COASTAL OBSERVATION PROGRAM - ENGINEERING (COPE)

WOODGATE - ISIS SHIRE

For the Years 1976 to 1979

Beach Protection Authority

November 1980

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.

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ABSTRACT:

This report provides a summary of primary analyses of COPE data on wind, wave and beach processes observed at Woodgate near Maryborough in the Isis Shire in Southern Queensland. The data were recorded by volunteer observers Mr R. Dwyer and Mr S. Ryan from the Queensland National Parks and Wildlife Service during the period January 1976 to the end of December 1979. The recordings were made daily during the four year period and the information published is considered representative and reliable.

OTHERS AVAILABLE IN THIS SERIES:

Coastal Observation Program - Engineering (COPE), Machans Beach - Mulgrave Shire, August 1979 (Report C 01.1).

Coastal Observation Program - Engineering (COPE), Baffle Creek - Miriam Vale Shire, October 1980 (Report C 02.1).

Coastal Observation Program - Engineering (COPE), Flying Fish Point - Johnstone Shire, November 1980 (Report C 03.1).

REFERENCES:

1. ROBINSON D.A. and JONES C.M.

Queensland Volunteer Coastal Observation Program - Engineering (COPE). 3rd Australian Conference on Coastal and Ocean Engineering, Melbourne, April 1979.

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1.0 INTRODUCTION

1.1 The Program

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

Each COPE observer is supplied with a basic kit of recording instruments including:-

- 30 metre Tape
- Wind Meter
- Abney Level
- 1.5 metre Sighting Support
- Recording Forms
- Fluorescent Dye.

A graduated reference pole is installed on the beach to serve as the base point for all plan measurements and the control for vertical levelling.

1.4. Observers

The majority of COPE observers are volunteer members of the public who may be local business people, local residents or school children. Some stations are manned by Government 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 program. 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 four year period 1976 to 1979 in a useful statistical form. No attempt has been made to interpret the observed data. It should be noted that Woodgate is located on Queensland's mainland coastline within Hervey Bay (Fig. 1). Fraser Island therefore offers considerable protection for the beach at the COPE station from the predominantly south-east ocean waves.

If this four year period is representative of the long term average meteorological conditions, the wind, wave and beach movement climatologies presented can be regarded as typical. However, this recording period is 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

Woodgate is located within the Isis Shire and is 30 kilometres north of Maryborough in Southern Queensland. It forms part of a 25 kilometre gently curving stretch of the coastline between Elliott Heads and Burrum Point. The small settlement of Woodgate is immediately adjacent to the COPE station. The location of the Woodgate COPE station is shown in Fig. 1.

2.2 Observers

This station has been manned by Mr R. Dwyer and Mr S. Ryan during the period January 1976 to December 1979. Messrs Dwyer and Ryan are officers with the Queensland National Parks and Wildlife Service.

2.3 Observed Parameters

The observer at this station usually recorded at 9.00 a.m. daily during the four year period 1976 to 1979.

This station has recorded:

- Wave Period
- Wave Height
- Wave Angle
- Wave Type
- Surf Zone Width
- Presence of Offshore Bar
- Wind Speed
- Wind Direction
- State of Tide
- Fixed Contour Level
- Distance to Fixed Contour
- Distance to Vegetation
- Foreshore Slope
- *Longshore Current Speed*
- Longshore Current Direction

In addition, a sand sample was collected at the station each month and a profile of the beach recorded monthly also.

2.4 Tidal Information

Tidal information for this station is not accurately known but is approximately as shown below. Datum is mean sea level.

M.H.W.S.: +1.3 metres
M.H.W.N.: +0.7 metres
M.L.W.S.: -0.7 metres
M.L.W.N.: -1.3 metres.

2.5 Description of the Beach

The beach of the Woodgate station is a clean sandy beach with a well formed dune system which is still essentially in its natural state. It exhibits the following characteristics:-

- Typical beach slopes: foreshore slope 1 in 20.
- Beach width: typically 8 to 20 metres from dune.
- D50 sand size: 0.25 mm averaged over several years.
- Dunal system: main dune 5 to 6 metres above mean sea level, typically with a steep front face as evidence of persistent erosion. The hind dune area is relatively flat at about 5 metres above mean sea level.
- Vegetation: well established Spinifex grass with Casuarina trees and other foredune vegetation.

2.6 Supervision of Station

The observer was instructed in the recording program 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 and maintenance of the reference pole for this station has been carried out by the Isis Shire Council and the Authority wishes to thank the Queensland National Parks and Wildlife Service and the Council for their assistance in all matters associated with the COPE Project.

3.0 DATA

3.1 General

COPE data for this station for the four year period January 1976 to December 1979 are presented on the attached figures. The data have 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. Wind direction is estimated to the nearest compass sector.

A summary of annual wind speed and direction percentage occurences are shown as a wind rose in Fig. 2. Where applicable, morning and afternoon readings as well as the overall average are shown.

3.3 Waves

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

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

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°	to	60°
Sector 2	-	60°	to	85°
Sector 3	-	85°	to	95°
Sector 4	-	95°	to	120°
Sector 5	-	120°	to	180°

Note: 0° is the beach alignment to the left of the observer when facing seaward.

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 (Fig. 3).

(b) the percentage occurrence of various combinations of wave heights and periods and directions (Fig. 4 and Fig. 5).

(c) surf zone width with an indication of the existence or otherwise of an offshore bar in Figs. 6 to 9.

(d) tabulation of the occurrence of various wave heights, periods, types and directions (Tables 1 to 4).

3.4 Longshore Currents

The observer measured the distance parallel to the shoreline that a dye patch 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 (Fig. 10 to Fig. 13). Mean upcoast and downcoast components and the overall annual means are also presented.

3.5 Beach Profile Parameters

Beach profile parameters were measured using an Abney level, tape measure and reference pole. These include:-

- distance from reference pole to the 1.6 m fixed contour level at the station.
- distance from reference pole to the vegetation line (usually front face of foredune).
- foreshore slope.

Changes in these parameters with time indicate how the beach moves in response to wave attack. Plots of these parameters are shown in Figs. 14 to 17 which provide a visual representation of the data.

TABLE 1.

MONTHLY AND ANNUAL

MEAN WAVE HEIGHT /MEAN WAVE PERIOD AND WAVE TYPE / WAVE DIRECTION
OCCURRENCES

YEAR 1976.

MONTH	MEAN WAVE PERIOD (Secs)	MEAN WAVE HEIGHT (Metres)	Percentage Occurrences - Wave Type /Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	-	-	-	-	-	-	-	-	-	-	-	-	-
FEBRUARY	-	-	-	-	-	-	-	-	-	-	-	-	-
MARCH	-	-	-	-	-	-	-	-	-	-	-	-	-
APRIL	-	-	-	-	-	-	-	-	-	-	-	-	-
MAY	-	-	-	-	-	-	-	-	-	-	-	-	-
JUNE	12.0	.39	75.0	14.3	-	10.7	-	-	7.1	82.1	10.7	-	-
JULY	13.0	.55	64.5	22.6	-	6.5	6.5	-	9.7	58.1	19.4	6.5	6.5
AUGUST	13.0	.45	71.0	-	-	19.4	9.7	-	22.6	61.3	6.5	-	9.7
SEPTEMBER	10.6	.43	92.9	-	-	3.6	3.6	-	3.6	78.6	14.3	-	3.6
OCTOBER	6.9	.49	56.8	8.1	-	32.4	2.7	2.7	27.0	62.2	5.4	-	2.7
NOVEMBER	7.0	.44	53.3	-	-	46.7	-	-	30.0	60.0	10.0	-	-
DECEMBER	7.2	.49	38.7	9.7	-	51.6	-	-	19.4	67.7	12.9	-	-
WHOLE YEAR	9.3	.47	63.9	7.9	-	25.0	3.2	.5	17.6	66.7	11.1	.9	3.2

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

YEAR 1977.

MONTH	MEAN WAVE PERIOD (Secs)	MEAN WAVE HEIGHT (Metres)	Percentage Occurrences - Wave Type /Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	7.9	.48	51.6	6.5	-	41.9	-	-	9.7	54.8	35.5	-	-
FEBRUARY	7.9	.52	35.7	-	-	64.3	-	-	10.7	57.1	32.1	-	-
MARCH	8.1	.47	45.2	-	3.2	51.6	-	-	6.5	77.4	16.1	-	-
APRIL	8.1	.37	56.7	-	-	43.3	-	-	10.0	80.0	10.0	-	-
MAY	8.3	.37	67.7	6.5	-	25.8	-	-	6.5	87.1	6.5	-	-
JUNE	9.3	.40	46.7	-	-	53.3	-	-	16.7	73.3	10.0	-	-
JULY	9.7	.48	33.3	3.3	10.0	53.3	-	-	6.7	80.0	13.3	-	-
AUGUST	7.8	.51	53.3	-	3.3	43.3	-	-	3.3	90.0	6.7	-	-
SEPTEMBER	6.8	.40	93.1	-	-	6.9	-	-	17.2	72.4	6.9	3.4	-
OCTOBER	7.1	.56	78.6	-	-	21.4	-	-	10.7	64.3	25.0	-	-
NOVEMBER	6.4	.60	60.9	-	-	39.1	-	-	34.8	52.2	13.0	-	-
DECEMBER	6.2	.59	34.5	3.4	-	62.1	-	-	20.7	58.6	20.7	-	-
WHOLE YEAR	7.8	.48	54.6	1.7	1.4	42.3	-	-	12.3	71.1	16.3	.3	-

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

YEAR 1978.

MONTH	MEAN WAVE PERIOD (Secs)	MEAN WAVE HEIGHT (Metres)	Percentage Occurrences - Wave Type /Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	5.6	.46	50.0	3.3	-	46.7	-	-	3.3	90.0	6.7	-	-
FEBRUARY	6.3	.57	37.0	-	3.7	59.3	-	-	11.1	55.6	33.3	-	-
MARCH	7.8	.62	20.7	-	-	79.3	-	-	17.2	75.9	6.9	-	-
APRIL	8.4	.41	35.7	14.3	7.1	42.9	-	-	14.3	71.4	7.1	7.1	-
MAY	8.4	.52	10.0	10.0	-	80.0	-	-	3.3	93.3	3.3	-	-
JUNE	9.9	.33	24.1	-	3.4	72.4	-	-	13.8	82.8	3.4	-	-
JULY	9.3	.55	51.7	6.9	-	41.4	-	-	17.2	69.0	13.8	-	-
AUGUST	9.8	.47	35.7	3.6	-	60.7	-	-	3.6	71.4	21.4	3.6	-
SEPTEMBER	7.8	.43	72.4	-	-	27.6	-	-	13.8	79.3	6.9	-	-
OCTOBER	7.1	.27	100.0	-	-	-	-	-	16.7	66.7	16.7	-	-
NOVEMBER	7.1	.60	48.1	-	-	51.9	-	-	18.5	70.4	11.1	-	-
DECEMBER	7.0	.54	52.4	-	-	47.6	-	-	23.8	71.4	4.8	-	-
WHOLE YEAR	8.0	.49	40.6	3.5	1.3	54.6	-	-	12.5	75.7	10.9	1.0	-

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

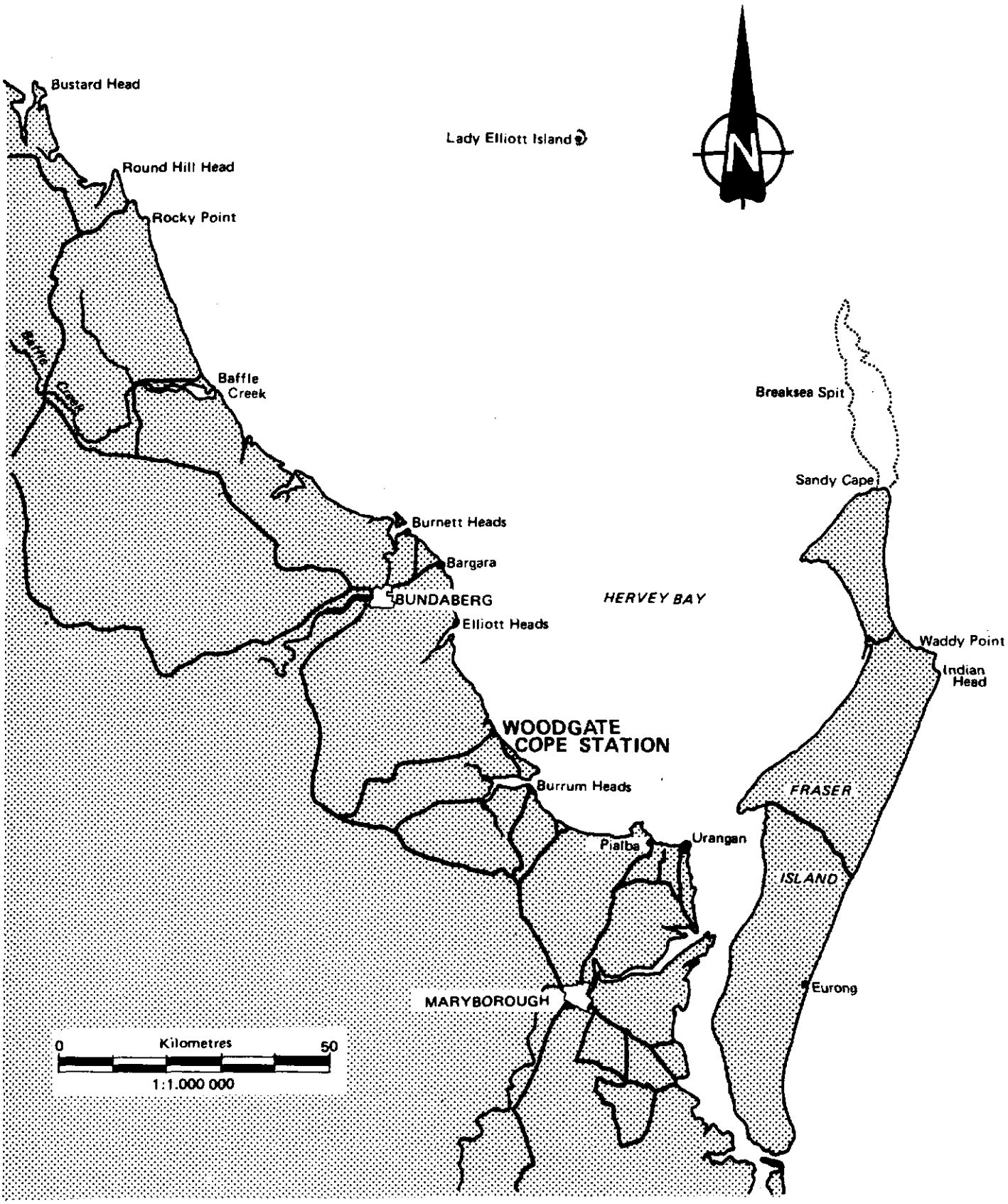
YEAR 1979.

MONTH	MEAN WAVE PERIOD (Secs)	MEAN WAVE HEIGHT (Metres)	Percentage Occurrences - Wave Type /Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	6.8	.56	38.7	-	-	61.3	-	-	6.5	51.6	41.9	-	-
FEBRUARY	8.3	.73	14.3	3.6	-	82.1	-	-	7.1	71.4	21.4	-	-
MARCH	8.0	.40	76.7	3.3	-	20.0	-	-	3.3	86.7	10.0	-	-
APRIL	8.6	.58	24.1	-	-	75.9	-	-	-	93.1	6.9	-	-
MAY	9.7	.32	64.3	-	-	35.7	-	-	-	71.4	28.6	-	-
JUNE	8.4	.46	42.3	3.8	-	53.8	-	-	-	76.9	23.1	-	-
JULY	-	-	-	-	-	-	-	-	-	-	-	-	-
AUGUST	-	-	-	-	-	-	-	-	-	-	-	-	-
SEPTEMBER	-	-	-	-	-	-	-	-	-	-	-	-	-
OCTOBER	-	-	-	-	-	-	-	-	-	-	-	-	-
NOVEMBER	-	-	-	-	-	-	-	-	-	-	-	-	-
DECEMBER	-	-	-	-	-	-	-	-	-	-	-	-	-
WHOLE YEAR	8.3	.51	43.6	1.7	-	54.7	-	-	2.9	75.0	22.1	-	-

SP – Spilling

PL – Plunging

SP/PL – Combined Spilling and Plunging



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LOCALITY PLAN

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Figure 1
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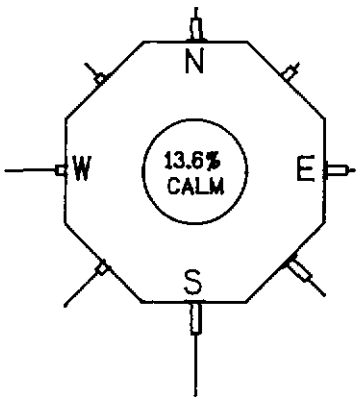
WIND GRAPH JUNE 1976 TO JUNE 1979

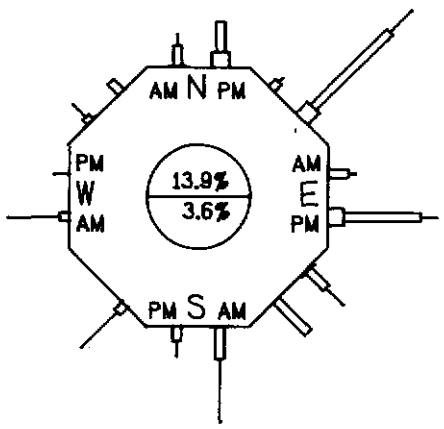
ISIS SHIRE.....WOODGATE.....1101

ALL OBSERVATIONS



TOTAL NO OF OBSERVATIONS 1046

MORNING / AFTERNOON OBSERVATIONS

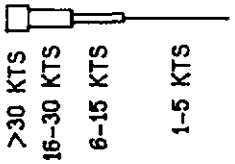


NOTES

FIGURES IN CENTRAL CIRCLE REPRESENT PERCENTAGE OF CALM OBSERVATIONS.

UPPER FIGURE FOR AM
LOWER FIGURE FOR PM

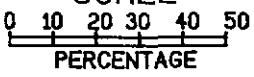
LEGEND



NO OF MORNING OBSERVATIONS 1018
NO OF AFTERNOON OBSERVATIONS 28

MEAN TIME :- MORNING OBS. 737. HRS
MEAN TIME :- AFTERNOON OBS. 1535. HRS

SCALE



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WIND DATA

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WAVE HEIGHT % EXCEEDANCE

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Figure 3
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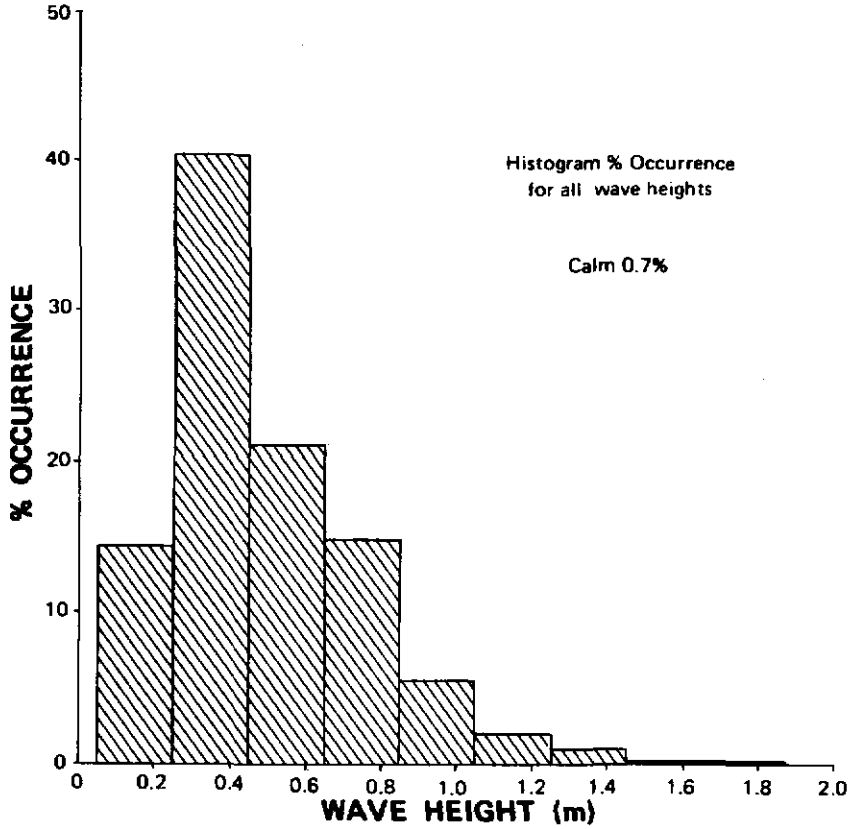

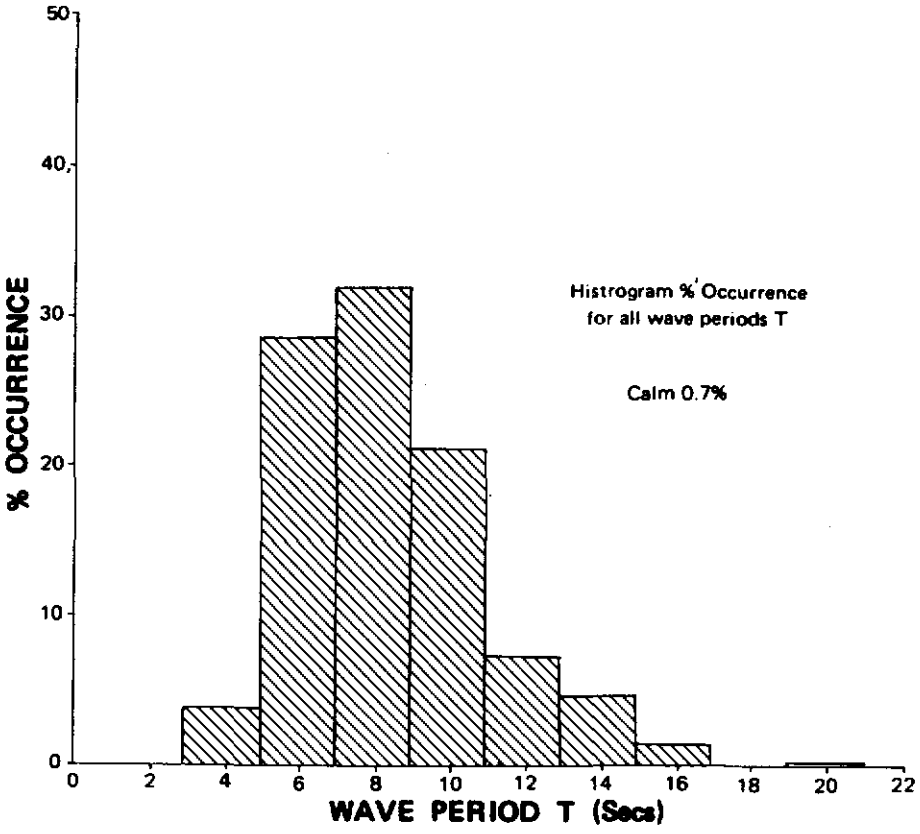

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WAVE HEIGHT AND PERIOD % OCCURRENCE

Figure 4
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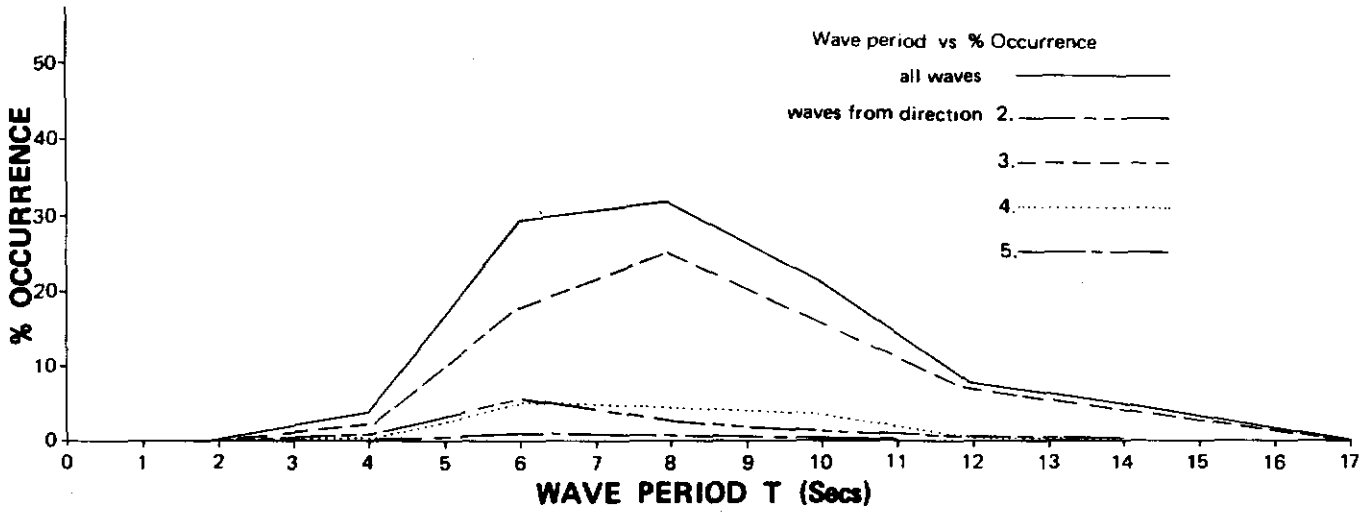

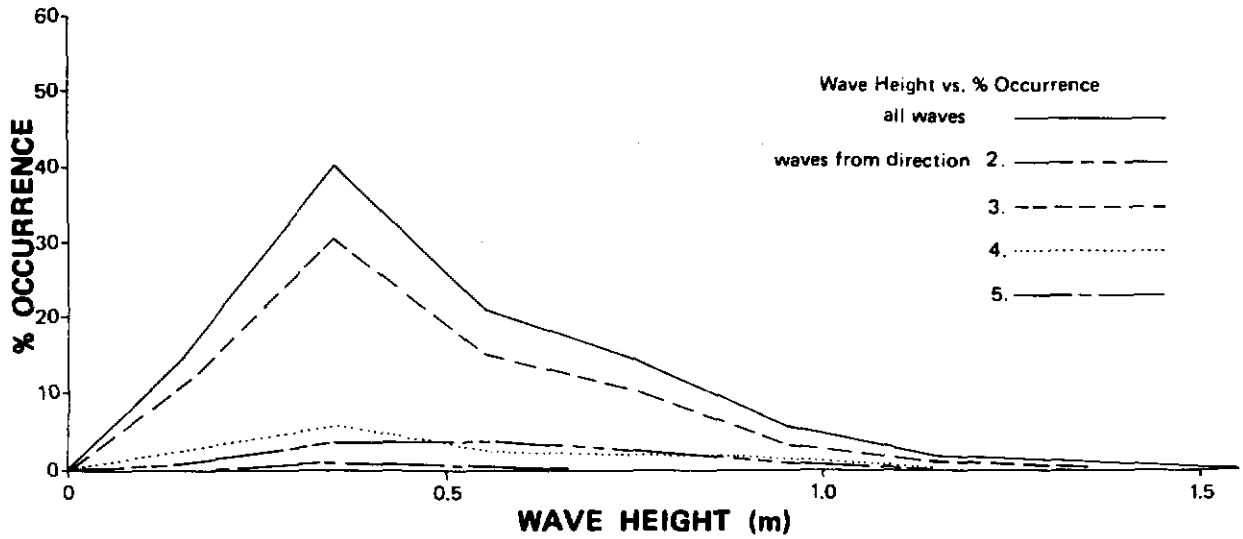

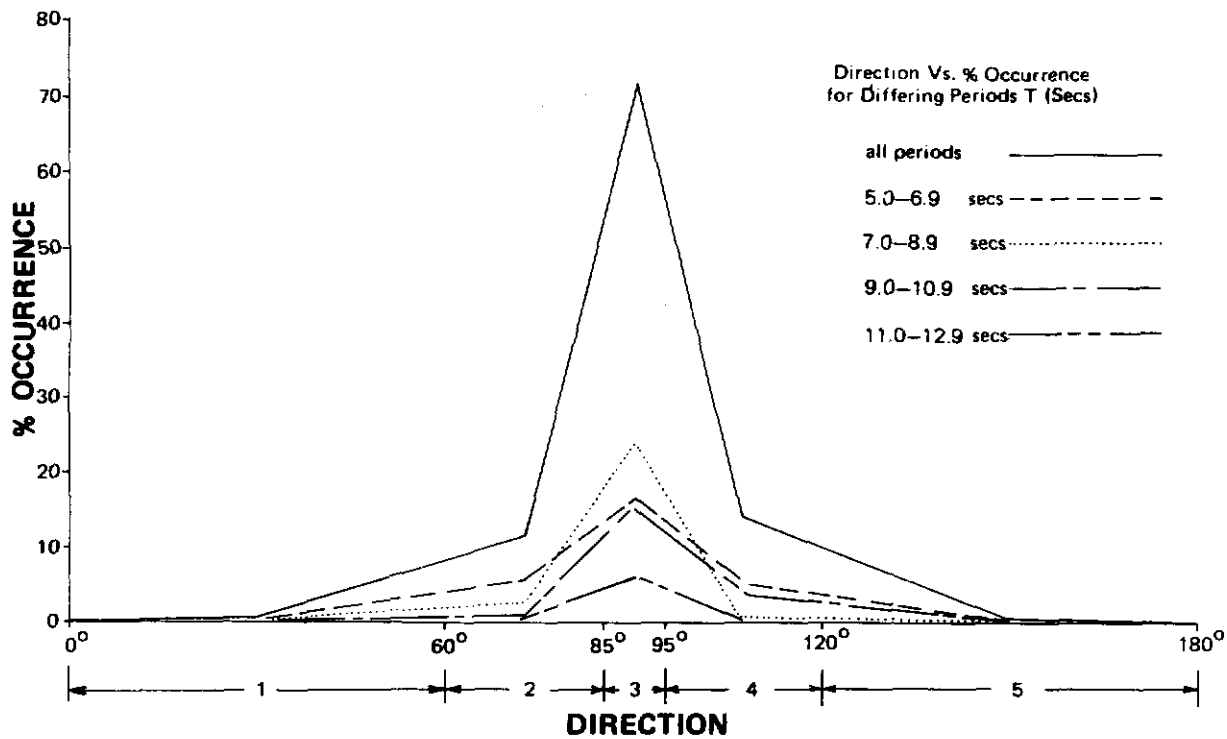

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WAVE DIRECTION ANALYSIS

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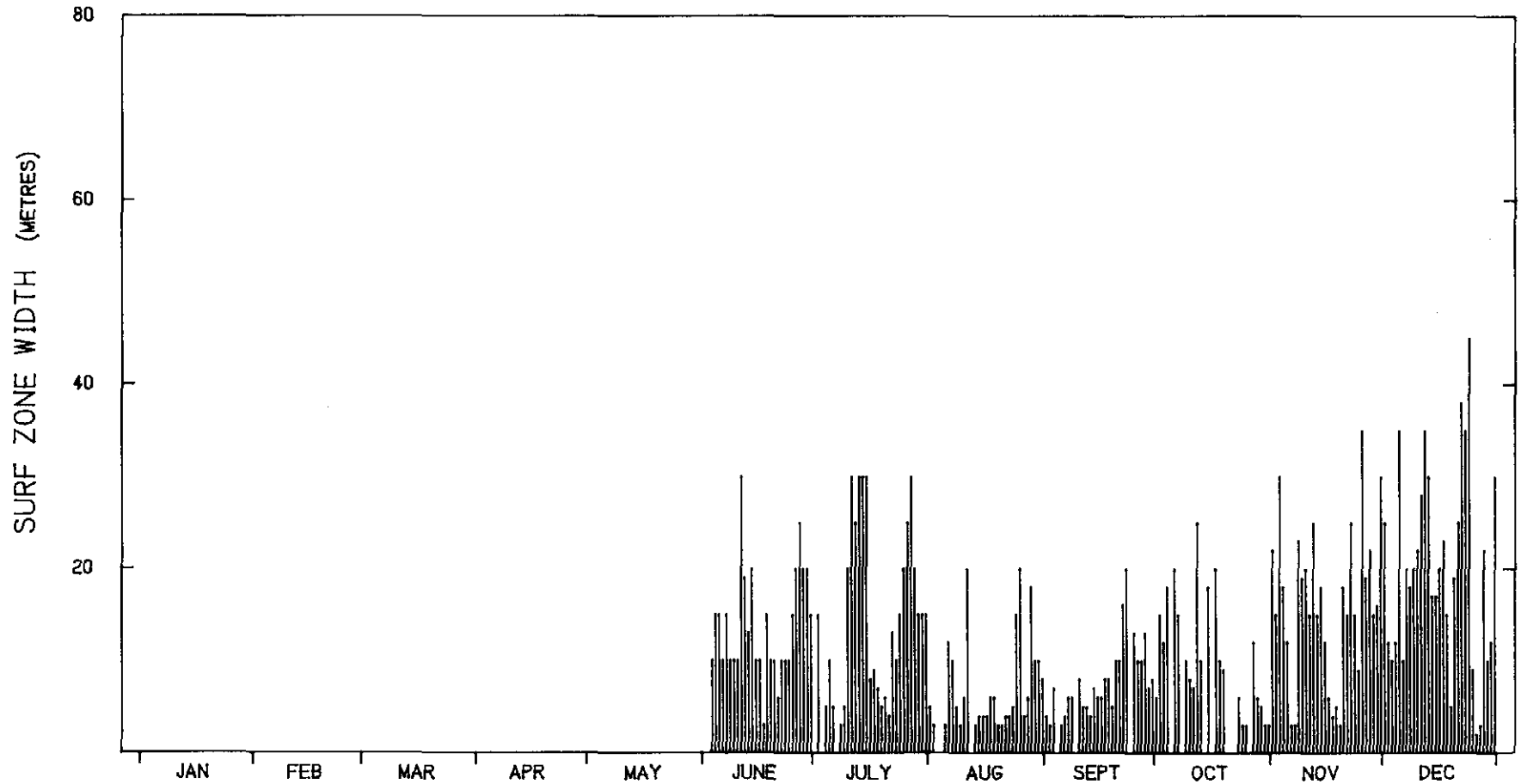

SURF ZONE WIDTH SUMMARY - 1976

MORNING OBSERVATIONS

NO. OF VALUES 202

MEAN SURF ZONE WIDTH 12.8 M

SURF ZONE WIDTH—1976

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Figure 6
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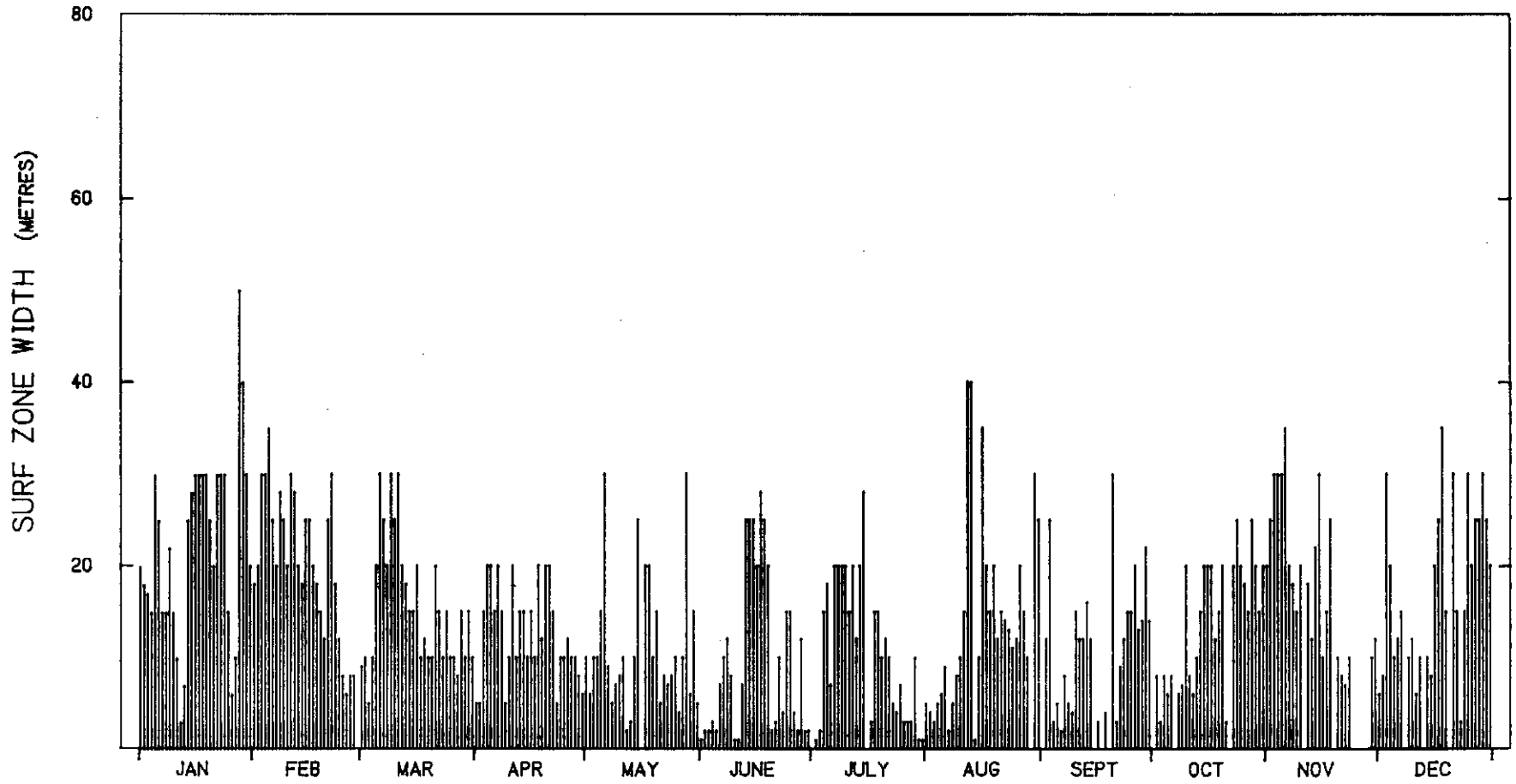

SURF ZONE WIDTH SUMMARY - 1977

MORNING OBSERVATIONS

NO. OF VALUES 345

MEAN SURF ZONE WIDTH 14.9 M

SURF ZONE WIDTH - 1977

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SURF ZONE WIDTH SUMMARY - 1978

MORNING OBSERVATIONS

NO. OF VALUES 303

MEAN SURF ZONE WIDTH 14.4 M

SURF ZONE WIDTH — 1978

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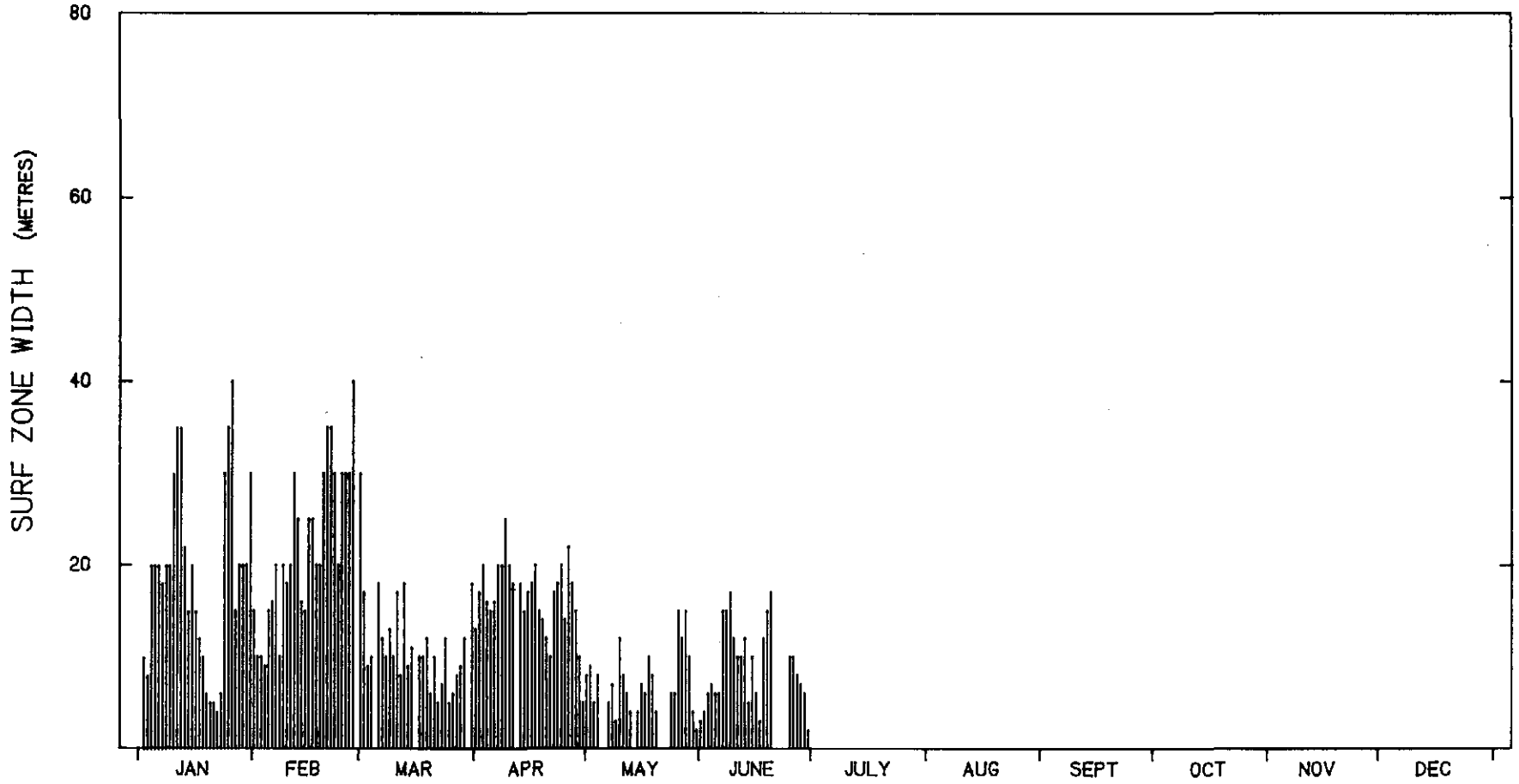

SURF ZONE WIDTH SUMMARY - 1979

MORNING OBSERVATIONS

NO. OF VALUES 166

MEAN SURF ZONE WIDTH 14.5 M

SURF ZONE WIDTH - 1979

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LITTORAL CURRENTS – 1976

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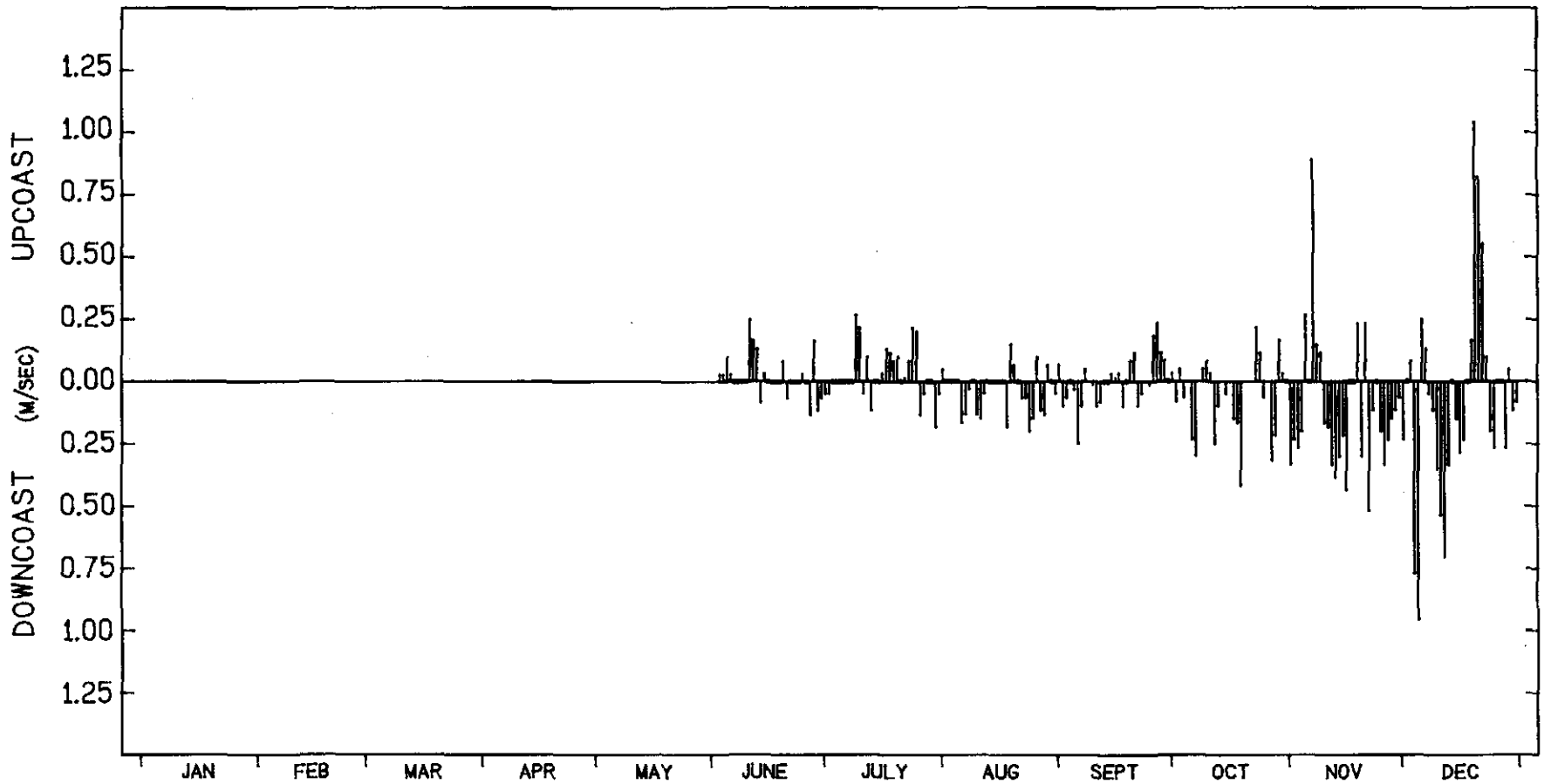
Figure 10
C 04.1

COPE – COASTAL OBSERVATION PROGRAMME ENGINEERING

ISIS SHIRE ..... WOODGATE..... 1101



LITTORAL CURRENT SUMMARY – 1976

NO OF VALUES 202 MEAN VEL -.035 M/SEC DOWN MEAN UPCOAST VEL .158 M/SEC
MORNING OBSERVATIONS

Beach Protection Authority

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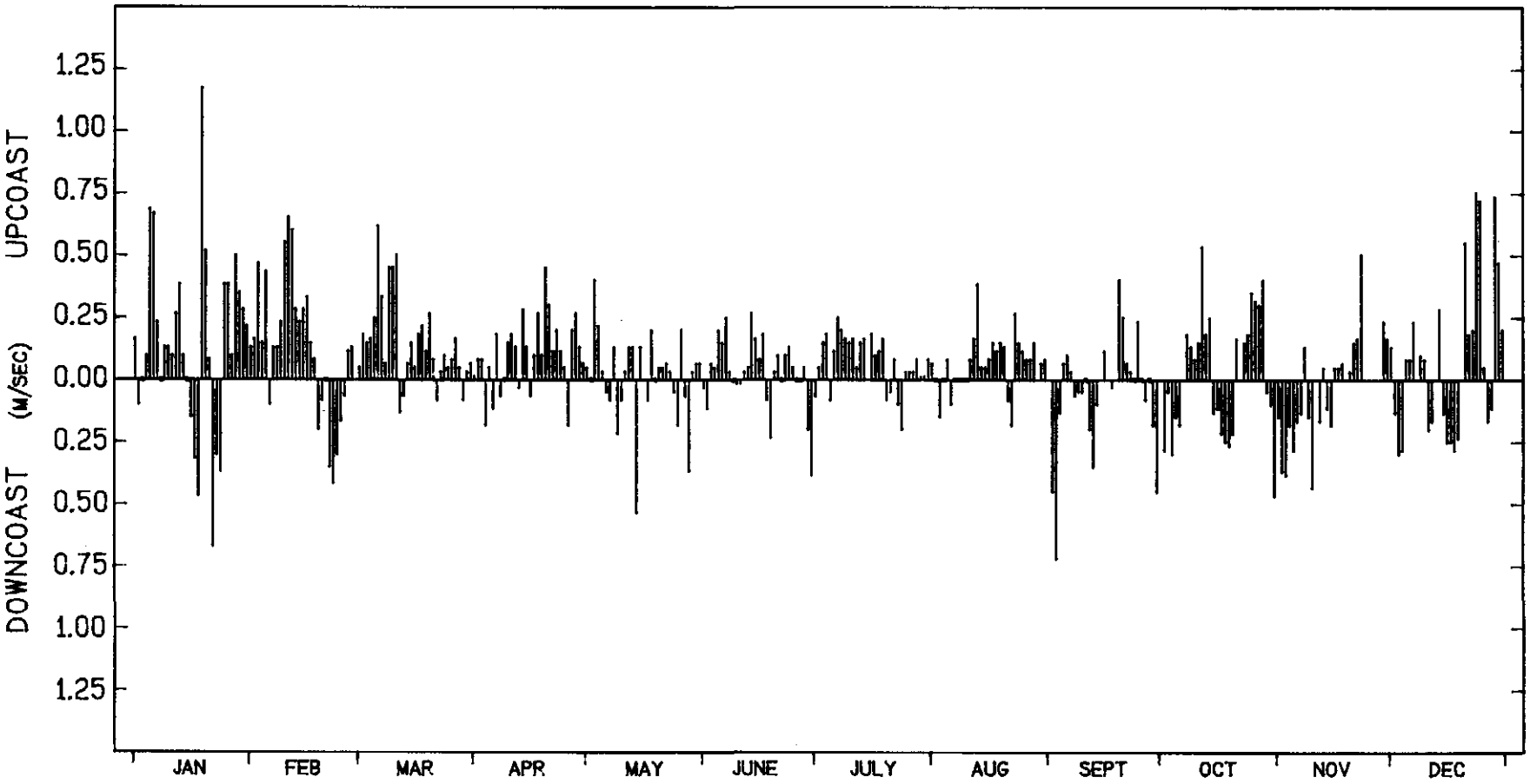
ISIS SHIRE .....

WOODGATE.....

1101



LITTORAL CURRENT SUMMARY - 1977

NO OF VALUES 345 MEAN VEL .062 M/SEC UP MEAN UPCOAST VEL .187 M/SEC

MORNING OBSERVATIONS

LITTORAL CURRENTS - 1977

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Figure 11

C 04.1

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LITTORAL CURRENTS—1978

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Figure 12
C 04.1

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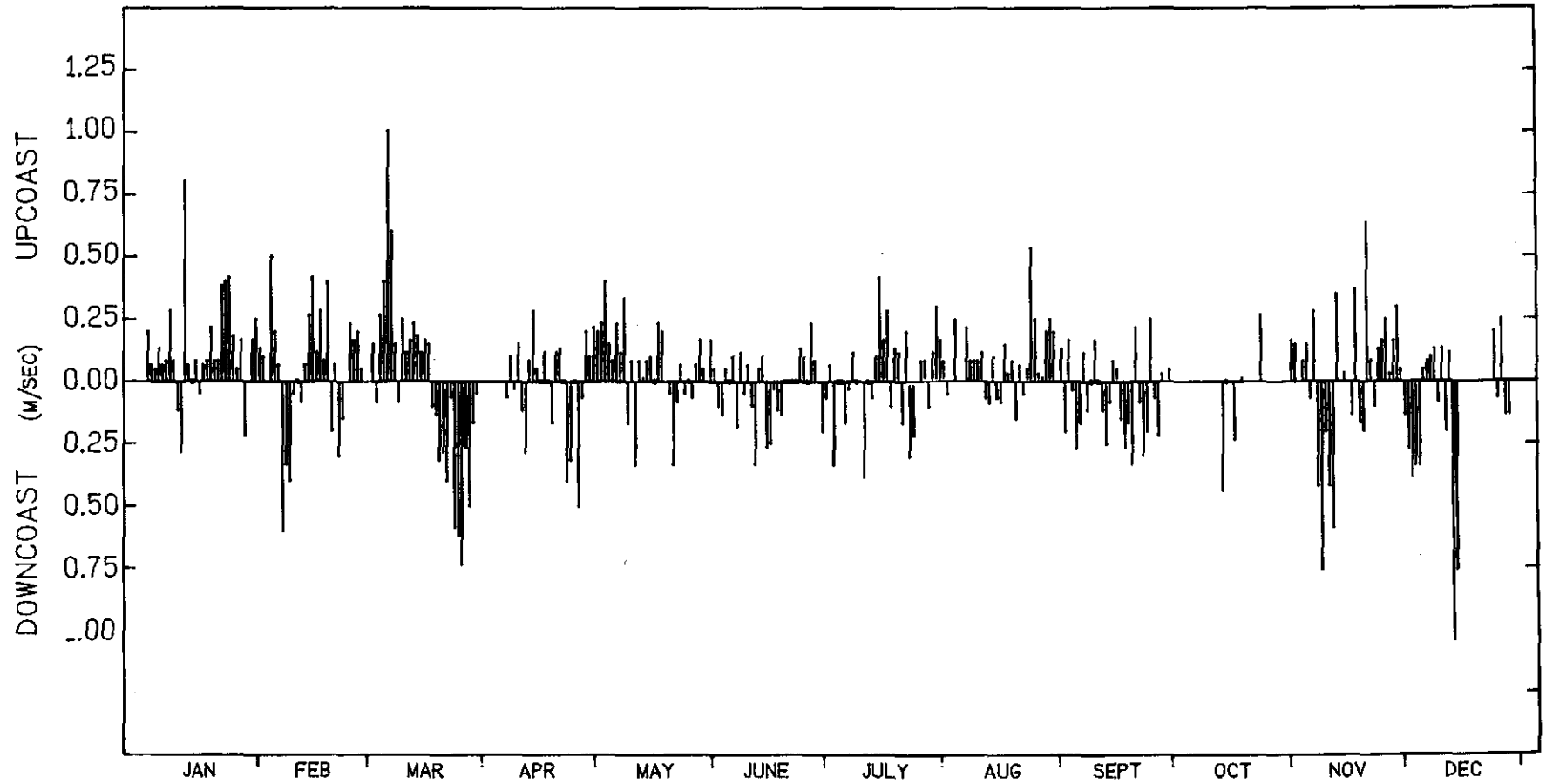
PROGRAMME ENGINEERING

ISIS SHIRE .....

WOODGATE.....

1101



LITTORAL CURRENT SUMMARY - 1978

NO OF VALUES 303 MEAN VEL .011 M/SEC UP MEAN UPCOAST VEL .171 M/SEC

MORNING OBSERVATIONS

Beach Protection Authority

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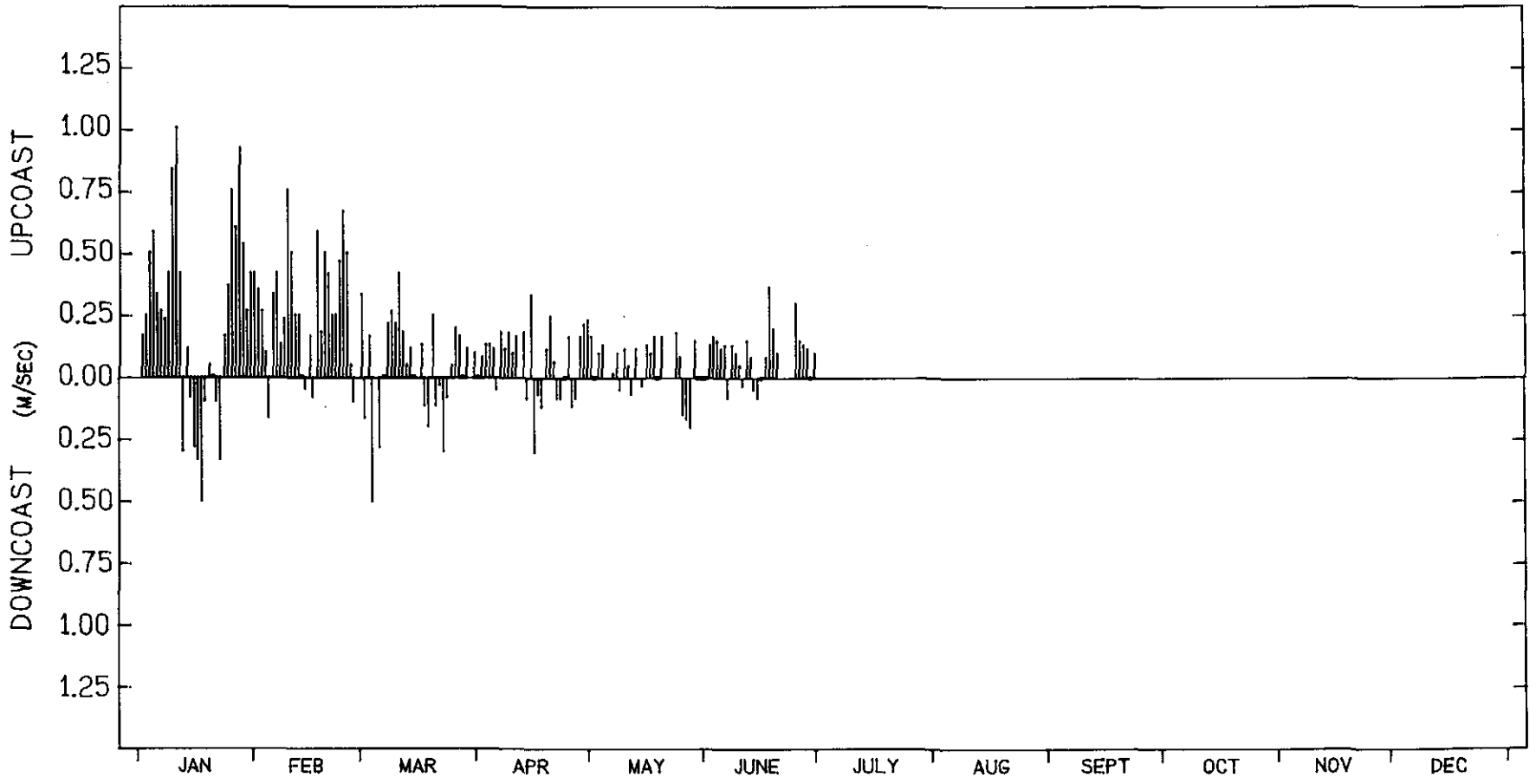
ISIS SHIRE ..... WOODGATE..... 1101



LITTORAL CURRENT SUMMARY - 1979

NO OF VALUES 166 MEAN VEL .130 M/SEC UP MEAN UPCOAST VEL .247 M/SEC

MORNING OBSERVATIONS

LITTORAL CURRENTS—1979

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Figure 13
C 04.1

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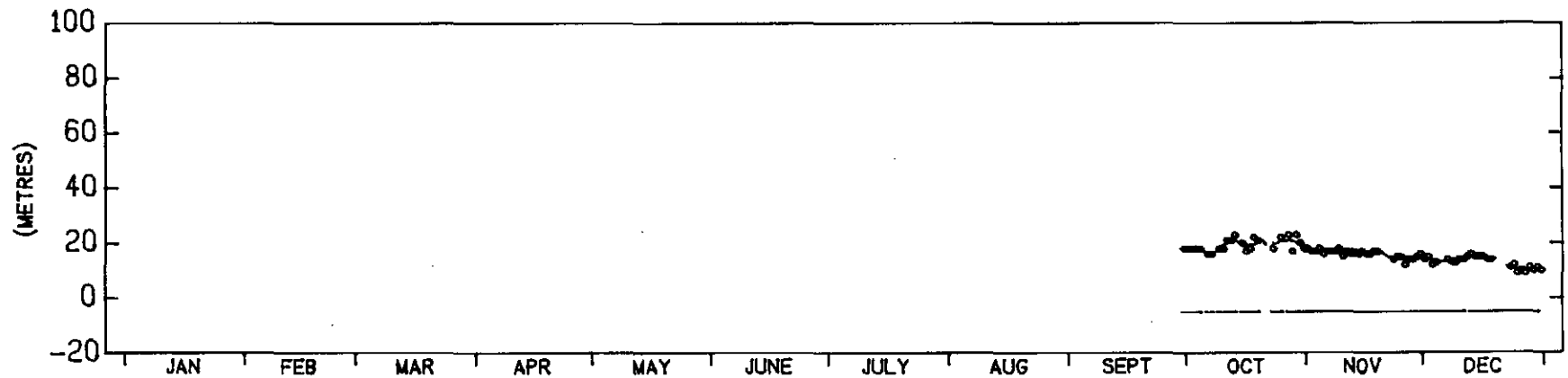
ISIS SHIRE..... WOODGATE..... 1101 YEAR : 1976

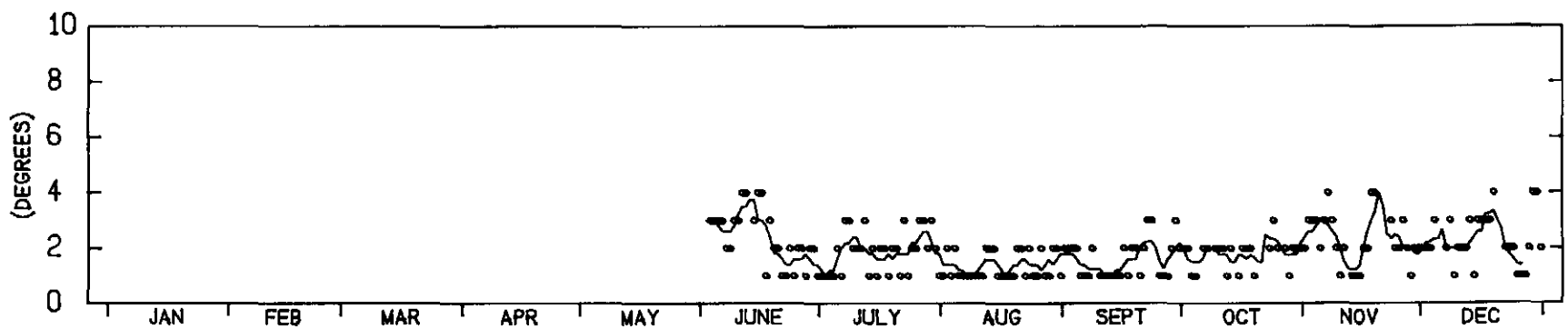


DISTANCE TO FIXED CONTOUR DISTANCE TO VEGETATION LINE

∞∞∞ INDICATES DISTANCE TO FIXED CONTOUR : 76 OBSERVATIONS

— INDICATES VEGETATION LINE : 84 OBSERVATIONS

FIXED CONTOUR LEVEL IS 1.6 M ABOVE MSL



FORESHORE SLOPE

FIVE DAY MOVING AVERAGE

NO. OF OBSERVATIONS 194

BEACH PROFILE PARAMETERS—1976

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Figure 14
C 04.1

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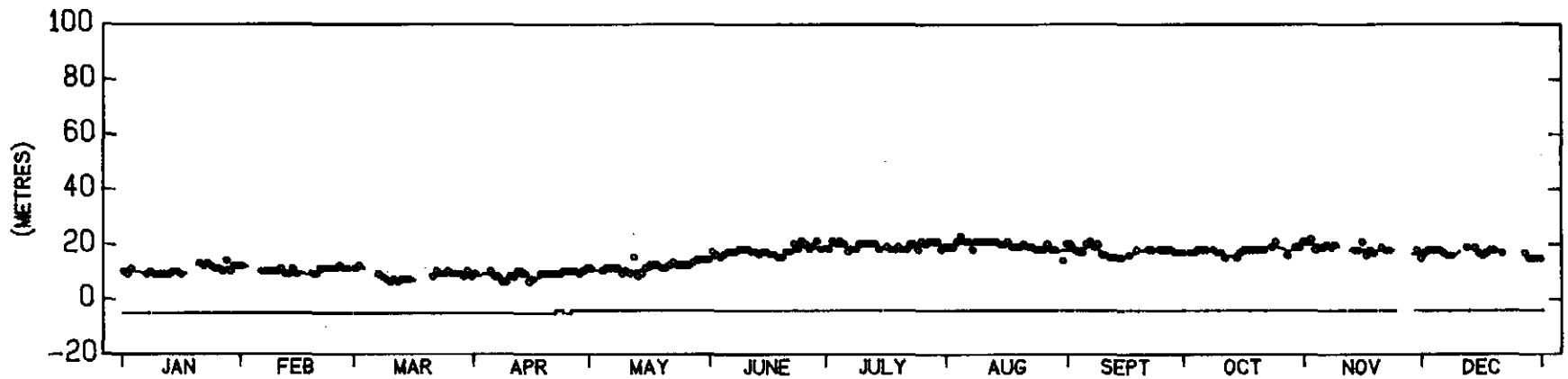
ISIS SHIRE..... WOODGATE..... 1101 YEAR : 1977

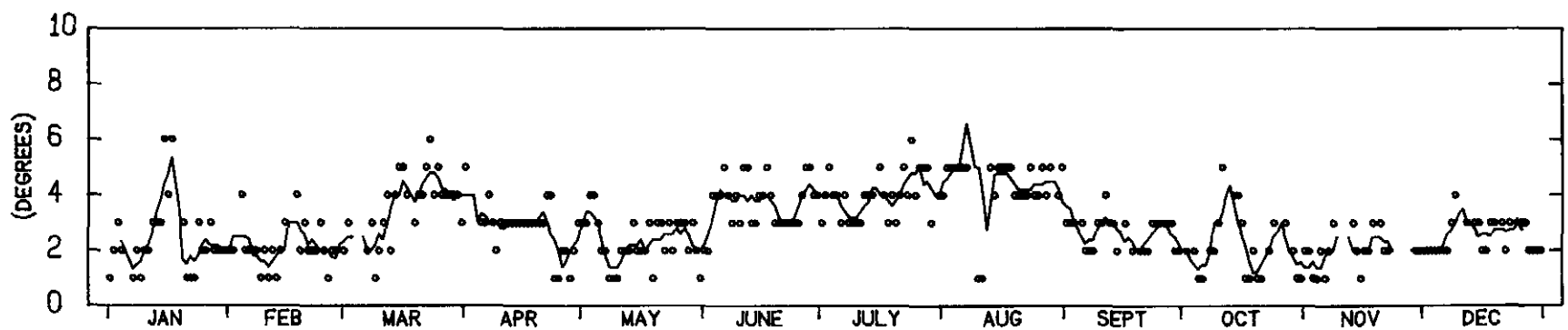


DISTANCE TO FIXED CONTOUR DISTANCE TO VEGETATION LINE

∞∞∞ INDICATES DISTANCE TO FIXED CONTOUR : 299 OBSERVATIONS

— INDICATES VEGETATION LINE : 344 OBSERVATIONS

FIXED CONTOUR LEVEL IS 1.6 M ABOVE MSL



FORESHORE SLOPE

FIVE DAY MOVING AVERAGE

NO. OF OBSERVATIONS 317

BEACH PROFILE PARAMETERS—1977

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Figure 15
C 04.1

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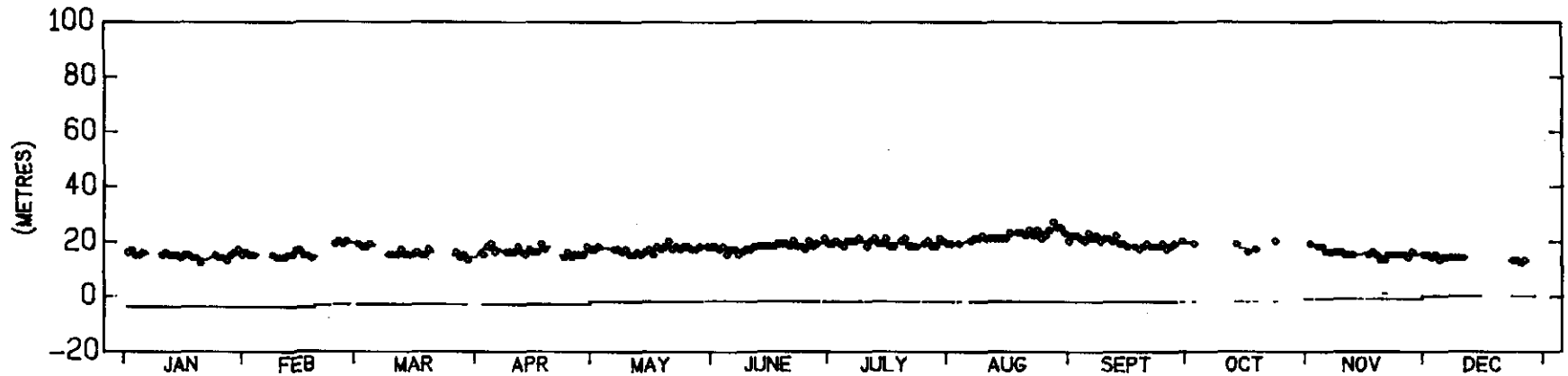
ISIS SHIRE..... WOODGATE..... 1101 YEAR : 1978

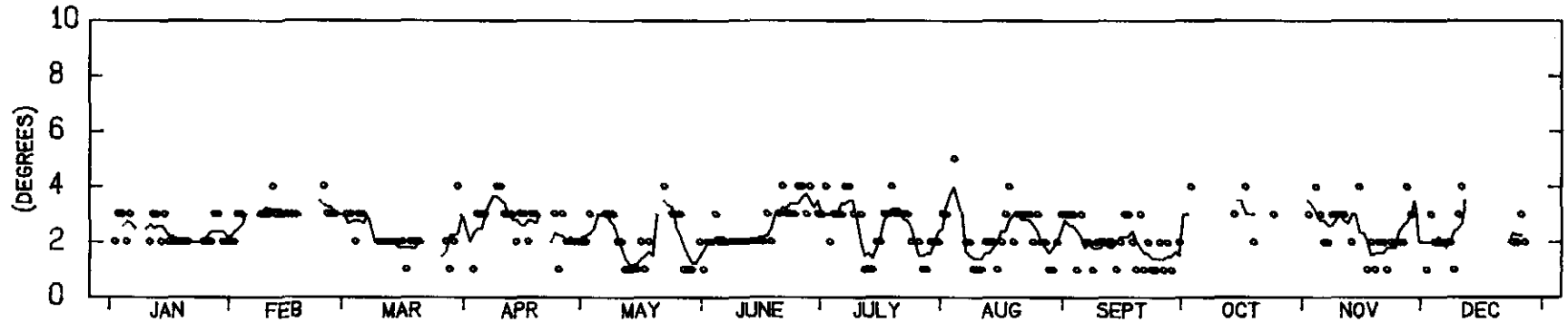


DISTANCE TO FIXED CONTOUR DISTANCE TO VEGETATION LINE

∞∞∞ INDICATES DISTANCE TO FIXED CONTOUR : 265 OBSERVATIONS

— INDICATES VEGETATION LINE : 312 OBSERVATIONS

FIXED CONTOUR LEVEL IS 1.6 M ABOVE MSL



FORESHORE SLOPE

FIVE DAY MOVING AVERAGE

NO. OF OBSERVATIONS 262

BEACH PROFILE PARAMETERS—1978

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Figure 16
C 04.1

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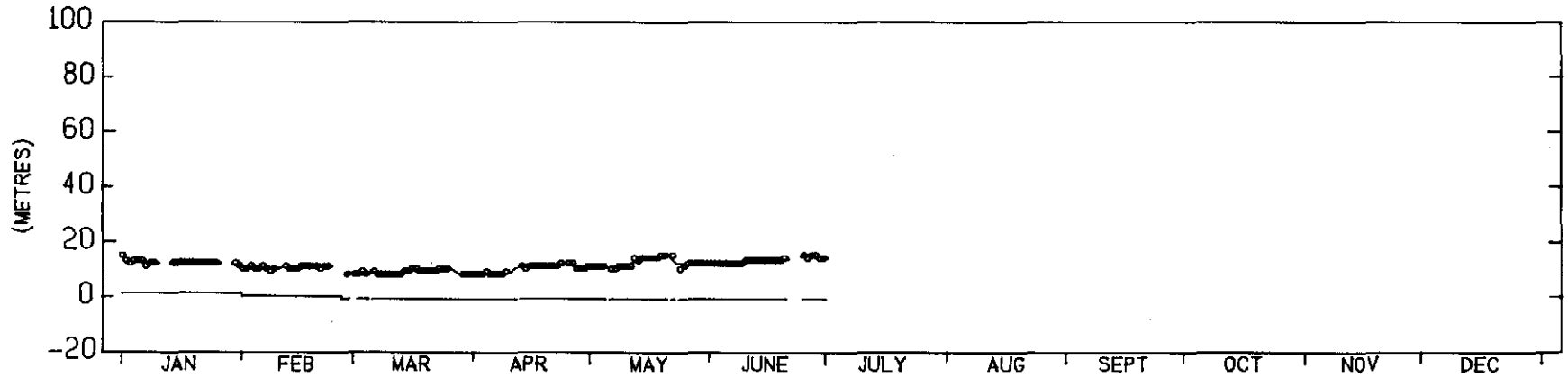
ISIS SHIRE..... WOODGATE..... 1101 YEAR : 1979

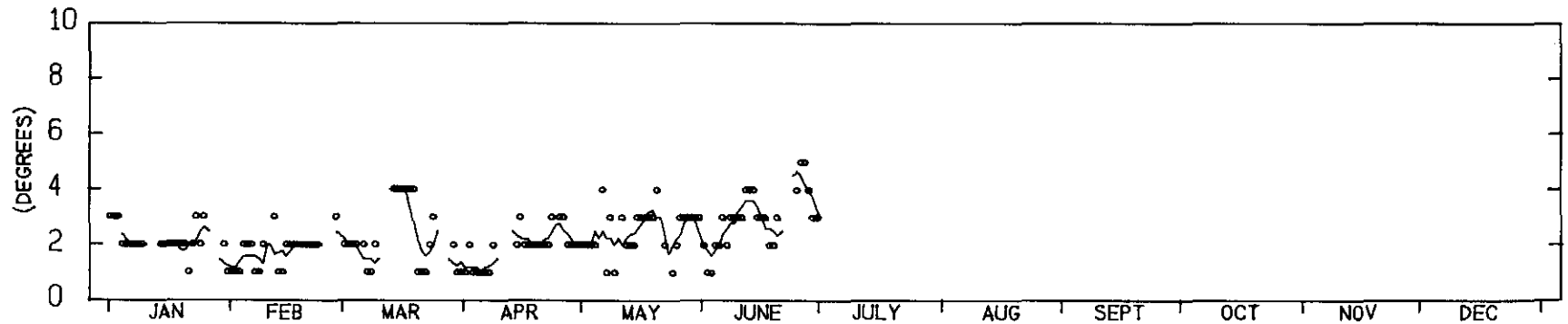


DISTANCE TO FIXED CONTOUR DISTANCE TO VEGETATION LINE

∞∞∞ INDICATES DISTANCE TO FIXED CONTOUR : 152 OBSERVATIONS

— INDICATES VEGETATION LINE : 171 OBSERVATIONS

FIXED CONTOUR LEVEL IS 1.6 M ABOVE MSL



FORESHORE SLOPE

FIVE DAY MOVING AVERAGE

NO. OF OBSERVATIONS 144

BEACH PROFILE PARAMETERS—1979

COPE
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Figure 17
C 04.1