

ISSN 0158-7749

**COASTAL OBSERVATION PROGRAMME - ENGINEERING (COPE)**

**RAINBOW BEACH - WIDGEE SHIRE**

**FOR THE YEARS 1977 TO 1988**

**REPORT NO. C25.1**

**Beach Protection Authority**

**December 1988**

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All reasonable care and attention has been exercised in the collection, processing and compilation of the COPE data included in this report. However, the accuracy and reliability of this information is not guaranteed in any way by the Beach Protection Authority and the Authority accepts no responsibility for the use of this information in any way whatsoever.

## DOCUMENTATION PAGE

**REPORT NO.:-** C25.1

**TITLE:-** Report - Coastal Observation Programme - Engineering (COPE),  
Rainbow Beach - Widgee Shire

**DATE:-** December 1988

**TYPE OF REPORT:-** Technical Memorandum

**PREPARED BY:-** Beach Protection Branch of the Department of  
Harbours and Marine on behalf of the Beach  
Protection Authority.

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**DISTRIBUTION:-** Public Distribution

### **ABSTRACT:-**

This report provides a summary of primary analyses of COPE data on wind, wave and beach processes observed at Rainbow Beach in the Widgee Shire on the south east Queensland coast. The data was recorded by volunteer observers during the period January 1977 to July 1988. The Beach Protection Authority wishes to thank all observers in the recording of data at the COPE Station, with a special thanks to Mr L. Boyce, the current observer, who has recorded continuously at Rainbow Beach since June 1979. The information published is considered representative of the long term conditions. At date of publication, the station was active.

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## **1.0 INTRODUCTION**

### **1.1 The Programme**

The Beach Protection Authority requires basic data on the behaviour of Queensland's beaches in order to provide well founded advice on coastal management to Local Authorities. The COPE project aims to collect information on wind, waves and beach behaviour in areas where extensive investigations are not practical and where otherwise little or no data exist.

The project is based on the recruitment of volunteer observers who are prepared to record a series of basic parameters once or twice daily for at least a three year period.

### **1.2 Site Selection**

In selecting a site for a COPE station, consideration is given to:-

- (a) the general shoreline configuration and the possibility of extrapolation of data to other adjacent beaches;
- (b) the distribution of stations along Queensland's coastline;
- (c) the need to correlate the COPE data with planned or existing data collection programmes.

### **1.3 Instrumentation**

The COPE observers are supplied with a basic kit of recording instruments including:-

- 30 metre tape, wind meter, stop watch, 2.0 metre measuring sticks, recording forms and fluorescent dye.

A graduated reference pole was installed on the beach in September 1977, to serve as the base point for all plan measurements and the control for vertical levelling. A second reference pole was installed thirty-four metres seaward of the existing reference pole in July 1983. This was due to the accretion of sand at the original pole.

### **1.4 Observers**

The majority of COPE observers are volunteers, who may be local business people, local residents or school children. Some stations are operated by Government and Local Authority employees who carry out the observations as part of their official duties.

### **1.5 Accuracy**

Individual observers differ in their subjective assessment of the various parameters recorded as part of the COPE programme. Wave parameters such as type, height, and angle of approach together with surf zone width and the location of the vegetation line all require visual assessment, the accuracy of which will vary from observer to observer and from recording to recording.

Although the Authority is confident that all observers make their observations to the best of their ability and accepts these observations without adjustment, the existence of random and non-random errors in the recorded data is to be expected.

Problems associated with the use of data containing these errors are minimised in two ways. Firstly, regular visits are made to the COPE stations by the Authority's COPE Field Officer to provide a check on any bias introduced into the recordings by incorrect observation procedures. Secondly, it has been found that, with a large number of observations taken on a regular basis, a reasonable assessment can be made of the average climatologies of the observed parameters provided the observation errors are random. A minimum recording period of three years has been adopted for the analysis and publication of the data. Five day moving averages are applied to observations of the various beach width and foreshore slope parameters to smooth out random errors.

For these reasons, the Authority is of the opinion that published COPE data can be used with confidence provided the above inherent limitations are recognised.

## **1.6 Presentation of Data**

The purpose of this report is to present COPE data for the 11 year period 1977 to 1988 in a useful statistical form. No attempt has been made to interpret the observed data.

If the 11 year period is representative of the long term average meteorological conditions, the statistics presented on wind, wave and beach movements can be regarded as typical. However, this recording period may be considered too short to be representative in terms of the average occurrence of extreme events such as cyclones and floods, and this should be taken into account when consideration is being given to the influence of such events on trends of long term beach behaviour.

## **2.0 STATION PARTICULARS**

### **2.1 Location**

Rainbow Beach is located within the Widgee Shire and lies approximately 200 kilometres north of Brisbane on the south east Queensland coast. It is a 20 kilometre stretch of coastline bounded by Double Island Point to the south and Inskip Point to the north. The location of the Rainbow Beach COPE station is shown in Figures 1.1 and 1.2.

### **2.2 Observers**

This station has been operated by Mr. S. Birtles (1977-1979) and Mr. L. Boyce (1979-1988) and Mr. I. Jensen (1984-1986). At date of publication Mr. L. Boyce was continuing as observer.

### **2.3 Observed Parameters**

The observers at this station recorded the majority of observations between 6.00 am and 6.00 pm. From June 1985 to March 1986 observations were recorded twice daily (7.30 am and 4.00 pm).

This station has recorded:

- Wave Period
- Wave Height
- Wave Direction
- Wave Type
- Surf Zone Width
- Presence of Offshore Bar
- Wind Speed
- Wind Direction
- State of Tide
- Distance to Berm
- Berm Elevation
- Distance to Vegetation Line from Landward Reference Pole
- Sand Level at C.O.P.E. Reference Poles
- Foreshore Slope
- Longshore Current Speed
- Longshore Current Direction
- Distance from Shoreline to Dye Patch or P.V.C. Float (Recorded from March 1986)

In addition a sand sample was collected at the station each month, and since September 1977, a profile of the beach has usually been recorded monthly.

Sand level at the seaward reference pole was recorded from July 1983.

#### 2.4 Tidal Information

Tidal information for Rainbow Beach is presented below. Datum is Low Water Datum.

M.H.W.S.	1.50 metres
M.H.W.N.	1.20 metres
M.S.L.	0.85 metres
M.L.W.N.	0.50 metres
M.L.W.S.	0.20 metres

A.H.D. is 0.71 metres above Low Water Datum.

Tidal information was obtained from the 1988, Queensland Tide Tables.

#### 2.5 Description of the Beach

The beach at the Rainbow Beach COPE Station exhibits the following characteristics:-

- Typical beach slopes: Foreshore slope is in the range 1 in 10 to 1 in 57 ( $6^{\circ}$  -  $1^{\circ}$ ).
- Beach width: Varied from 60 to 100 metres measured from the seaward toe of the frontal dune to Low Water Mark over the eleven year period (1977-1988).
- D50 sand size: 0.25 mm averaged over ten years (1977-1987).
- Adjoining Landform: Recently accreted system of low foredunes backed by a somewhat higher dune system supporting woodland vegetation.

- **Vegetation:** The recently accreted foredunes support herbland dominated by sand spinifex grass (Spinifex sericeus), goat's foot convolvulus (Ipomoea pes-caprae) and beach bean (Vigna marina). The woodland community further inland is dominated by horsetail she-oak (Casuarina equisetifolia var. incana).

## 2.6 Meteorological Events

The following cyclones were recorded by the Brisbane Bureau of Meteorology as having tracks within 500 kilometres of Rainbow Beach between January 1977 and July 1988. It is considered that the following meteorological events may have had some effect on the condition of Rainbow Beach.

Cyclone Paul	03/01/80 - 08/01/80
Cyclone Simon	20/02/80 - 28/02/80
Cyclone Cliff	09/02/81 - 15/02/81
Cyclone Abigail	22/01/82 - 05/02/82
Cyclone Lance	04/04/84 - 07/04/84
Low Pressure System	07/04/84 - 13/04/84
Low Pressure System	18/05/84 - 23/05/84
Cyclone Pierre	18/02/85 - 24/02/85
Cyclone Vernon	21/01/86 - 24/01/86

## 2.7 Supervision of Station

The observers were instructed in the recording programme by the COPE Field Officer and the initial instruction period was followed up with visits to the station during the period of recordings presented in this report.

Installation of the two reference poles for this station has been carried out by the Widgee Shire Council and the Authority wishes to thank the Council for its assistance in all matters associated with the COPE project. Maintenance of the poles is carried out by the Beach Protection Authority's COPE Field Officer.

## 3.0 DATA

### 3.1 General

COPE data for this station for the eleven year period September 1977 to July 1988 is presented on the attached figures. The data has been analysed statistically and/or smoothed to reveal long term averages or trends. A brief description of each of the observed parameters is given below with the relevant figure references.

### 3.2 Wind

The observer recorded the wind speed at the beach using a hand held wind meter at 1.5 metres above beach level. Prior to March 1986 wind direction was estimated to the nearest compass sector. After this time wind direction is recorded in degrees by compass.

A summary of annual wind speed and direction percentage occurrences are shown as a wind rose in Figure 3. Where applicable, morning and afternoon readings as well as the overall average are shown.

Wind speed was recorded in miles per hour (m.p.h.) rather than knots after September 1977. The recordings are converted from (m.p.h.) to knots for Figure 3.

### 3.3 Waves

The average and maximum breaker height (trough to crest) is usually estimated to the nearest 0.1 metre. From experience the estimate of average breaker height has been found to be comparable with the equivalent deep water significant wave height.

Recordings of maximum wave height and method used to obtain wave height were introduced into the programme from March 1986. Wave type and state of tide were discontinued at this time.

The observers estimate the wave period by recording the time taken for eleven wave crests (the duration of 10 waves) to pass a point.

Wave direction was recorded in degrees of a compass from March 1986. The direction recorded was then converted to a sector (see following paragraph regarding sector system).

The wave direction is estimated as one of five direction sectors indicating the angle to the shoreline alignment from which the waves are approaching the beach. These sectors have been selected as:-

Sector 1	-	0 <sup>o</sup>	to	60 <sup>o</sup>
Sector 2	-	61 <sup>o</sup>	to	85 <sup>o</sup>
Sector 3	-	86 <sup>o</sup>	to	95 <sup>o</sup>
Sector 4	-	96 <sup>o</sup>	to	120 <sup>o</sup>
Sector 5	-	121 <sup>o</sup>	to	180 <sup>o</sup>

Note: 0<sup>o</sup> is the beach alignment to the left of the observer when facing seaward, and at the Rainbow Beach COPE station this direction is approximately 40<sup>o</sup> east of true north.

Statistical representations of the observed wave data include:-

- (a) the percentage of wave height recordings which exceed any given wave height for all directions combined (Figure 4).
- (b) the percentage occurrence of various combinations of wave heights and periods and directions (Figure 5 and Figure 6).
- (c) surf zone width with an indication of the existence or otherwise of an offshore bar (Figure 7 to Figure 22).
- (d) tabulation of the occurrence of various wave heights, periods, types and directions (Tables 1 to 12).

### 3.4 Longshore Currents

The observer measured the distance parallel to the shoreline that a dye patch or P.V.C. float in the surf zone moved in one minute. Current direction is either upcoast or downcoast, upcoast being to the left when facing the sea from the beach.

The readings are converted to a velocity which is plotted on a daily basis (Figure 23 to Figure 38). Mean upcoast and downcoast components and the overall annual means are also presented.

### **3.5 Beach Profile Parameters**

Beach profile parameters were measured until 1983 using an Abney level, tape measure and the landward reference pole. These include:

- Distance from reference pole to the berm.
- Elevation of the berm.
- Distance from reference pole to the vegetation line.
- The foreshore slope.

Since 1983 profiles have been recorded using a measuring stick, the reference pole, and a line of sight to the horizon.

Sand level at the landward reference pole was recorded from April 1981 to July 1983. The level was then recorded at the new seaward reference pole from July 1983 to July 1988.

Changes in these parameters with time indicate how the beach moves in response to varying wave attack. Plots of these parameters are shown in Figure 39 to Figure 51.

### **3.6 Monthly Beach Profiles**

Beach profiles are normally taken at the beginning of each month. However, should the beach undergo appreciable erosion or accretion during the month, then the observer is requested to take another beach profile. Monthly beach profiles are shown in Figure 51 to Figure 62.

**TABLE 1**  
**MONTHLY AND ANNUAL**  
**MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE TYPE/WAVE DIRECTION**  
**OCCURRENCES**

Rainbow Beach

No. of Observations: 338

Year 1977

MONTH	MEAN WAVE PERIOD (secs)	MEAN WAVE HEIGHT (metres)	Percentage Occurrence - Wave Type/Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	8.4	1.01	44.4	11.1	-	44.4	-	-	7.4	29.6	63.0	-	-
FEBRUARY	9.6	1.14	50.0	21.4	-	28.6	-	-	-	28.6	71.4	-	-
MARCH	9.6	0.99	77.4	-	-	22.6	-	-	-	12.9	87.1	-	-
APRIL	8.8	0.87	50.0	3.8	-	46.2	-	-	-	19.2	80.8	-	-
MAY	9.5	0.83	54.8	9.7	-	35.5	-	-	3.2	51.6	45.2	-	-
JUNE	8.6	0.69	30.0	3.3	-	66.7	-	-	3.3	50.0	46.7	-	-
JULY	9.9	1.05	38.7	-	-	61.3	-	-	-	35.5	64.5	-	-
AUGUST	9.0	1.03	-	12.9	-	87.1	-	-	-	16.1	83.9	-	-
SEPTEMBER	9.7	0.81	27.3	9.1	-	63.6	-	-	13.6	36.4	50.0	-	-
OCTOBER	8.1	0.87	75.0	-	-	25.0	-	-	17.9	35.7	46.4	-	-
NOVEMBER	8.4	0.99	56.7	20.0	-	23.3	-	-	26.6	36.7	36.7	-	-
DECEMBER	8.6	0.84	52.2	-	17.4	30.4	-	-	13.0	34.8	52.2	-	-
WHOLE YEAR	9.0	0.93	46.4	7.7	1.2	44.7	0.0	0.0	6.8	32.2	60.9	0.0	0.0

SP - Spilling  
 PL - Plunging  
 SP/PL - Combined Spilling and Plunging

**TABLE 2**  
**MONTHLY AND ANNUAL**  
**MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE TYPE/WAVE DIRECTION**  
**OCCURRENCES**

Rainbow Beach

No. of Observations: 305

Year 1978

MONTH	MEAN WAVE PERIOD (secs)	MEAN WAVE HEIGHT (metres)	Percentage Occurrence - Wave Type/Wave Direction											
			Wave Type					Wave Direction						
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm	
JANUARY	9.4	0.89	60.0	-	-	40.0	-	-	-	-	35.0	65.0	-	-
FEBRUARY	8.9	0.96	37.5	-	-	62.5	-	-	-	-	29.2	70.8	-	-
MARCH	9.0	0.95	33.3	4.2	-	62.5	-	-	8.3	37.5	54.2	-	-	-
APRIL	9.6	0.79	64.3	10.7	-	25.0	-	-	3.6	39.3	57.1	-	-	-
MAY	10.1	1.06	34.6	3.8	3.8	57.7	-	-	-	50.0	50.0	-	-	-
JUNE	10.9	0.77	60.0	3.3	-	36.7	-	-	-	73.3	26.7	-	-	-
JULY	9.2	1.06	55.2	6.9	-	37.9	-	-	17.2	34.5	48.3	-	-	-
AUGUST	10.7	1.54	14.3	10.7	-	75.0	-	-	-	25.0	75.0	-	-	-
SEPTEMBER	10.3	0.98	44.0	-	4.0	52.0	-	-	12.0	60.0	28.0	-	-	-
OCTOBER	9.1	1.30	38.7	-	6.3	54.8	-	-	3.2	35.5	61.3	-	-	-
NOVEMBER	10.2	1.54	26.3	-	-	73.7	-	-	-	52.6	47.4	-	-	-
DECEMBER	8.4	1.02	85.7	-	4.8	9.5	-	-	19.0	71.4	9.5	-	-	-
WHOLE YEAR	9.7	1.07	45.9	3.6	1.6	48.9	0.0	0.0	5.2	44.9	49.8	0.0	0.0	0.0

SP - Spilling  
 PL - Plunging  
 SP/PL - Combined Spilling and Plunging



**TABLE 3**  
**MONTHLY AND ANNUAL**  
**MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE TYPE/WAVE DIRECTION**  
**OCCURRENCES**

Rainbow Beach

No. of Observations: 237

Year 1979

MONTH	MEAN WAVE PERIOD (secs)	MEAN WAVE HEIGHT (metres)	Percentage Occurrence - Wave Type/Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	9.8	1.60	45.8	4.2	-	50.0	-	-	-	45.8	54.2	-	-
FEBRUARY	10.8	1.43	45.0	5.0	-	50.0	-	-	-	5.0	95.0	-	-
MARCH	-	-	-	-	-	-	-	-	-	-	-	-	-
APRIL	-	-	-	-	-	-	-	-	-	-	-	-	-
MAY	-	-	-	-	-	-	-	-	-	-	-	-	-
JUNE	12.4	0.83	52.9	17.6	-	29.4	-	-	-	35.3	64.7	-	-
JULY	12.3	0.82	29.0	45.2	-	22.6	3.2	-	3.2	54.8	38.7	-	3.2
AUGUST	15.3	0.56	19.4	45.2	-	25.8	9.7	-	-	64.5	22.6	-	12.9
SEPTEMBER	11.1	0.72	40.0	28.0	-	32.0	-	-	-	36.0	64.0	-	-
OCTOBER	9.3	0.63	10.7	17.9	-	71.4	-	3.6	3.6	42.9	50.0	-	-
NOVEMBER	10.0	0.70	30.0	10.0	-	60.0	-	-	-	65.5	34.5	-	-
DECEMBER	9.2	0.73	45.2	3.2	-	51.6	-	-	-	48.4	51.6	-	-
WHOLE YEAR	11.1	0.86	33.8	20.7	0.0	43.8	1.7	0.4	0.8	46.6	50.0	0.0	2.1

SP - Spilling  
 PL - Plunging  
 SP/PL - Combined Spilling and Plunging

**TABLE 4**  
**MONTHLY AND ANNUAL**  
**MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE TYPE/WAVE DIRECTION**  
**OCCURRENCES**

Rainbow Beach

No. of Observations: 356

Year 1980

MONTH	MEAN WAVE PERIOD (secs)	MEAN WAVE HEIGHT (metres)	Percentage Occurrence - Wave Type/Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	9.7	0.66	16.1	32.3	-	48.4	3.2	-	-	48.4	48.4	-	3.2
FEBRUARY	10.9	1.27	6.9	37.9	-	55.2	-	-	-	3.4	96.6	-	-
MARCH	10.1	0.77	10.0	23.3	-	66.7	-	-	-	6.5	93.5	-	-
APRIL	9.9	0.83	20.0	26.7	-	53.3	-	-	-	43.3	56.7	-	-
MAY	9.6	0.93	32.3	19.4	-	45.3	-	-	-	56.7	43.3	-	-
JUNE	10.4	0.73	13.8	37.9	-	48.3	-	-	-	73.3	26.7	-	-
JULY	9.8	0.82	-	90.3	-	6.5	3.2	-	-	29.0	67.8	-	3.2
AUGUST	9.7	0.83	-	41.7	-	58.3	-	-	-	54.2	45.8	-	-
SEPTEMBER	8.8	0.70	13.3	36.7	-	50.0	-	-	3.3	80.0	16.7	-	-
OCTOBER	9.9	0.81	6.5	25.8	-	67.7	-	-	-	67.7	32.3	-	-
NOVEMBER	9.6	0.80	22.2	25.9	-	51.9	-	-	-	51.9	48.1	-	-
DECEMBER	9.2	0.79	24.1	24.1	-	51.8	-	-	-	45.2	54.8	-	-
WHOLE YEAR	9.8	0.83	13.9	35.2	0.0	50.0	0.6	0.0	0.3	46.5	52.6	0.0	0.6

SP - Spilling

PL - Plunging

SP/PL - Combined Spilling and Plunging

**TABLE 5**  
**MONTHLY AND ANNUAL**  
**MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE TYPE/WAVE DIRECTION**  
**OCCURRENCES**

Rainbow Beach

No. of Observations: 340

Year 1981

MONTH	MEAN WAVE PERIOD (secs)	MEAN WAVE HEIGHT (metres)	Percentage Occurrence - Wave Type/Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	10.1	0.89	28.6	21.4	-	50.0	-	-	-	-	100.0	-	-
FEBRUARY	10.2	0.85	60.0	15.0	-	25.0	-	-	-	40.0	60.0	-	-
MARCH	10.5	0.76	43.3	26.7	-	30.0	-	-	-	16.1	83.9	-	-
APRIL	9.6	0.76	32.1	39.3	-	28.6	-	-	-	35.7	64.3	-	-
MAY	10.7	0.77	10.0	70.0	-	20.0	-	-	-	51.6	48.4	-	-
JUNE	10.6	0.61	7.7	42.3	-	50.0	-	-	3.7	85.2	11.1	-	-
JULY	9.3	0.72	16.1	51.6	-	32.3	-	-	-	55.2	44.8	-	-
AUGUST	9.2	0.60	6.7	86.7	-	6.6	-	-	-	83.9	16.1	-	-
SEPTEMBER	9.2	0.75	7.4	48.1	-	44.4	-	-	-	67.9	32.1	-	-
OCTOBER	8.2	0.83	16.7	26.7	-	56.6	-	-	-	35.5	64.5	-	-
NOVEMBER	9.0	0.84	16.7	33.3	-	50.0	-	-	3.3	53.4	43.3	-	-
DECEMBER	9.5	1.00	41.7	16.7	-	41.6	-	-	-	64.0	36.0	-	-
WHOLE YEAR	9.7	0.78	22.8	41.0	0.0	36.2	0.0	0.0	0.6	49.0	50.4	0.0	0.0

SP - Spilling  
 PL - Plunging  
 SP/PL - Combined Spilling and Plunging

**TABLE 6**  
**MONTHLY AND ANNUAL**  
**MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE TYPE/WAVE DIRECTION**  
**OCCURRENCES**

Rainbow Beach

No. of Observations: 352

Year 1982

MONTH	MEAN WAVE PERIOD (secs)	MEAN WAVE HEIGHT (metres)	Percentage Occurrence - Wave Type/Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	9.6	0.90	46.4	14.3	-	39.3	-	-	-	37.9	62.1	-	-
FEBRUARY	9.4	0.85	-	26.1	-	73.9	-	-	-	-	100.0	-	-
MARCH	9.9	1.10	14.3	42.9	7.1	35.7	-	-	-	57.1	42.9	-	-
APRIL	10.4	0.92	-	30.0	-	70.0	-	-	-	21.4	78.6	-	-
MAY	8.8	0.90	6.7	60.0	-	33.3	-	-	-	36.7	63.3	-	-
JUNE	10.9	0.81	6.7	76.7	-	16.7	-	-	-	73.3	26.7	-	-
JULY	9.3	0.68	-	96.6	-	3.4	-	-	-	70.0	30.0	-	-
AUGUST	9.5	0.86	9.7	22.6	-	67.7	-	-	-	29.0	71.0	-	-
SEPTEMBER	8.9	0.63	-	79.3	-	20.7	-	-	-	75.9	24.1	-	-
OCTOBER	8.3	0.66	16.7	63.3	-	20.0	-	-	-	61.3	38.7	-	-
NOVEMBER	8.9	0.82	40.0	16.7	-	43.3	-	-	-	30.0	70.0	-	-
DECEMBER	9.1	0.70	60.0	6.7	-	33.3	-	-	-	67.7	32.3	-	-
WHOLE YEAR	9.4	0.82	17.0	44.8	0.6	37.6	0.0	0.0	0.0	49.7	50.3	0.0	0.0

SP - Spilling  
 PL - Plunging  
 SP/PL - Combined Spilling and Plunging

**TABLE 7**  
**MONTHLY AND ANNUAL**  
**MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE TYPE/WAVE DIRECTION**  
**OCCURRENCES**

Rainbow Beach

No. of Observations: 357

Year 1983

MONTH	MEAN WAVE PERIOD (secs)	MEAN WAVE HEIGHT (metres)	Percentage Occurrence - Wave Type/Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	8.9	1.00	21.4	-	-	78.6	-	-	-	44.8	55.2	-	-
FEBRUARY	9.7	0.70	50.0	3.6	-	46.4	-	-	-	25.9	74.1	-	-
MARCH	9.8	0.89	9.7	45.2	-	45.2	-	-	-	32.3	67.7	-	-
APRIL	9.9	0.80	35.7	28.6	-	35.7	-	-	-	41.4	58.6	-	-
MAY	7.1	0.85	20.0	16.7	-	63.3	-	-	-	45.2	54.8	-	-
JUNE	8.5	0.91	16.7	63.3	-	20.0	-	-	-	36.7	63.3	-	-
JULY	7.7	0.71	9.7	35.5	-	54.8	-	-	-	61.3	38.7	-	-
AUGUST	7.9	0.75	3.2	32.3	3.2	61.3	-	-	-	64.5	35.5	-	-
SEPTEMBER	7.5	0.76	10.7	7.1	-	75.0	7.1	-	3.6	82.1	14.3	-	-
OCTOBER	7.7	0.65	16.1	58.1	-	25.8	-	-	-	58.1	41.9	-	-
NOVEMBER	7.7	0.81	22.2	14.8	-	63.0	-	-	-	40.7	59.3	-	-
DECEMBER	7.5	0.94	9.7	29.0	-	61.3	-	-	-	54.8	45.2	-	-
WHOLE YEAR	8.3	0.81	18.4	28.5	0.3	52.3	0.6	0.0	0.3	49.2	50.6	0.0	0.0

SP - Spilling  
 PL - Plunging  
 SP/PL - Combined Spilling and Plunging

**TABLE 8**  
**MONTHLY AND ANNUAL**  
**MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE TYPE/WAVE DIRECTION**  
**OCCURRENCES**

Rainbow Beach

No. of Observations: 357

Year 1984

MONTH	MEAN WAVE PERIOD (secs)	MEAN WAVE HEIGHT (metres)	Percentage Occurrence - Wave Type/Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	7.5	0.88	54.9	3.2	-	41.9	-	-	-	32.3	67.7	-	-
FEBRUARY	7.7	0.79	38.5	23.0	-	38.5	-	-	-	42.3	57.7	-	-
MARCH	8.1	0.83	37.9	6.9	-	55.2	-	-	-	41.4	58.6	-	-
APRIL	8.3	0.99	13.3	23.4	-	63.3	-	-	-	20.0	80.0	-	-
MAY	7.1	0.85	-	82.1	-	17.9	-	-	-	53.6	46.4	-	-
JUNE	7.3	0.88	-	69.0	-	31.0	-	-	-	37.9	62.1	-	-
JULY	7.6	0.72	-	51.6	-	45.2	3.2	-	-	74.2	22.6	-	3.2
AUGUST	7.9	0.78	3.2	51.6	-	45.2	-	-	3.2	90.3	6.5	-	-
SEPTEMBER	8.7	0.74	6.7	60.0	-	33.3	-	-	-	86.7	13.3	-	-
OCTOBER	8.4	0.84	9.7	32.3	-	58.0	-	-	-	19.4	80.6	-	-
NOVEMBER	7.9	0.73	46.7	3.3	-	50.0	-	-	-	40.0	60.0	-	-
DECEMBER	8.4	0.73	12.9	16.1	-	71.0	-	-	-	48.4	51.6	-	-
WHOLE YEAR	7.9	0.81	18.5	35.0	0.0	46.2	0.3	0.0	0.3	49.0	50.4	0.0	0.3

SP - Spilling  
 PL - Plunging  
 SP/PL - Combined Spilling and Plunging

**TABLE 9**  
**MONTHLY AND ANNUAL**  
**MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE TYPE/WAVE DIRECTION**  
**OCCURRENCES**

Rainbow Beach

No. of Observations: 441

Year 1985

MONTH	MEAN WAVE PERIOD (secs)	MEAN WAVE HEIGHT (metres)	Percentage Occurrence - Wave Type/Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	7.6	0.71	19.4	54.8	-	25.8	-	-	-	48.4	51.6	-	-
FEBRUARY	8.0	0.95	7.4	48.1	3.7	40.7	-	-	-	25.9	74.1	-	-
MARCH	8.6	0.93	7.1	10.7	-	82.2	-	-	-	7.1	92.9	-	-
APRIL	10.1	0.84	3.6	92.8	-	3.6	-	-	-	14.8	85.2	-	-
MAY	10.2	0.82	3.2	48.4	-	48.4	-	-	-	19.4	80.6	-	-
JUNE	9.1	0.50	20.6	23.5	5.9	50.0	-	-	-	29.4	70.6	-	-
JULY	7.8	0.58	8.5	42.4	1.7	47.4	-	-	-	33.9	66.1	-	-
AUGUST	7.4	0.56	31.4	43.1	2.0	23.5	-	-	-	37.3	62.7	-	-
SEPTEMBER	8.0	0.59	14.3	51.4	5.7	28.6	-	-	5.7	51.4	42.9	-	-
OCTOBER	7.5	0.63	28.0	34.0	-	38.0	-	-	2.0	24.0	74.0	-	-
NOVEMBER	7.7	0.70	15.0	35.0	5.0	45.0	-	-	-	27.5	72.5	-	-
DECEMBER	8.2	0.63	22.2	40.8	-	37.0	-	-	-	48.1	51.9	-	-
WHOLE YEAR	8.2	0.68	16.1	42.9	2.0	39.0	0.0	0.0	0.7	31.1	68.2	0.0	0.0

SP - Spilling  
 PL - Plunging  
 SP/PL - Combined Spilling and Plunging

**TABLE 10**  
**MONTHLY AND ANNUAL**  
**MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE TYPE/WAVE DIRECTION**  
**OCCURRENCES**

Rainbow Beach

No. of Observations: 403

Year 1986

MONTH	MEAN WAVE PERIOD (secs)	MEAN WAVE HEIGHT (metres)	Percentage Occurrence - Wave Type/Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	8.7	0.75	-	12.9	-	87.1	-	-	-	16.1	83.9	-	-
FEBRUARY	7.8	0.63	7.1	42.9	19.6	30.4	-	-	-	12.5	87.5	-	-
MARCH	8.9	0.74	30.0	40.0	-	30.0	-	-	-	6.2	81.3	12.5	-
APRIL	8.3	0.67	CR	CR	CR	CR	CR	-	-	-	70.0	30.0	-
MAY	9.5	0.64						-	7.1	14.3	46.4	32.2	-
JUNE	7.7	0.63						-	-	10.3	69.0	20.7	-
JULY	9.3	0.53						6.7	3.3	26.7	26.7	36.6	-
AUGUST	8.8	0.48						15.0	7.5	20.0	32.5	25.0	-
SEPTEMBER	8.3	0.50						19.2	7.7	46.2	7.7	19.2	-
OCTOBER	7.9	0.45						46.4	3.6	-	25.0	25.0	-
NOVEMBER	7.9	0.60						20.0	4.0	8.0	28.0	40.0	-
DECEMBER	8.7	0.65						16.1	3.2	32.3	29.0	19.4	-
WHOLE YEAR	8.5	0.61	7.2	33.0	11.3	48.5	0.0	9.0	2.7	15.4	53.2	19.7	0.0

SP - Spilling

PL - Plunging

SP/PL - Combined Spilling and Plunging

CR - Combined Spilling and Plunging



**TABLE 11**  
**MONTHLY AND ANNUAL**  
**MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE DIRECTION OCCURRENCES**

Rainbow Beach

No. of Observations: 330

Year 1987

MONTH	MEAN WAVE PERIOD (secs)	MEAN WAVE HEIGHT (metres)	Percentage Occurrence - Wave Direction					
			Wave Direction					
			1	2	3	4	5	Calm
JANUARY	7.8	0.47	39.3	3.6	17.9	32.1	7.1	-
FEBRUARY	8.6	0.76	-	-	7.1	46.4	46.5	-
MARCH	8.3	0.68	9.7	3.2	22.6	32.3	32.2	-
APRIL	8.5	0.80	3.6	7.1	3.6	7.1	78.6	-
MAY	8.1	0.74	-	-	6.5	32.3	61.2	-
JUNE	9.1	0.79	6.7	-	10.0	23.3	60.0	-
JULY	8.9	0.72	10.7	7.1	3.6	39.3	39.3	-
AUGUST	7.7	0.58	4.3	8.7	8.7	21.7	56.6	-
SEPTEMBER	8.9	0.48	4.0	-	16.0	24.0	56.0	-
OCTOBER	8.1	0.67	32.3	6.5	6.5	12.9	41.8	-
NOVEMBER	8.4	0.69	17.6	-	11.8	11.8	58.8	-
DECEMBER	8.1	0.63	13.8	-	24.1	27.6	34.5	-
WHOLE YEAR	8.4	0.67	11.9	3.0	11.6	26.4	47.1	0.0

**TABLE 12**  
**MONTHLY AND ANNUAL**  
**MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE DIRECTION OCCURRENCES**

Rainbow Beach

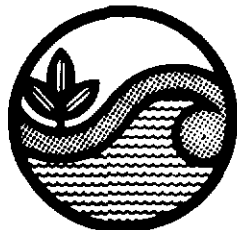
No. of Observations: 197

Year 1988

MONTH	MEAN WAVE PERIOD (secs)	MEAN WAVE HEIGHT (metres)	Percentage Occurrence - Wave Direction					
			Wave Direction					
			1	2	3	4	5	Calm
JANUARY	8.2	0.77	4.2	-	12.5	37.5	45.8	-
FEBRUARY	8.0	0.74	-	-	14.3	14.3	71.4	-
MARCH	8.4	0.81	7.7	-	11.5	7.7	73.1	-
APRIL	8.5	0.78	-	-	13.3	20.0	66.7	-
MAY	7.8	0.59	9.7	-	12.9	32.3	45.1	-
JUNE	8.5	0.70	-	-	14.8	37.0	48.2	-
JULY	8.5	0.70	6.7	6.7	13.3	26.7	46.6	-
WHOLE YEAR	8.3	0.72	4.1	1.0	13.3	25.0	56.6	0.0



0 100 200 300 400 500 metres  
Scale 1:12 000 approx.

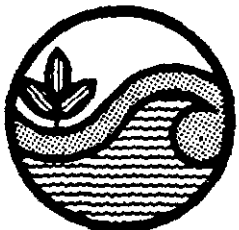
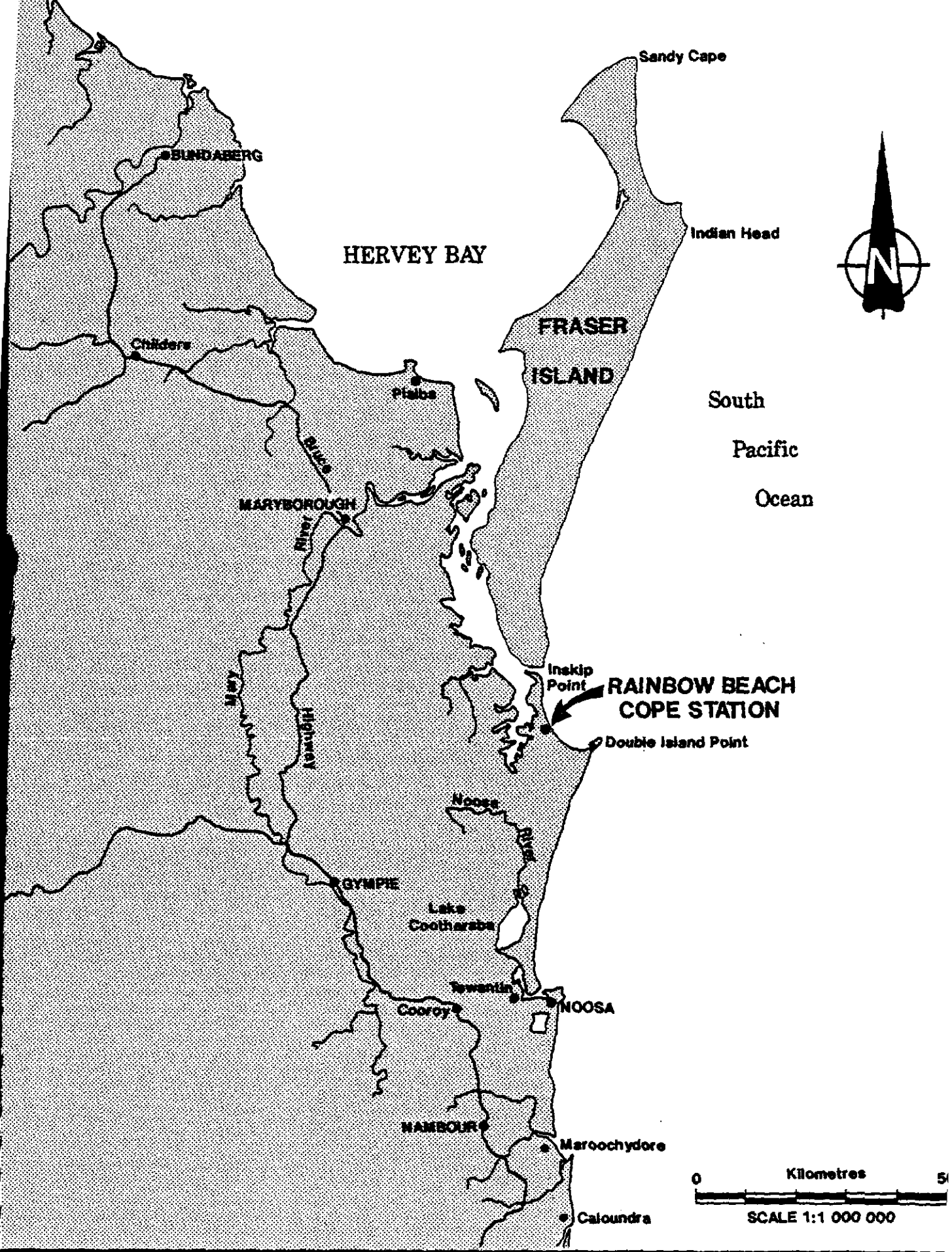


Beach Protection Authority

SITE PLAN  
**RAINBOW BEACH COPE STATION**

COPE  
Rainbow Beach

**Figure 1.1**  
C 25.1



Beach Protection Authority

LOCALITY PLAN

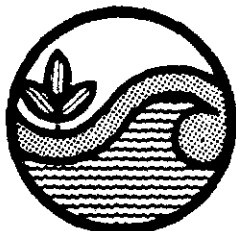
COPE  
Rainbow Beach

**Figure 1.2**  
C25.1



RECORD ALL DATA CAREFULLY AND LEGIBLY

<u>SITE NUMBER</u> 1 2 3 4 5 <input type="text"/>	<u>DAY</u> 6 7 <input type="text"/>	<u>MONTH</u> 8 9 <input type="text"/>	<u>YEAR</u> 10 11 <input type="text"/>	<u>TIME</u> 12 13 14 15 Record time using 24 hour system <input type="text"/>
(i) <u>WAVE HEIGHT (AVERAGE)</u> Record the best estimate of the average breaking wave height to the nearest tenth of a metre. If less than 0.1 record as 0.0 and go directly to Section (ii). <input type="text"/> 16 <input type="text"/> 17	<u>WAVE HEIGHT (MAXIMUM)</u> Record the best estimate of the maximum breaking wave height during the entire observation period to the nearest tenth of a metre. <input type="text"/> 18 <input type="text"/> 19			
<u>WAVE HEIGHT METHOD</u> Record the method that you used to obtain wave height. Record 1 if visual estimate Record 2 if measured with COPE sticks Record 3 if measured by COPE pole <input type="text"/> 20	<u>WAVE PERIOD</u> Record the time in seconds for eleven (11) wave crests to pass a stationary point just seaward of the surf zone. <input type="text"/> 21 <input type="text"/> 22 <input type="text"/> 23			
<u>WAVE DIRECTION</u> Determine the direction that the waves are entering the surf zone using the compass provided and record the direction in degrees. <input type="text"/> 24 <input type="text"/> 25 <input type="text"/> 26	<u>SURF ZONE WIDTH</u> Record the time in seconds for a wave of average height to traverse the surf zone from break point to final run-up on the beach. <input type="text"/> 27 <input type="text"/> 28 <input type="text"/> 29			
(ii) <u>CURRENT SPEED</u> Measure in metres the distance that the centre of the dye patch is observed to move during a one (1) minute period; if no long shore movement record 000. <input type="text"/> 30 <input type="text"/> 31 <input type="text"/> 32	<u>CURRENT DIRECTION</u> When the observer faces the sea 0 — no long shore movement L — dye moves to the left R — dye moves to the right <input type="text"/> 33			
<u>DISTANCE FROM SHORE</u> Record the distance in metres from the shore to where the current measurements were commenced. <input type="text"/> 34 <input type="text"/> 35	<u>OFFSHORE BAR</u> Is an off-shore bar causing the waves to break? 1—yes 0—no <input type="text"/> 36			
(iii) <u>WIND SPEED</u> Record wind speed to the nearest m.p.h. If calm record 00 and go directly to Section (iv). <input type="text"/> 37 <input type="text"/> 38	<u>WIND DIRECTION</u> Determine the direction that the wind is coming from using the compass provided and record the direction in degrees. <input type="text"/> 39 <input type="text"/> 40 <input type="text"/> 41			
(iv) <u>BERM ELEVATION</u> Record the elevation of berm to the nearest tenth of a metre. Measurements should be taken of the most seaward berm if more than one exists. <input type="text"/> 42 <input type="text"/> 43	<u>DISTANCE TO THE BERM</u> Record the distance, to the nearest metre, from the reference post to the berm. Distances landward of the reference post are negative. e.g. 009 measures 9 metres seaward (No sign); —07 measures 7 metres landward. (Minus sign). <input type="text"/> 44 <input type="text"/> 45 <input type="text"/> 46			
(v) <u>DISTANCE TO THE VEGETATION</u> Record the distance from the reference post to the average vegetation line. Distances landward of the reference post are negative. <input type="text"/> 47 <input type="text"/> 48 <input type="text"/> 49	<u>SAND LEVEL AT POLE</u> Record to nearest tenth of a metre. <input type="text"/> 50 <input type="text"/> 51			
(vi) <u>SAND SAMPLE</u> If sample taken then record 1. Otherwise leave blank. <input type="text"/> 52	<u>PLEASE PRINT</u> Please check the form for completeness			
	<u>SITE NAME</u>		<u>OBSERVER</u>	
	<u>REMARKS:</u> _____ _____			
	Make any additional remarks, computations or sketches on the reverse side of this form.			
	(for office use only)			
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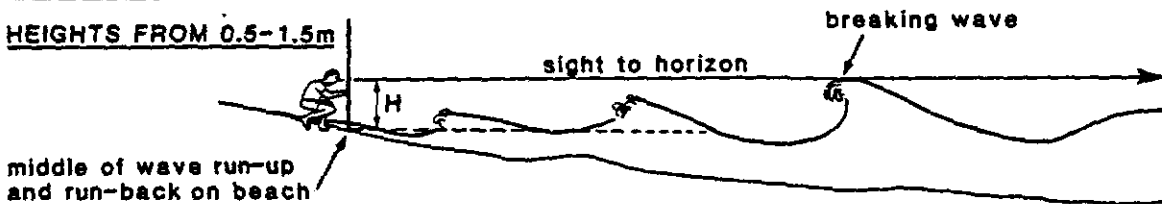
## WAVE HEIGHT AND DIRECTION INSTRUCTIONS

### METHOD 1 VISUAL ESTIMATION

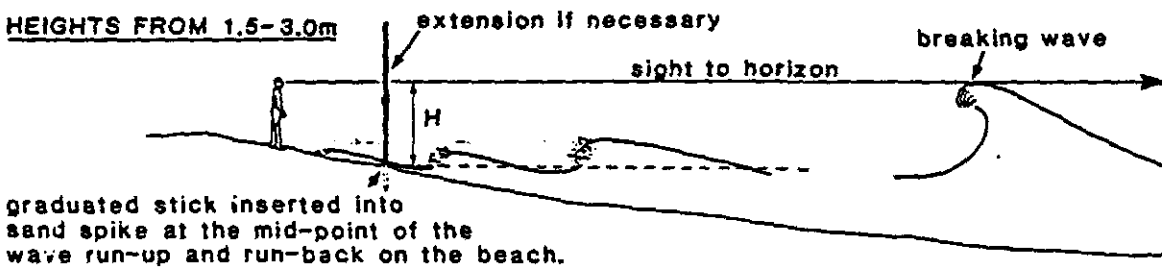
This method should only be used where the waveheights are below 0.5 and it is not practicable to use the preferred Method 2.

### METHOD 2

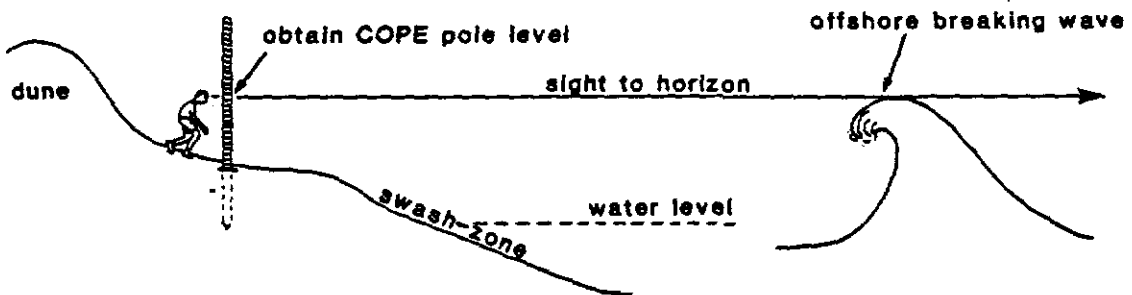
**HEIGHTS FROM 0.5-1.5m**



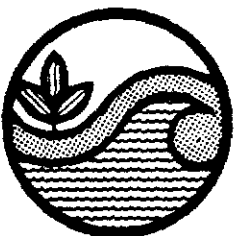
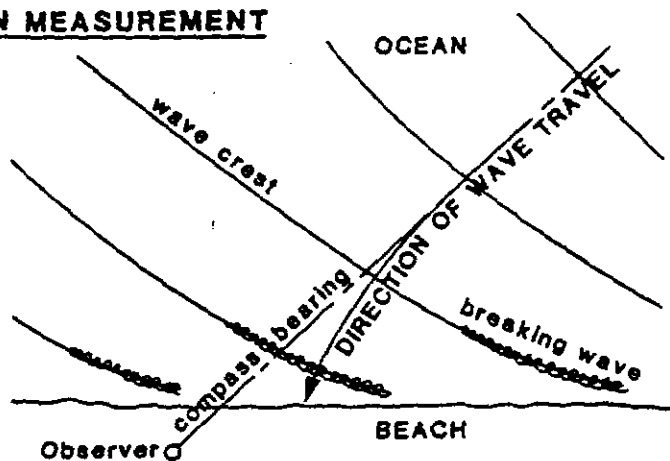
**HEIGHTS FROM 1.5-3.0m**



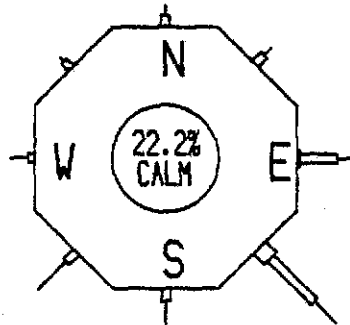
### METHOD 3 FOR WAVES OVER 3m



### WAVE DIRECTION MEASUREMENT



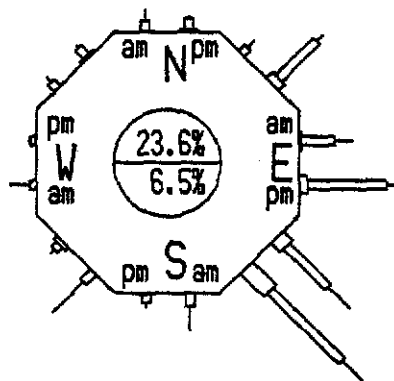
ALL OBSERVATIONS



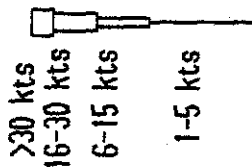
Total No. of Observations : 4006

MORNING - AFTERNOON OBSERVATIONS

NOTES :  
 Figures in Central Circle  
 Represent Percentage  
 of CALM Observations.  
 Upper Figure for AM  
 Lower Figure for PM

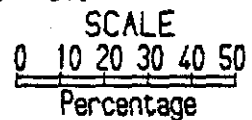


LEGEND

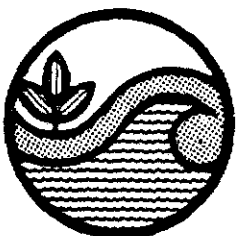


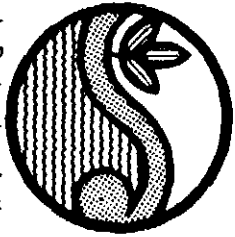
No. of Morning Observations : 3696  
 No. of Afternoon Observations : 310

Mean Time :- Morning Obs : 0749 hrs  
 Mean Time :- Afternoon Obs : 1538 hrs



WIND DATA - JAN 1977 to JULY 1988





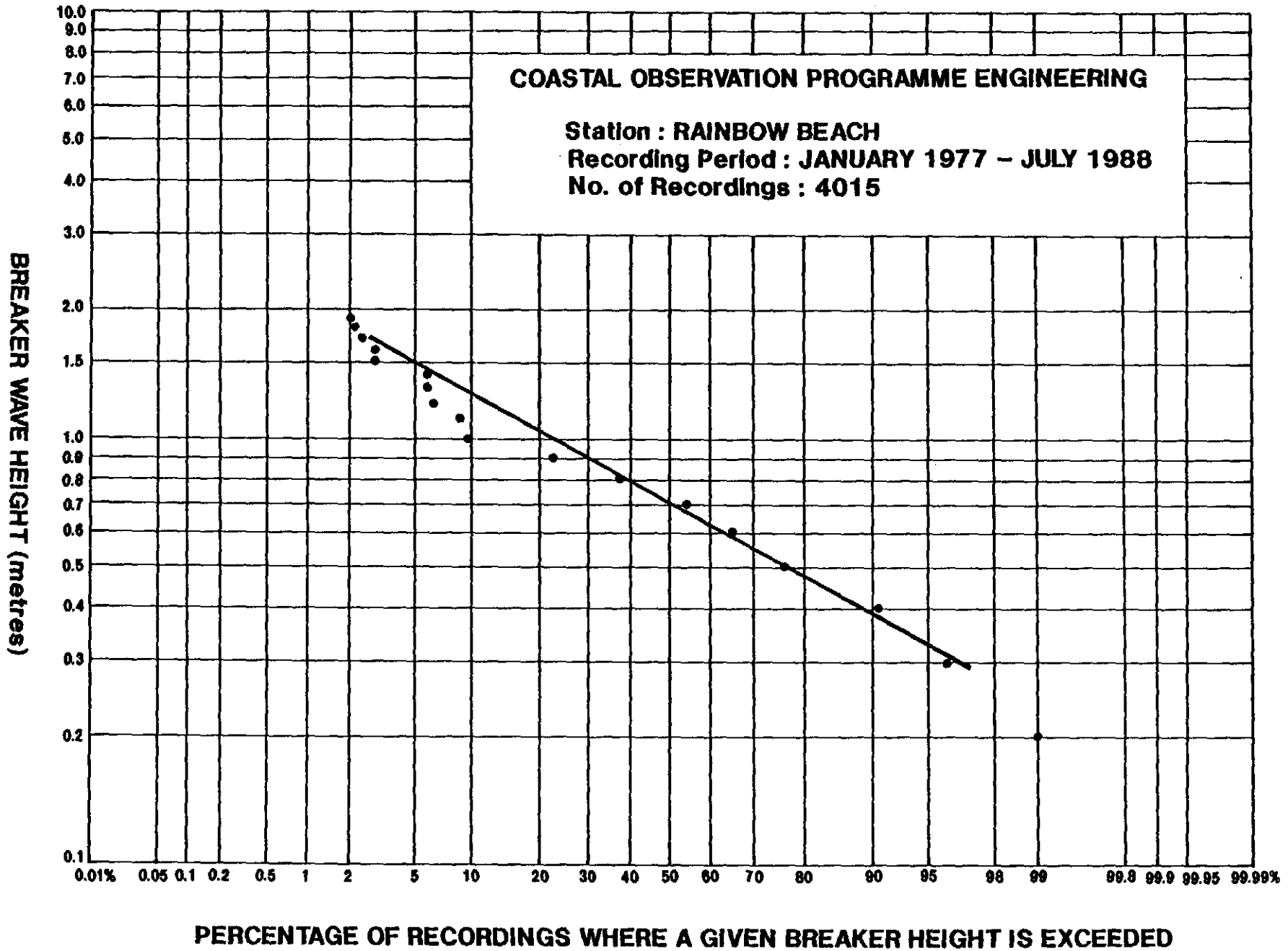
WAVE HEIGHT PERCENTAGE EXCEEDANCE

COPE

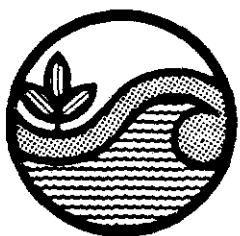
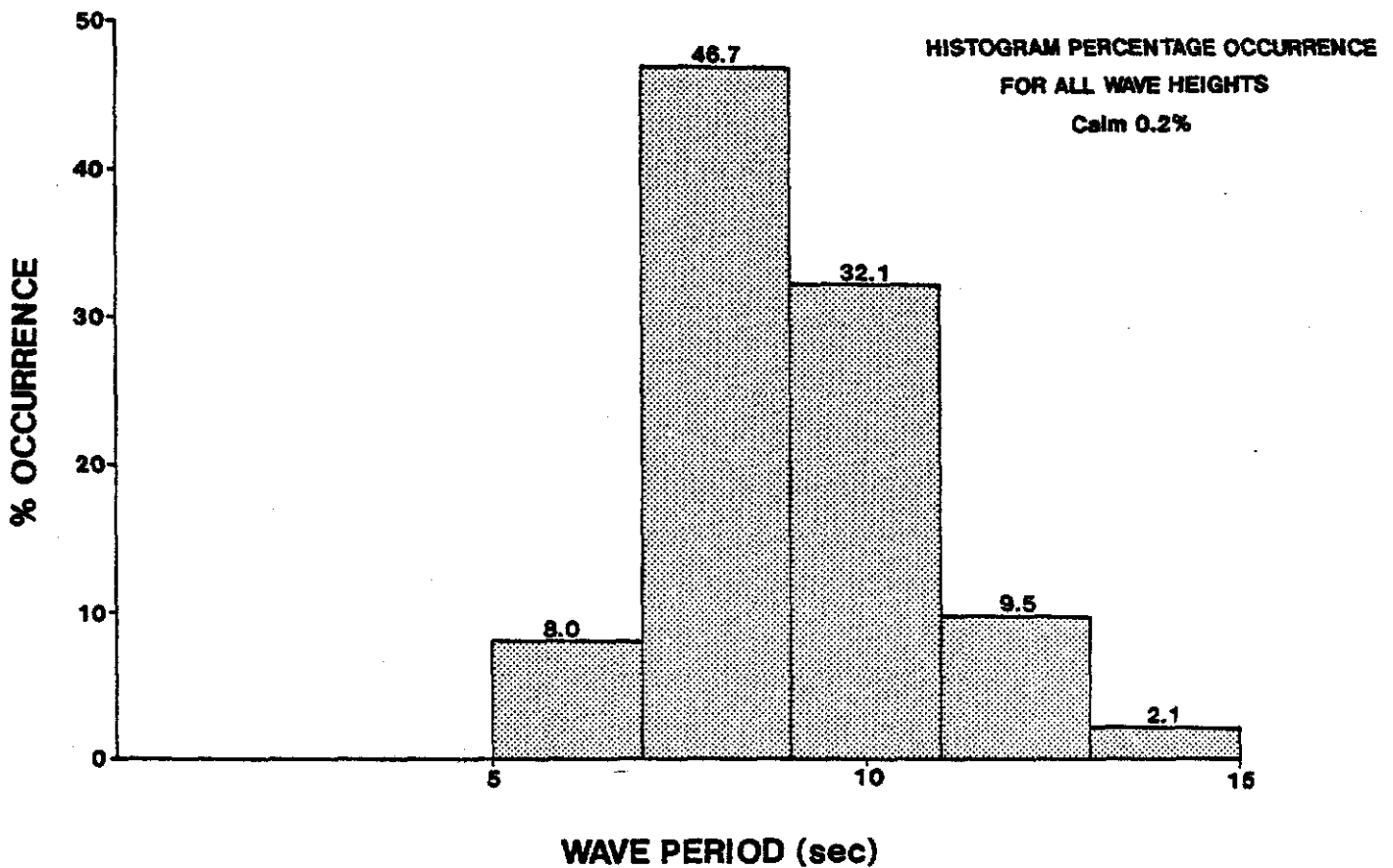
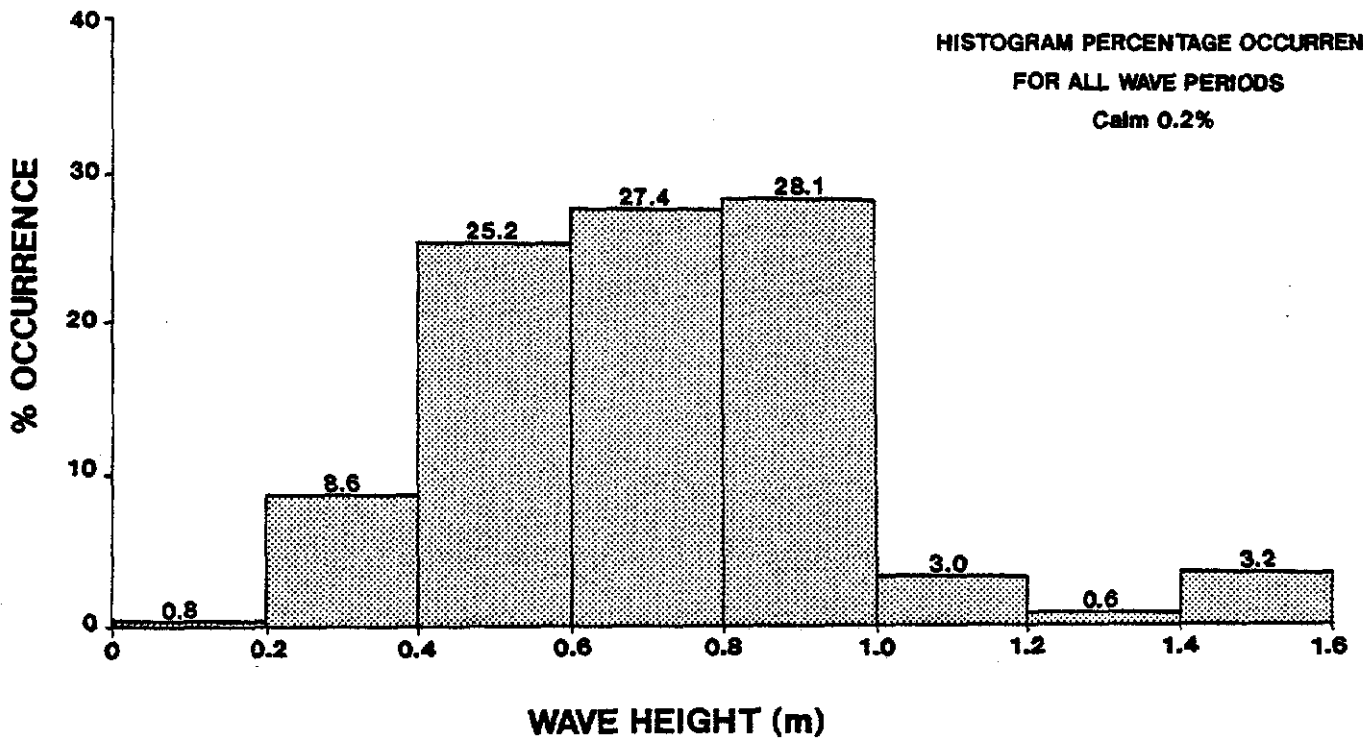
Rainbow Beach

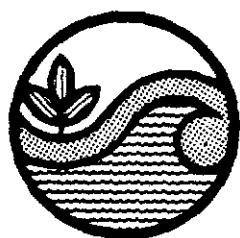
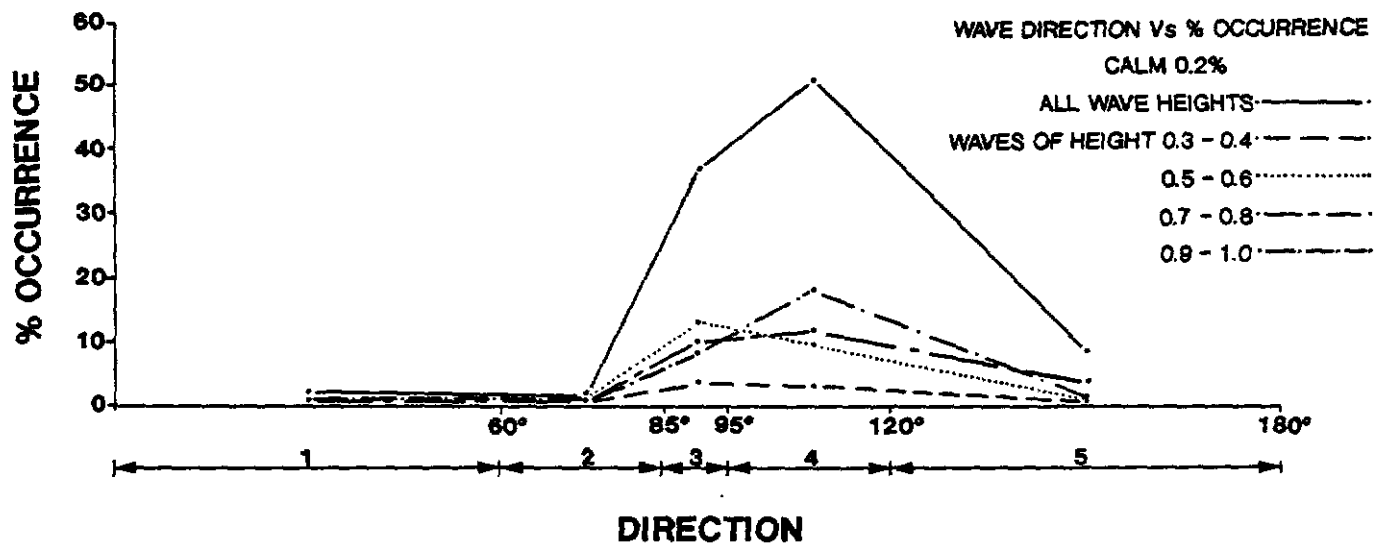
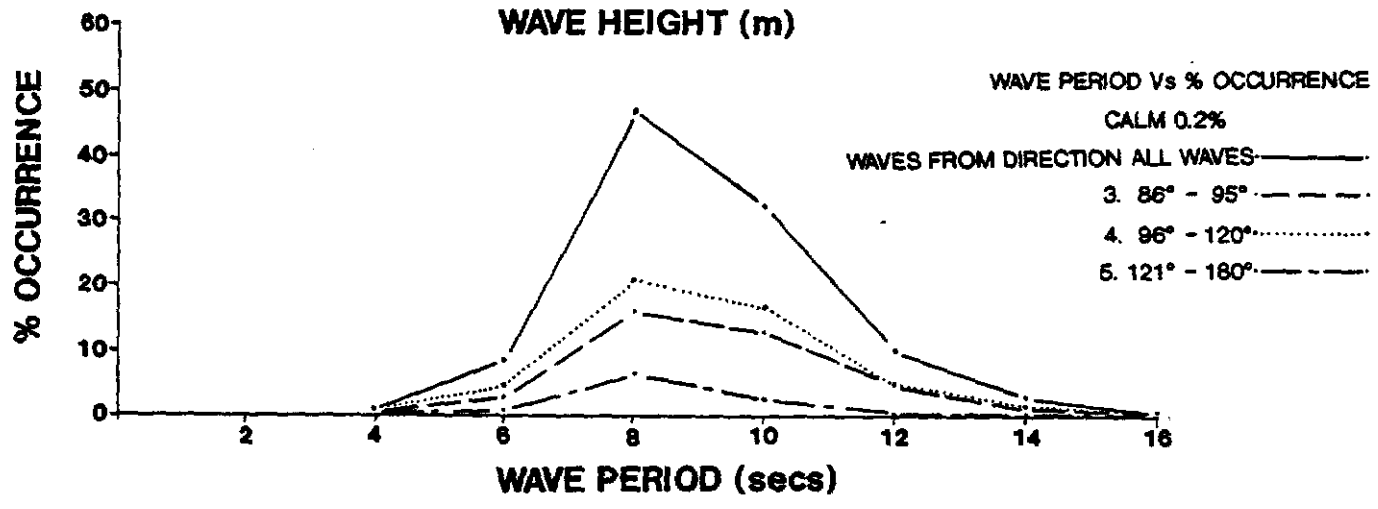
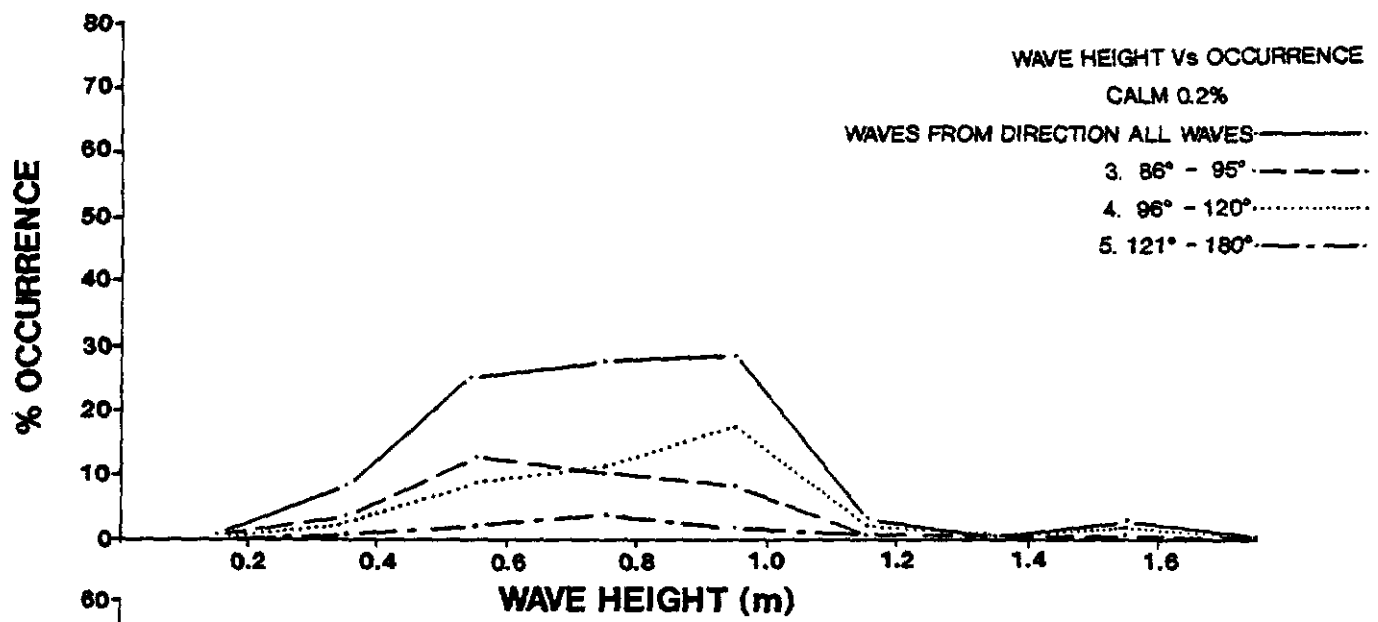
Figure 4

C25.1







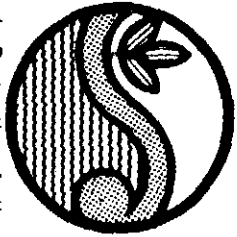


Beach Protection Authority

**WAVE DIRECTION ANALYSIS**

COPE  
Rainbow Beach

**Figure 6**  
C25.1



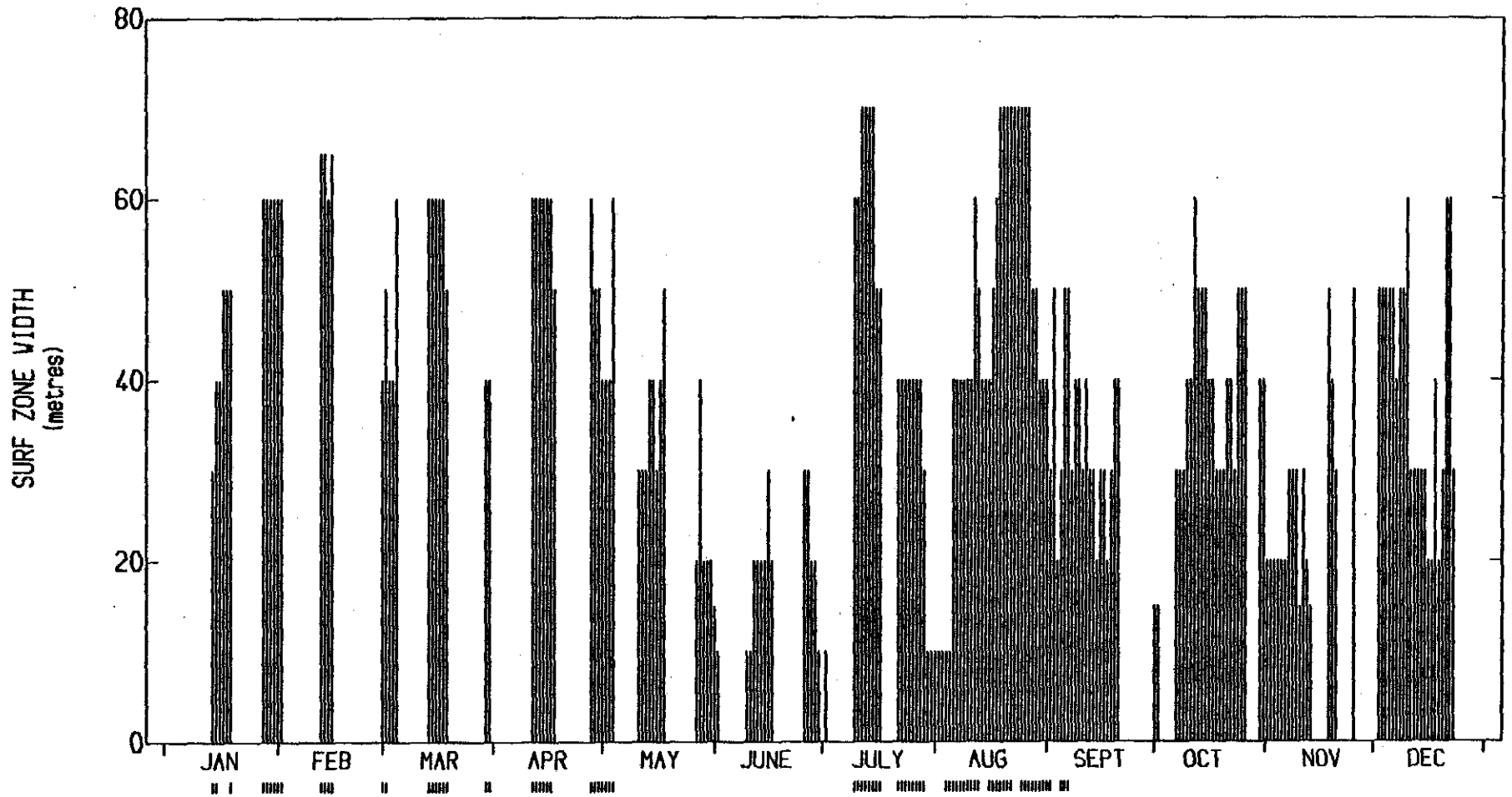
SURF ZONE WIDTH - MORNING 1977

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WIDGEE SHIRE

RAINBOW BEACH

0901



SURF ZONE WIDTH SUMMARY - 1977

No. of Observations : 206

MORNING OBSERVATIONS

Mean Surf Zone Width = 40.0 m

m Indicates Offshore Bar Present

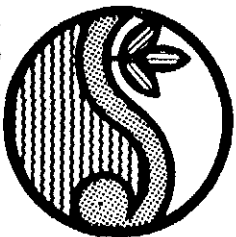
COPE

Rainbow Beach

Figure 7

C25.1





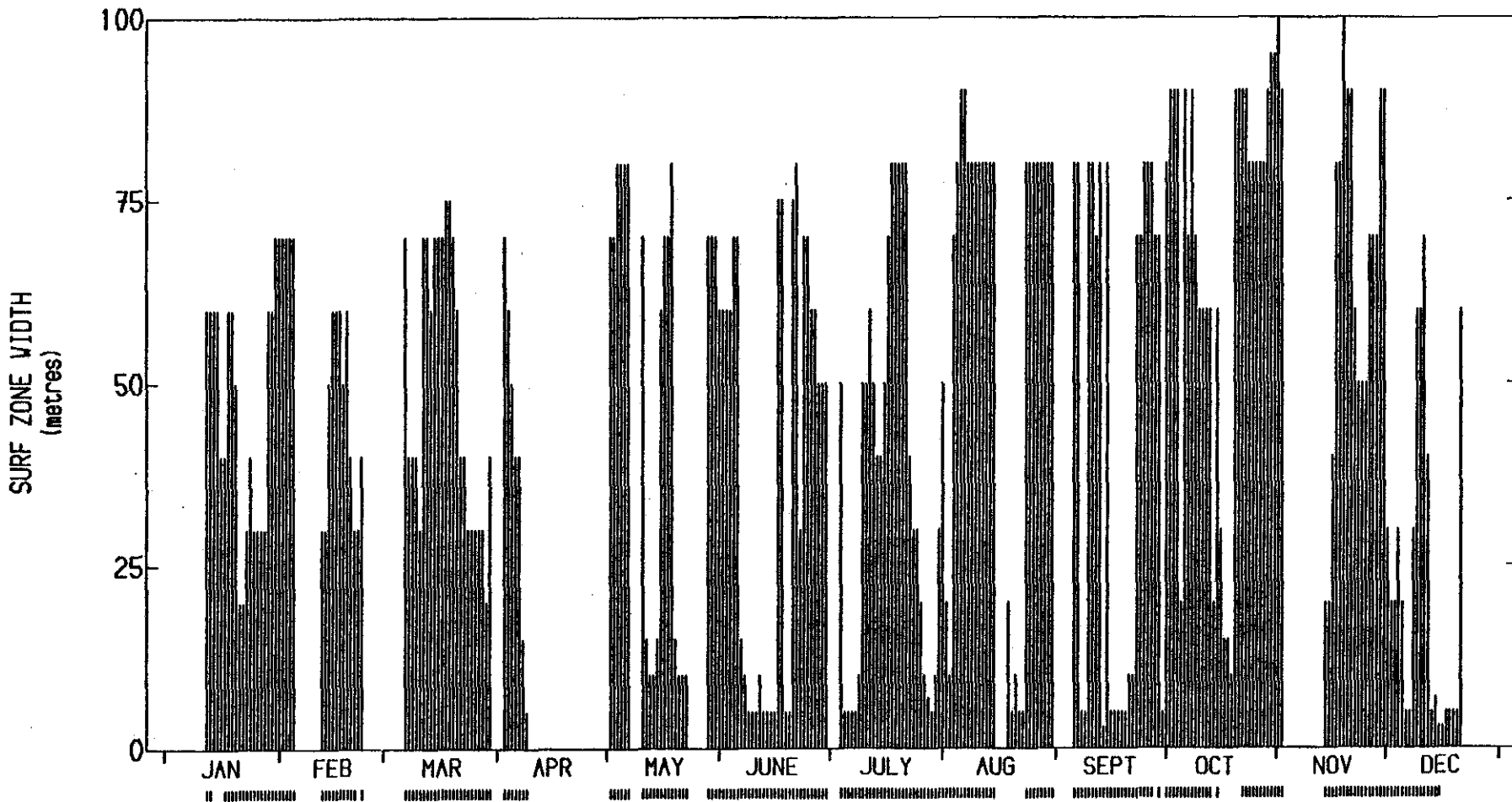
SURF ZONE WIDTH - MORNING 1978

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

0901



SURF ZONE WIDTH SUMMARY - 1978

No. of Observations : 273

MORNING OBSERVATIONS

Mean Surf Zone Width = 49.4 m

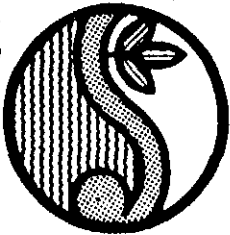
m Indicates Offshore Bar Present

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Rainbow Beach

Figure 9

C25.1



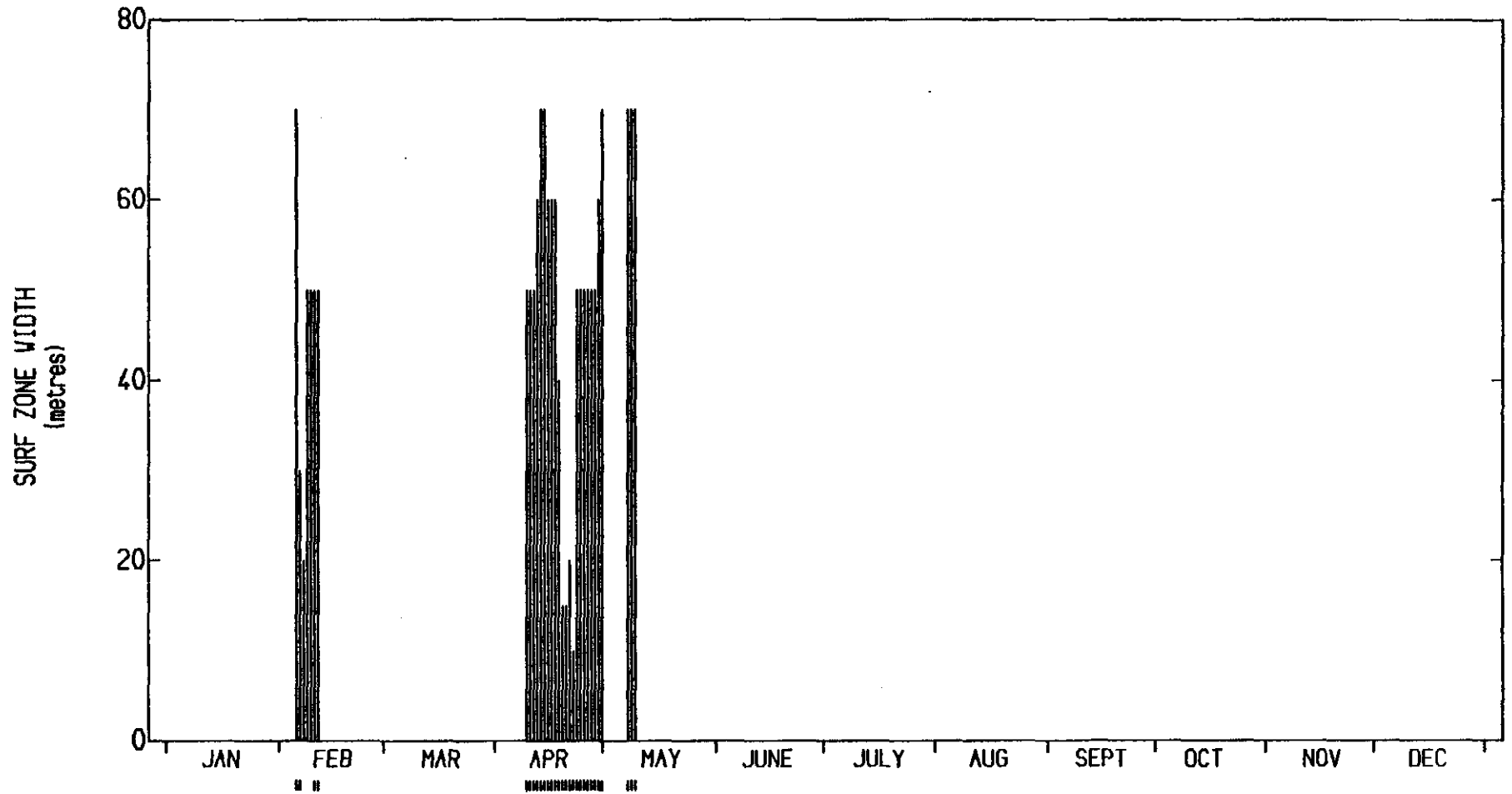
SURF ZONE WIDTH - AFTERNOON 1978

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WIDGEE SHIRE

RAINBOW BEACH

0901



SURF ZONE WIDTH SUMMARY - 1978

No. of Observations : 32

AFTERNOON OBSERVATIONS

Mean Surf Zone Width = 49.7 m

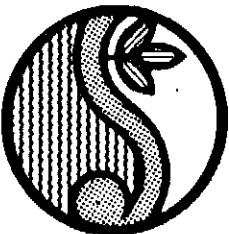
m Indicates Offshore Bar Present

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Rainbow Beach

Figure 10

G25.1



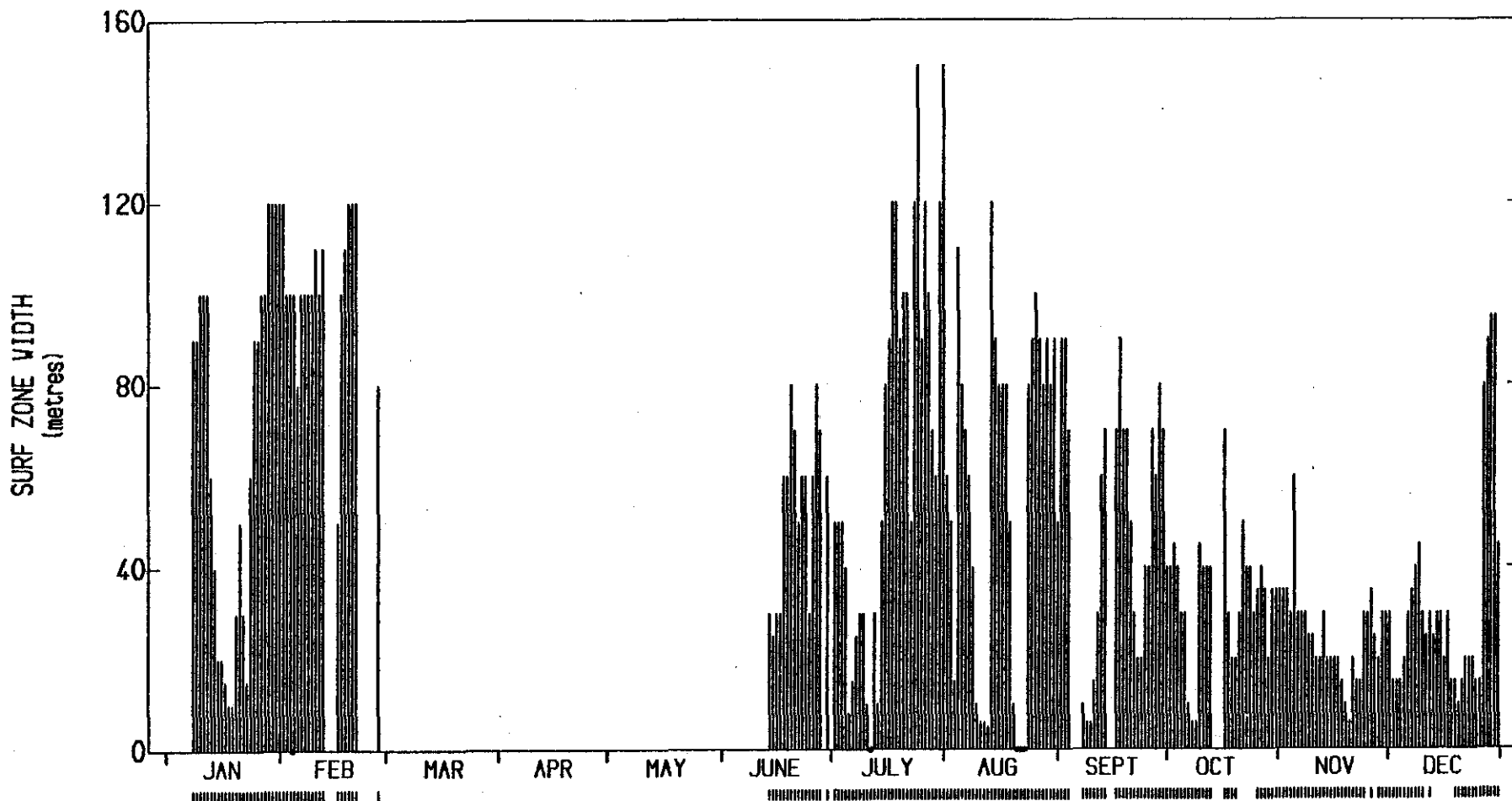
SURF ZONE WIDTH - MORNING 1979

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WIDGEE SHIRE

RAINBOW BEACH

0901



SURF ZONE WIDTH SUMMARY - 1979

No. of Observations : 236

MORNING OBSERVATIONS

Mean Surf Zone Width = 52.6 m

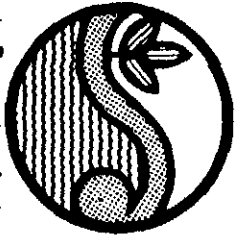
▄ Indicates Offshore Bar Present

Figure 11

C25.1

Rainbow Beach

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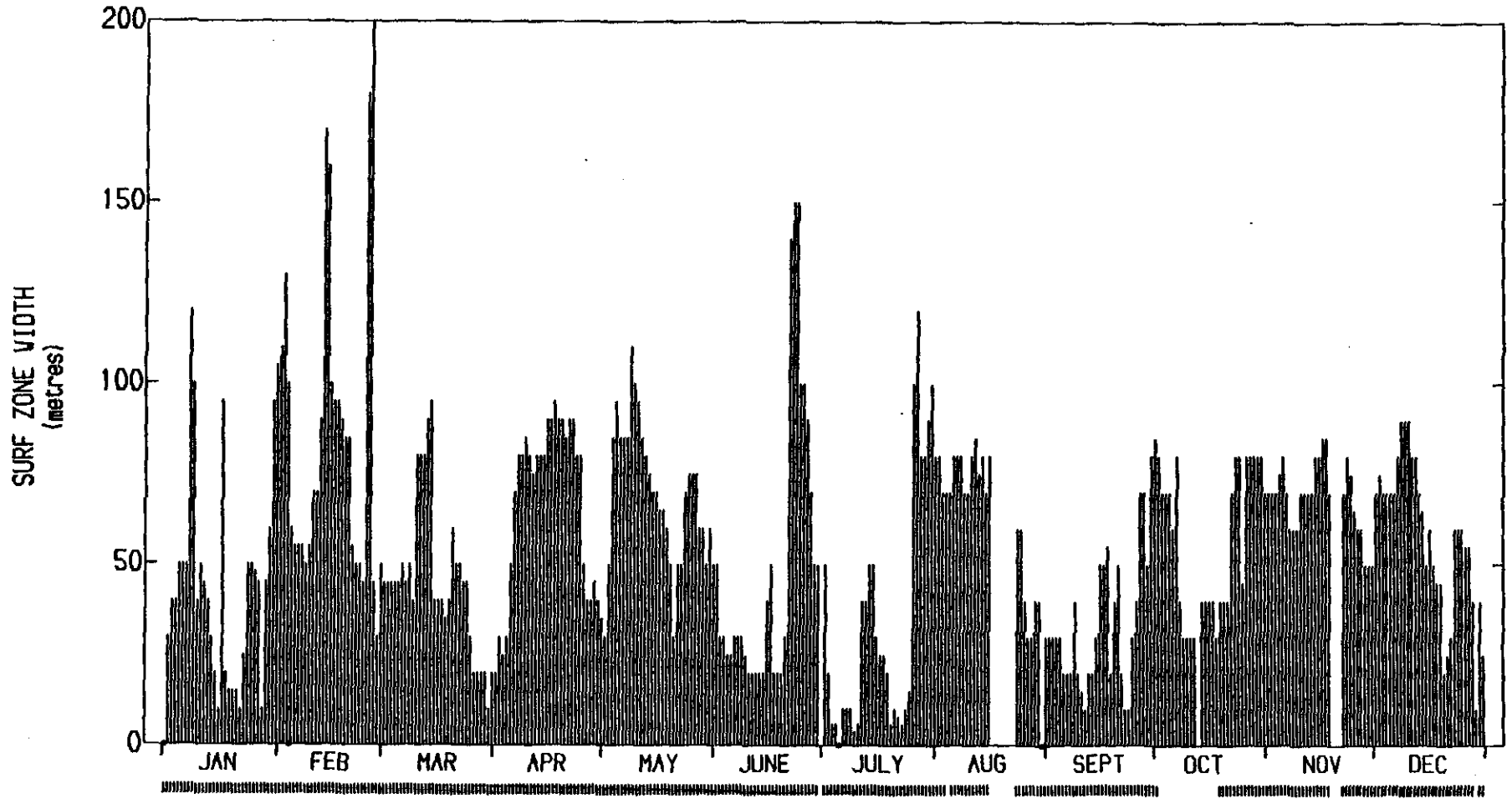
SURF ZONE WIDTH - MORNING 1980

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WIDGEE SHIRE

RAINBOW BEACH

0901



SURF ZONE WIDTH SUMMARY - 1980

No. of Observations : 356

MORNING OBSERVATIONS

Mean Surf Zone Width = 56.0 m

m Indicates Offshore Bar Present

Figure 12  
C25.1

Rainbow Beach

COPE





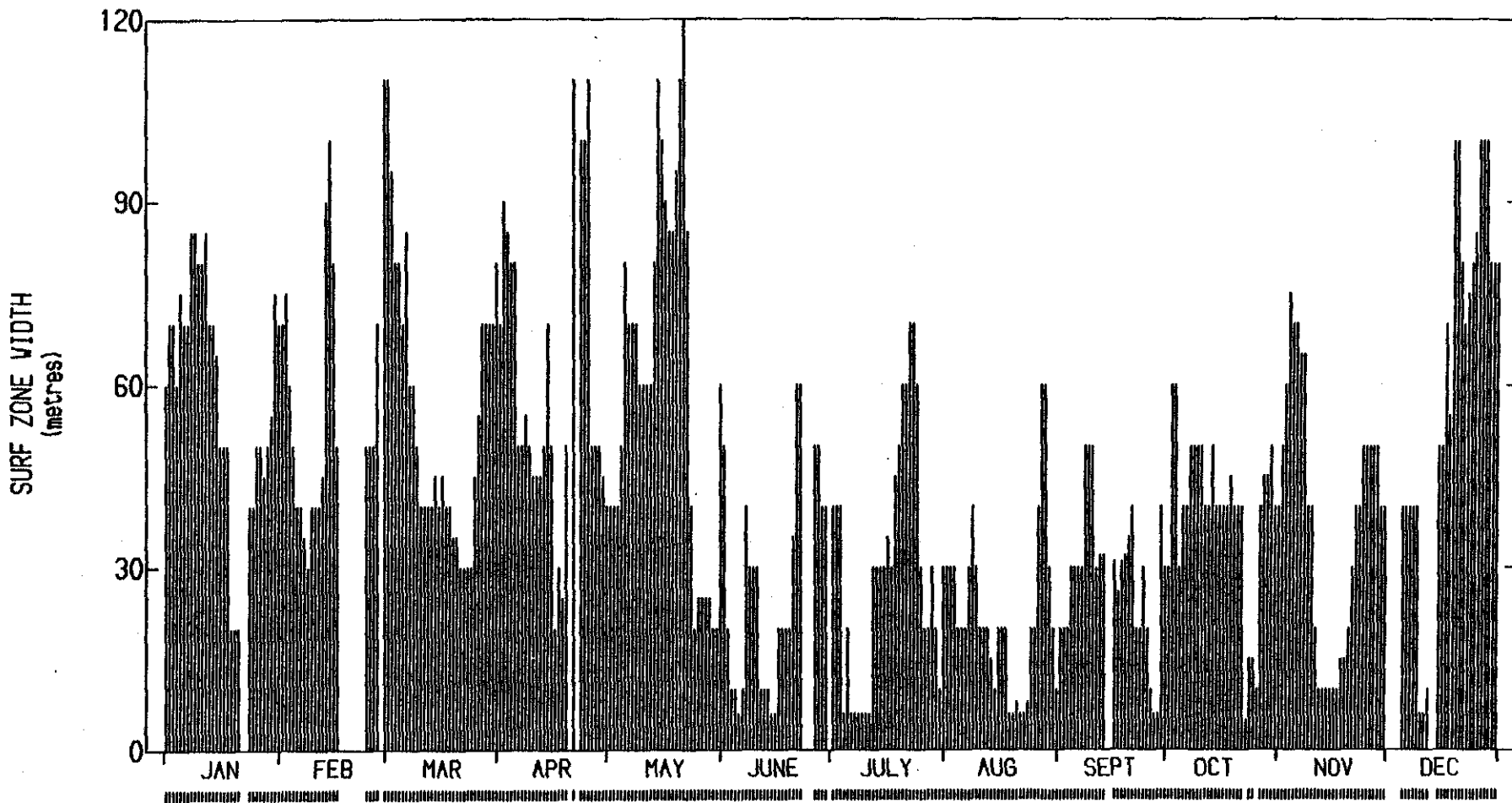
SURF ZONE WIDTH - MORNING 1981

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WIDGEE SHIRE

RAINBOW BEACH

0901



SURF ZONE WIDTH SUMMARY - 1981

No. of Observations : 343

MORNING OBSERVATIONS

Mean Surf Zone Width = 44.8 m

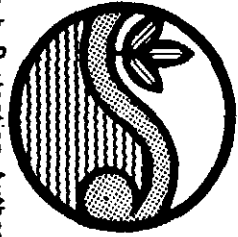
w Indicates Offshore Bar Present

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Rainbow Beach

Figure 13

C25.1



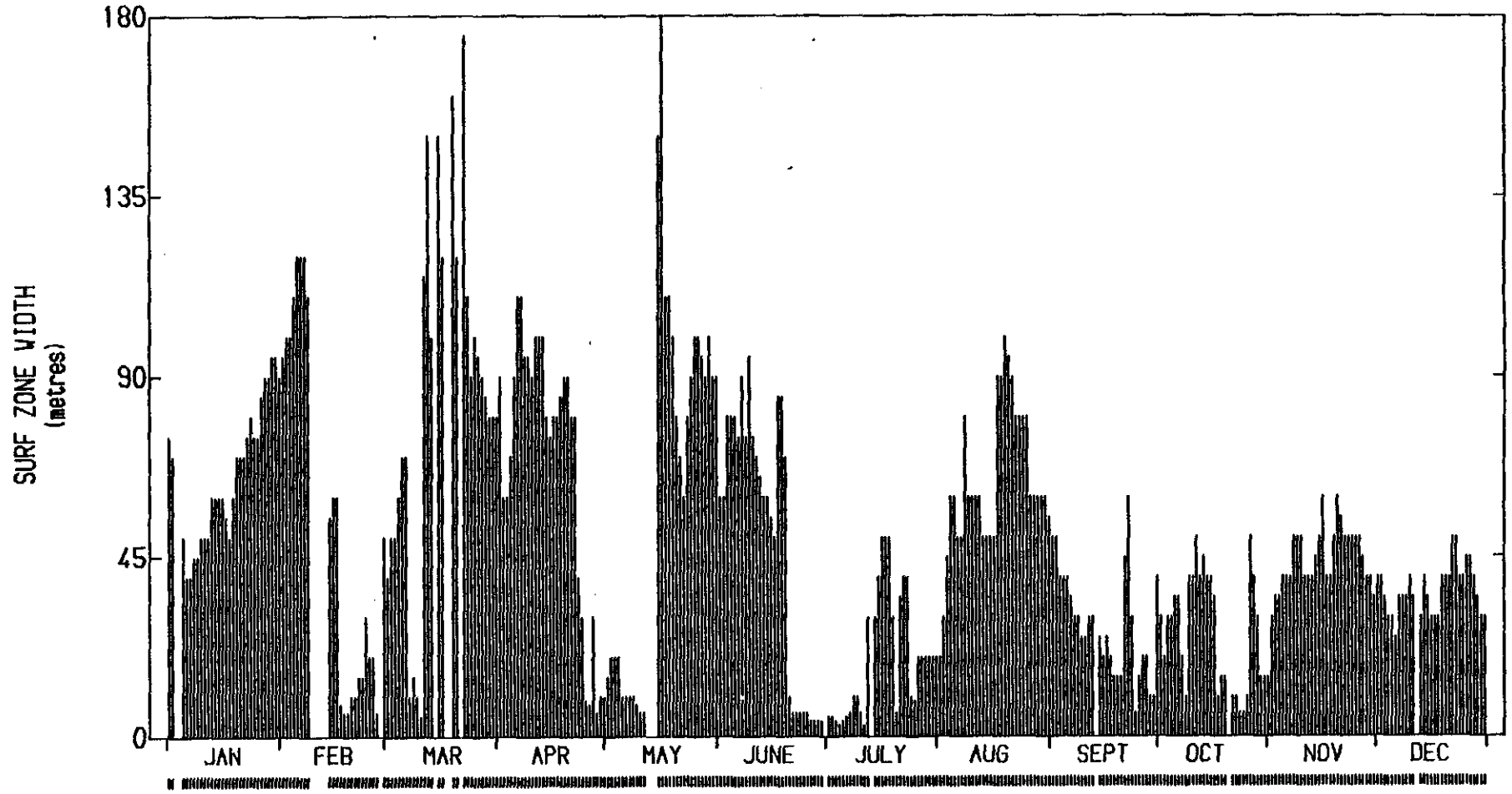
SURF ZONE WIDTH - MORNING 1982

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RAINBOW BEACH

0901



SURF ZONE WIDTH SUMMARY - 1982

No. of Observations : 349

MORNING OBSERVATIONS

Mean Surf Zone Width = 49.9 m

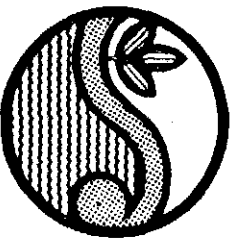
■ Indicates Offshore Bar Present

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Rainbow Beach

Figure 14

C25.1



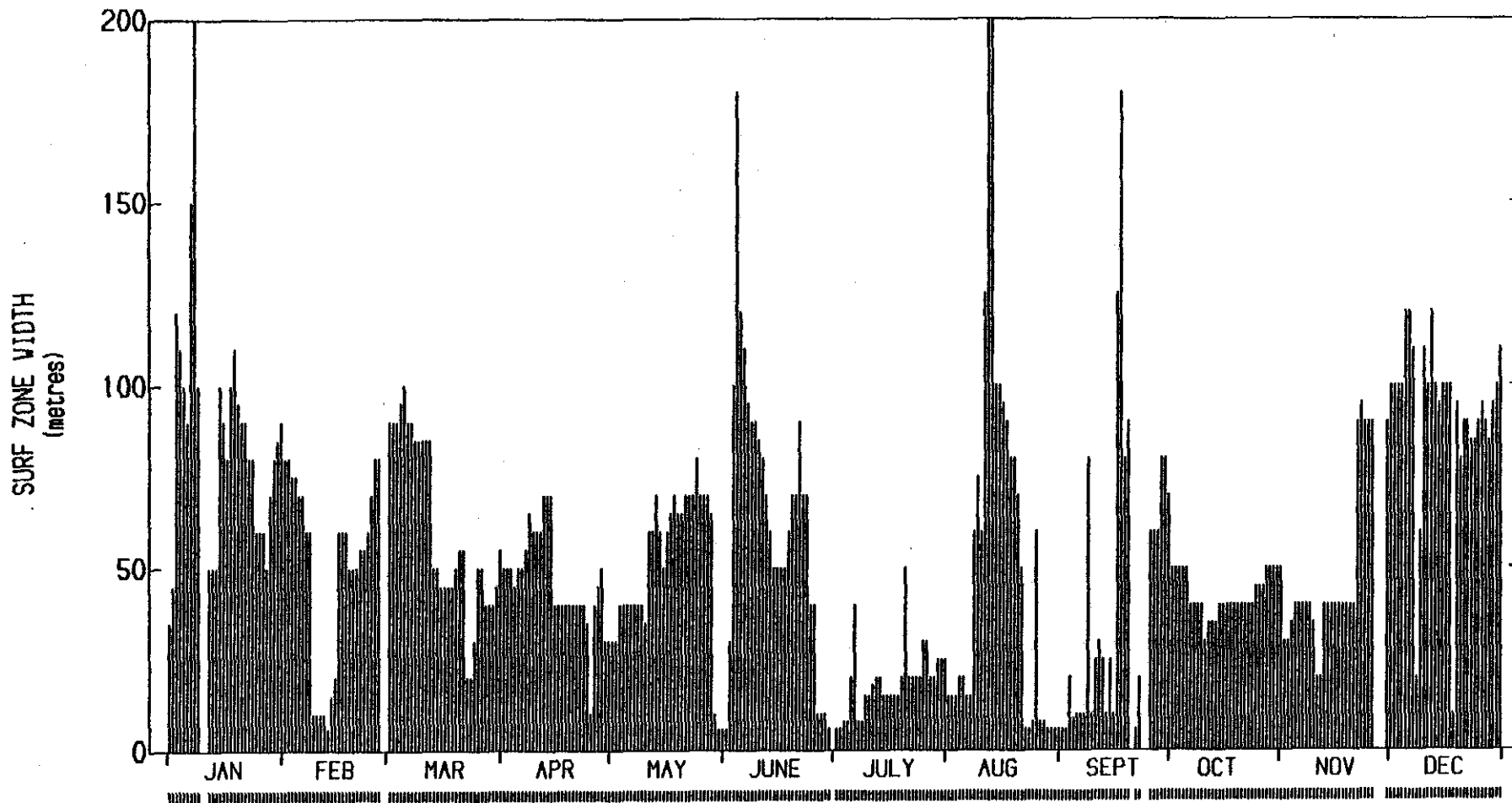
SURF ZONE WIDTH - MORNING 1983

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RAINBOW BEACH

0901



SURF ZONE WIDTH SUMMARY - 1983

No. of Observations : 358

MORNING OBSERVATIONS

Mean Surf Zone Width = 54.7 m

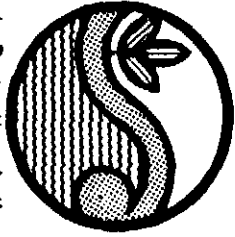
■ Indicates Offshore Bar Present

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Rainbow Beach

Figure 15

C25.1



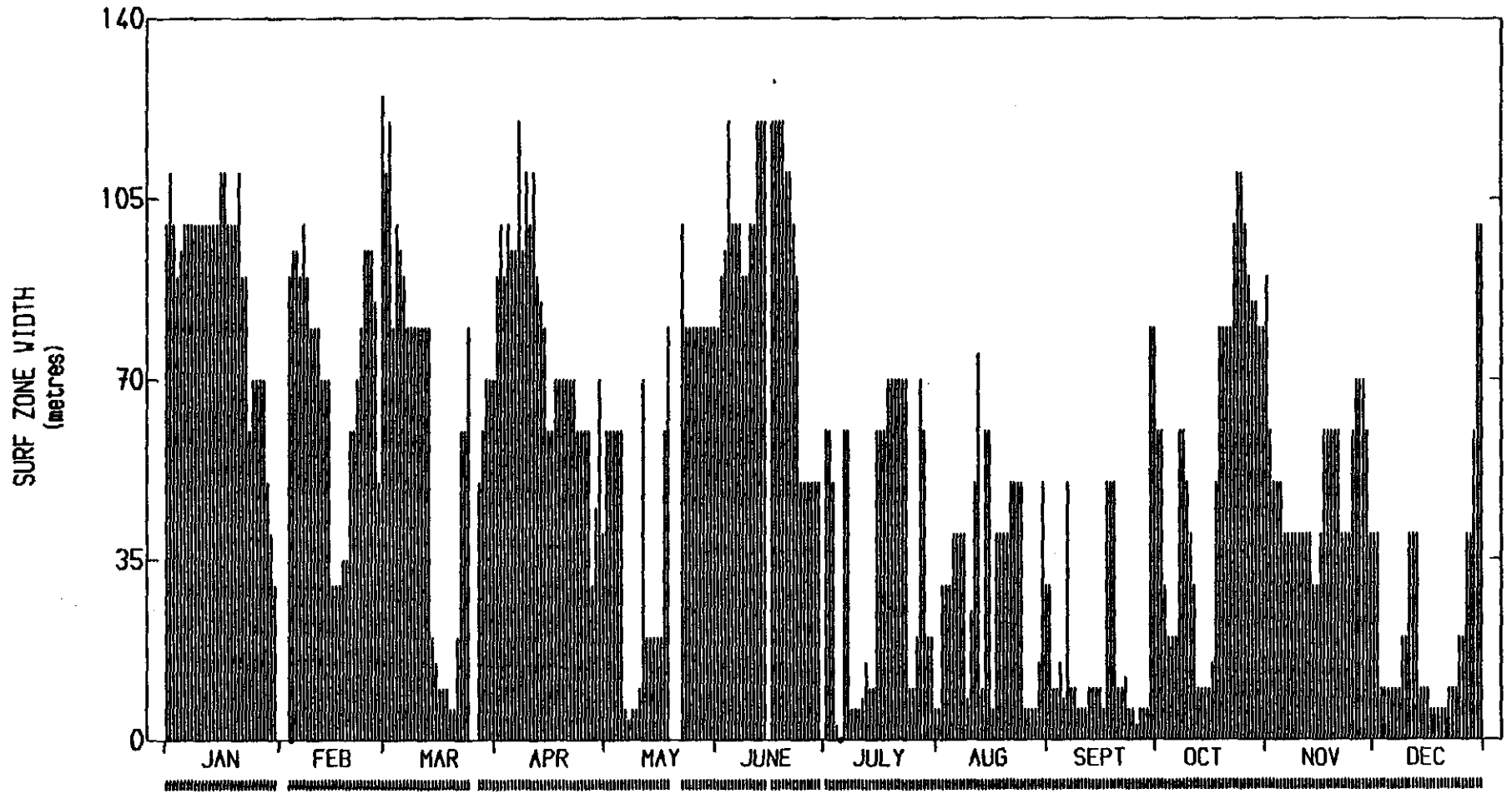
SURF ZONE WIDTH - MORNING 1984

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RAINBOW BEACH

0901



SURF ZONE WIDTH SUMMARY - 1984

No. of Observations : 357

MORNING OBSERVATIONS

Mean Surf Zone Width = 55.2 m

▨ Indicates Offshore Bar Present

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Rainbow Beach

Figure 16

C26.1



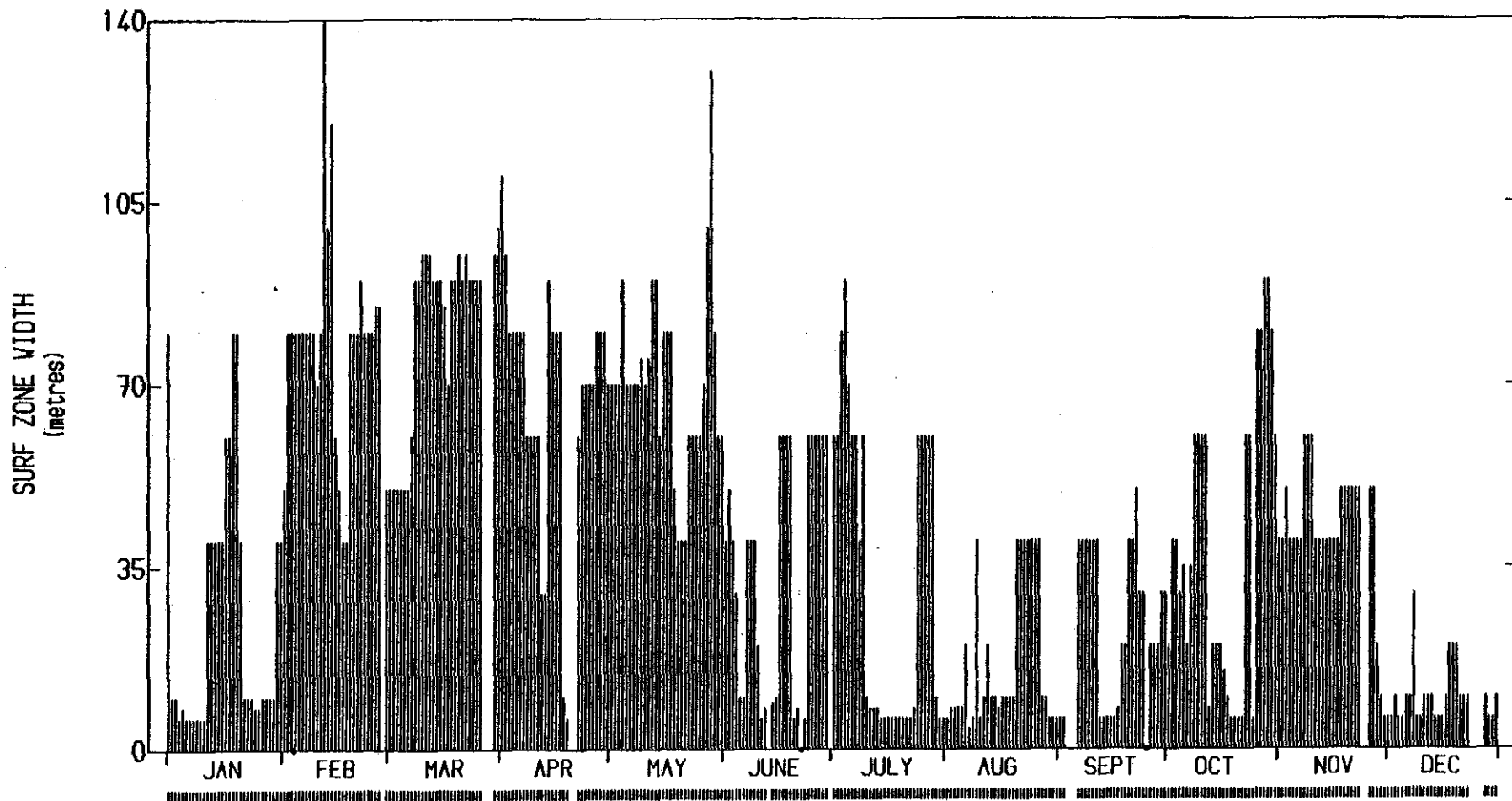
SURF ZONE WIDTH - MORNING 1985

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WIDGEE SHIRE

RAINBOW BEACH

0901



SURF ZONE WIDTH SUMMARY - 1985

No. of Observations : 351

MORNING OBSERVATIONS

Mean Surf Zone Width = 43.2 m

|| Indicates Offshore Bar Present

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Rainbow Beach

Figure 17

C25.1



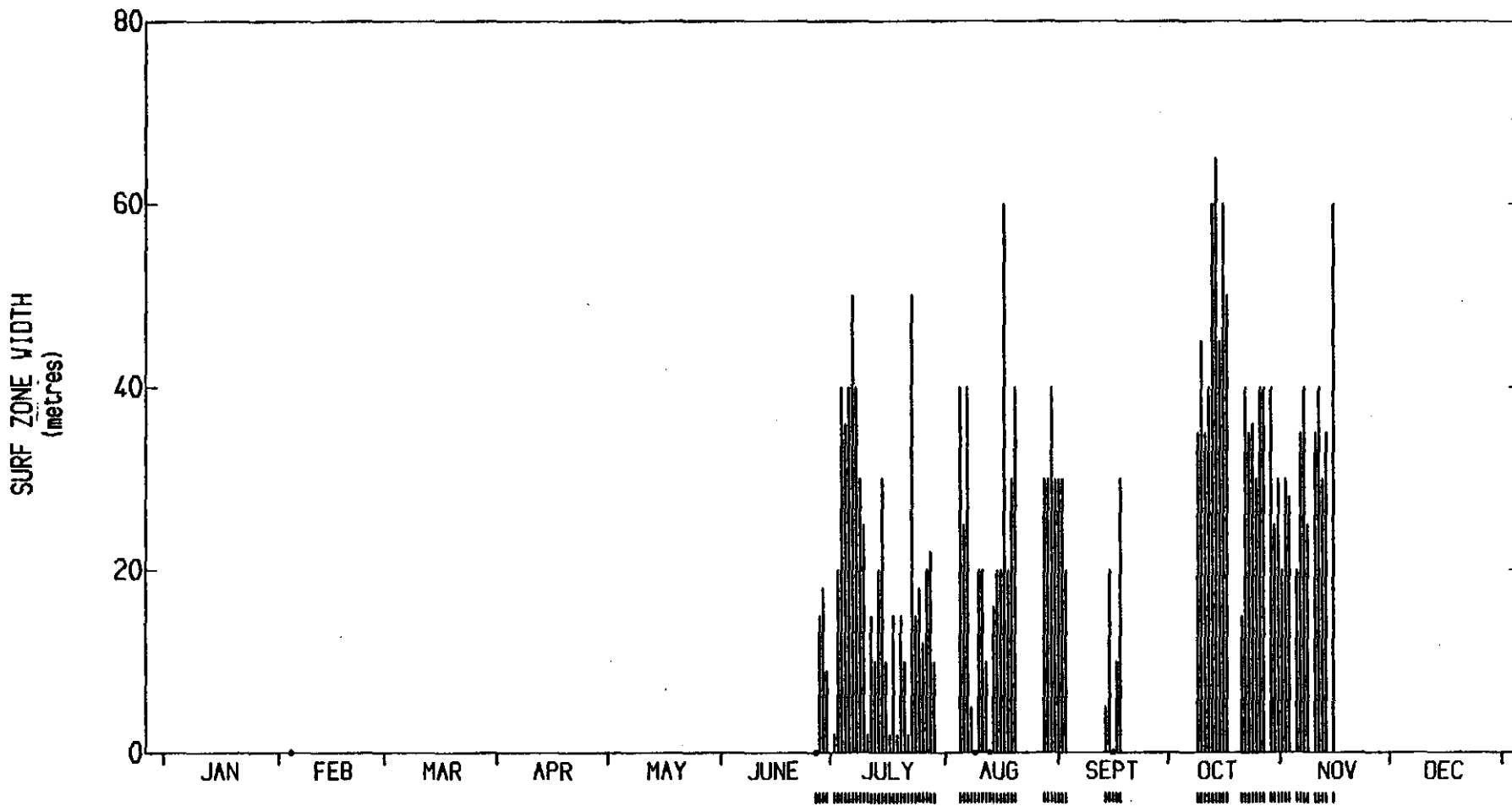
SURF ZONE WIDTH - AFTERNOON 1985

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RAINBOW BEACH

0901



SURF ZONE WIDTH SUMMARY - 1985

No. of Observations : 91

AFTERNOON OBSERVATIONS

Mean Surf Zone Width = 26.5 m

m Indicates Offshore Bar Present

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Rainbow Beach

Figure 18

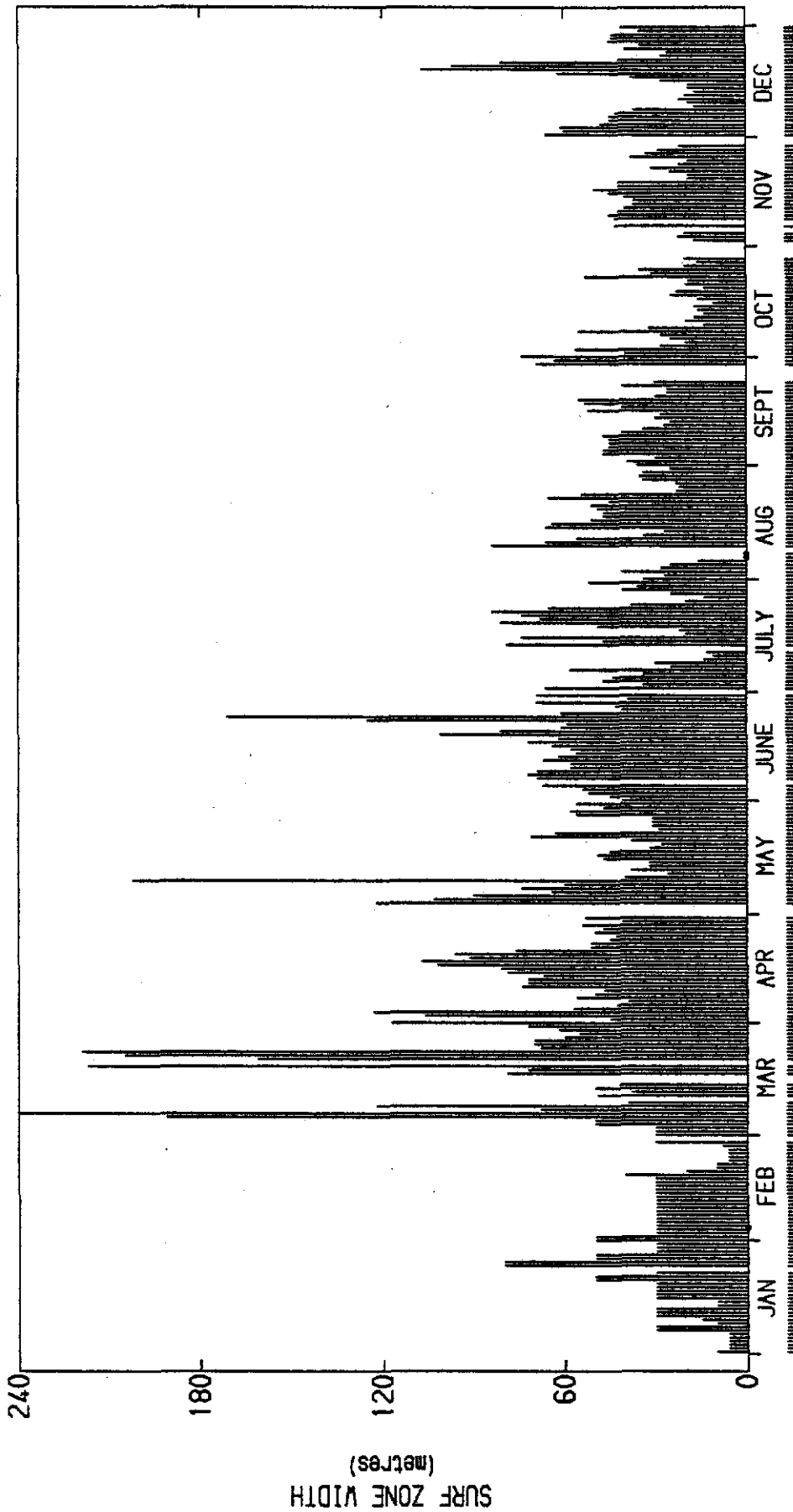
C25.1

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RAINBOW BEACH

0901



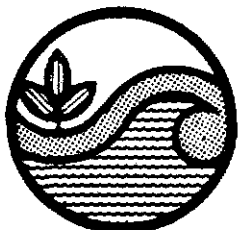
**SURF ZONE WIDTH SUMMARY - 1986**

No. of Observations : 343

MORNING OBSERVATIONS

Mean Surf Zone Width = 46.7 m

|| Indicates Offshore Bar Present



Beach Protection Authority

**SURF ZONE WIDTH - MORNING 1986**

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Rainbow Beach

**Figure 19**

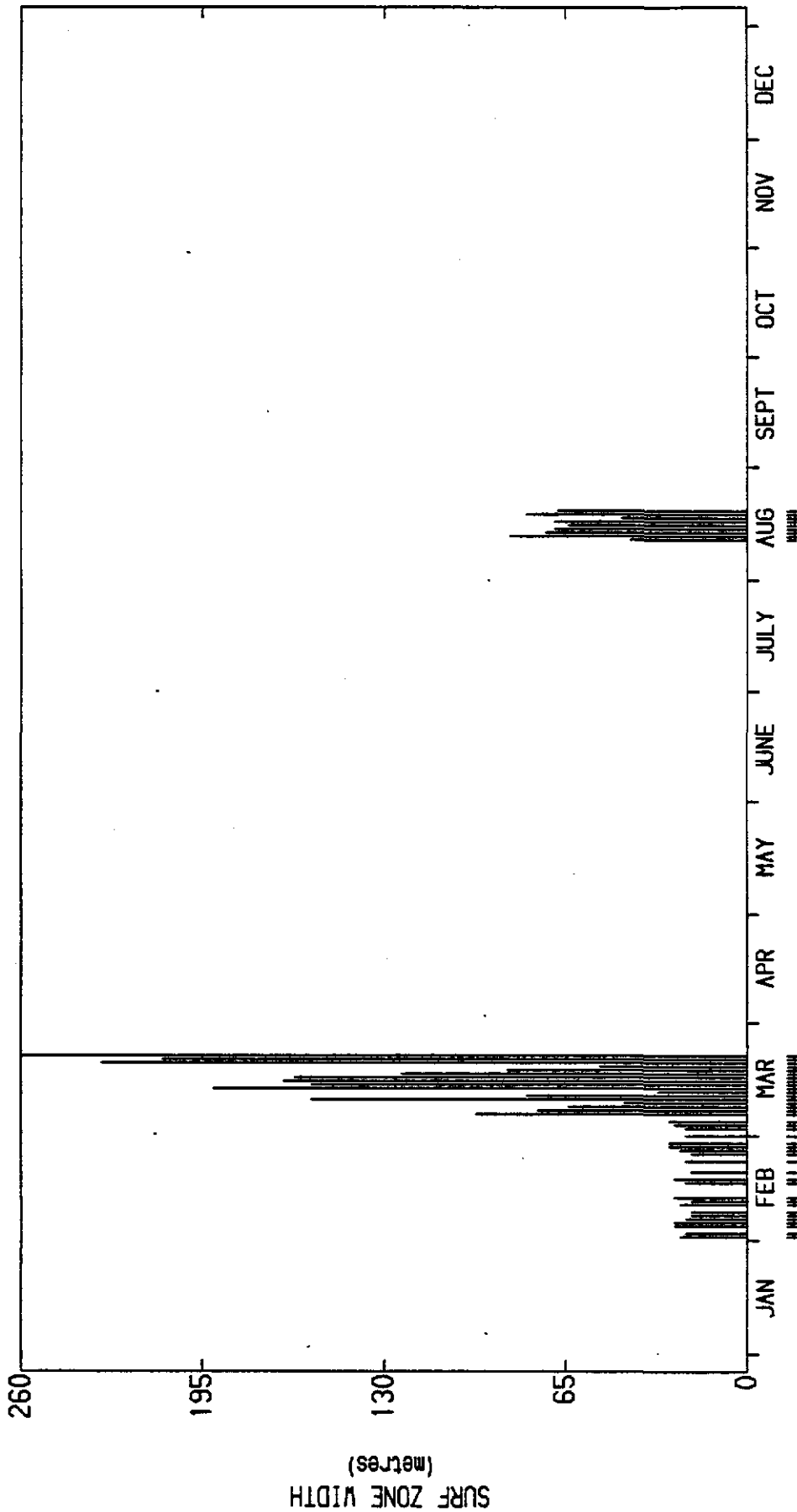
C25.1

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Programme Engineering

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RAINBOW BEACH

0901

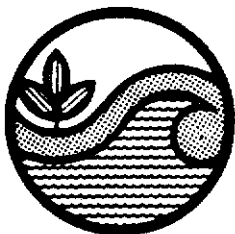


### SURF ZONE WIDTH SUMMARY - 1986

No. of Observations : 59

AFTERNOON OBSERVATIONS

Mean Surf Zone Width = 71.6 m



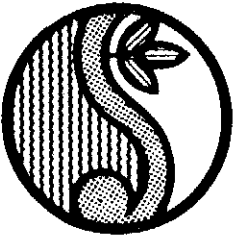
## SURF ZONE WIDTH - AFTERNOON 1986

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Rainbow Beach

Figure 20

C25.1





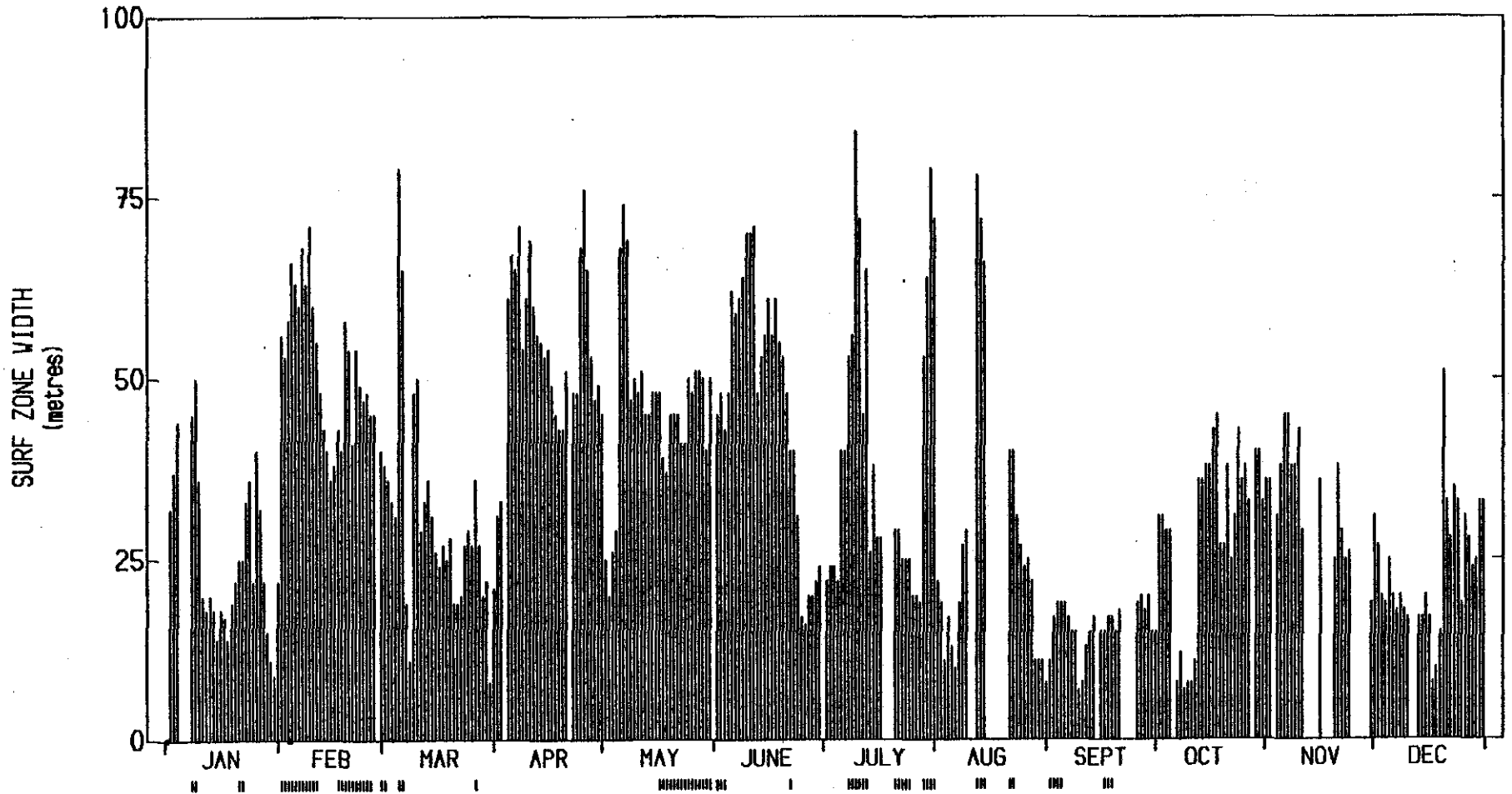
SURF ZONE WIDTH - MORNING 1987

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WIDGEE SHIRE

RAINBOW BEACH

0901



SURF ZONE WIDTH SUMMARY - 1987

No. of Observations : 326

MORNING OBSERVATIONS

Mean Surf Zone Width = 35.7 m

||| Indicates Offshore Bar Present

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Rainbow Beach

Figure 21

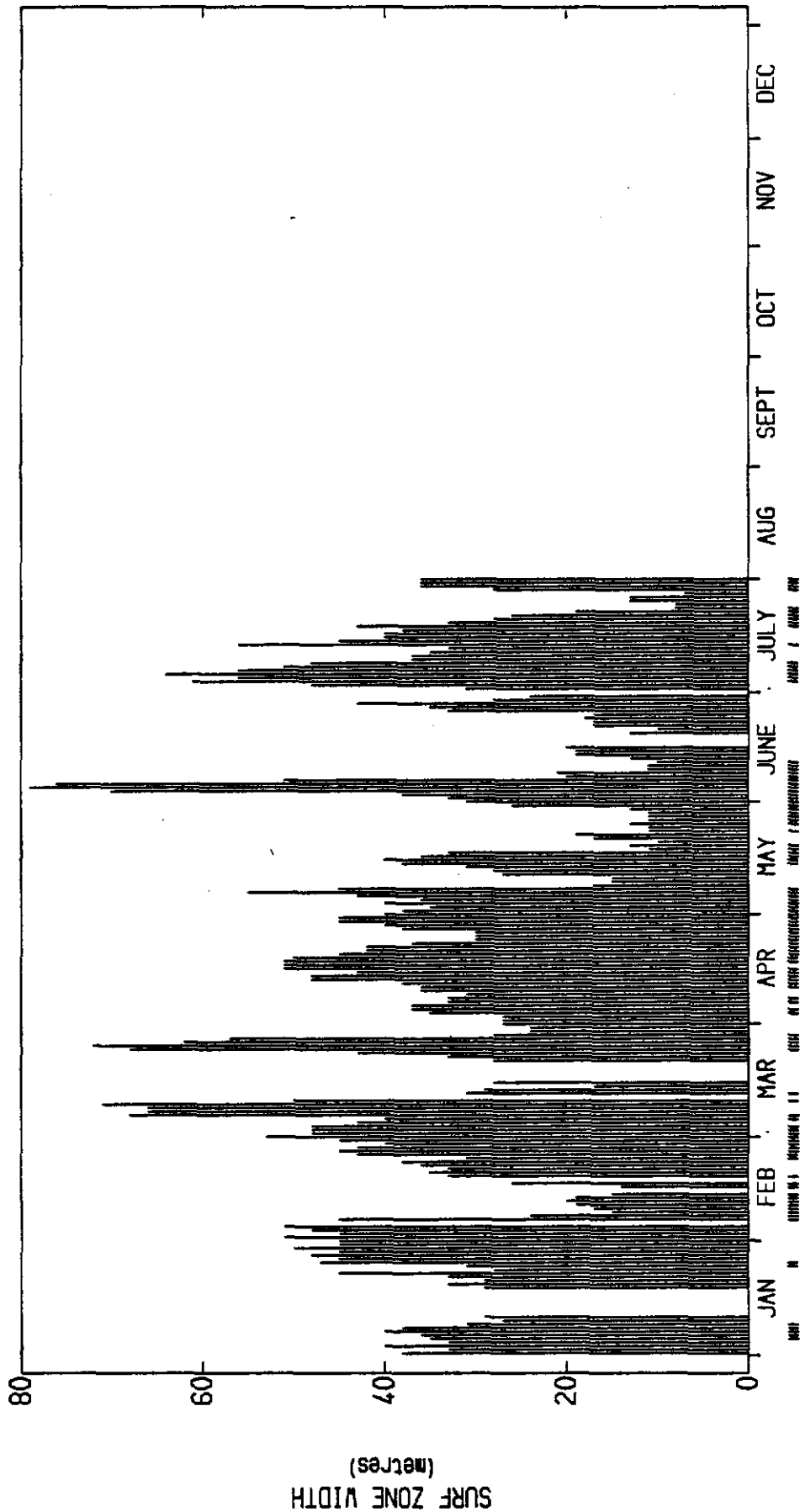
C25.1

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Programme Engineering

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RAINBOW BEACH

0901



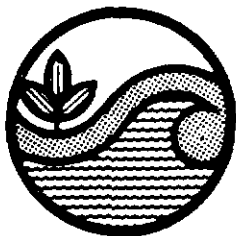
### SURF ZONE WIDTH SUMMARY - 1988

No. of Observations : 195

MORNING OBSERVATIONS

Mean Surf Zone Width = 34.8 m

||| Indicates Offshore Bar Present



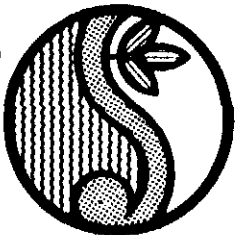
Beach Protection Authority

## SURF ZONE WIDTH - MORNING 1988

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Rainbow Beach

Figure 22

Q25.1



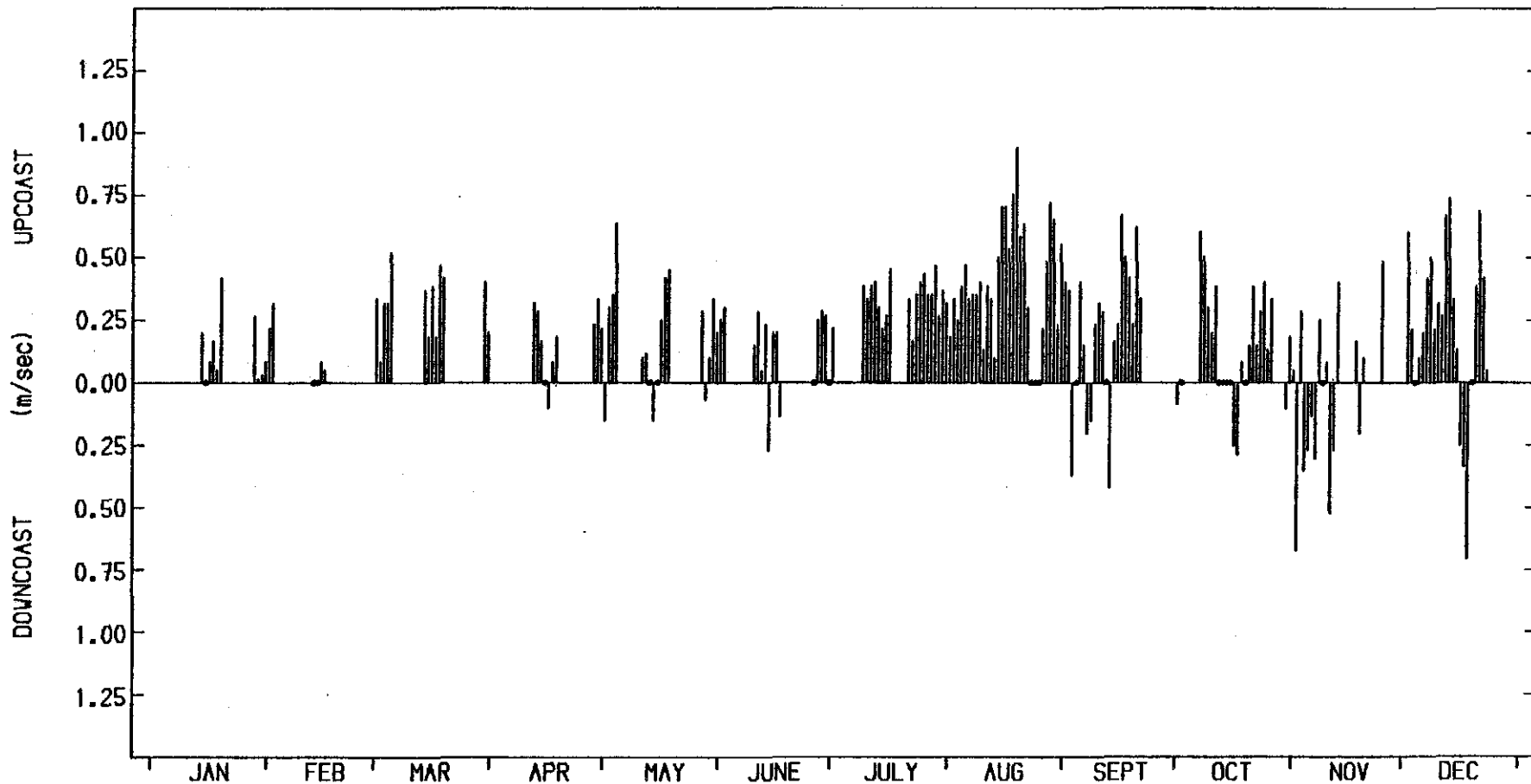
LITTORAL CURRENTS - MORNING 1977

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WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1977

Mean Vel = .213 m/sec (up)

Mean Upcoast Vel = .319 m/sec

Mean Downcoast Vel = .268 m/sec

MORNING OBSERVATIONS - (206 recordings)

Figure 23

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Rainbow Beach

C25.1



LITTORAL CURRENTS - AFTERNOON 1977

COPE

Rainbow Beach

Figure 24

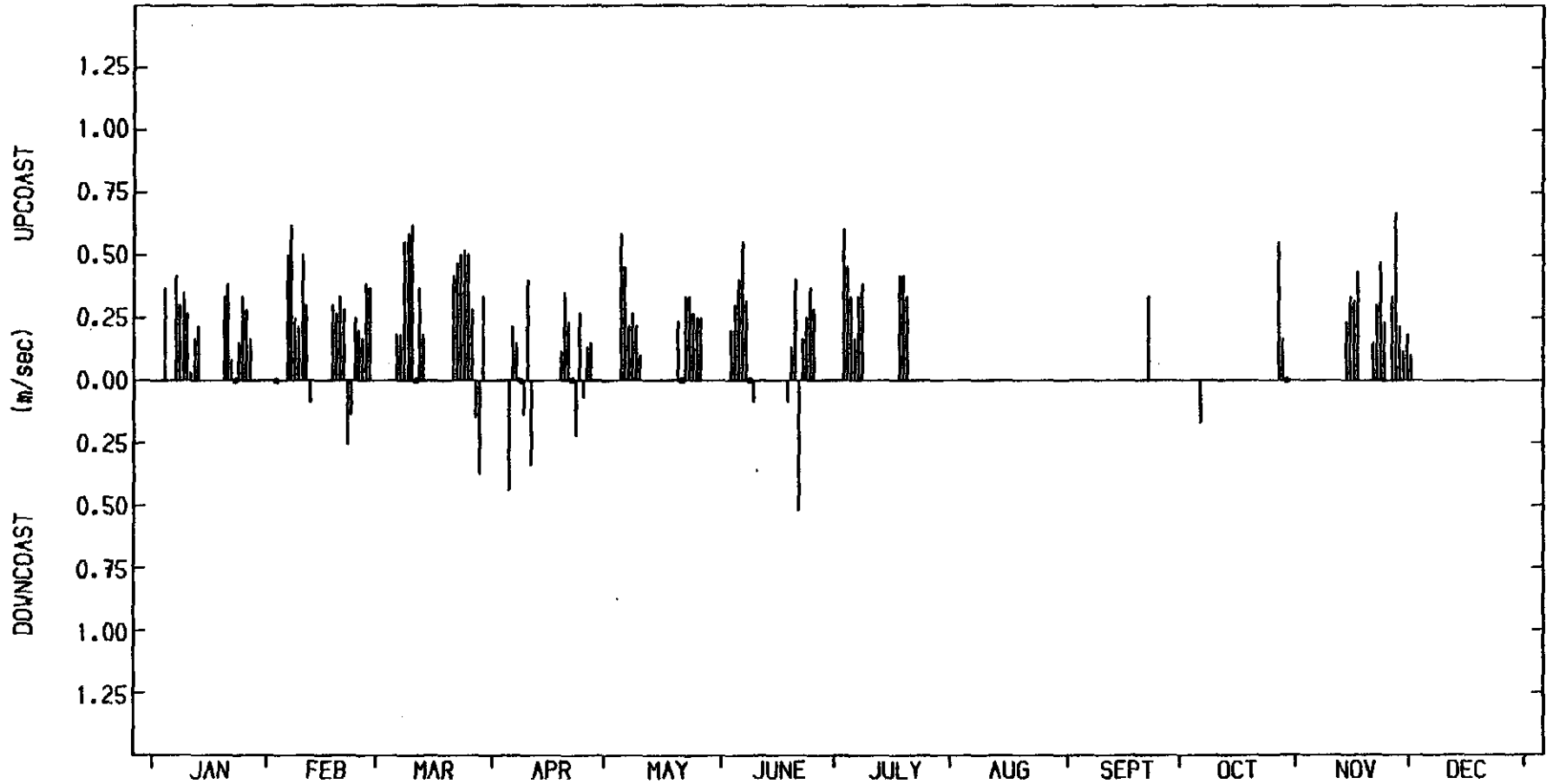
C25.1

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WIDGEE SHIRE

RAINBOW BEACH

0901



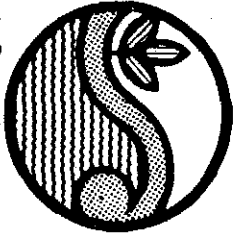
LITTORAL CURRENT SUMMARY - 1977

Mean Vel = .233 m/sec (up)

Mean Upcoast Vel = .313 m/sec

Mean Downcoast Vel = .215 m/sec

AFTERNOON OBSERVATIONS - (124 recordings)



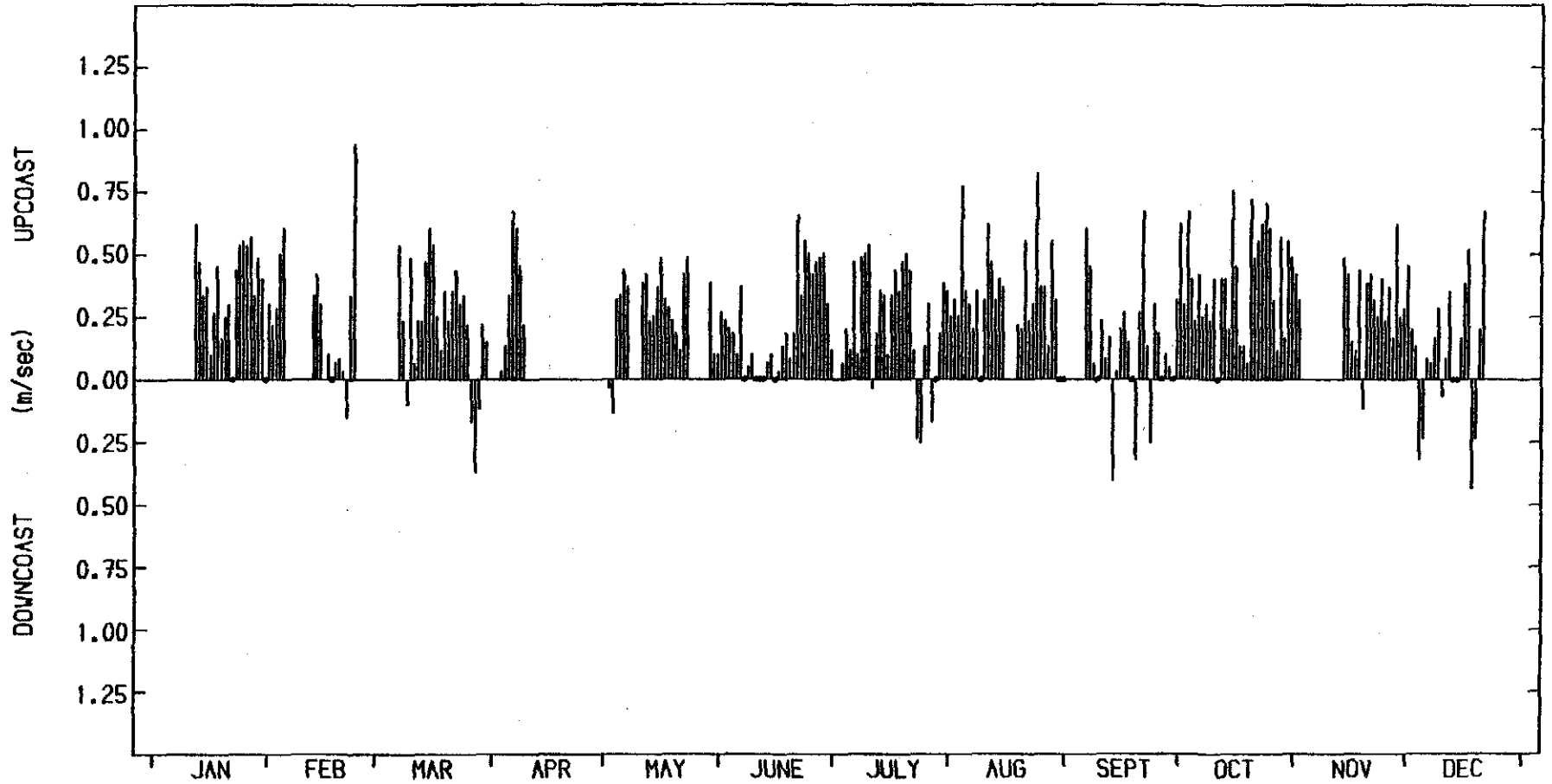
LITTORAL CURRENTS - MORNING 1978

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RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1978

Mean Vel = .265 m/sec (up)

Mean Upcoast Vel = .327 m/sec

Mean Downcoast Vel = .206 m/sec

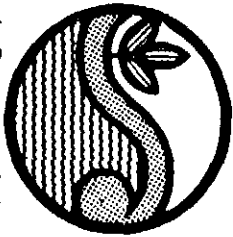
MORNING OBSERVATIONS - (272 recordings)

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Rainbow Beach

Figure 25

C25.1



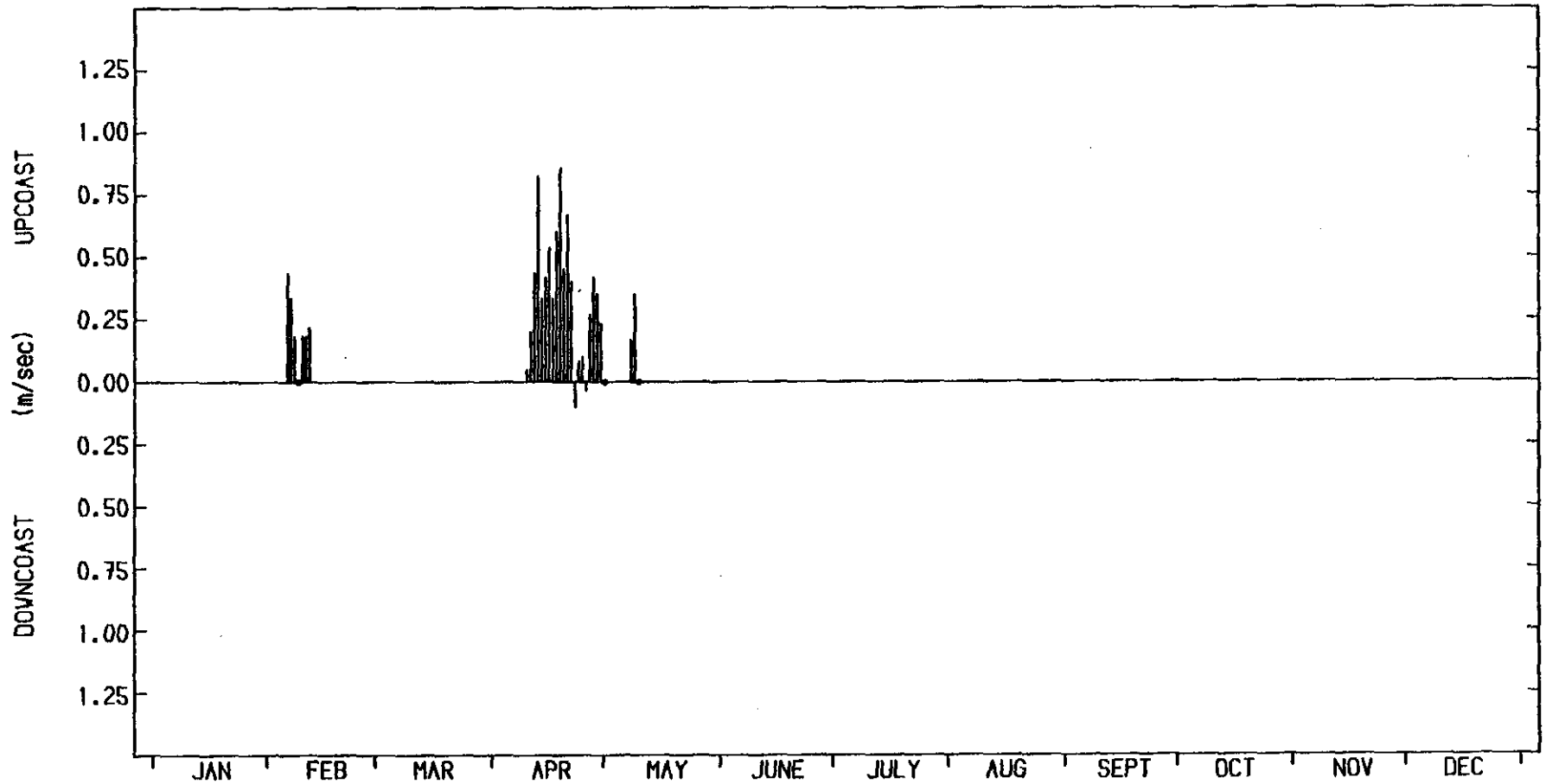
LITTORAL CURRENTS - AFTERNOON 1978

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1978

Mean Vel = .295 m/sec (up)

Mean Upcoast Vel = .355 m/sec

Mean Downcoast Vel = .067 m/sec

AFTERNOON OBSERVATIONS - ( 32 recordings)

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Rainbow Beach

Figure 26

C25.1



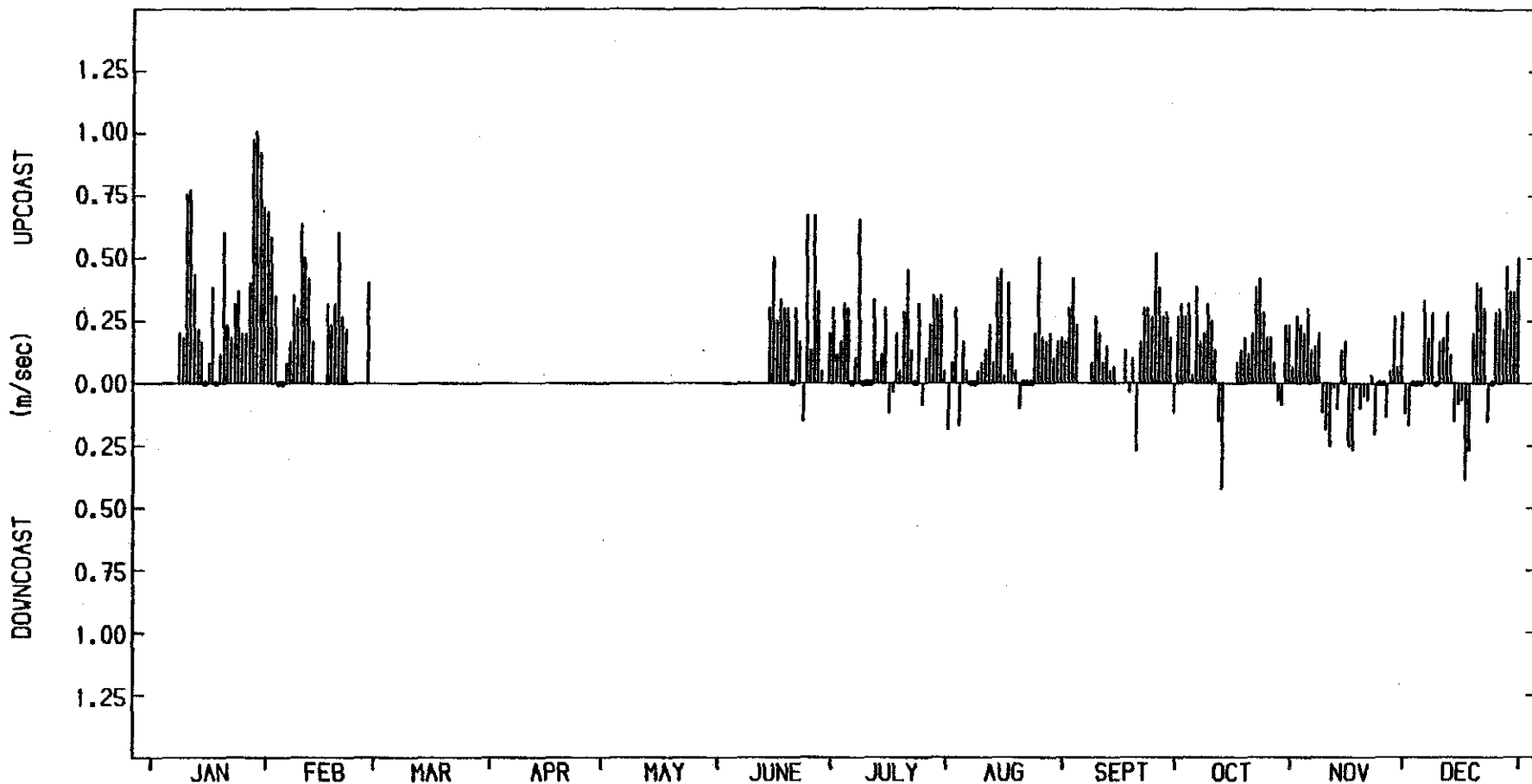
LITTORAL CURRENTS - MORNING 1979

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WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1979

Mean Vel = .185 m/sec (up)

Mean Upcoast Vel = .272 m/sec

Mean Downcoast Vel = .146 m/sec

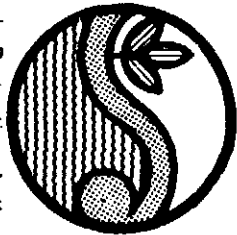
MORNING OBSERVATIONS - (236 recordings)

COPE

Rainbow Beach

Figure 27

C25.1



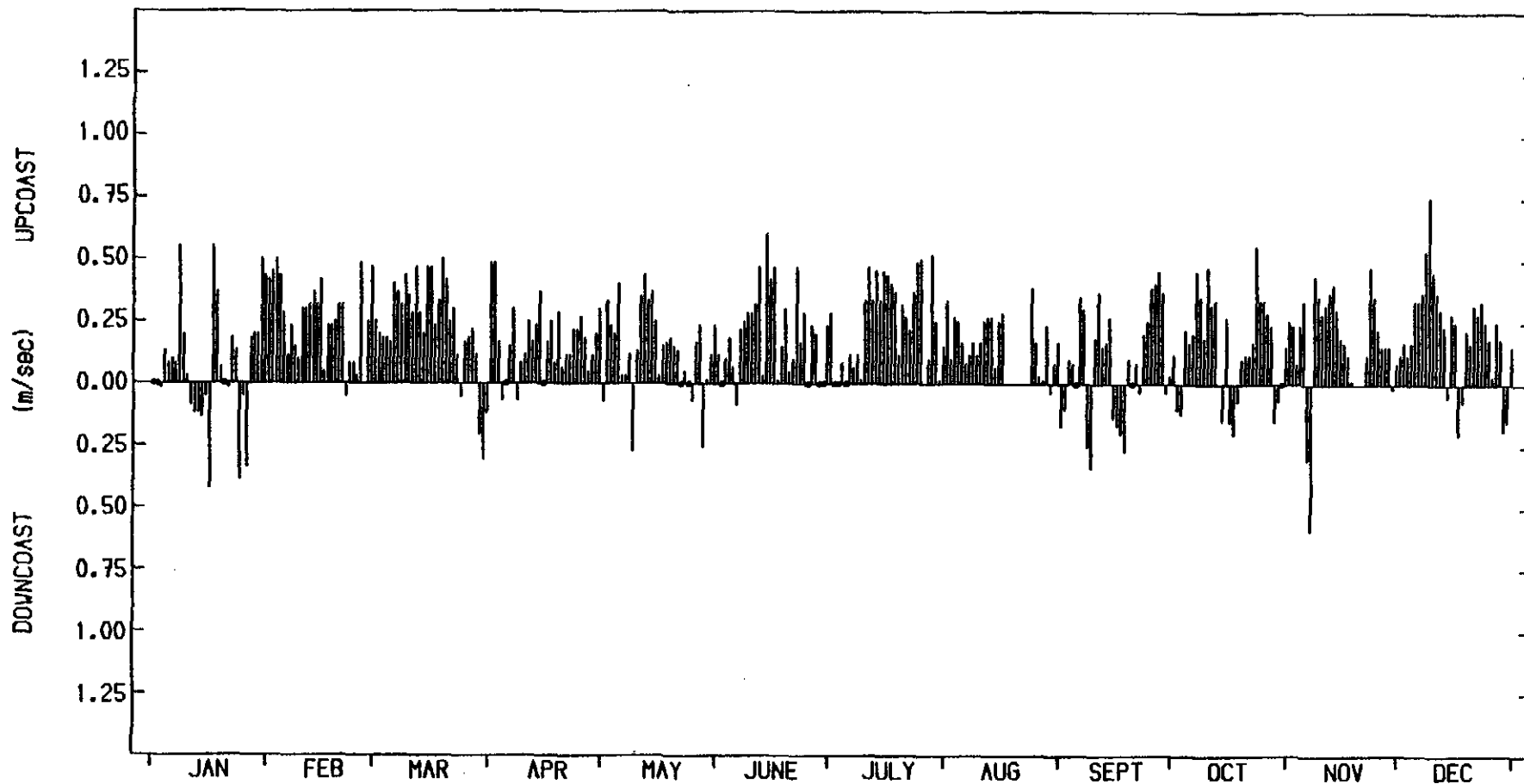
LITTORAL CURRENTS - MORNING 1980

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1980

Mean Vel = .177 m/sec (up)

Mean Upcoast Vel = .245 m/sec

Mean Downcoast Vel = .151 m/sec

MORNING OBSERVATIONS - (354 recordings)

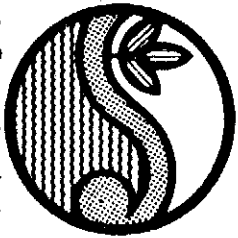
Figure 28

COPE

Rainbow Beach

C25.1





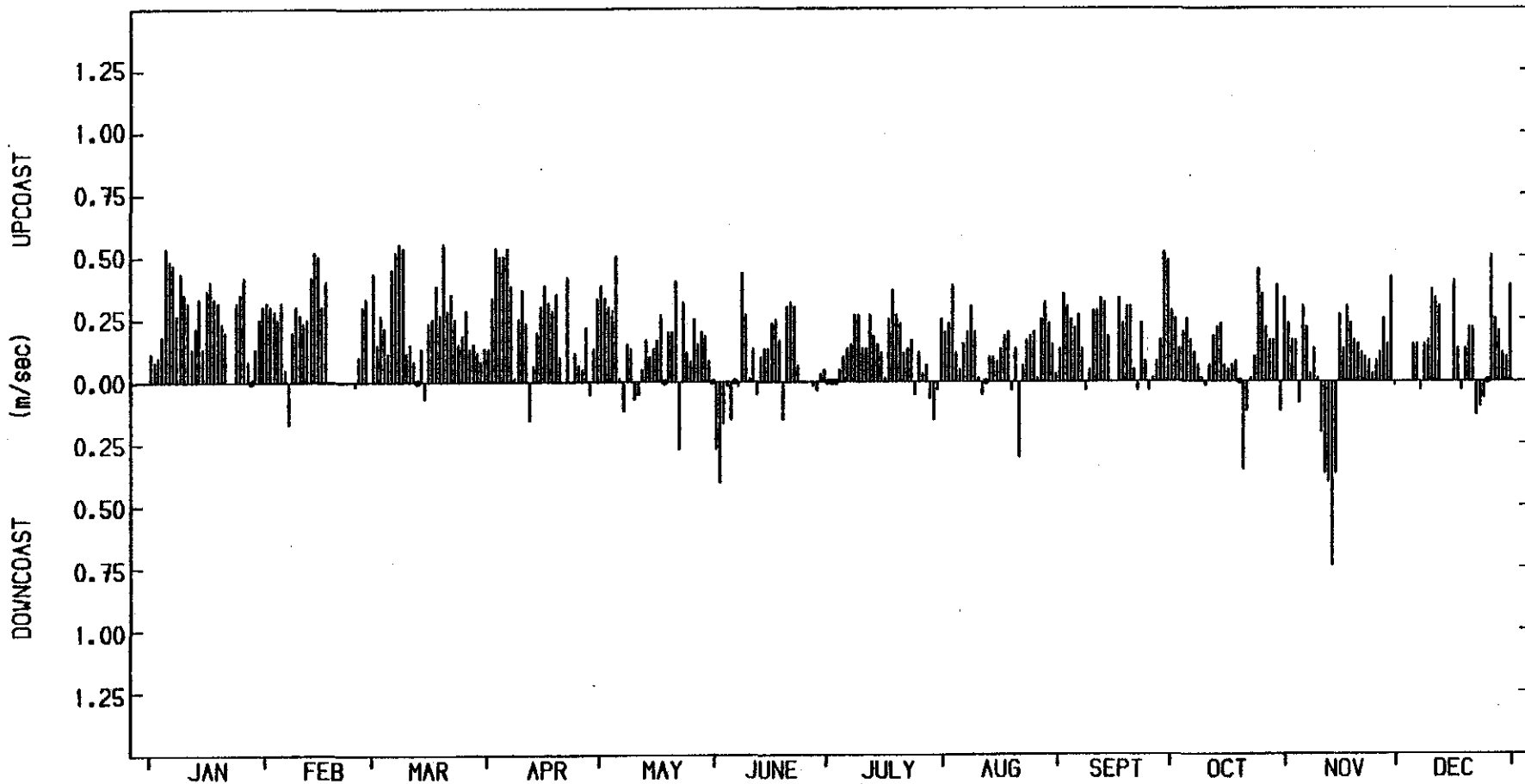
LITTORAL CURRENTS - MORNING 1981

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1981

Mean Vel = .167 m/sec (up)

Mean Upcoast Vel = .221 m/sec

Mean Downcoast Vel = .136 m/sec

MORNING OBSERVATIONS - (342 recordings)

Figure 29

Rainbow Beach

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C25.1



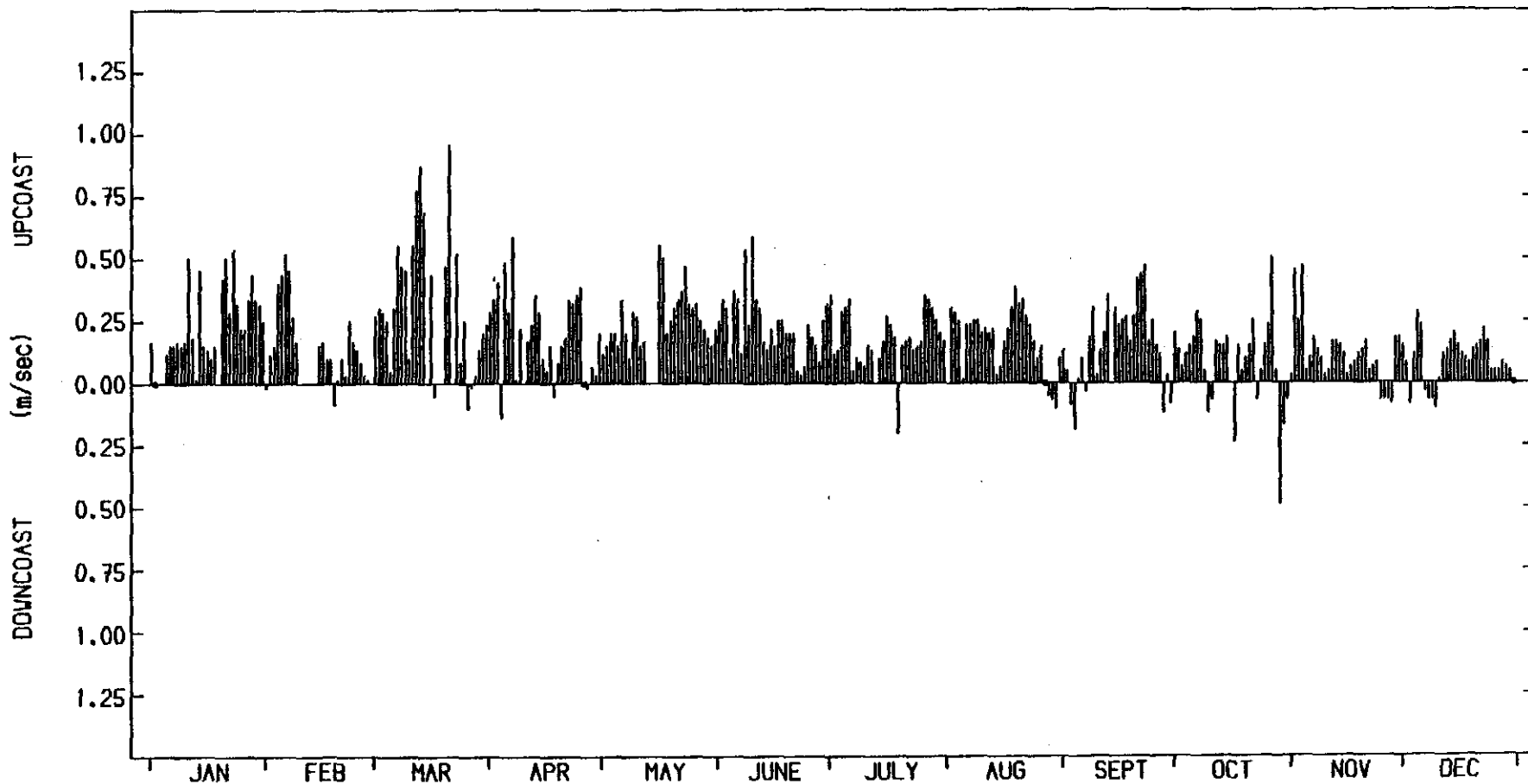
LITTORAL CURRENTS - MORNING 1982

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1982

Mean Vel = .184 m/sec (up)

Mean Upcoast Vel = .217 m/sec

Mean Downcoast Vel = .097 m/sec

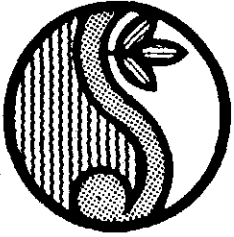
MORNING OBSERVATIONS - (345 recordings)

COPE

Rainbow Beach

Figure 30

C25.1



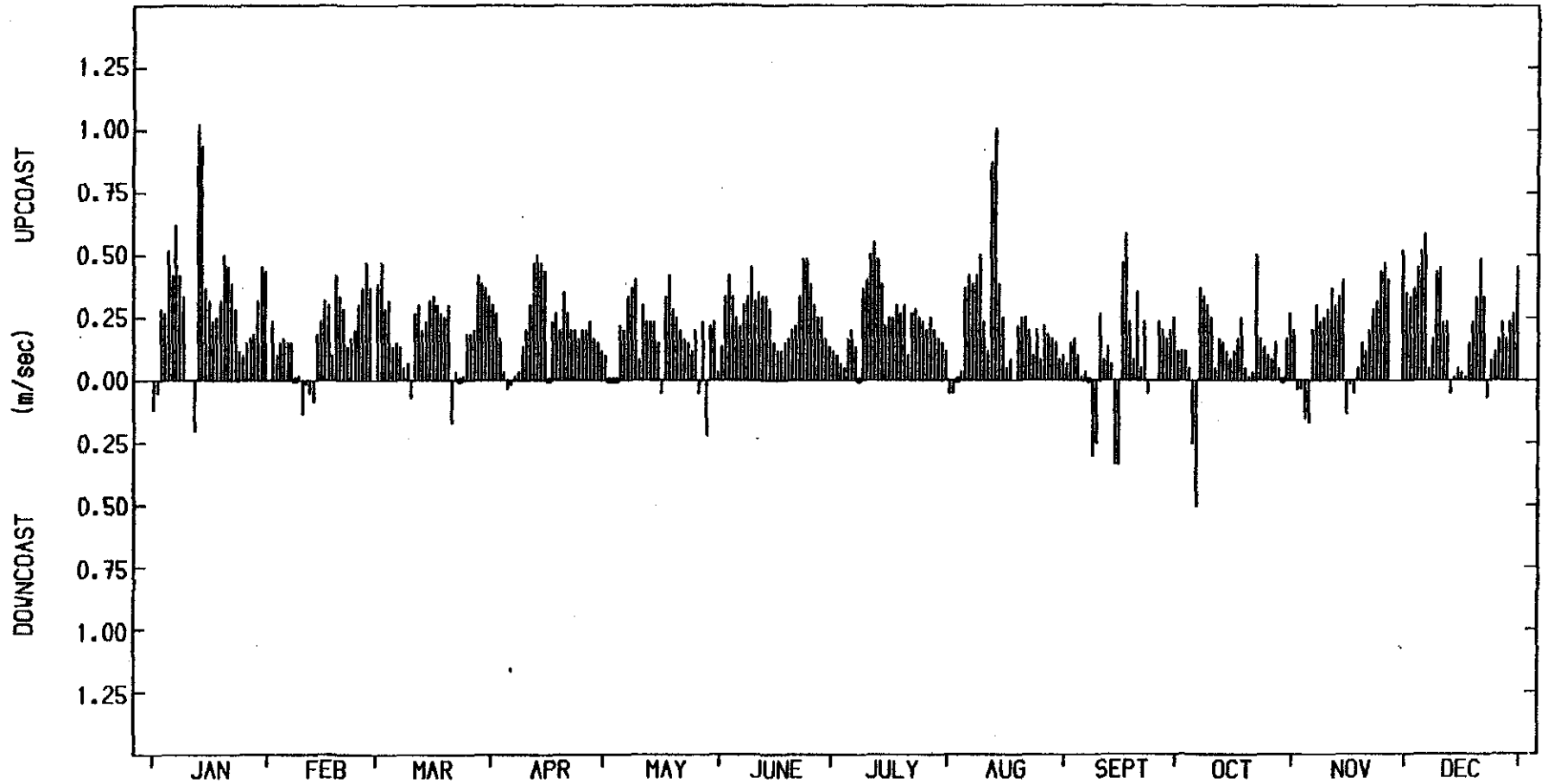
LITTORAL CURRENTS - MORNING 1983

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1983

Mean Vel = .209 m/sec (up)

Mean Upcoast Vel = .250 m/sec

Mean Downcoast Vel = .127 m/sec

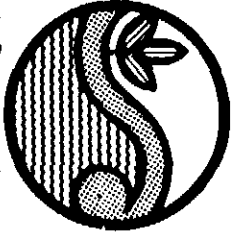
MORNING OBSERVATIONS - (356 recordings)

COPE

Rainbow Beach

Figure 31

C25.1



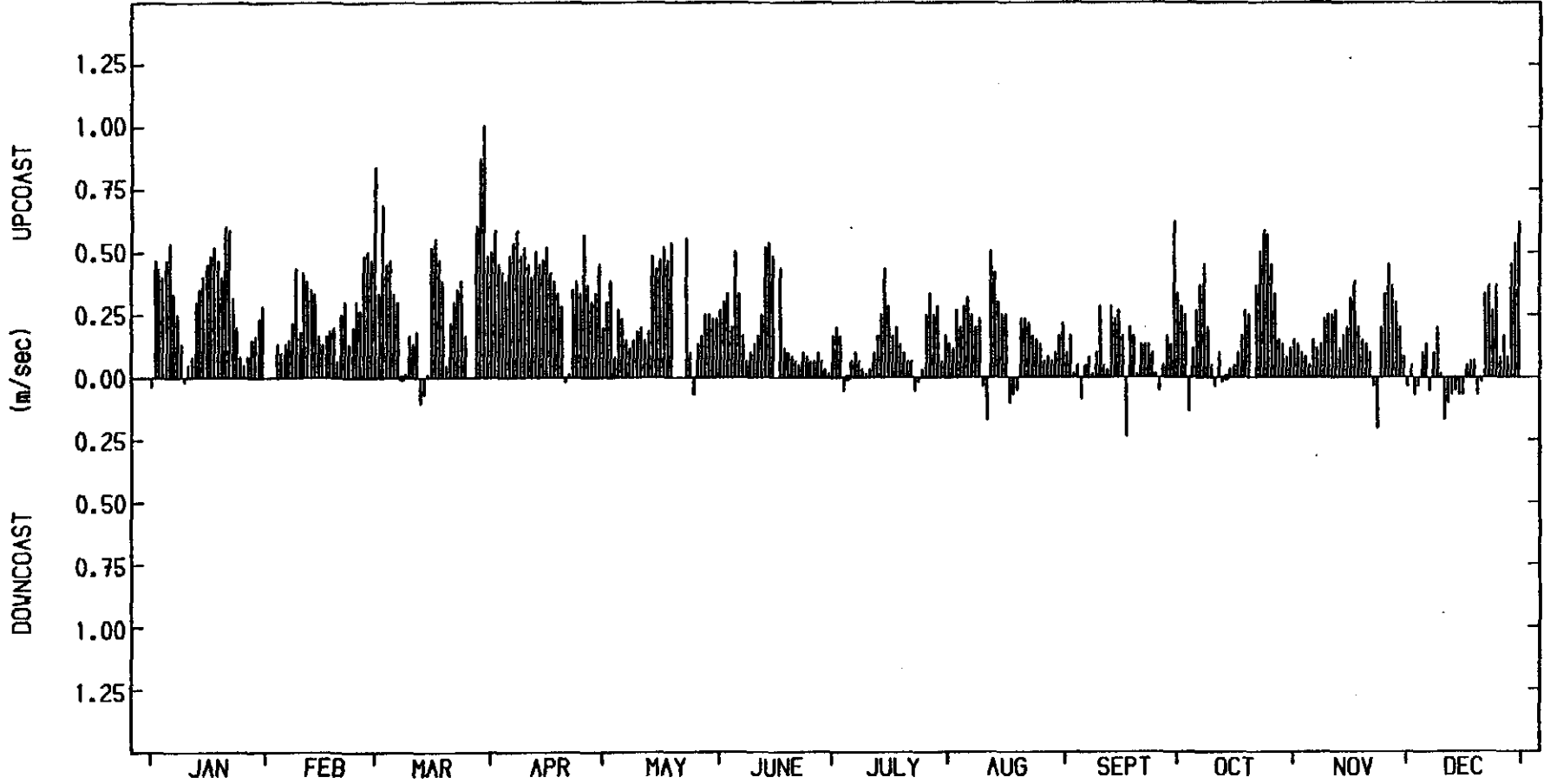
LITTORAL CURRENTS - MORNING 1984

COPE - Coastal Observation  
Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1984

Mean Vel = .222 m/sec (up)

Mean Upcoast Vel = .255 m/sec

Mean Downcoast Vel = .071 m/sec

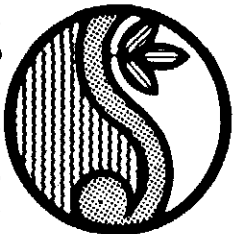
MORNING OBSERVATIONS - (356 recordings)

COPE

Rainbow Beach

Figure 32

C25.1



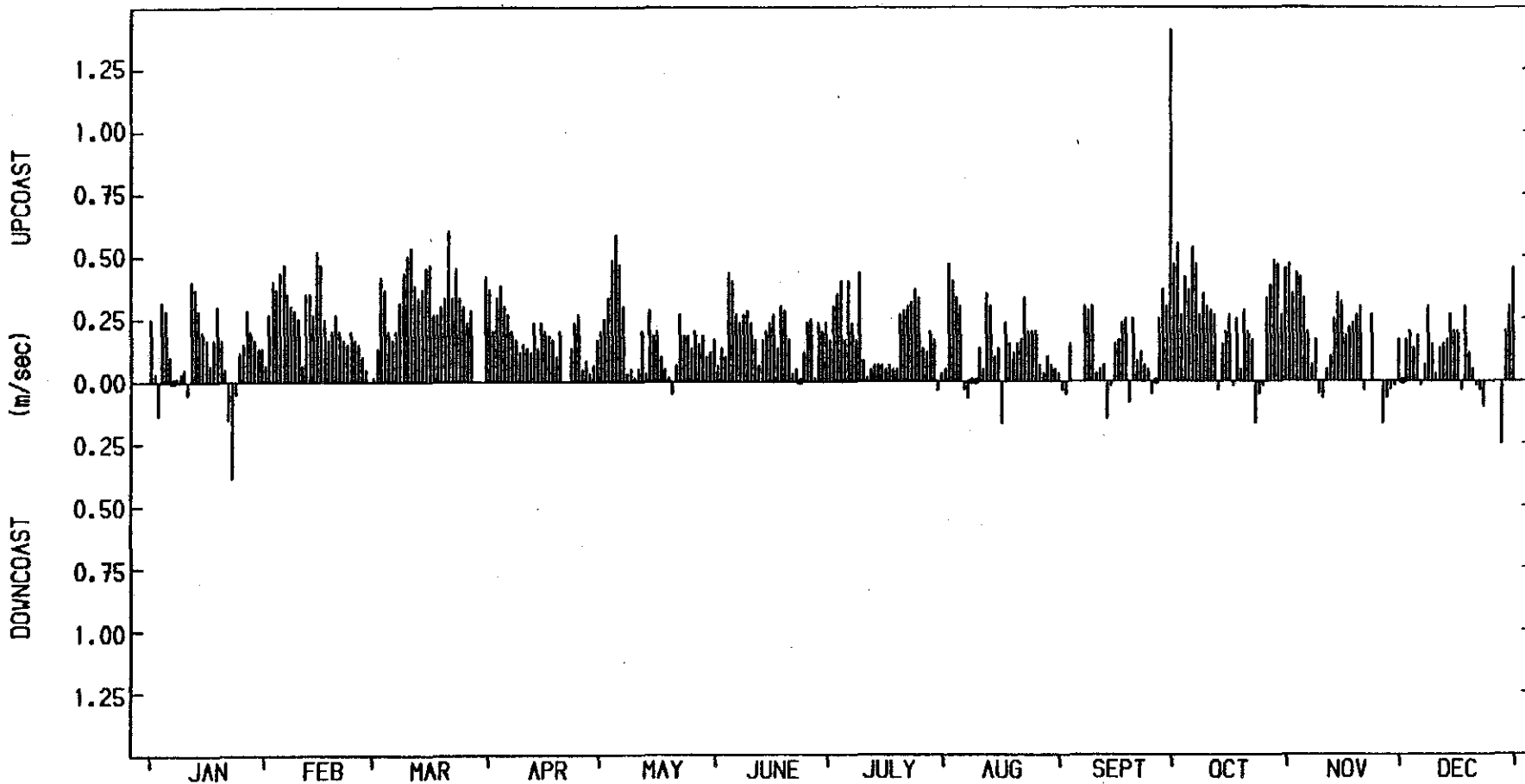
LITTORAL CURRENTS - MORNING 1985

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1985

Mean Vel = .193 m/sec (up)

Mean Upcoast Vel = .227 m/sec

Mean Downcoast Vel = .078 m/sec

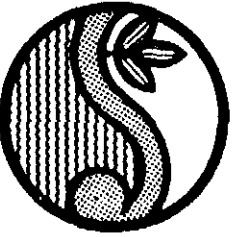
MORNING OBSERVATIONS - (350 recordings)

COPE

Rainbow Beach

Figure 33

C25.1



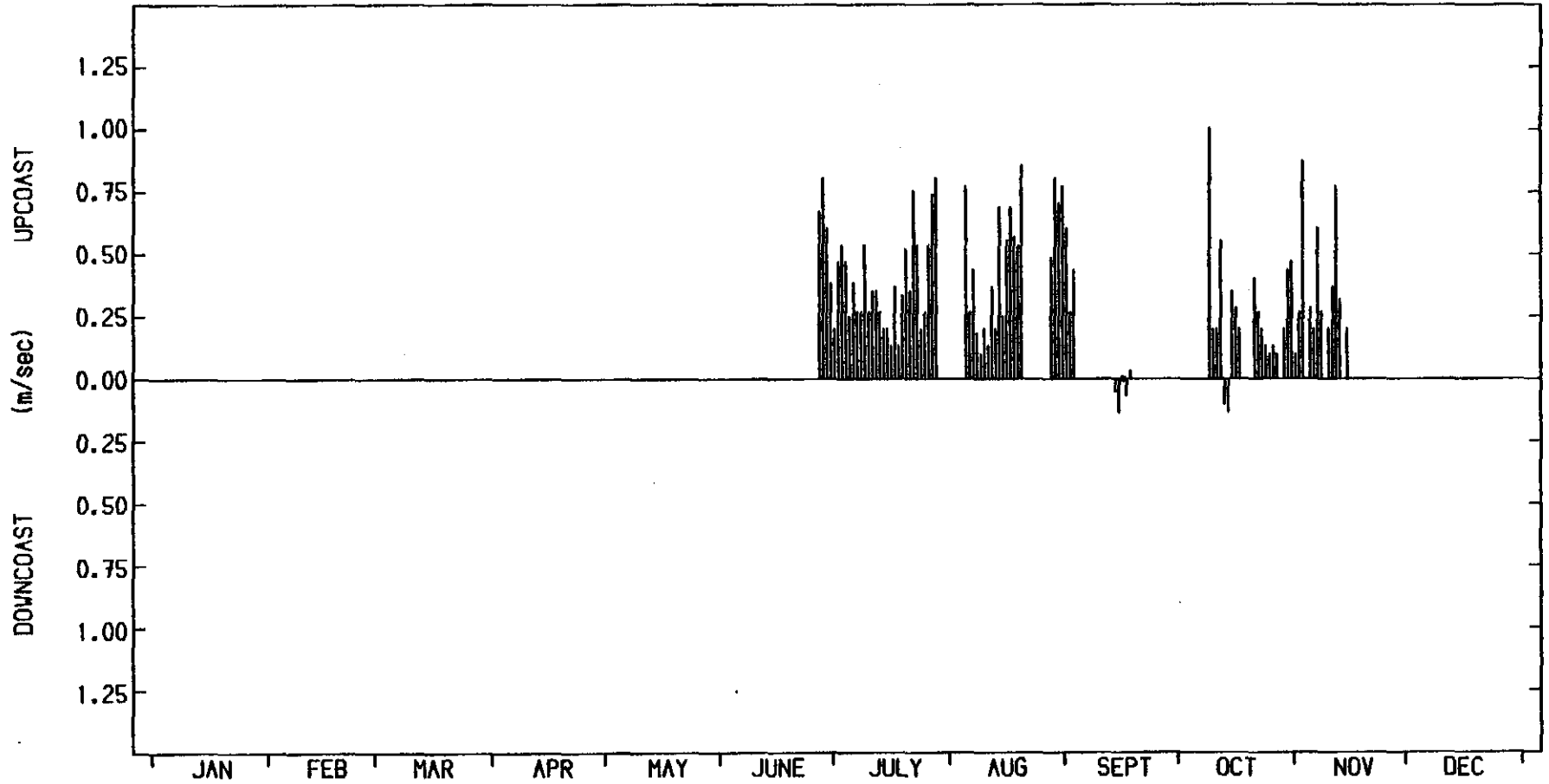
LITTORAL CURRENTS - AFTERNOON 1985

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1985

Mean Vel = .364 m/sec (up)

Mean Upcoast Vel = .395 m/sec

Mean Downcoast Vel = .097 m/sec

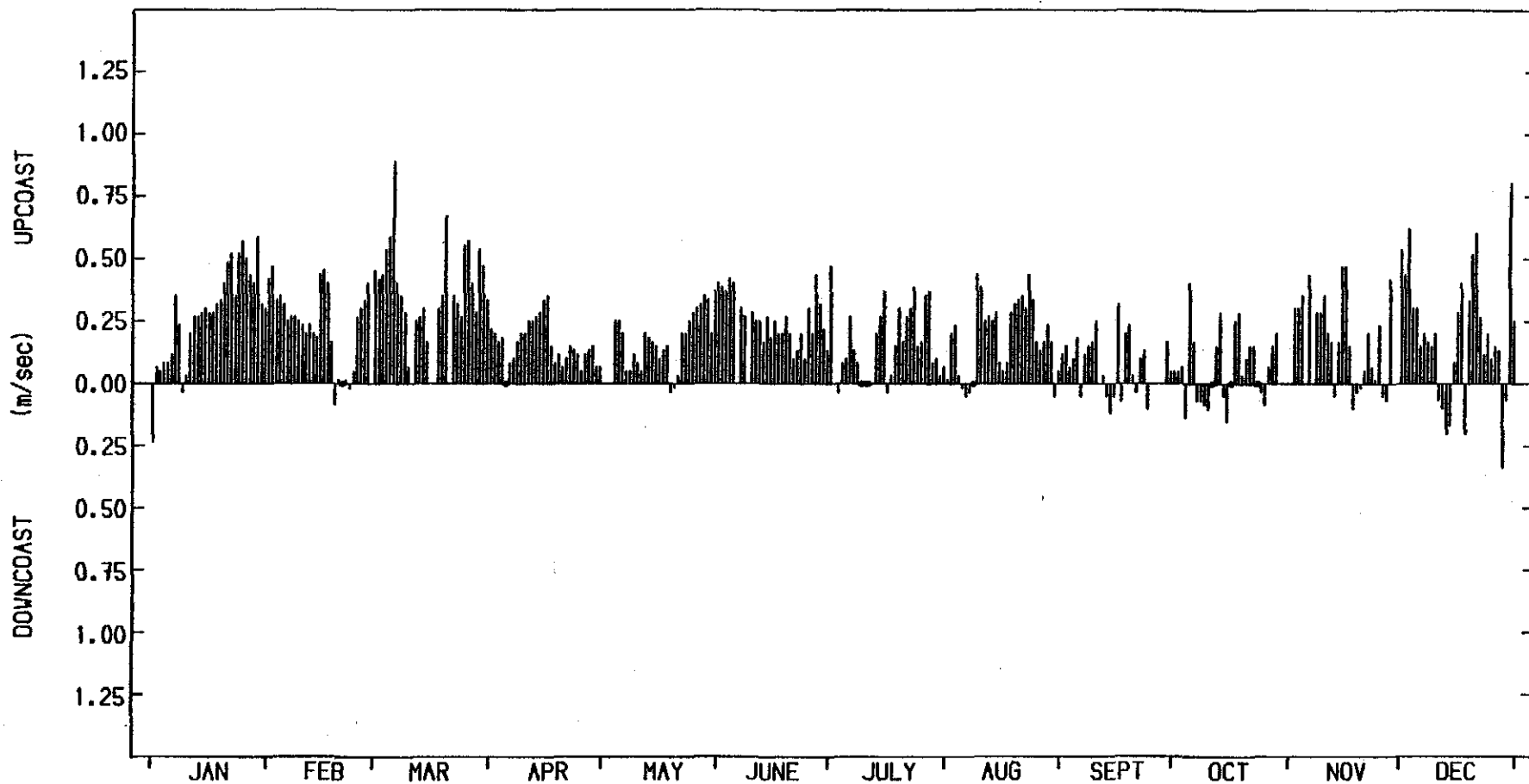
AFTERNOON OBSERVATIONS - ( 91 recordings)

COPE

Rainbow Beach

Figure 34

C25.1



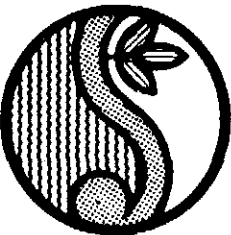
### LITTORAL CURRENT SUMMARY - 1986

Mean Vel = .200 m/sec (up)

Mean Upcoast Vel = .245 m/sec

Mean Downcoast Vel = .081 m/sec

MORNING OBSERVATIONS - (341 recordings)





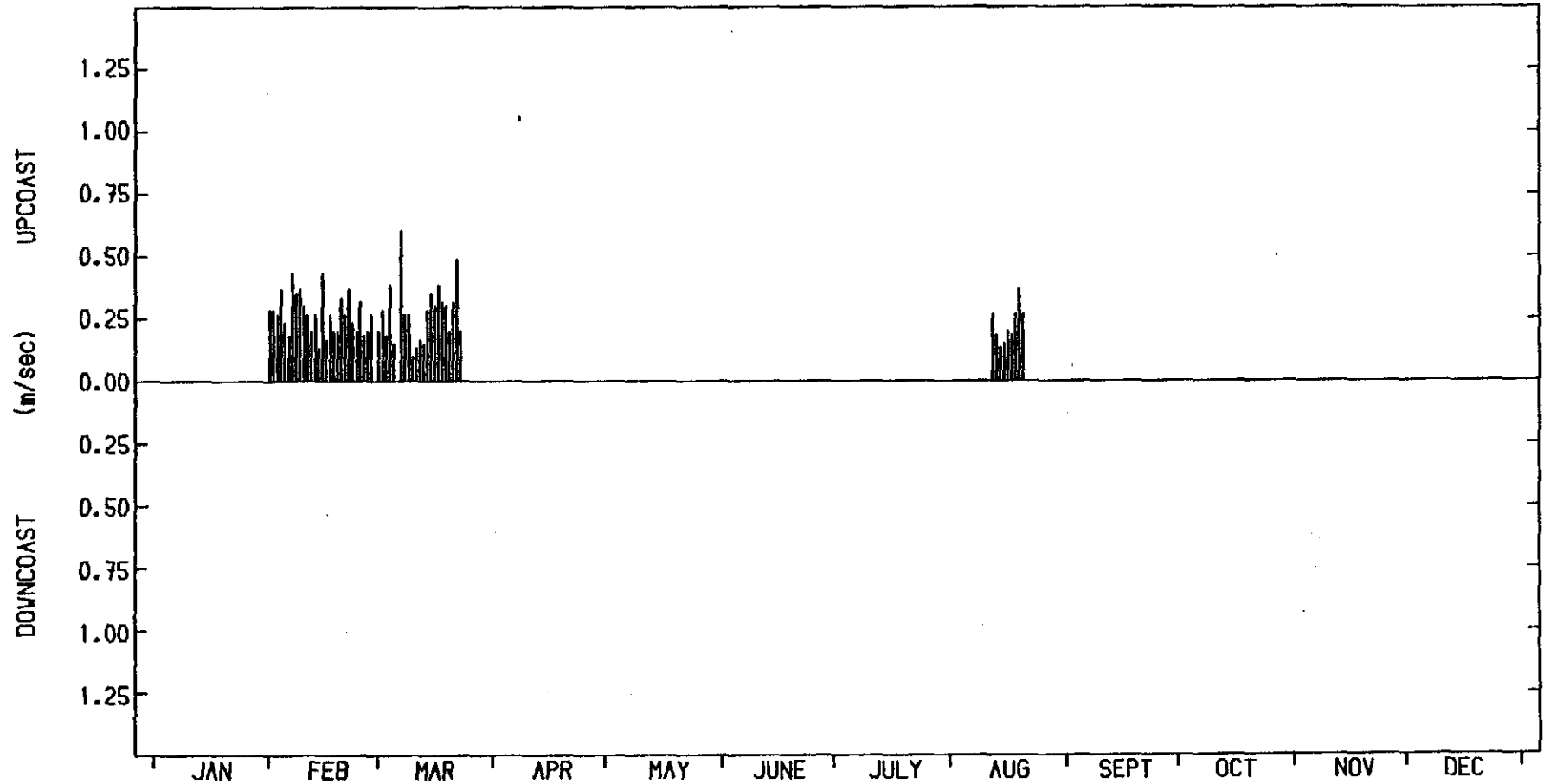
LITTORAL CURRENTS - AFTERNOON 1986

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1986

Mean Vel = .264 m/sec (up)

Mean Upcoast Vel = .264 m/sec

Mean Downcoast Vel = .000 m/sec

AFTERNOON OBSERVATIONS - ( 59 recordings)

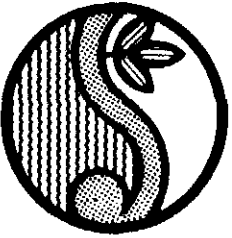
COPE

Rainbow Beach

Figure 36

C25.1





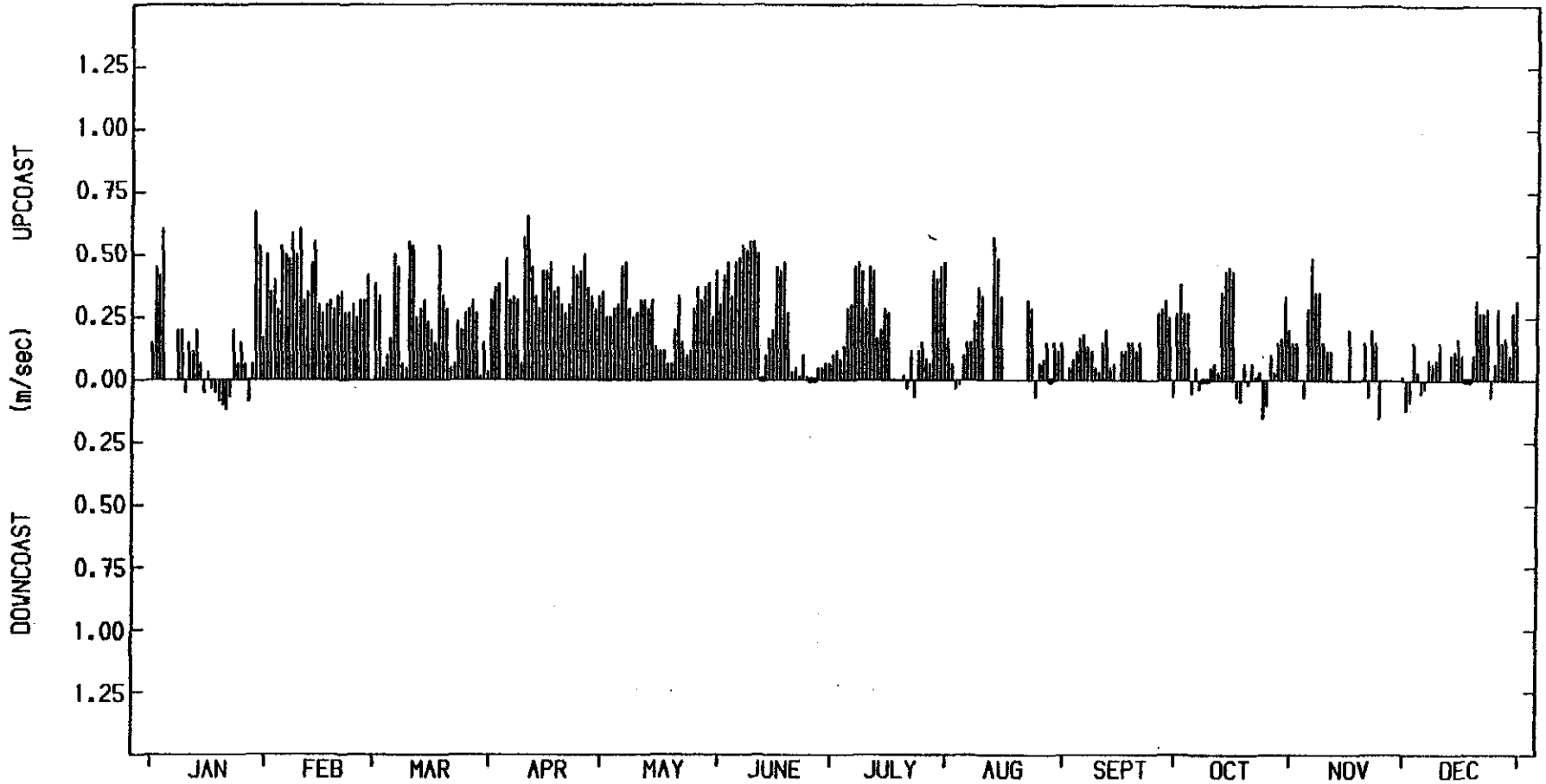
LITTORAL CURRENTS - MORNING 1987

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1987

Mean Vel = .221 m/sec (up)

Mean Upcoast Vel = .256 m/sec

Mean Downcoast Vel = .068 m/sec

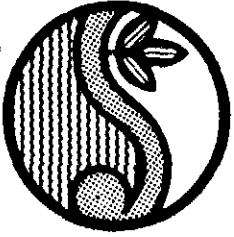
MORNING OBSERVATIONS - (329 recordings)

COPE

Rainbow Beach

Figure 37

C25.1



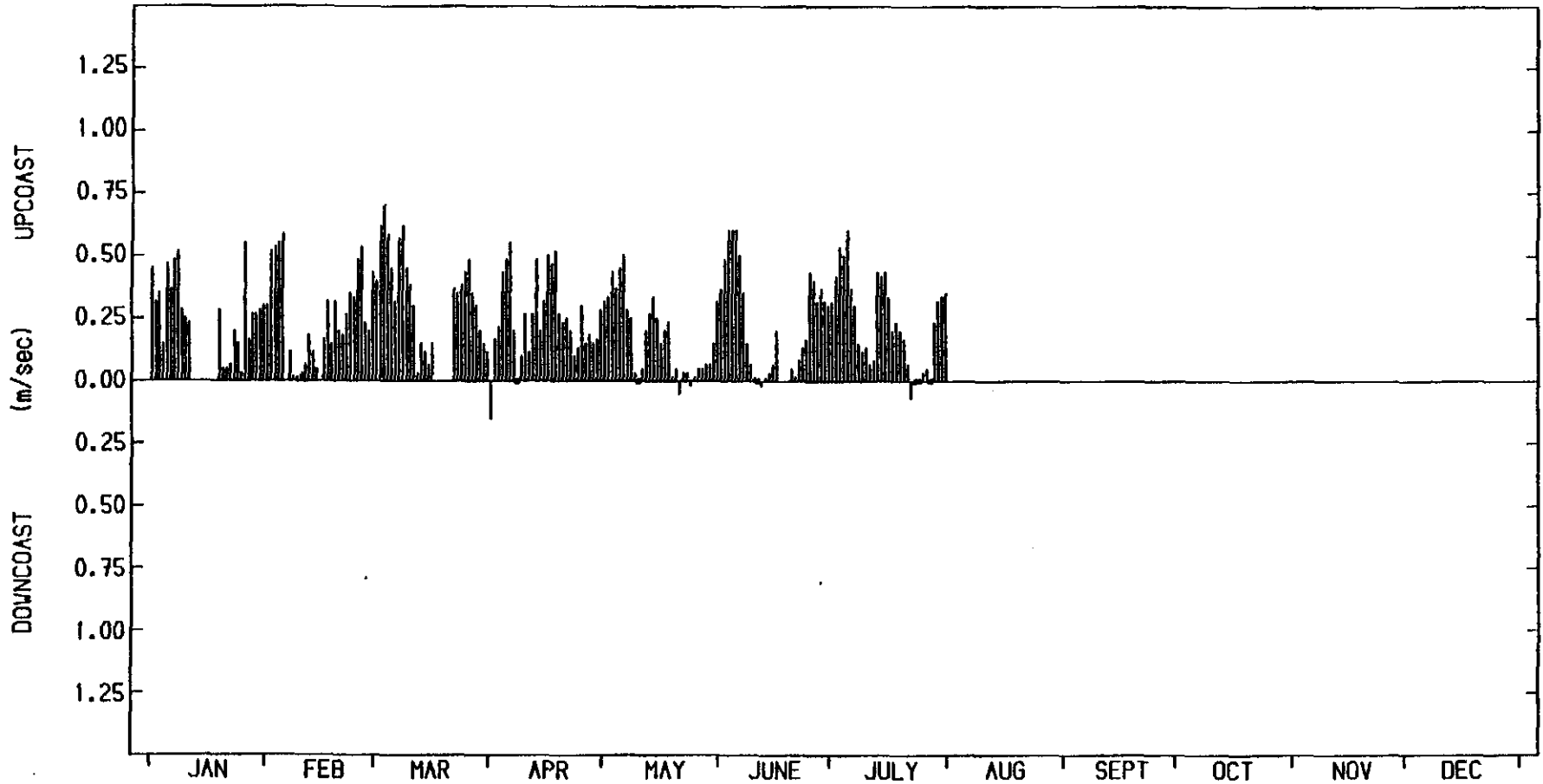
LITTORAL CURRENTS - MORNING 1988

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

0901



LITTORAL CURRENT SUMMARY - 1988

Mean Vel = .253 m/sec (up)

Mean Upcoast Vel = .269 m/sec

Mean Downcoast Vel = .060 m/sec

MORNING OBSERVATIONS - (197 recordings)

COPE

Rainbow Beach

Figure 38

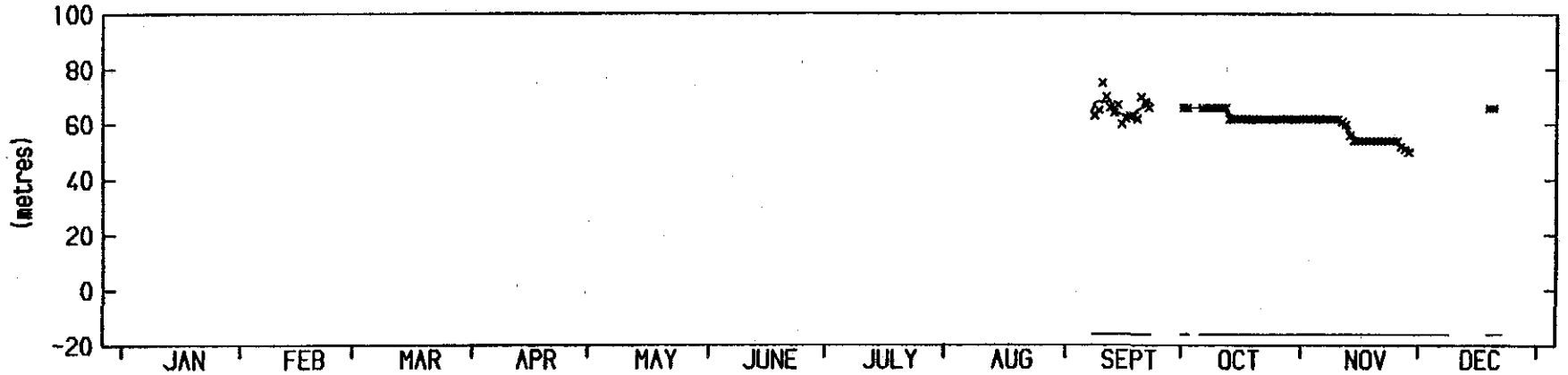
C25.1

0901

RAINBOW BEACH

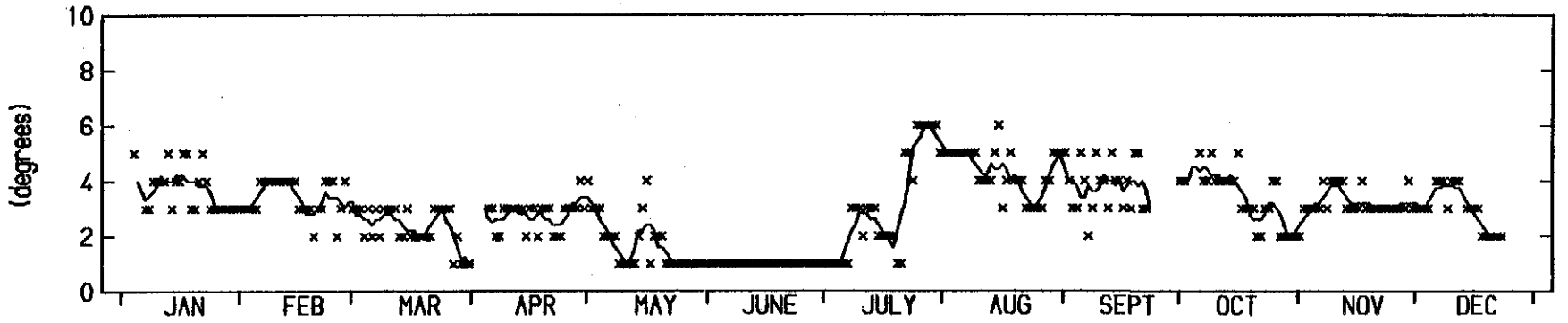
WIDGEE SHIRE

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Programme Engineering



DISTANCE TO BERM AND VEGETATION LINE - 1977

xxxxx Indicates Distance to Berm : 73 Observations  
 — Indicates Distance to Vegetation Line : 85 Observations



FORESHORE SLOPE - 1977

∩ Five Day Moving Average

No. of Observations : 335



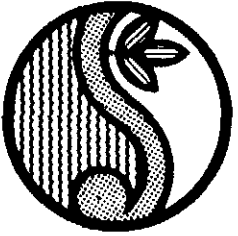
Beach Protection Authority

BEACH PROFILE PARAMETERS - 1977

Figure 39  
C25.1

Rainbow Beach

COPE



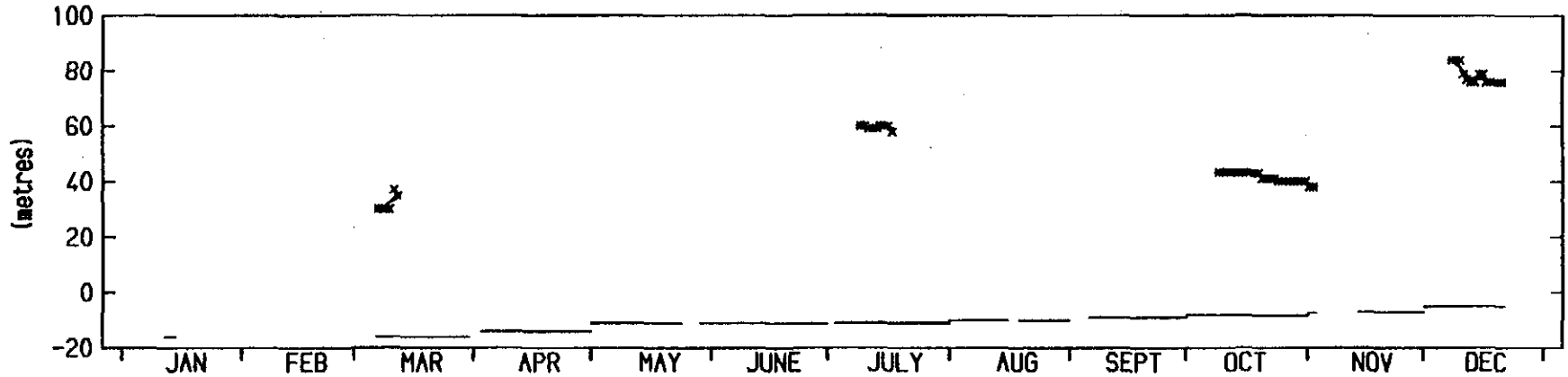
BEACH PROFILE PARAMETERS - 1978

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

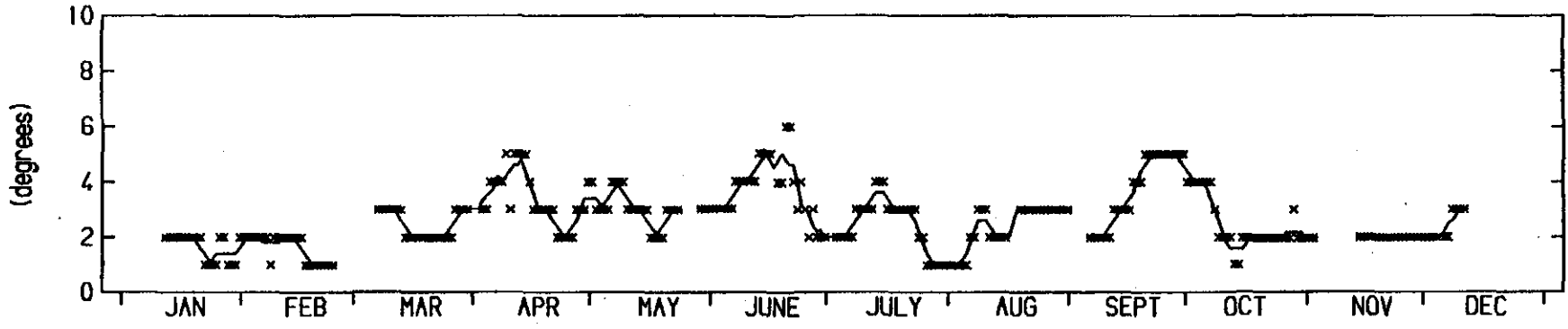
RAINBOW BEACH

0901



DISTANCE TO BERM AND VEGETATION LINE - 1978

xxxxx Indicates Distance to Berm : 54 Observations  
 — Indicates Distance to Vegetation Line : 264 Observations



FORESHORE SLOPE - 1978

Five Day Moving Average

No. of Observations : 292

COPE

Rainbow Beach

Figure 40

C25.1



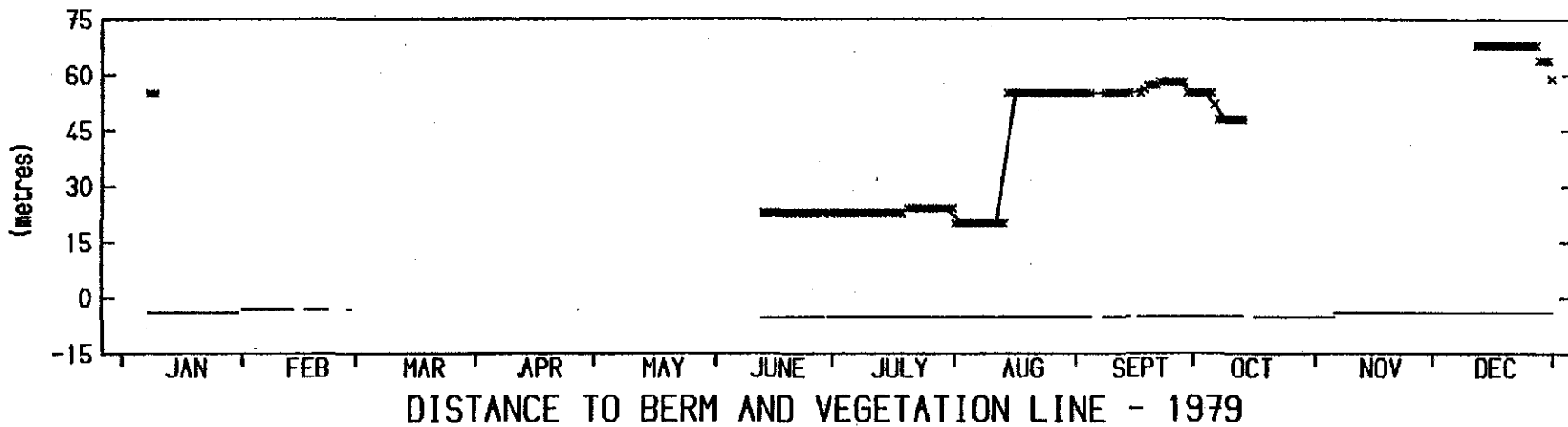
BEACH PROFILE PARAMETERS - 1979

COPE - Coastal Observation Programme Engineering

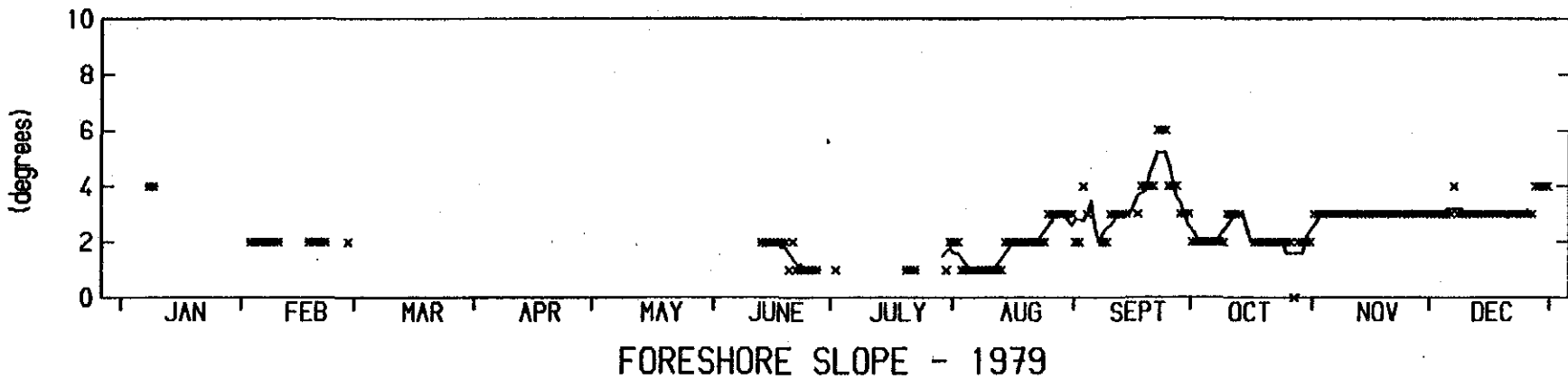
WIDGEE SHIRE

RAINBOW BEACH

0901



xxxx Indicates Distance to Berm : 138 Observations  
 — Indicates Distance to Vegetation Line : 236 Observations



Five Day Moving Average

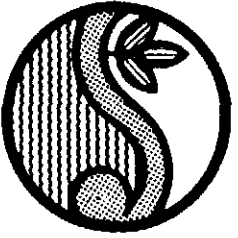
No. of Observations : 182

COPE

Rainbow Beach

Figure 41

C25.1



BEACH PROFILE PARAMETERS - 1980

Rainbow Beach

COPE

Figure 42

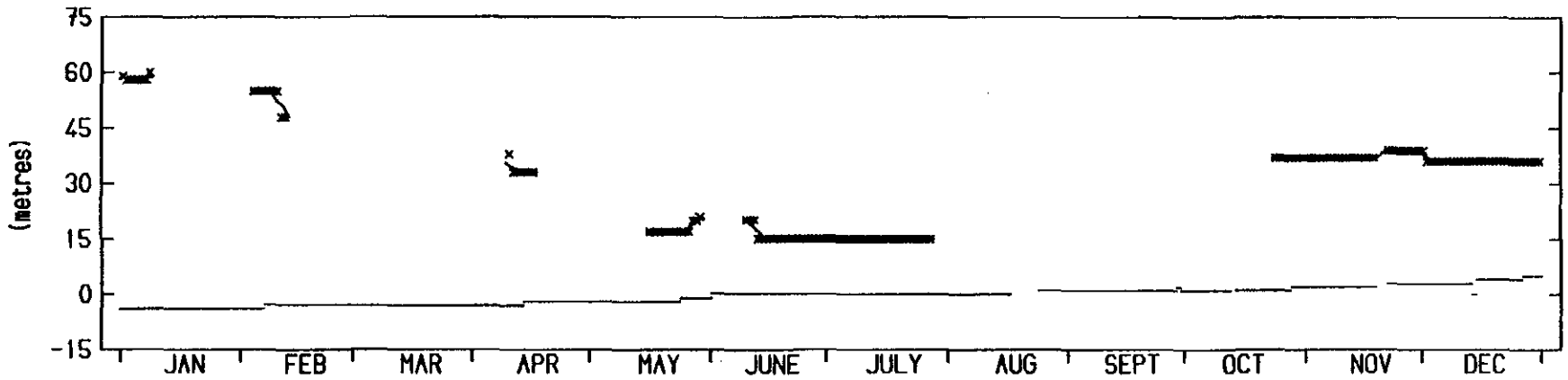
C25.1

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

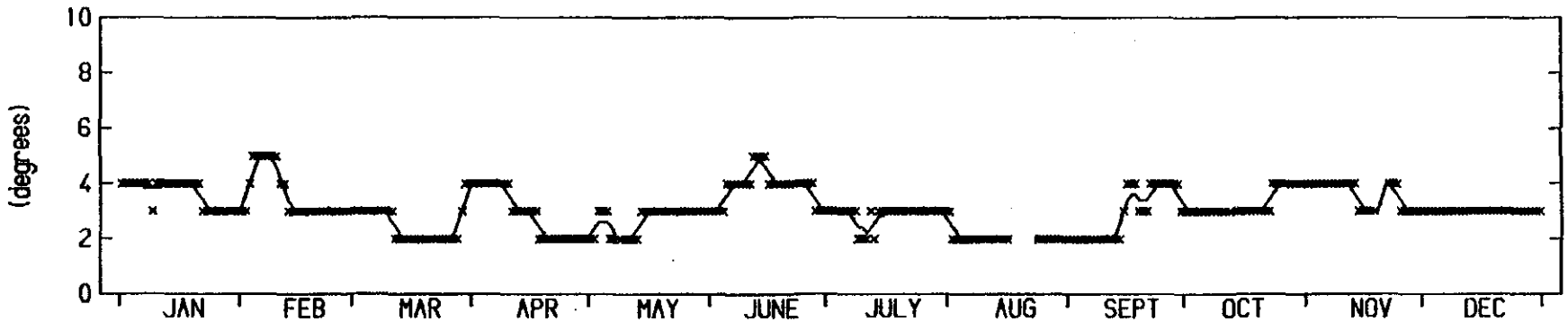
RAINBOW BEACH

0901



DISTANCE TO BERM AND VEGETATION LINE - 1980

xxxxx Indicates Distance to Berm : 152 Observations  
 ——— Indicates Distance to Vegetation Line : 355 Observations



FORESHORE SLOPE - 1980

Five Day Moving Average

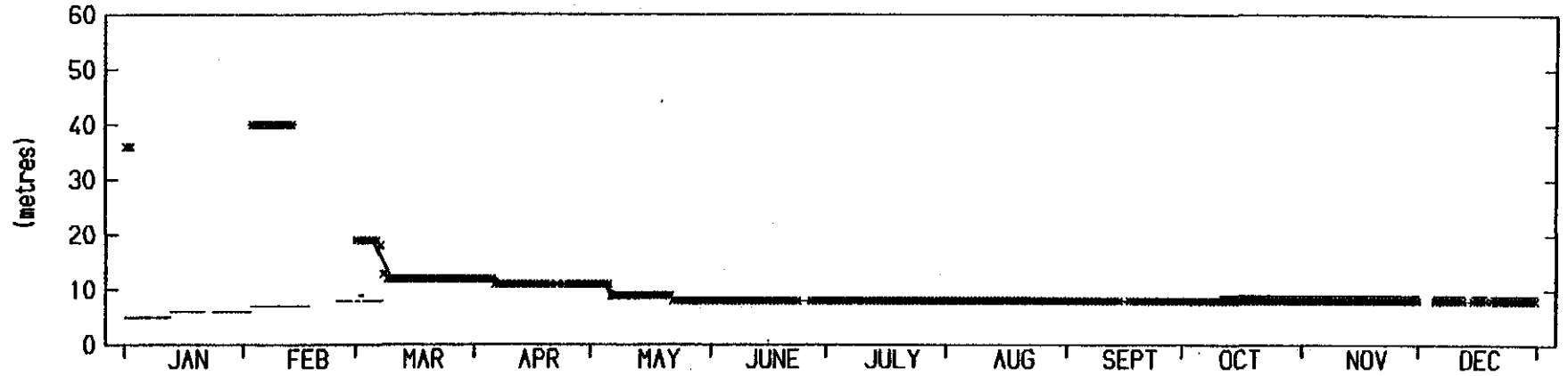
No. of Observations : 354

0901

RAINBOW BEACH

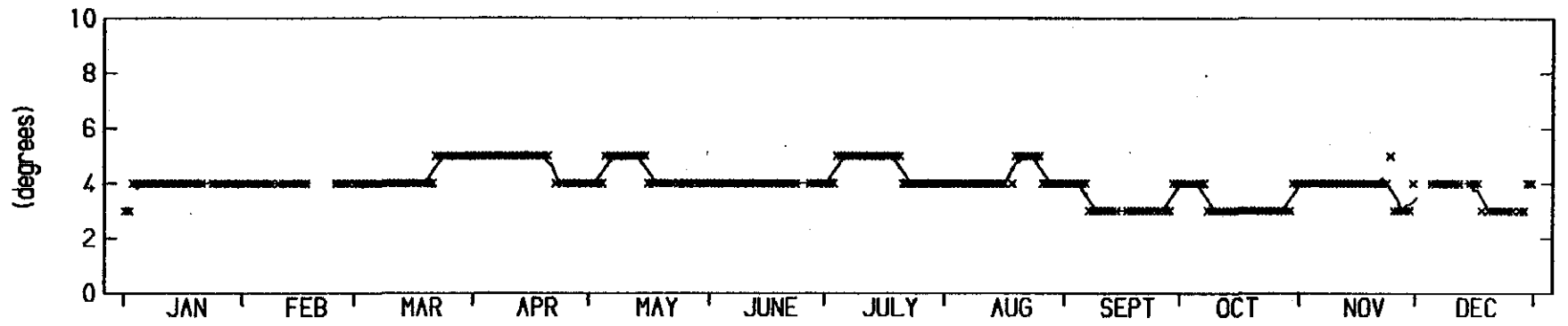
WIDGEE SHIRE

COPE - Coastal Observation  
Programme Engineering



DISTANCE TO BERM AND VEGETATION LINE - 1981

xxxxx Indicates Distance to Berm : 305 Observations  
 — Indicates Distance to Vegetation Line : 342 Observations



FORESHORE SLOPE - 1981

△ Five Day Moving Average

No. of Observations : 338

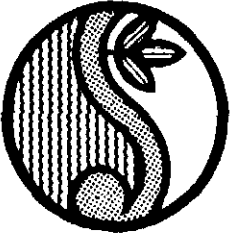


Beach Protection Authority

BEACH PROFILE PARAMETERS - 1981

Figure 43  
C25.1

COPE  
Rainbow Beach



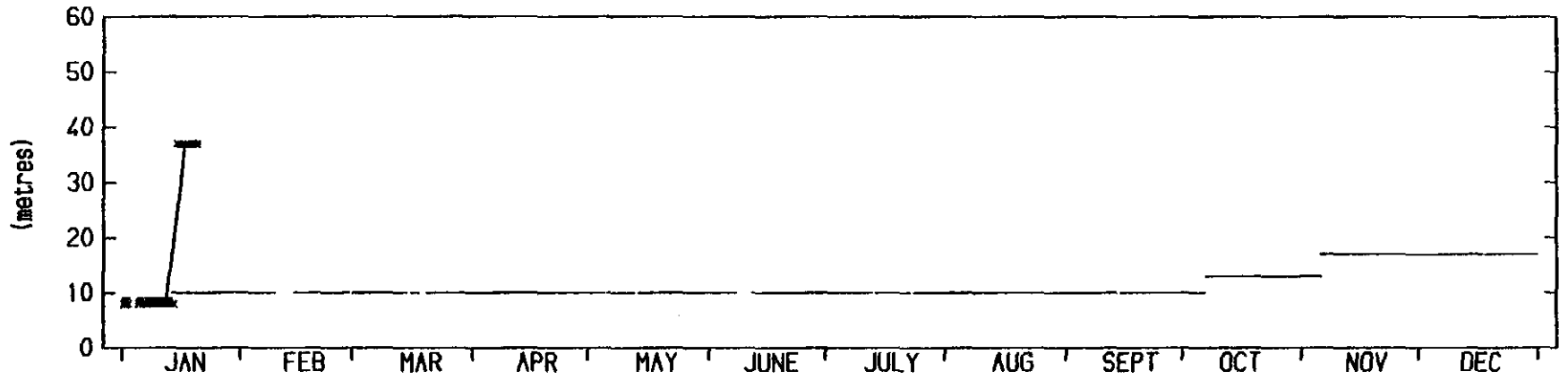
BEACH PROFILE PARAMETERS - 1982

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

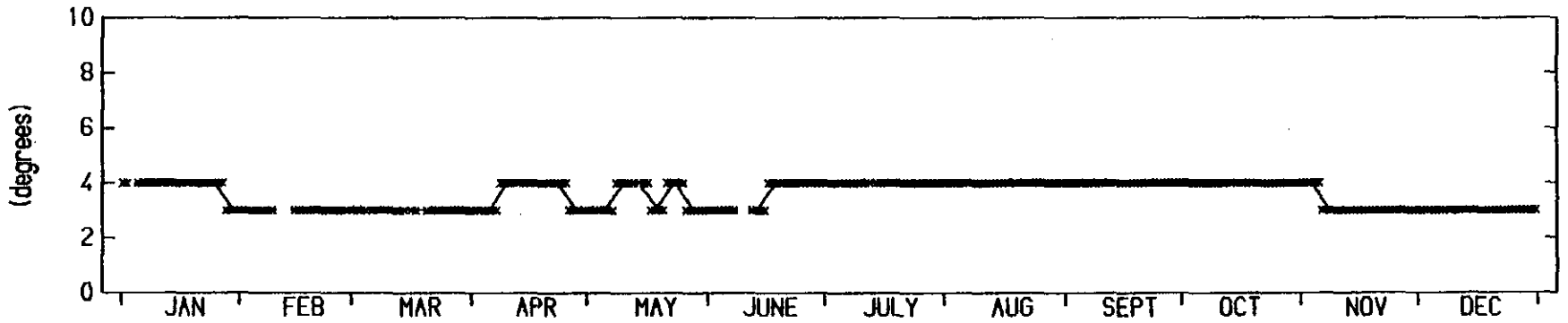
RAINBOW BEACH

0901



DISTANCE TO BERM AND VEGETATION LINE - 1982

x x x x x Indicates Distance to Berm : 18 Observations  
 - Indicates Distance to Vegetation Line : 346 Observations



FORESHORE SLOPE - 1982

Five Day Moving Average

No. of Observations : 347

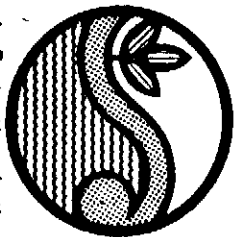
COPE

Rainbow Beach

Figure 44

C25.1





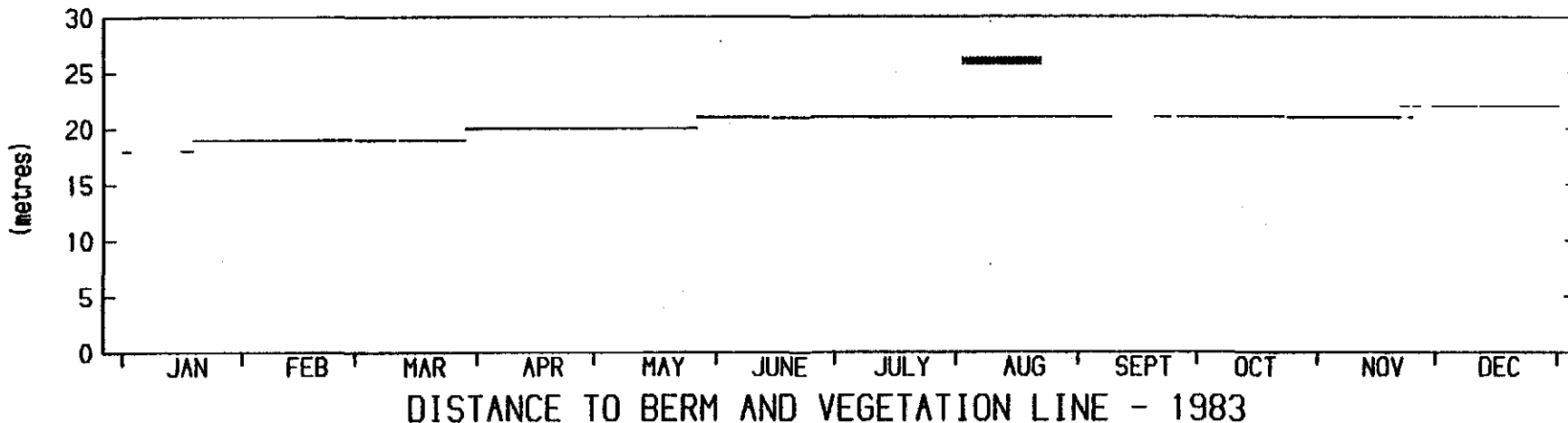
BEACH PROFILE PARAMETERS - 1983

COPE - Coastal Observation Programme Engineering

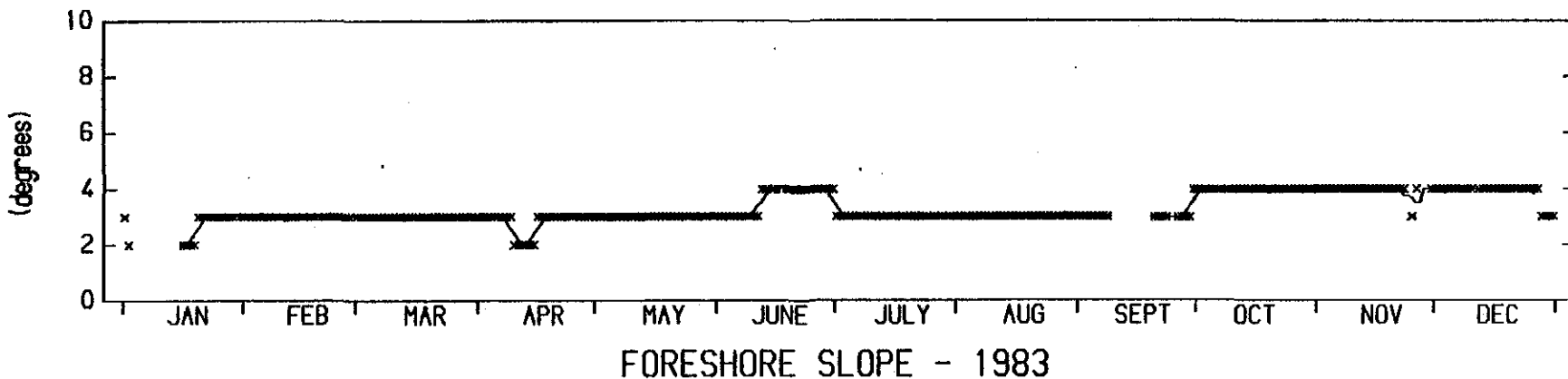
WIDGEE SHIRE

RAINBOW BEACH

0901



x x x x x Indicates Distance to Berm : 19 Observations  
 — Indicates Distance to Vegetation Line : 333 Observations



∩ Five Day Moving Average

No. of Observations : 333



Figure 45

C25.1

Rainbow Beach

COPE



BEACH PROFILE PARAMETERS - 1984

COPE

Rainbow Beach

Figure 46

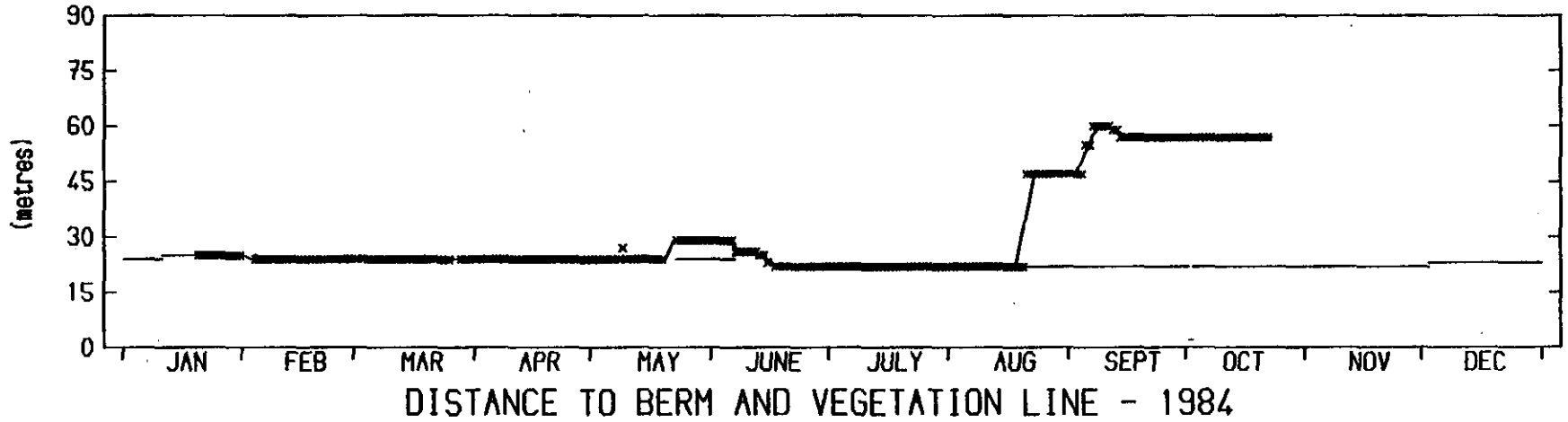
C25.1

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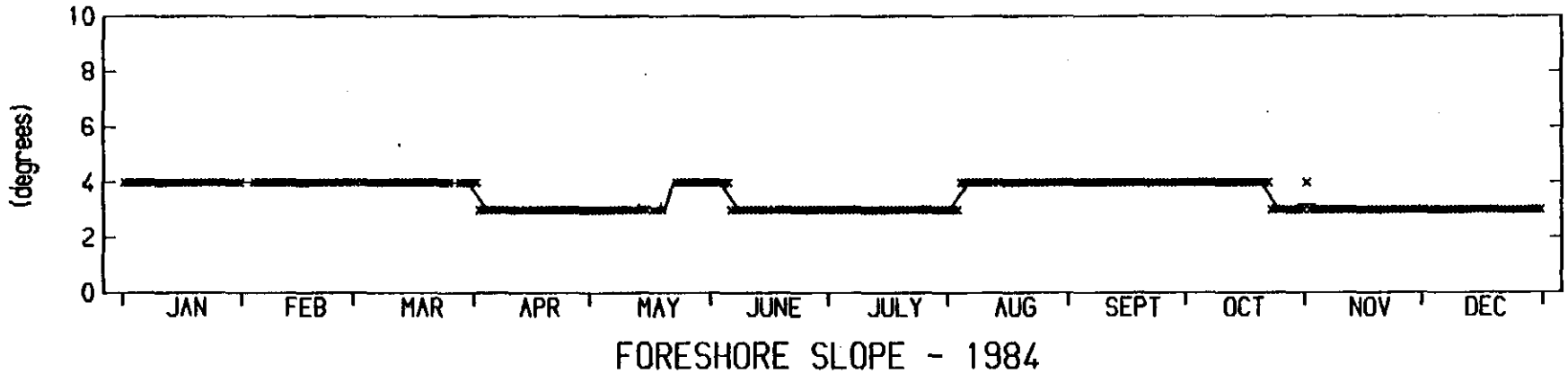
WIDGEE SHIRE

RAINBOW BEACH

0901



xooooo Indicates Distance to Berm : 267 Observations  
 — Indicates Distance to Vegetation Line : 356 Observations



Five Day Moving Average

No. of Observations : 355



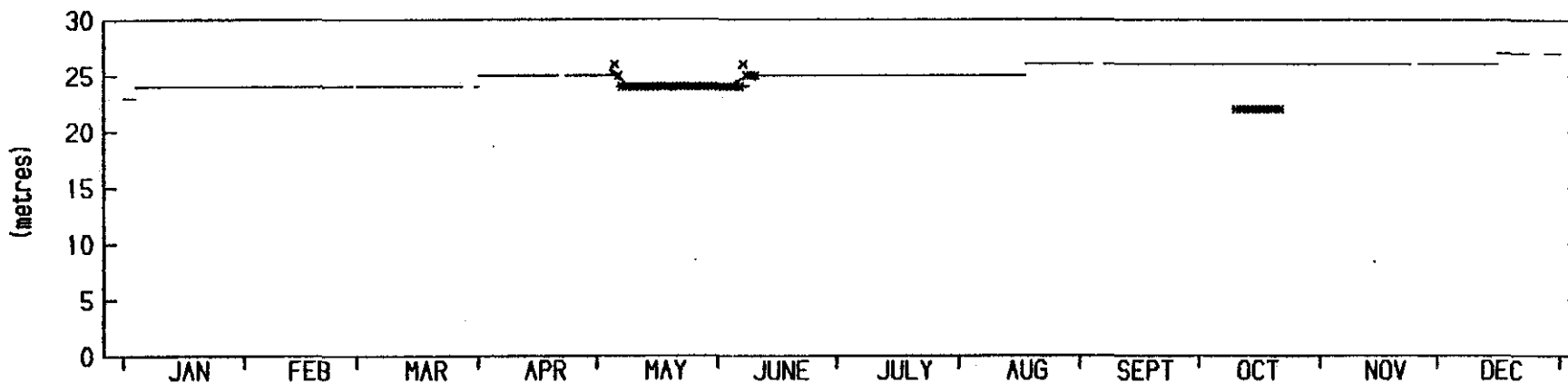
BEACH PROFILE PARAMETERS - 1985

COPE - Coastal Observation Programme Engineering

WIDGEE SHIRE

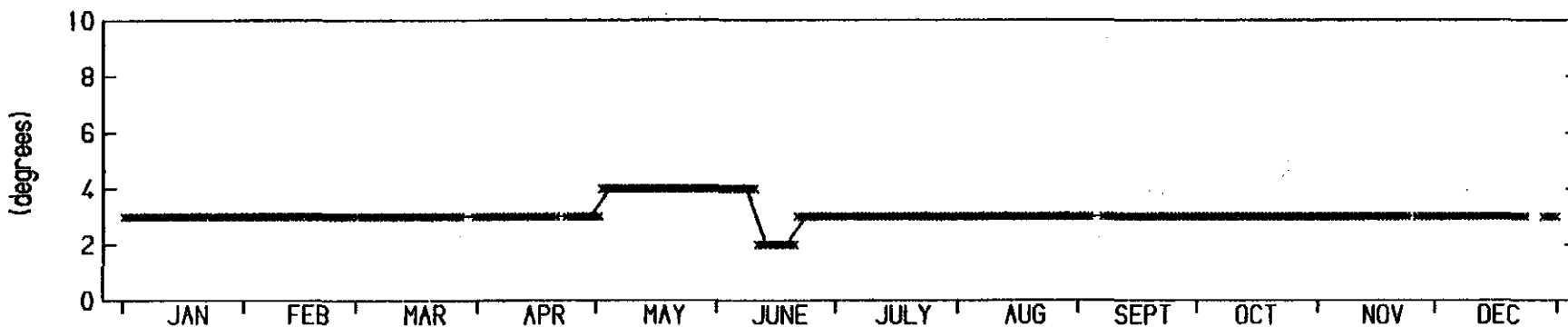
RAINBOW BEACH

0901



DISTANCE TO BERM AND VEGETATION LINE - 1985

xxxx Indicates Distance to Berm : 49 Observations  
 — Indicates Distance to Vegetation Line : 351 Observations



FORESHORE SLOPE - 1985

Five Day Moving Average

No. of Observations : 351

COPE

Rainbow Beach

Figure 47

C25.1



**BEACH PROFILE PARAMETERS - 1986**

(Foreshore Slope)

**Figure 48**  
C25.1

Rainbow Beach

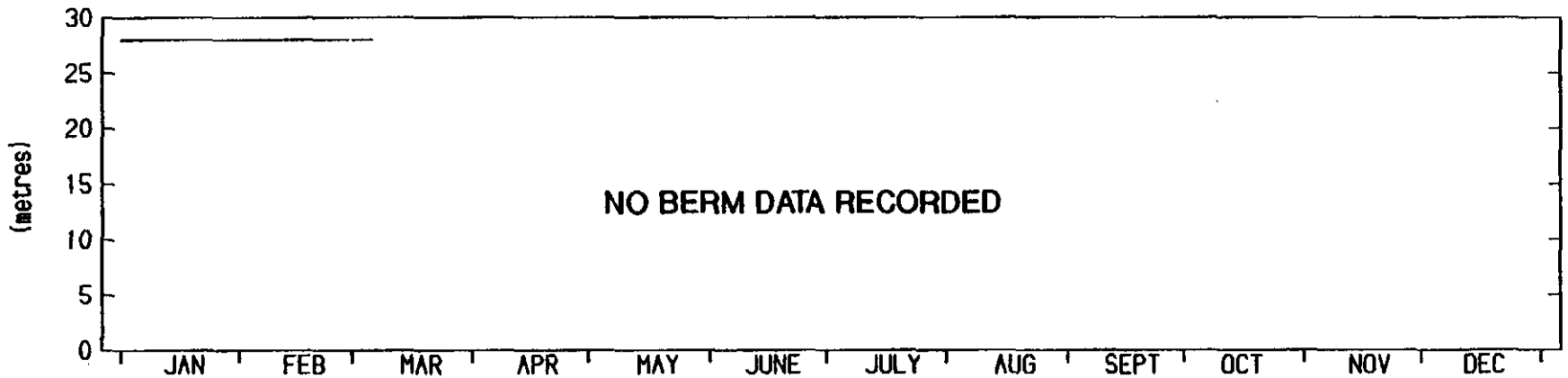
COPE

COPE - Coastal Observation  
Programme Engineering

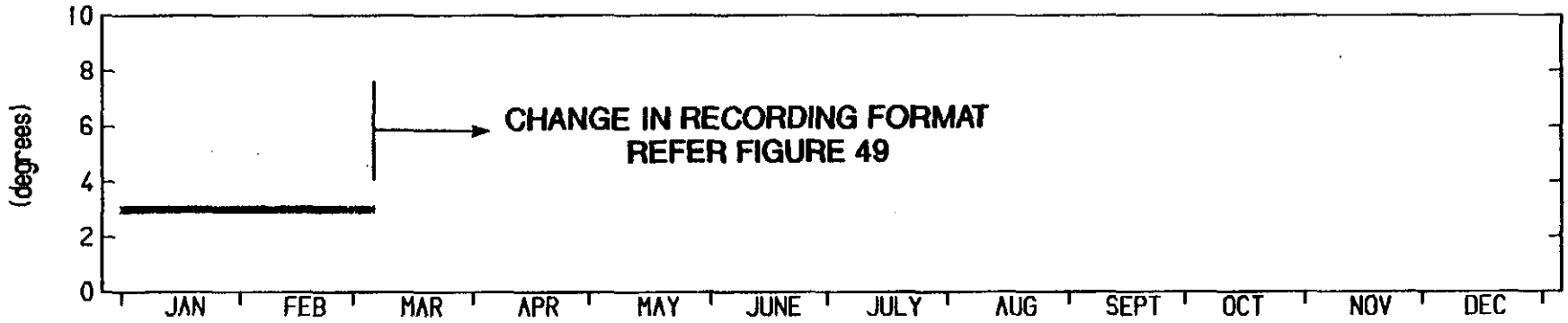
WIDGEE SHIRE

RAINBOW BEACH

0901

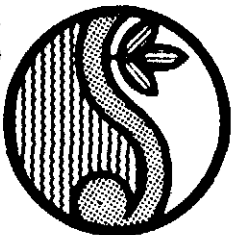


xxxx Indicates Distance to Berm : 2 Observations  
 — Indicates Distance to Vegetation Line : 64 Observations



Five Day Moving Average

No. of Observations : 64



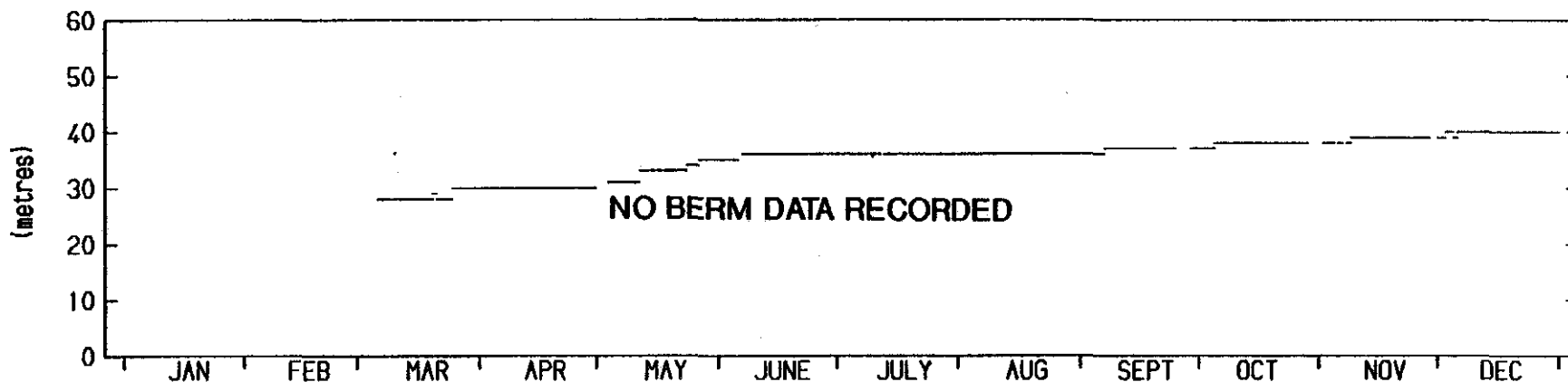
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Programme Engineering

WIDGEE SHIRE

RAINBOW BEACH

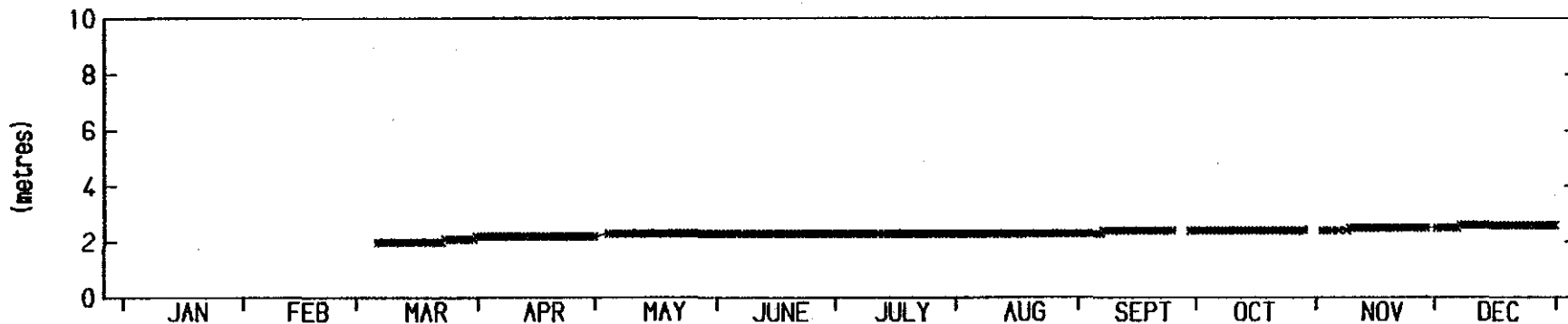
0901

**BEACH PROFILE PARAMETERS - 1986**  
(Sand Level at Pole)



DISTANCE TO BERM AND VEGETATION LINE - 1986

xxxxx Indicates Distance to Berm : 0 Observations  
 ——— Indicates Distance to Vegetation Line : 284 Observations



SAND LEVEL AT POLE - 1986

Five Day Moving Average

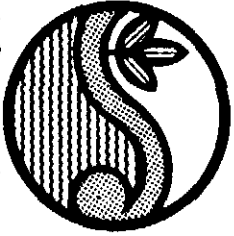
No. of Observations : 284

COPE

Rainbow Beach

Figure 49

C25.1



BEACH PROFILE PARAMETERS - 1987

COPE

Rainbow Beach

Figure 50

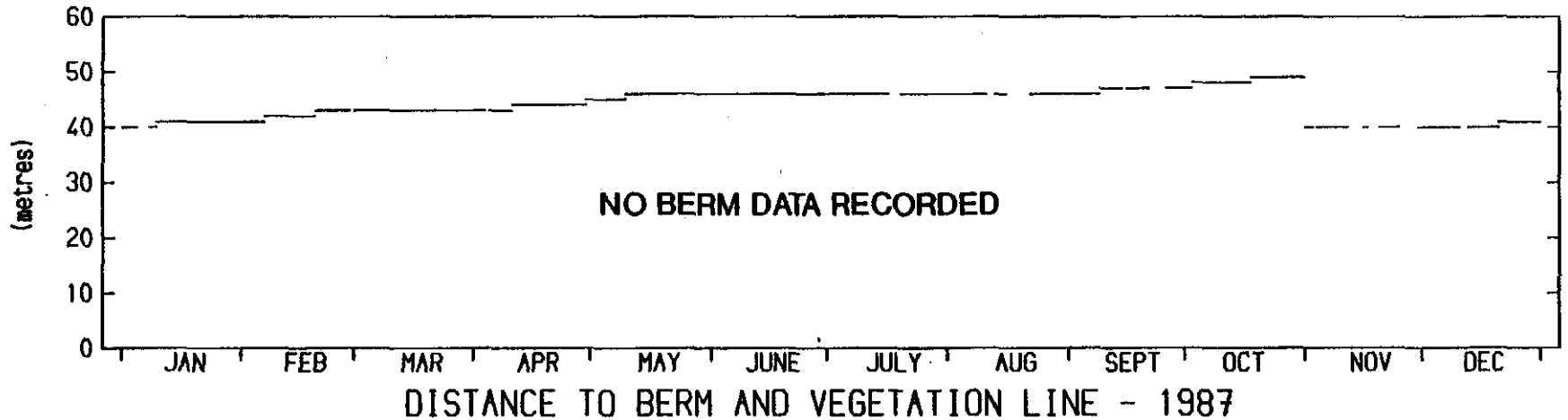
C25.1

COPE - Coastal Observation Programme Engineering

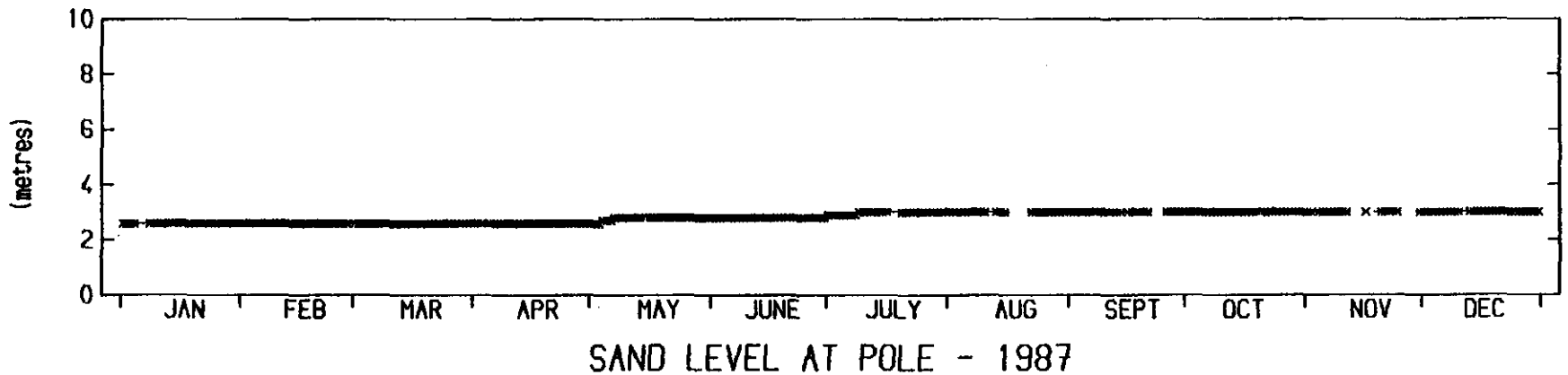
WIDGEE SHIRE

RAINBOW BEACH

0901



xxxxx Indicates Distance to Berm : 0 Observations  
 — Indicates Distance to Vegetation Line : 330 Observations



Five Day Moving Average

No. of Observations : 330



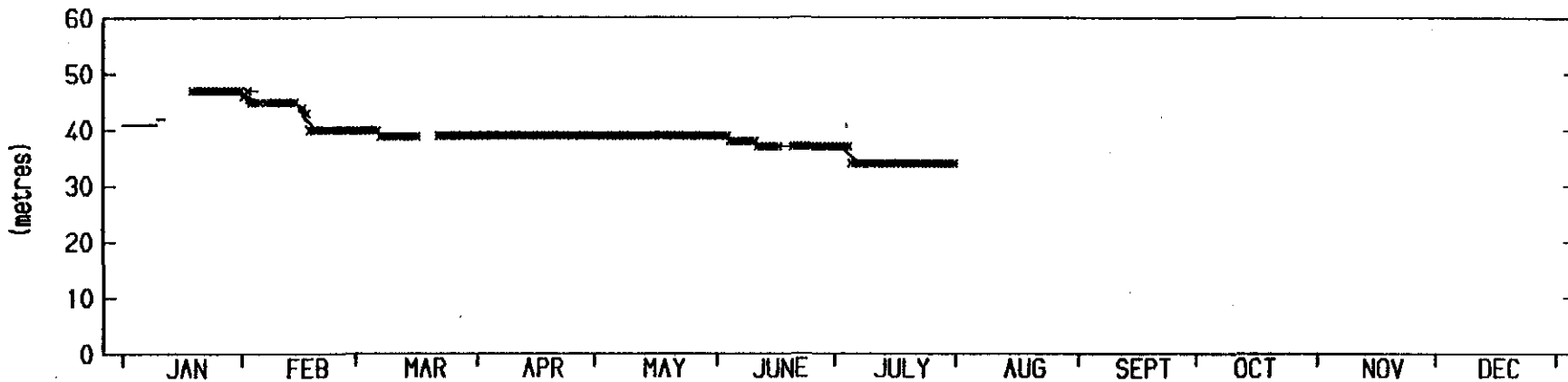
BEACH PROFILE PARAMETERS - 1988

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WIDGEE SHIRE

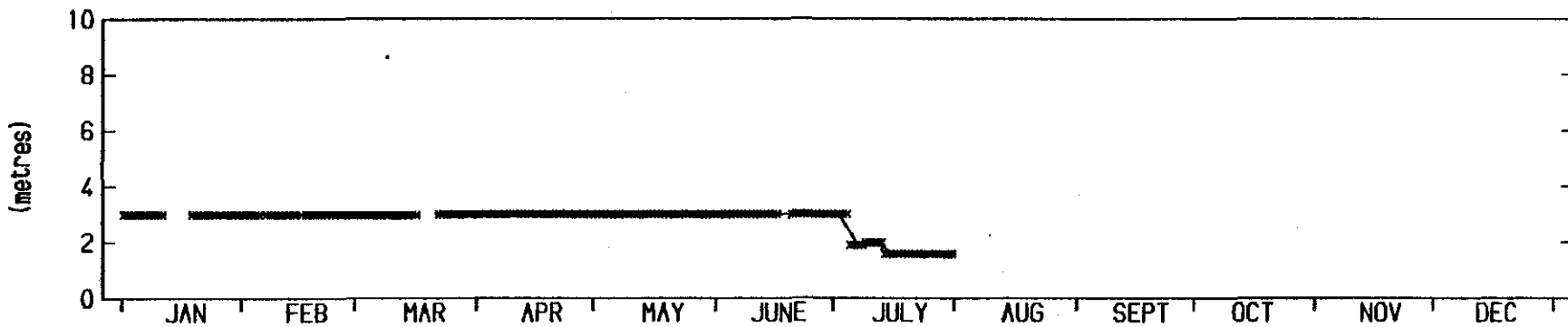
RAINBOW BEACH

0901



DISTANCE TO BERM AND VEGETATION LINE - 1988

xxxx Indicates Distance to Berm : 185 Observations  
 — Indicates Distance to Vegetation Line : 196 Observations



SAND LEVEL AT POLE - 1988

Five Day Moving Average

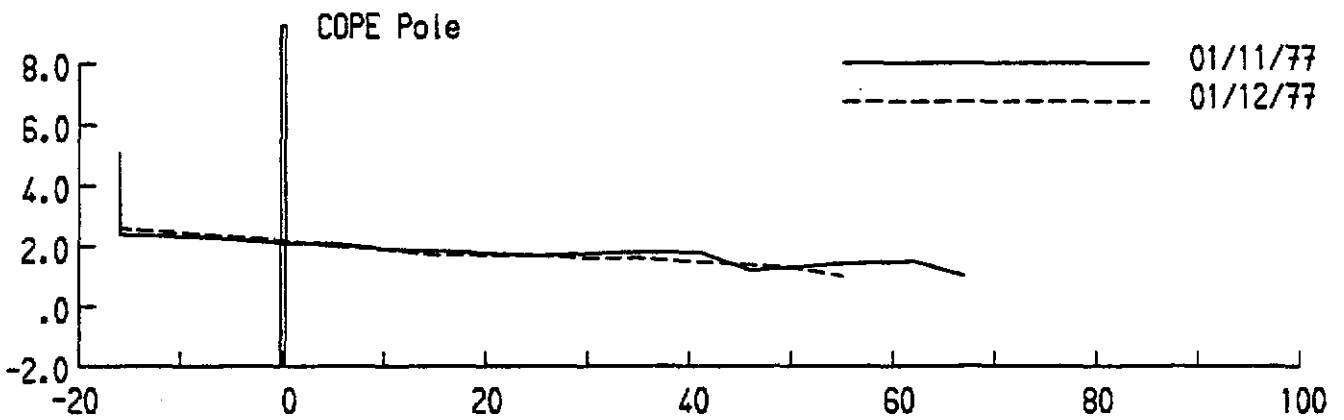
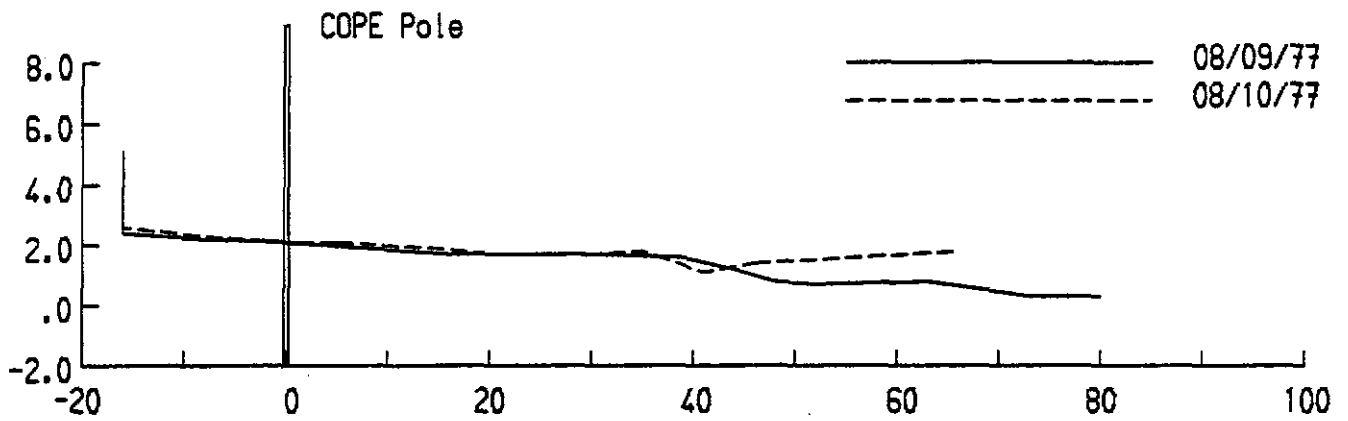
No. of Observations : 196

COPE

Rainbow Beach

Figure 51

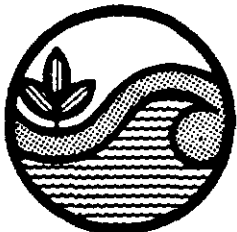
C25.1



ALL PROFILES MEASURED FROM LANDWARD POLE

Level Datum is A.H.D.

Distances and Levels are measured in Metres



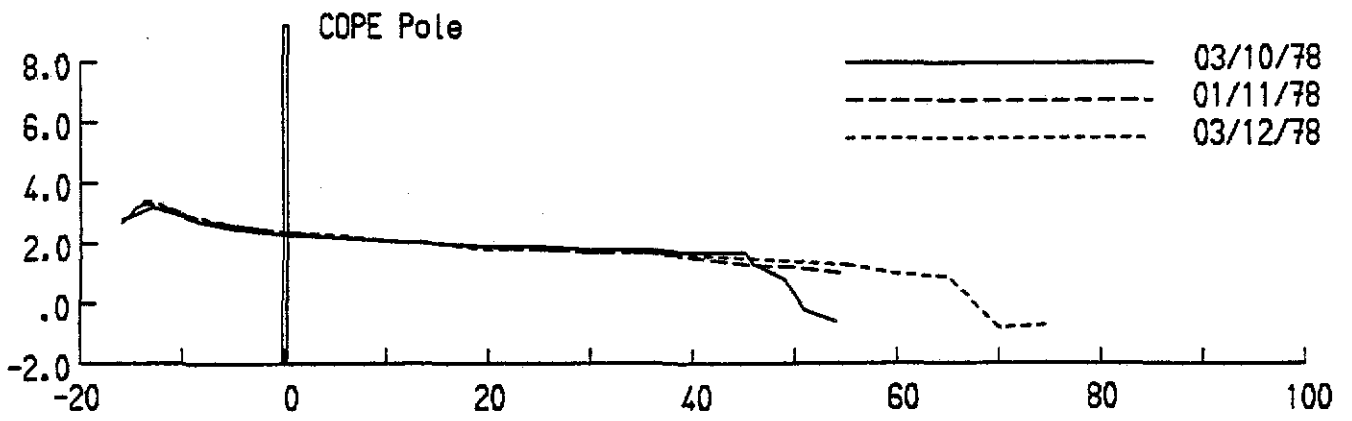
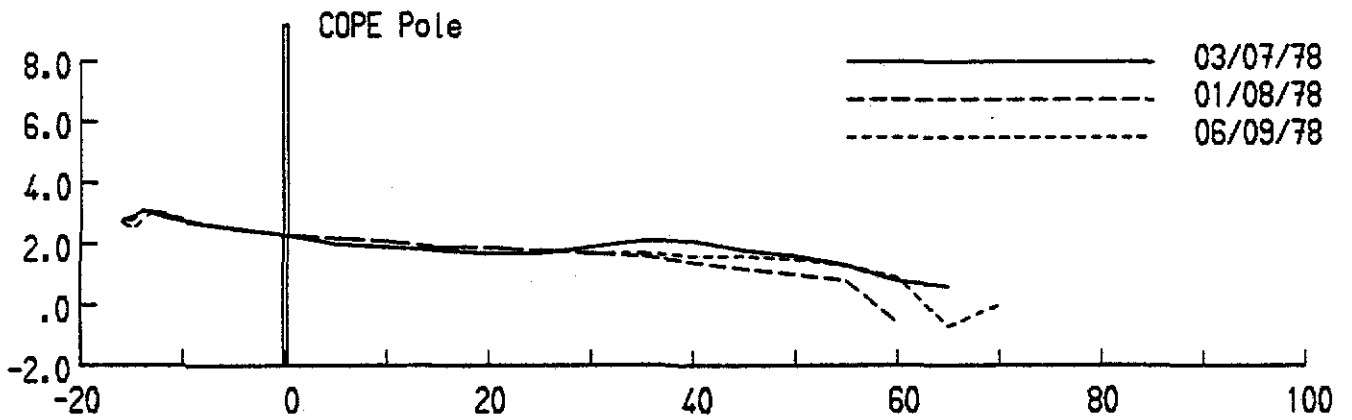
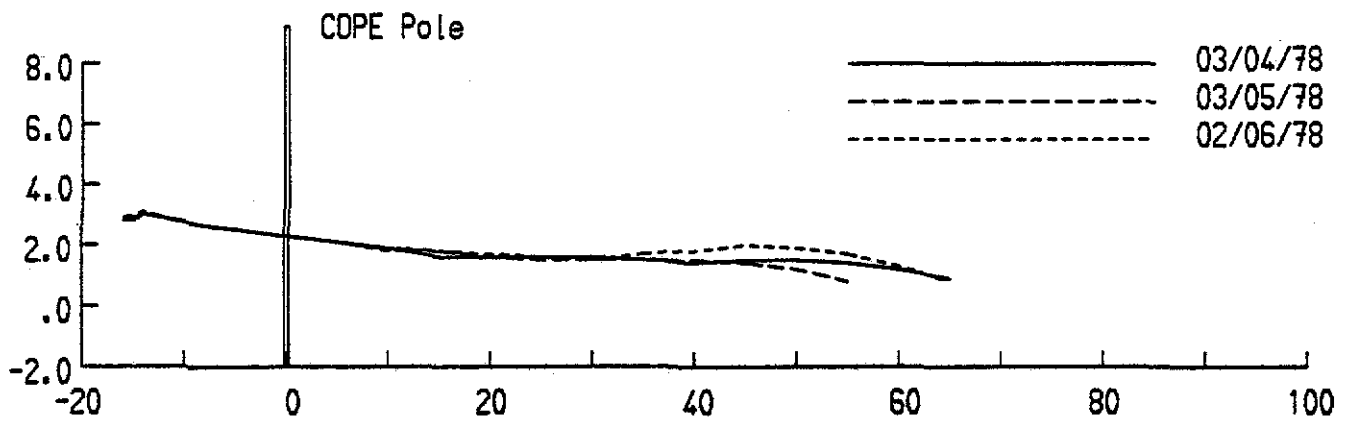
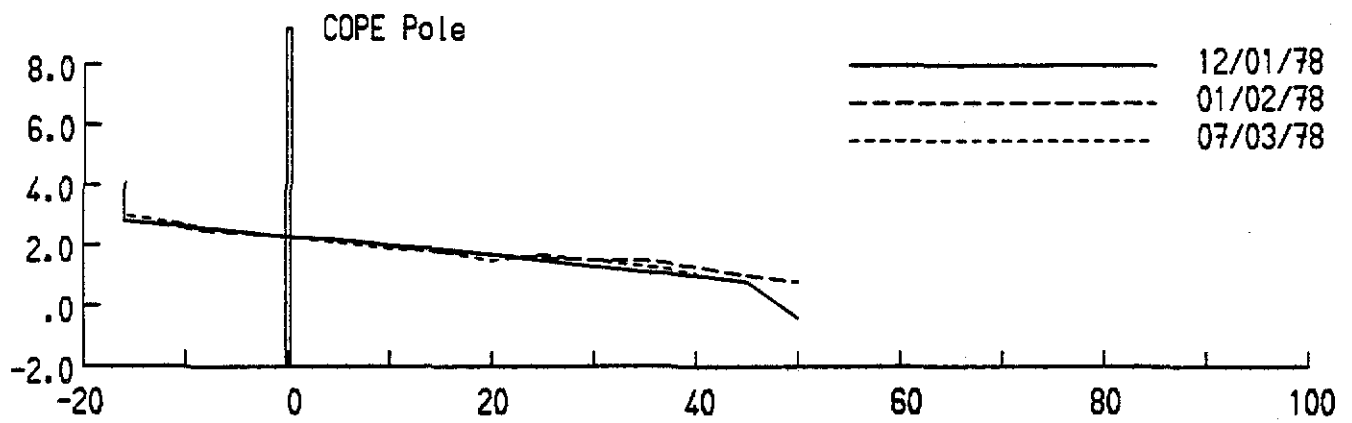
Beach Protection Authority

**MONTHLY BEACH PROFILES - 1977**

COPE  
Rainbow Beach

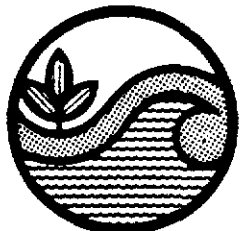
**Figure 52**  
C25.1





Level Datum is A.H.D.

Distances and Levels are measured in Metres



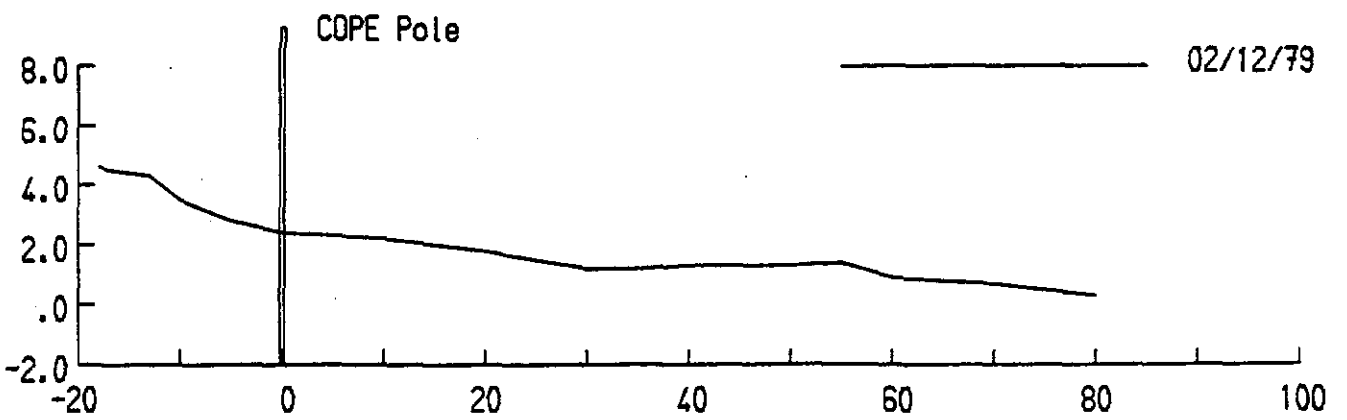
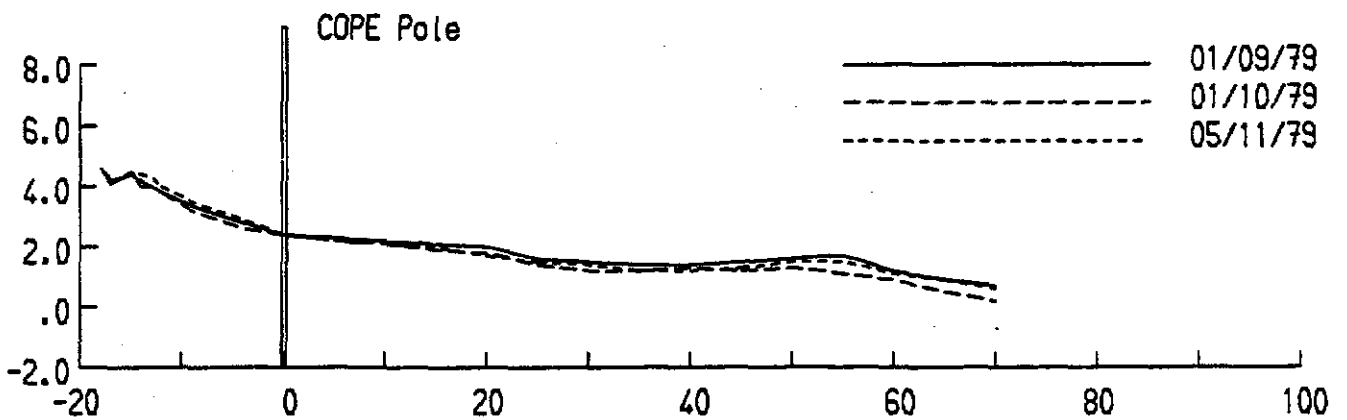
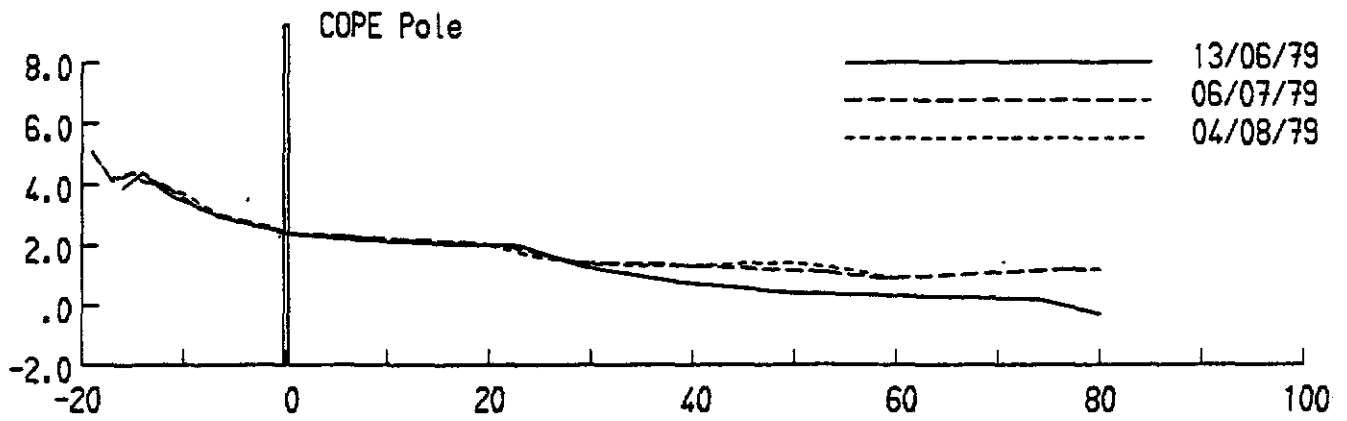
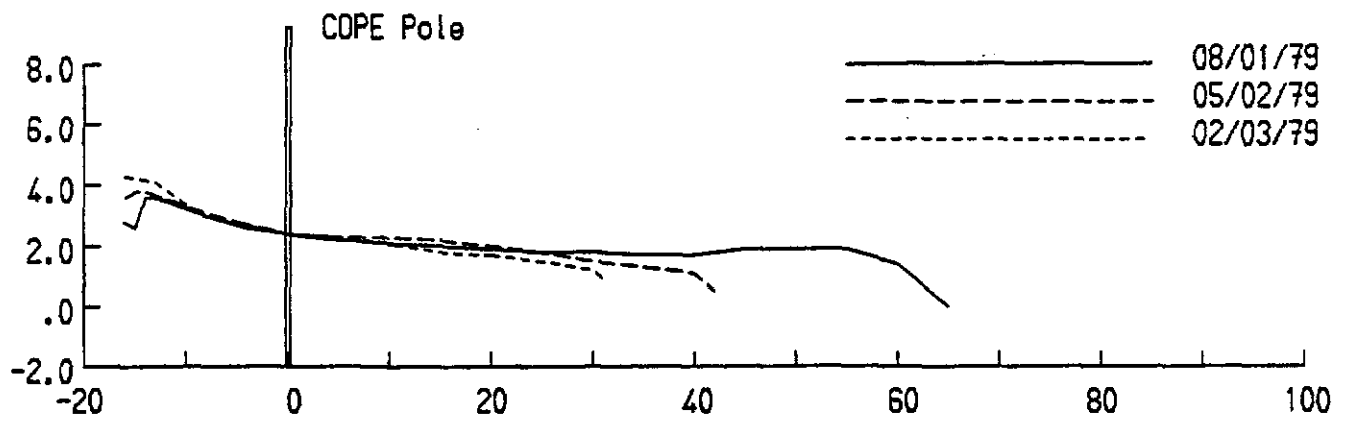
Beach Protection Authority

## MONTHLY BEACH PROFILES - 1978

COPE  
Rainbow Beach

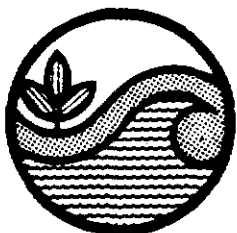
Figure 53

C25.1



Level Datum is A.H.D.

Distances and Levels are measured in Metres



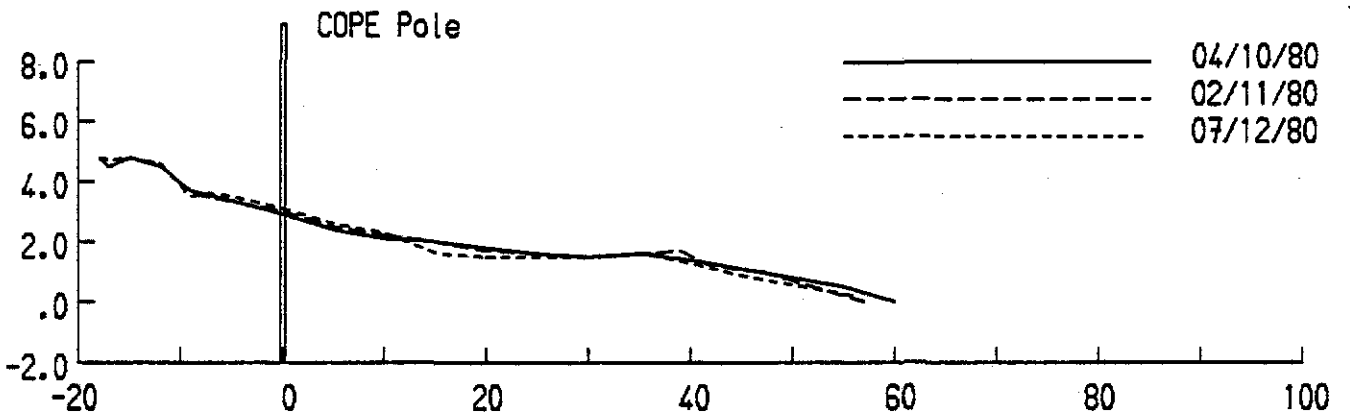
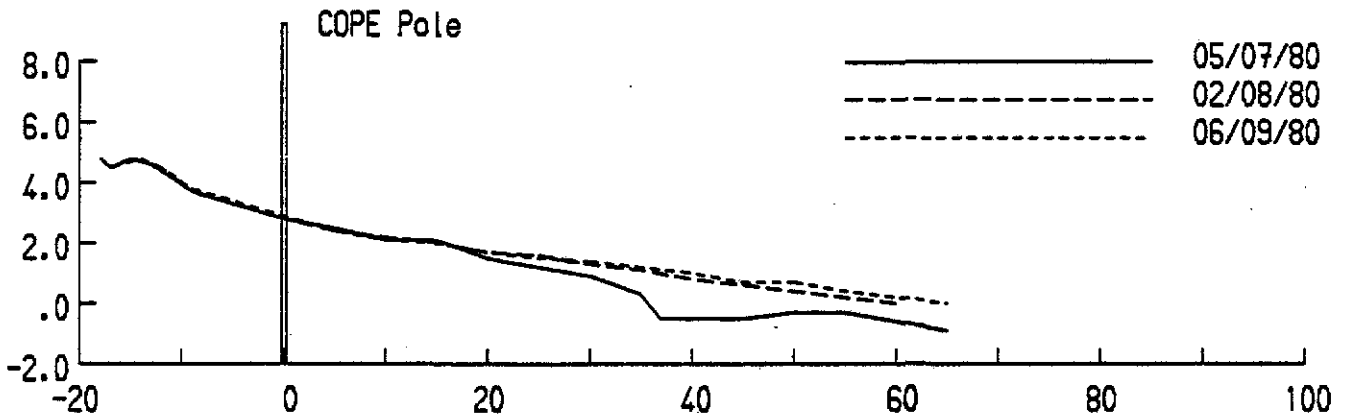
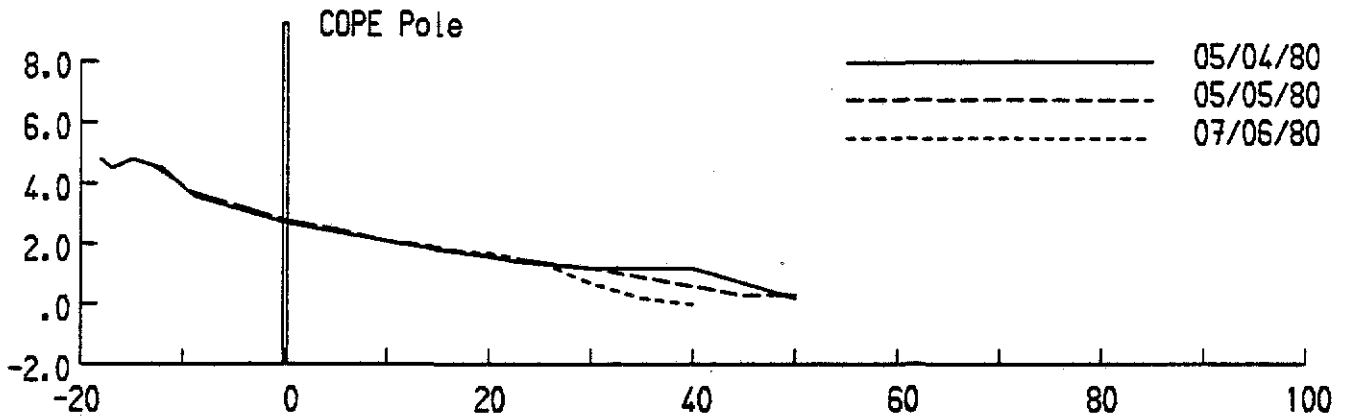
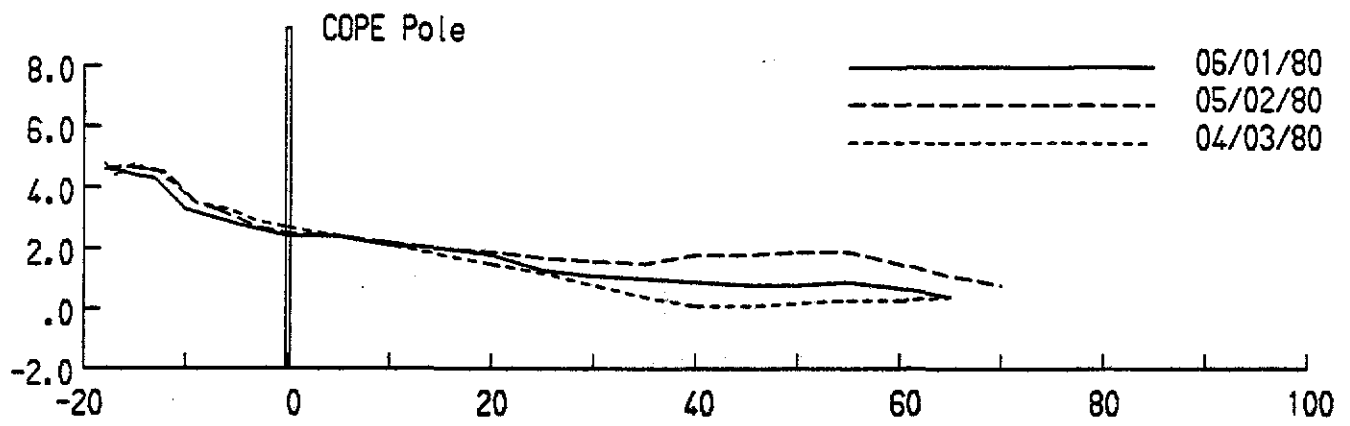
Beach Protection Authority

## MONTHLY BEACH PROFILES - 1979

COPE  
Rainbow Beach

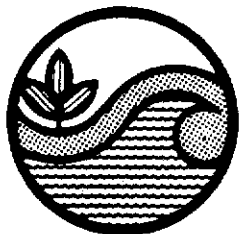
Figure 54

C25.1



Level Datum is A.H.D.

Distances and Levels are measured in Metres



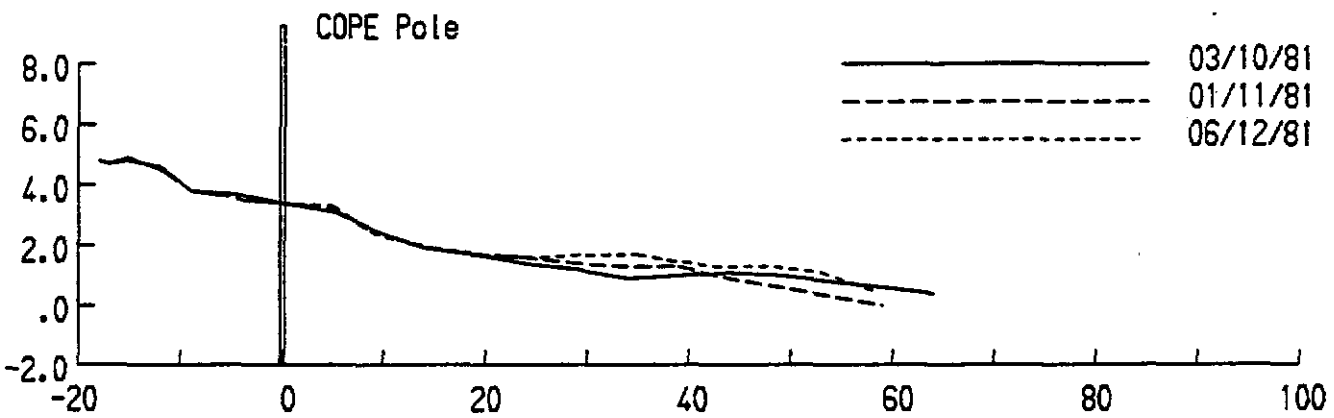
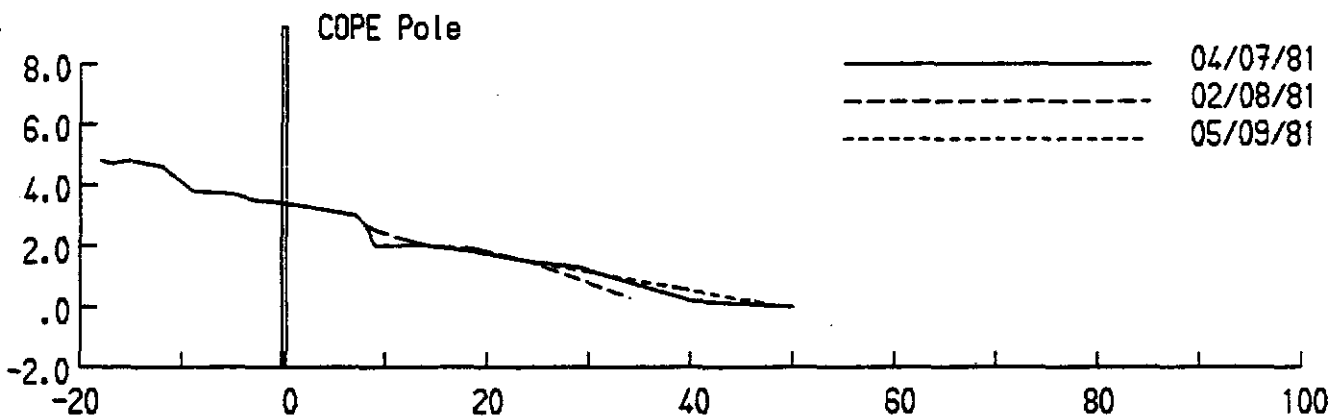
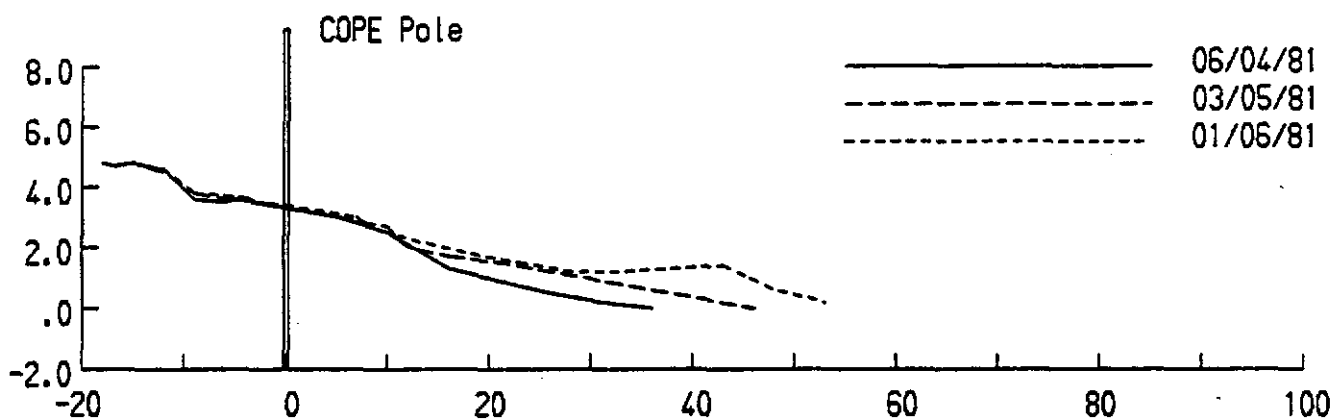
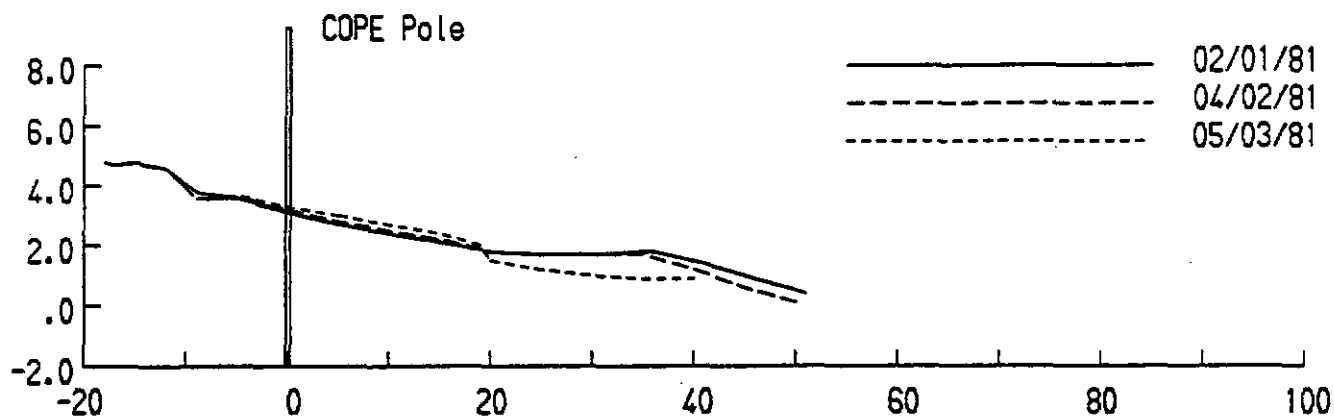
Beach Protection Authority

## MONTHLY BEACH PROFILES - 1980

COPE  
Rainbow Beach

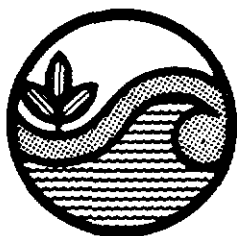
Figure 55

C25.1



Level Datum is A.H.D.

Distances and Levels are measured in Metres



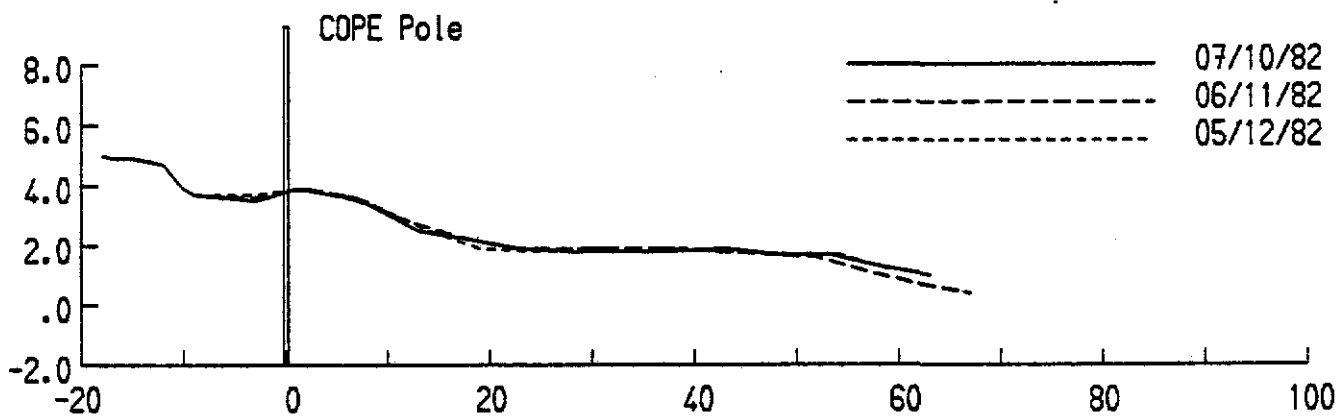
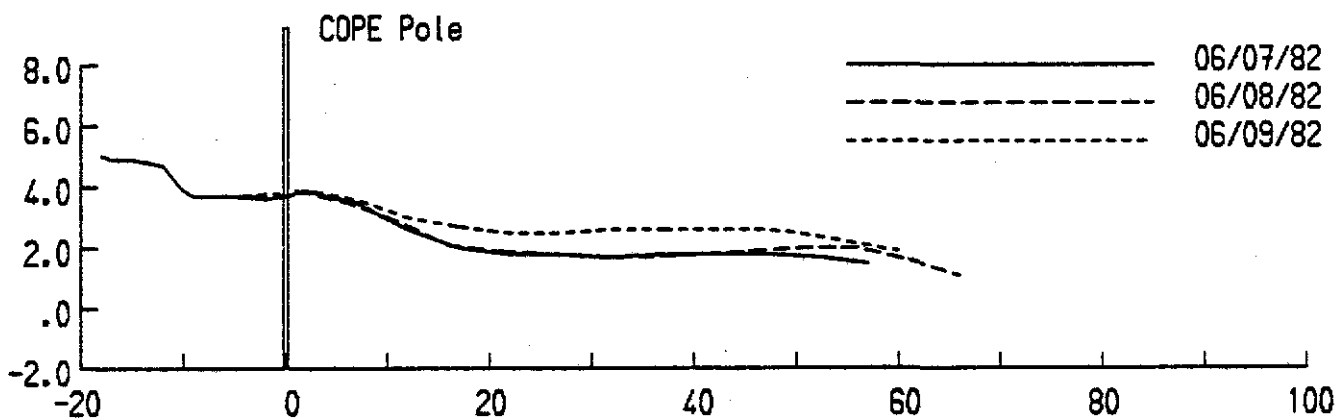
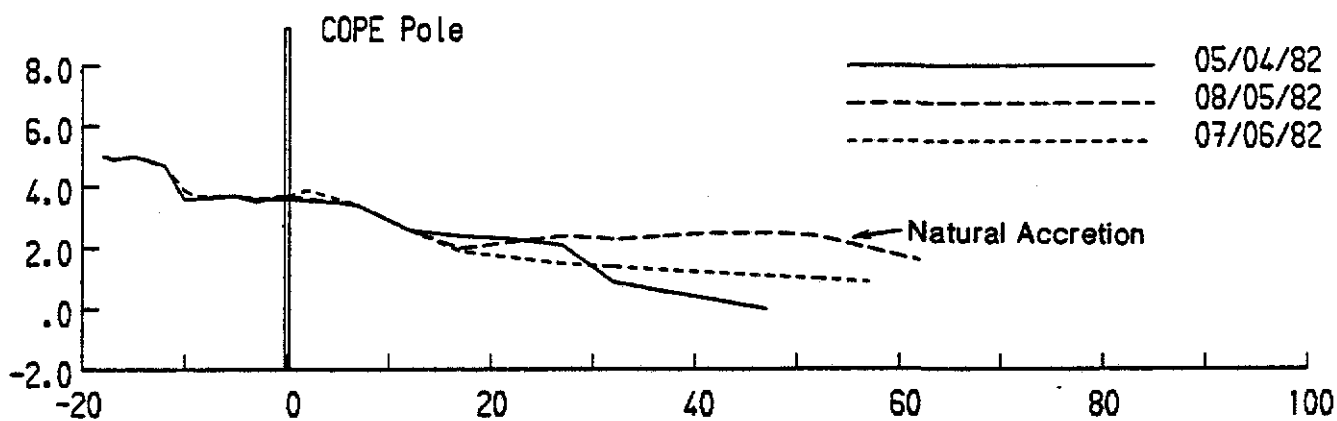
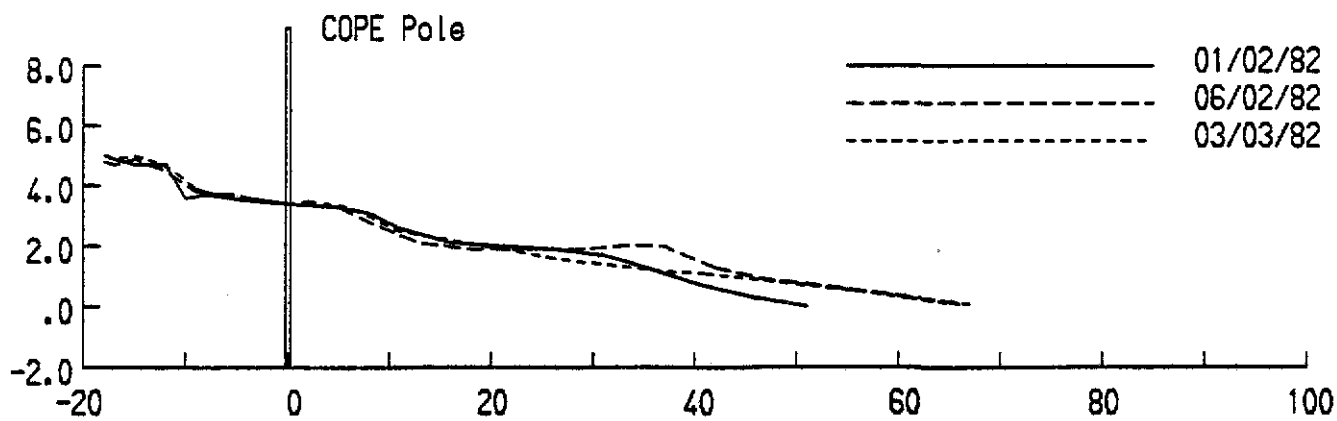
Beach Protection Authority

# MONTHLY BEACH PROFILES - 1981

COPE  
Rainbow Beach

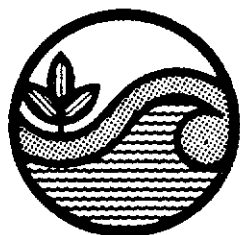
Figure 56

G25.1



Level Datum is A.H.D.

Distances and Levels are measured in Metres



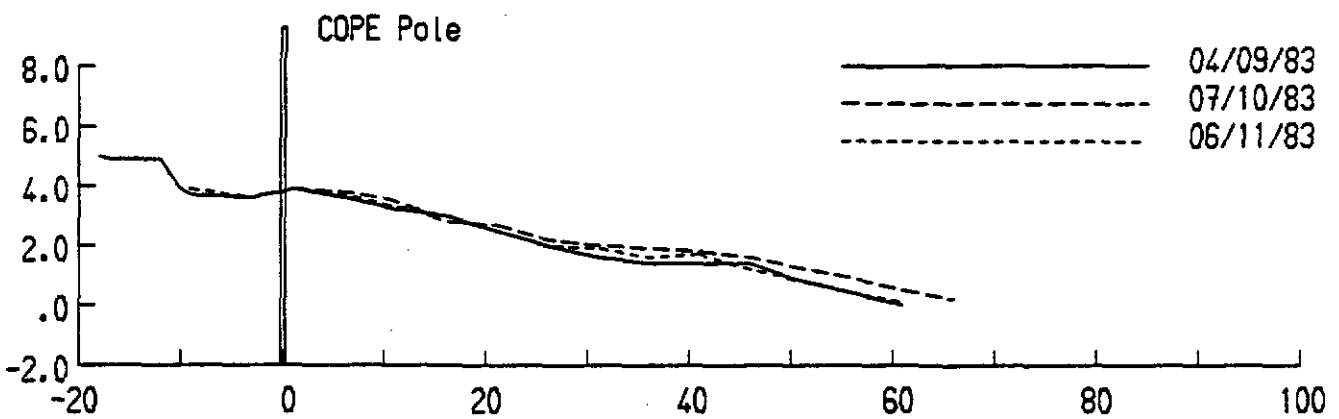
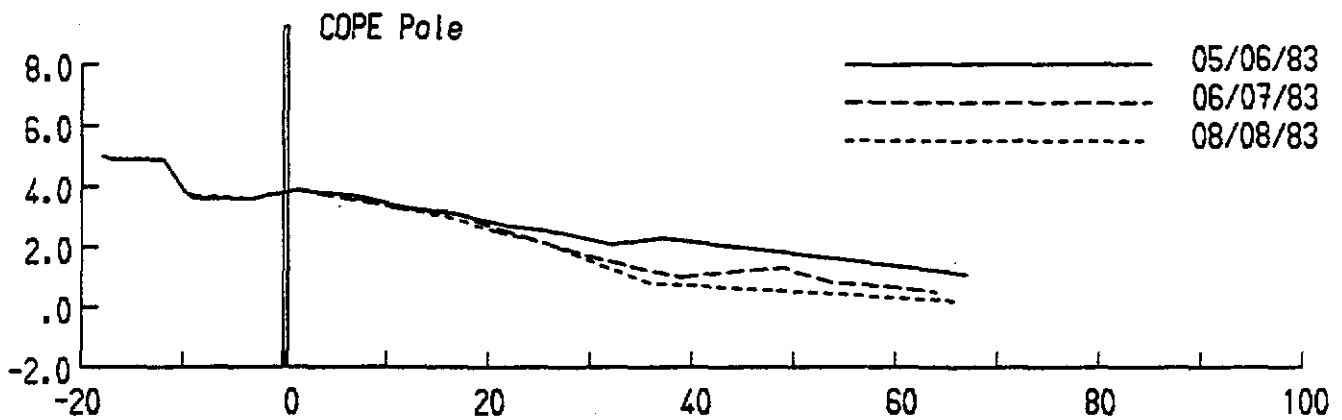
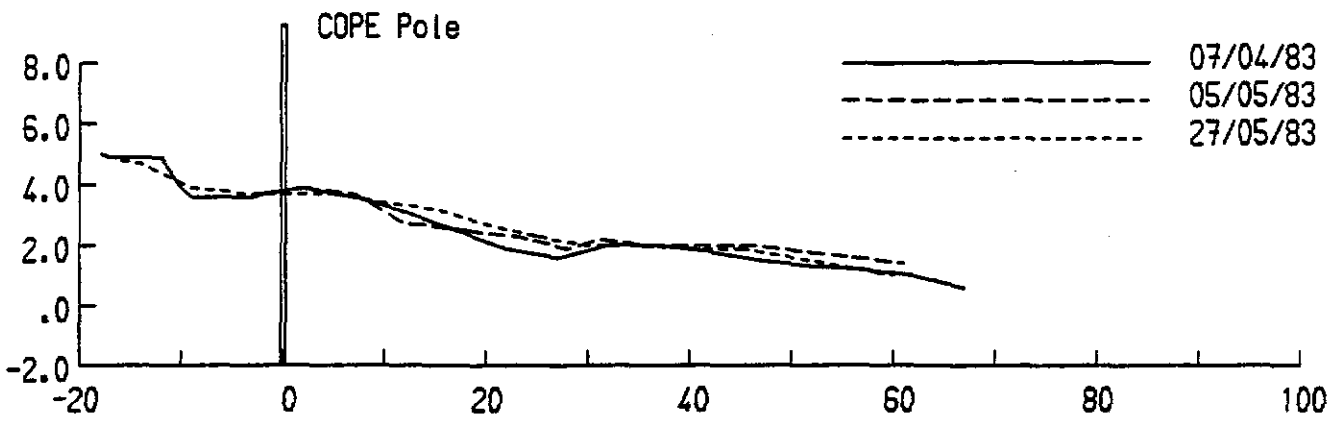
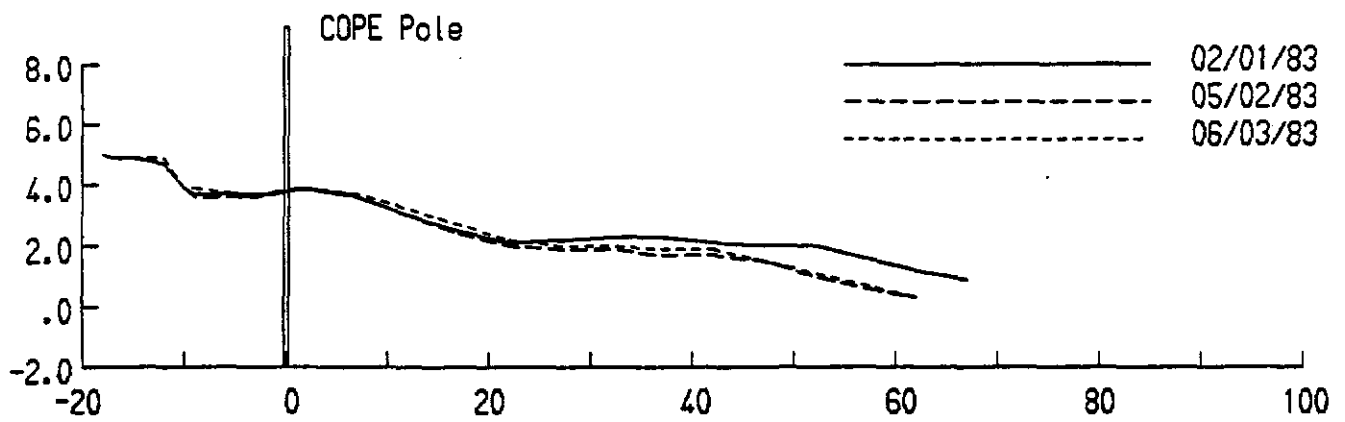
Beach Protection Authority

## MONTHLY BEACH PROFILES - 1982

COPE  
Rainbow Beach

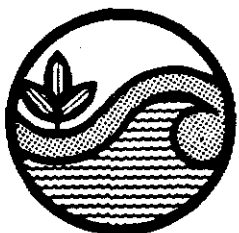
Figure 57

C25.1



Level Datum is A.H.D.

Distances and Levels are measured in Metres



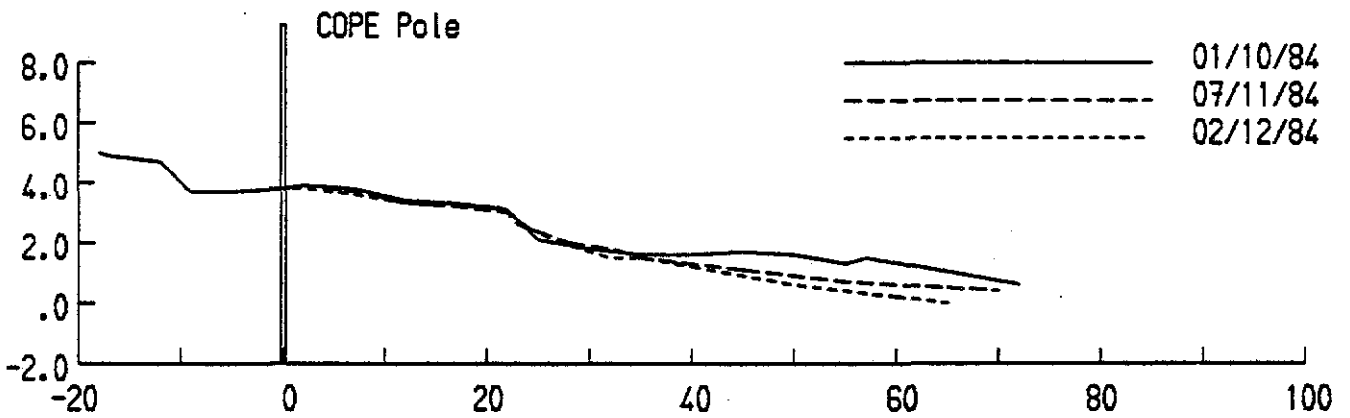
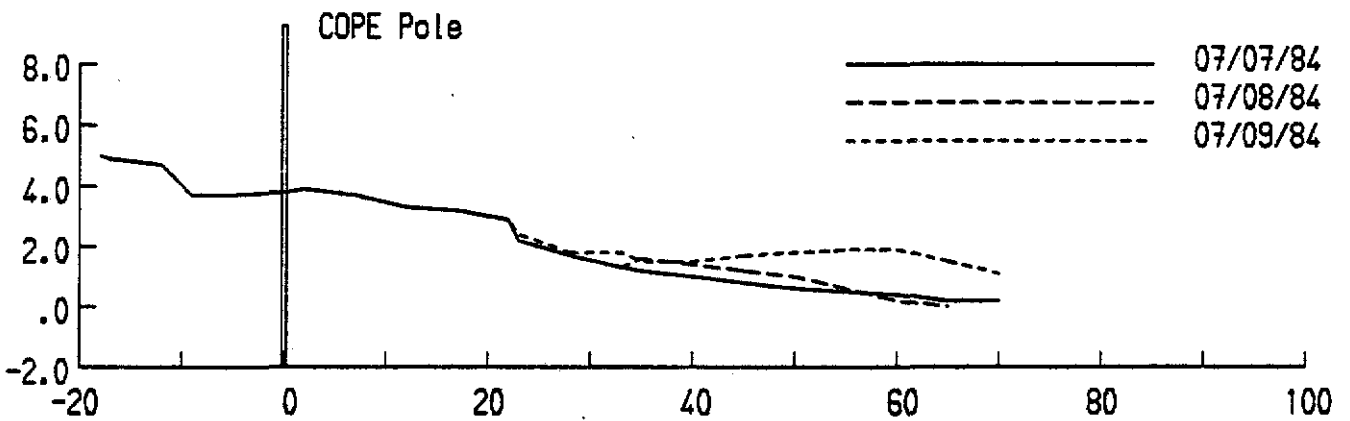
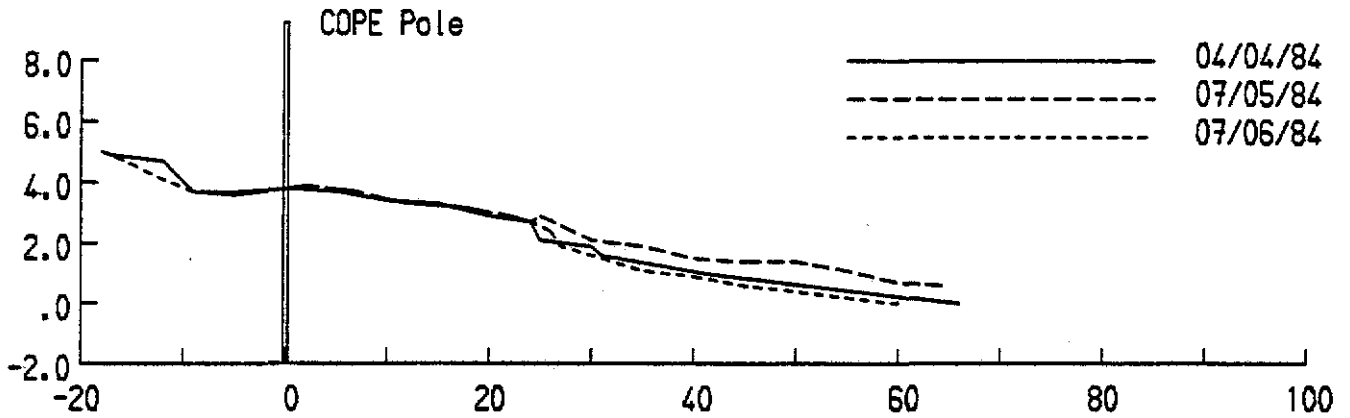
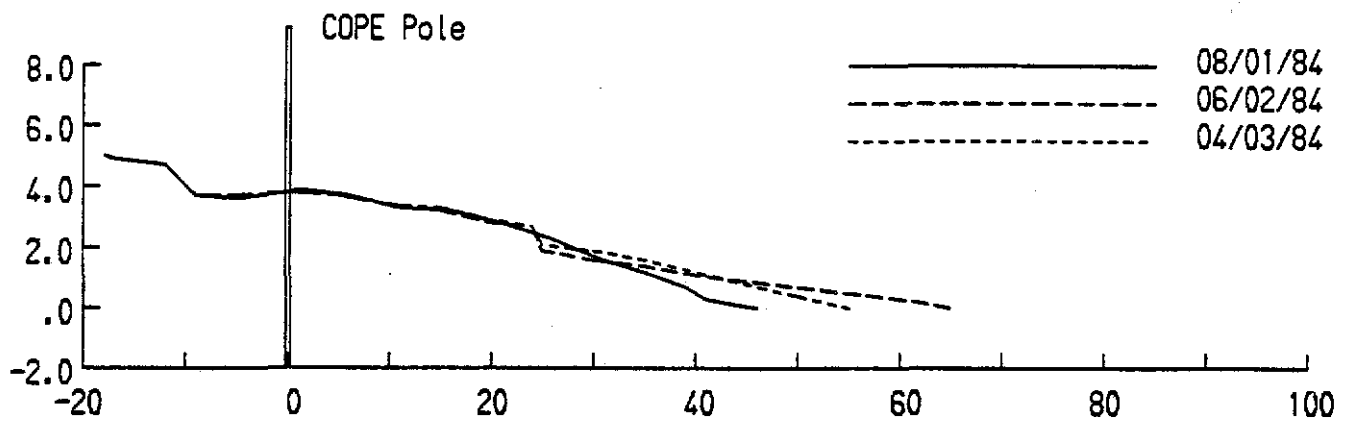
Beach Protection Authority

## MONTHLY BEACH PROFILES - 1983

COPE  
Rainbow Beach

Figure 58

C25.1



Level Datum is A.H.D.

Distances and Levels are measured in Metres



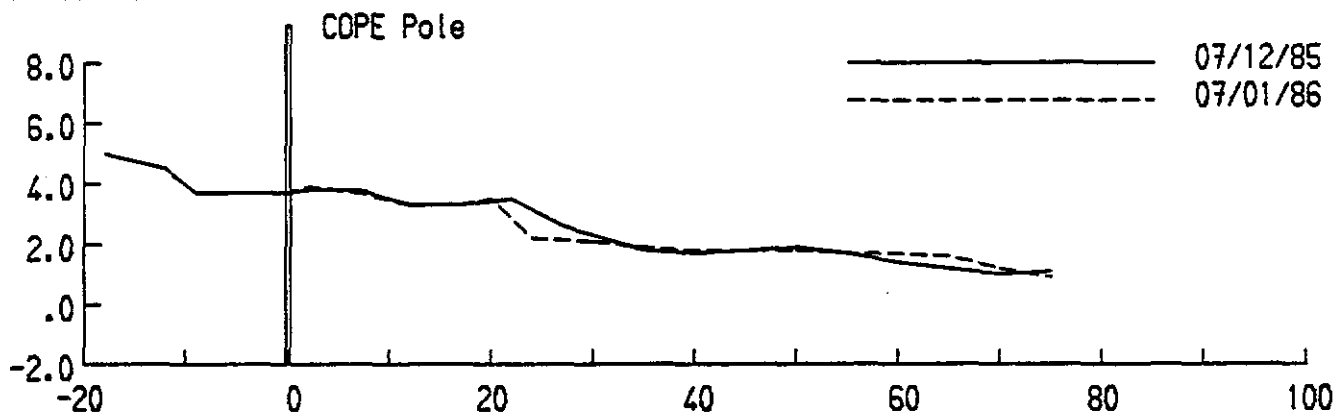
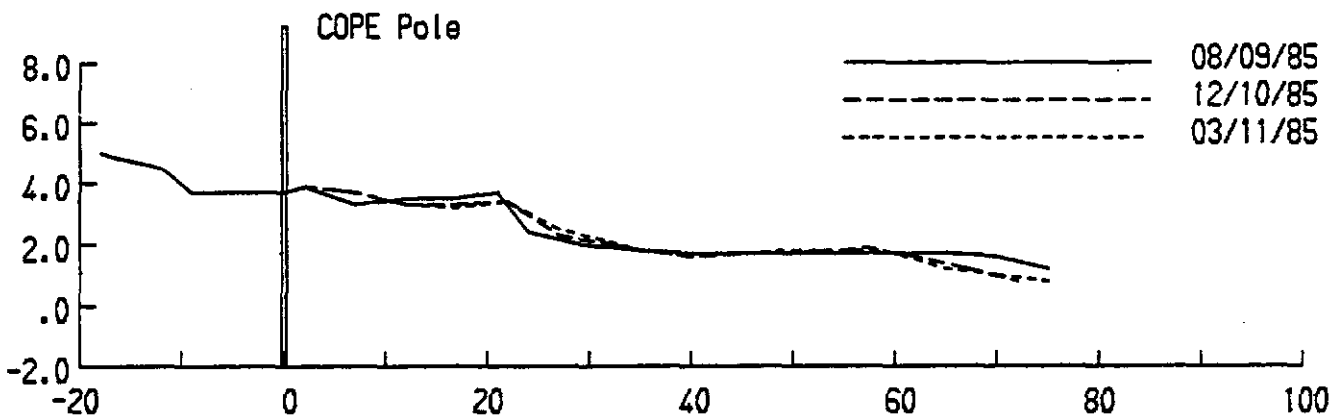
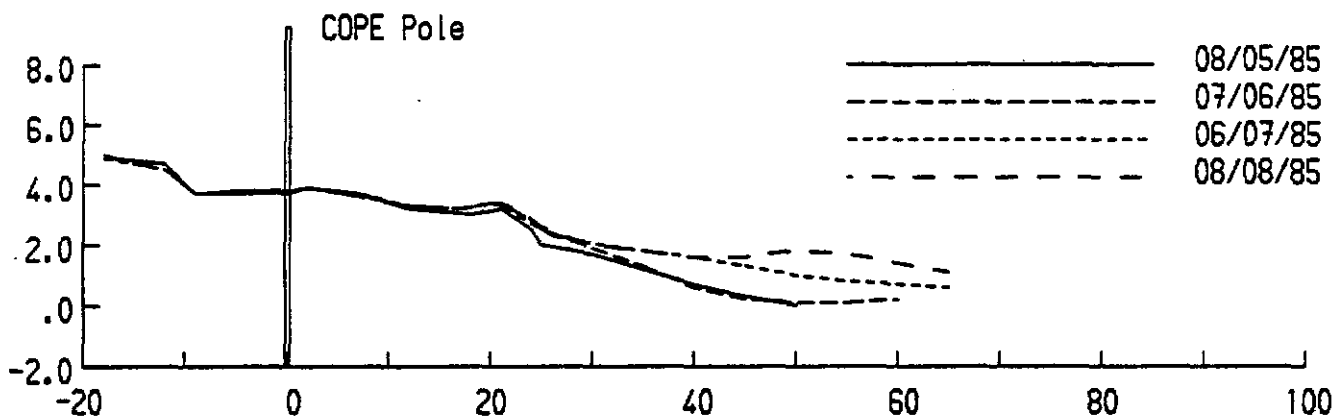
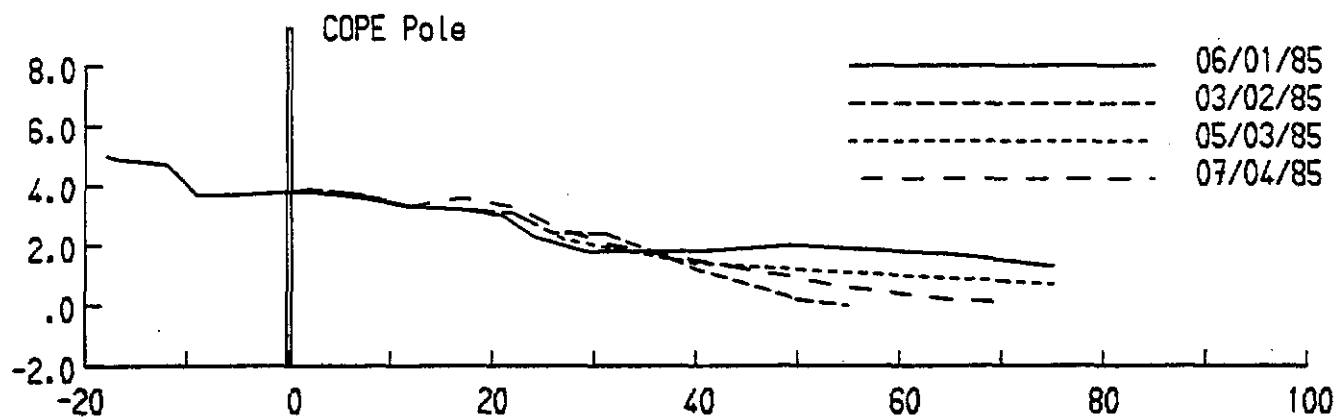
Beach Protection Authority

## MONTHLY BEACH PROFILES - 1984

COPE  
Rainbow Beach

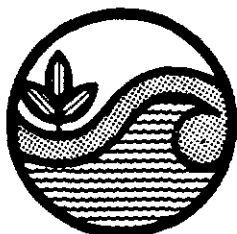
Figure 59

C25.1



Level Datum is A.H.D.

Distances and Levels are measured in Metres



Beach Protection Authority

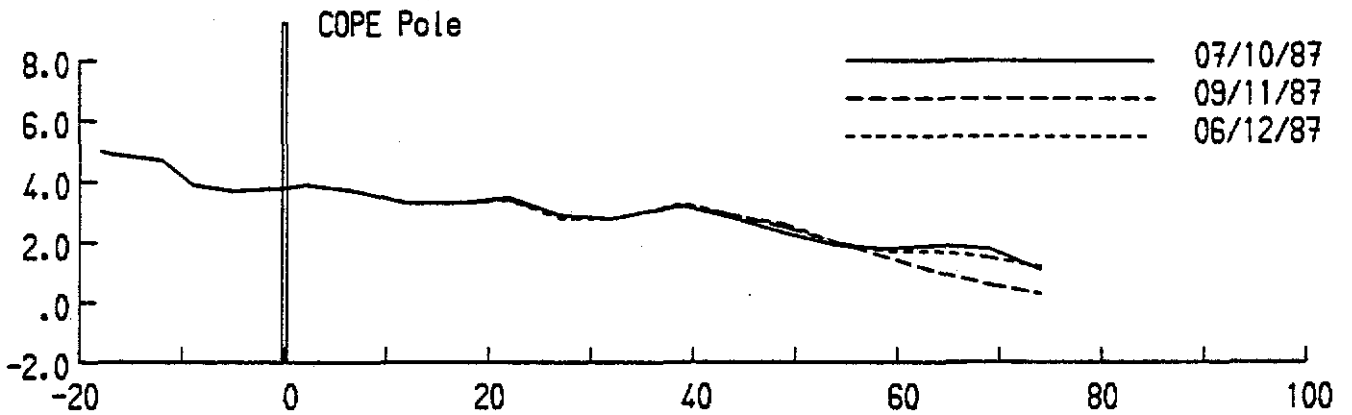
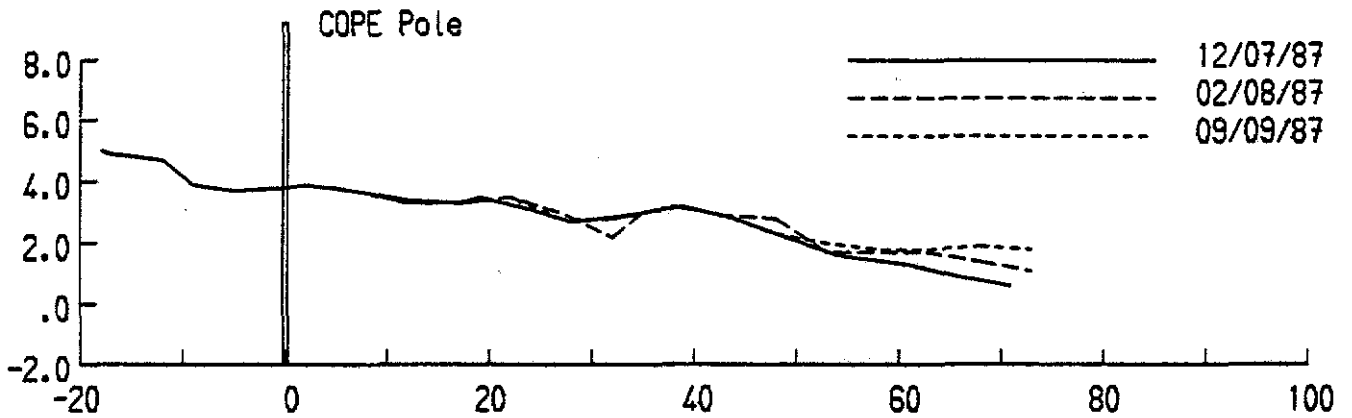
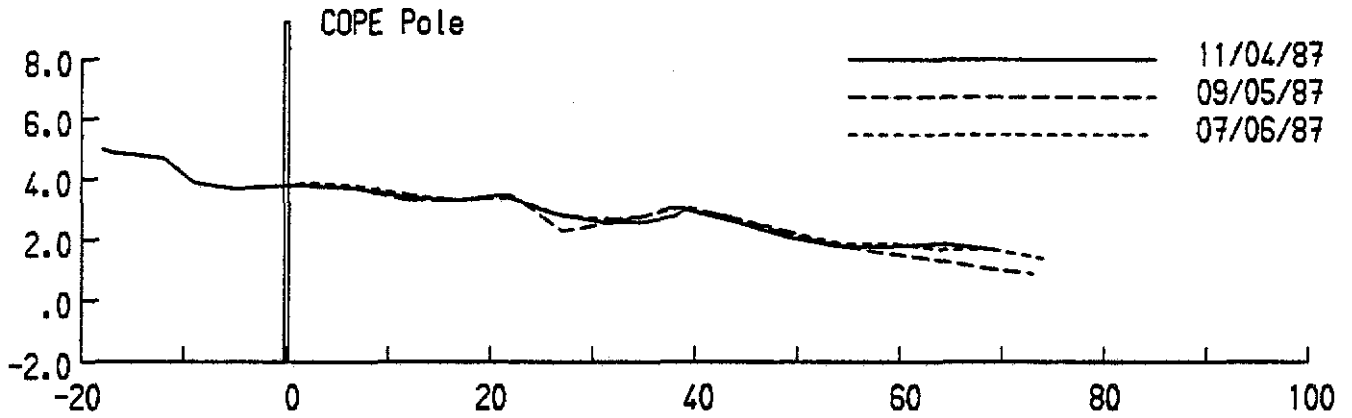
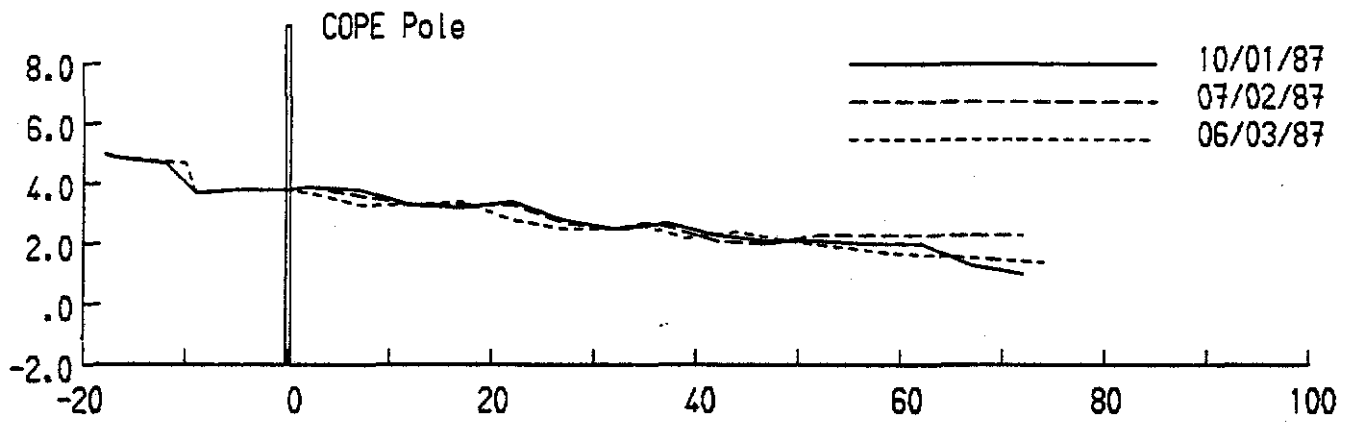
MONTHLY BEACH PROFILES - 1985-1986

COPE  
Rainbow Beach

Figure 60

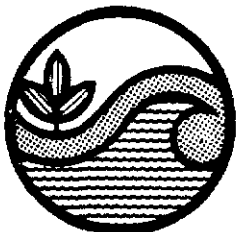
C25.1





Level Datum is A.H.D.

Distances and Levels are measured in Metres



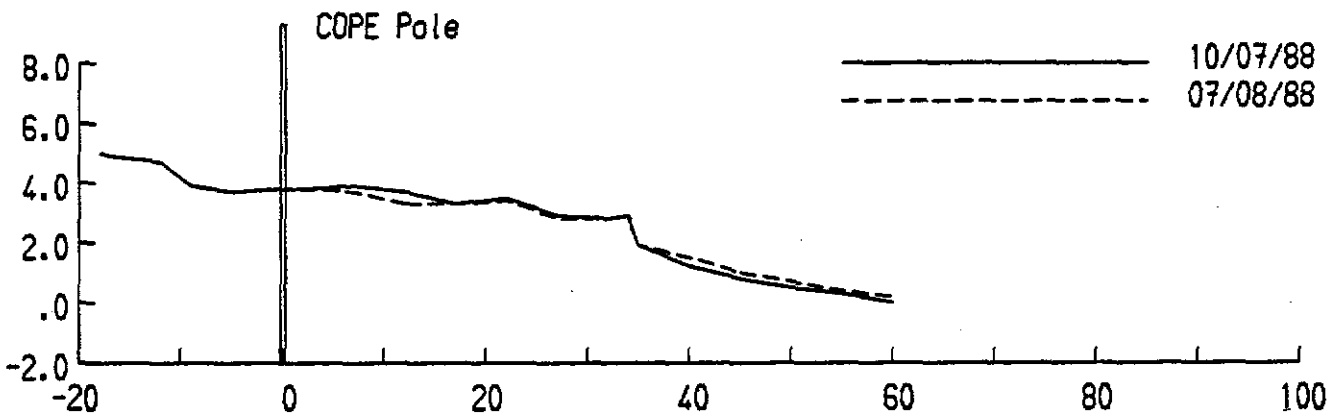
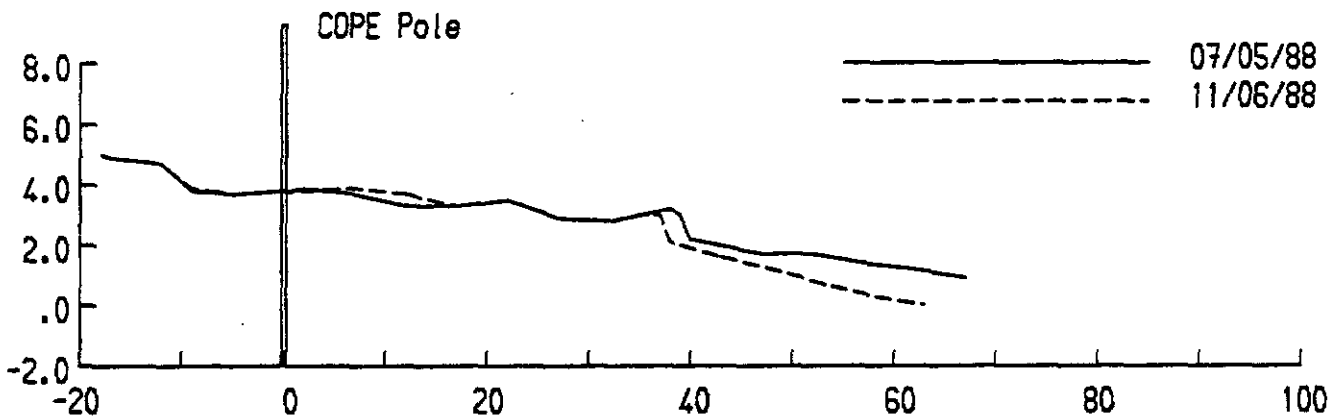
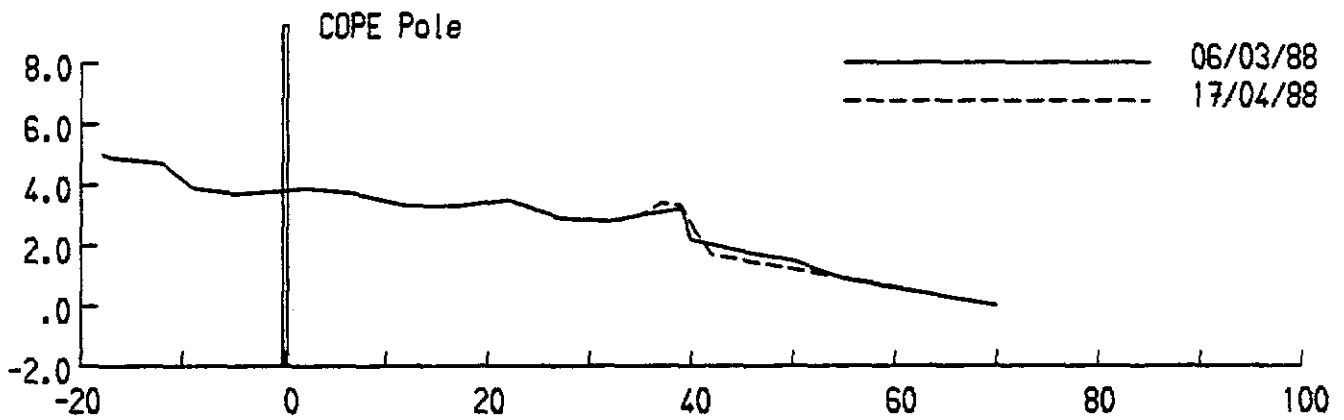
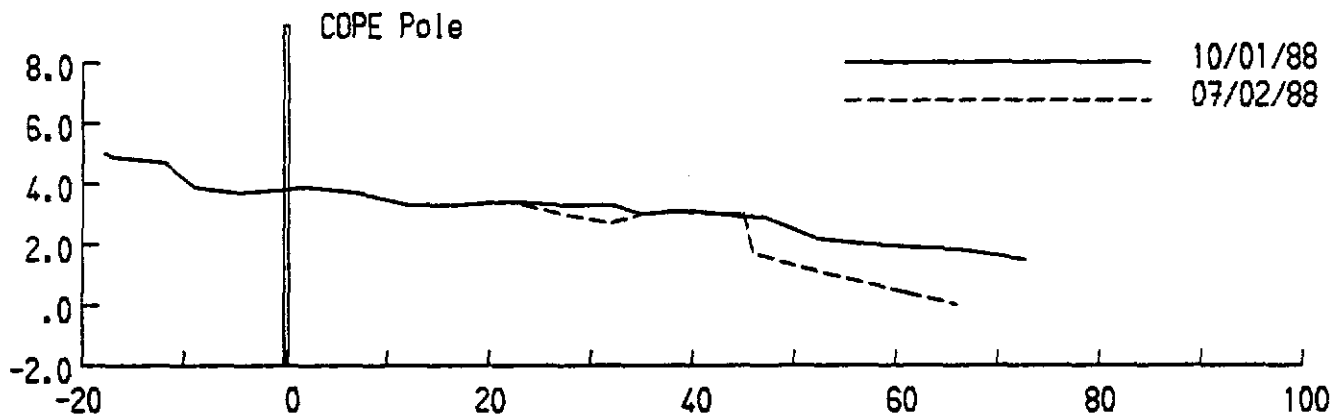
Beach Protection Authority

## MONTHLY BEACH PROFILES - 1987

COPE  
Rainbow Beach

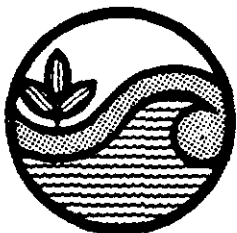
Figure 61

C25.1



Level Datum is A.H.D.

Distances and Levels are measured in Metres



Beach Protection Authority

## MONTHLY BEACH PROFILES - 1988

COPE  
Rainbow Beach

Figure 62

C25.1