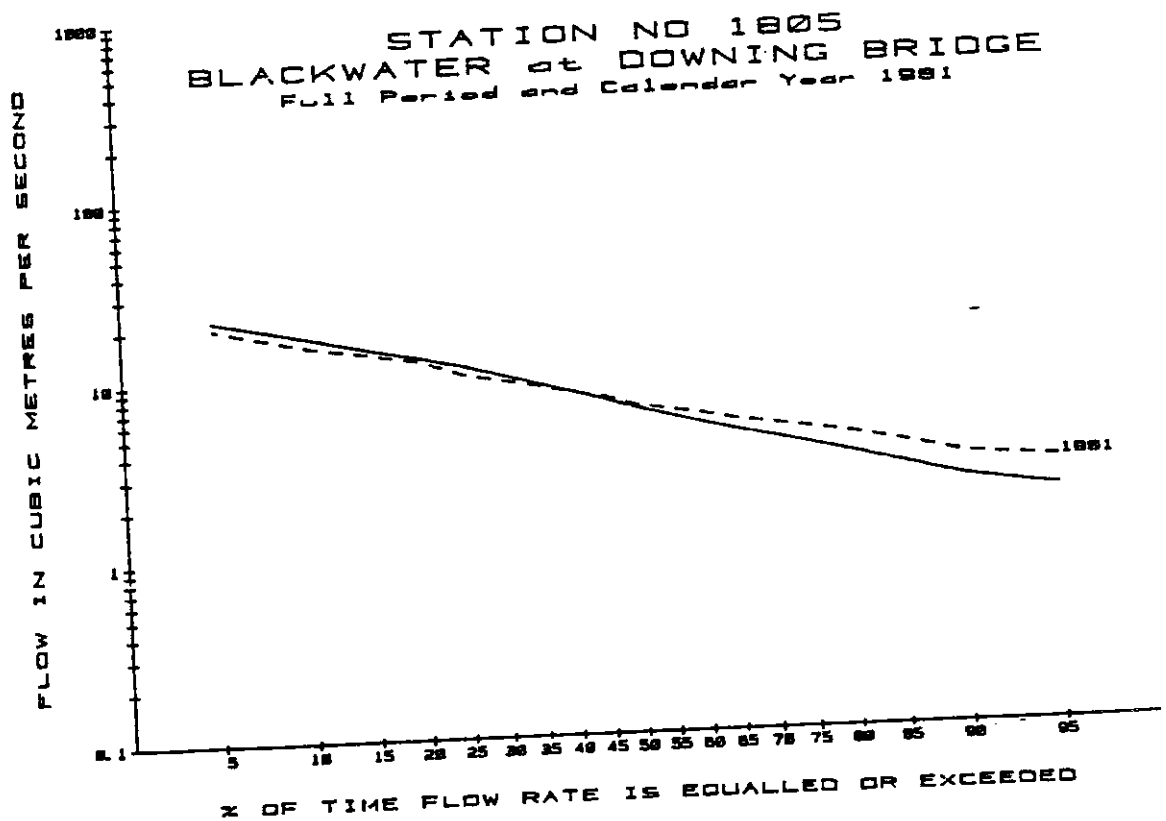
BLACKWATER at DOWNING BRIDGE

Data based on continuous water level records for the period :
1-Jan-72 to 31-Dec-82

PERIOD	SUSTAINED LOW FLOWS				DAYS [Average]
	3	7	15	30	
1981	2.720	2.750	2.82	3.18	
1972-1982	2.290	2.380	2.68	3.37	

TABLE OF EXCEEDANCE PERCENTILES					
Year 1981 Only					
5%	20.30	30%	9.53	75%	4.63
10%	15.70	40%	7.99	80%	4.25
15%	13.90	50%	6.55	85%	3.77
20%	12.50	60%	5.76	90%	3.16
25%	10.40	70%	4.97	95%	2.86

** All flow rates above are in cubic metres per second. **



BLACKWATER at DOWNING BRIDGE

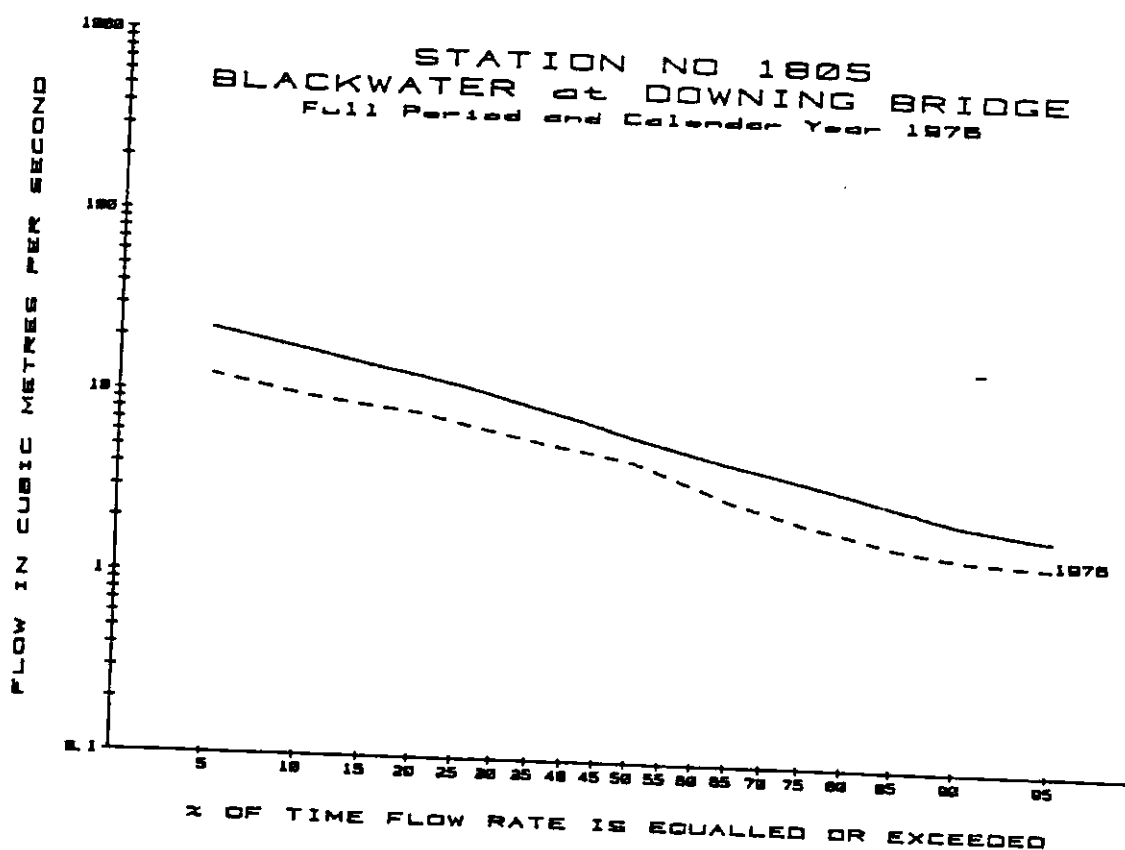
Data based on continuous water level records for the period :
1-Jan-72 to 31-Dec-82

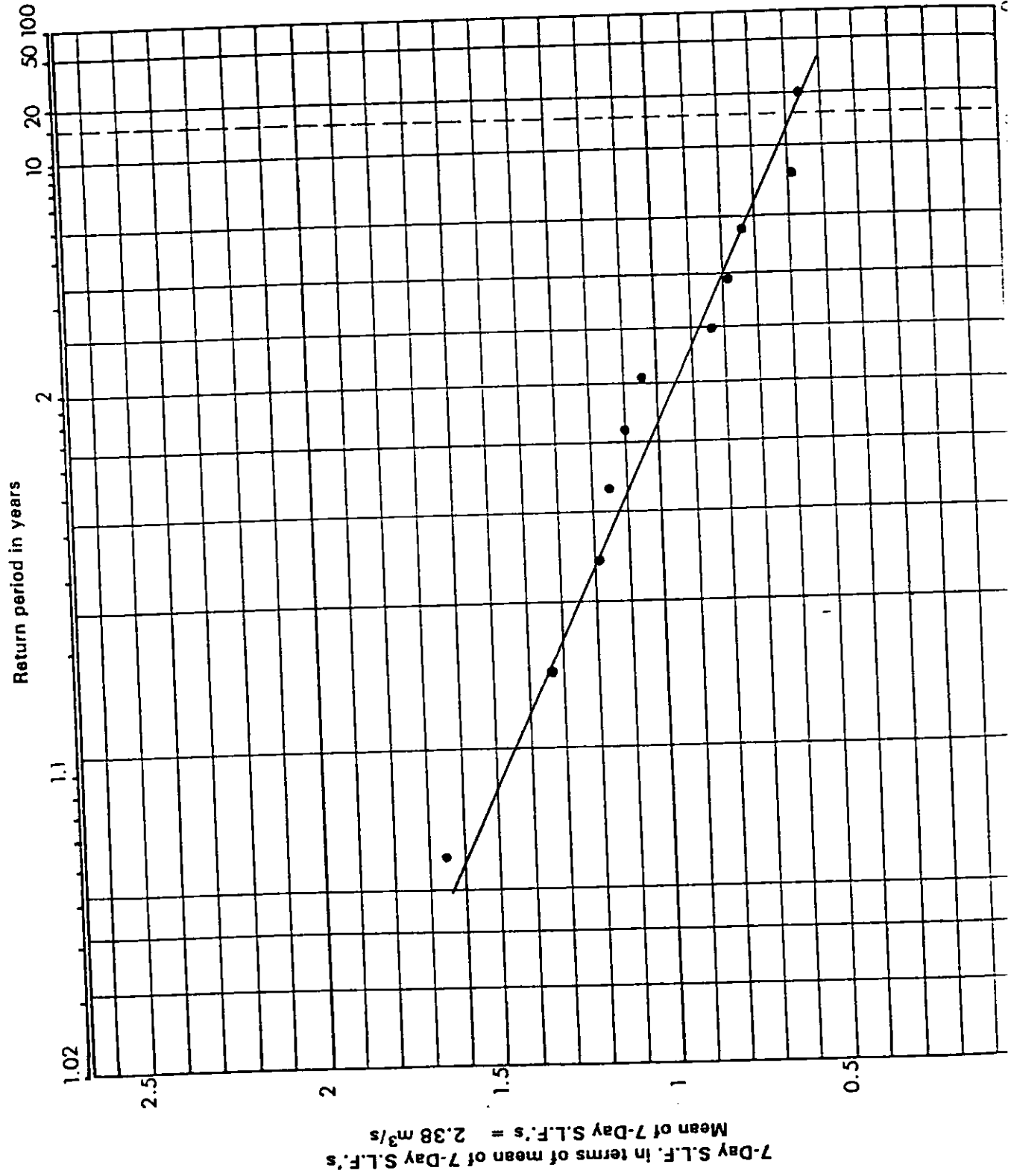
PERIOD	SUSTAINED LOW FLOWS				DAYS [Min]
	3	7	15	30	
1976	1.330	1.340	1.43	1.64	
1972-1982	1.330	1.340	1.43	1.64	

TABLE OF EXCEEDANCE PERCENTILES

Year 1976 Only					
5%	12.50	30%	6.48	75%	2.24
10%	9.81	40%	5.43	80%	2.00
15%	8.79	50%	4.65	85%	1.72
20%	8.19	60%	3.42	90%	1.53
25%	7.20	70%	2.58	95%	1.41

** All flow rates above are in cubic metres per second. **





Distribution of
SEVEN-DAY SUSTAINED LOW FLOW
at Station No. 1805
R. FUNSHION AT DOWNING BRIDGE
for period 1972 to 1982

BLACKWATER at CSET MALLOW

Body Responsible: CSE

N. G. R.: W 525 973

Catchment Area to Station: 1058.0 sq km
 Long Average Rainfall [1941-1970]: 1303 mm/yr

Data based on continuous water level records for the period :
 16-Jul-77 to 31-Dec-85

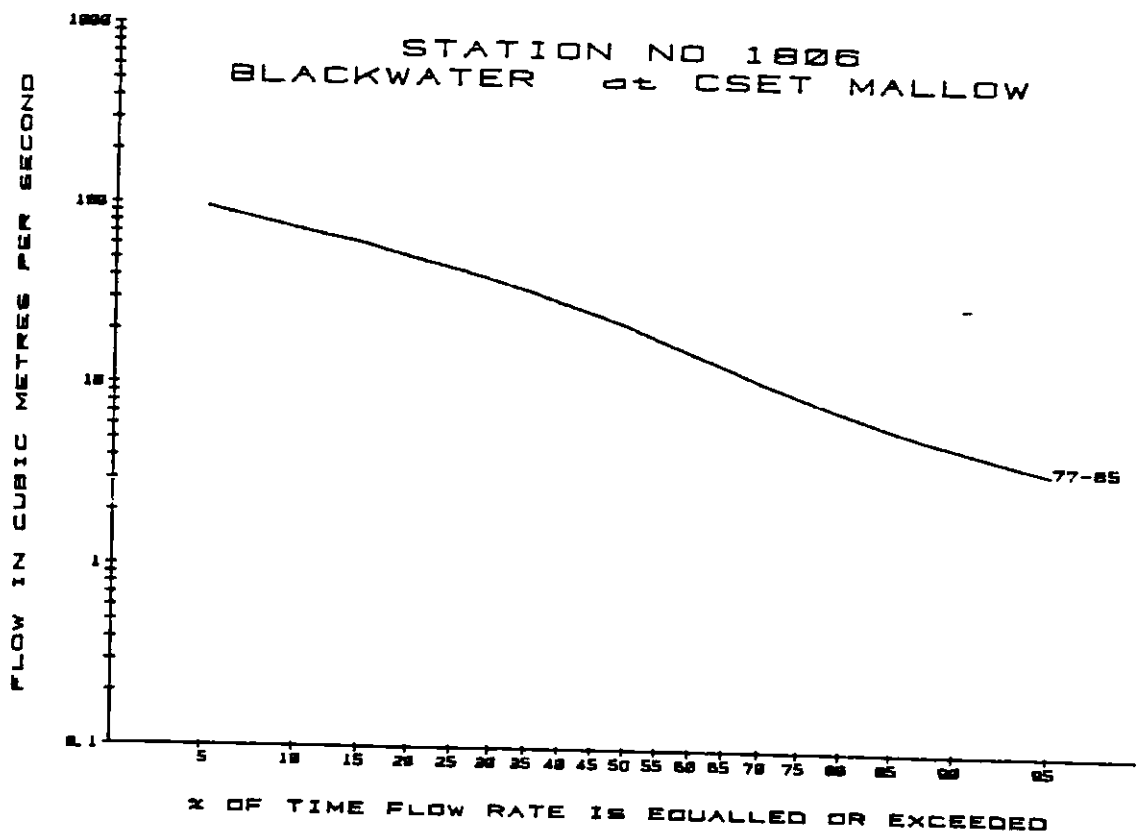
Mean Flow Rate: 32.88 [980 mm/yr rainfall on catchment]

Daily Mean Flows: minimum 2.110 on 13-Aug-77
 maximum 318.10 on 7-Dec-78

TABLE OF EXCEEDANCE PERCENTILES

		Full period		PERCENTILES	
5%	96.90	30%	39.36	75%	9.21
10%	73.70	40%	29.56	80%	7.61
15%	62.20	50%	22.25	85%	6.17
20%	52.00	60%	15.78	90%	4.97
25%	45.41	70%	11.01	95%	3.66

** All flow rates above are in cubic metres per second. **



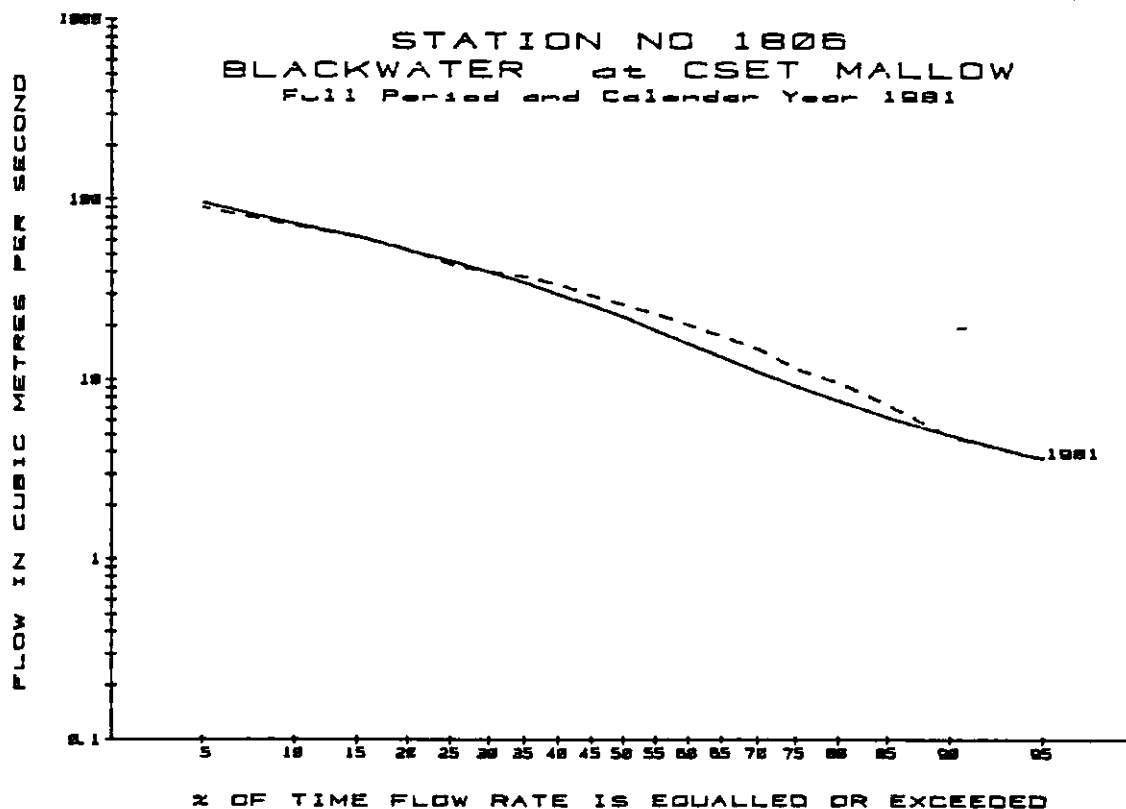
BLACKWATER at CSET MALLOW

Data based on continuous water level records for the period :
16-Jul-77 to 31-Dec-85

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	3.030	3.160	3.71	6.88	
1977-1985	3.810	4.220	5.26	7.91	[Average]

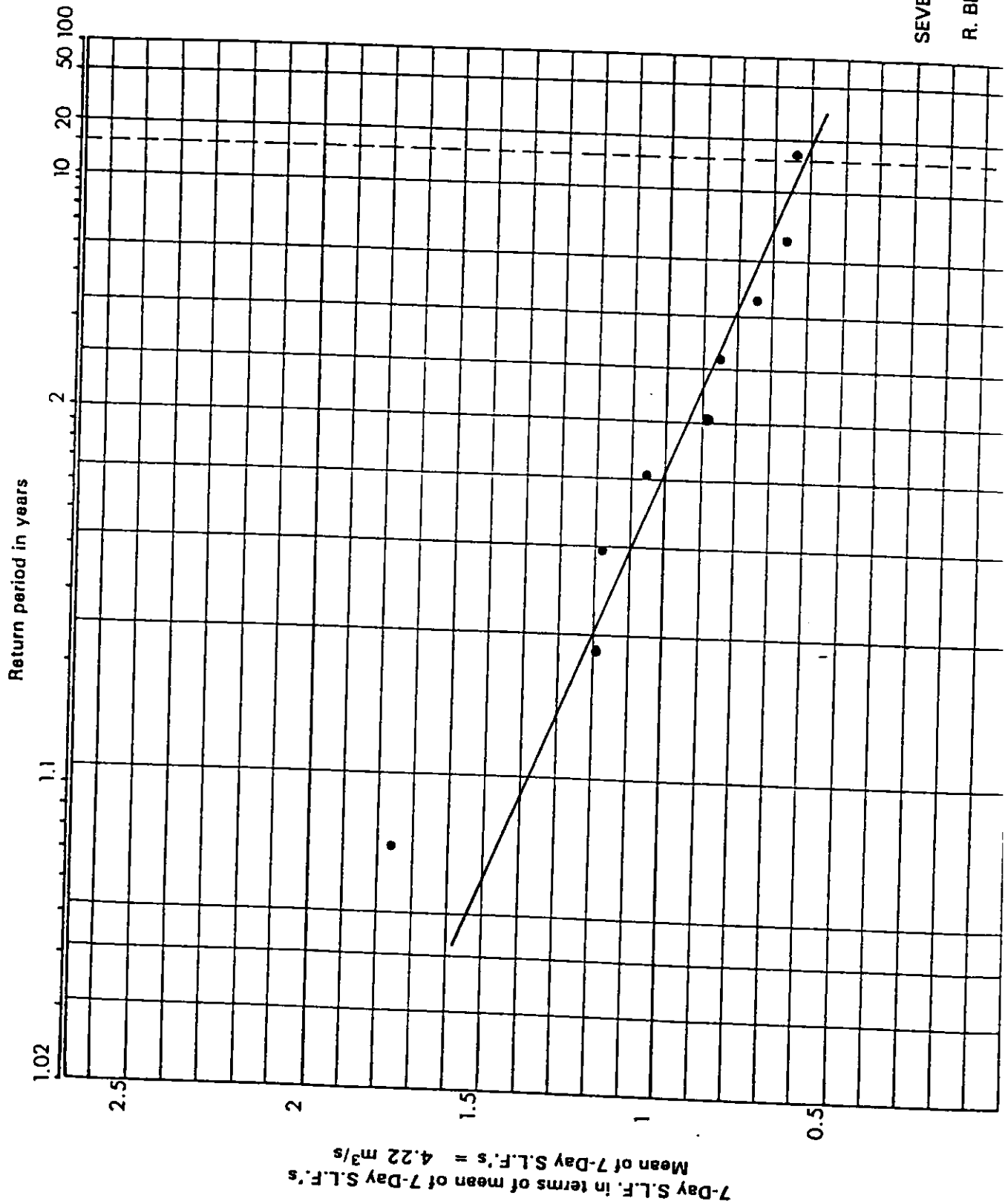
TABLE OF EXCEEDANCE PERCENTILES					
Year 1981 Only					
5%	90.90	30%	39.40	75%	11.47
10%	71.90	40%	33.65	80%	9.57
15%	61.90	50%	25.99	85%	7.23
20%	52.80	60%	20.06	90%	4.87
25%	43.22	70%	14.82	95%	3.71

** All flow rates above are in cubic metres per second. **



Data for 1976 for
Station No. 1806 CSET MALLOW
is not available

Sheet D



Distribution of
SEVEN-DAY SUSTAINED LOW FLOWS
at Station No. 1806
R. BLACKWATER AT CSET MALLOW
for period 1977 to 1985

STATION NO 1901

Sheet A

OWENBOY at BALLEA

Body Responsible: OPW

N.G.R.: W 709 635

Catchment Area to Station: 106.0 sq km
 Long Average Rainfall [1941-1970]: 1212 mm/yr

Data based on continuous water level records for the period:
 1-Jan-75 to 31-Dec-85

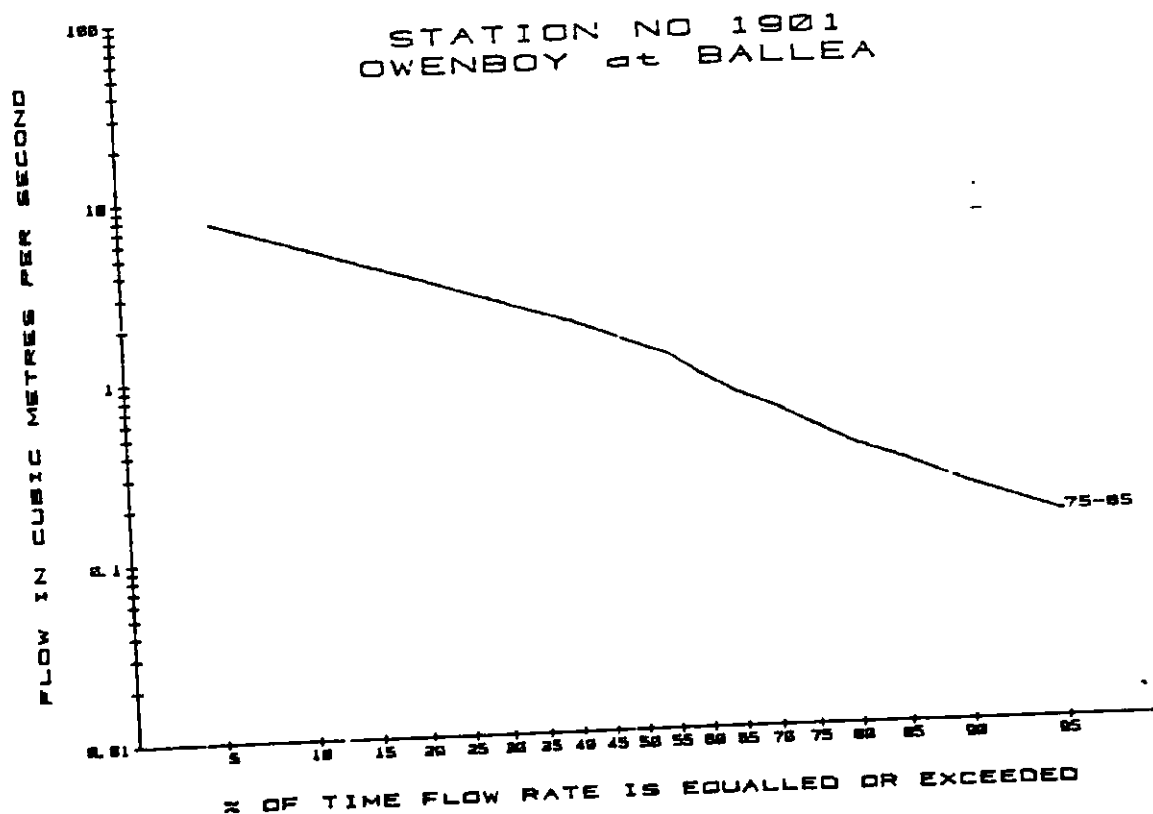
Mean Flow Rate: 2.25 [659 mm/yr rainfall on catchment]

Daily Mean Flows: minimum 0.030 on 6-Jul-75
 maximum 22.00 on 22-Feb-78

TABLE OF EXCEEDANCE PERCENTILES

TABLE OF EXCEEDANCE					
		Full period			
5%	7.70	30%	2.53	75%	0.47
10%	5.40	40%	1.92	80%	0.36
15%	4.20	50%	1.39	85%	0.29
20%	3.50	60%	0.91	90%	0.21
25%	2.94	70%	0.60	95%	0.14

** All flow rates above are in cubic metres per second. **



OWENBOY at BALLEA

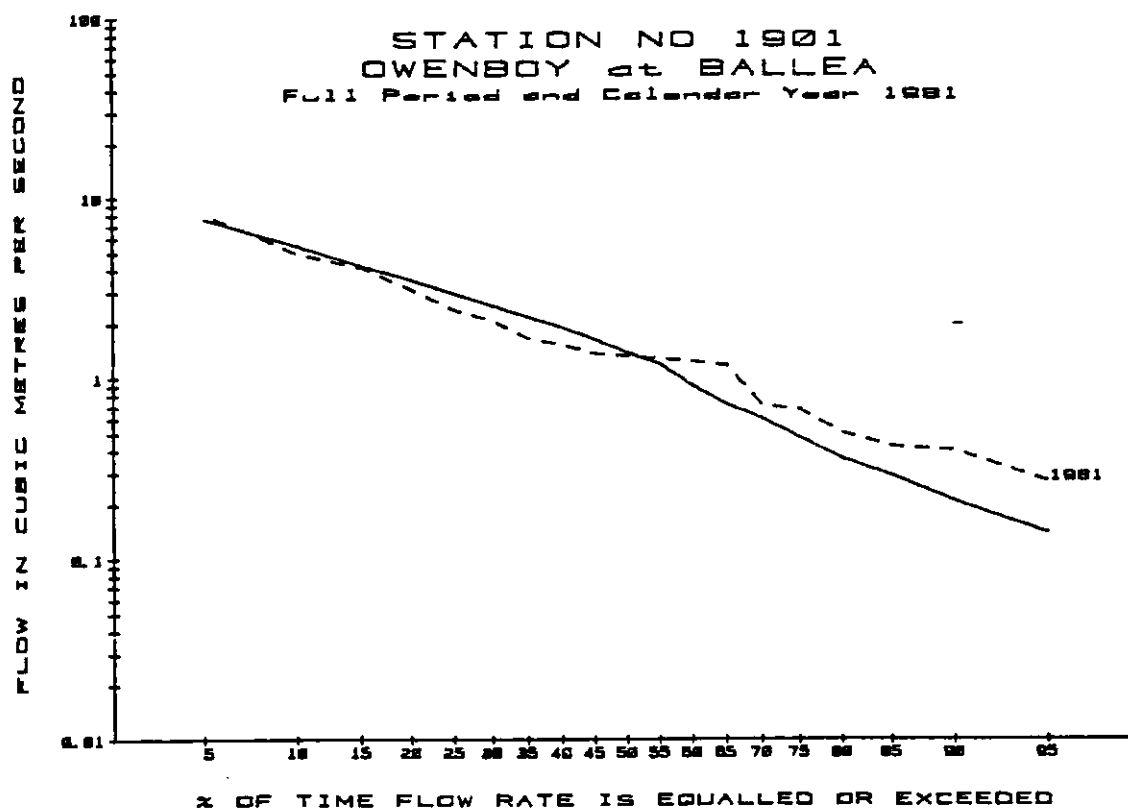
Data based on continuous water level records for the period :
1-Jan-75 to 31-Dec-85

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.196	0.210	0.33	0.97	
1975-1985	0.175	0.200	0.25	0.74	[Average]

TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	8.20	30%	2.09	75%	0.67
10%	4.90	40%	1.54	80%	0.50
15%	4.10	50%	1.33	85%	0.42
20%	3.10	60%	1.24	90%	0.40
25%	2.39	70%	0.71	95%	0.27

** All flow rates above are in cubic metres per second. **



OWENNACURRA at BUCKLEY'S BRIDGE

Body Responsible: IDL

N. G. R.: W 888 737

Catchment Area to Station: 51.0 sq km
 Long Average Rainfall [1941-1970]: 1125 mm/yr

Data based on continuous water level records for the period :
 1-Jan-81 to 31-Dec-85

Mean Flow Rate: 0.84 [519 mm/yr rainfall on catchment]

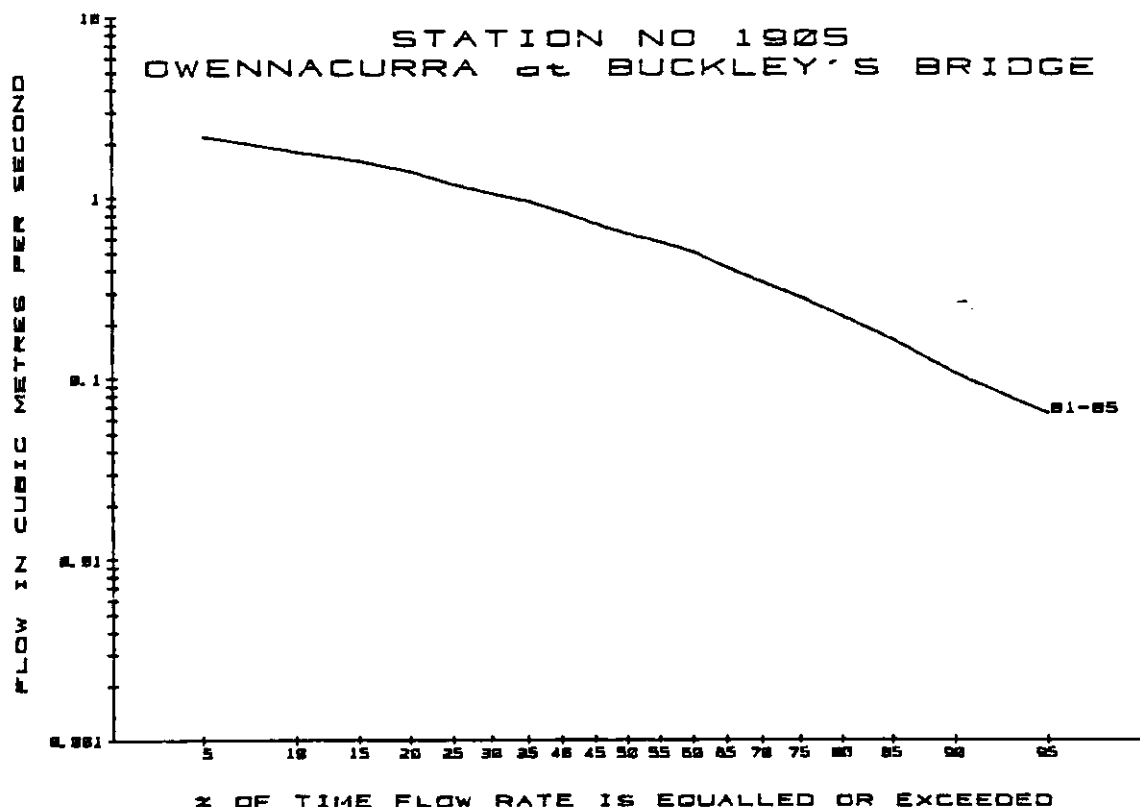
Daily Mean Flows: minimum 0.040 on 30-Jul-84
 maximum 7.80 on 8-Feb-85

TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	2.20	30%	1.06	75%	0.28
10%	1.80	40%	0.84	80%	0.22
15%	1.60	50%	0.63	85%	0.16
20%	1.40	60%	0.50	90%	0.11
25%	1.19	70%	0.34	95%	0.06

** All flow rates above are in cubic metres per second. **

** Note: Lowest Measured Flow 0.026 on 9-Aug-76. **



OWENNACURRA at BUCKLEY'S BRIDGE

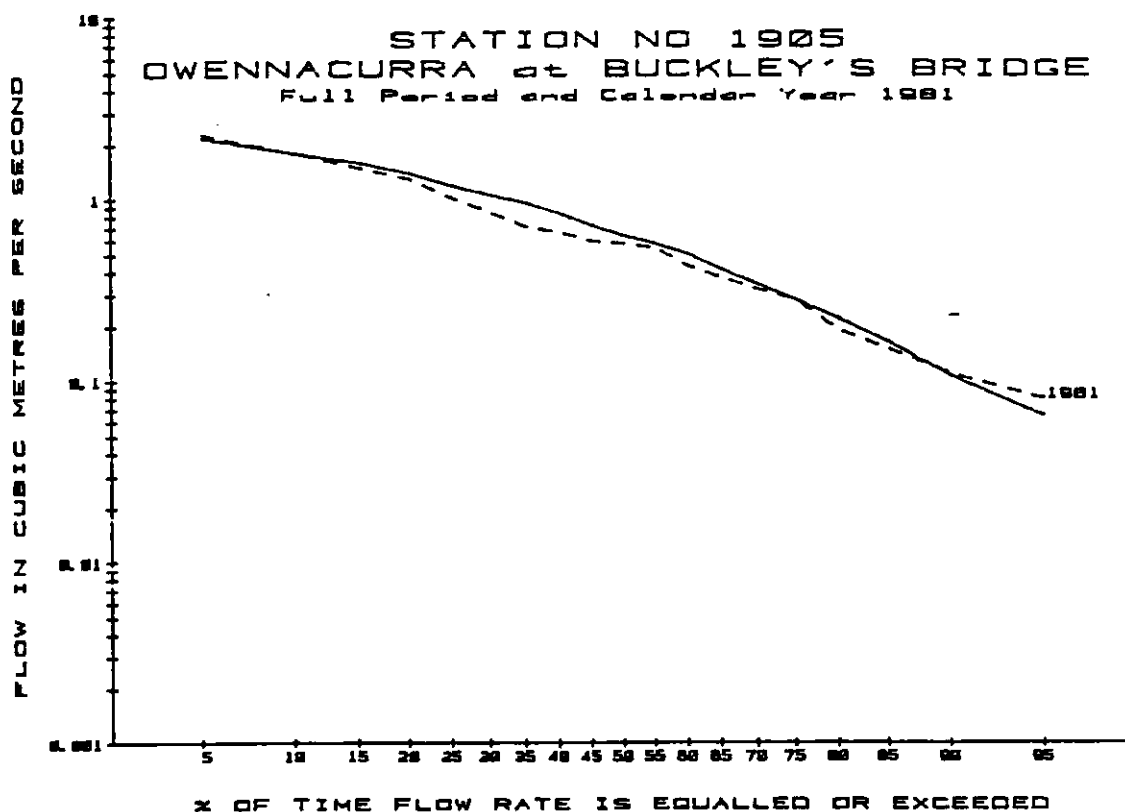
Data based on continuous water level records for the period :
1-Jan-81 to 31-Dec-85

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.070	0.070	0.08	0.16	
1981-1985	0.070	0.080	0.12	0.26	[Average]

TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	2.30	30%	0.85	75%	0.28
10%	1.80	40%	0.66	80%	0.19
15%	1.50	50%	0.57	85%	0.15
20%	1.30	60%	0.43	90%	0.11
25%	1.02	70%	0.32	95%	0.08

** All flow rates above are in cubic metres per second. **



BUTLERSTOWN at BROOKHILL

Body Responsible: COR

N.G.R.: W 736 763

Catchment Area to Stations: 41.0 sq km
 Long Average Rainfall [1941-1970]: 1216 mm/yr

Data based on continuous water level records for the period :
 20-Jul-77 to 31-Dec-85

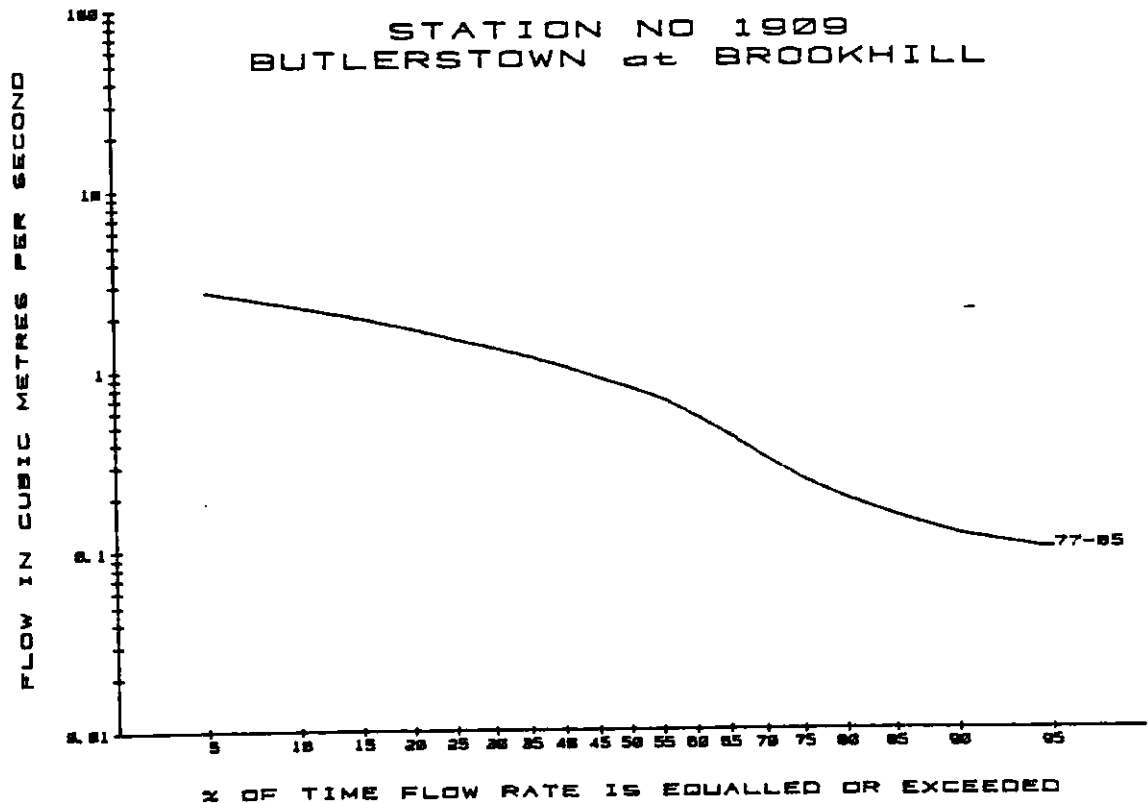
Mean Flow Rate: 1.03 [789 mm/yr rainfall on catchment]

Daily Mean Flows: minimum 0.040 on 21-Aug-77
 maximum 8.90 on 22-Feb-78

TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	2.78	30%	1.33	75%	0.24
10%	2.27	40%	1.04	80%	0.19
15%	1.95	50%	0.79	85%	0.15
20%	1.70	60%	0.55	90%	0.12
25%	1.48	70%	0.32	95%	0.10

** All flow rates above are in cubic metres per second. **



BUTLERSTOWN at BROOKHILL

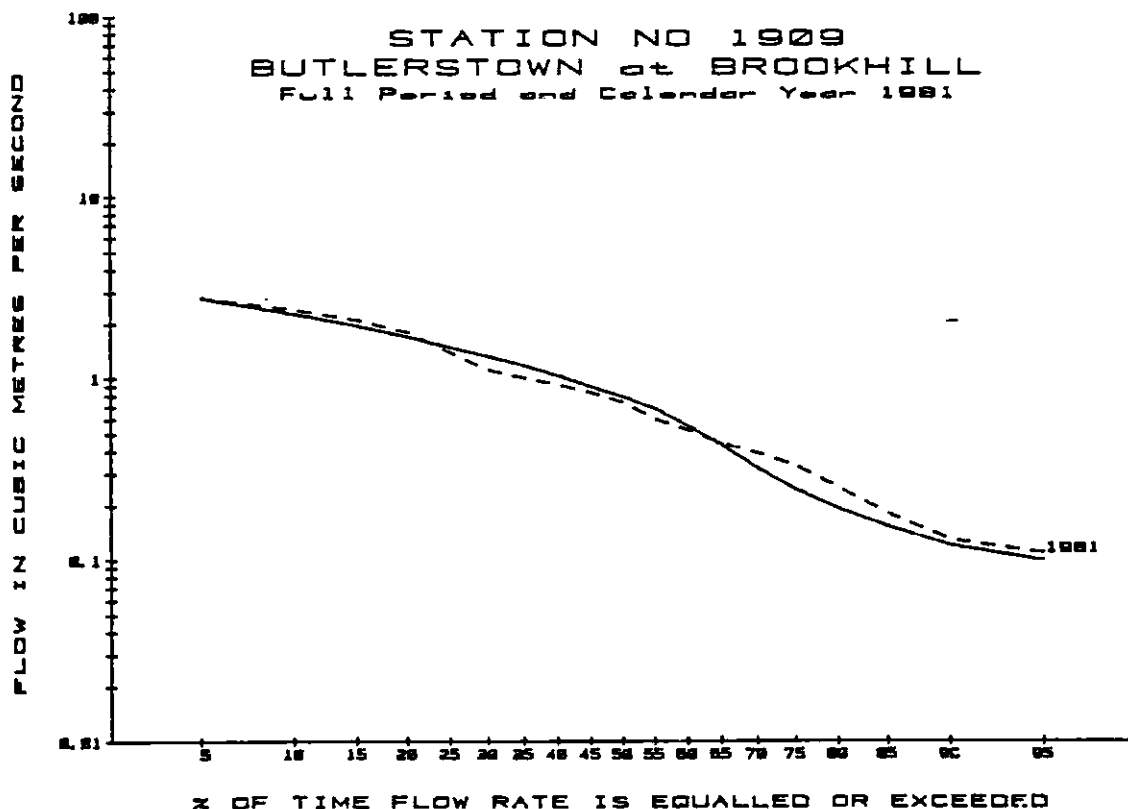
Data based on continuous water level records for the period :
20-Jul-77 to 31-Dec-85

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.094	0.100	0.11	0.20	
1977-1985	0.094	0.110	0.13	0.22	[Average]

TABLE OF EXCEEDANCE PERCENTILES

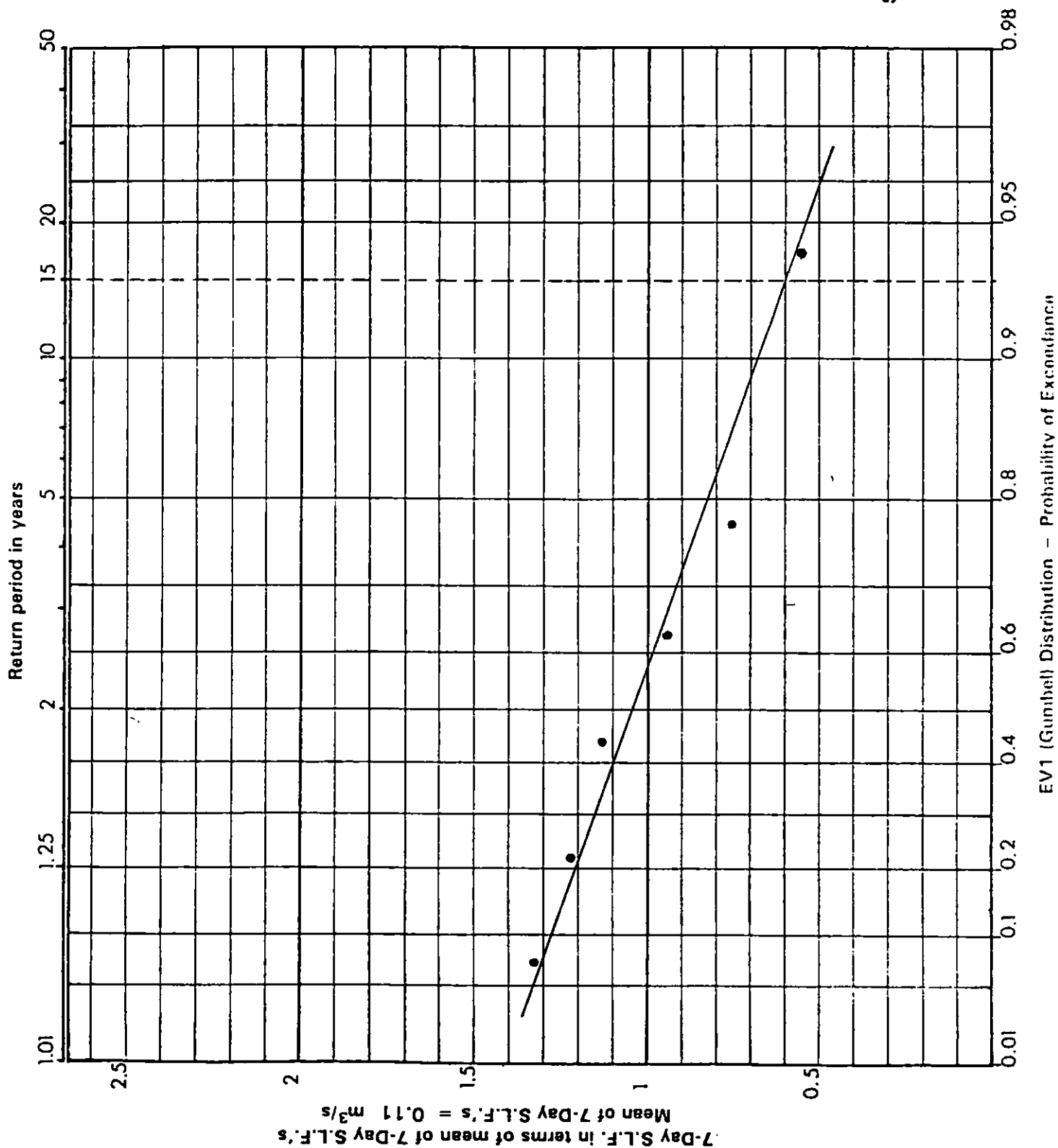
Year 1981 Only					
5%	2.80	30%	1.12	75%	0.33
10%	2.40	40%	0.93	80%	0.25
15%	2.10	50%	0.74	85%	0.18
20%	1.80	60%	0.52	90%	0.13
25%	1.39	70%	0.39	95%	0.11

** All flow rates above are in cubic metres per second. **



Data for 1976 for
Station No. 1909 Brookhill
is not available

Distribution of
SEVEN-DAY SUSTAINED LOW FLOWS
at Station No. 1909
R. BUTLERSTOWN AT BROOKHILL
for period 1977 to 1985



BLARNEY at BAWNNAFINNY

Body Responsible: COR

N. G. R.: W 506 754

Catchment Area to Station: 89.0 sq km
 Long Average Rainfall [1941-1970]: 1191 mm/yr

Data based on continuous water level records for the period :
 1-Jan-78 to 31-Dec-82

Mean Flow Rate: 2.43 [861 mm/yr rainfall on catchment]

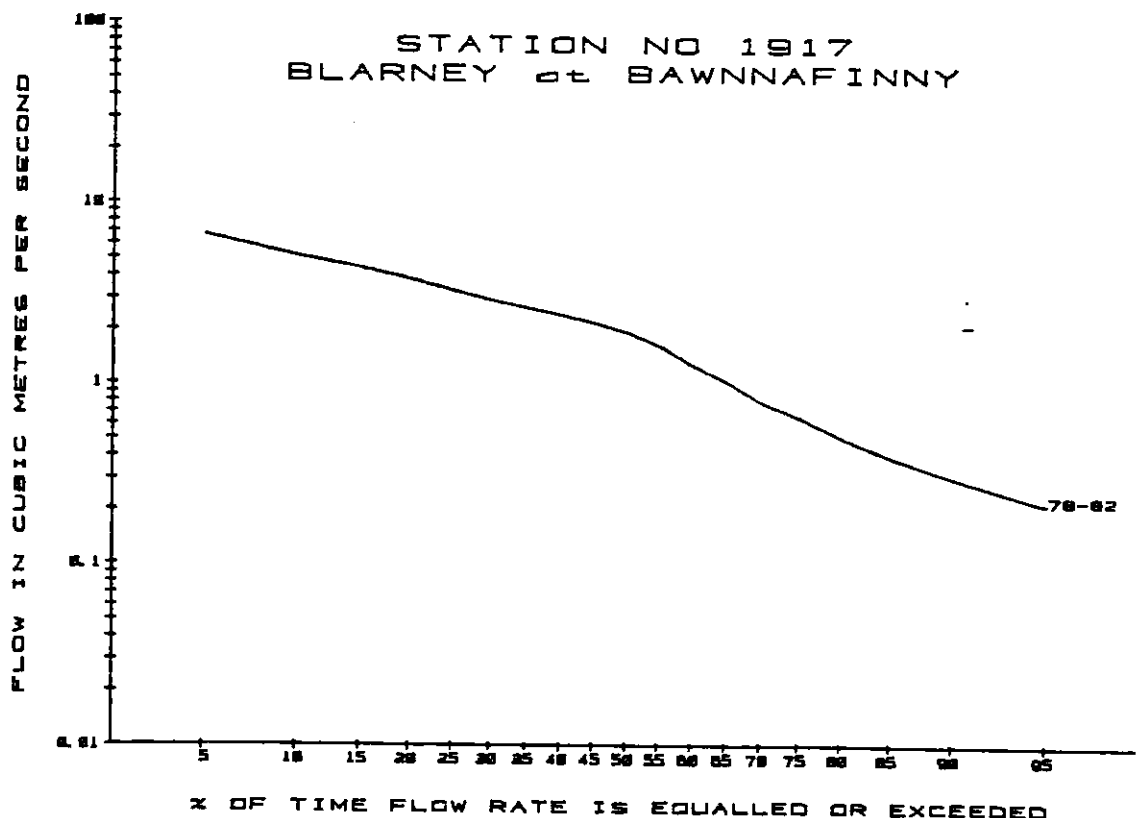
Daily Mean Flows: minimum 0.090 on 4-Oct-78
 maximum 19.90 on 7-Dec-78

TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	6.70	30%	2.91	75%	0.66
10%	5.10	40%	2.41	80%	0.51
15%	4.40	50%	1.94	85%	0.40
20%	3.80	60%	1.28	90%	0.31
25%	3.28	70%	0.80	95%	0.22

** All flow rates above are in cubic metres per second. **

** Note: Lowest Measured Flow 0.038 on 27-Aug-76 **



BLARNEY at BAWNNAFINNY

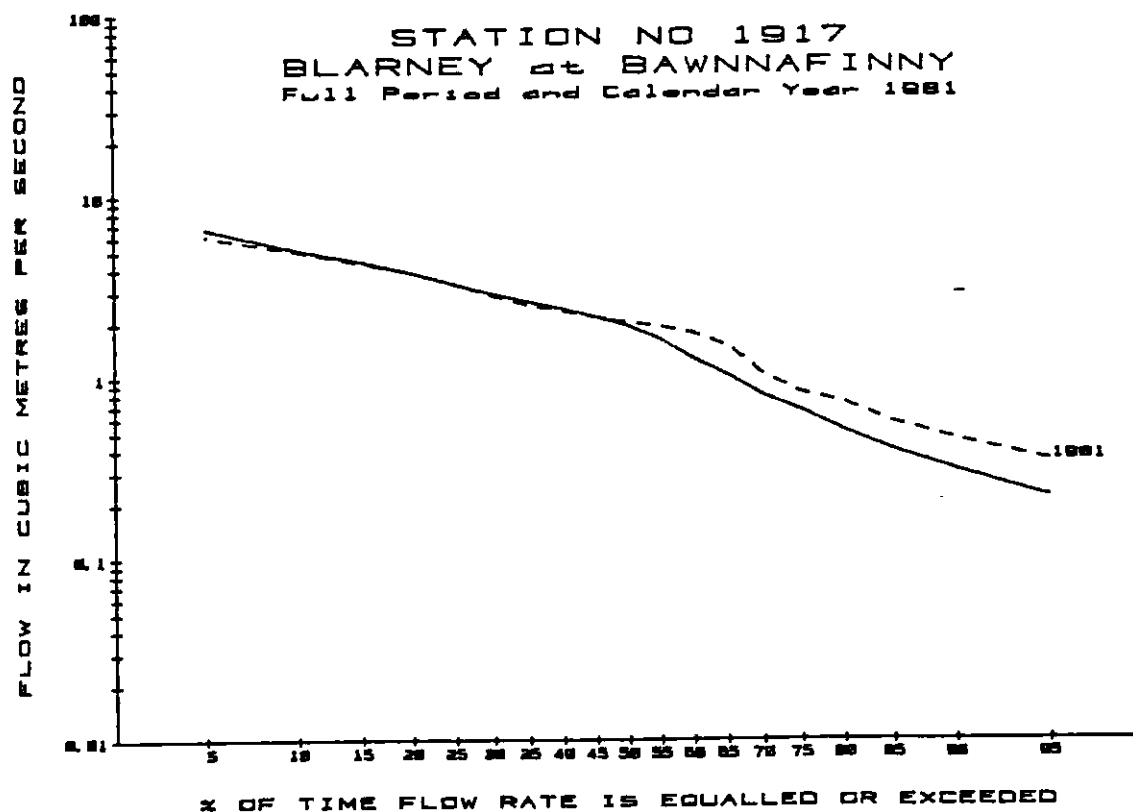
Data based on continuous water level records for the period :
1-Jan-78 to 31-Dec-82

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.274	0.300	0.48	0.59	
1978-1982	0.234	0.260	0.35	0.47	[Average]

TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	6.10	30%	2.84	75%	0.83
10%	5.00	40%	2.34	80%	0.73
15%	4.30	50%	2.02	85%	0.57
20%	3.80	60%	1.77	90%	0.46
25%	3.30	70%	1.05	95%	0.35

** All flow rates above are in cubic metres per second. **



SHOURNAGH at TOWER BRIDGE

Body Responsible: COR

N. G. R.: W 726 766

Catchment Area to Station: 160.0 sq km
 Long Average Rainfall [1941-1970]: 1234 mm/yr

Data based on continuous water level records for the period :
 1-Jan-78 to 31-Dec-82

Mean Flow Rate: 5.72 [1128 mm/yr rainfall on catchment]

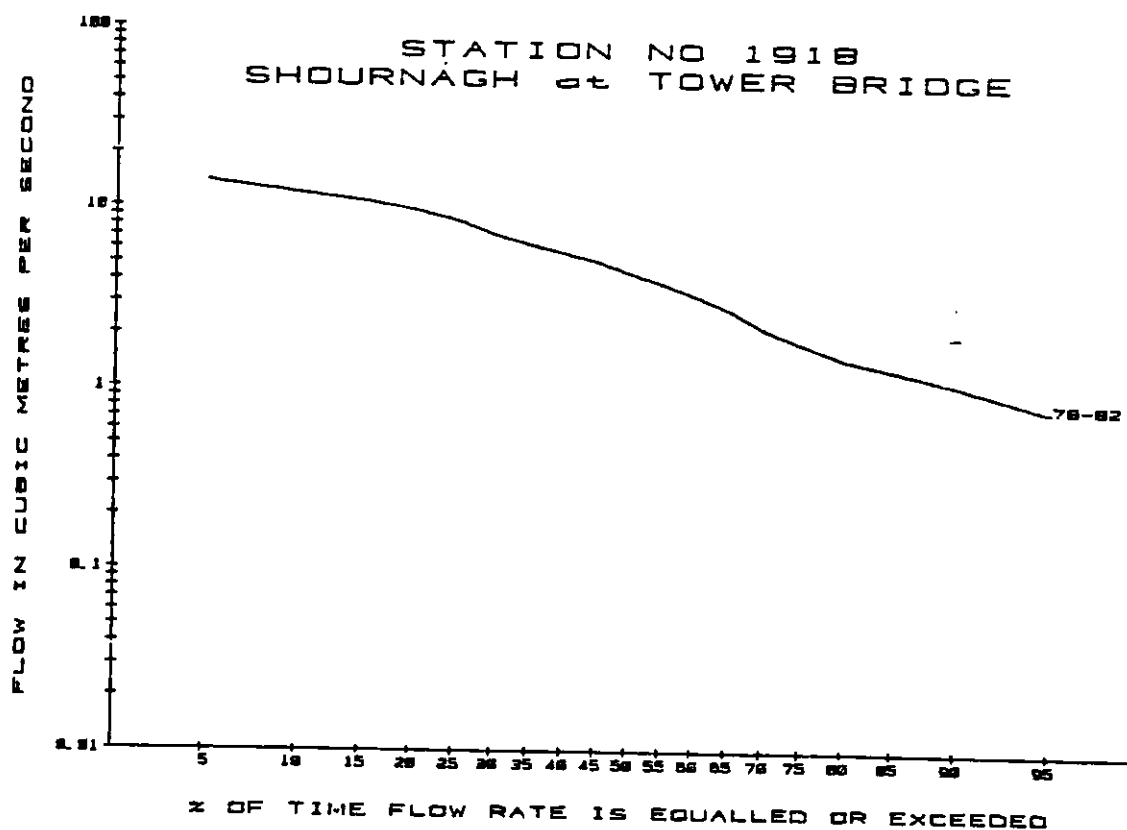
Daily Mean Flows: minimum 0.255 on 9-Sep-78
 maximum 47.80 on 7-Dec-78

TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	14.00	30%	7.15	75%	1.81
10%	12.00	40%	5.67	80%	1.49
15%	10.90	50%	4.42	85%	1.31
20%	9.90	60%	3.33	90%	1.09
25%	8.58	70%	2.17	95%	0.79

** All flow rates above are in cubic metres per second. **

** Note: Lowest Measured Flow 0.139 on 6-Sept-76. **



SHOURNAGH at TOWER BRIDGE

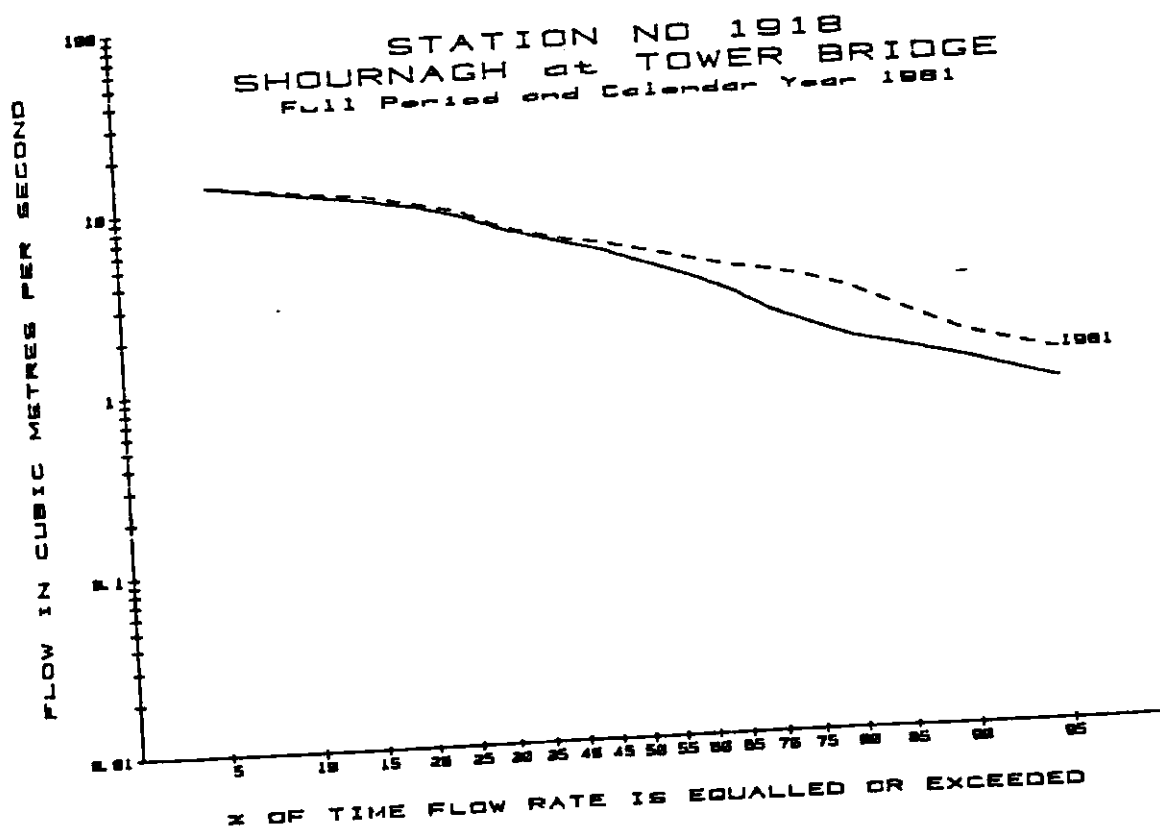
Data based on continuous water level records for the period :
1-Jan-78 to 31-Dec-82

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.941	1.070	1.13	1.84	[Average]
1978-1982	0.830	0.910	1.02	1.39	

TABLE OF EXCEEDANCE PERCENTILES

		Year 1981 Only			
5%	14.10	30%	7.38	75%	3.27
10%	12.40	40%	5.95	80%	2.79
15%	11.50	50%	5.11	85%	2.12
20%	10.20	60%	4.23	90%	1.51
25%	9.08	70%	3.61	95%	1.14

** All flow rates above are in cubic metres per second. **



OWENNACURRA at BALLYEDMOND

Body Responsible: COR

N. G. R.: W 859 766

Catchment Area to Station: 75.0 sq km
 Long Average Rainfall [1941-1970]: 1224 mm/yr

Data based on continuous water level records for the period:
 16-Jun-77 to 31-Dec-85

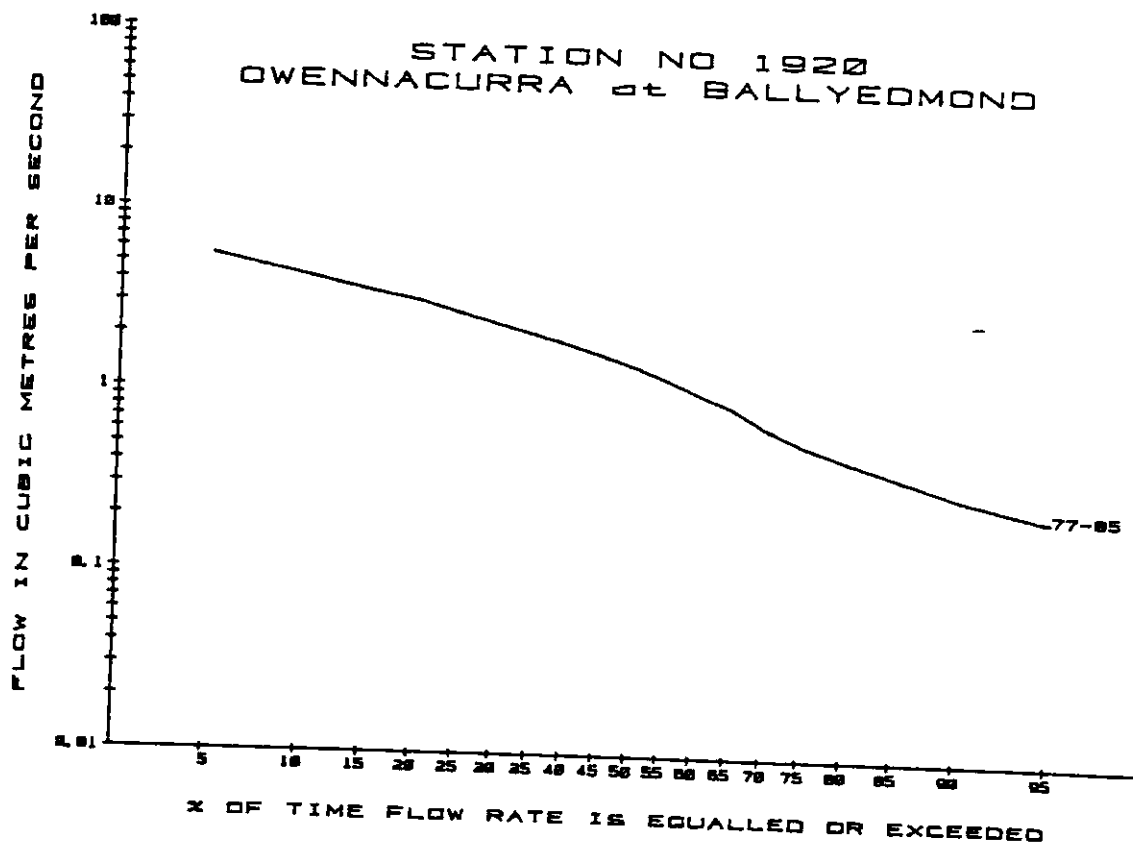
Mean Flow Rate: 1.97 [830 mm/yr rainfall on catchment]

Daily Mean Flows: minimum 0.100 on 22-Sep-77
 maximum 20.60 on 22-Feb-78

TABLE OF EXCEEDANCE PERCENTILES

		Full period		PERCENTILES	
5%	5.50	30%	2.40	75%	0.55
10%	4.30	40%	1.89	80%	0.46
15%	3.60	50%	1.45	85%	0.38
20%	3.20	60%	1.04	90%	0.30
25%	2.74	70%	0.68	95%	0.23

** All flow rates above are in cubic metres per second. **



OWENNACURRA at BALLYEDMOND

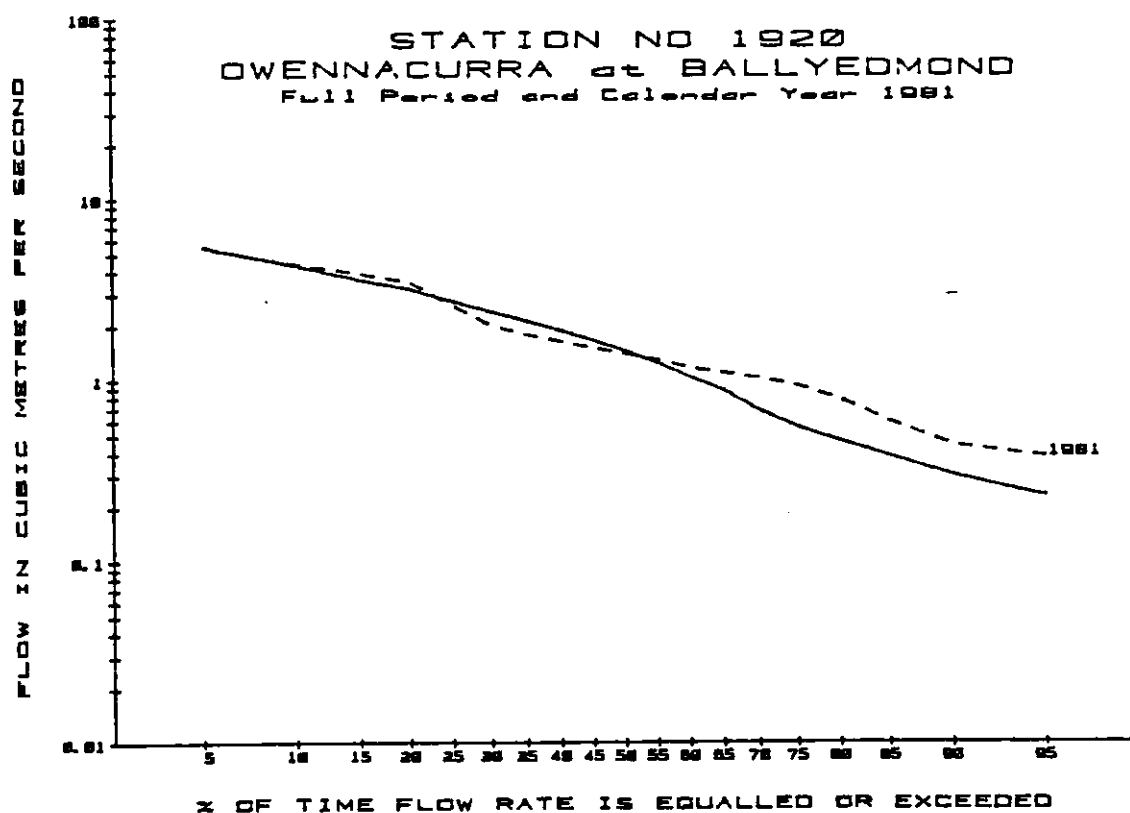
Data based on continuous water level records for the period :
16-Jun-77 to 31-Dec-85

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.340	0.350	0.38	0.50	[Average]
1977-1985	0.220	0.258	0.31	0.48	

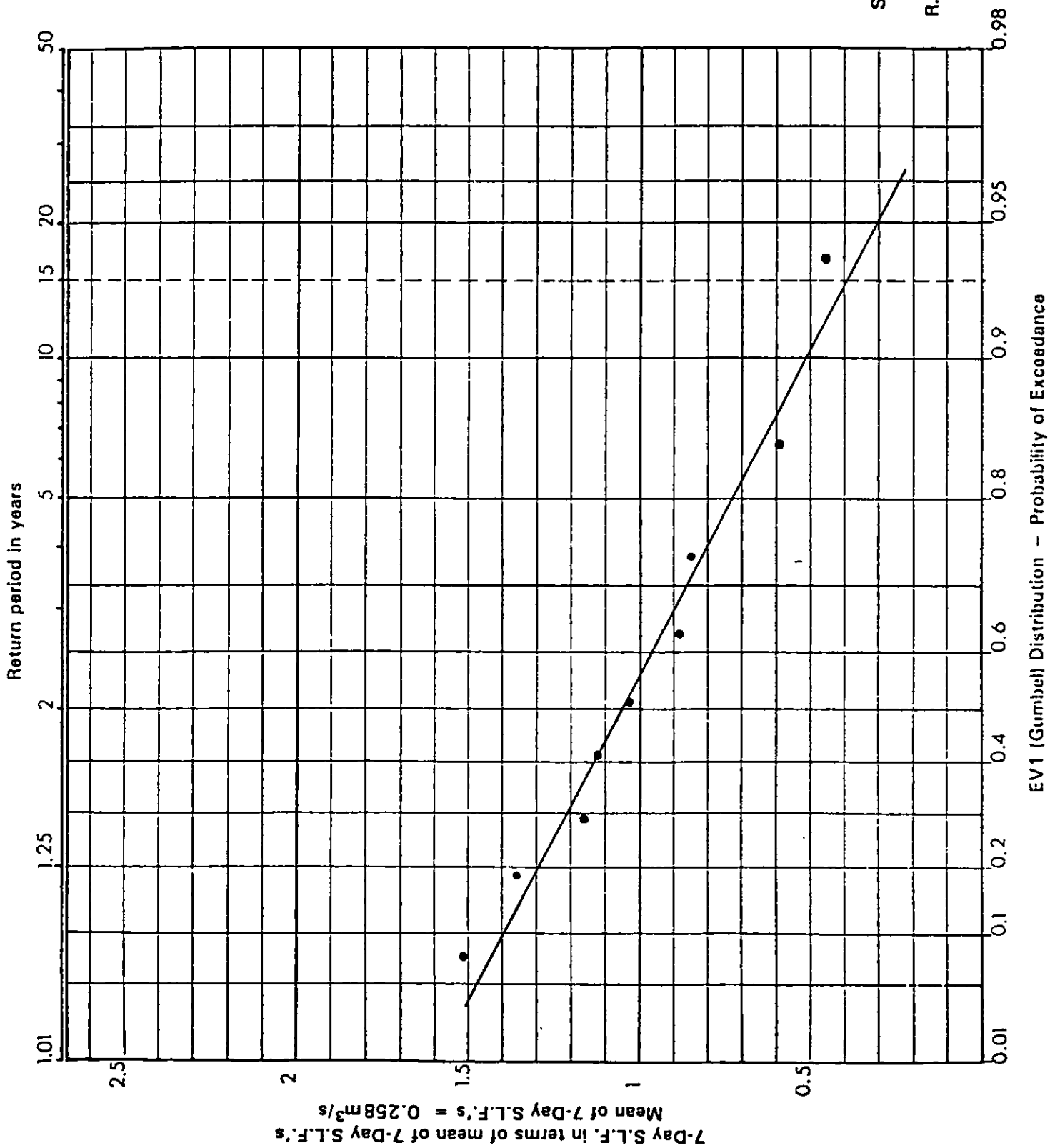
TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	5.40	30%	2.02	75%	0.93
10%	4.40	40%	1.64	80%	0.78
15%	3.90	50%	1.40	85%	0.59
20%	3.50	60%	1.17	90%	0.44
25%	2.60	70%	1.03	95%	0.38

** All flow rates above are in cubic metres per second. **



Data for 1976 for
Station No. 1920 Ballyedmond
is not available



Distribution of
SEVEN-DAY SUSTAINED LOW FLOWS
at Station No. 1920
R. OWENNACURRA AT BALLYEDMOND
for period 1977 to 1985

EV1 (Gumbel) Distribution - Probability of Exceedance

BANDON at BANDON

Body Responsible: OPW

N. G. R.: W 493 553

Catchment Area to Station: 406.0 sq km
 Long Average Rainfall [1941-1970]: 1623 mm/yr

Data based on continuous water level records for the period :
 1-Jan-72 to 31-Dec-82

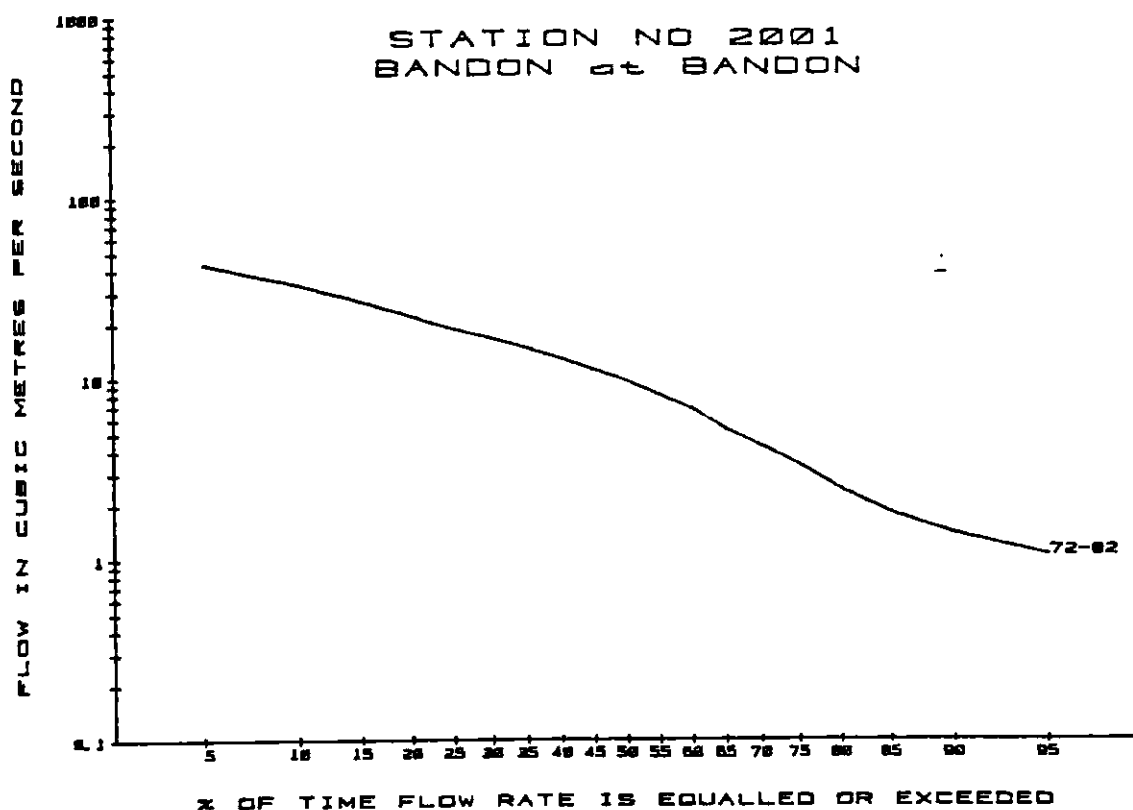
Mean Flow Rate: 14.20 [1103 mm/yr rainfall on catchment]

Daily Mean Flows: minimum 0.510 on 14-Sep-76
 maximum 205.10 on 23-Oct-75

TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	43.30	30%	16.70	75%	3.31
10%	33.30	40%	12.80	80%	2.42
15%	26.90	50%	9.65	85%	1.80
20%	22.20	60%	6.74	90%	1.39
25%	18.80	70%	4.20	95%	1.06

** All flow rates above are in cubic metres per second. **



BANDON at BANDON

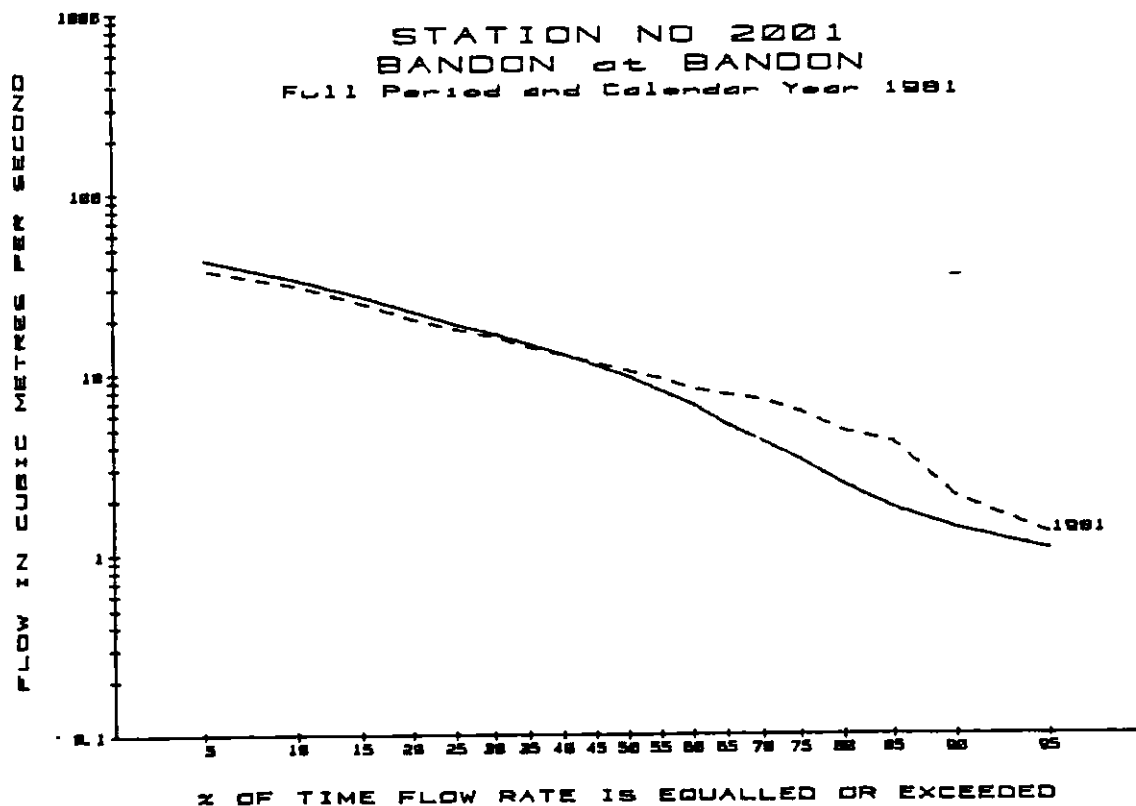
Data based on continuous water level records for the period :
1-Jan-72 to 31-Dec-82

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.950	1.040	1.28	1.93	
1972-1982	0.949	1.060	1.34	2.13	[Average]

TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	38.00	30%	16.05	75%	6.10
10%	30.90	40%	12.70	80%	4.80
15%	24.70	50%	10.35	85%	4.15
20%	20.10	60%	8.23	90%	2.07
25%	17.68	70%	7.13	95%	1.30

** All flow rates above are in cubic metres per second. **



BANDON at BANDON

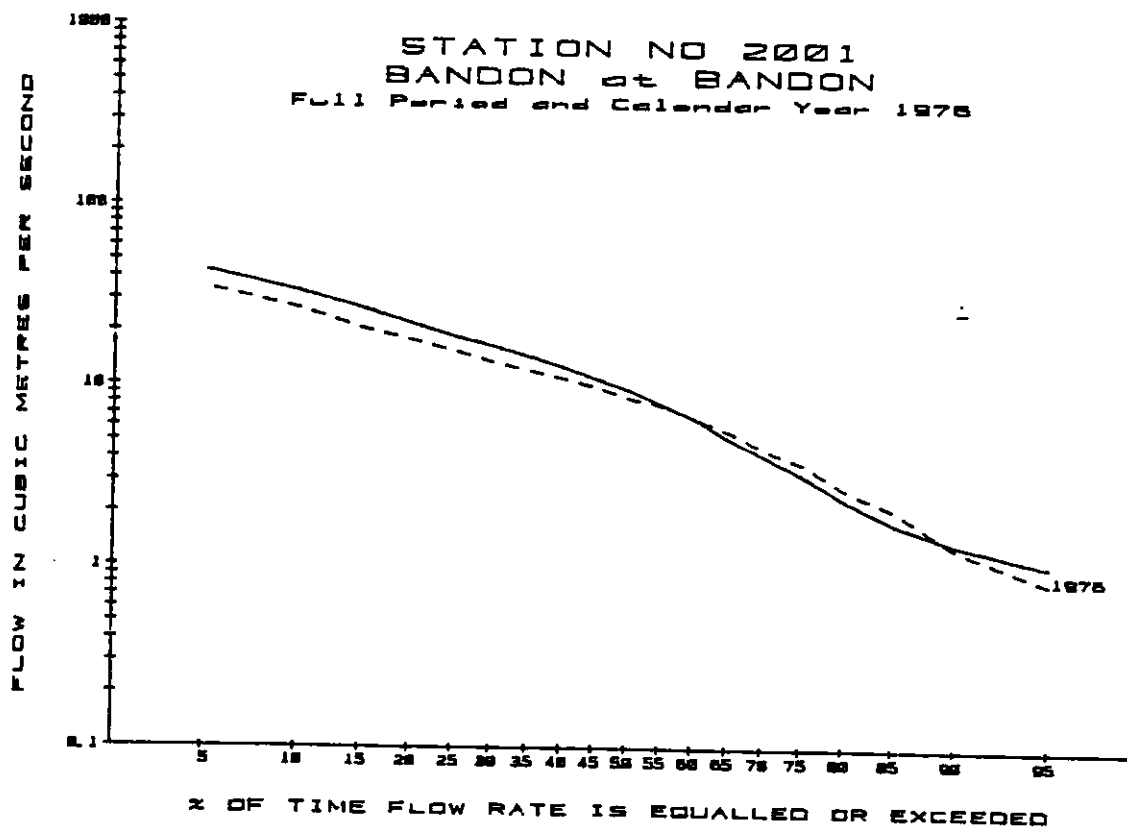
Data based on continuous water level records for the period :
1-Jan-72 to 31-Dec-82

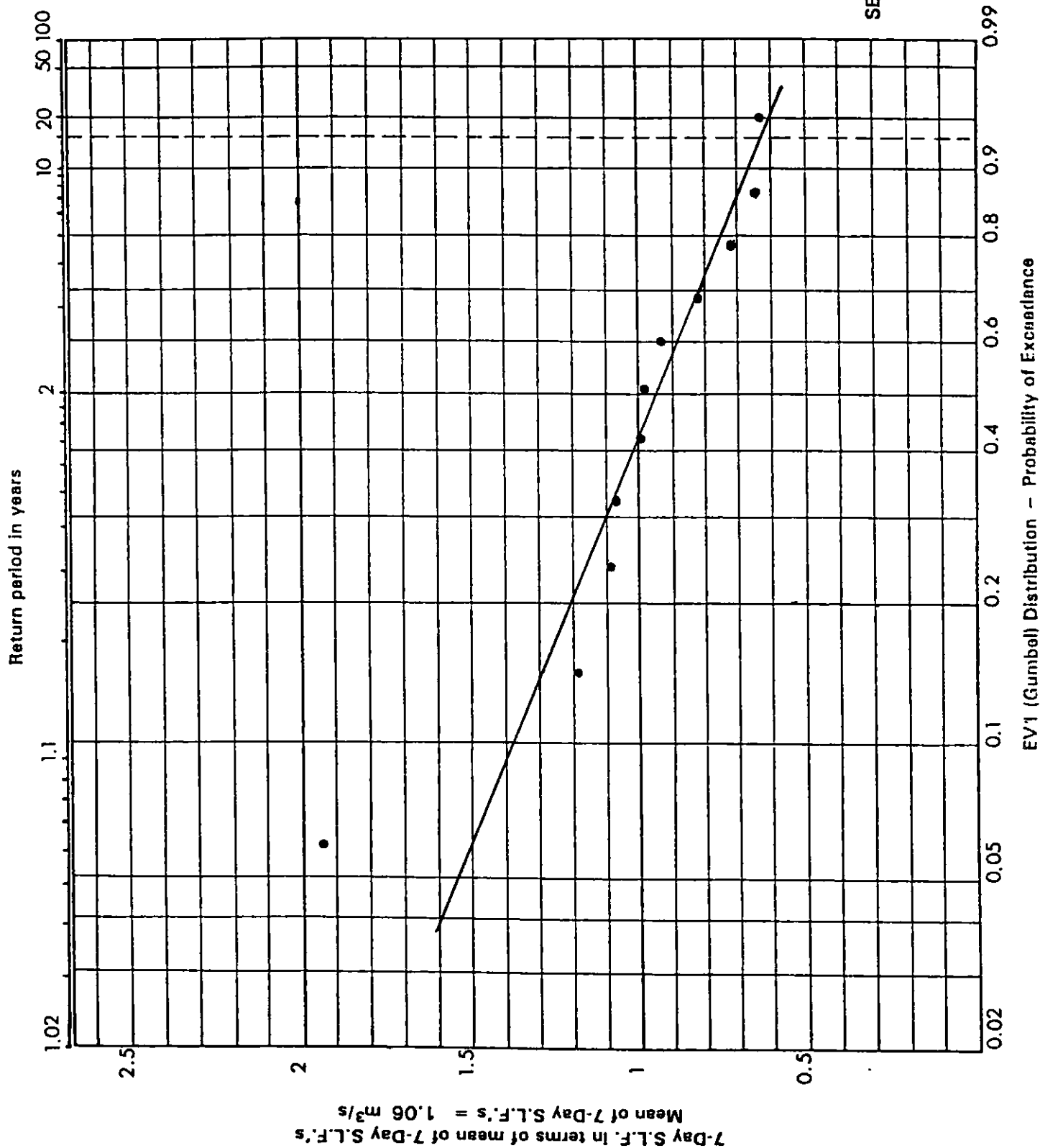
PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1976	0.600	0.670	0.79	1.18	
1972-1982	0.600	0.670	0.78	0.90	[Min]

TABLE OF EXCEEDANCE PERCENTILES

Year 1976 Only					
5%	34.70	30%	13.60	75%	3.81
10%	26.80	40%	11.10	80%	2.75
15%	20.80	50%	8.67	85%	2.14
20%	18.00	60%	6.76	90%	1.31
25%	15.65	70%	4.54	95%	0.85

** All flow rates above are in cubic metres per second. **





Distribution of
SEVEN-DAY SUSTAINED LOW FLOWS
at Station No. 2001
R. BANDON AT BANDON
for period 1972 to 1982

BANDON at CURRANURE

Body Responsible: OPW

N.G.R.: W 529 573

Catchment Area to Station: 431.0 sq km
 Long Average Rainfall [1941-1970]: 1603 mm/yr

Data based on continuous water level records for the period:
 1-Jan-75 to 31-Dec-82

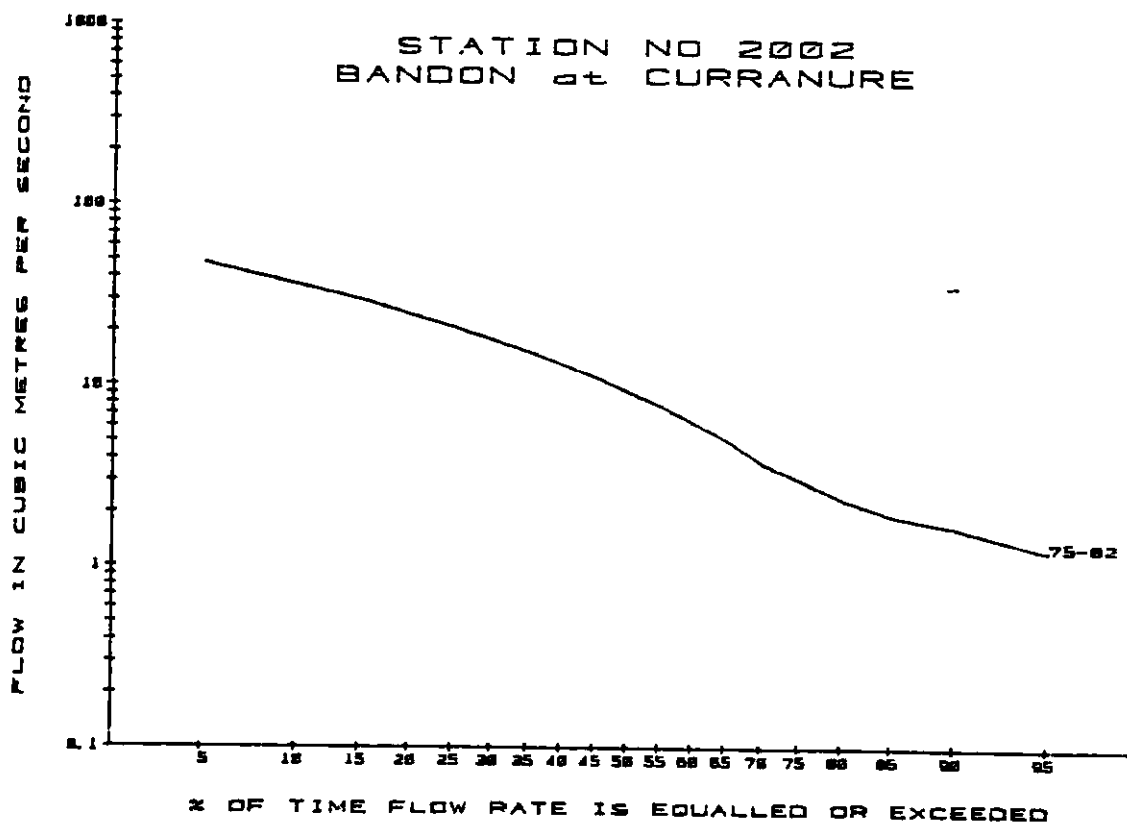
Mean Flow Rate: 15.25 [1116 mm/yr rainfall on catchment]

Daily Mean Flows: minimum 0.550 on 14-Sep-76
 maximum 264.70 on 24-Oct-75

TABLE OF EXCEEDANCE PERCENTILES

		Full period		PERCENTILES	
5%	47.70	30%	18.00	75%	3.10
10%	36.30	40%	13.20	80%	2.42
15%	30.00	50%	9.37	85%	1.97
20%	24.90	60%	6.35	90%	1.70
25%	21.20	70%	3.81	95%	1.26

** All flow rates above are in cubic metres per second. **



BANDON at CURRANURE

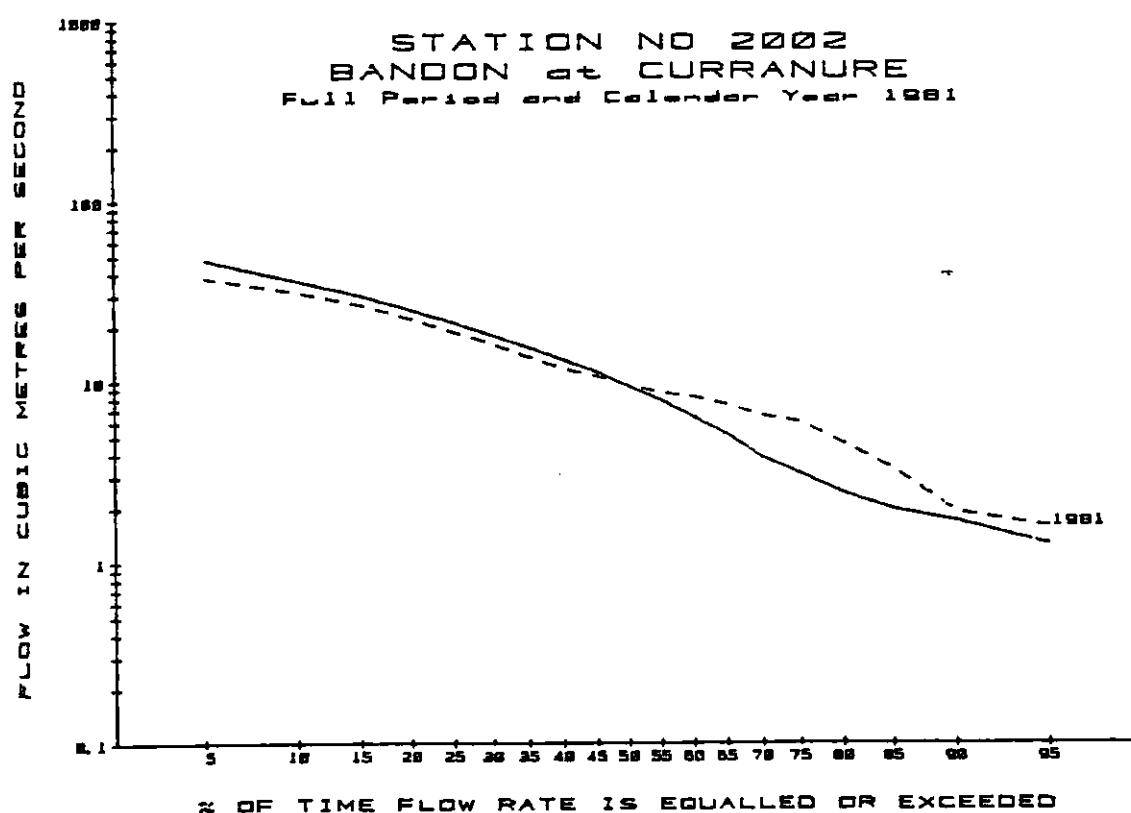
Data based on continuous water level records for the period :
1-Jan-75 to 31-Dec-82

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	1.050	1.230	1.29	1.94	
1975-1982	1.020	1.185	1.44	1.99	[Average]

TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	37.90	30%	16.20	75%	5.97
10%	31.40	40%	11.80	80%	4.54
15%	26.70	50%	9.48	85%	3.27
20%	22.20	60%	8.22	90%	1.91
25%	18.80	70%	6.48	95%	1.58

** All flow rates above are in cubic metres per second. **



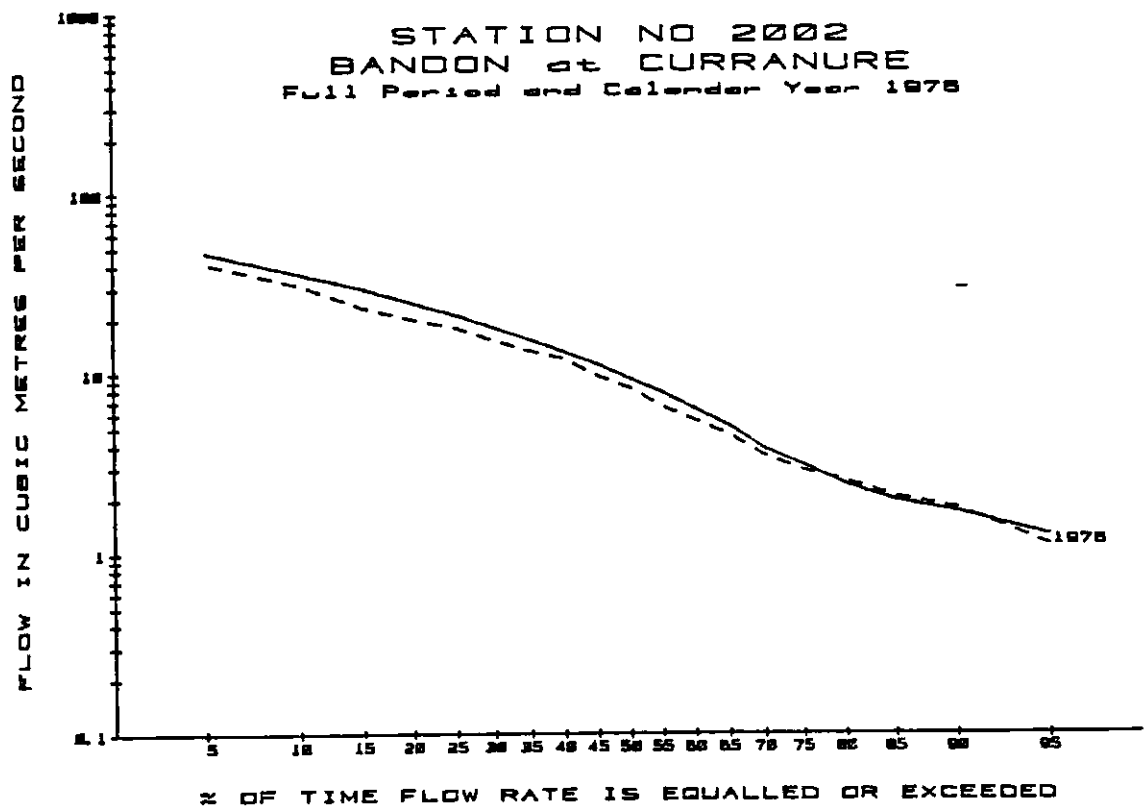
BANDON at CURRANURE

Data based on continuous water level records for the period :
1-Jan-75 to 31-Dec-82

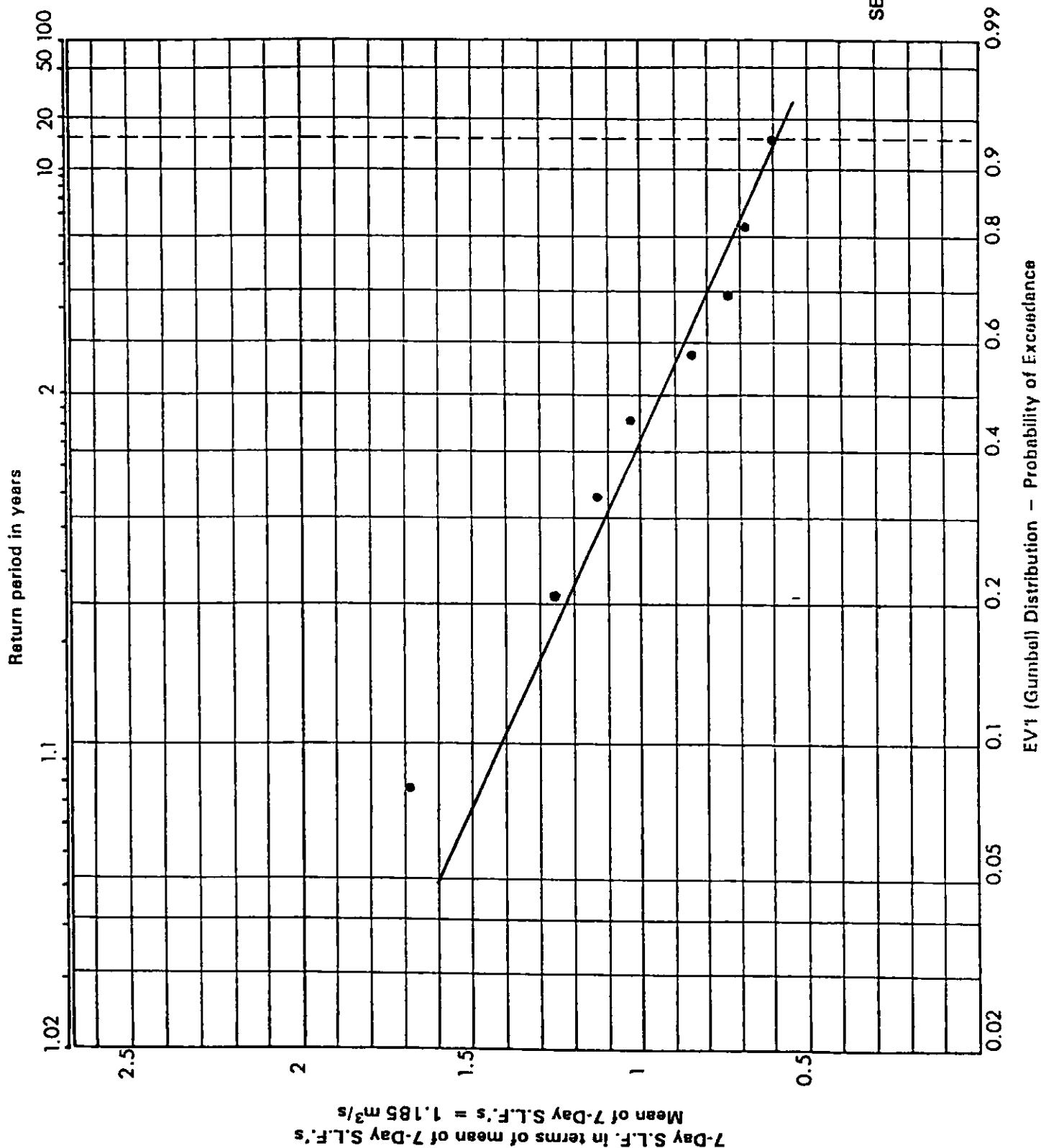
PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1976	0.680	0.720	1.03	1.40	
1975-1982	0.670	0.720	0.97	1.40	[Min]

TABLE OF EXCEEDANCE PERCENTILES					
Year 1976 Only					
5%	41.40	30%	15.30	75%	2.90
10%	31.40	40%	12.10	80%	2.54
15%	23.50	50%	8.34	85%	2.07
20%	20.10	60%	5.49	90%	1.78
25%	18.00	70%	3.49	95%	1.11

** All flow rates above are in cubic metres per second. **



Distribution of
SEVEN-DAY SUSTAINED LOW FLOWS
at Station No. 2002
R. BANDON AT CURRANURE
for period 1975 to 1982



STICK at BELGOOLY

Body Responsible: COR

N. G. R.: W 563 540

Catchment Area to Station: 37.0 sq km
 Long Average Rainfall [1941-1970]: 1150 mm/yr

Data based on continuous water level records for the period :
 1-Jan-78 to 31-Dec-85

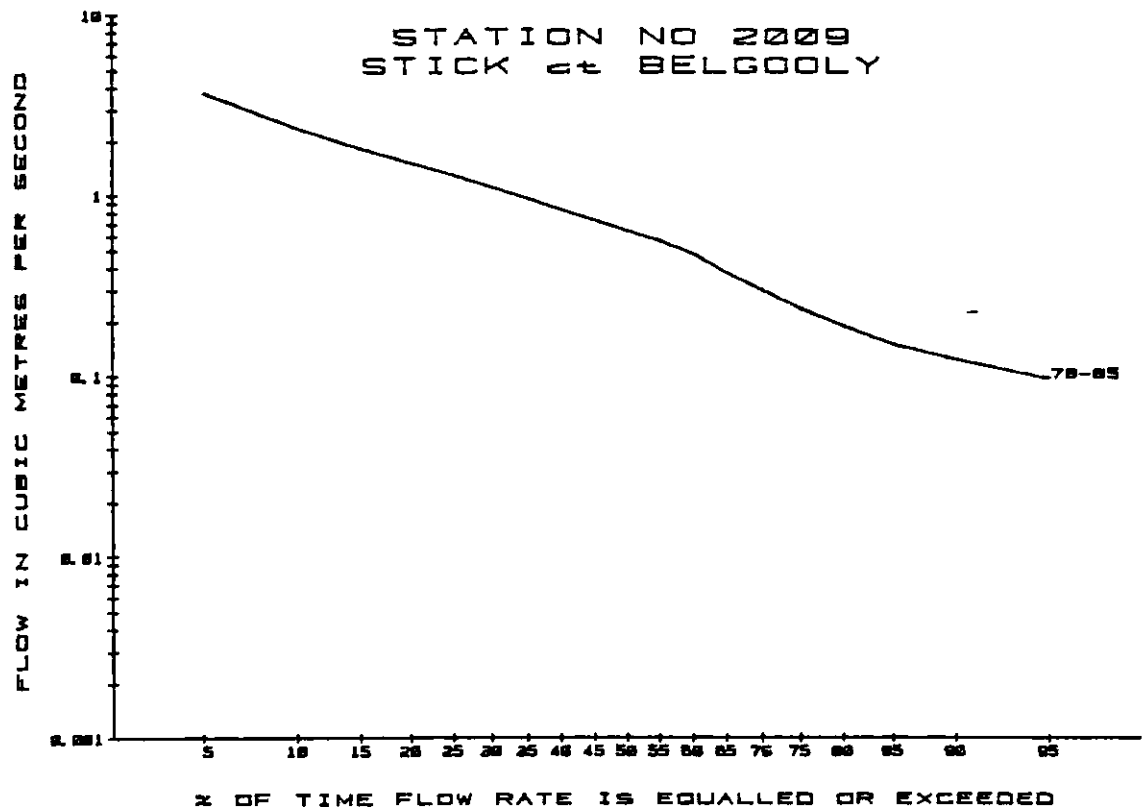
Mean Flow Rate: 1.17 [998 mm/yr rainfall on catchment]

Daily Mean Flows: minimum 0.050 on 16-Sep-84
 maximum 31.60 on 10-Feb-79

TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	3.74	30%	1.12	75%	0.24
10%	2.38	40%	0.84	80%	0.19
15%	1.84	50%	0.64	85%	0.15
20%	1.53	60%	0.48	90%	0.12
25%	1.30	70%	0.30	95%	0.10

** All flow rates above are in cubic metres per second. **



STICK at BELGOOLY

Data based on continuous water level records for the period :

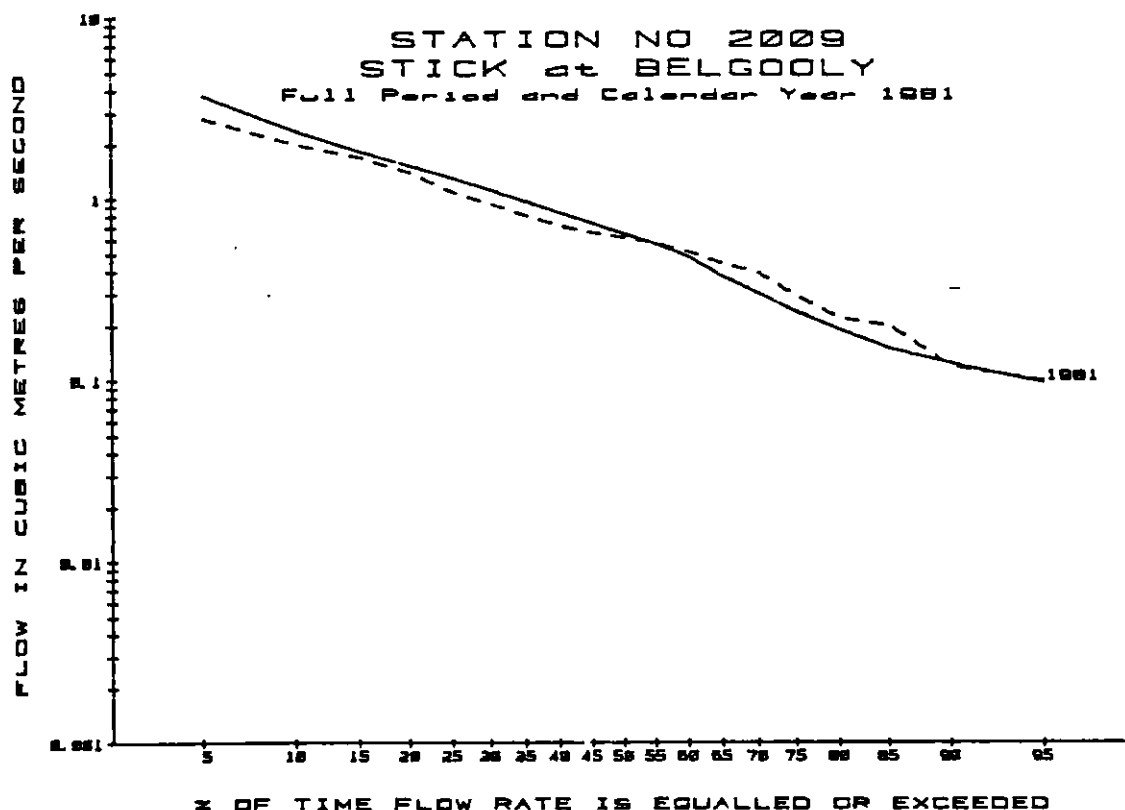
1-Jan-78 to 31-Dec-85

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.080	0.090	0.10	0.16	
1978-1985	0.090	0.095	0.12	0.18	[Average]

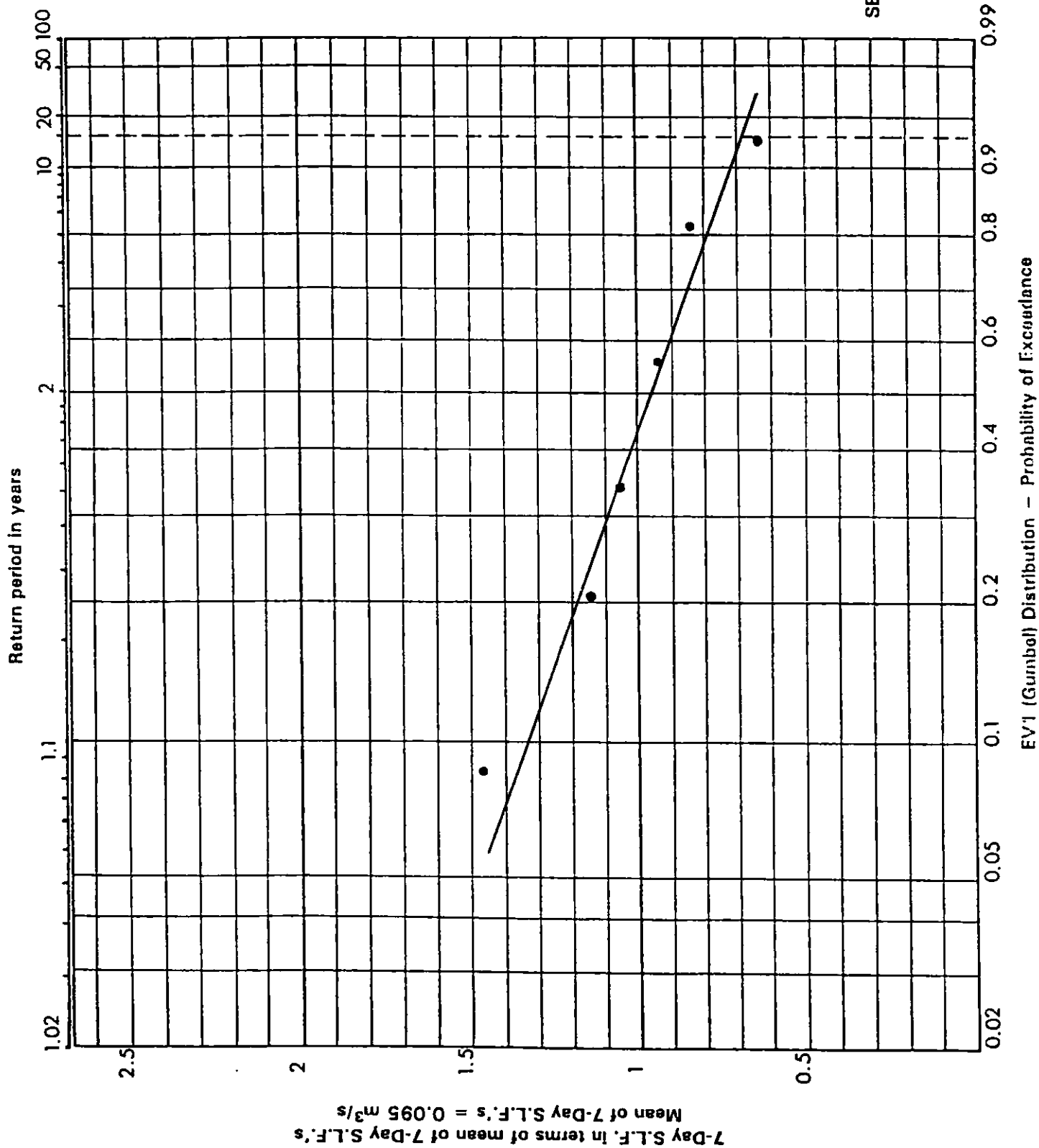
TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	2.80	30%	0.94	75%	0.29
10%	2.00	40%	0.71	80%	0.22
15%	1.70	50%	0.61	85%	0.20
20%	1.40	60%	0.51	90%	0.12
25%	1.09	70%	0.39	95%	0.10

** All flow rates above are in cubic metres per second. **



Data for 1976 for
Station No. 2009 Belgooly
is not available



Distribution of
SEVEN-DAY SUSTAINED LOW FLOWS
at Station No. 2009
R. STICK AT BELGOOLY
for period 1978 to 1985

CUMMERAGH at CUMMERAGH WEIR

Body Responsible: ESB

N.G.R.: V 546 695

Catchment Area to Station: 47.0 sq km
 Long Average Rainfall [1941-1970]: 1998 mm/yr

Data based on continuous water level records for the period:
 1-Jan-43 to 31-Dec-86 *

Mean Flow Rate: 2.89 [1941 mm/yr rainfall on catchment]

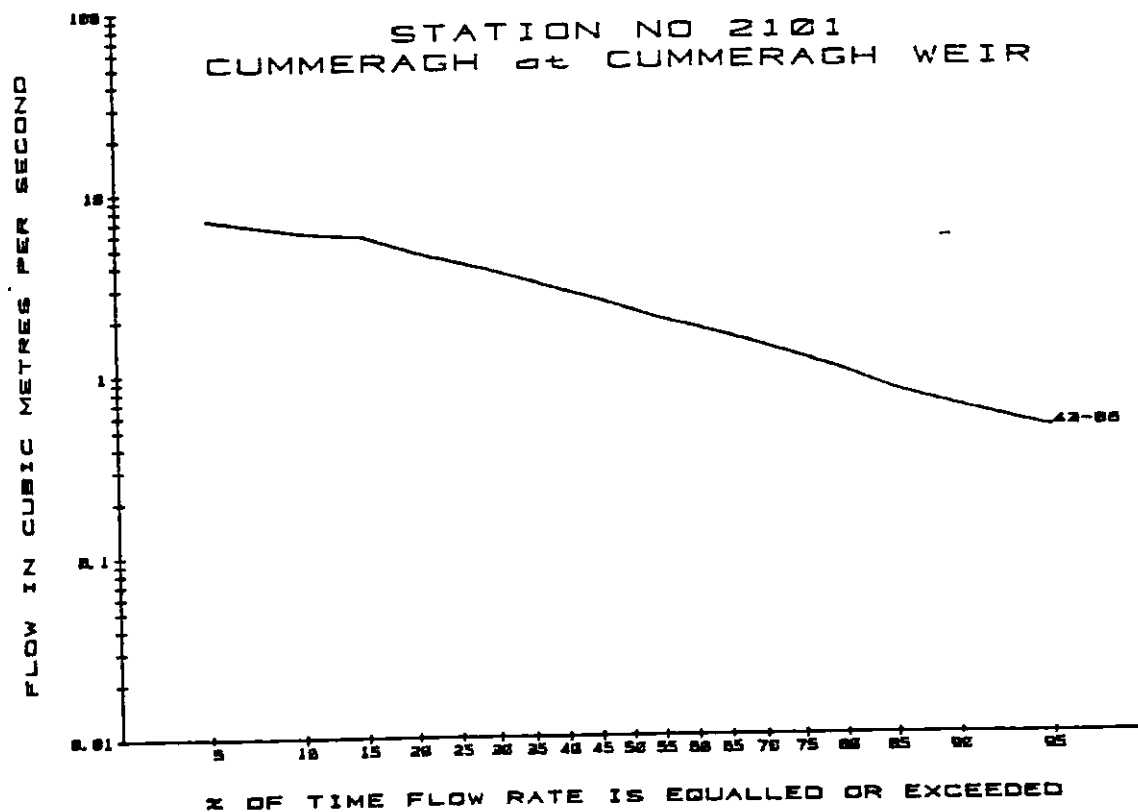
Daily Mean Flows: minimum 0.166 on 8-Sep-76
 maximum 21.40 on 1-Mar-55

TABLE OF EXCEEDANCE PERCENTILES

TABLE OF EXCEEDANCE PERCENTILES					
		Full period			
5%	7.23	30%	3.66	75%	1.20
10%	6.09	40%	2.84	80%	1.01
15%	5.79	50%	2.23	85%	0.79
20%	4.72	60%	1.77	90%	0.64
25%	4.13	70%	1.39	95%	0.48

** All flow rates above are in cubic metres per second. **

* excl. data for 1973.



CUMMERAGH at CUMMERAGH WEIR

Data based on continuous water level records for the period :
1-Jan-43 to 31-Dec-86 *

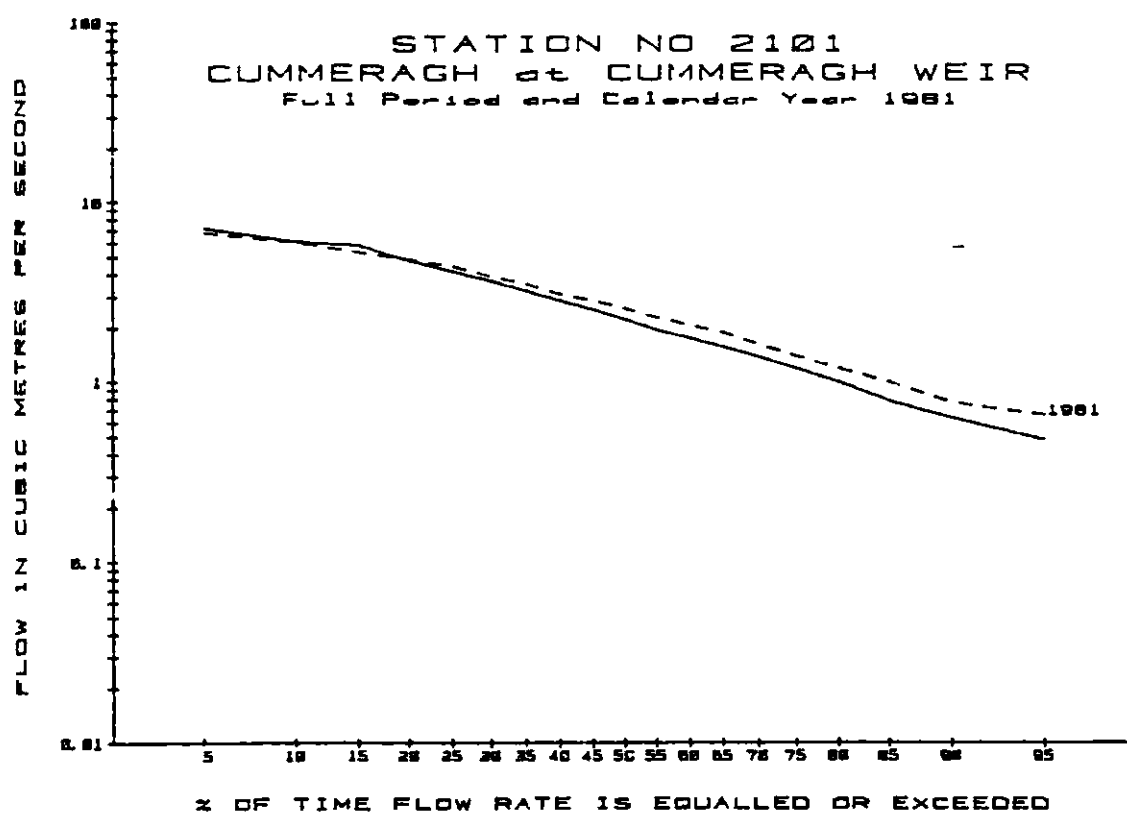
PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.520	0.570	0.90	0.96	
1943-1986	0.376	0.450	0.65	1.65	[Average]

TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	6.80	30%	3.88	75%	1.40
10%	6.00	40%	3.08	80%	1.20
15%	5.30	50%	2.57	85%	1.01
20%	4.80	60%	2.08	90%	0.78
25%	4.41	70%	1.63	95%	0.66

** All flow rates above are in cubic metres per second. **

* excl. data for 1973 .



CUMMERAGH at CUMMERAGH WEIR

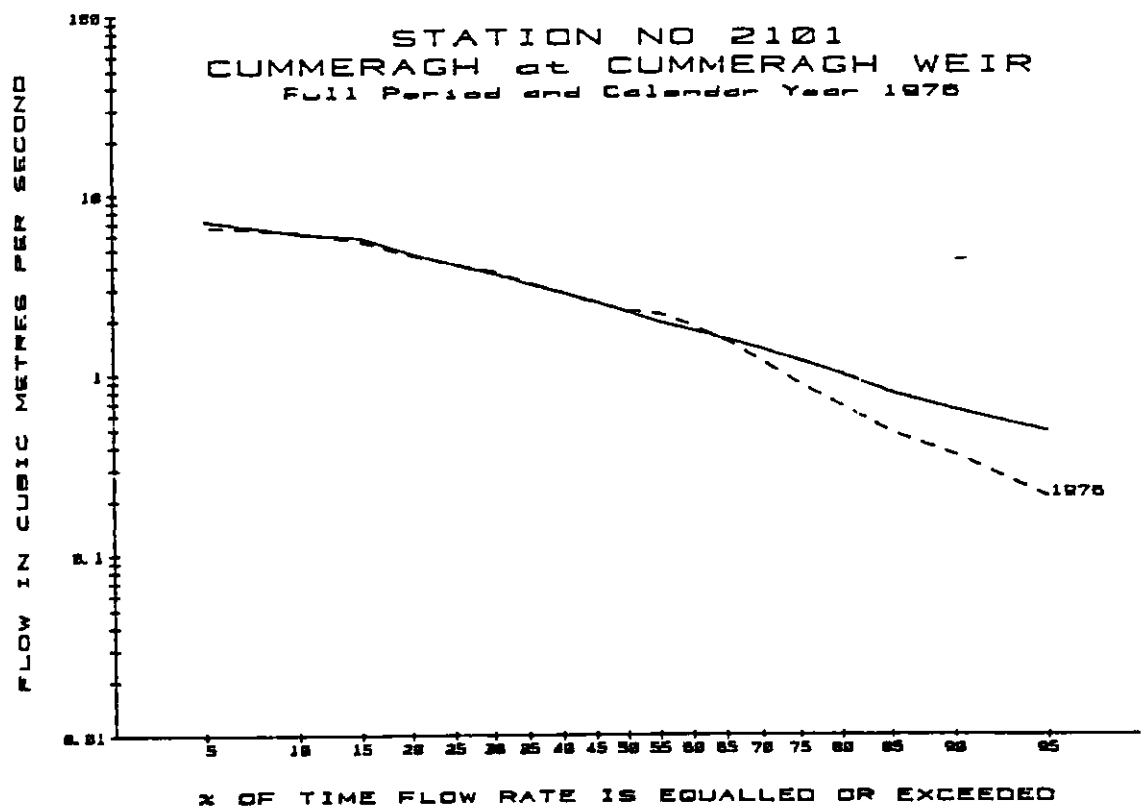
Data based on continuous water level records for the period :
1-Jan-43 to 31-Dec-86 *

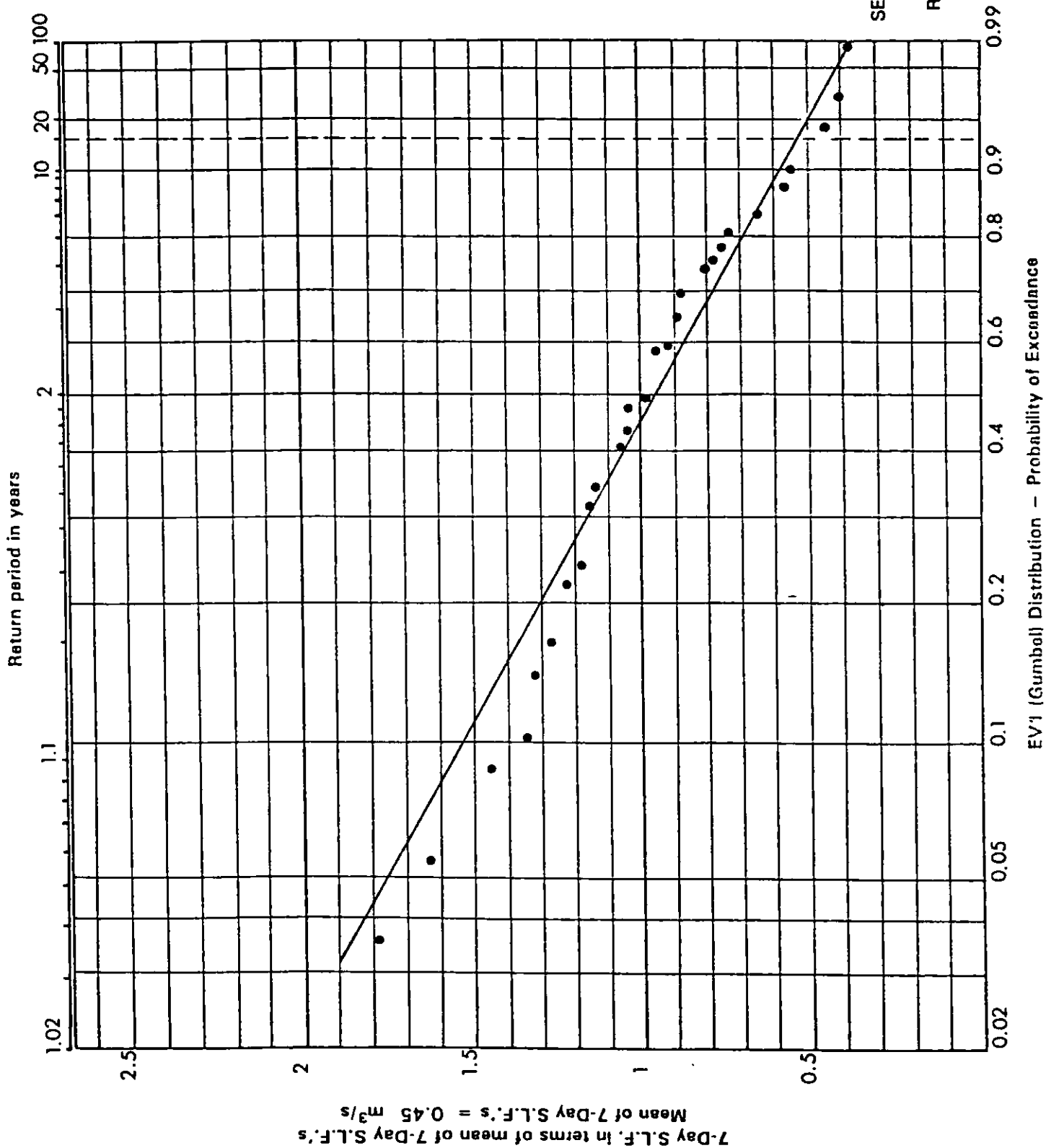
PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1976	0.167	0.170	0.20	0.46	
1943-1986	0.167	0.170	0.20	0.40	[Min]

TABLE OF EXCEEDANCE PERCENTILES					
Year 1976 Only					
5%	6.70	30%	3.76	75%	0.89
10%	6.20	40%	2.87	80%	0.67
15%	5.50	50%	2.28	85%	0.48
20%	4.60	60%	1.88	90%	0.36
25%	4.16	70%	1.19	95%	0.21

** All flow rates above are in cubic metres per second. **

* excl. data for 1973.





Distribution of
SEVEN-DAY SUSTAINED LOW FLOWS
at Station No. 2101
R. CUMMERAGH AT CUMMERAGH
for period 1943 to 1986

COOMHOLA at COOMHOLA

Body Responsible: COR

N. G. R.: V 998 548

Catchment Area to Station: 65.0 sq km
 Long Average Rainfall [1941-1970]: 2168 mm/yr

Data based on continuous water level records for the period :
 9-Jul-75 to 31-Dec-85

Mean Flow Rate: 4.77 [2314 mm/yr rainfall on catchment]

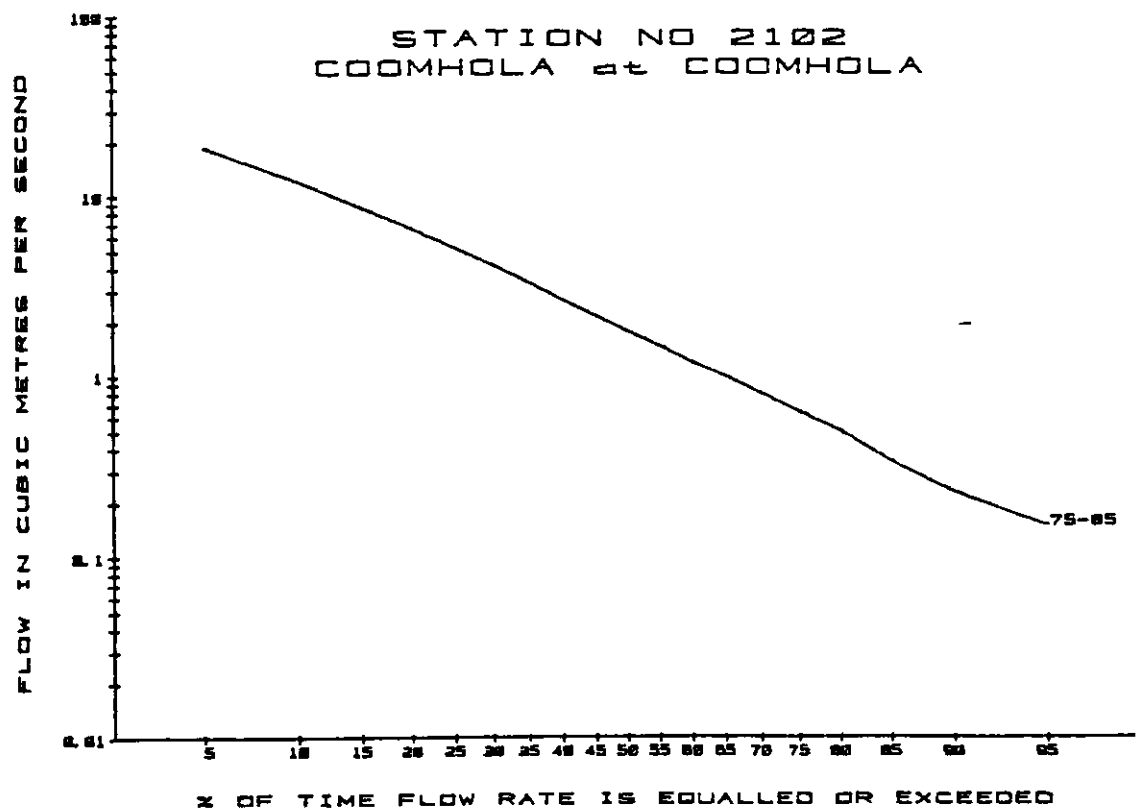
Daily Mean Flows: minimum < 0.010 on 8-Sep-76
 maximum 102.10 on 6-Dec-78

TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	19.00	30%	4.19	75%	0.64
10%	12.30	40%	2.68	80%	0.50
15%	8.80	50%	1.79	85%	0.34
20%	6.70	60%	1.20	90%	0.23
25%	5.21	70%	0.81	95%	0.15

** All flow rates above are in cubic metres per second. **

** Note: Lowest Measured Flow 0.009 on 1-Sept-76. **



COOMHOLA at COOMHOLA

Data based on continuous water level records for the period :
9-Jul-75 to 31-Dec-85

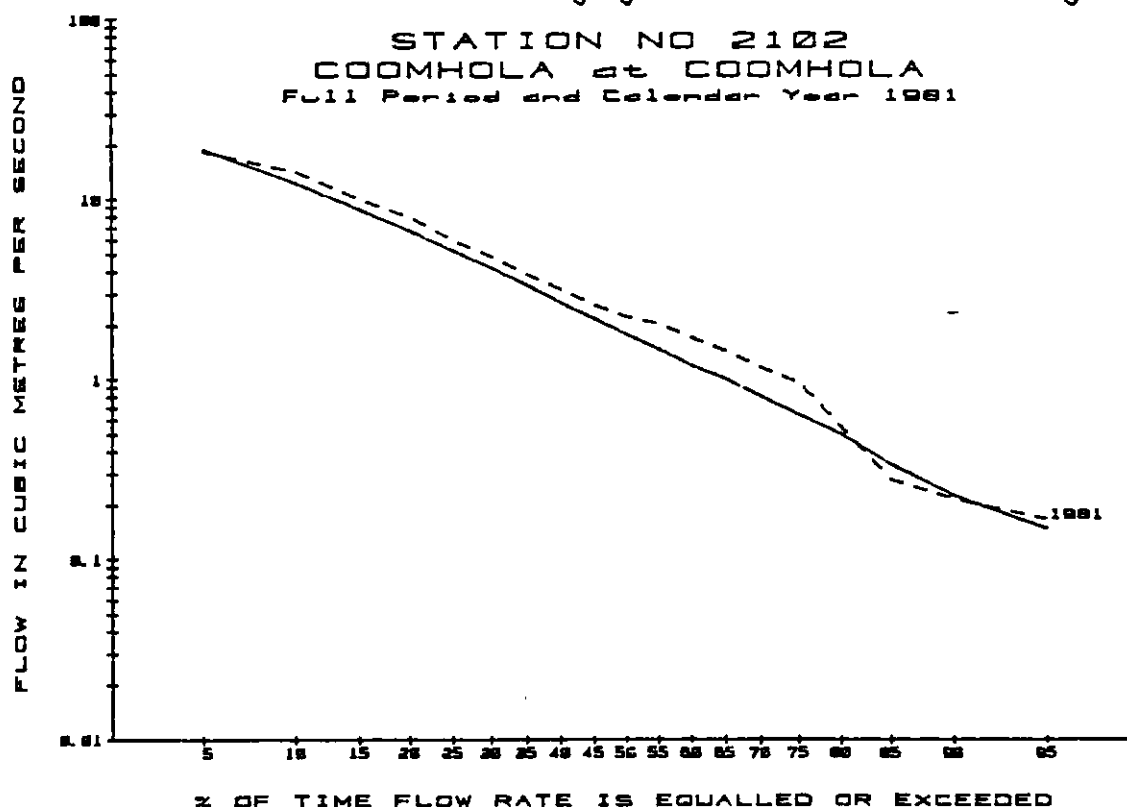
PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.140	0.150	0.19	3.44	
1975-1985	- *	- *	0.24	1.92	[Average]

TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	18.50	30%	4.83	75%	0.96
10%	14.20	40%	3.18	80%	0.54
15%	10.00	50%	2.24	85%	0.28
20%	8.00	60%	1.71	90%	0.22
25%	5.95	70%	1.17	95%	0.17

** All flow rates above are in cubic metres per second. **

- * Exact values of the 3- and 7- day SLF data for 1976 at Station 2102 COOMHOLA are not available due to interference with the gauge before the end of the drought in 1976.



COOMHOLA at COOMHOLA

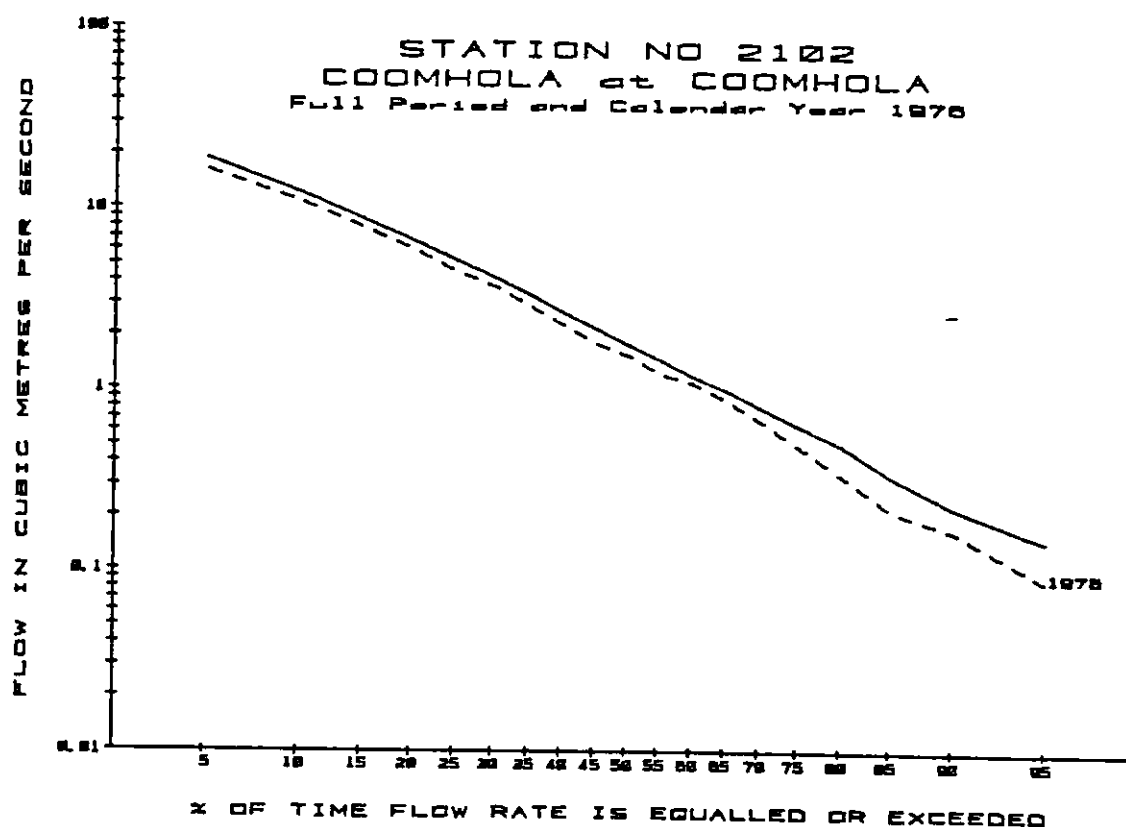
Data based on continuous water level records for the period :
9-Jul-75 to 31-Dec-85

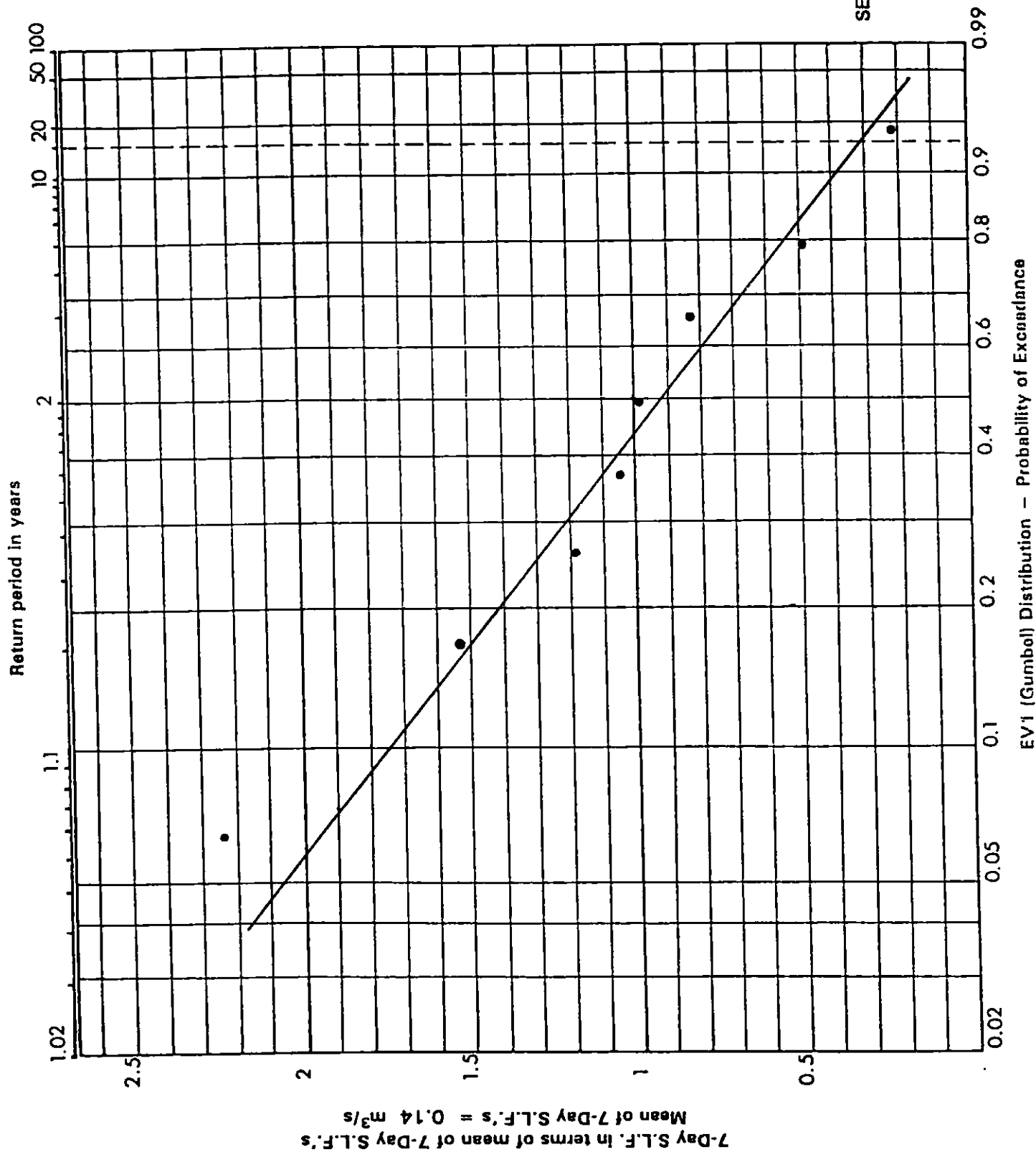
PERIOD	SUSTAINED LOW FLOWS				DAYS
	3 *	7 *	15	30	
1976	<0.010	<0.010	0.15	0.19	
1975-1985	<0.010	<0.010	0.08	0.15	[Min]

TABLE OF EXCEEDANCE PERCENTILES					
Year 1976 Only					
5%	16.40	30%	3.74	75%	0.49
10%	11.00	40%	2.30	80%	0.34
15%	7.90	50%	1.56	85%	0.22
20%	6.00	60%	1.10	90%	0.17
25%	4.52	70%	0.68	95%	0.09

** All flow rates above are in cubic metres per second. **

* see note on SHEET B .





Distribution of
SEVEN-DAY SUSTAINED LOW FLOWS
at Station No. 2102
R. COOMHOLA AT COOMHOLA
for period 1975 to 1985
(excl. 1976)

STATION NO 2103

Sheet A

OWVANE at BALLYLICKEY

Body Responsible: COR

N.G.R.: W 010 536

Catchment Area to Station:

Long Average Rainfall [1941-1970]: 75.0 sq km
1861 mm/yrData based on continuous water level records for the period :
27-Jul-76 to 31-Dec-84

Mean Flow Rate: 4.59

[1929 mm/yr rainfall on catchment]

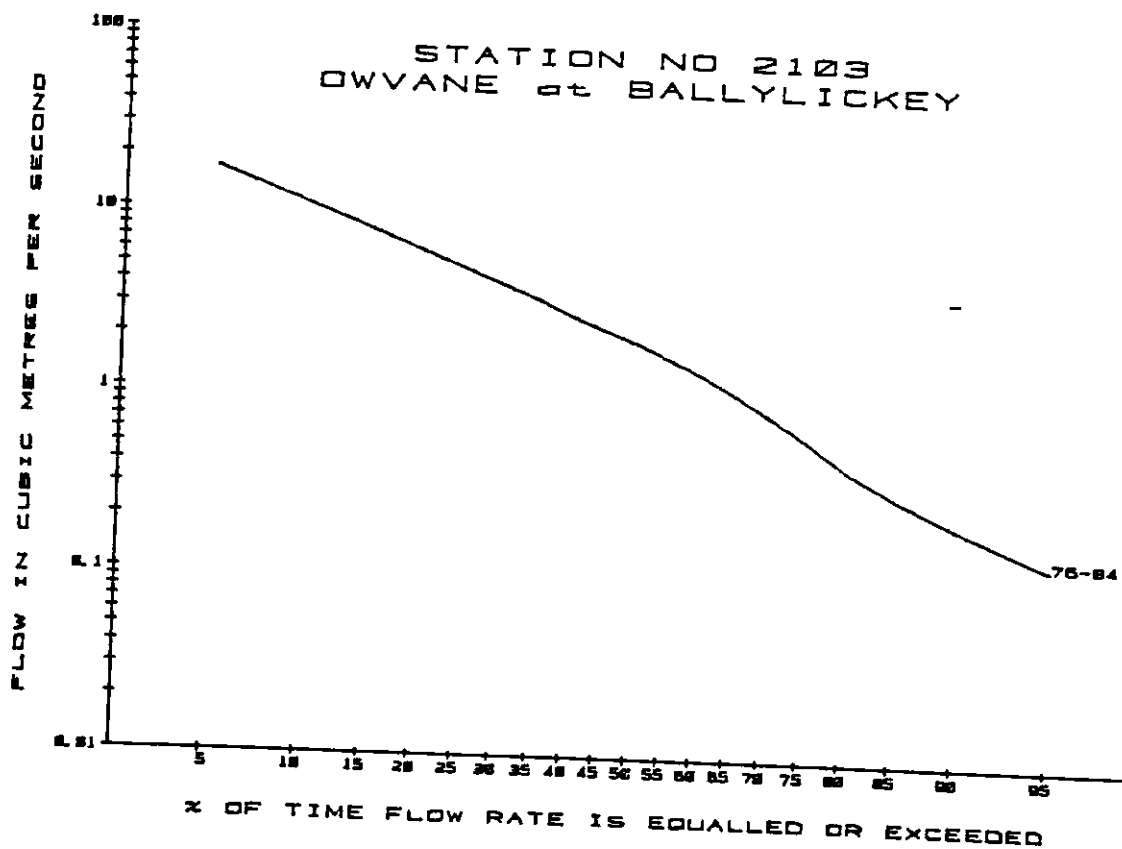
Daily Mean Flows:

minimum 0.040 on 8-Sep-76
maximum 181.10 on 6-Dec-78

TABLE OF EXCEEDANCE PERCENTILES

CLEARANCE PERCENTILES					
		Full period			
5%	17.10	30%	4.10	75%	0.61
10%	10.90	40%	2.78	80%	0.42
15%	8.00	50%	2.00	85%	0.30
20%	6.20	60%	1.36	90%	0.21
25%	4.99	70%	0.83	95%	0.13

** All flow rates above are in cubic metres per second. **



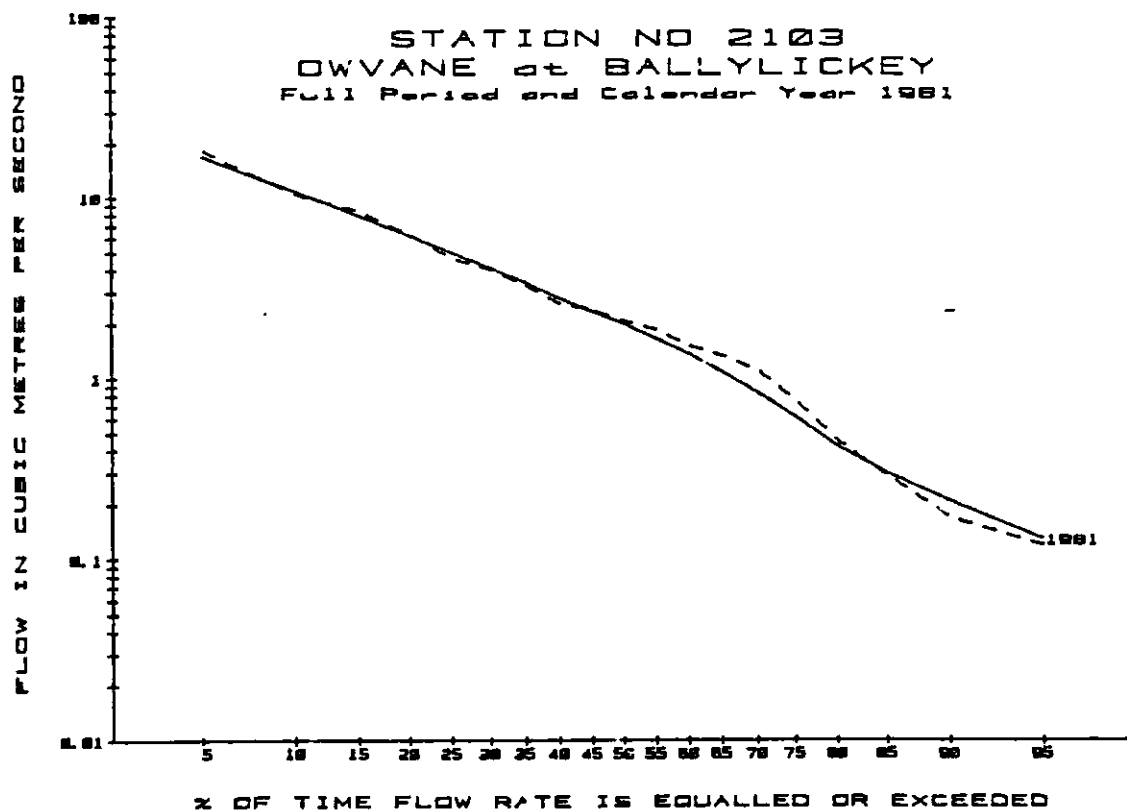
OWVANE at BALLYLICKEY

Data based on continuous water level records for the period :
7-Jul-76 to 31-Dec-84

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.100	0.120	0.13	0.36	
1976-1984	0.120	0.150	0.23	1.05	[Average]

TABLE OF EXCEEDANCE PERCENTILES					
Year 1981 Only					
5%	18.50	30%	3.99	75%	0.75
10%	10.50	40%	2.60	80%	0.45
15%	8.50	50%	2.09	85%	0.29
20%	6.30	60%	1.51	90%	0.17
25%	4.64	70%	1.10	95%	0.12

** All flow rates above are in cubic metres per second. **



OWVANE at BALLYLICKY

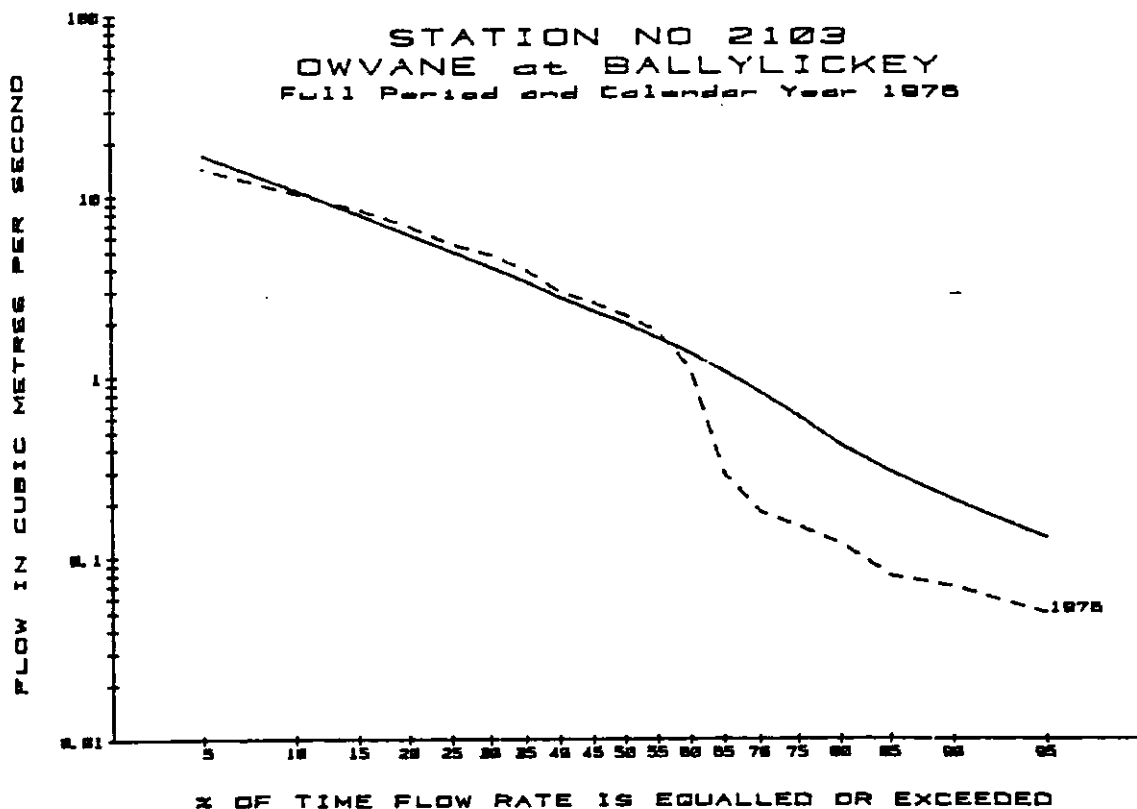
Data based on continuous water level records for the period :
27-Jul-76 to 31-Dec-84

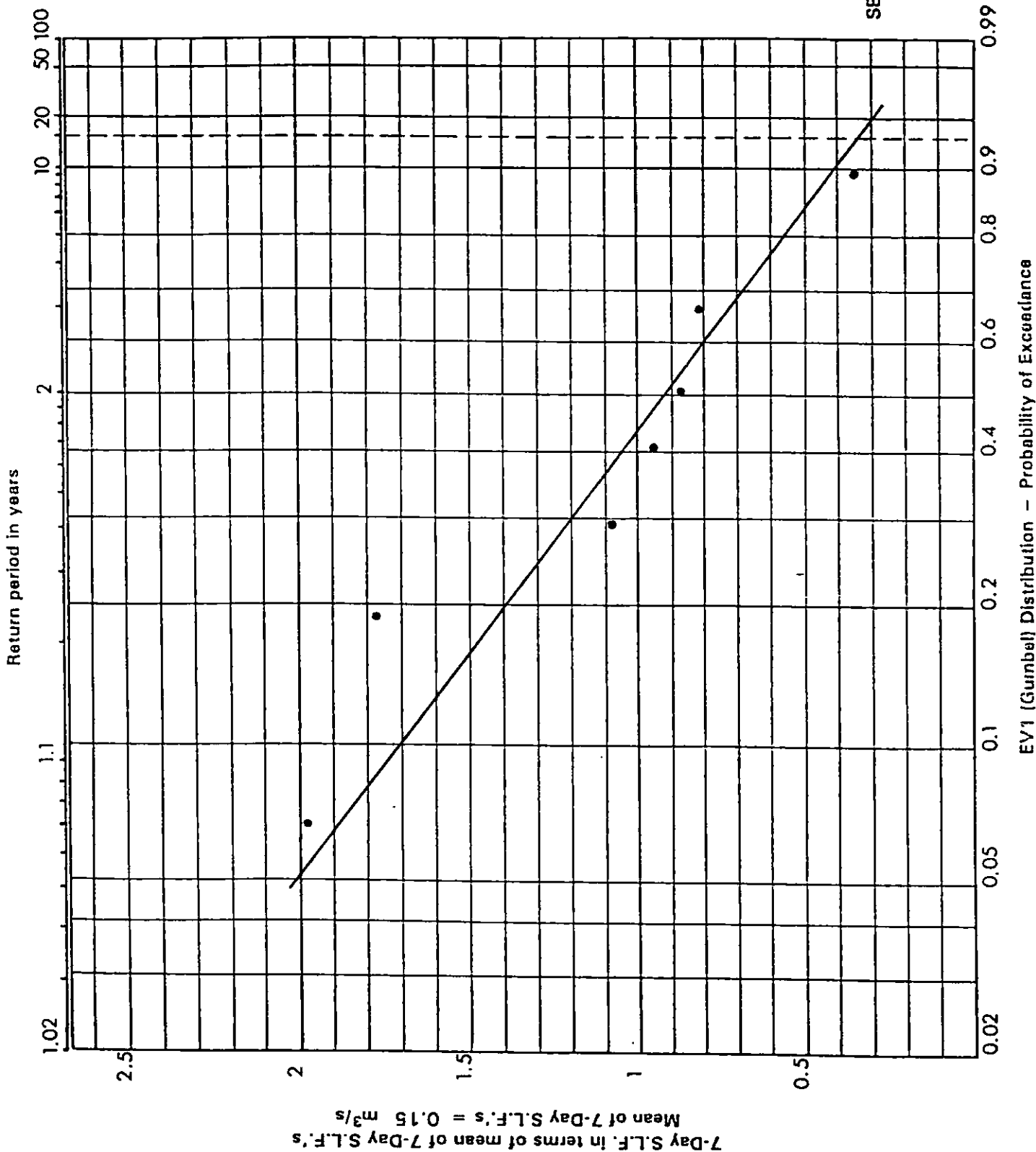
PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1976	0.040	0.050	0.08	0.18	
1976-1984	0.040	0.050	0.08	0.18	[Min]

TABLE OF EXCEEDANCE PERCENTILES

Year 1976 Only					
5%	14.40	30%	4.80	75%	0.15
10%	10.40	40%	2.99	80%	0.12
15%	8.50	50%	2.21	85%	0.08
20%	6.90	60%	1.10	90%	0.07
25%	5.47	70%	0.18	95%	0.05

** All flow rates above are in cubic metres per second. **





Sheet D

Distribution of
SEVEN-DAY SUSTAINED LOW FLOWS
at Station No. 2103
R. OWVANE AT BALLYLICKEY
for period 1976 to 1984

MEALAGH at INCHICLOUGH

Body Responsible: COR

N.G.R.: W 027 511

Catchment Area to Station: 46.0 sq km
 Long Average Rainfall [1941-1970]: 1809 mm/yr

Data based on continuous water level records for the period :
 3-Jul-75 to 31-Dec-85 *

Mean Flow Rate: 2.30 [1577 mm/yr rainfall on catchment]

Daily Mean Flows: minimum < 0.010 on 8-Sep-76
 maximum 129.80 on 22-Oct-75

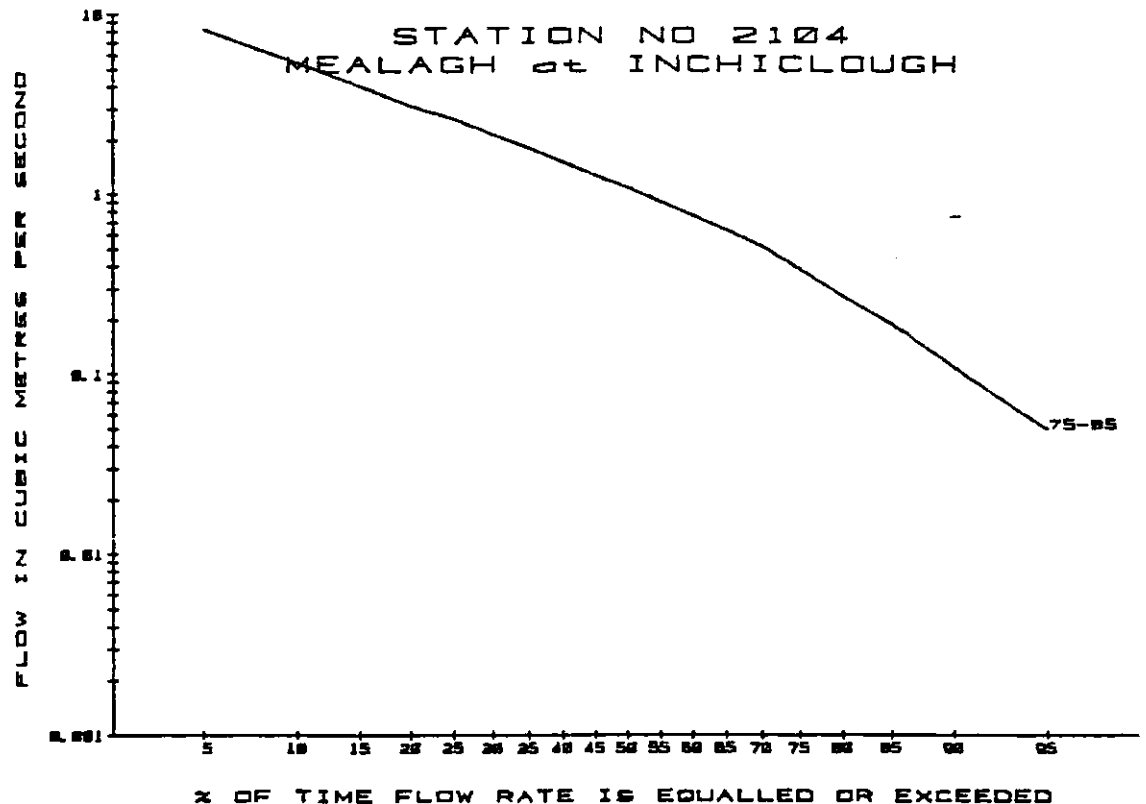
TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	8.30	30%	2.15	75%	0.38
10%	5.40	40%	1.51	80%	0.27
15%	4.00	50%	1.09	85%	0.19
20%	3.10	60%	0.76	90%	0.11
25%	2.63	70%	0.51	95%	0.05

* excl. data for 1982 .

** All flow rates above are in cubic metres per second. **

** Note : Lowest Measured Flow 0.012 on 1-Sept-76 and 10-Aug-83 . **



MEALAGH at INCHICLOUGH

Data based on continuous water level records for the period :
3-Jul-75 to 31-Dec-85 *

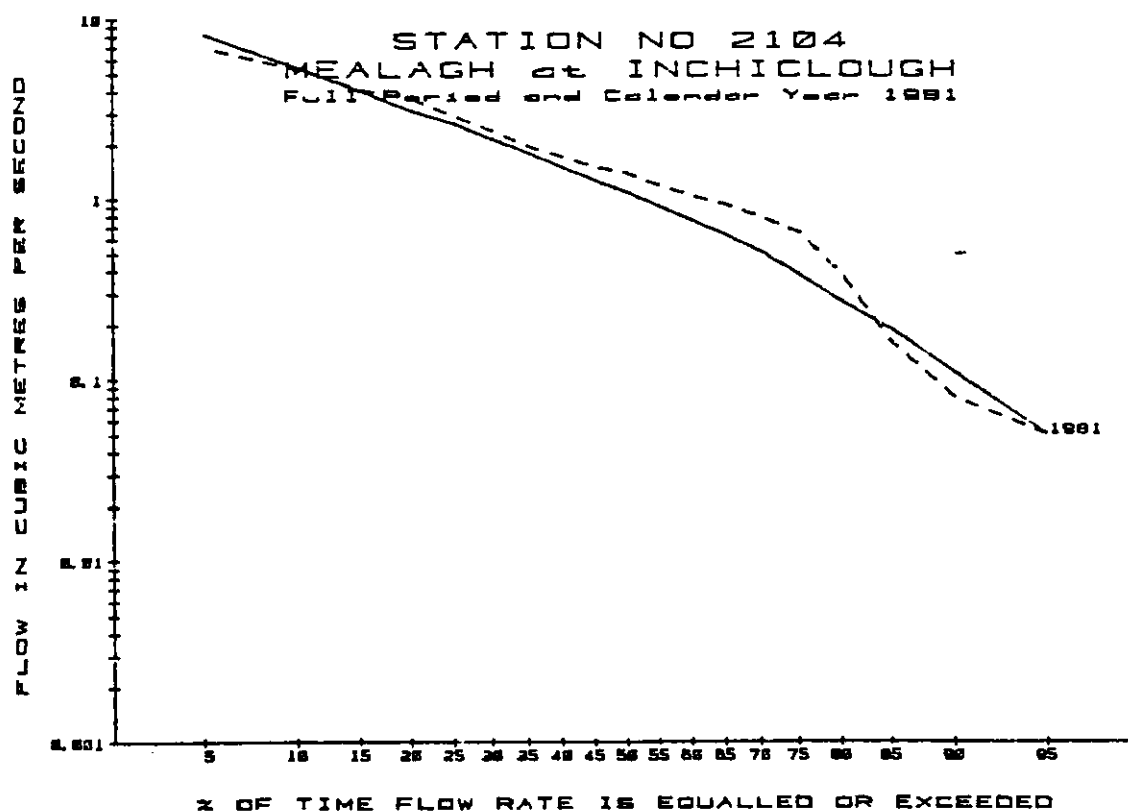
PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.039	0.050	0.07	0.26	
1975-1985	—	0.060	0.14	0.35	[Average]

TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	7.00	30%	2.40	75%	0.65
10%	5.30	40%	1.72	80%	0.38
15%	4.10	50%	1.39	85%	0.16
20%	3.60	60%	1.04	90%	0.08
25%	2.90	70%	0.79	95%	0.05

** All flow rates above are in cubic metres per second. **

* excl. data for 1982.



ADRI GOLE at ADRI GOLE

Body Responsible: COR

N.G.R.: V 812 506

Catchment Area to Station: 27.0 sq km
 Long Average Rainfall [1941-1970]: 2274 mm/yr

Data based on continuous water level records for the period :
 1-Jan-78 to 31-Dec-85

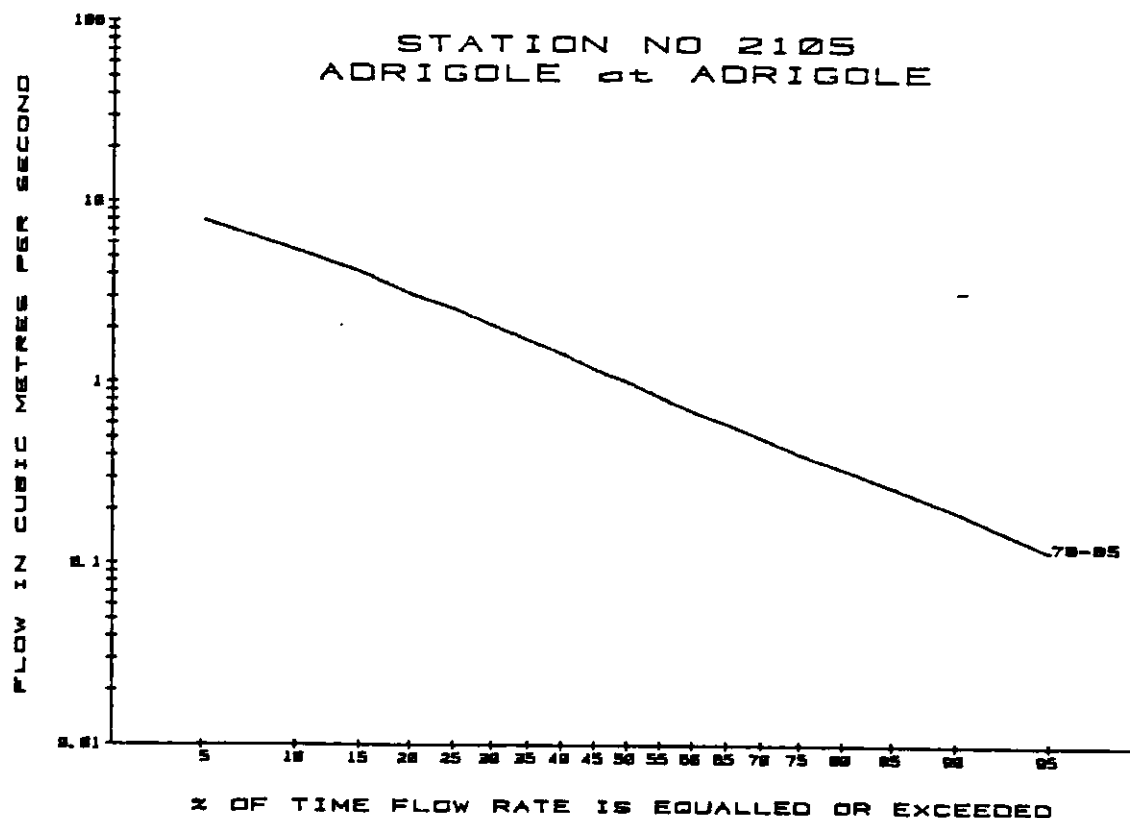
Mean Flow Rate: 2.18 [2541 mm/yr rainfall on catchment]

Daily Mean Flows: minimum 0.012 on 14-Aug-83
 maximum 48.40 on 12-Feb-80

TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	7.90	30%	2.09	75%	0.41
10%	5.40	40%	1.46	80%	0.34
15%	4.10	50%	1.02	85%	0.27
20%	3.10	60%	0.70	90%	0.20
25%	2.58	70%	0.50	95%	0.12

** All flow rates above are in cubic metres per second. **



ADRIGOLE at ADRIGOLE

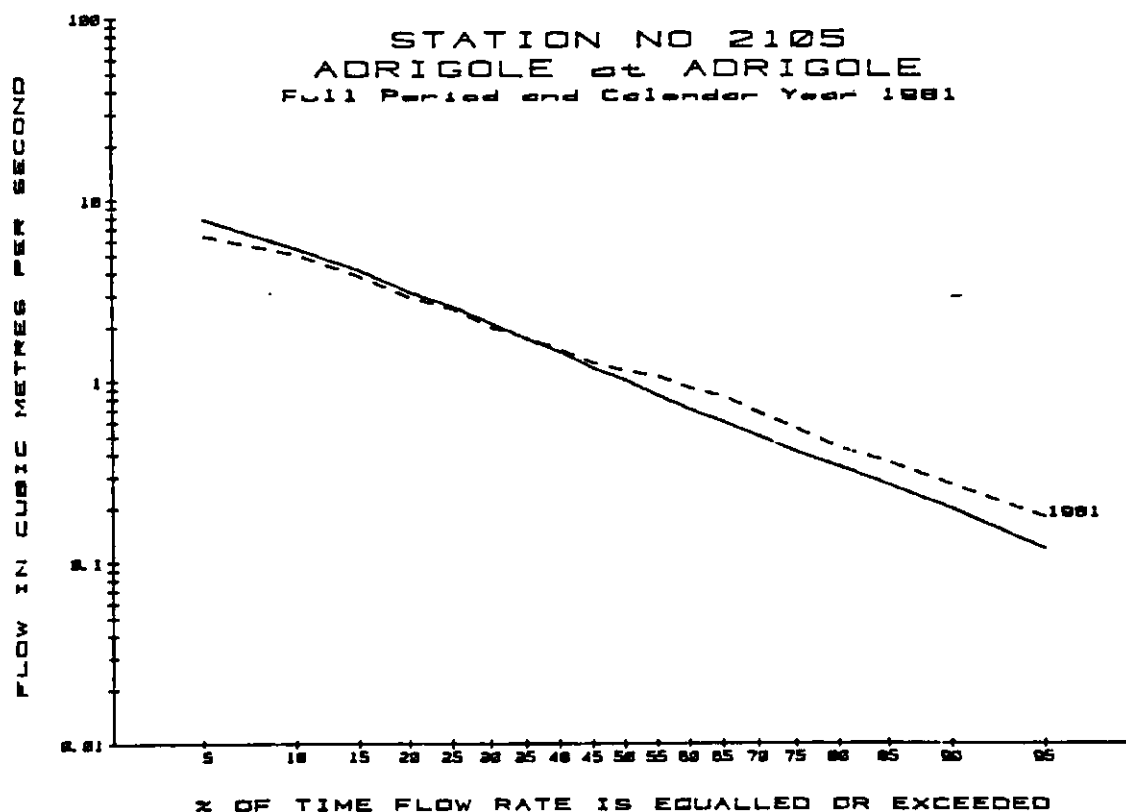
Data based on continuous water level records for the period :
1-Jan-78 to 31-Dec-85

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.094	0.160	0.30	1.22	
1978-1985	0.098	0.120	0.21	1.21	[Average]

TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	6.40	30%	1.98	75%	0.55
10%	5.00	40%	1.51	80%	0.43
15%	3.80	50%	1.15	85%	0.36
20%	2.90	60%	0.92	90%	0.27
25%	2.50	70%	0.67	95%	0.18

** All flow rates above are in cubic metres per second. **



MAINE at RIVERVILLE

Body Responsible: OPW

N.G.R.: Q 923 063

Catchment Area to Station: 272.0 sq km
 Long Average Rainfall [1941-1970]: 1354 mm/yr

Data based on continuous water level records for the period :
 1-Jan-71 to 31-Dec-81

Mean Flow Rate: 8.48 [983 mm/yr rainfall on catchment]

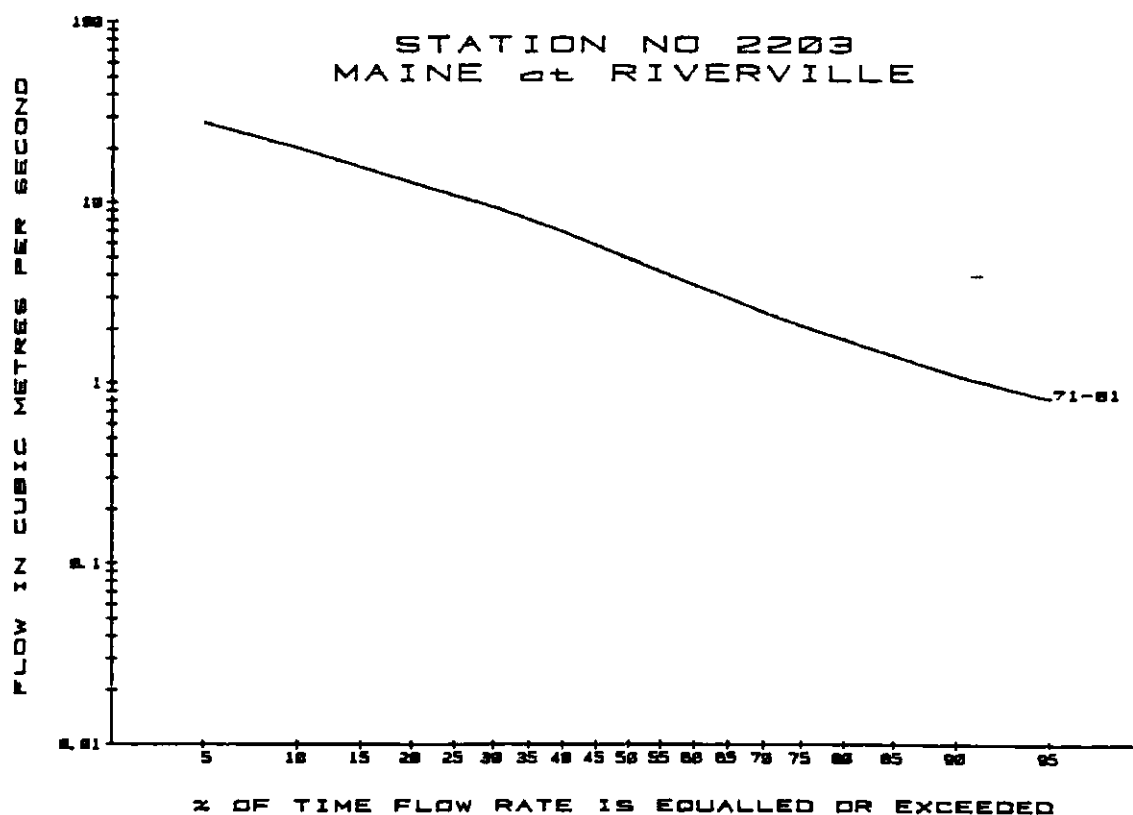
Daily Mean Flows: minimum 0.450 on 1-Sep-75
 maximum 230.60 on 1-Dec-73

TABLE OF EXCEEDANCE PERCENTILES

		Full period			
5%	27.90	30%	9.54	75%	2.09
10%	20.20	40%	6.96	80%	1.76
15%	15.80	50%	4.93	85%	1.44
20%	13.00	60%	3.52	90%	1.12
25%	11.00	70%	2.49	95%	0.83

** All flow rates above are in cubic metres per second. **

** Note: Lowest Measured Flow 0.71 on 17-Aug-84 **



MAINE at RIVERVILLE

Data based on continuous water level records for the period :

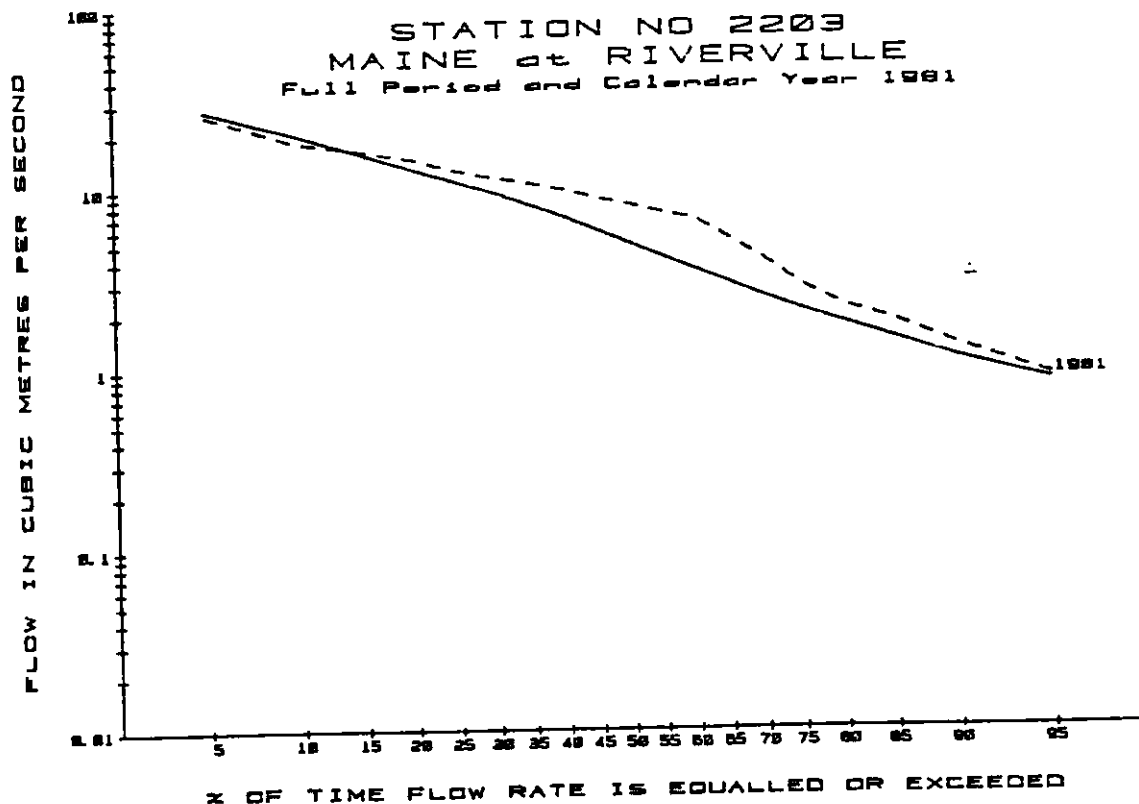
1-Jan-71 to 31-Dec-81

PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.760	0.850	0.97	2.20	[Average]
1971-1981	0.910	1.030	1.26	1.76	

TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	26.20	30%	11.50	75%	2.85
10%	18.30	40%	9.81	80%	2.19
15%	16.40	50%	8.10	85%	1.81
20%	14.70	60%	6.70	90%	1.32
25%	12.70	70%	4.01	95%	0.88

** All flow rates above are in cubic metres per second. **



MAINE at RIVERVILLE

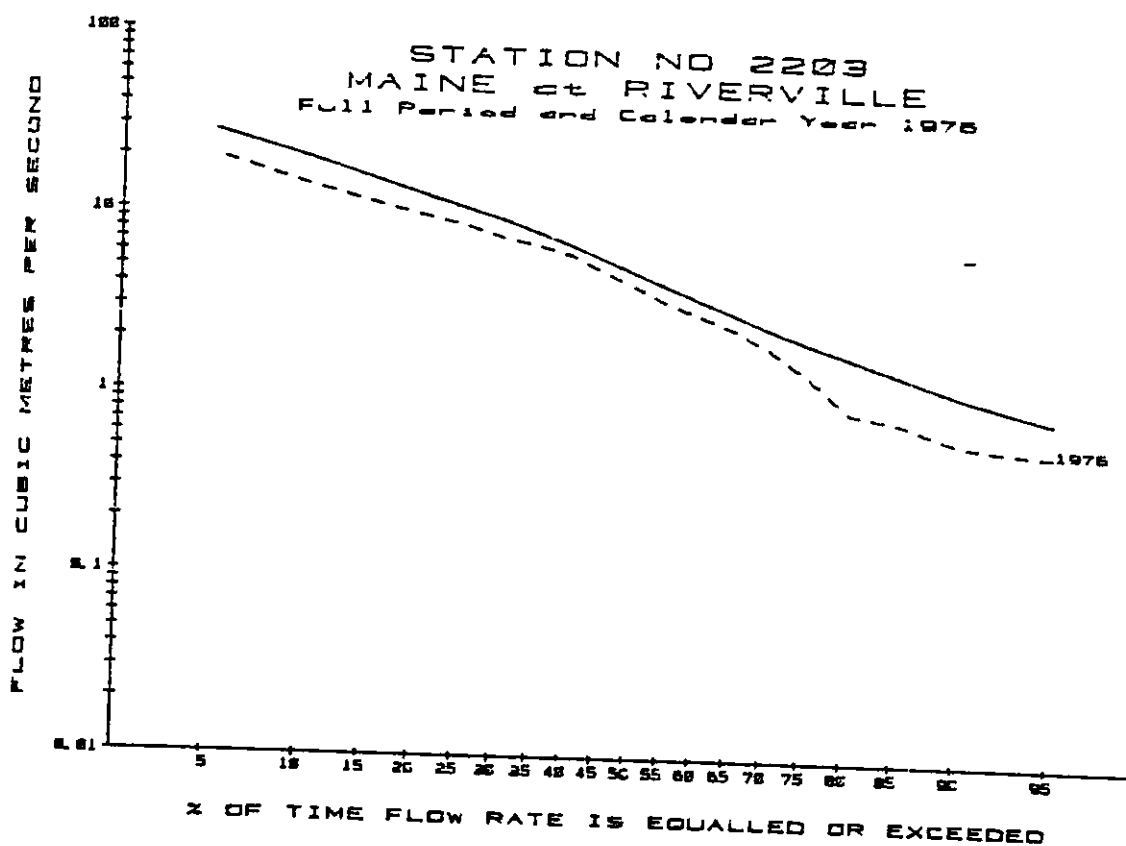
Data based on continuous water level records for the period :
1-Jan-71 to 31-Dec-81

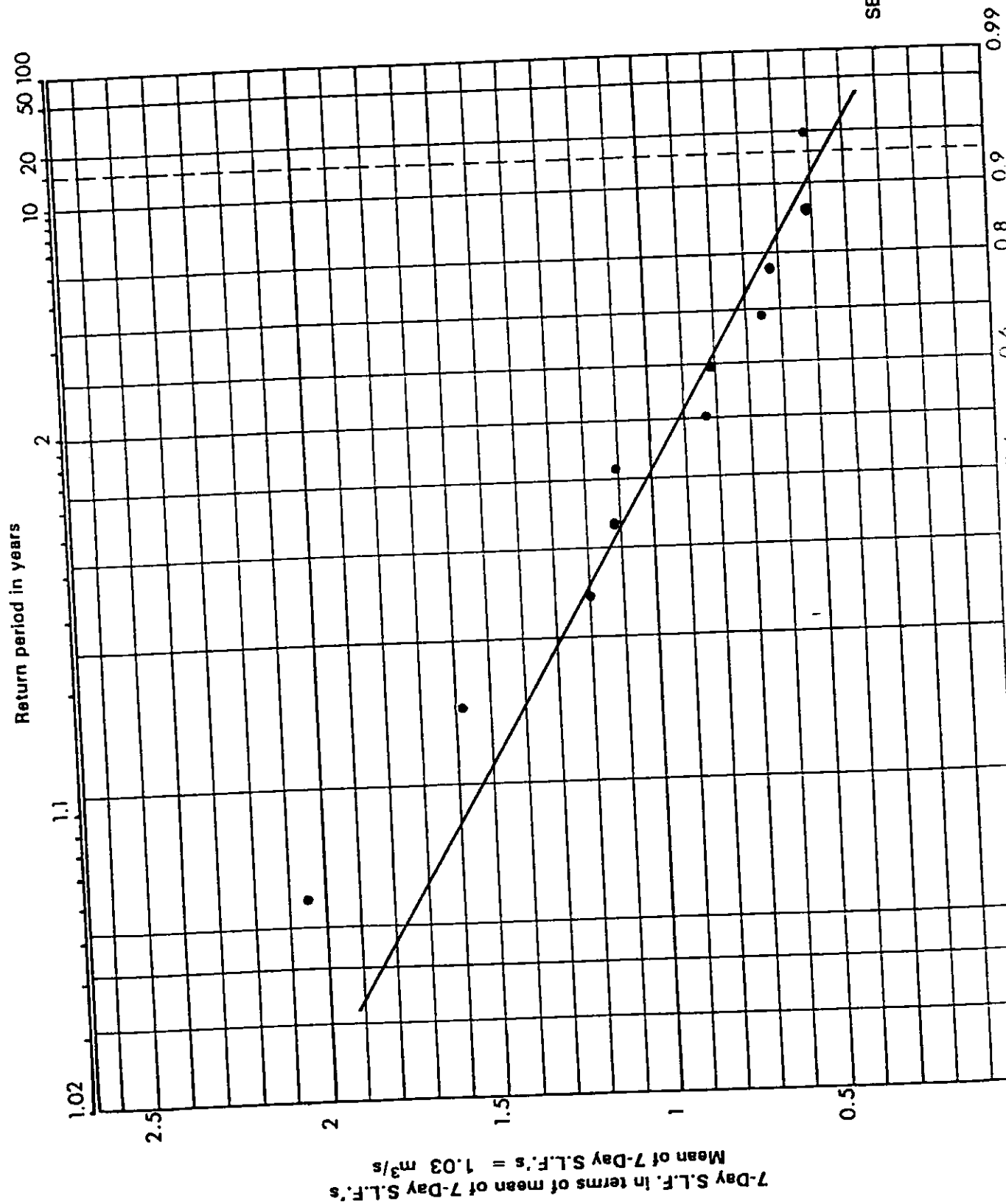
PERIOD	SUSTAINED LOW FLOWS				DAYS [Min]
	3	7	15	30	
1976	0.500	0.520	0.58	0.62	
1971-1981	0.480	0.520	0.58	0.62	

TABLE OF EXCEEDANCE PERCENTILES
Year 1976 Only

5%	20.30	30%	7.60	75%	1.39
10%	14.30	40%	6.15	80%	0.86
15%	11.60	50%	4.14	85%	0.79
20%	9.97	60%	2.91	90%	0.61
25%	8.83	70%	1.94	95%	0.54

** All flow rates above are in cubic metres per second. **





Distribution of
SEVEN-DAY SUSTAINED LOW FLOW
at Station No. 2203
R. MAINE AT RIVERVILLE
for period 1971 to 1981

FLESK at FLESK BRIDGE

Body Responsible: ESB

N.G.R.: V 970 892

Catchment Area to Station:

Long Average Rainfall [1941-1970]:

325.0 sq km
1747 mm/yrData based on continuous water level records for the period :
1-Jan-47 to 31-Dec-86 *

Mean Flow Rate: 13.43

[1303 mm/yr rainfall on catchment]

Daily Mean Flows:

minimum 0.372 on 9-Sep-81
maximum 229.80 on 2-Nov-80

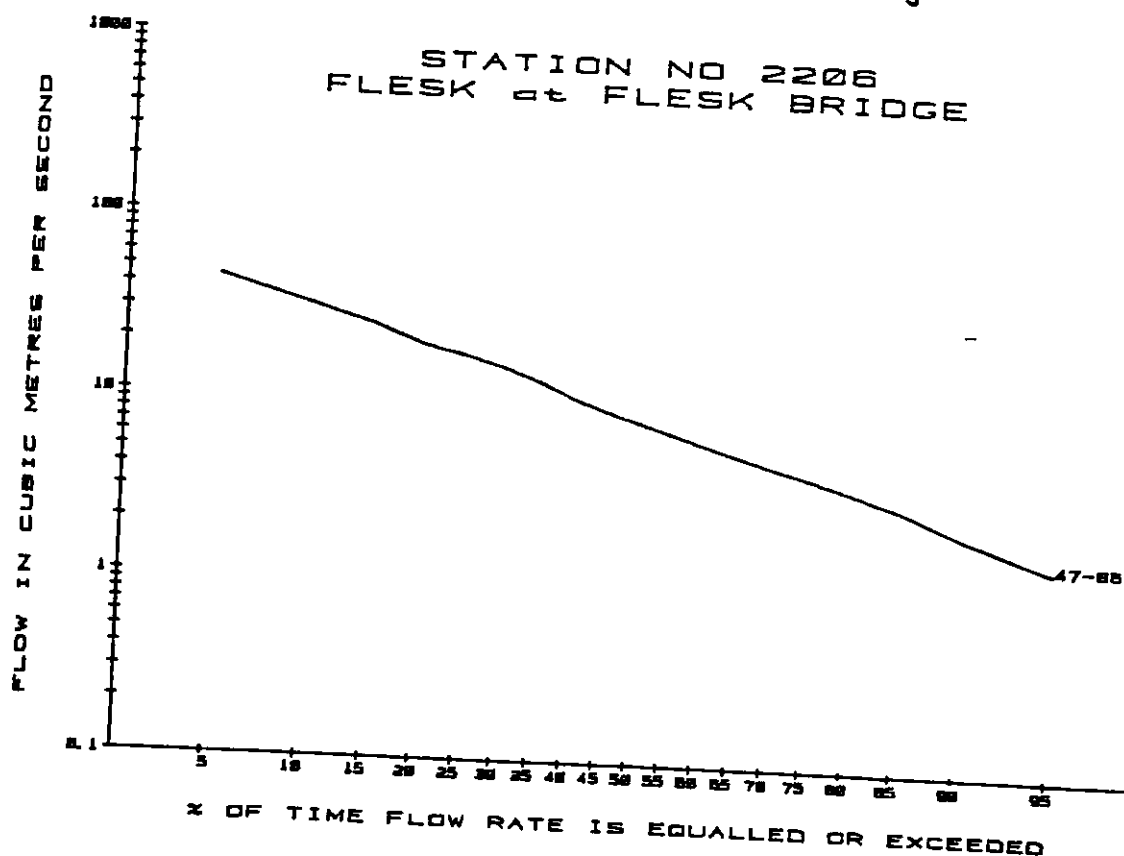
TABLE OF EXCEEDANCE PERCENTILES

PERCENTILES					
Full period					
5%	44.81	30%	15.16	75%	4.18
10%	32.00	40%	10.55	80%	3.57
15%	25.23	50%	7.99	85%	2.93
20%	19.77	60%	6.14	90%	2.14
25%	17.46	70%	4.74	95%	1.44

* see note on SHEET C.

** All flow rates above are in cubic metres per second. **

** Note: Lowest Measured Flow 0.736 on 18-Aug-76. **



FLESK at FLESK BRIDGE

Data based on continuous water level records for the period :
1-Jan-47 to 31-Dec-86 *

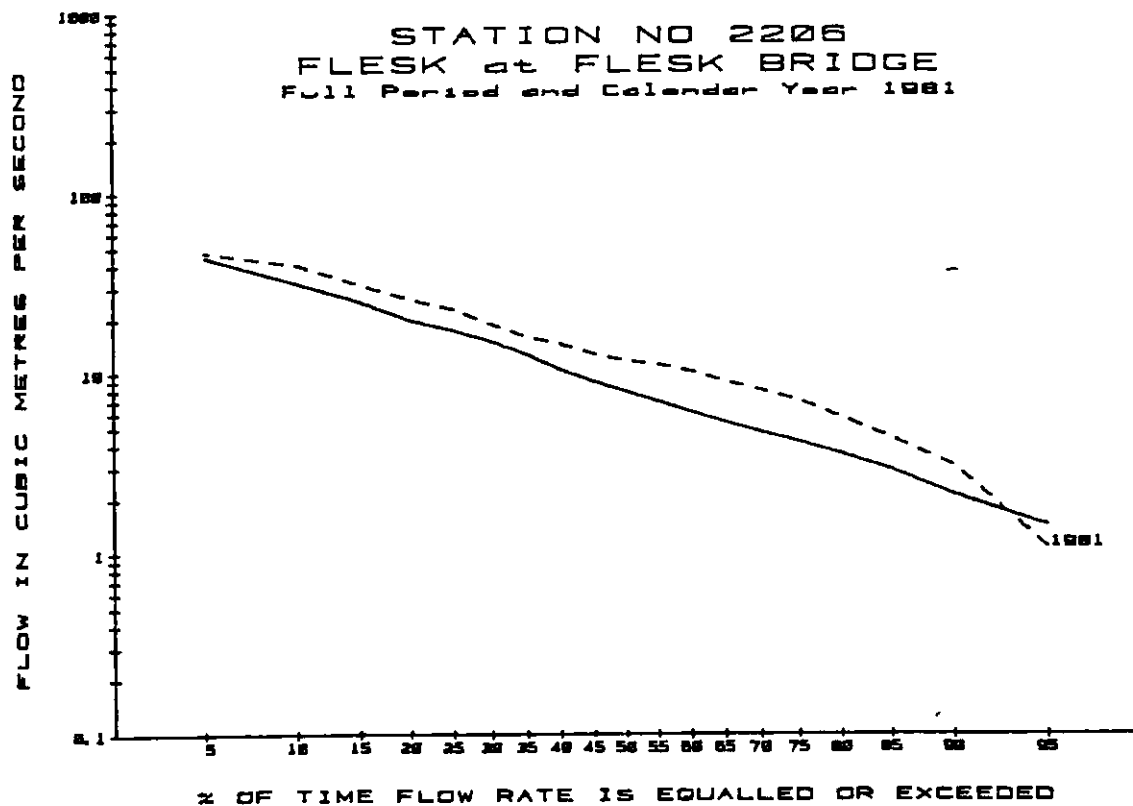
PERIOD	SUSTAINED LOW FLOWS				DAYS
	3	7	15	30	
1981	0.453	0.620	1.04	40.25	
1947-1986	1.107	1.520	3.29	11.76	[Average]

TABLE OF EXCEEDANCE PERCENTILES

Year 1981 Only					
5%	47.60	30%	18.83	75%	7.07
10%	40.40	40%	14.65	80%	5.68
15%	31.30	50%	11.83	85%	4.38
20%	25.90	60%	10.29	90%	3.09
25%	22.83	70%	8.09	95%	1.09

** All flow rates above are in cubic metres per second. **

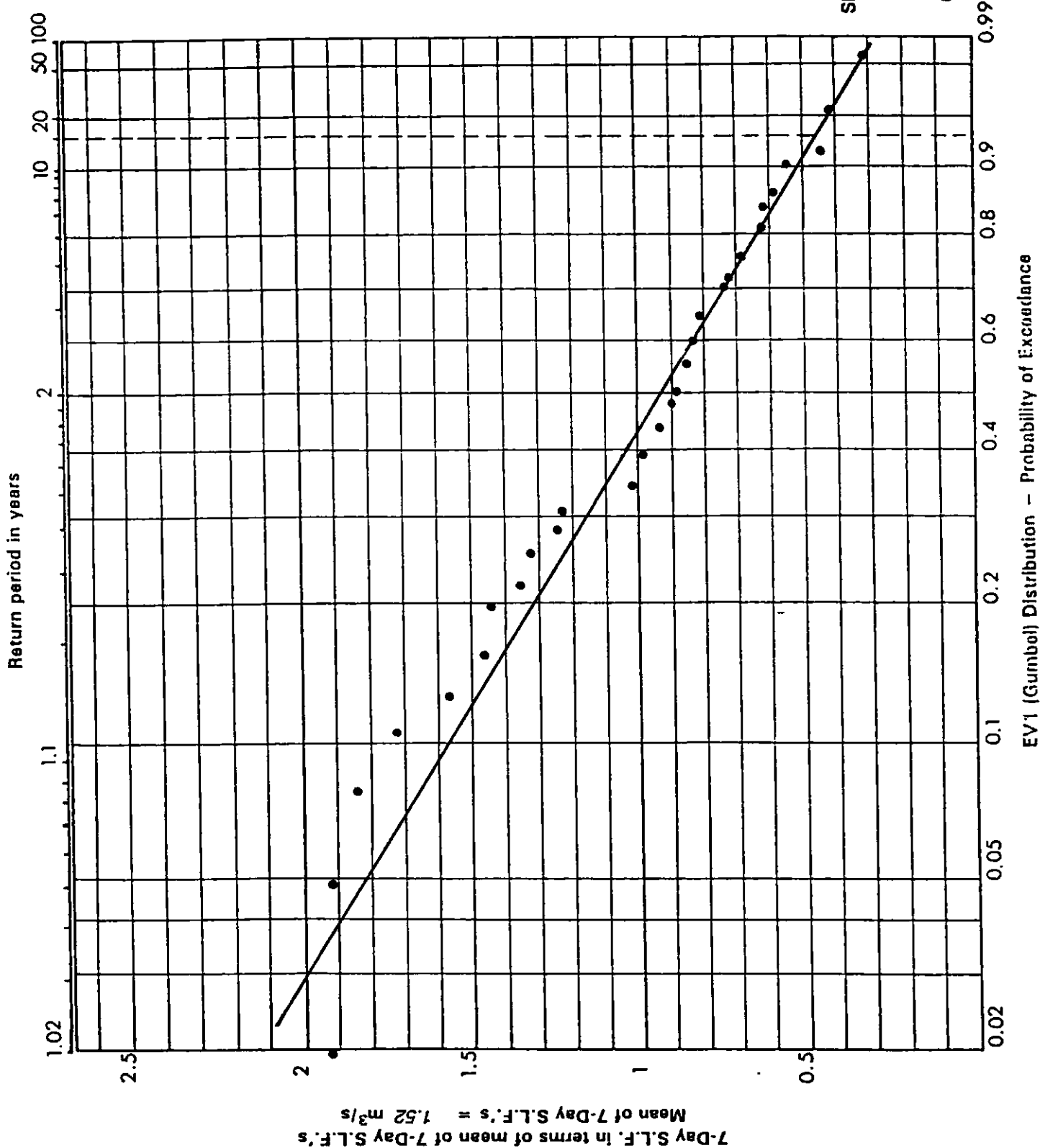
* see note on SHEET C.



Data for 1976 for
Station 2206 Flesk
has been omitted

Note:

In the preparation of the Flow Duration Curve and the Sustained Low Flow value for Station 2206 Flesk, data for 1972, 1975, 1976, 1977 and 1982 was omitted due to gaps in the data in these years.



Distribution of
SEVEN-DAY SUSTAINED LOW FLOWS
at Station No. 2206
R. FLESK AT FLESK
for period 1947 to 1986
(excl. 1972, 1975, 1976, 1977, 1982)

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APPENDICES

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APPENDIX 1

HYDROMETRIC AREAS IN IRELAND

- | | | |
|-----|----------------------------|--|
| 01 | Foyle | The surface catchment drained by the River Foyle and by all streams entering tidal water between Culmore Point, Co. Derry and Coolkeeragh, Co. Derry. |
| 02 | Faughan-Roe | The surface catchment drained by the Rivers Faughan and Roe and by all streams entering tidal water between Coolkeeragh and The Barmouth, Co. Derry. |
| 03 | Bann | The surface catchment drained by the River Bann and by all streams entering tidal water between The Barmouth and Ballyaghran Point, Co. Derry. |
| 04 | Bush and NE Streams | The surface catchment drained by the River Bush and by all streams entering tidal water between Ballyaghran Point and Curran Point, Co. Antrim. |
| 05 | Lagan-Quoile | The surface catchment drained by the Rivers Lagan and Quoile and by all streams entering tidal water between Curran Point and Murlough Upper, Co. Down. |
| 06 | Newry, Fane, Glyde and Dee | The surface catchment drained by the Rivers Newry, Fane, Glyde and Dee and by all streams entering tidal water between Murlough Upper and The Haven Co. Louth. |
| 07 | Boyne | The surface catchment drained by the River Boyne and by all streams entering tidal water between The Haven and Mornington Point, Co. Meath. |
| 08 | Nanny-Delvin | The surface catchment drained by the rivers Nanny and Delvin and by all streams entering tidal water between Mornington Point and Sea Mount,- Co. Dublin. |
| 09 | Liffey and Dublin Bay | The surface catchment drained by the River Liffey and by all streams entering tidal water between Sea Mount and Sorrento Point, Co. Dublin. |
| 10 | Ovoca-Vartry | The surface catchment drained by the Rivers Ovoca and Vartry and by all streams entering tidal water between Sorrento Point and Kilmichael Point, Co. Wexford |
| 11. | Owenavorrigh | The surface catchment drained by the River Owenavorrigh and by all streams entering tidal water between Kilmichael Point and the Raven Point, Co. Wexford. |
| 12 | Slaney and Wexford Harbour | The surface catchment drained by the River Slaney and all streams entering tidal water between the Raven Point and Greenore Point, Co. Wexford. |

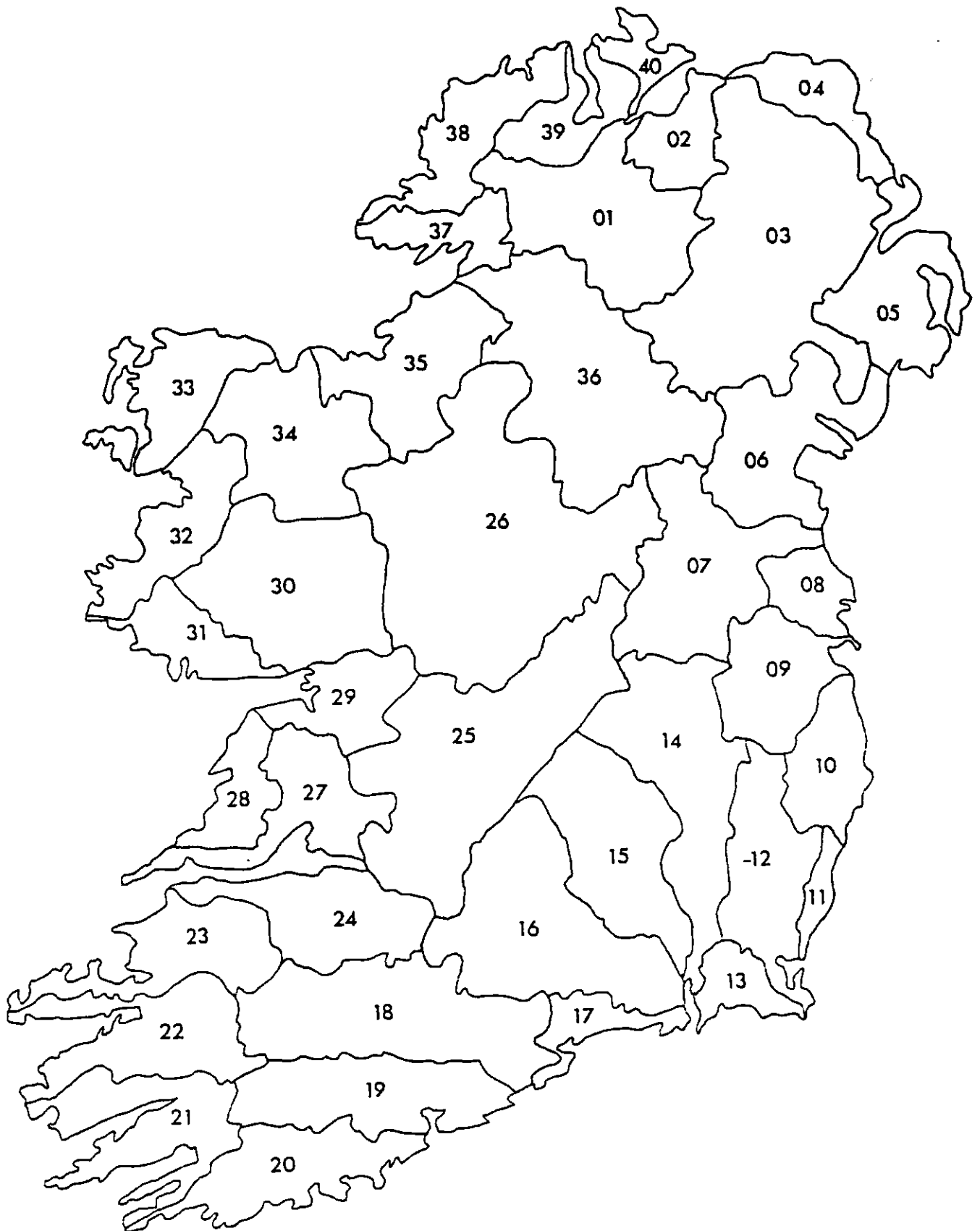
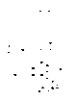


Fig. 4 Hydrometric Areas of Ireland.

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|----|-----------------------------------|--|
| 13 | Ballyteigue-Bannow | The surface catchment drained by all streams entering tidal water between Greenore Point and Railway Bridge, Great Island, Co. Wexford. |
| 14 | Barrow | The surface catchment drained by the River Barrow upstream of the River Nore confluence and all streams entering tidal water between the Barrow railway bridge at Great Island and Ringwood, Co. Kilkenny. |
| 15 | Nore | The surface catchment drained by the River Nore and all streams entering tidal water between its confluence with the River Barrow at Ringwood and the Barrow railway bridge at Drumdowney, Co. Kilkenny. |
| 16 | Suir | The surface catchment drained by the River Suir and all streams entering tidal water between Drumdowney and Cheekpoint, Co. Waterford. |
| 17 | Colligan-Mahon | The surface catchment drained by the Rivers Colligan and Mahon and all streams entering tidal water between Cheekpoint and East Point, Co. Waterford. |
| 18 | Blackwater (Munster) | The surface catchment drained by the River Blackwater and all streams entering tidal water between East Point and Knockaverry, Youghal, Co. Cork. |
| 19 | Lee, Cork Harbour and Youghal Bay | The surface catchment drained by the River Lee and all streams entering tidal water in Cork Harbour and Youghal Bay and between Knockaverry and Templebreedy Battery, Co. Cork. |
| 20 | Bandon-Ilen | The surface catchment drained by the Rivers Bandon and Ilen and all streams entering tidal water between Templebreedy Battery and Mizen Head, Co. Cork. |
| 21 | Dunmanus-Maine-Dingle Bay | The surface catchment drained by all streams entering tidal water in Dunmanus, Bantry and Kenmare Bays between Mizen Head and Glanearagh Head, Co. Kerry. |
| 22 | Laune-Maine-Dingle Bay | The surface catchment drained by the Rivers Laune and Maine and all streams entering tidal water between Glanearagh Head and Clogher Head, Co. Kerry. |
| 23 | Tralee Bay-Feale | The surface catchment drained by the River Feale and all streams entering tidal water in Tralee Bay and between Clogher Head and Kilconly Point, Co. Kerry. |

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|----|--------------------------|--|
| 24 | Shannon Estuary
South | The surface catchment drained by the Rivers Deel and Maigue and all streams entering tidal water in the Shannon Estuary between Kilconly Point and Thomond Bridge, Limerick. |
| 25 | Lower Shannon | The surface catchment drained by the River Shannon and all tributary streams entering it between Thomond Bridge and its confluence with the River Suck between Shannonbridge, Co. Offaly and Clonfert, Co. Galway. |
| 26 | Upper Shannon | The surface catchment drained by the Rivers Shannon and Suck and all tributary streams upstream of their confluence between Shannonbridge and Clonfert. |
| 27 | Shannon Estuary
North | The surface catchment drained by the River Fergus and all streams entering tidal water between Thomond Bridge and George's Head, Co. Clare. |
| 28 | Mal Bay | The surface catchment drained by all streams entering tidal water in Mal Bay between George's Head and Black Head, Co. Clare. |
| 29 | Galway Bay
South East | The surface catchment drained by all streams entering tidal water in Galway Bay between Black Head and Kenmore Point, Galway. |
| 30 | Corrib | The surface catchment drained by the River Corrib and all streams entering tidal water between Kenmore Point and Nimmo's Pier, Galway. |
| 31 | Galway Bay North | The surface catchment drained by all streams entering tidal water between Nimmo's Pier and Slyne Head, Co. Galway. |
| 32 | Erriff-Clew Bay | The surface catchment drained by the River Erriff and all streams entering tidal water between Slyne Head and Corraun Point, Co. Mayo. |
| 33 | Blacksod-
Broadhaven | The surface catchment drained by all streams entering tidal water in Blacksod and Broadhaven Bays and between Corraun Point and Benwee Head, Co. Mayo. |
| 34 | Moy and Killala
Bay | The surface catchment drained by the River Moy and all streams entering tidal water in Killala Bay between Benwee Head and Lenadoon Point, Co. Mayo. |
| 35 | Sligo Bay and
Drowes | The surface catchment drained by the River Drowes and all streams entering tidal water in Sligo Bay and between Lenadoon Point and Aughrus Point, Co. Donegal. |

- 36 Erne The surface catchment drained by the River Erne and all streams entering tidal water between Aughrus Point and Kildoney Point, Co. Donegal.
- 37 Donegal Bay North The surface catchment drained by all streams entering tidal water between Kildoney Point and Rossan Point, Co. Donegal.
- 38 Gweebarra-Sheephaven The surface catchment drained by all streams entering tidal water in Gweebarra River, Sheephaven Bay and between Rossan Point and Fanad Head, Co. Donegal.
- 39 Lough Swilly The surface catchment drained by all streams entering tidal water in Lough Swilly between Fanad Head and Dunaff Head, Co. Donegal.
- 40 Donagh-Moville The surface catchment drained by the River Donagh and all streams entering tidal water between Dunaff Head and Culmore Point, Co. Derry.



APPENDIX 2

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