

COASTAL OBSERVATION PROGRAMME - ENGINEERING (COPE)

SHINGLY BEACH – PROSERPINE SHIRE

For the Years 1976 to 1979

Beach Protection Authority

November 1984

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DOCUMENTATION PAGE

REPORT NO.: C14.1

TITLE: REPORT - COASTAL OBSERVATION PROGRAMME - ENGINEERING (COPE),
SHINGLY BEACH, PROSERPINE SHIRE

DATE: November 1984

TYPE OF REPORT: Technical Memorandum

ISSUING ORGANISATION: Beach Protection Authority
G.P.O. Box 2195
BRISBANE QLD 4001

DISTRIBUTION: Public Distribution

ABSTRACT:

This report provides a summary of primary analyses of COPE data on wind, wave and beach processes observed at Shingly Beach in Proserpine Shire on the Central Queensland Coast. The data were recorded by volunteer observers Dr. Morrie Rapson, Mr David McRae, Mr Andrew Peach and Mr Ted Priestler during the period August 1976 to December 1979. The recordings were made daily during the three year period and the information published is considered representative and reliable.

OTHERS AVAILABLE IN THIS SERIES:

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Coastal Observation Programme - Engineering (COPE), Noah Creek - Douglas Shire, (Report C 08.1).

Coastal Observation Programme - Engineering (COPE), Cardwell - Cardwell Shire, (Report C 09.1).

Coastal Observation Programme - Engineering (COPE), Surfers Paradise - City of Gold Coast (Report C 10.1).

Coastal Observation Programme - Engineering (COPE), Mission Beach - Johnstone Shire, (Report C 11.1).

Coastal Observation Programme - Engineering (COPE), Urangan - Town of Hervey Bay, (Report C 12.1).

Coastal Observation Programme - Engineering (COPE), Noosa Beach - Noosa Shire, (Report C13.1).

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 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

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 volunteers, 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 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 three year period 1976 to 1979 in a useful statistical form. No attempt has been made to interpret the observed data.

If this three 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

Shingly Beach is located on the central Queensland coast within the Proserpine Shire, is situated approximately 20 kilometres north east of the town of Proserpine and is a small well protected beach, lying in the lee of the Whitsunday Island group. The location of the Shingly Beach COPE station is shown in Figure 1.

2.2 Observers

This station has been manned by Dr Morrie Rapson, Mr David McRae, Mr Andrew Peach and Mr Ted Priestler during the period August 1976 to December 1979. All observers were local residents who lived near the COPE Station.

2.3 Observed Parameters

The observers at this station usually recorded at 5.30 p.m. daily during the three year period August 1976 to December 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
- Distance to Fixed Contour
- Distance to Vegetation
- Foreshore Slope
- Longshore Current Speed
- Longshore Current Direction

In addition, a sand sample was collected every month and from June 1977 a beach profile was usually recorded monthly also.

2.4 Tidal Information

Tidal information for this station as presented below is essentially the same as that for Cannon Vale. Datum is Low Water Datum.

M.H.W.S. : 3.0 metres
 M.H.W.N. : 2.4 metres
 M.S.L. : 1.9 metres
 M.L.W.N. : 1.4 metres
 M.L.W.S. : 0.7 metres.

2.5 Description of the Beach

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

- Typical beach slopes: foreshore slope is in the range 1 in 7 to 1 in 11 ($5^{\circ} - 8^{\circ}$)
- Beach width: typically 12 to 15 metres from vegetation line.
- D50 sand size: 0.36 mm averaged over three years.
- Adjoining Landform: Low frontal beach ridge.
- Vegetation: Vegetation on the beach ridge consists of mixed grassland which is mowed. Mangroves, beach grass (*Thyarea involuta*), love grass (*Eragrostis spp.*) and green couch (*Cynodon dactylon*) grow on the upper part of the beach and along the seaward toe of the frontal ridge.

2.6 Supervision of Station

The observers were 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 Proserpine Shire Council and the Authority wishes to thank the Council for its assistance in all matters associated with the COPE project.

3.0 DATA

3.1 General

COPE data for this station for the three year period August 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 occurrences are shown as a wind rose in Figure 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 usually 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 (Figure 3).

- (b) the percentage occurrence of various combinations of wave heights and periods and directions (Figure 4 and Figure 5).
- (c) surf zone width with an indication of the existence or otherwise of an offshore bar in Figures 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 (Figure 10 to Figure 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 the reference pole to the 0.9 metre relative to AHD, fixed contour level from November 1976 to December 1979.
- Distance from the reference pole to the vegetation line.
- The foreshore slope.

Changes in these parameters with time indicate how the beach moves in response to varying wave attack. Plots of these parameters are shown in Figures 14 to 17.

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 Figures 18 to 20.

TABLE 1

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

SHINGLY BEACH

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														
JULY														
AUGUST	3.5	0.01	7.7	-	-	-	92.3	-	-	7.7	-	-	92.3	
SEPTEMBER	4.4	0.07	25.0	-	4.2	-	70.8	-	4.2	16.7	8.3	-	70.8	
OCTOBER	4.3	0.20	66.7	7.4	7.4	-	18.5	-	-	77.8	3.7	-	18.5	
NOVEMBER	3.0	0.26	46.7	3.3	-	46.7	3.3	-	6.7	90.0	-	-	3.3	
DECEMBER	4.0	0.22	42.3	7.7	-	42.3	7.7	-	-	92.3	-	-	7.7	
WHOLE YEAR	3.8	0.16	38.3	3.8	2.3	19.3	36.3	0.0	2.3	59.1	2.3	0.0	36.3	

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

SHINGLY BEACH

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	4.9	0.09	32.3	6.5	-	25.8	35.5	-	-	64.5	-	-	35.5
FEBRUARY	6.0	0.20	20.8	16.7	8.3	20.8	33.3	-	-	66.7	-	-	33.3
MARCH	5.5	0.16	19.2	3.8	-	26.9	50.0	-	-	50.0	-	-	50.0
APRIL	6.8	0.09	-	20.0	-	20.0	60.0	-	-	40.0	-	-	60.0
MAY	4.9	0.10	7.4	11.1	-	18.5	63.0	-	-	37.0	-	-	63.0
JUNE	6.8	0.02	-	-	-	15.0	85.0	-	-	15.0	-	-	85.0
JULY	8.8	0.01	-	10.3	-	3.4	86.2	-	-	13.8	-	-	86.2
AUGUST	5.0	0.00	-	3.2	-	-	96.8	-	-	3.2	-	-	96.8
SEPTEMBER	5.6	0.05	-	14.3	-	7.1	78.6	-	-	21.4	-	-	78.6
OCTOBER	4.1	0.05	4.0	12.0	-	-	84.0	-	-	16.0	-	-	84.0
NOVEMBER	4.2	0.16	12.5	16.7	-	20.8	50.0	-	4.2	45.8	-	-	50.0
DECEMBER	3.9	0.08	3.2	-	-	16.2	80.6	-	9.7	9.7	-	-	80.6
WHOLE YEAR	5.4	0.08	8.7	9.3	0.6	14.7	66.7	0.0	1.3	32.0	0.0	0.0	66.7

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**

SHINGLY BEACH

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	4.5	0.06	5.3	-	-	10.5	84.2	-	-	15.8	-	-	84.2
FEBRUARY	4.8	0.07	18.2	-	4.5	-	77.3	-	13.7	9.0	-	-	77.3
MARCH	4.3	0.04	-	5.3	-	5.3	89.5	-	5.2	5.3	-	-	89.5
APRIL	8.3	0.02	-	4.2	-	4.2	91.7	-	-	4.1	4.2	-	91.7
MAY	6.5	0.06	8.7	-	-	8.7	82.6	-	4.3	13.1	-	-	82.6
JUNE	0.0	0.00	-	-	-	-	100.0	-	-	-	-	-	100.0
JULY	3.2	0.02	5.3	-	-	-	94.7	-	5.3	-	-	-	94.7
AUGUST	5.4	0.04	10.5	-	-	-	89.5	-	-	5.2	5.3	-	89.5
SEPTEMBER	3.4	0.04	-	6.3	-	6.3	87.5	-	6.3	-	6.2	-	87.5
OCTOBER	4.5	0.02	-	-	-	6.3	93.8	-	6.2	-	-	-	93.8
NOVEMBER	3.0	0.10	-	-	-	28.0	72.0	-	12.0	16.0	-	-	72.0
DECEMBER	3.4	0.16	14.3	7.1	-	28.6	50.0	-	28.6	21.4	-	-	50.0
WHOLE YEAR	4.4	0.05	5.1	1.7	0.4	8.2	84.6	0.0	6.4	7.8	1.2	0.0	84.6

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**

SHINGLY BEACH

YEAR: 1979

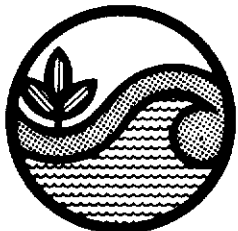
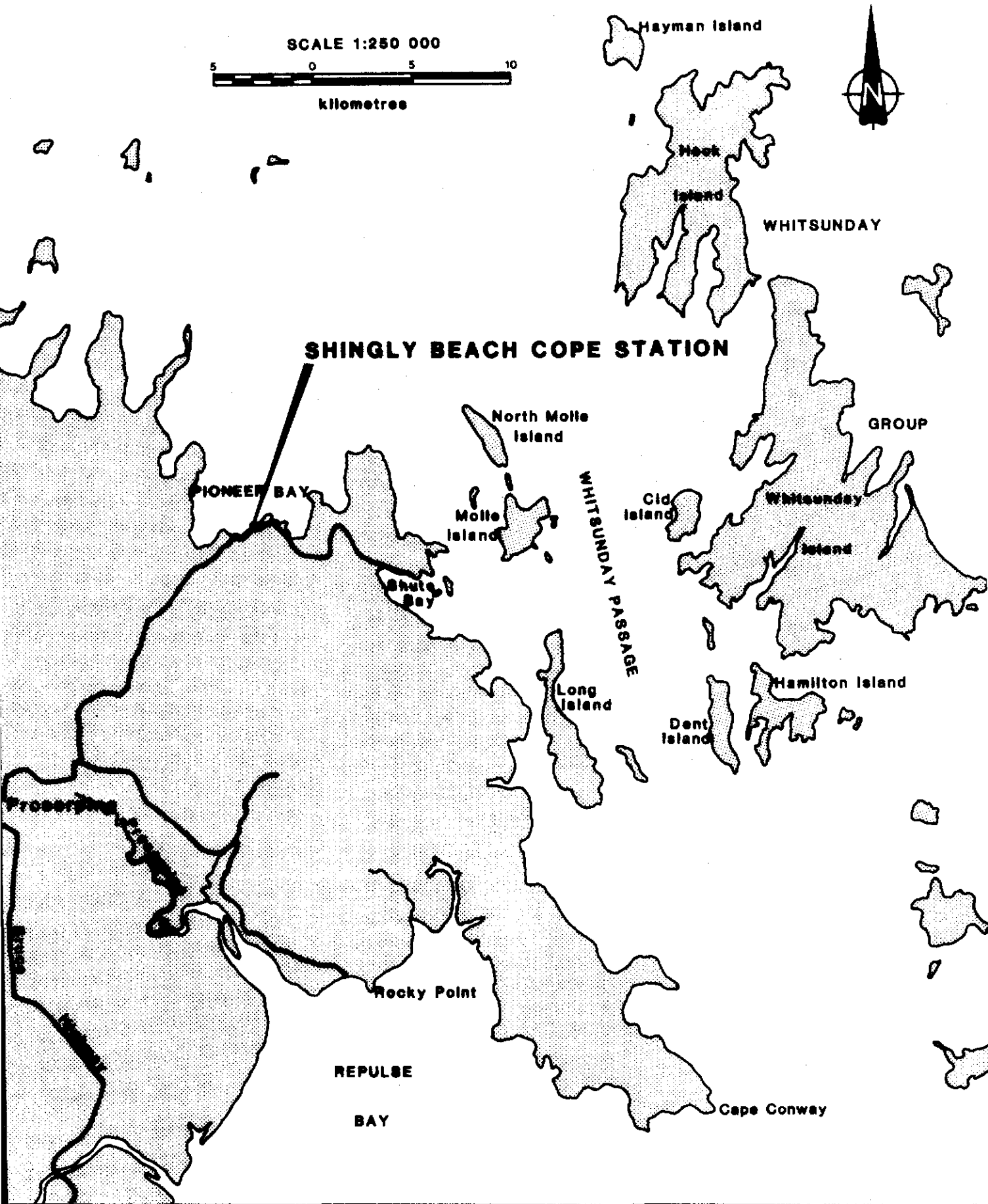
MONTH	MEAN WAVE PERIOD (Secs)	MEAN WAVE HEIGHT (Metres)	Percentage Occurrences - Wave Type /Wave Direction										
			Wave Type					Wave Direction					
			SP	PL	Surge	SP/PL	Calm	1	2	3	4	5	Calm
JANUARY	3.1	0.06	-	5.9	-	11.8	82.4	-	-	17.6	-	-	82.4
FEBRUARY	9.9	0.12	11.1	-	5.6	11.1	72.2	-	-	27.8	-	-	72.2
MARCH	4.7	0.09	-	9.1	-	4.5	86.4	-	-	9.0	4.6	-	86.4
APRIL	7.2	0.02	-	-	5.3	-	94.7	-	-	5.3	-	-	94.7
MAY	0.0	0.0	-	-	-	-	100.0	-	-	-	-	-	100.0
JUNE	5.2	0.01	-	-	-	5.0	95.0	-	-	5.0	-	-	95.0
JULY	0.0	0.0	-	-	-	-	100.0	-	-	-	-	-	100.0
AUGUST	-	-	-	-	-	-	-	-	-	-	-	-	-
SEPTEMBER	-	-	-	-	-	-	-	-	-	-	-	-	-
OCTOBER	3.7	0.12	11.1	11.1	-	11.1	66.7	-	22.2	11.1	-	-	66.7
NOVEMBER	3.2	0.17	-	-	-	45.5	54.5	-	9.1	27.3	9.1	-	54.5
DECEMBER	3.0	0.29	-	-	-	62.5	37.5	-	25.0	37.5	-	-	37.5
WHOLE YEAR	5.0	0.09	1.8	2.4	1.2	10.2	84.4	0.0	3.0	11.4	1.2	0.0	84.4

SP — Spilling

PL — Plunging

SP/PL — Combined spilling and plunging

SCALE 1:250 000



Beach Protection Authority

LOCALITY PLAN

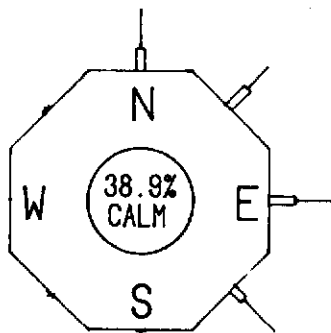
COPE

Shingly Beach

Figure 1

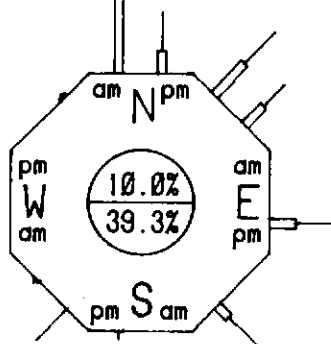
C 14.1

ALL OBSERVATIONS

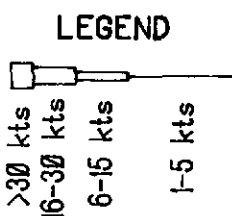


Total No. of Observations : 835

MORNING - AFTERNOON OBSERVATIONS

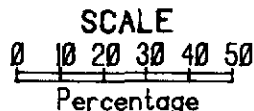


NOTES :
 Figures in Central Circle
 Represent Percentage
 of CALM Observations.
 Upper Figure for AM
 Lower Figure for PM

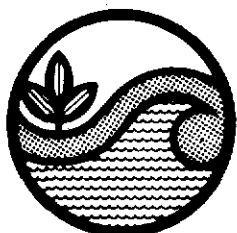


No. of Morning Observations : 10
 No. of Afternoon Observations : 825

Mean Time :- Morning Obs : 0936 hrs
 Mean Time :- Afternoon Obs : 1718 hrs



WIND DATA - AUG 1976 to NOV 1979

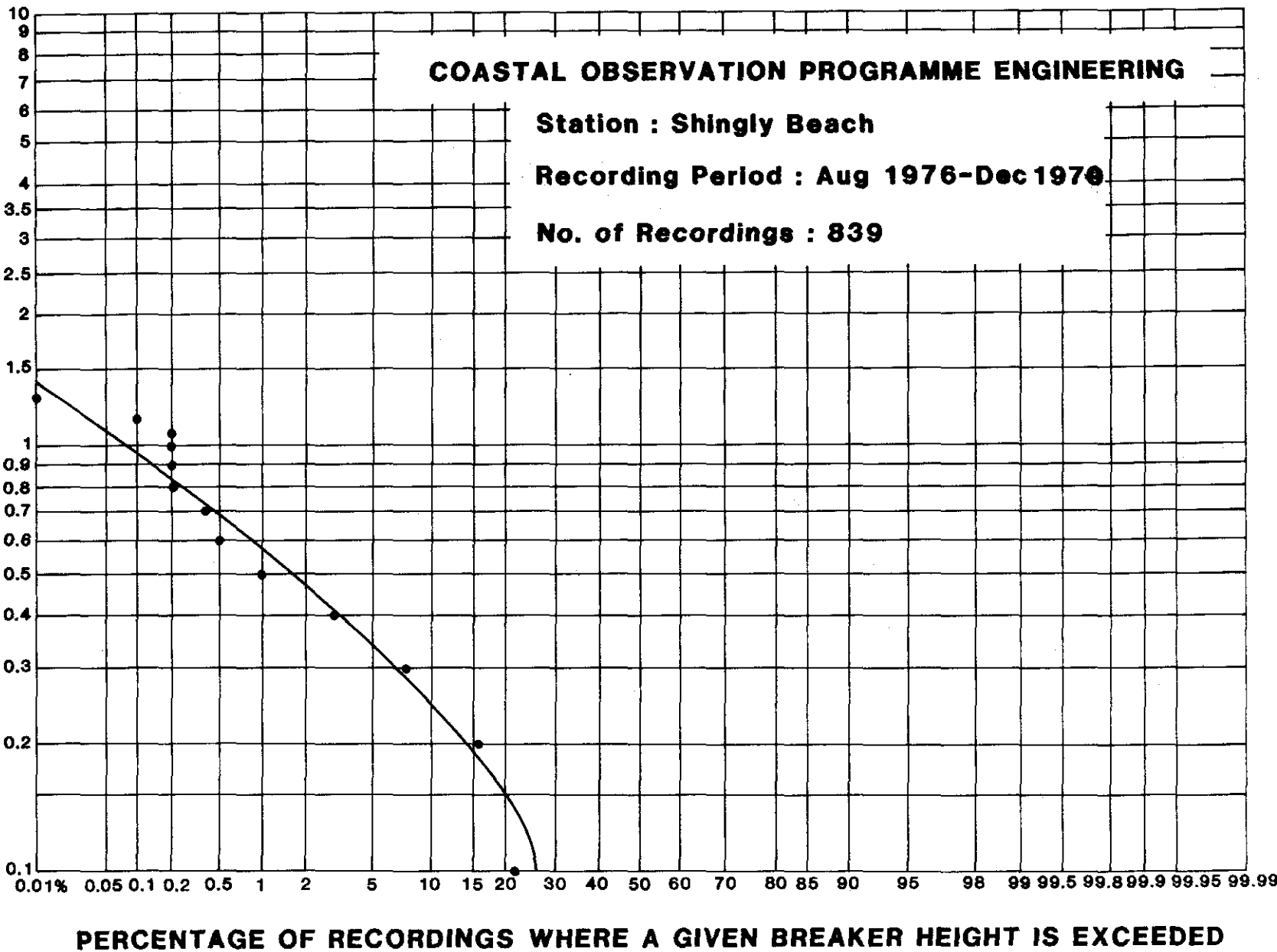


Beach Protection Authority

WIND DATA

COPE
 Shingly Beach

Figure 2
 C 14.1



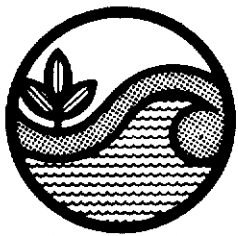
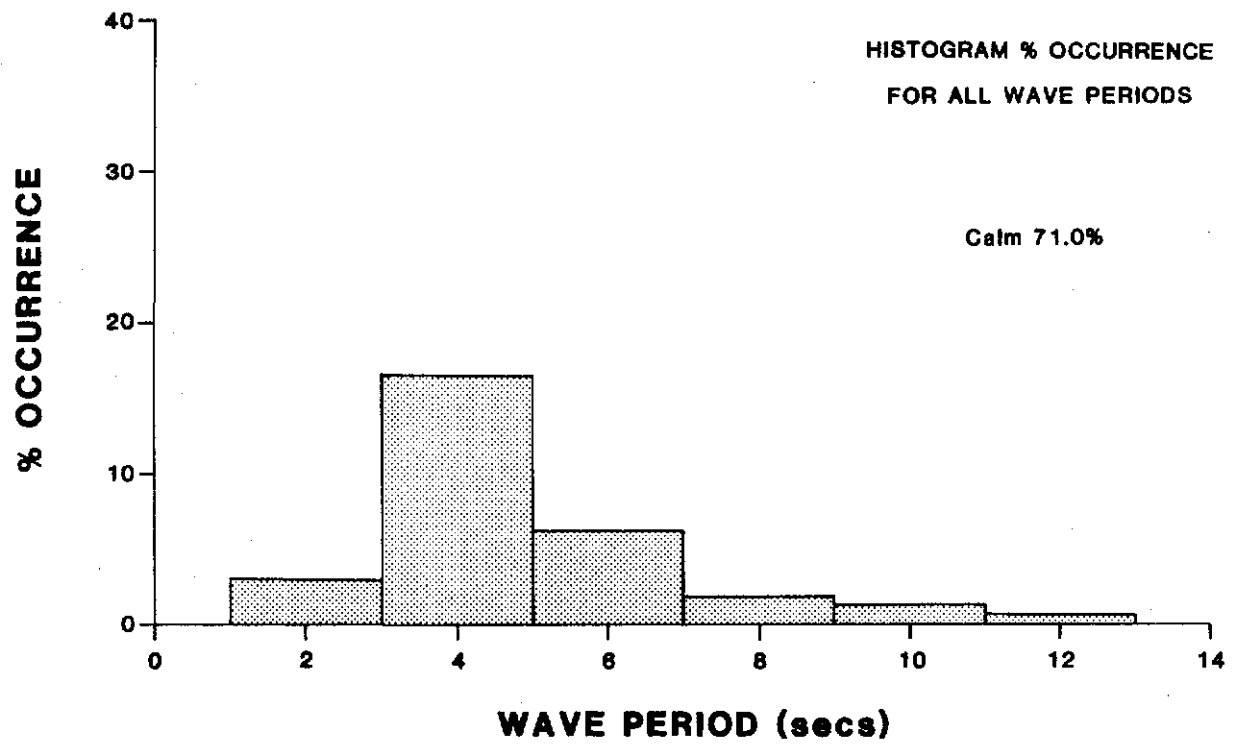
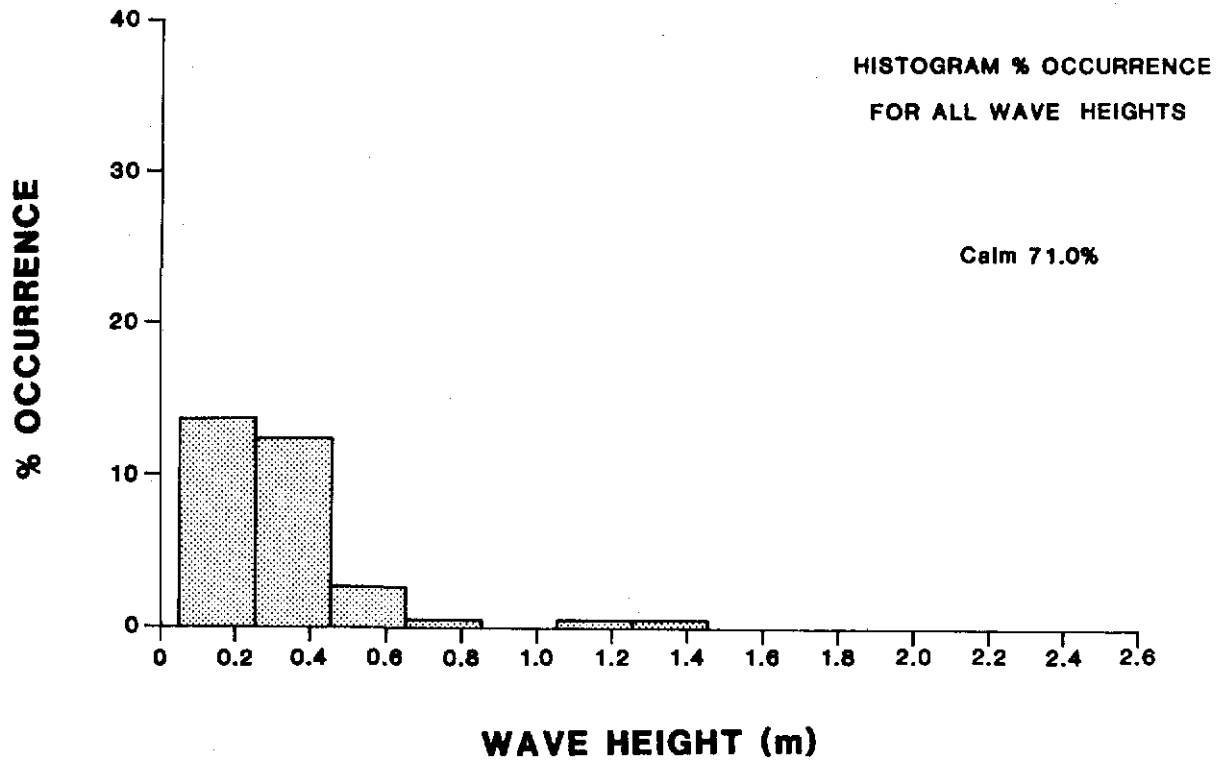
WAVE HEIGHT % EXCEEDANCE

ALL DATA

Figure 3
C 14.1

Shingly Beach

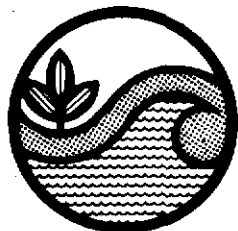
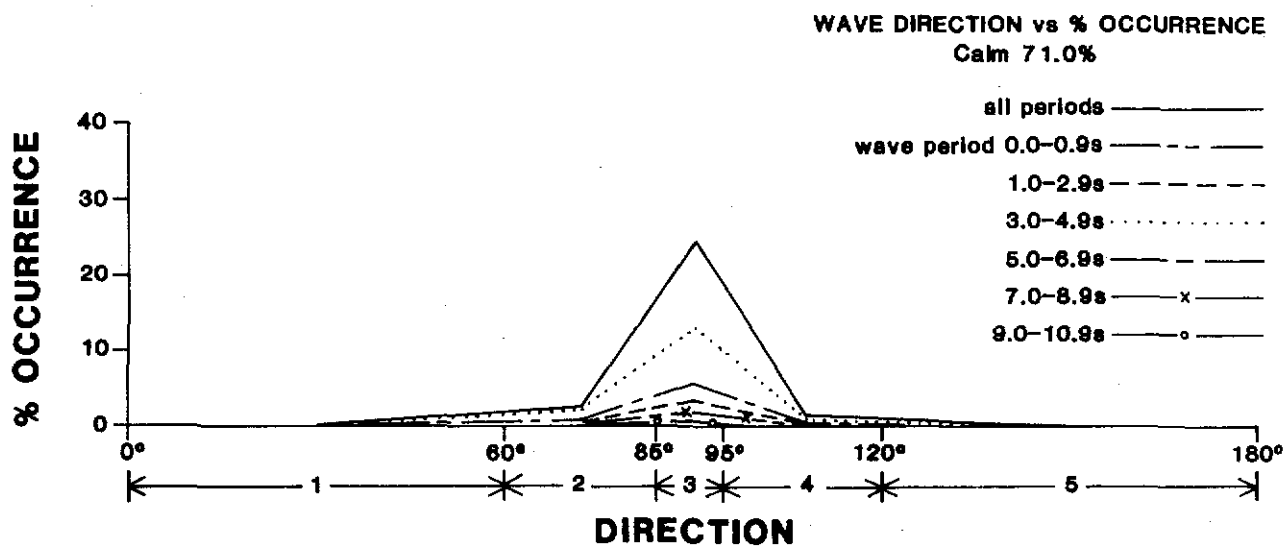
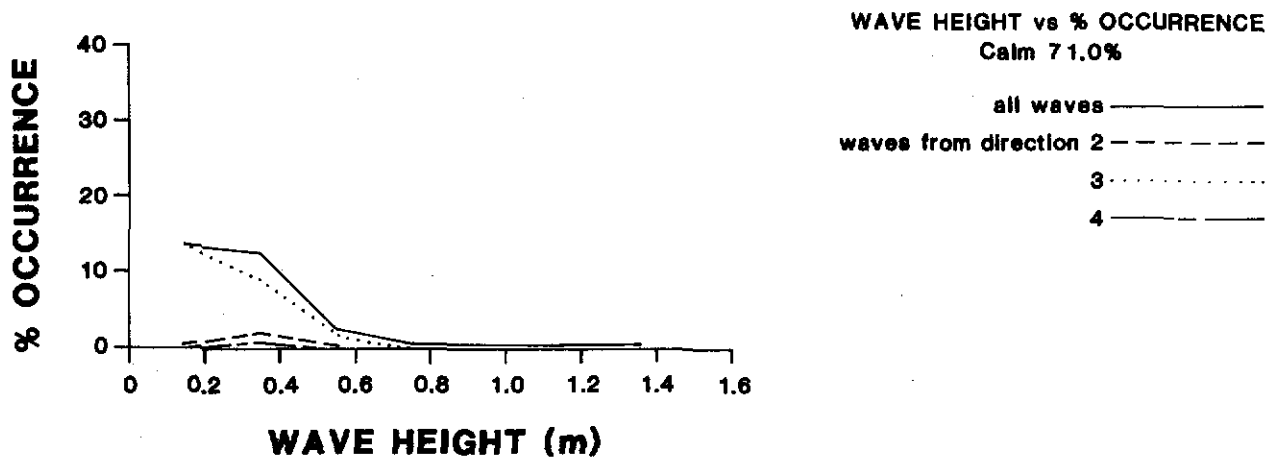
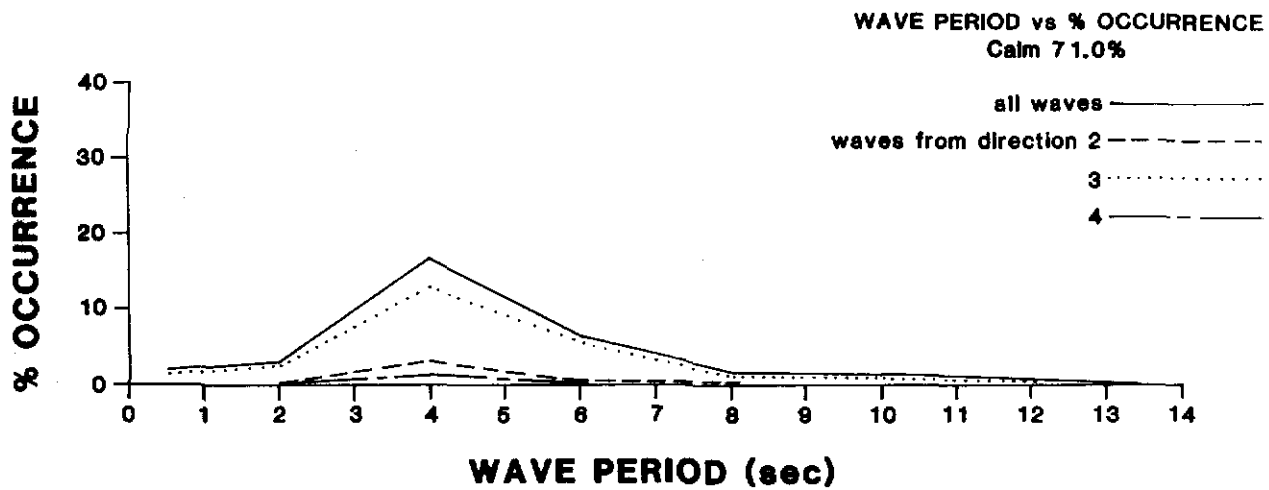
COPE



Beach Protection Authority

**WAVE HEIGHT AND PERIOD % OCCURRENCE
ALL DATA**

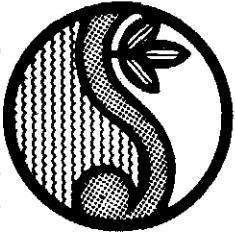
COPE
Shingly Beach
Figure 4
C 14.1



Beach Protection Authority

WAVE DIRECTION ANALYSIS
ALL DATA

COPE
Shingly Beach
Figure 5
C 14.1



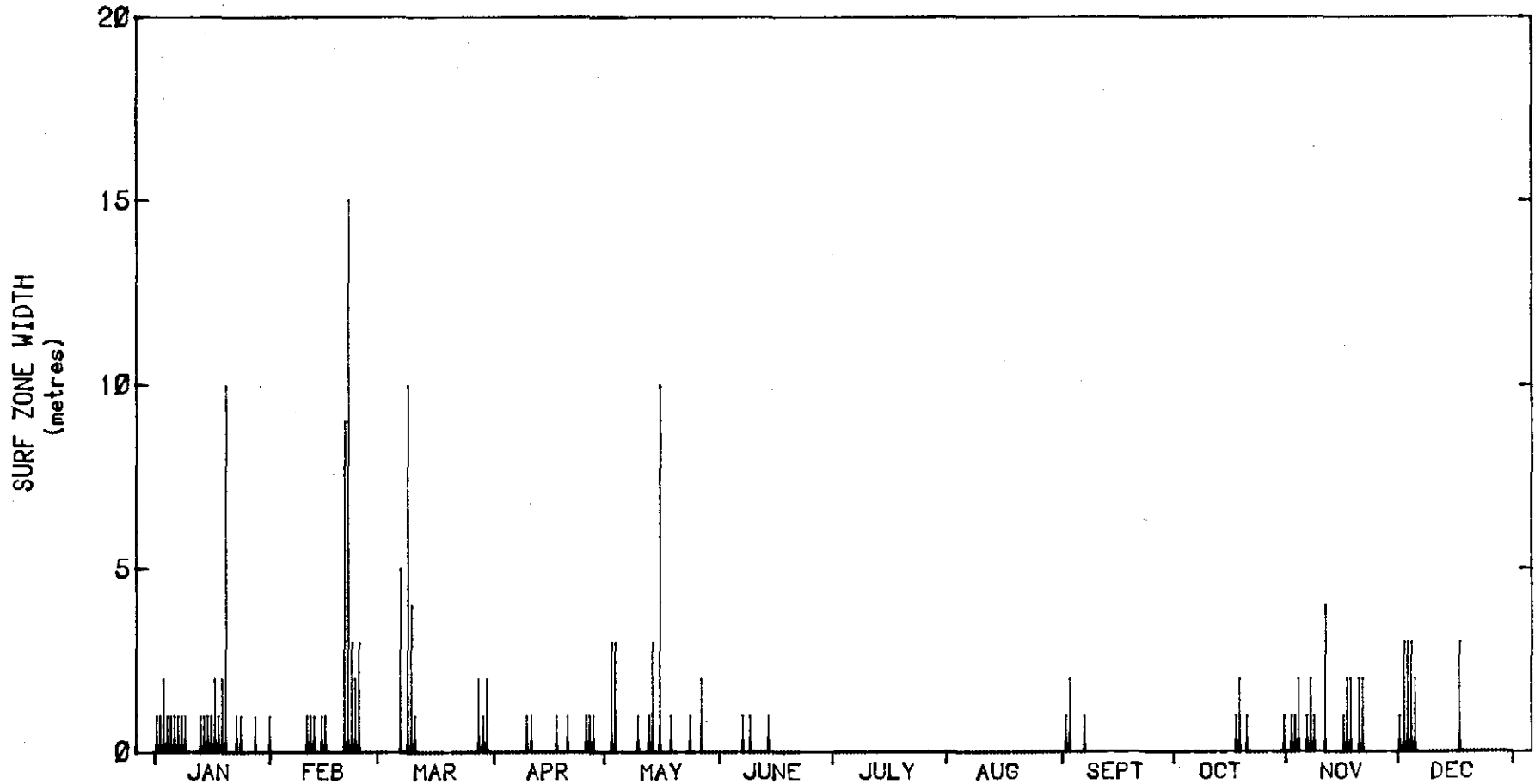
SURF ZONE WIDTH - AFTERNOON 1977

COPE - Coastal Observation Programme Engineering

SHINGLY BEACH

PROSERPINE SHIRE

2101



SURF ZONE WIDTH SUMMARY - 1977

No. of Observations : 312

AFTERNOON OBSERVATIONS

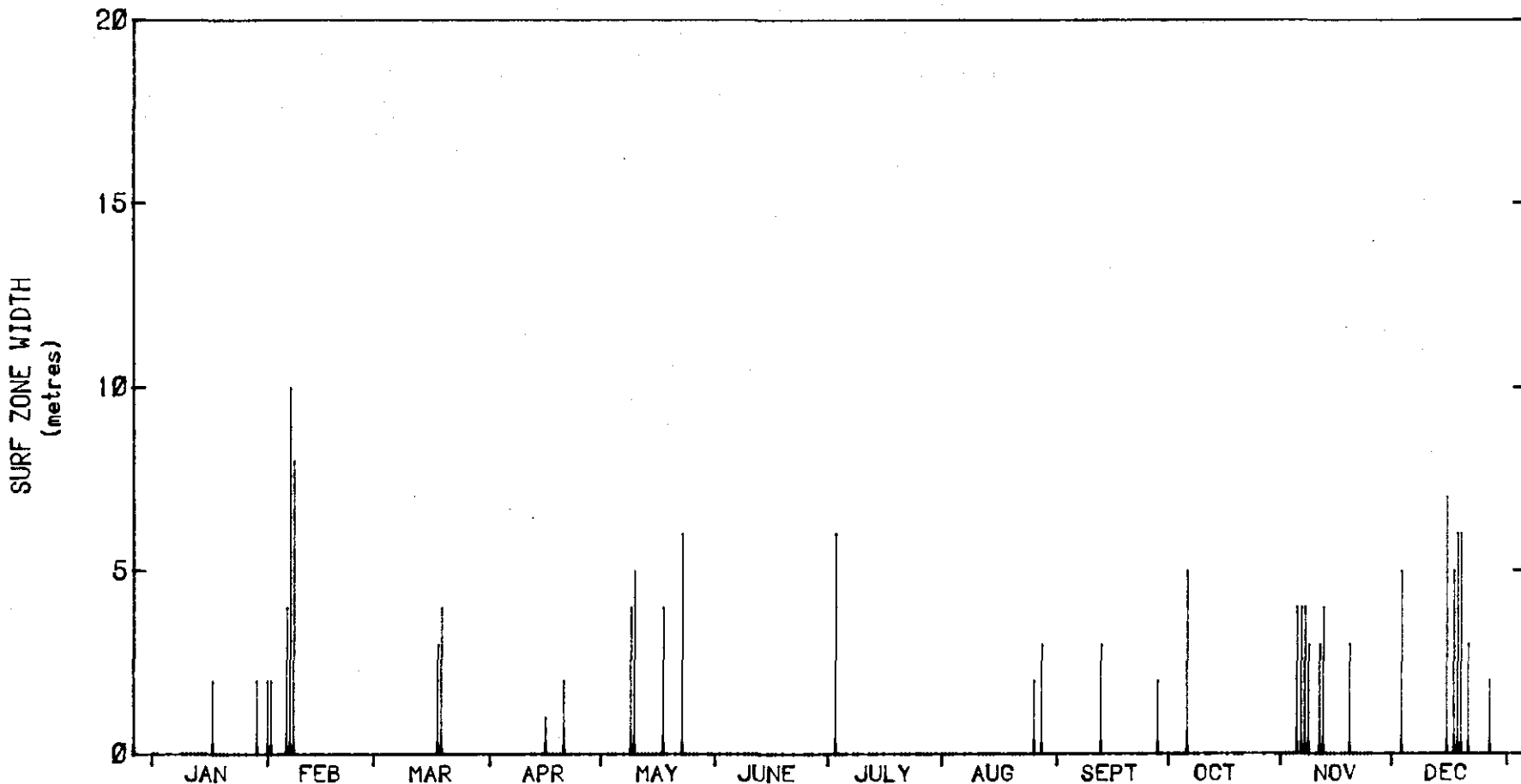
Mean Surf Zone Width = .6 m

Figure 7
C 14.1

COPE
Shingly Beach



SURF ZONE WIDTH - AFTERNOON 1978



SURF ZONE WIDTH SUMMARY - 1978

No. of Observations : 233

AFTERNOON OBSERVATIONS

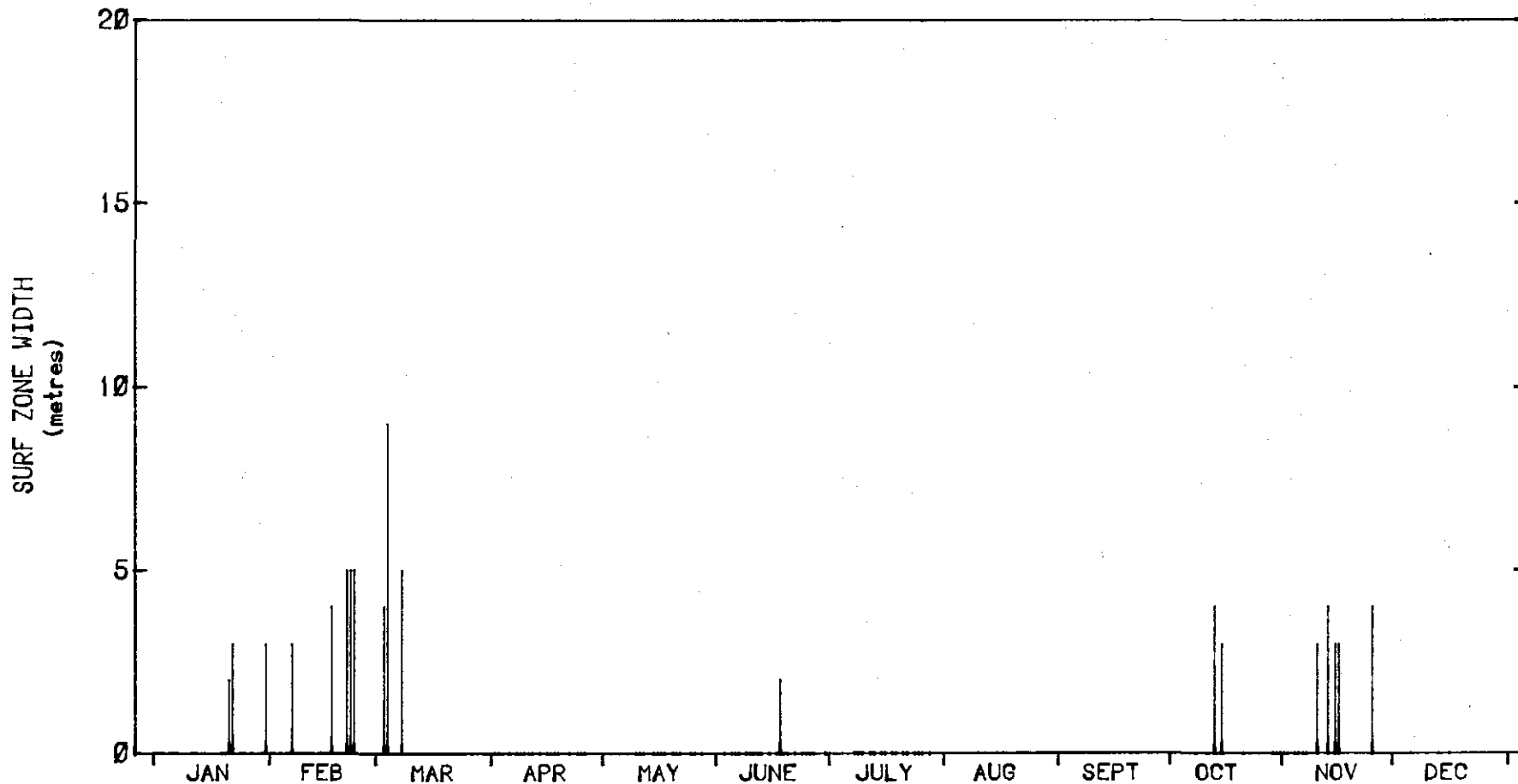
Mean Surf Zone Width = .6 m

COPE

Shingly Beach

Figure 8

C 14.1

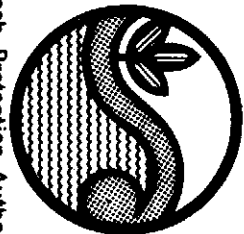


SURF ZONE WIDTH SUMMARY - 1979

No. of Observations : 157

AFTERNOON OBSERVATIONS

Mean Surf Zone Width = .5 m



Beach Protection Authority

SURF ZONE WIDTH - AFTERNOON 1979

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Shingly Beach

Figure 9

C 14.1



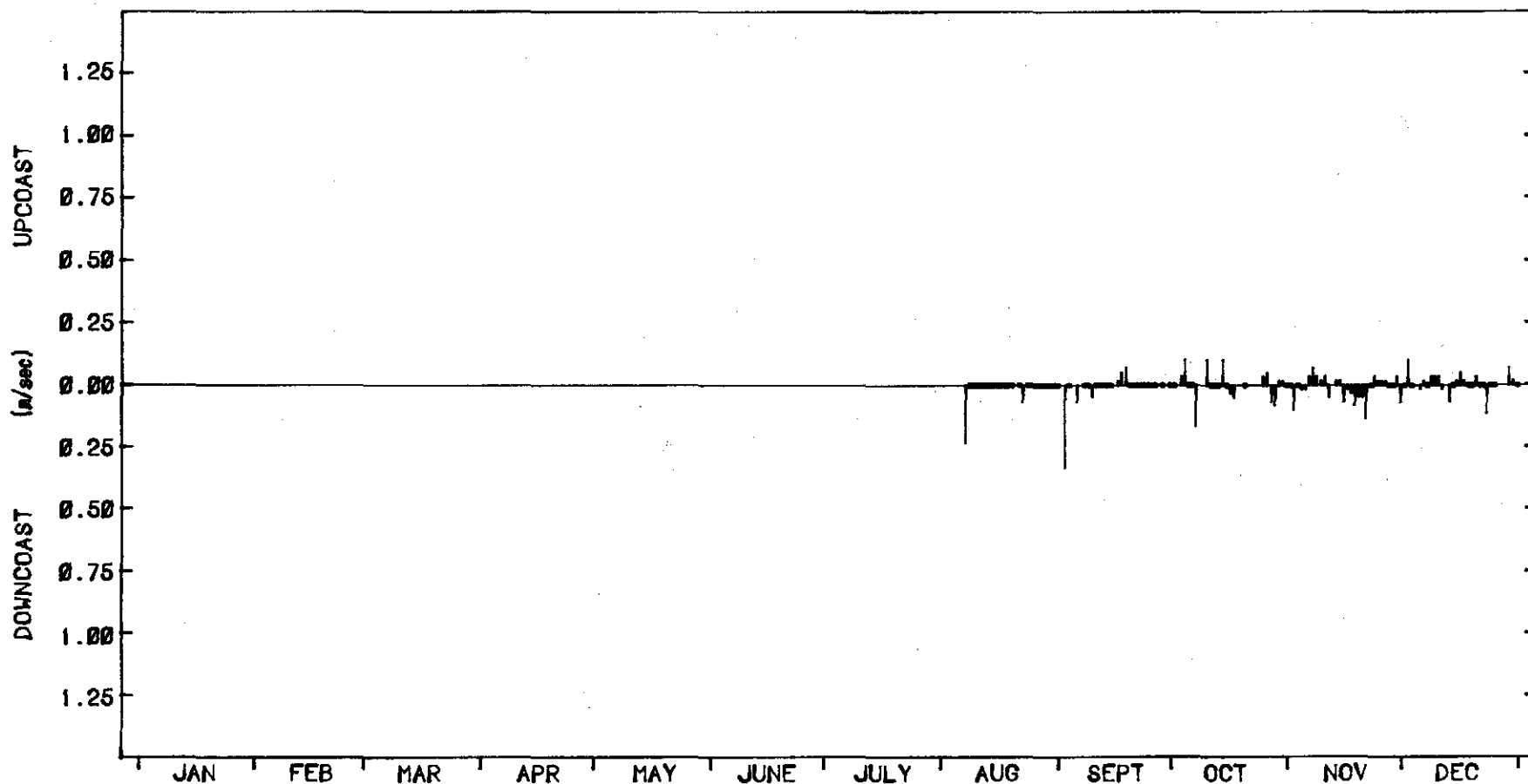
LITTORAL CURRENTS - AFTERNOON 1976

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PROSERPINE SHIRE

SHINGLY BEACH

2101



LITTORAL CURRENT SUMMARY - 1976

Mean Vel = -0.006 m/sec (down)

Mean Upcoast Vel = 0.038 m/sec

Mean Downcoast Vel = 0.079 m/sec

AFTERNOON OBSERVATIONS - (125 recordings)

COPE

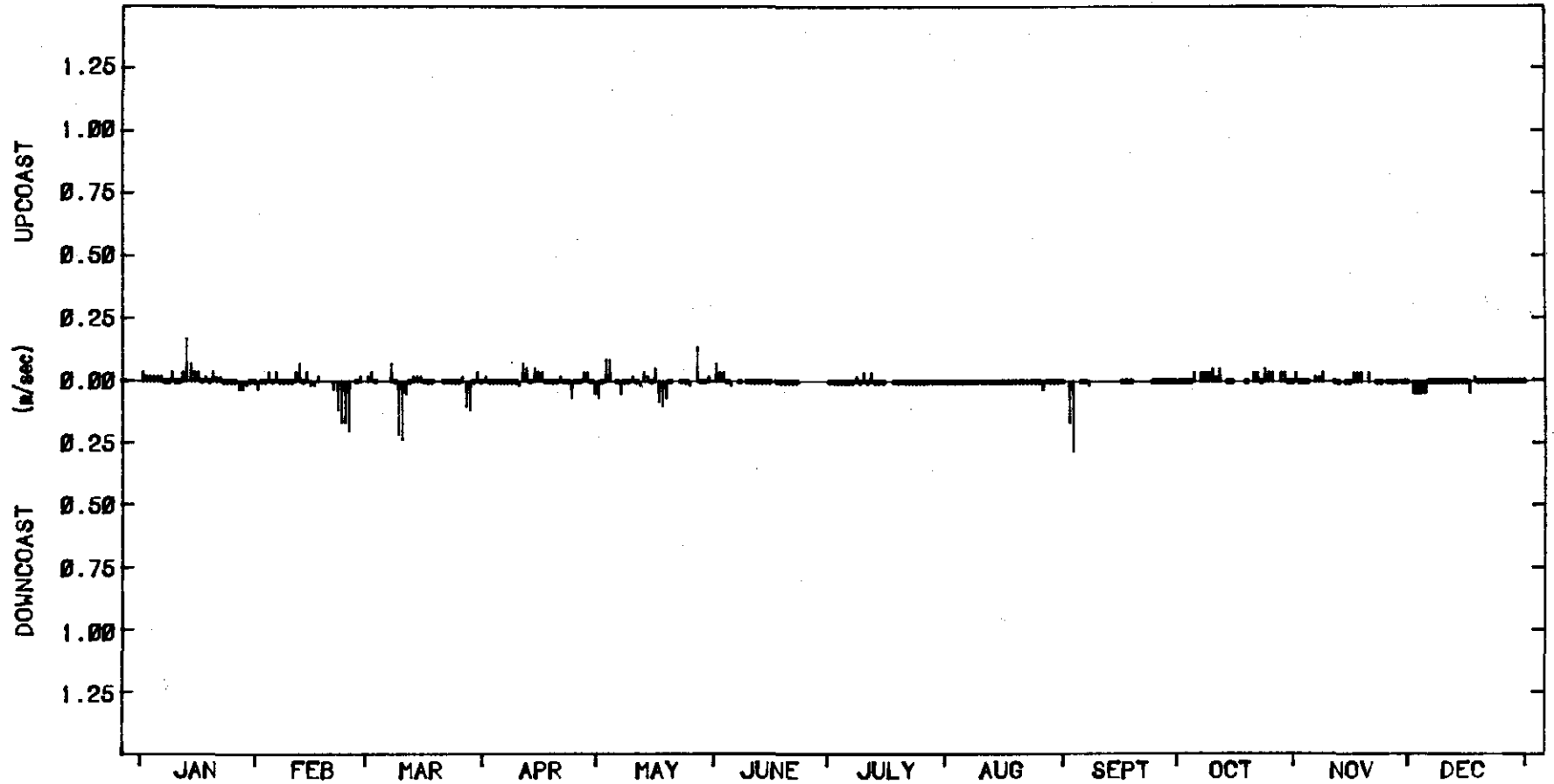
Shingly Beach

Figure 10

C 14.1



LITTORAL CURRENTS - AFTERNOON 1977



LITTORAL CURRENT SUMMARY - 1977

Mean Vel = .000 m/sec (down)

Mean Upcoast Vel = 0.036 m/sec

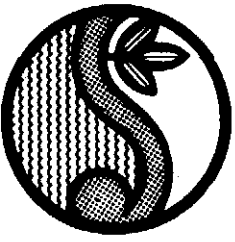
Mean Downcoast Vel = 0.077 m/sec

AFTERNOON OBSERVATIONS - (308 recordings)

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Shingly Beach

Figure 11

C 14.1



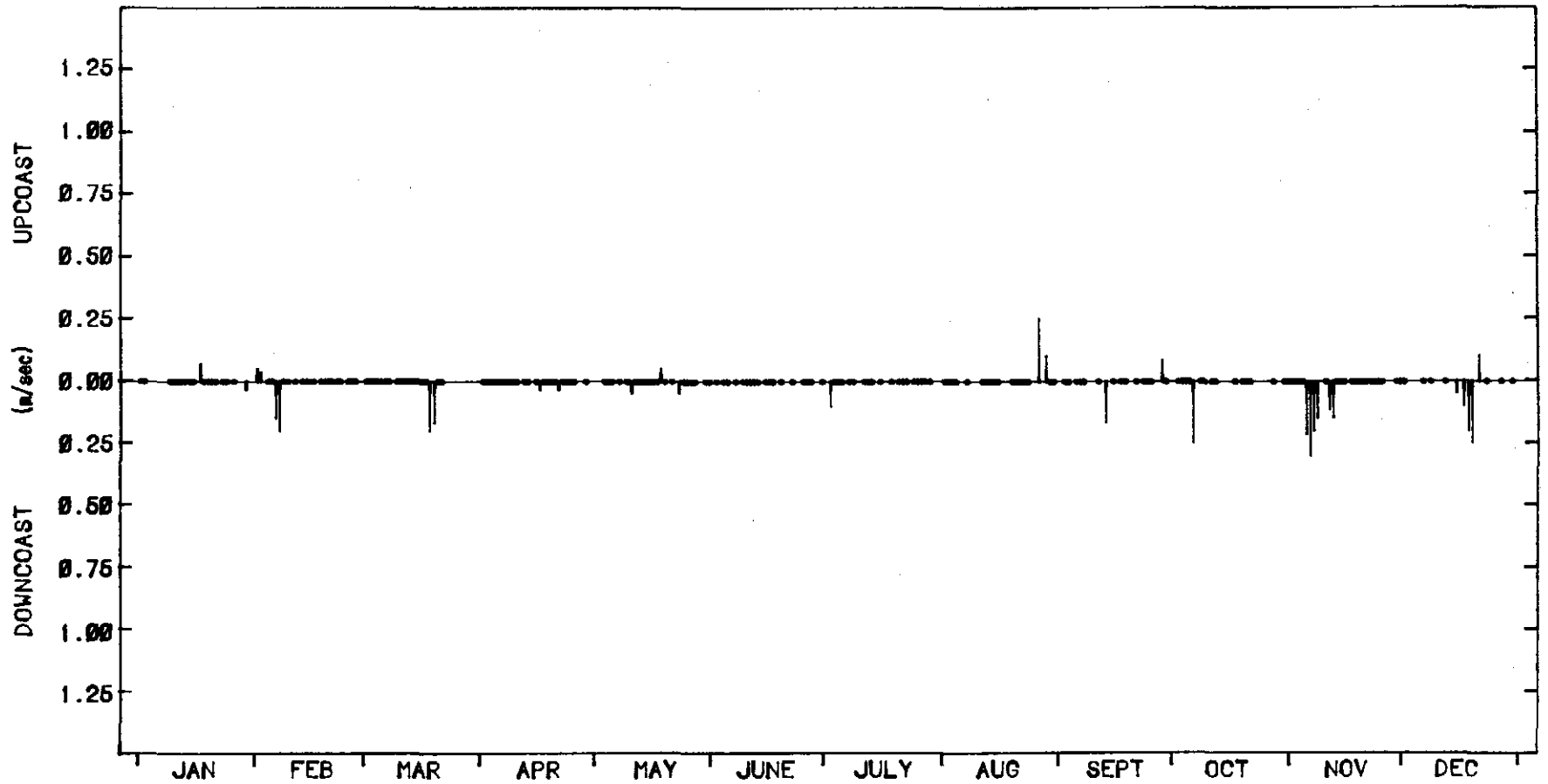
LITTORAL CURRENTS - AFTERNOON 1978

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PROSERPINE SHIRE

SHINGLY BEACH

2101



LITTORAL CURRENT SUMMARY - 1978

Mean Vel = -0.010 m/sec (down)

Mean Upcoast Vel = 0.092 m/sec

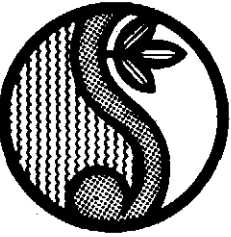
Mean Downcoast Vel = 0.144 m/sec

AFTERNOON OBSERVATIONS - (232 recordings)

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Shingly Beach

Figure 12

C 14.1



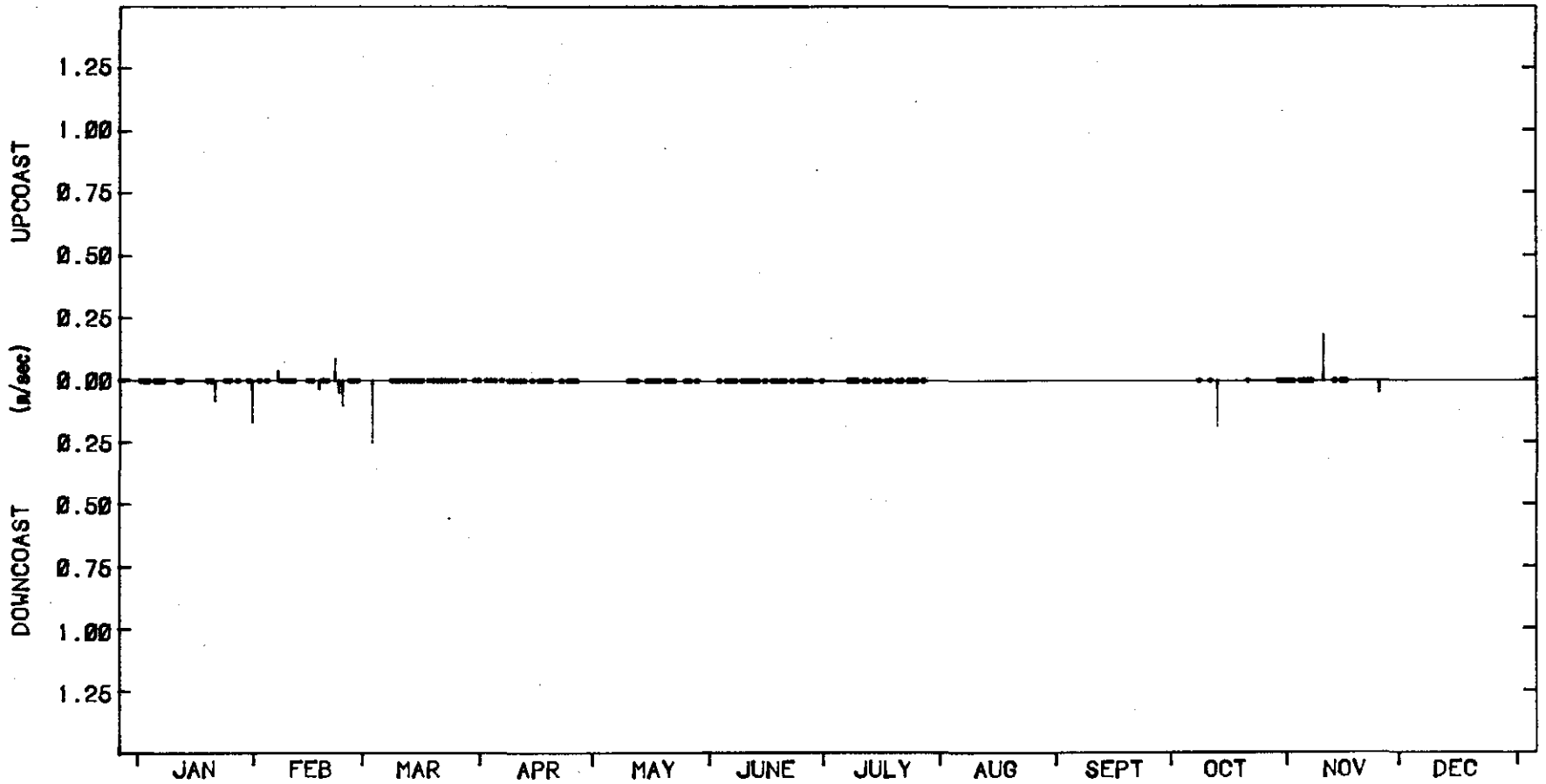
LITTORAL CURRENTS - AFTERNOON 1979

COPE - Coastal Observation Programme Engineering

PROSERPINE SHIRE

SHINGLY BEACH

2101



LITTORAL CURRENT SUMMARY - 1979

Mean Vel = -.004 m/sec (down)

Mean Upcoast Vel = 0.100 m/sec

Mean Downcoast Vel = 0.115 m/sec

AFTERNOON OBSERVATIONS - (154 recordings)

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Shingly Beach

Figure 13

C 14.1



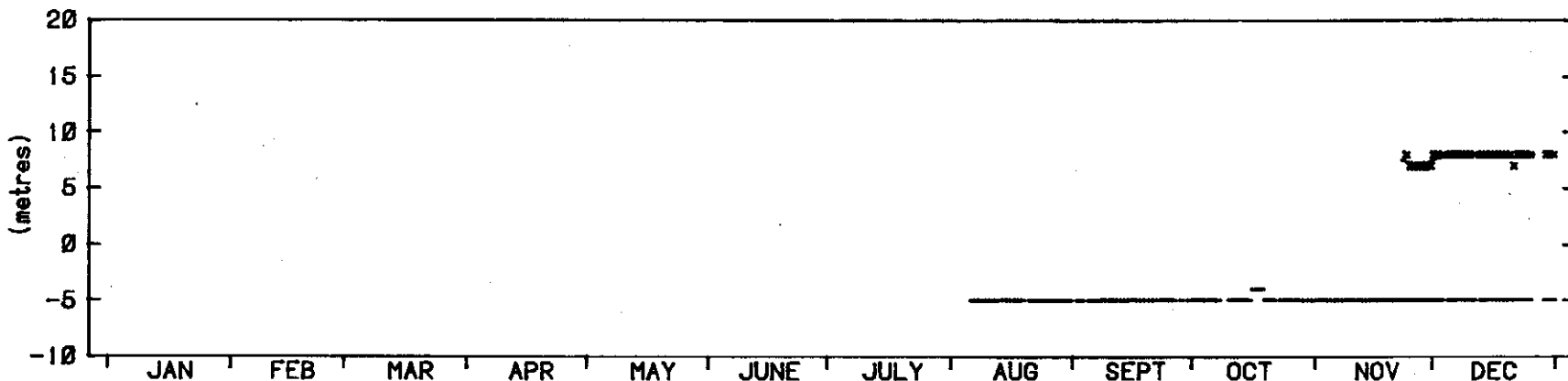
BEACH PROFILE PARAMETERS - 1976

COPE - Coastal Observation Programme Engineering

PROSERPINE SHIRE

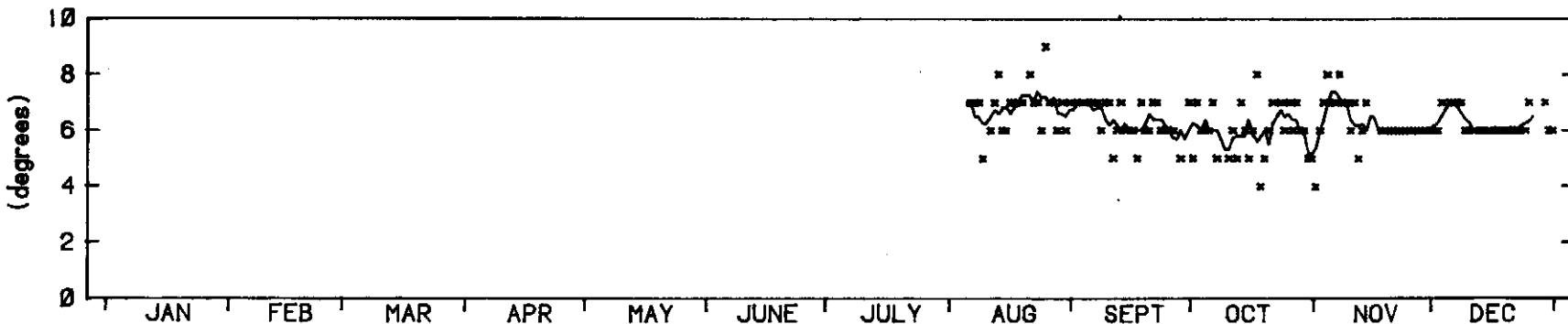
SHINGLY BEACH

2101



DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1976

— Indicates Distance to Fixed Contour : 33 Observations Fixed Contour Level is approx .9 m above AHD
 - - - Indicates Distance to Vegetation Line : 135 Observations



FORESHORE SLOPE - 1976

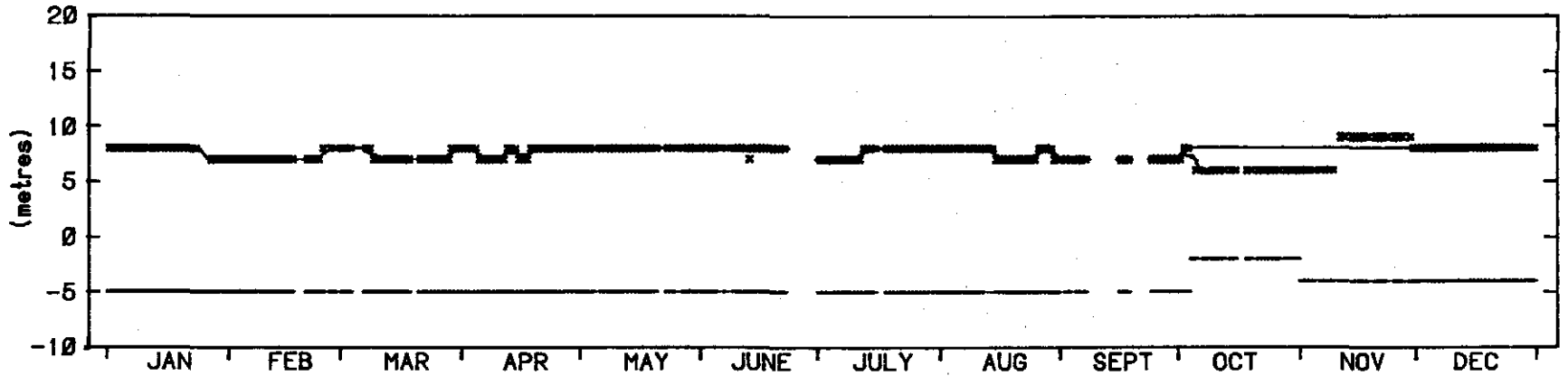
— Five Day Moving Average

No. of Observations : 130

COPE

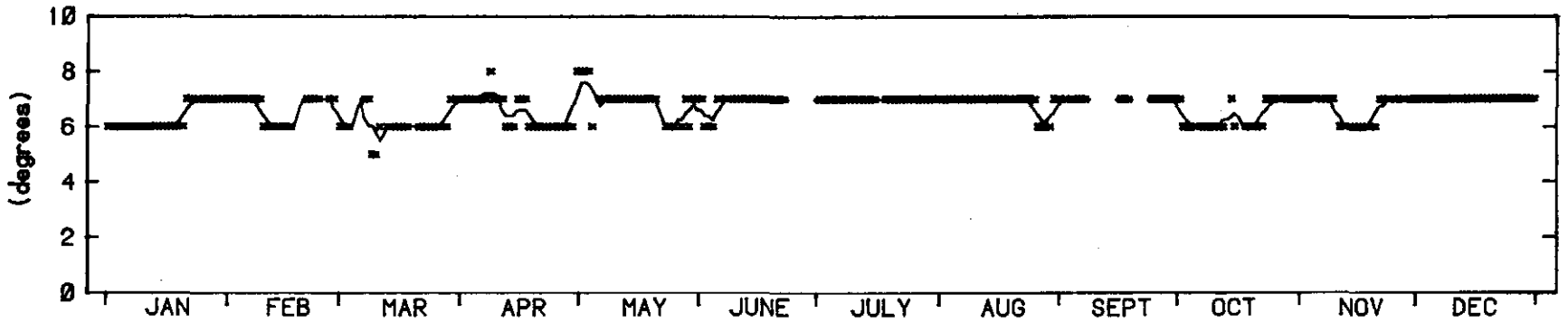
Shingly Beach

Figure 14
C 14.1



DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1977

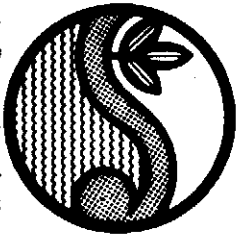
- - - Indicates Distance to Fixed Contour : 308 Observations Fixed Contour Level is approx .9 m above AHD
 - - - Indicates Distance to Vegetation Line : 313 Observations

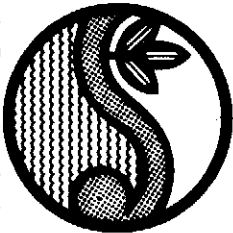


FORESHORE SLOPE - 1977

Five Day Moving Average

No. of Observations : 311





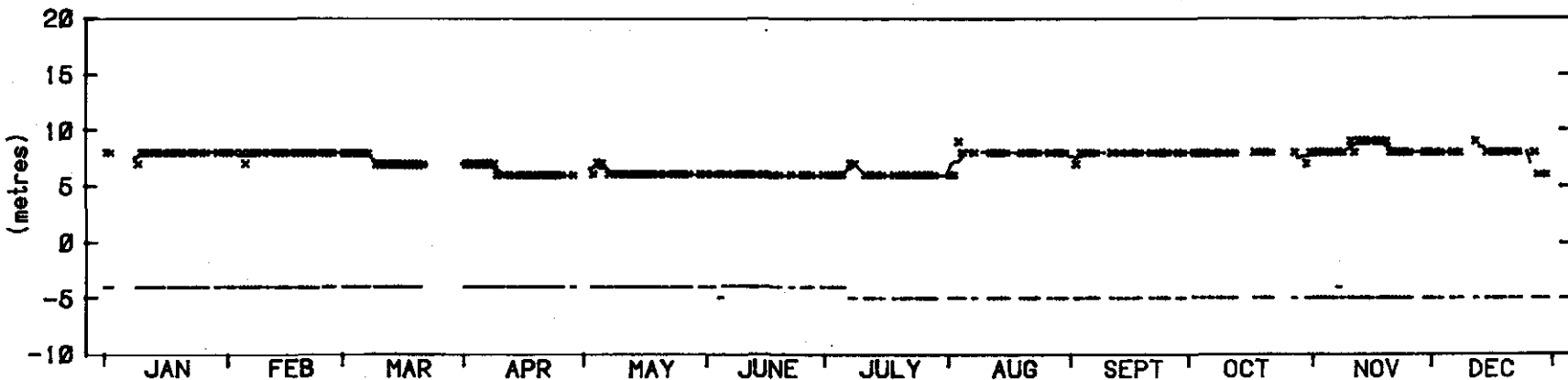
COPE - Coastal Observation Programme Engineering

PROSERPINE SHIRE

SHINGLY BEACH

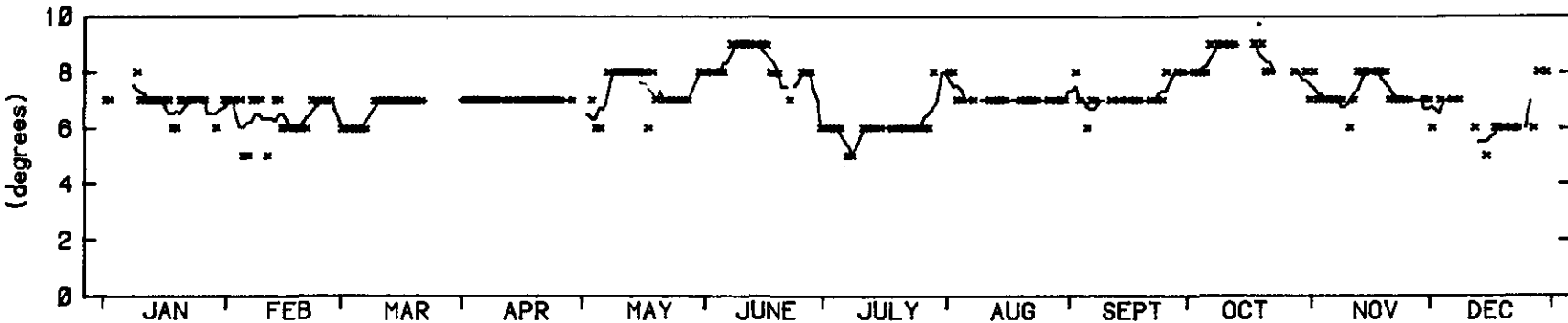
2101

BEACH PROFILE PARAMETERS - 1978



DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1978

- - - - - Indicates Distance to Fixed Contour : 235 Observations Fixed Contour Level is approx .9 m above AHD
 - - - - - Indicates Distance to Vegetation Line : 232 Observations



FORESHORE SLOPE - 1978

Five Day Moving Average

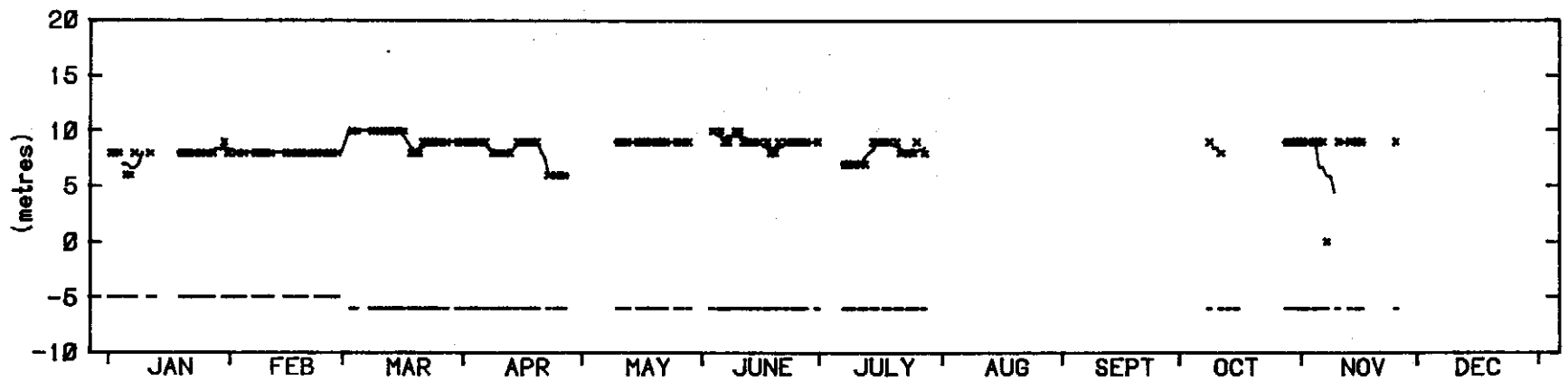
No. of Observations : 235

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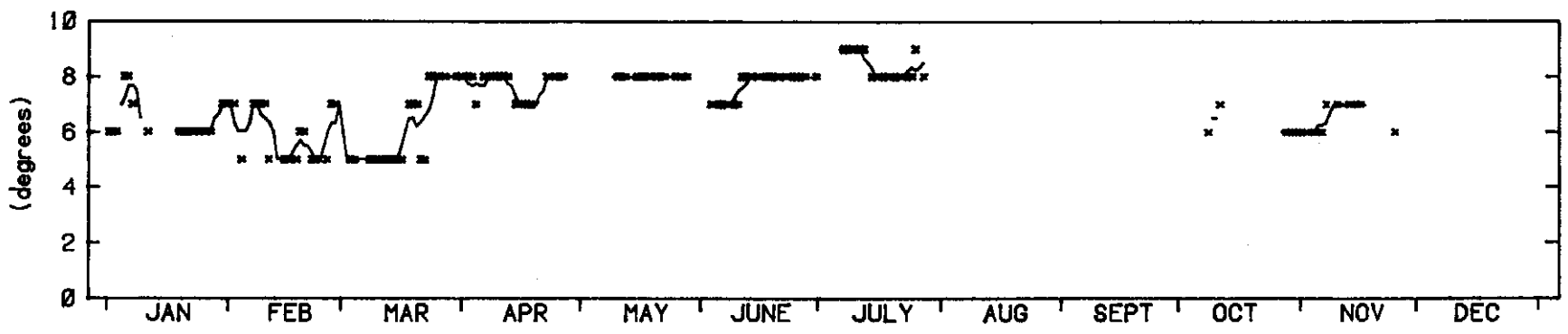
Figure 16

C 14.1



DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1979

----- Indicates Distance to Fixed Contour : 154 Observations Fixed Contour Level is approx .9 m above AHD
 ———— Indicates Distance to Vegetation Line : 156 Observations



FORESHORE SLOPE - 1979

— — — — — Five Day Moving Average

No. of Observations : 154

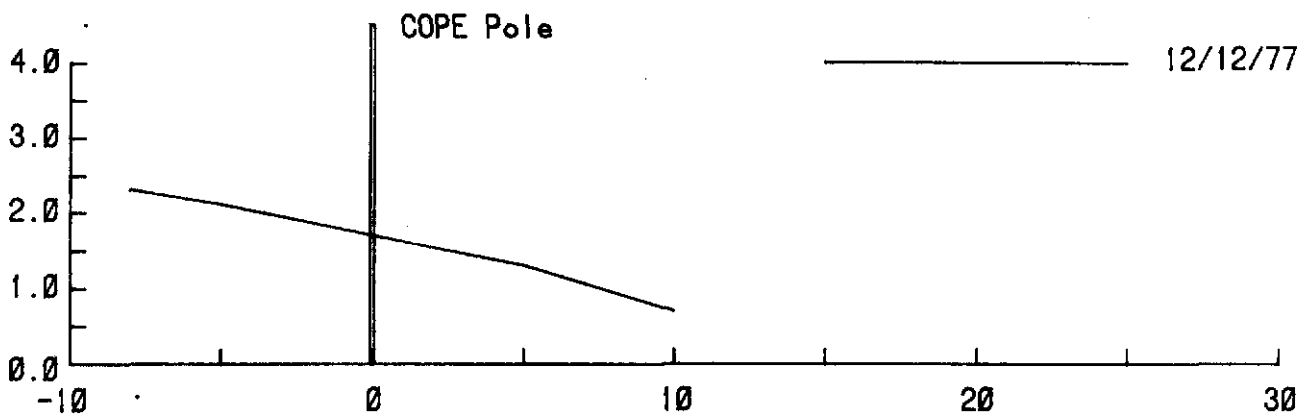
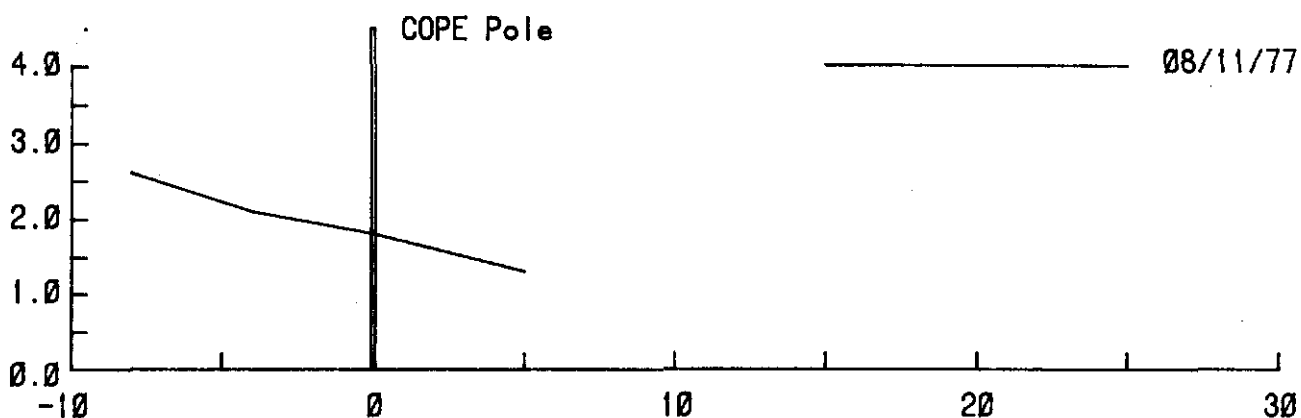
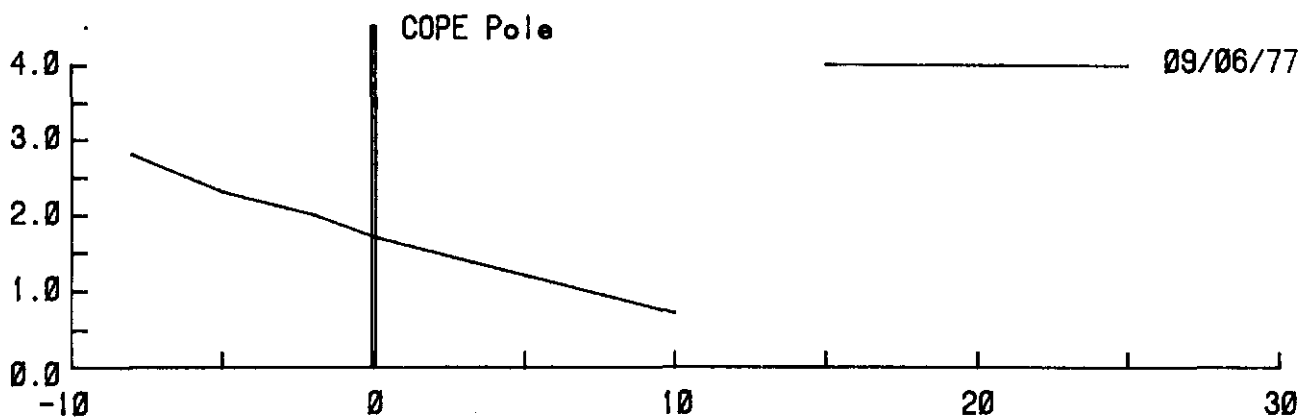


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BEACH PROFILE PARAMETERS - 1979

Figure 17
 C 14.1

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 Shingly Beach



Level Datum is A.H.D.

Distances and Levels are measured in Metres



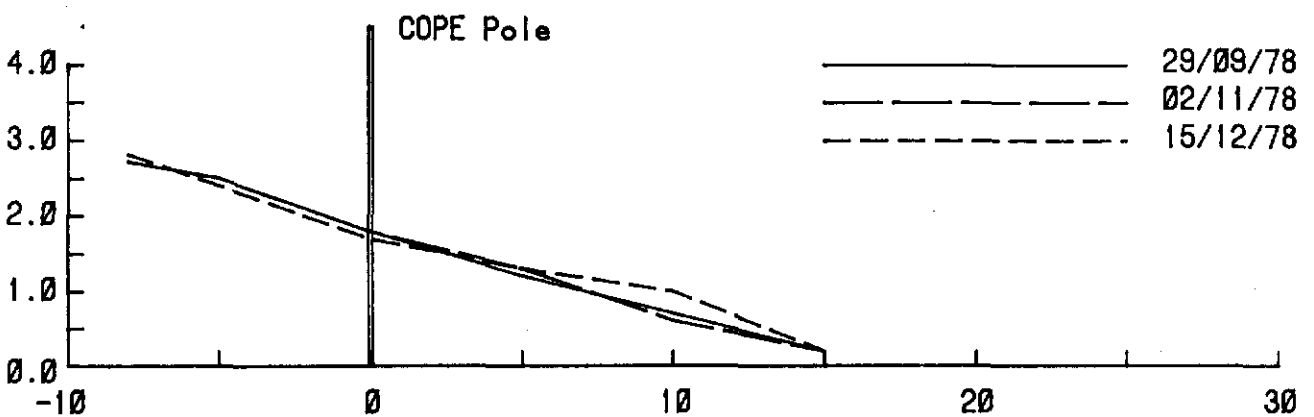
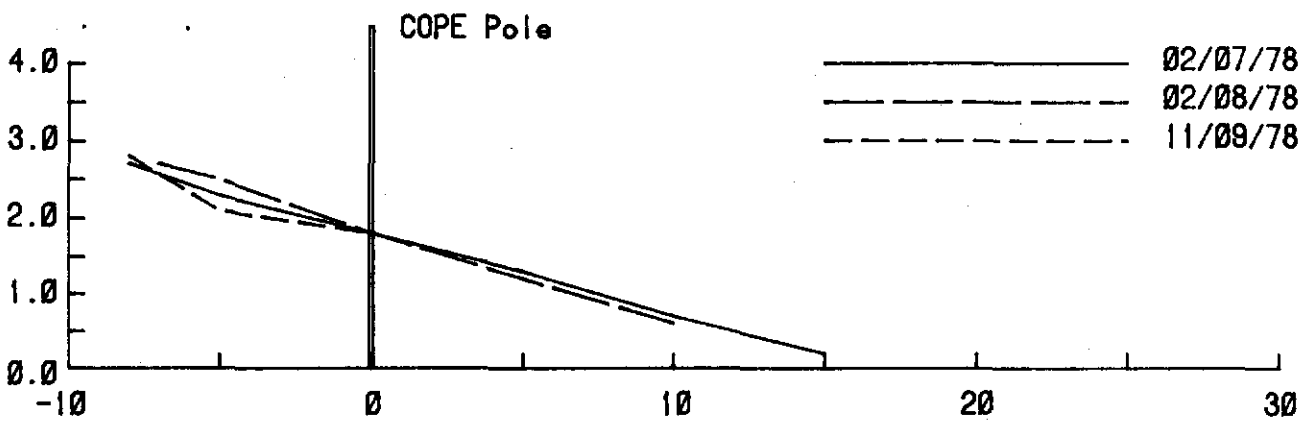
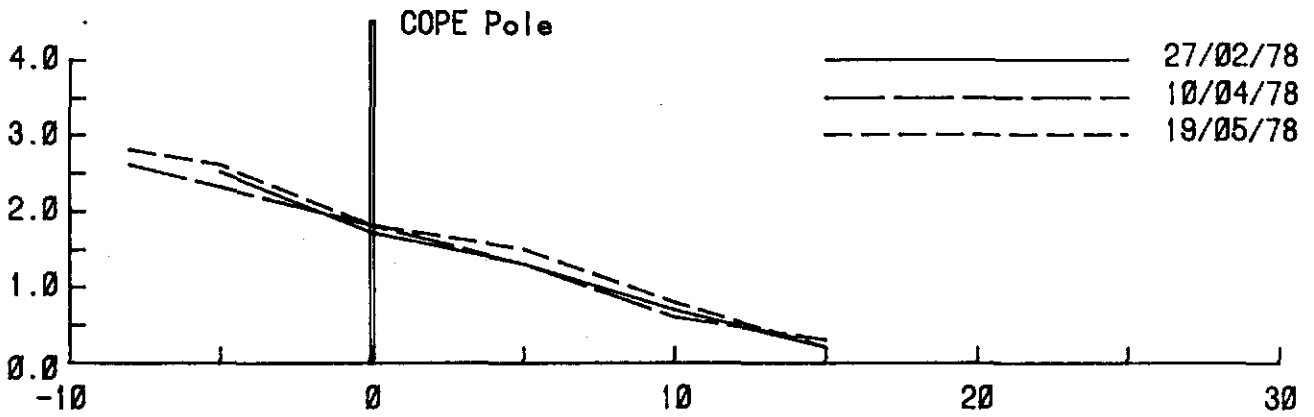
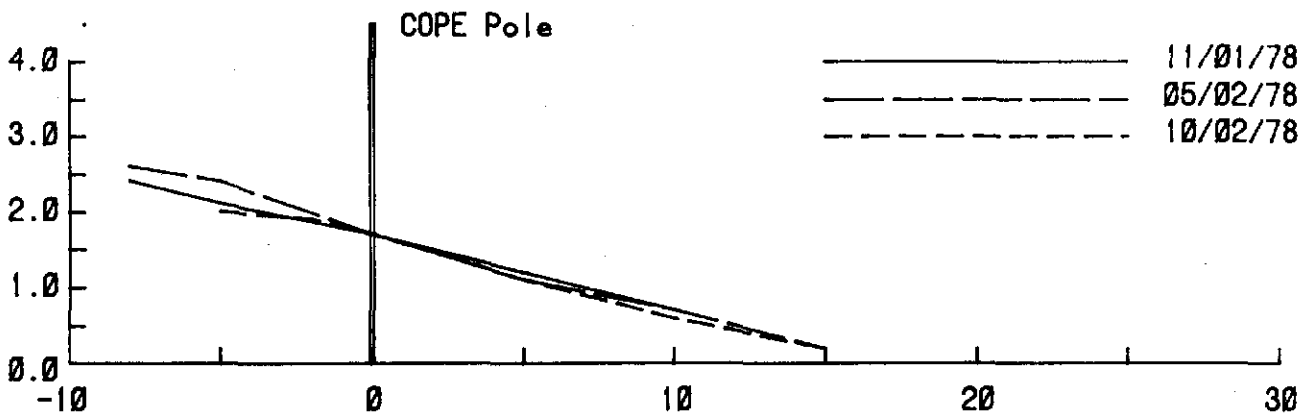
Beach Protection Authority

MONTHLY BEACH PROFILES

1977

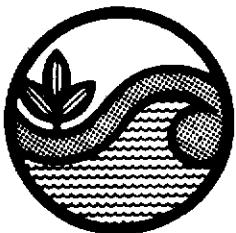
COPE
Shingly Beach

Figure 18
C 14.1



Level Datum is A.H.D.

Distances and Levels are measured in Metres



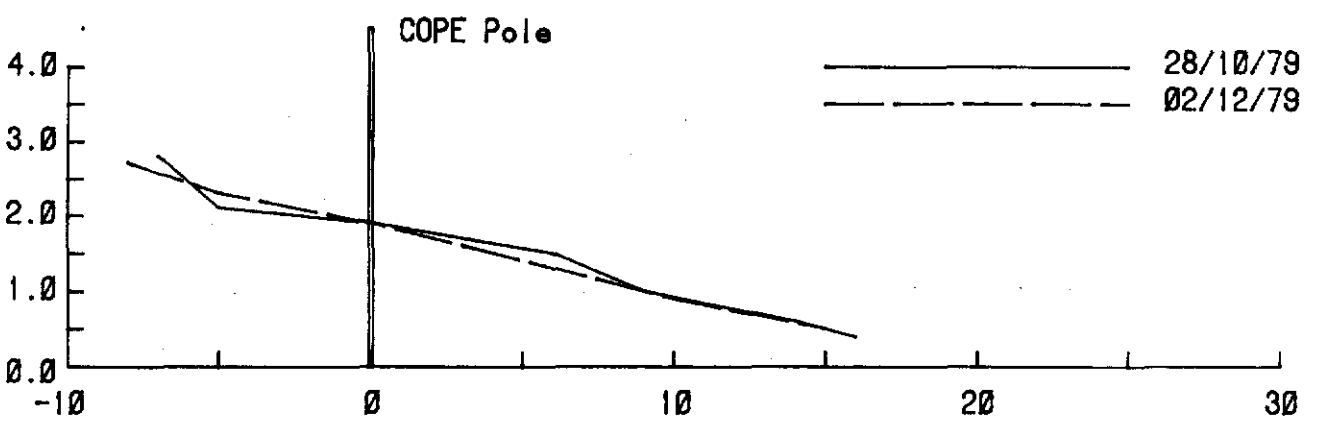
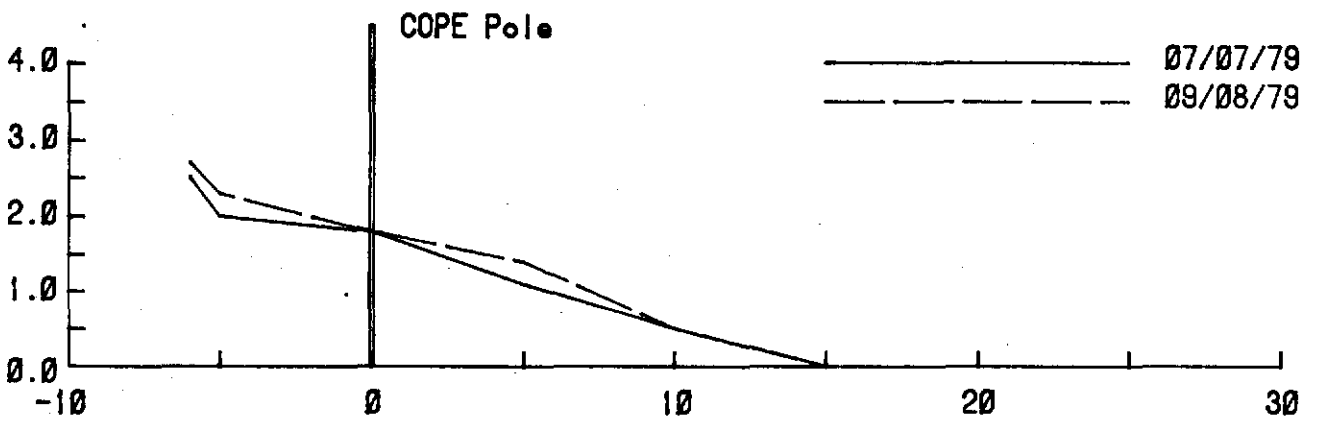
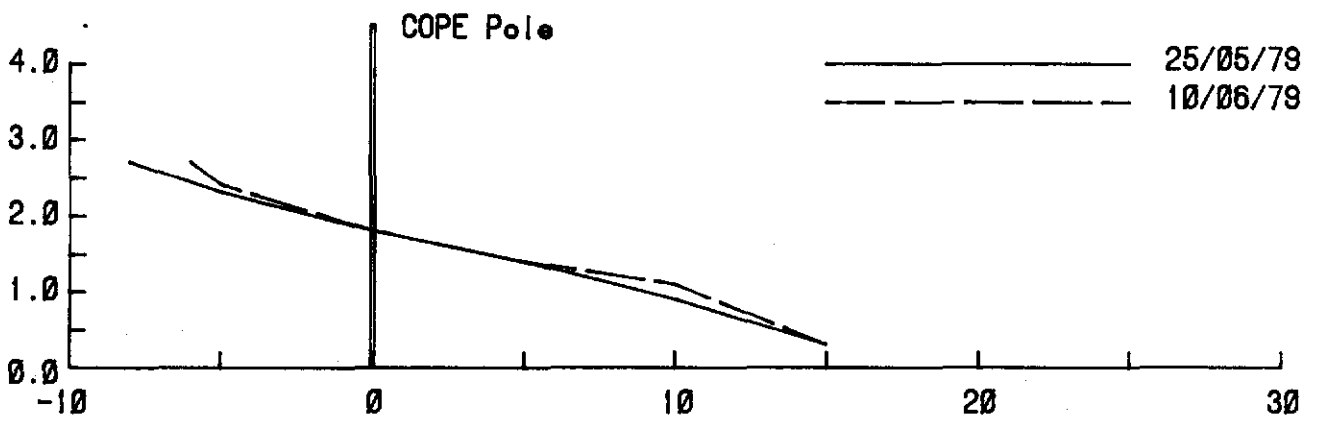
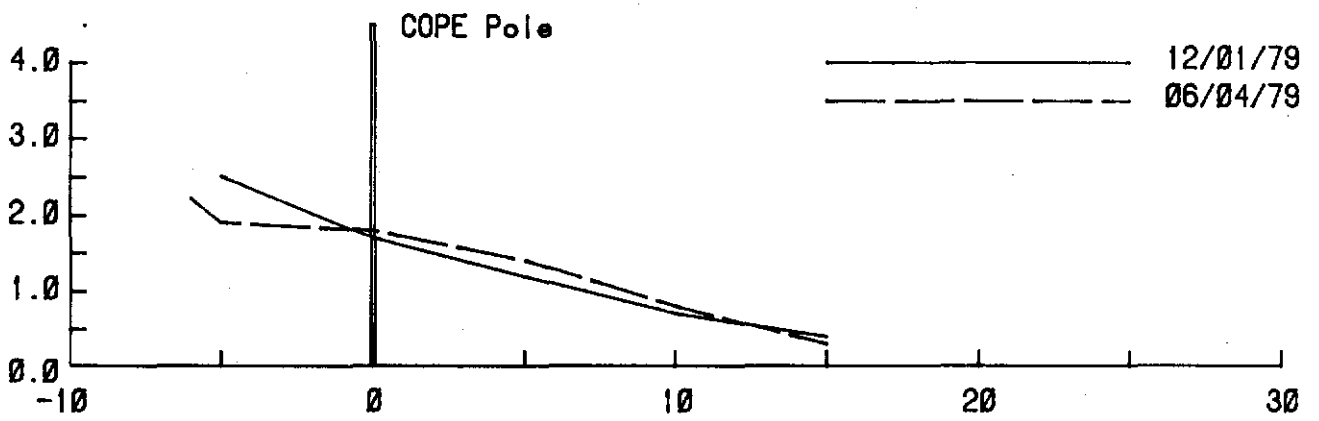
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MONTHLY BEACH PROFILES

1978

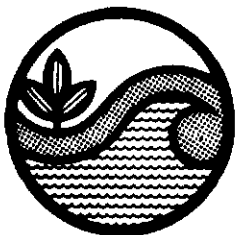
COPE
Shingly Beach

Figure 19
C 14.1



Level Datum is A.H.D.

Distances and Levels are measured in Metres



Beach Protection Authority

MONTHLY BEACH PROFILES

1979

COPE
Shingly Beach

Figure 20
C 14.1