

COASTAL OBSERVATION PROGRAMME-ENGINEERING

(COPE)

LAMMERMOOR BEACH—LIVINGSTONE SHIRE

REPORT NO. C 07.1

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COASTAL OBSERVATION PROGRAMME – ENGINEERING (COPE)

LAMMERMOOR BEACH – LIVINGSTONE SHIRE

For the Years 1975 to 1980

Beach Protection Authority

March 1984

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 Lammermoor Beach, Yeppoon in the Livingstone Shire on the Central Queensland coast. The data were recorded by volunteer observer Mr. J. Fee during the period October 1975 to the end of June 1980. The recordings were made daily during the five 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).

Coastal Observation Program - Engineering (COPE), Woodgate - Isis Shire, November 1980 (Report C 04.1).

Coastal Observation Programme - Engineering (COPE), Shelly Beach - Landsborough Shire, March 1984 (Report C 05.1).

Coastal Observation Programme - Engineering (COPE), Eurong - Maryborough City, March 1984 (Report C 06.1).

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 five year period 1975 to 1980 in a useful statistical form. No attempt has been made to interpret the observed data.

If this five 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

Lammermoor Beach is located within the Livingstone Shire, 35 kilometres north-east of Rockhampton on the central Queensland coast. It is a 3 kilometre gently curving stretch of the coastline between Wreck Point and Double Head lying in the lee of Great Keppel Island. The small settlement of Lammermoor Beach is immediately adjacent to the COPE station. The location of the Lammermoor Beach COPE station is shown in Figure 1.

2.2 Observers

This station has been manned by Mr. J. Fee during the period October 1975 to June 1980. Mr. Fee is a resident of Yeppoon and lives near the COPE station.

2.3 Observed Parameters

The observer at this station usually recorded at 7.00 a.m. daily during the five year period 1975 to 1980.

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 as presented below is essentially the same as that for Rosslyn Bay. Datum is Low Water Datum.

M.H.W.S. : 4.1 metres
 M.H.W.N. : 3.2 metres
 M.S.L. : 2.38 metres
 M.L.W.S. : 0.7 metres
 M.L.W.N. : 1.6 metres.

2.5 Description of the Beach

Lammermoor Beach is a clean sandy beach with a well formed dune system with a small residential settlement on the hind dune. It exhibits the following characteristics:-

- Typical beach slopes: foreshore slope is in the range 1 in 10 to 1 in 30.
- Beach width: typically 20 to 30 metres from dune.
- D50 sand size: 0.32 mm averaged over several years.
- Dunal system: main dune 5 to 6 metres above mean sea level. 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 fore-dune 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 Livingstone Shire Council. 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 five year period October 1975 to June 1980 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 11.
- (d) tabulation of the occurrence of various wave heights, periods, types and directions (Tables 1 to 6).

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 12 to Figure 17). 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 1.9 metre, relative to A.H.D., fixed contour level.
- distance from reference pole to the vegetation line (usually front face of fore-dune).
- 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 18 to 23 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 1975

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 SEPTEMBER														
OCTOBER	8.5	0.25	75.0	-	-	20.8	4.2	-	20.8	70.8	4.2	-	4.2	
NOVEMBER	8.9	0.37	70.0	3.3	-	23.3	3.3	-	30.0	53.3	13.3	-	3.3	
DECEMBER	6.5	0.52	61.3	9.7	-	29.0	-	-	32.3	64.5	3.2	-	-	
WHOLE YEAR	7.9	0.39	68.2	4.7	-	24.7	2.4	-	28.2	62.4	7.1	-	2.4	

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 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	8.1	0.67	52.8	13.9	-	27.8	5.6	-	8.3	80.6	5.6	-	5.6
FEBRUARY	7.0	0.53	48.3	6.9	-	44.8	-	-	10.3	89.7	-	-	-
MARCH	8.5	0.49	32.3	22.6	-	38.7	6.5	-	12.9	80.6	-	-	6.5
APRIL	7.8	0.61	38.5	15.4	-	46.2	-	-	-	100.0	-	-	-
MAY	7.9	0.42	29.4	35.3	-	29.4	5.9	-	-	94.1	-	-	5.9
JUNE	7.6	0.33	16.7	20.0	13.3	43.3	6.7	-	-	93.3	-	-	6.7
JULY	7.4	0.47	35.5	29.0	6.5	22.6	6.5	-	-	93.1	-	-	6.5
AUGUST	6.9	0.25	23.5	23.5	11.8	29.4	11.8	-	5.9	82.4	-	-	11.8
SEPTEMBER	7.1	0.26	40.0	16.7	16.7	16.7	10.0	-	20.7	69.0	-	-	10.0
OCTOBER	5.8	0.30	45.2	25.8	6.5	16.1	6.5	-	58.1	35.5	-	-	6.5
NOVEMBER	5.1	0.37	63.3	16.7	3.3	16.7	-	-	56.7	43.3	-	-	-
DECEMBER	5.5	0.42	58.6	13.8	3.4	20.7	3.4	-	44.8	51.7	-	-	3.4
WHOLE YEAR	7.0	0.44	41.5	19.3	5.0	29.1	5.0	-	19.5	74.9	0.6	-	5.0

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

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	6.5	0.52	75.0	-	6.3	18.8	-	-	31.3	62.5	6.3	-	-
FEBRUARY	6.7	0.59	55.6	3.7	7.4	29.6	3.7	-	18.5	59.3	18.5	-	3.7
MARCH	6.8	0.56	48.4	19.4	-	29.0	3.2	-	3.2	83.9	9.7	-	3.2
APRIL	6.8	0.53	42.9	14.3	-	42.9	-	-	-	75.0	25.0	-	-
MAY	8.1	0.31	-	50.0	-	50.0	-	-	18.8	81.3	-	-	-
JUNE	7.7	0.26	26.7	10.0	16.7	33.3	13.3	-	-	83.3	3.3	-	13.3
JULY	7.2	0.41	29.0	29.0	9.7	32.3	-	-	-	90.3	9.7	-	-
AUGUST	6.4	0.37	23.5	41.2	11.8	23.5	-	-	-	100.0	-	-	-
SEPTEMBER	6.3	0.32	26.7	23.3	10.0	33.3	6.7	-	16.7	66.7	10.0	-	6.7
OCTOBER	5.7	0.42	65.5	13.8	10.3	10.3	-	-	31.0	58.6	10.3	-	-
NOVEMBER	5.6	0.47	59.3	3.7	11.1	25.9	-	-	44.4	40.7	14.8	-	-
DECEMBER	5.9	0.46	25.8	6.5	6.5	61.3	-	-	35.5	54.8	9.7	-	-
WHOLE YEAR	6.6	0.44	40.3	16.6	7.7	32.9	2.6	-	16.3	70.6	10.5	-	2.6

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

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	5.9	0.34	80.0	-	-	20.0	-	-	-	33.3	66.7	-	-	-
FEBRUARY	6.9	0.56	53.6	17.9	7.1	17.9	3.6	-	-	7.1	60.7	28.6	-	3.6
MARCH	6.7	0.46	12.9	12.9	12.9	61.3	-	-	-	38.7	48.4	12.9	-	-
APRIL	7.4	0.35	23.1	34.6	11.5	30.8	-	-	-	7.7	88.5	3.8	-	-
MAY	7.5	0.36	41.2	35.3	5.9	11.8	5.9	-	-	5.9	82.4	5.9	-	5.9
JUNE	8.8	0.24	17.2	37.9	17.2	17.2	10.3	-	-	6.9	82.8	-	-	10.3
JULY	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AUGUST	7.3	0.48	-	20.0	-	80.0	-	-	-	-	80.0	20.0	-	-
SEPTEMBER	7.0	0.30	48.3	17.2	10.3	20.7	3.4	-	-	31.0	48.3	17.2	-	3.4
OCTOBER	7.7	0.57	50.0	7.7	-	42.3	-	-	-	11.5	19.2	69.2	-	-
NOVEMBER	6.8	0.42	63.3	13.3	3.3	20.0	-	-	-	36.7	30.0	33.3	-	-
DECEMBER	6.1	0.30	75.9	3.4	10.3	6.9	3.4	-	-	41.4	51.7	3.4	-	3.4
WHOLE YEAR	7.1	0.39	44.2	18.1	8.3	26.8	2.6	-	-	22.3	56.6	18.5	-	2.6

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

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	7.0	0.52	43.8	12.5	-	37.5	6.3	-	31.3	25.0	37.5	-	6.3
FEBRUARY	8.0	0.64	67.9	7.1	-	25.0	-	-	14.3	25.0	60.7	-	-
MARCH	6.6	0.33	60.7	7.1	3.6	21.4	7.1	-	21.4	46.4	25.0	-	7.1
APRIL	7.5	0.32	48.3	17.2	3.4	31.0	-	-	20.7	55.2	24.1	-	-
MAY	8.6	0.32	30.0	30.0	10.0	20.0	10.0	-	-	60.0	30.0	-	10.0
JUNE	7.4	0.32	46.2	19.2	3.8	30.8	-	-	7.7	57.7	34.6	-	-
JULY	7.6	0.30	18.5	51.9	7.4	18.5	3.7	-	7.4	51.9	37.0	-	3.7
AUGUST	6.8	0.18	13.3	26.7	13.3	33.3	13.3	-	46.7	33.3	6.7	-	13.3
SEPTEMBER	6.6	0.33	72.4	6.9	6.9	10.3	3.4	-	34.5	34.5	27.6	-	3.4
OCTOBER	6.5	0.33	70.4	3.7	7.4	14.8	3.7	-	33.3	44.4	18.5	-	3.7
NOVEMBER	6.3	0.37	92.3	-	-	7.7	-	-	57.7	15.4	26.9	-	-
DECEMBER	6.4	0.37	96.7	-	-	3.3	-	-	66.7	16.7	16.7	-	-
WHOLE YEAR	7.0	0.36	59.1	13.7	4.1	19.9	3.1	-	29.6	38.1	29.2	-	3.1

SP - Spilling

PL - Plunging

SP/PL - Combined Spilling and Plunging

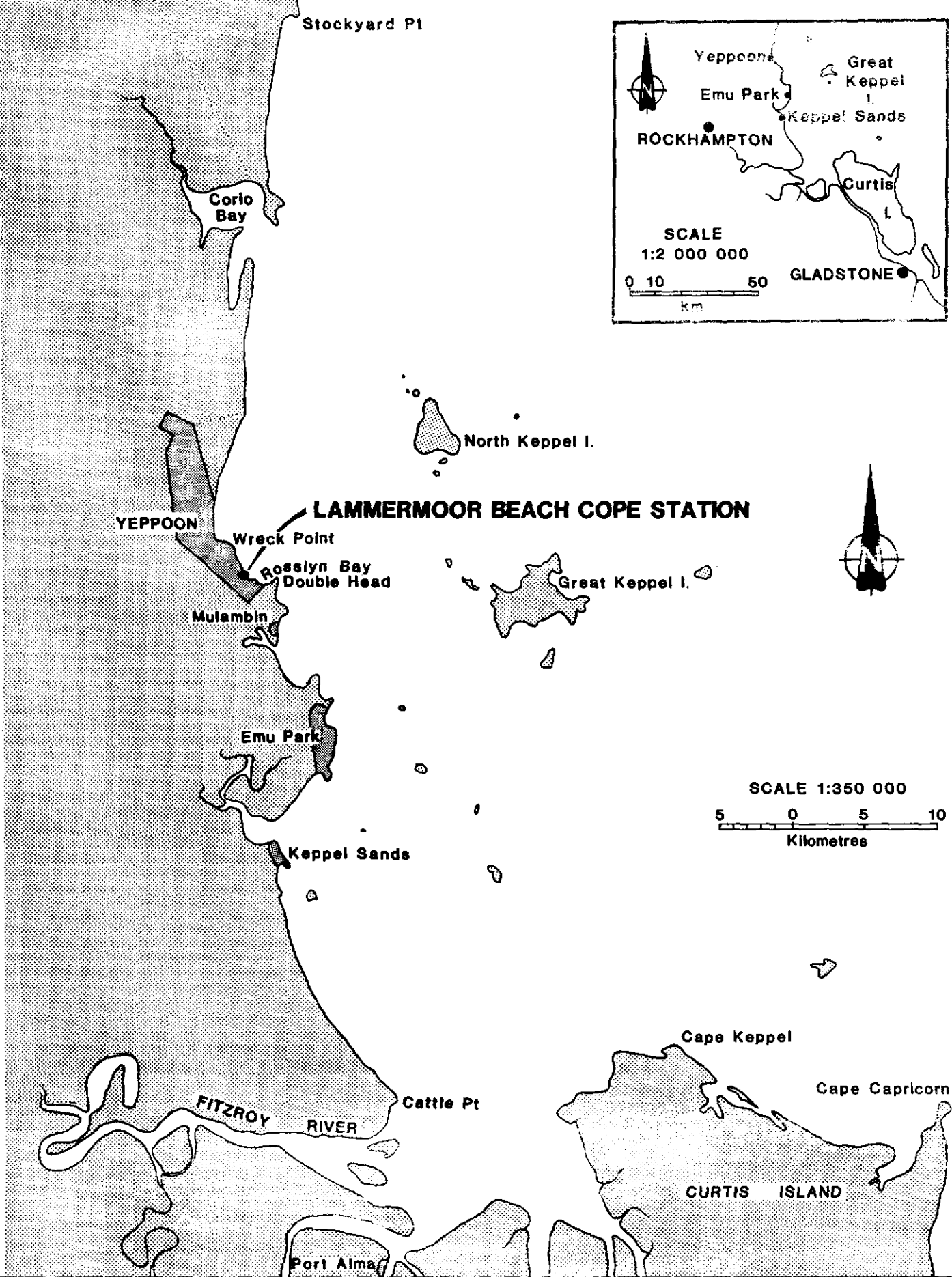
TABLE 6

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

YEAR 1980

MONTH	MEAN WAVE PERIOD (Sec)	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	6.3	0.31	37.5	62.5	-	-	-	-	-	75.0	25.0	-	-
FEBRUARY	8.0	0.52	57.1	28.6	3.6	10.7	-	-	14.3	39.3	46.4	-	-
MARCH	7.1	0.31	66.7	11.1	3.7	18.5	-	-	14.8	48.1	37.0	-	-
APRIL	6.8	0.31	72.4	-	3.4	10.3	13.8	-	10.3	27.6	48.3	-	13.8
MAY	7.2	0.26	85.7	-	14.3	-	-	-	14.3	85.7	-	-	-
JUNE	7.1	0.20	57.7	-	7.7	7.7	26.9	-	3.8	26.9	42.3	-	26.9
JULY													
AUGUST													
SEPTEMBER													
OCTOBER													
NOVEMBER													
DECEMBER													
WHOLE YEAR	7.2	0.32	62.2	12.8	4.8	10.4	8.8	-	10.4	40.8	40.0	-	8.8

SP - Spilling
PL - Plunging
SP/PL - Combination of Spilling and Plunging



LAMMERMOOR BEACH COPE STATION

COPE

Lammermoor Beach

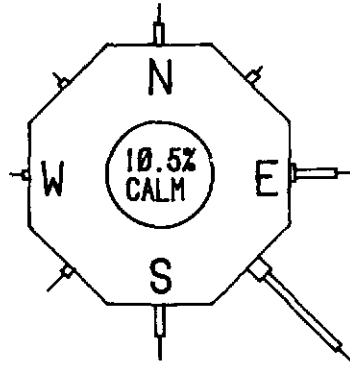
LOCALITY PLAN

Figure 1
C 07.1



Beach Protection Authority

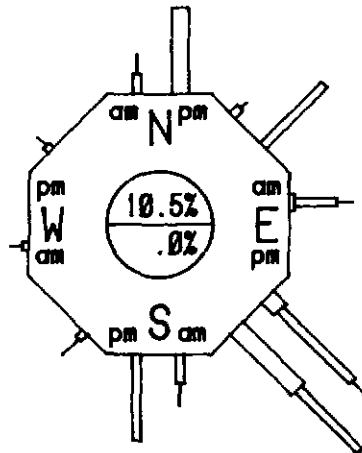
ALL OBSERVATIONS



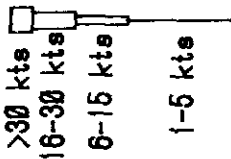
Total No. of Observations : 1414

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 : 1409

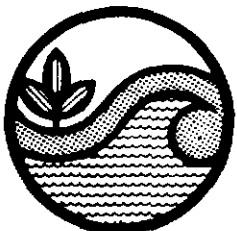
No. of Afternoon Observations : 5

SCALE

Mean Time :- Morning Obs : 0700 hrs

Mean Time :- Afternoon Obs : 1535 hrs

WIND DATA - OCT 1975 to JUNE 1980

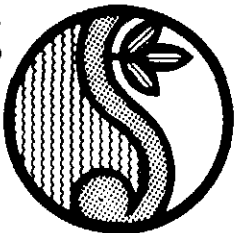


Beach Protection Authority

WIND DATA

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Figure 2
 C 07.1

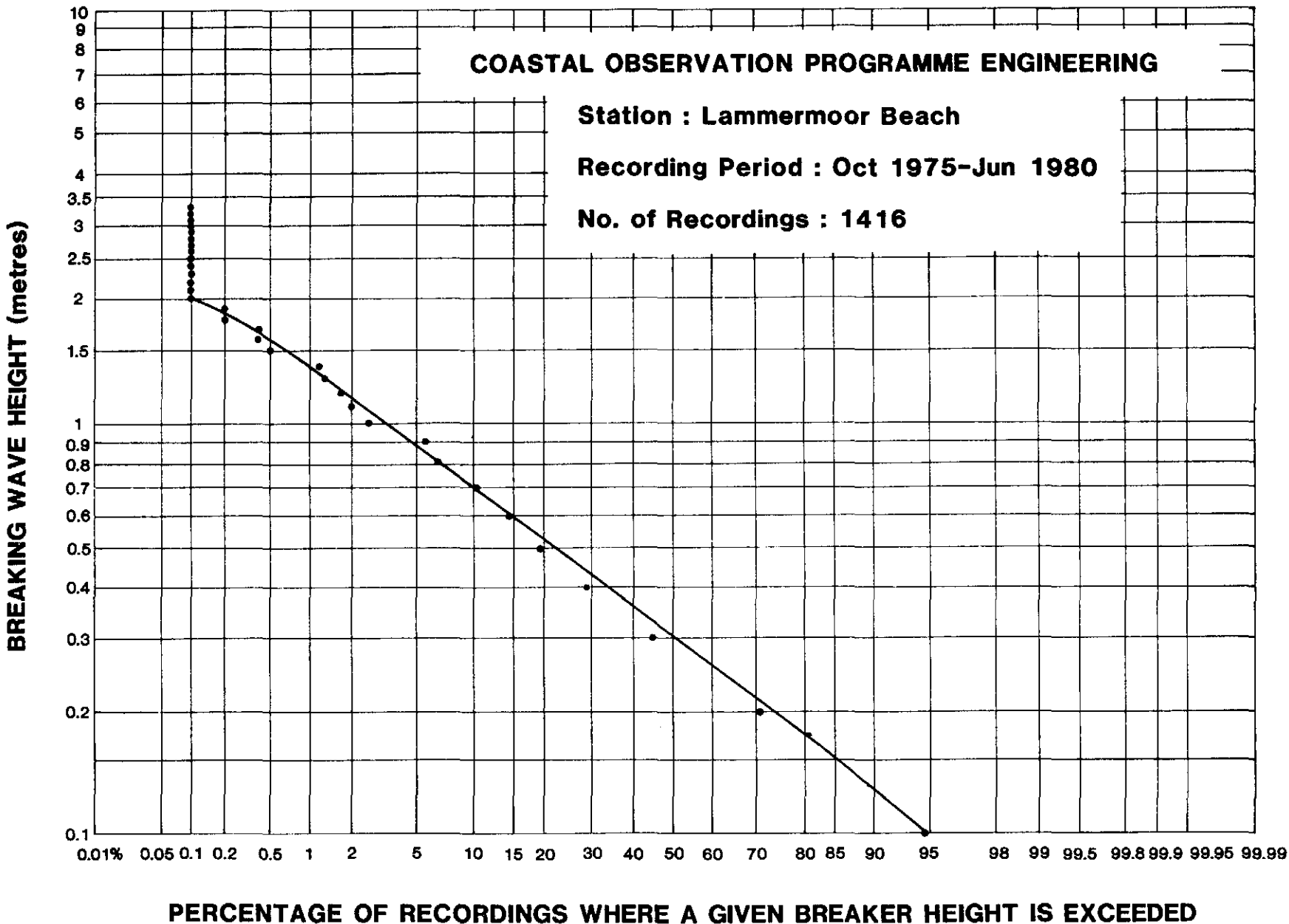


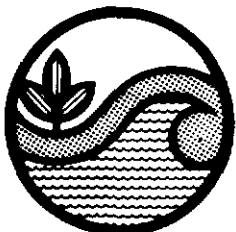
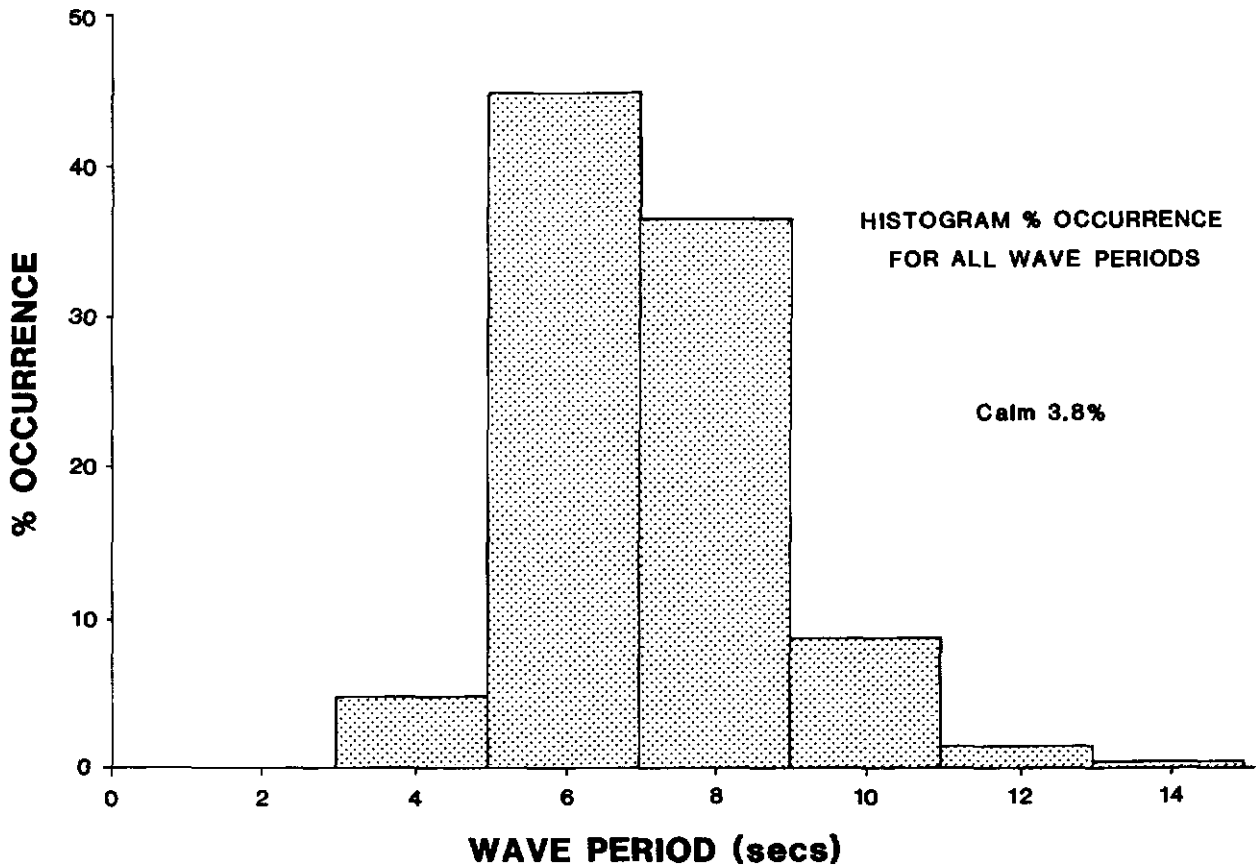
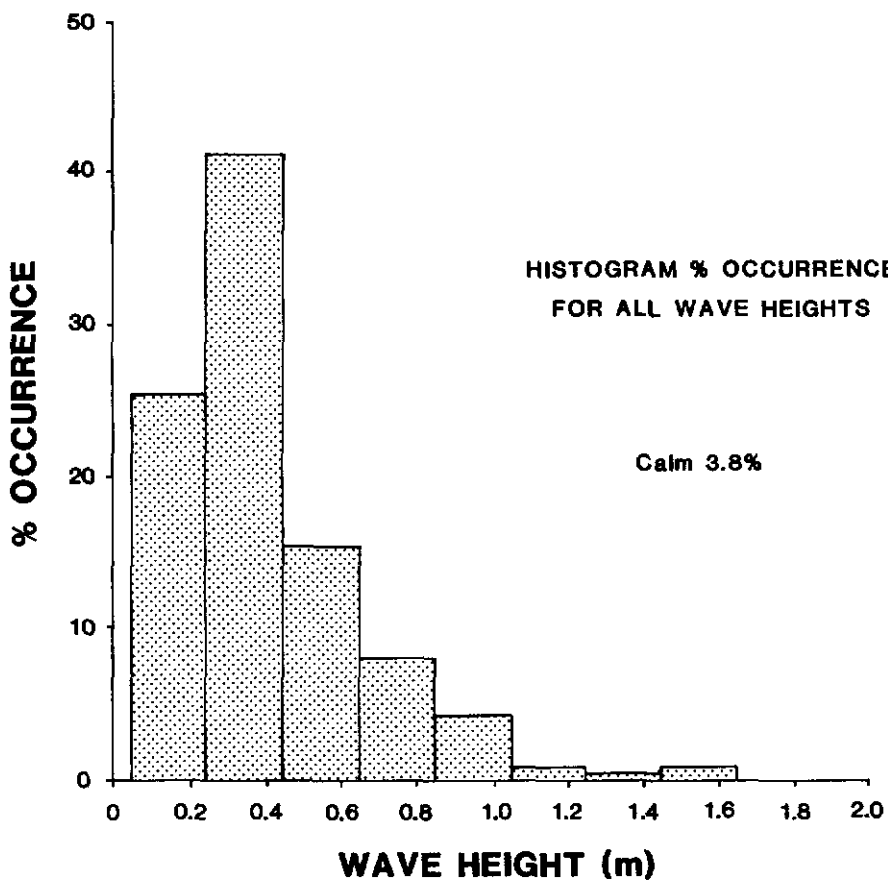
**WAVE HEIGHT % EXCEEDANCE
ALL DATA**

Lammermoor Beach

COPE

Figure 3
C 07.1



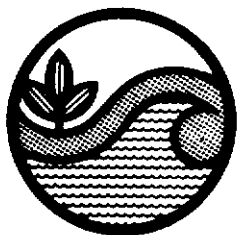
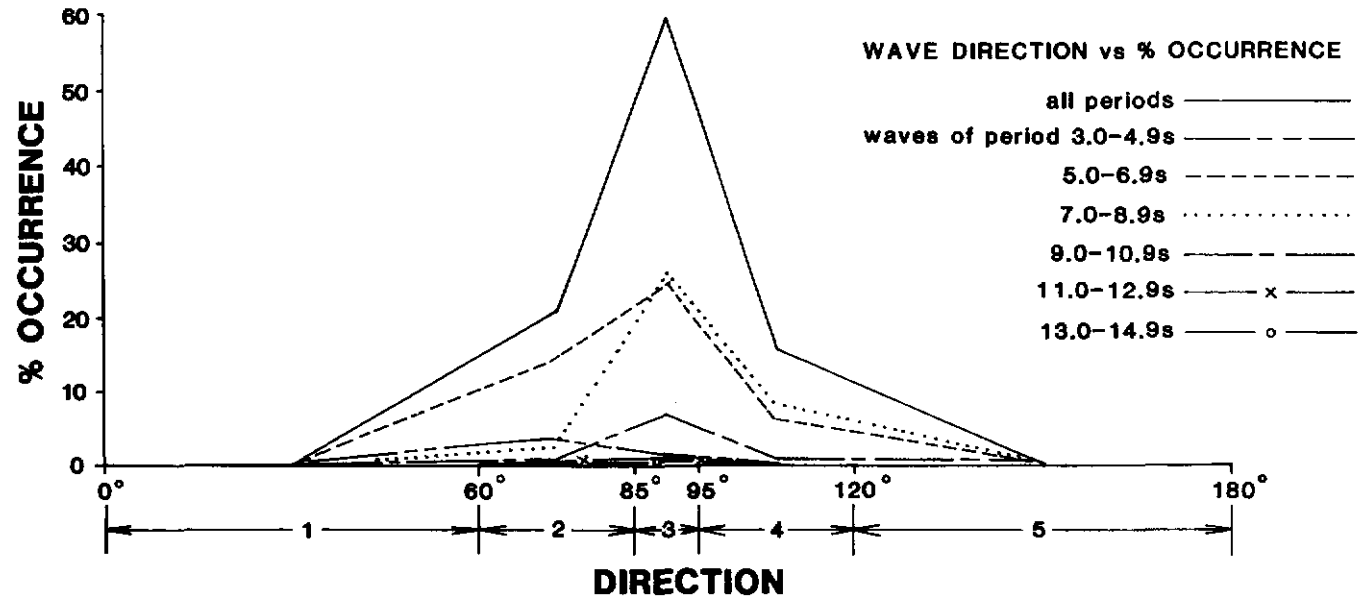
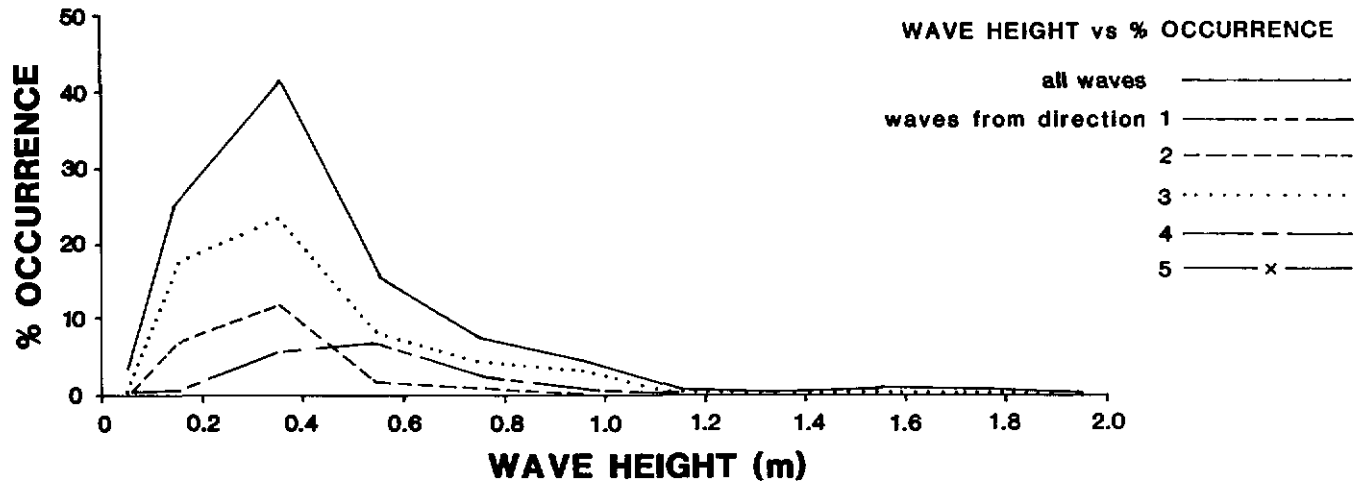
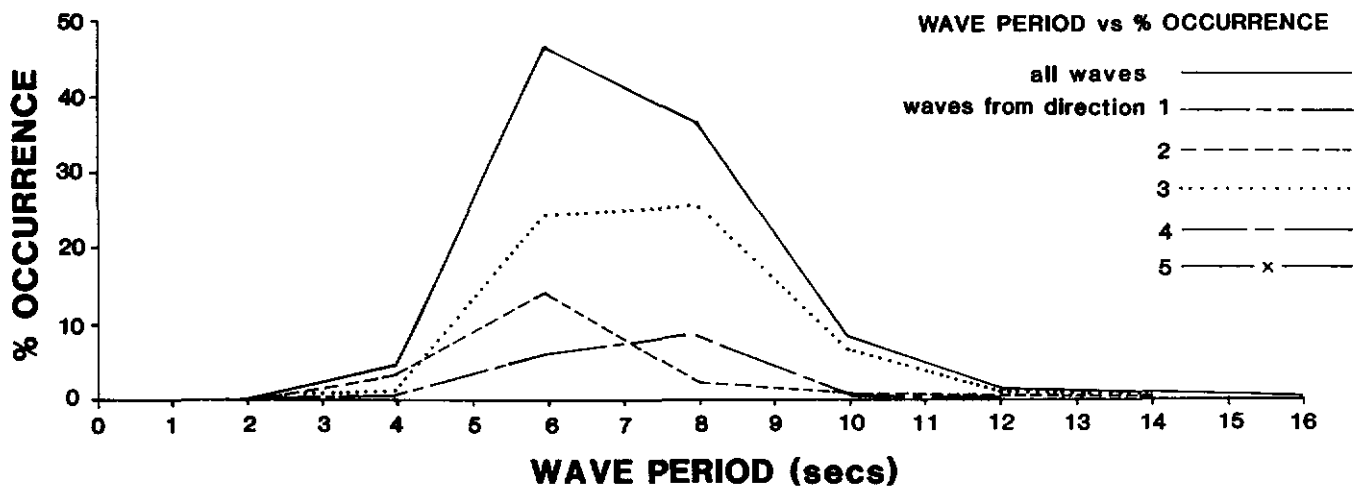


Beach Protection Authority

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

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Lammermoor Beach**

Figure 4
C 07.1



Beach Protection Authority

**WAVE DIRECTION ANALYSIS
ALL DATA**

COPE
Lammermoor Beach

Figure 5
C 07.1



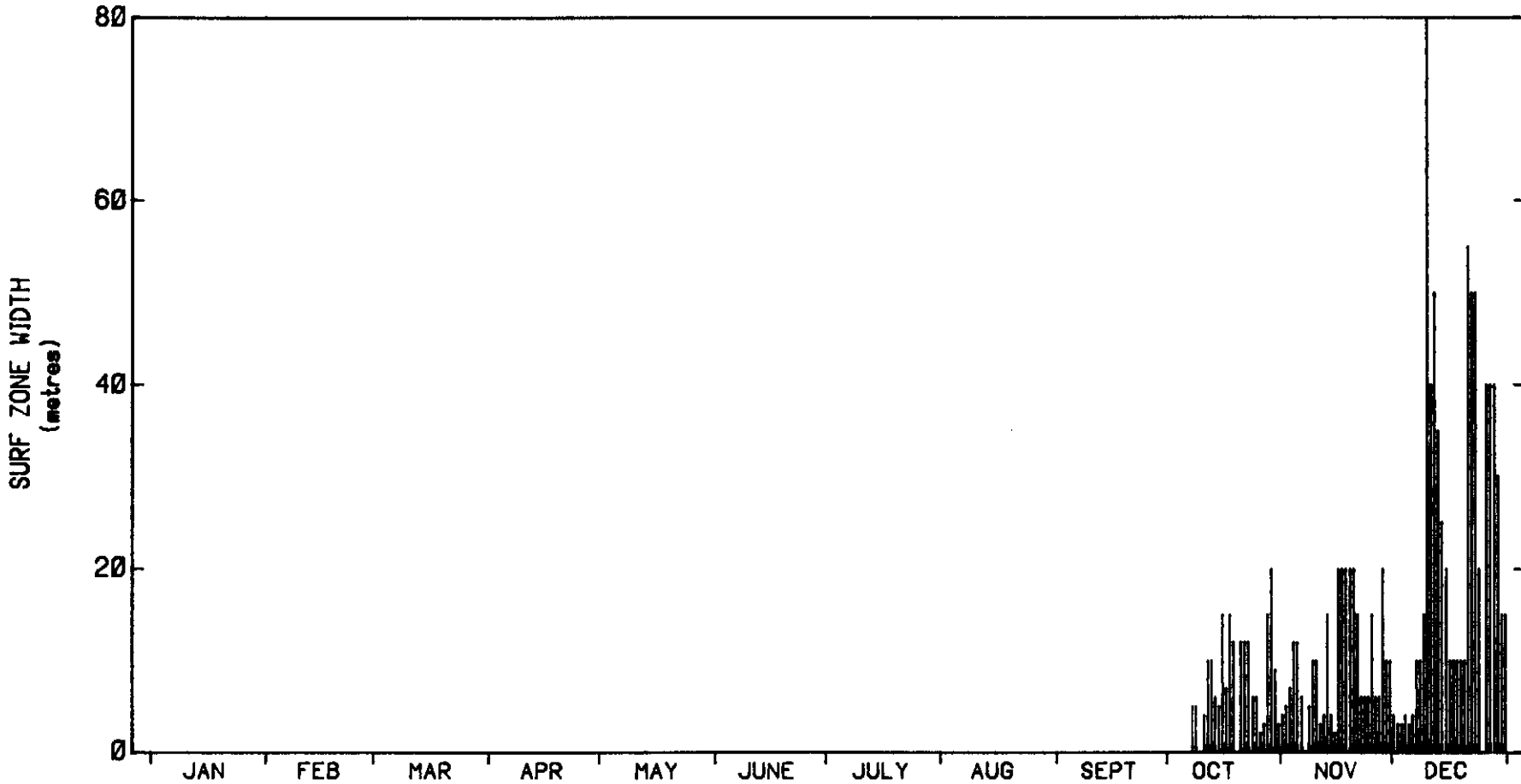
SURF ZONE WIDTH - MORNING 1975

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1602



SURF ZONE WIDTH SUMMARY - 1975

No. of Observations : 83

MORNING OBSERVATIONS

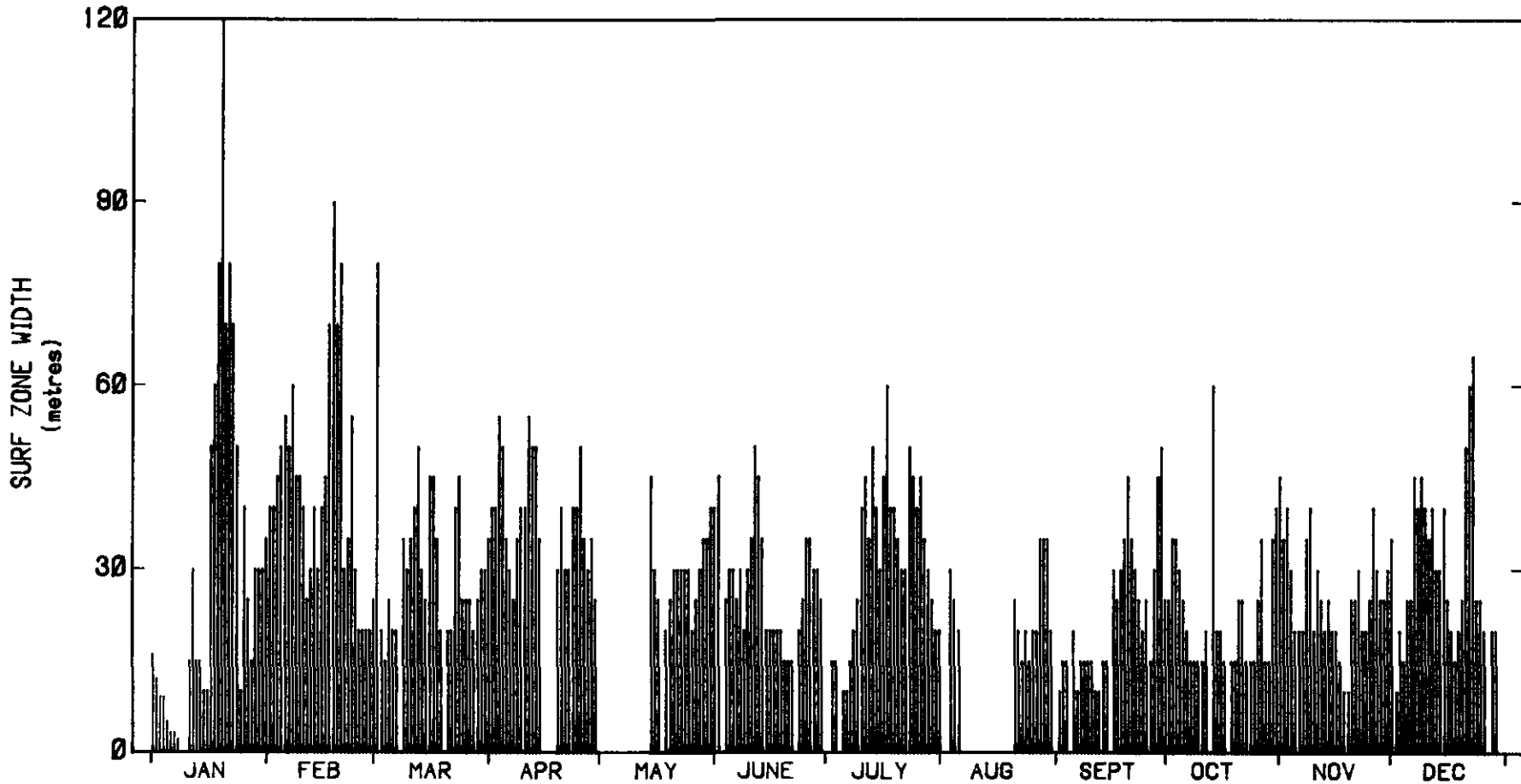
Mean Surf Zone Width = 14.5 m

Figure 6
C 07.1

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Lammermoor Beach



SURF ZONE WIDTH - MORNING 1976



SURF ZONE WIDTH SUMMARY - 1976

No. of Observations : 334

MORNING OBSERVATIONS

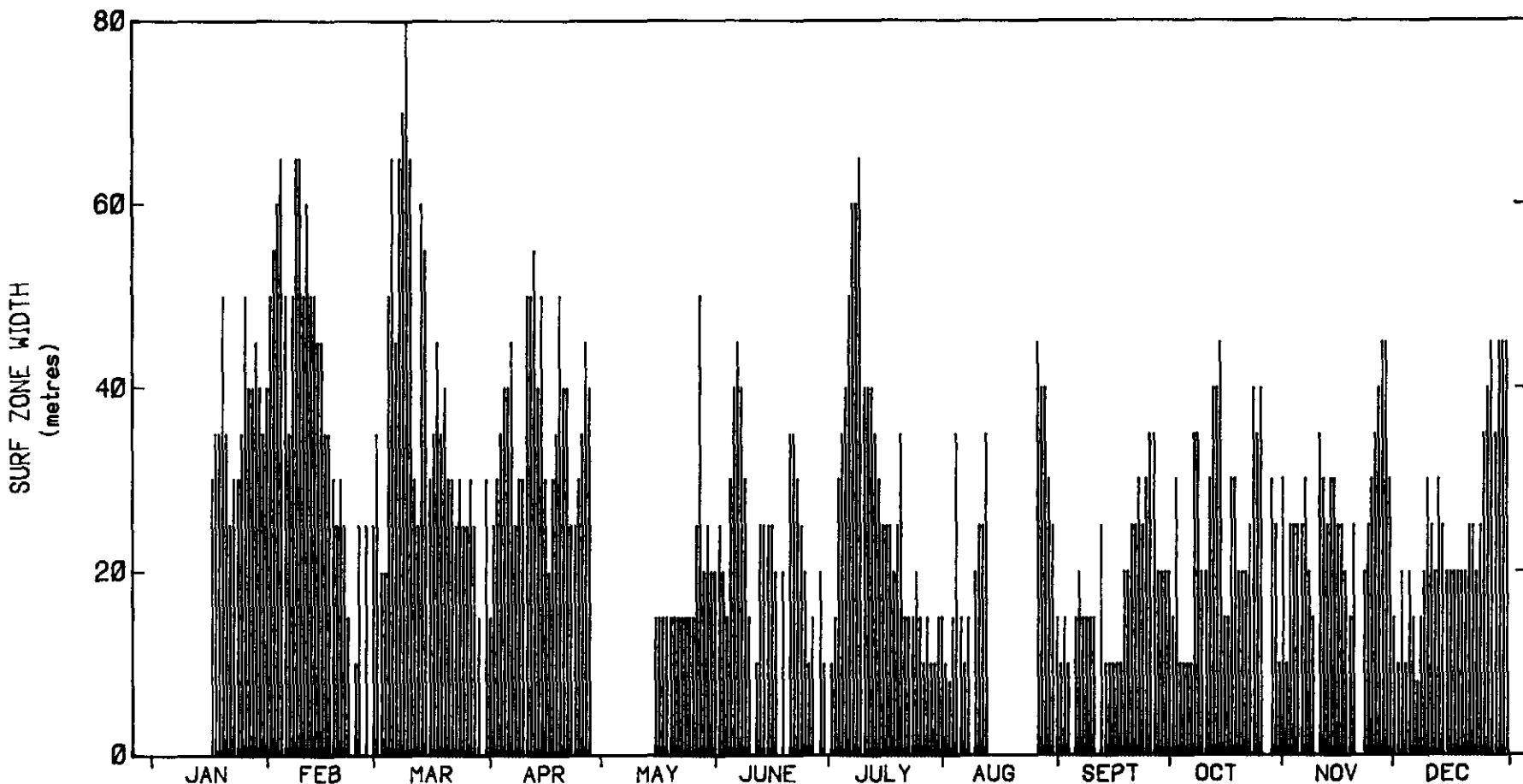
Mean Surf Zone Width = 29.0 m

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Lammermoor Beach

Figure 7
C 07.1



SURF ZONE WIDTH - MORNING 1977



SURF ZONE WIDTH SUMMARY - 1977

No. of Observations : 313

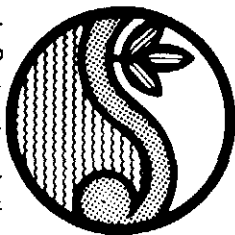
MORNING OBSERVATIONS

Mean Surf Zone Width = 28.1 m

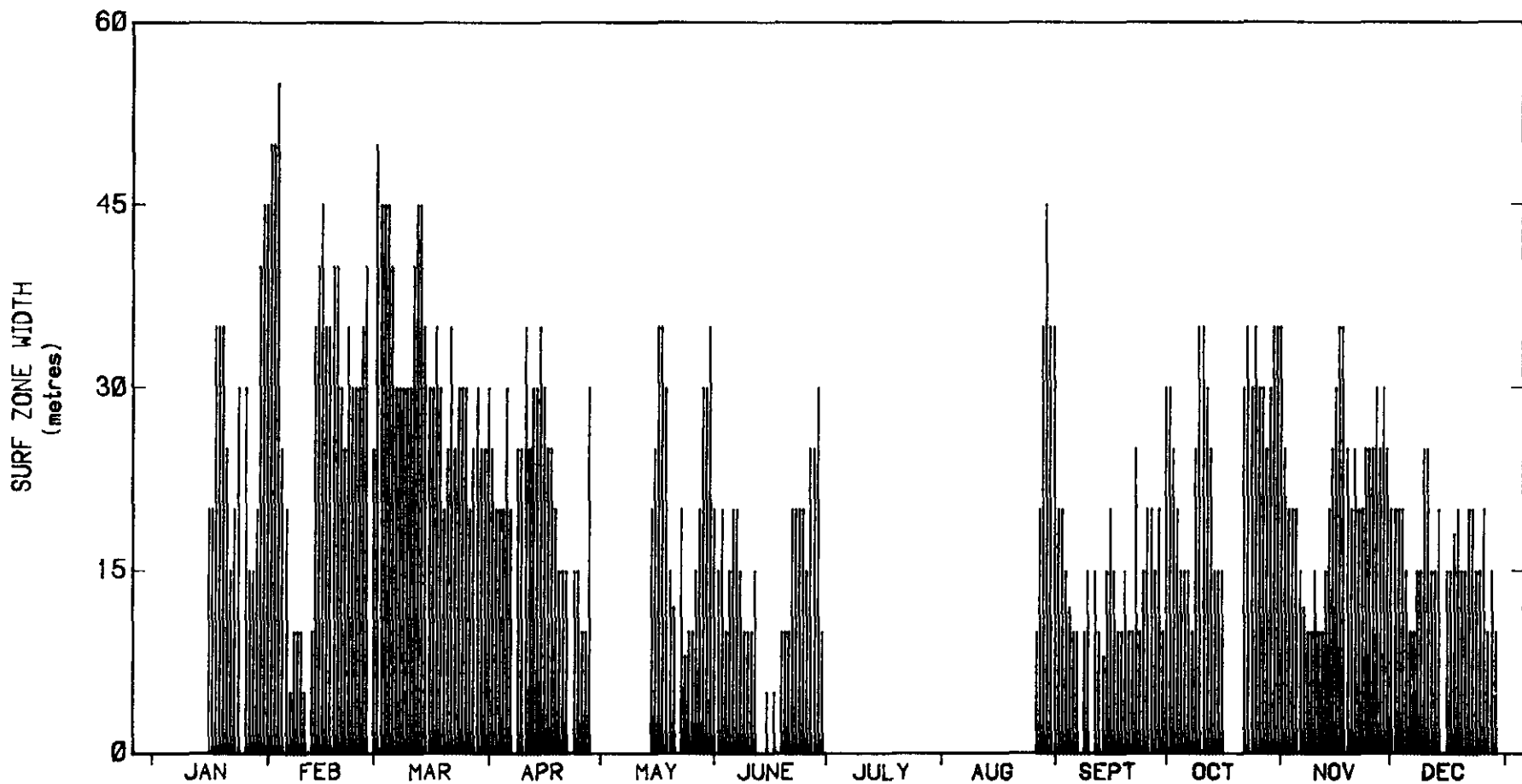
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Figure 8

C 07.1



SURF ZONE WIDTH - MORNING 1978



SURF ZONE WIDTH SUMMARY - 1978

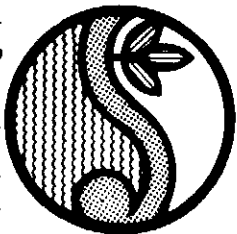
No. of Observations : 265

MORNING OBSERVATIONS

Mean Surf Zone Width = 22.4 m

Figure 9
C 07.1

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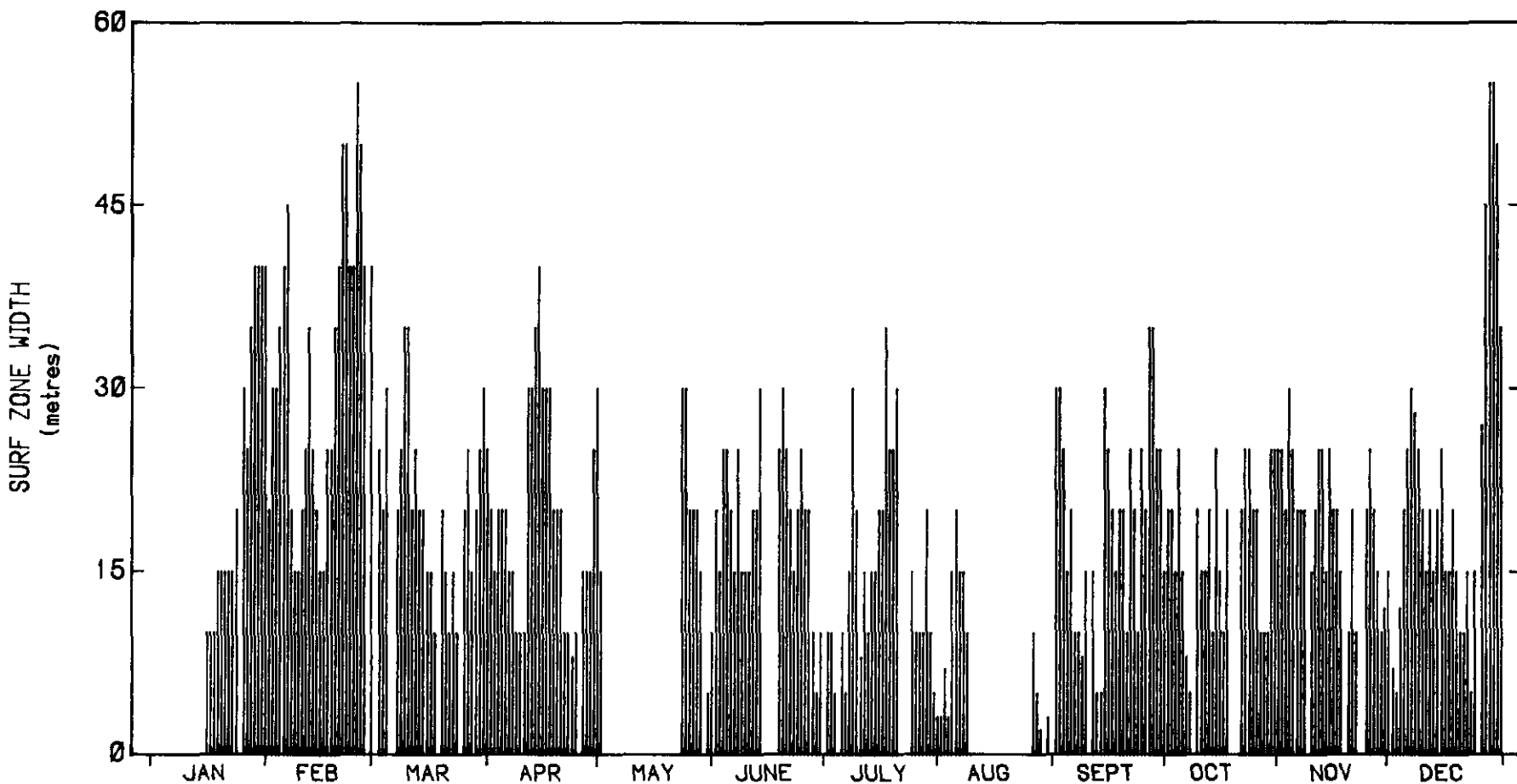
SURF ZONE WIDTH - MORNING 1979

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SURF ZONE WIDTH SUMMARY - 1979

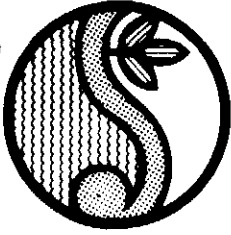
No. of Observations : 292

MORNING OBSERVATIONS

Mean Surf Zone Width = 19.7 m

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Lammermoor Beach

Figure 10
C 07.1



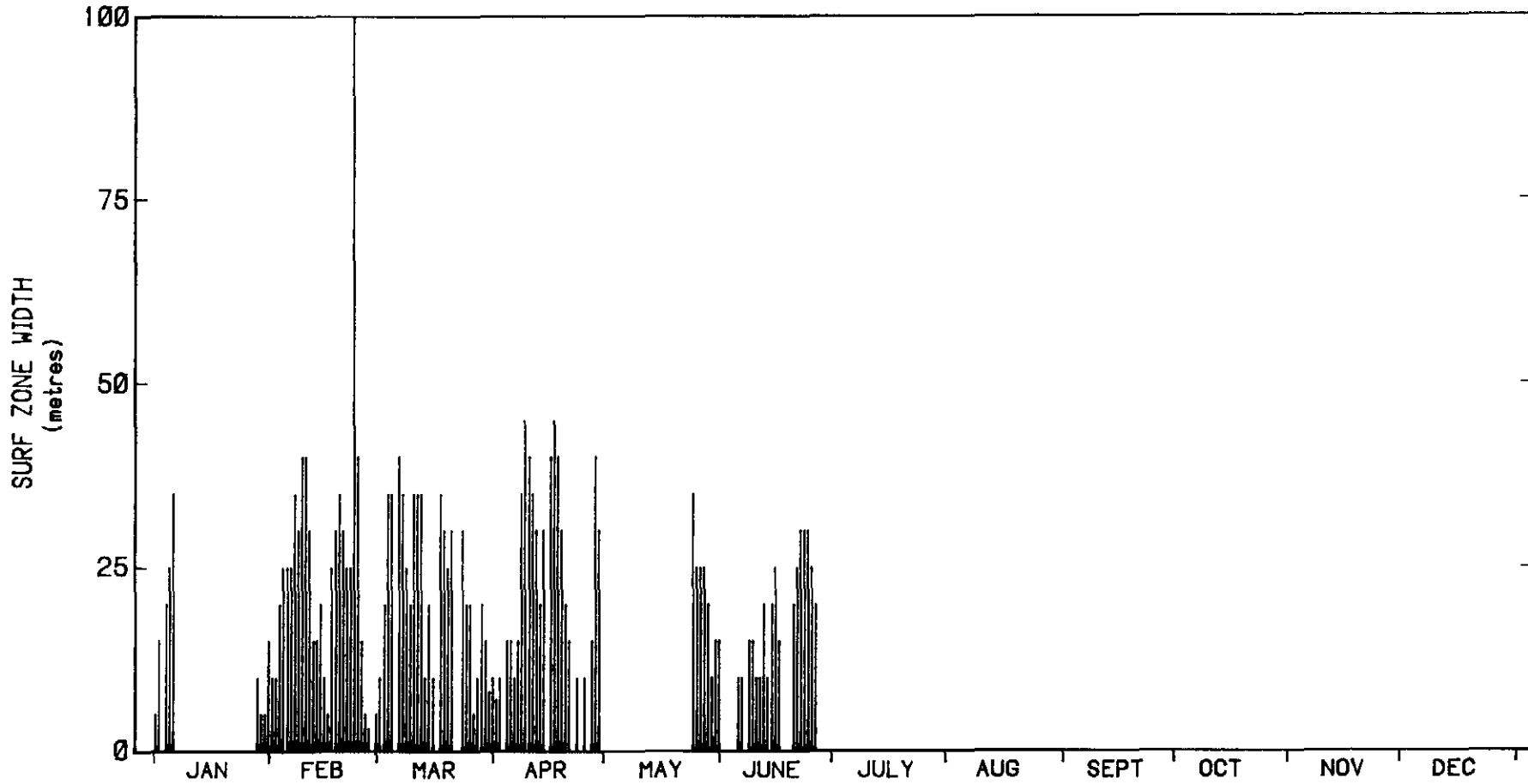
SURF ZONE WIDTH - MORNING 1980

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SURF ZONE WIDTH SUMMARY - 1980

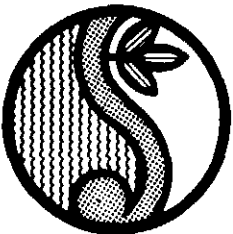
No. of Observations : 125

MORNING OBSERVATIONS

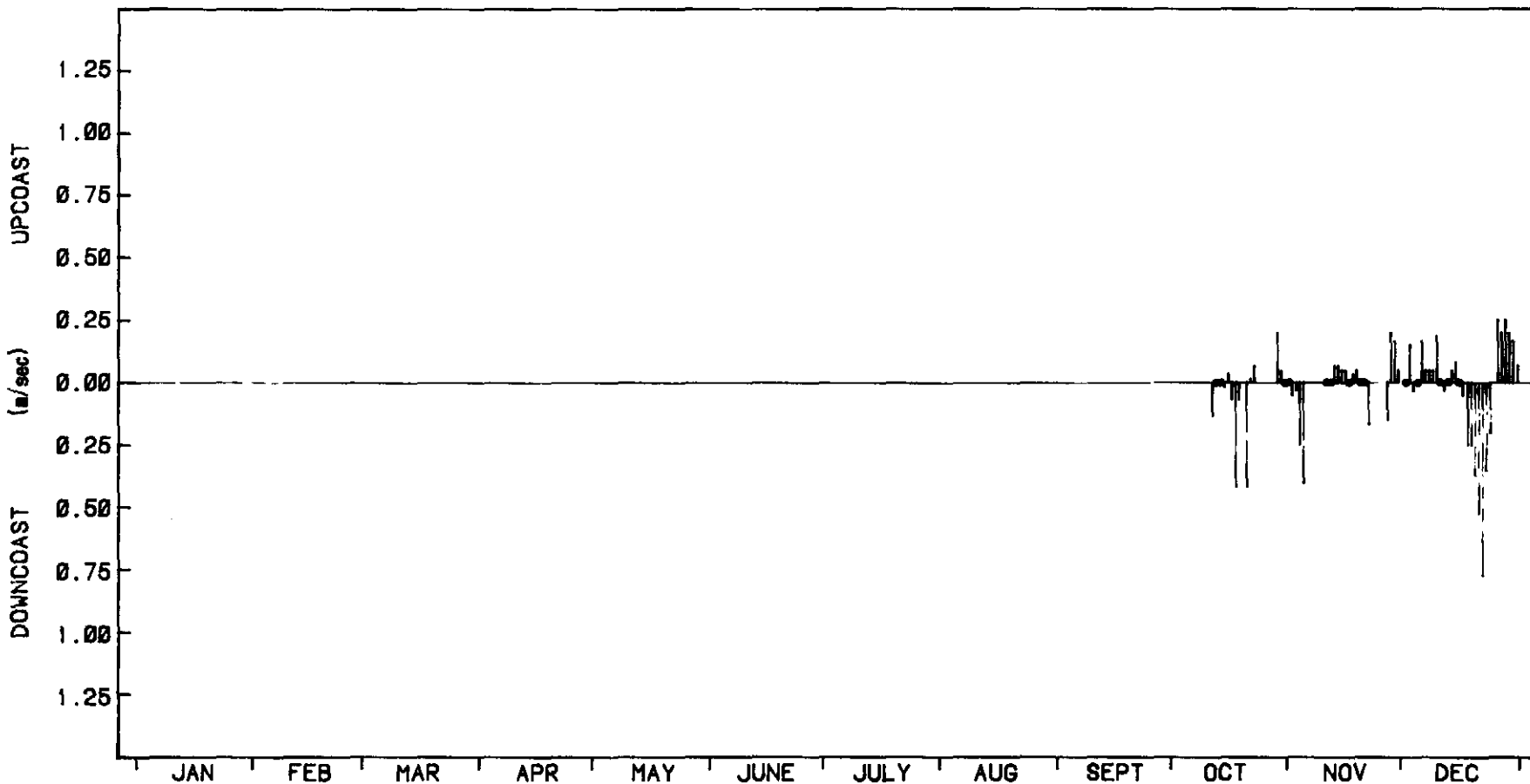
Mean Surf Zone Width = 20.5 m

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Figure 11
C 07.1



LITTORAL CURRENTS - MORNING 1975



LITTORAL CURRENT SUMMARY - 1975

Mean Vel = -.031 m/sec (down)

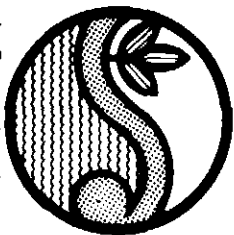
Mean Upcoast Vel = 0.108 m/sec

Mean Downcoast Vel = 0.227 m/sec

MORNING OBSERVATIONS - (64 recordings)

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Lammermoor Beach

Figure 12
C 07.1



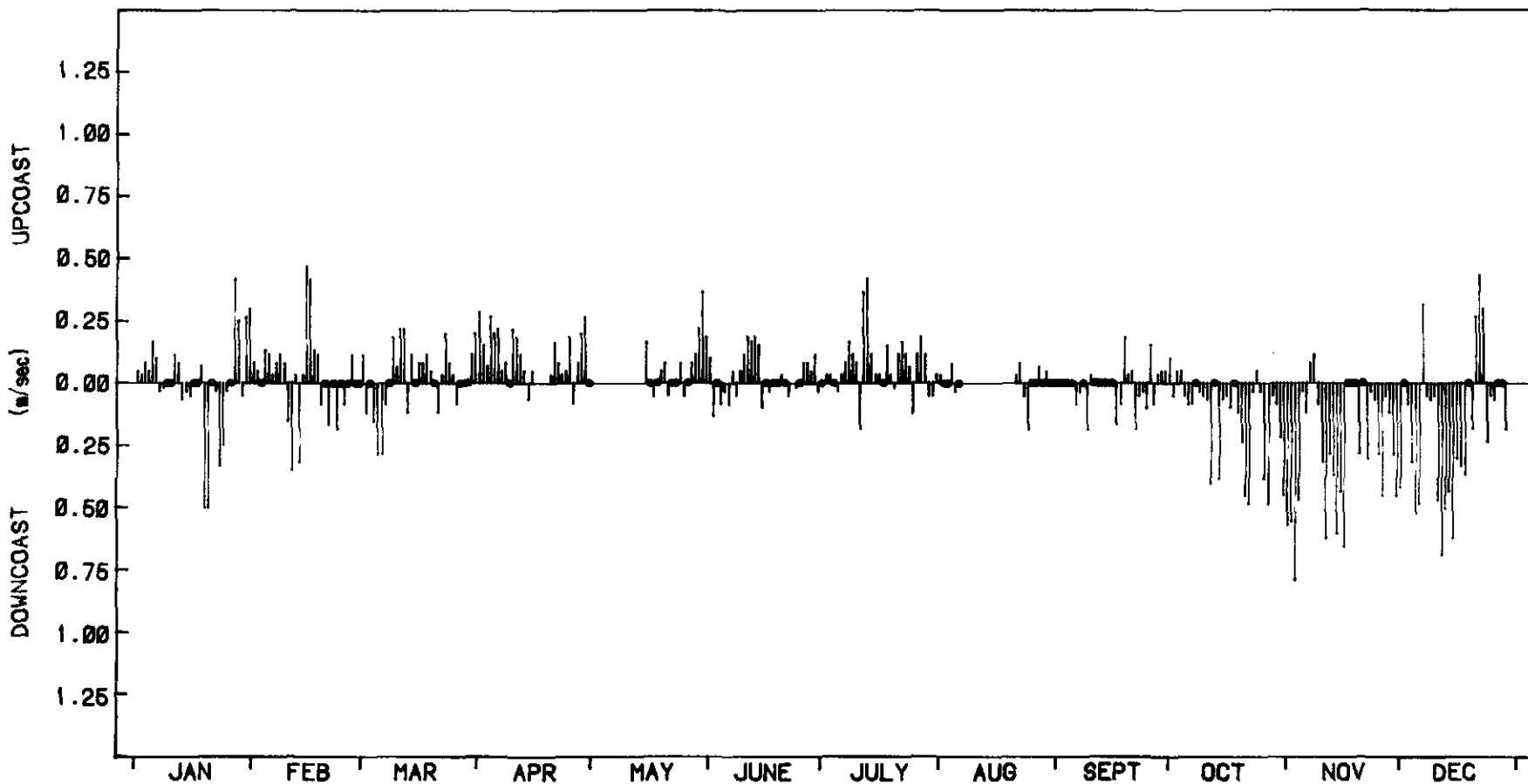
LITTORAL CURRENTS - MORNING 1976

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LITTORAL CURRENT SUMMARY - 1976

Mean Vel = -.028 m/sec (down)

Mean Upcoast Vel = 0.127 m/sec

Mean Downcoast Vel = 0.201 m/sec

MORNING OBSERVATIONS - (331 recordings)

COPE

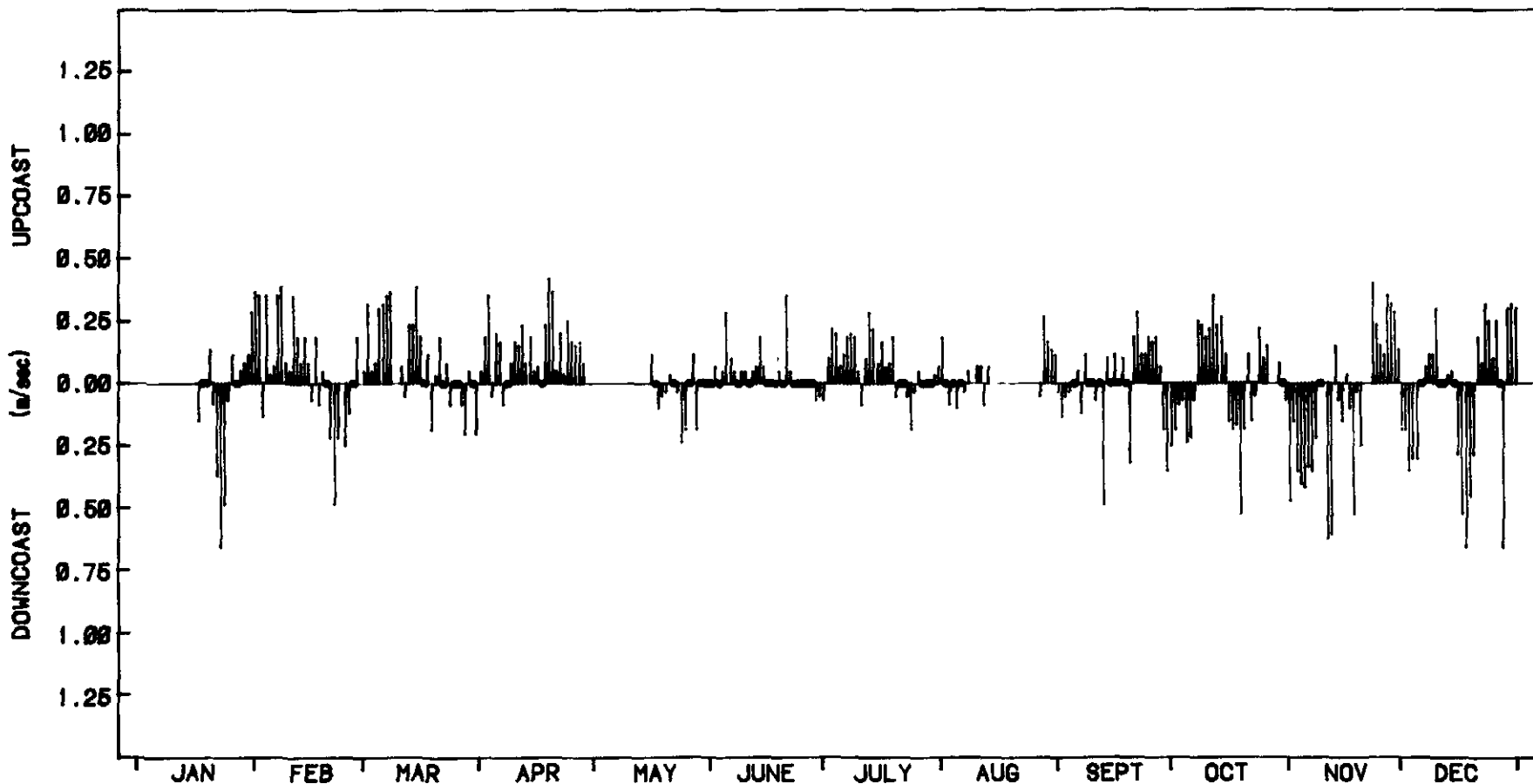
Lammermoor Beach

Figure 13

C 07.1



LITTORAL CURRENTS - MORNING 1977



LITTORAL CURRENT SUMMARY - 1977

Mean Vel = 0.022 m/sec (up)

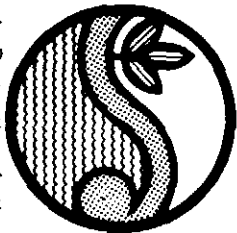
Mean Upcoast Vel = 0.163 m/sec

Mean Downcoast Vel = 0.206 m/sec

MORNING OBSERVATIONS - (311 recordings)

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Figure 14
C 07.1



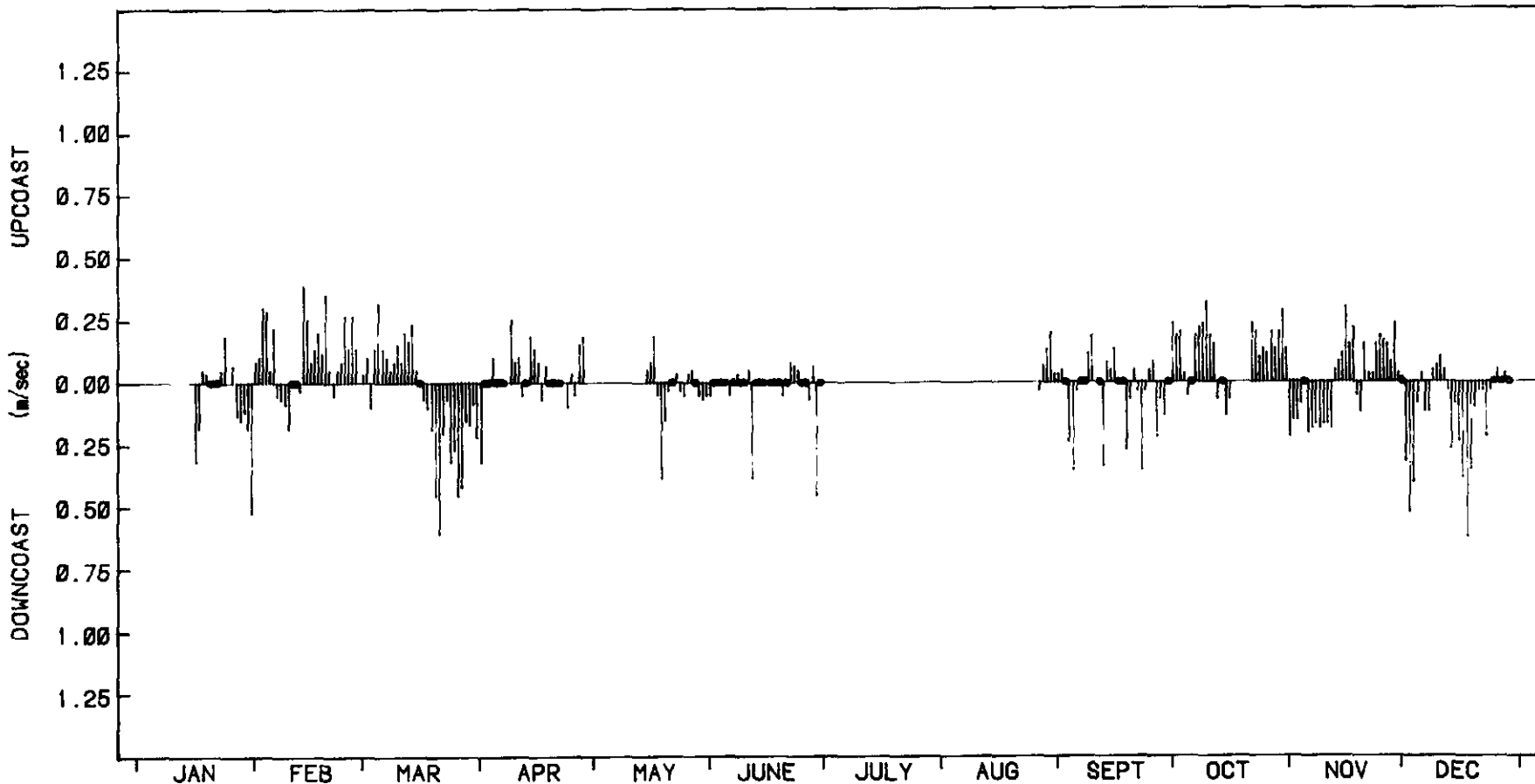
LITTORAL CURRENTS - MORNING 1978

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LITTORAL CURRENT SUMMARY - 1978

Mean Vel = -.006 m/sec (down)

Mean Upcoast Vel = 0.129 m/sec

Mean Downcoast Vel = 0.173 m/sec

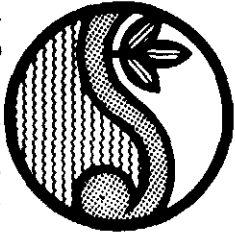
MORNING OBSERVATIONS - (265 recordings)

COPE

Lammermoor Beach

Figure 15

C 07.1



LITTORAL CURRENTS - MORNING 1979

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Lammermoor Beach

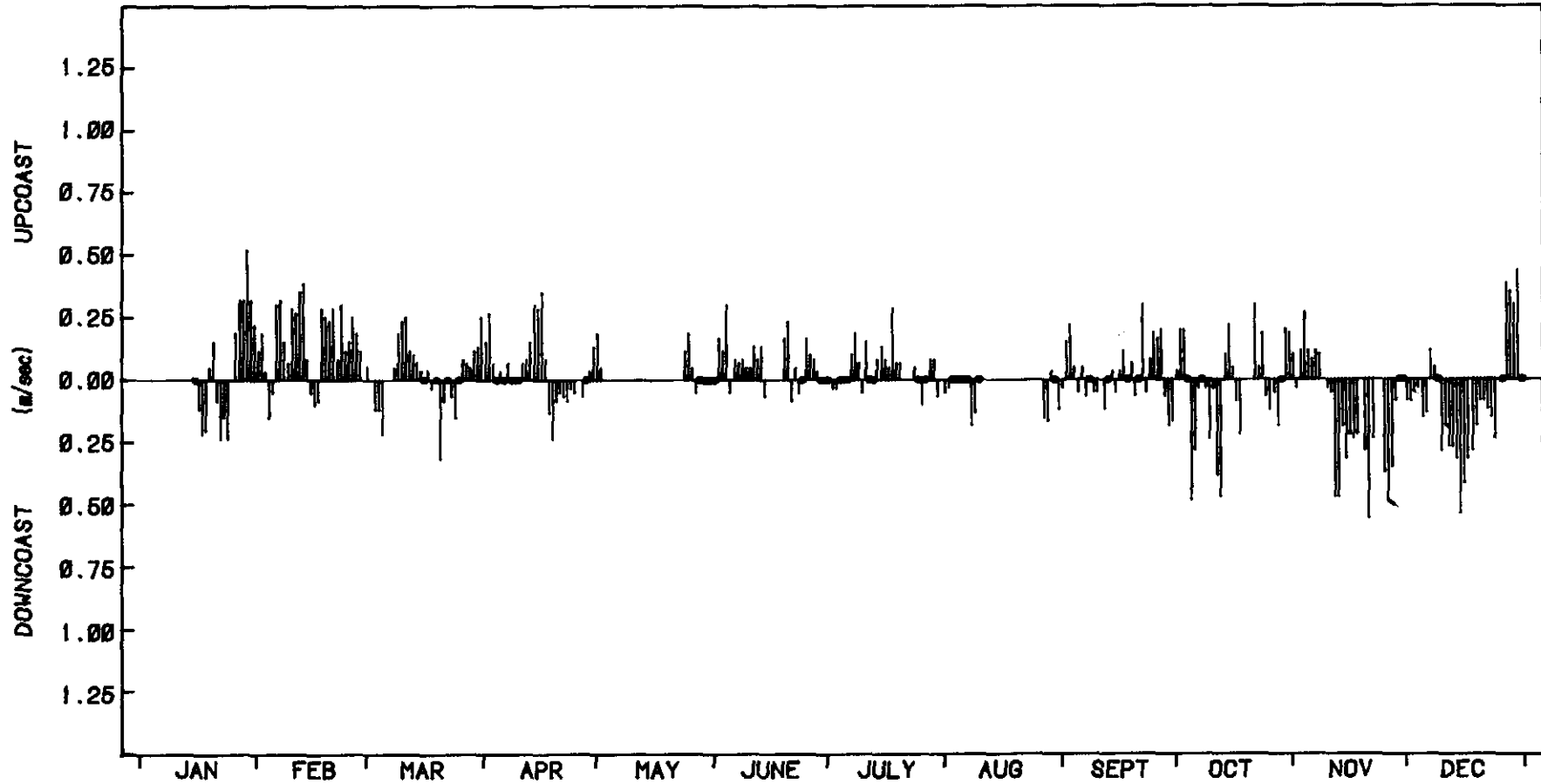
Figure 16
C 07.1

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1602



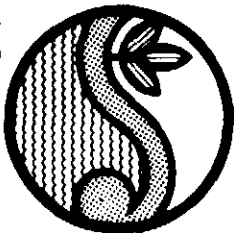
LITTORAL CURRENT SUMMARY - 1979

Mean Vel = 0.012 m/sec (up)

Mean Upcoast Vel = 0.153 m/sec

Mean Downcoast Vel = 0.158 m/sec

MORNING OBSERVATIONS - (292 recordings)



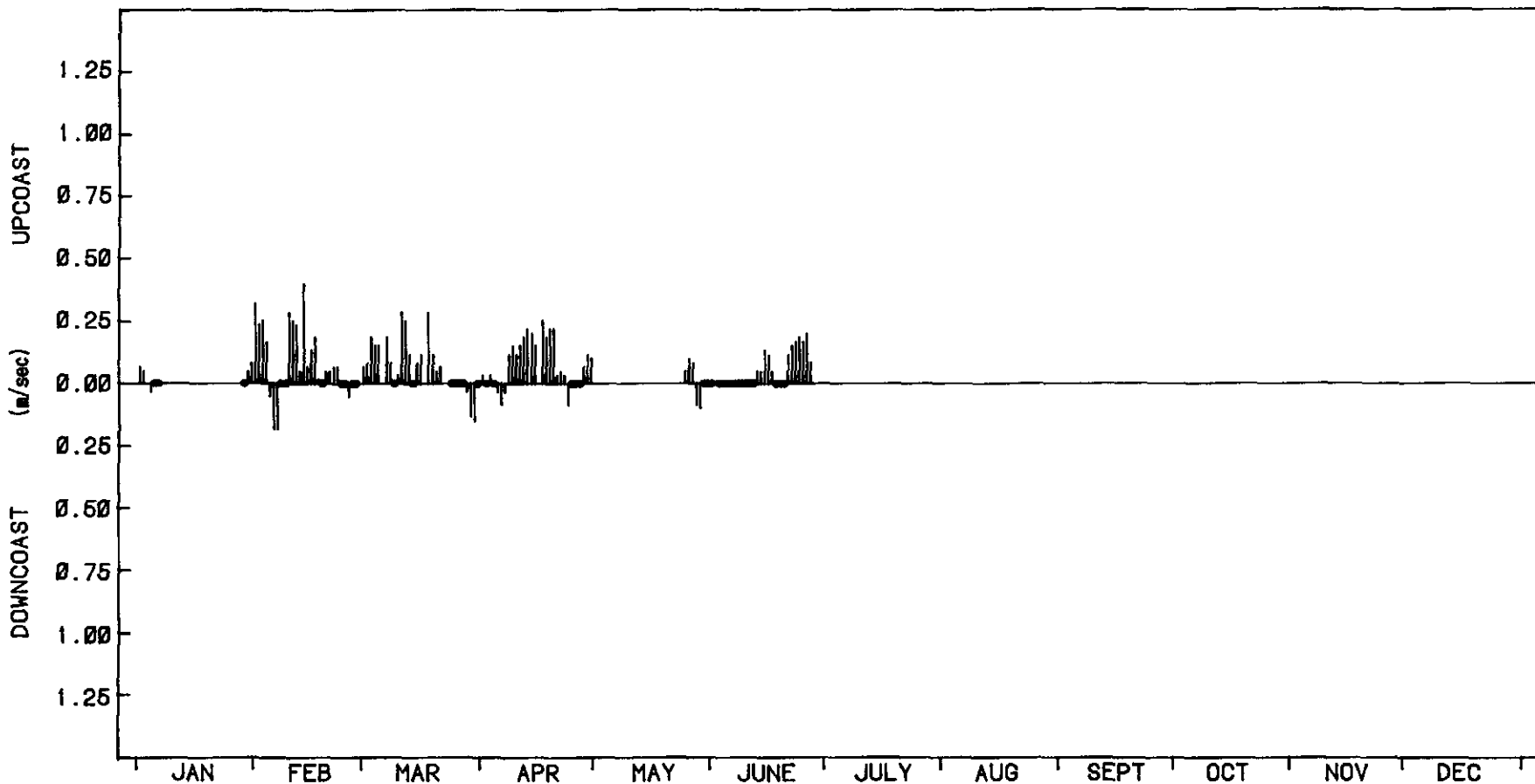
LITTORAL CURRENTS - MORNING 1980

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LITTORAL CURRENT SUMMARY - 1980

Mean Vel = 0.068 m/sec (up)

Mean Upcoast Vel = 0.133 m/sec

Mean Downcoast Vel = 0.088 m/sec

MORNING OBSERVATIONS - (125 recordings)

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Figure 17
C 07.1



BEACH PROFILE PARAMETERS - 1975

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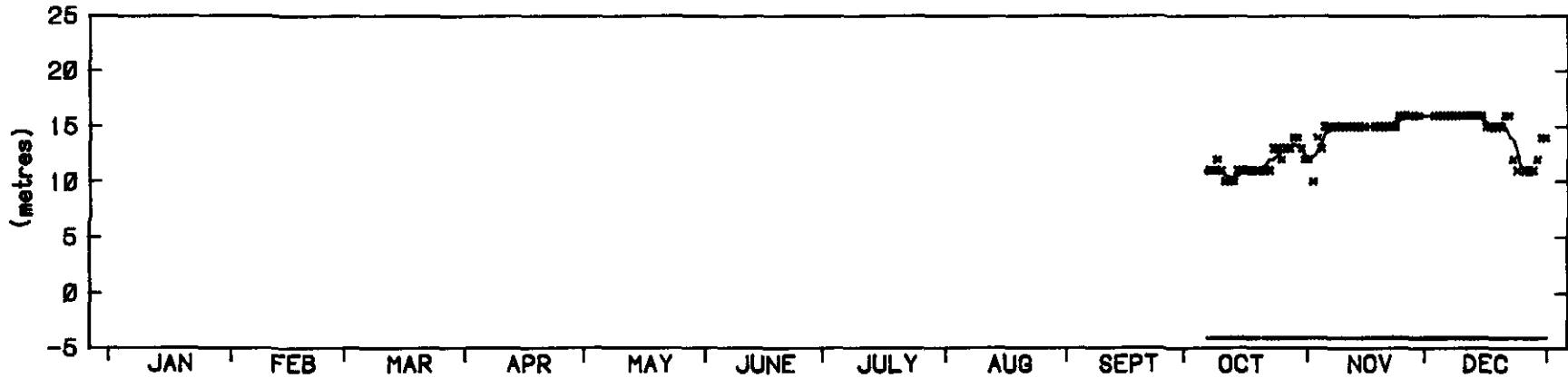
Figure 18
C 07.1

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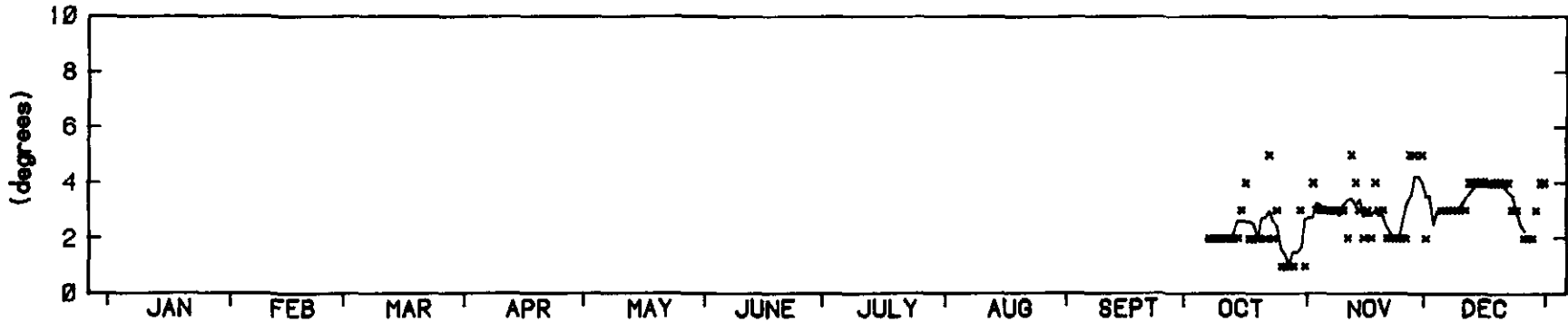
LAMMERMOOR BEACH

1602



DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1975

----- Indicates Distance to Fixed Contour : 79 Observations Fixed Contour Level is approx 1.9 m above A.H.D.
 ———— Indicates Distance to Vegetation Line : 84 Observations



FORESHORE SLOPE - 1975

— Five Day Moving Average

No. of Observations : 78

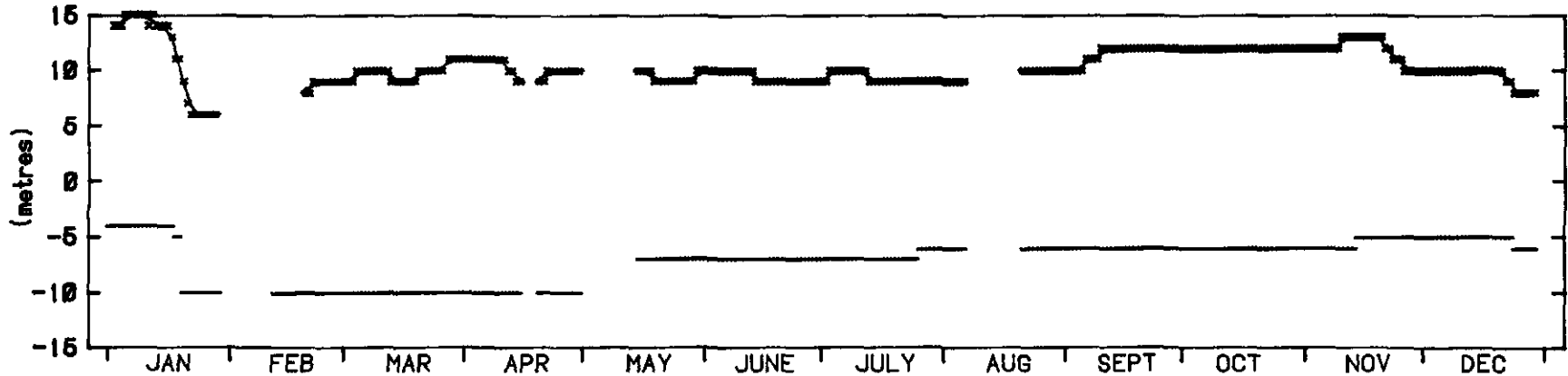


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LIVINGSTONE SHIRE

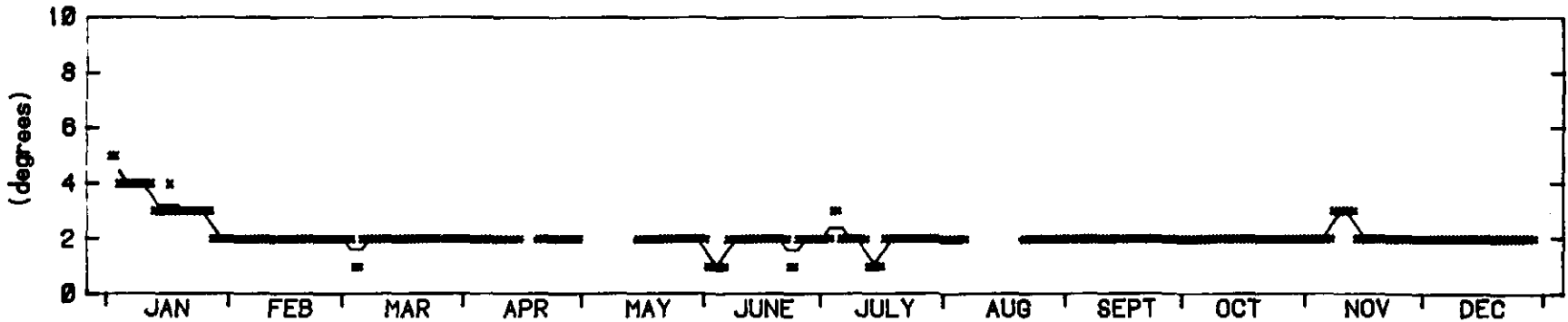
LAMMERMOOR BEACH

1602



DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1976

Indicates Distance to Fixed Contour : 308 Observations Fixed Contour Level is approx 1.9 m above A.H.D.
 Indicates Distance to Vegetation Line : 318 Observations



FORESHORE SLOPE - 1976

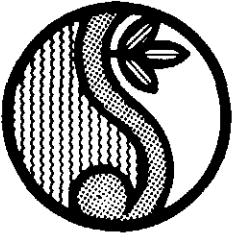
Five Day Moving Average

No. of Observations : 328

BEACH PROFILE PARAMETERS - 1976

COPE
Lammermoor Beach

Figure 19
C 07.1



BEACH PROFILE PARAMETERS - 1977

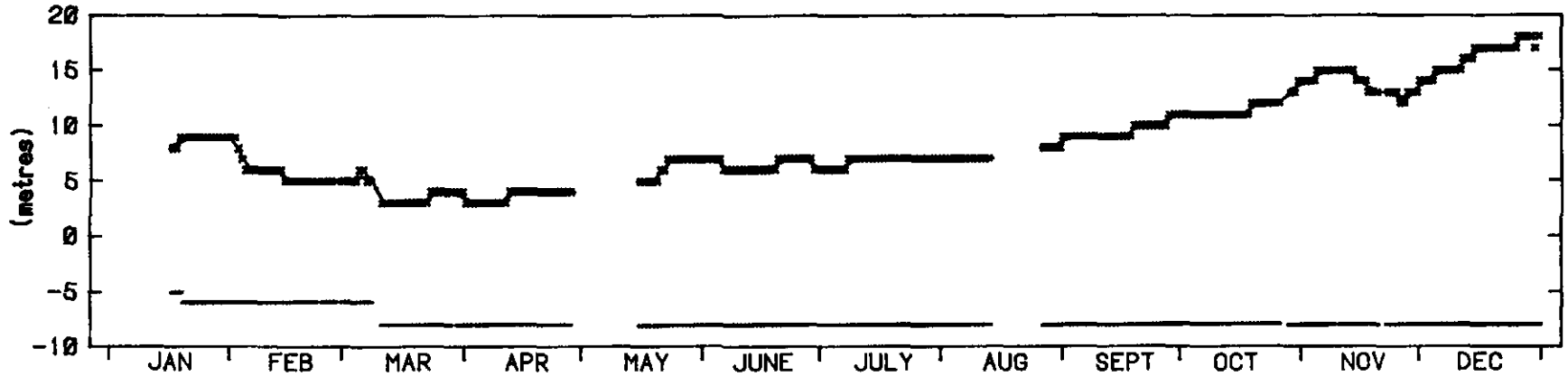
COPE
Lammermoor Beach

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LAMMERMOOR BEACH

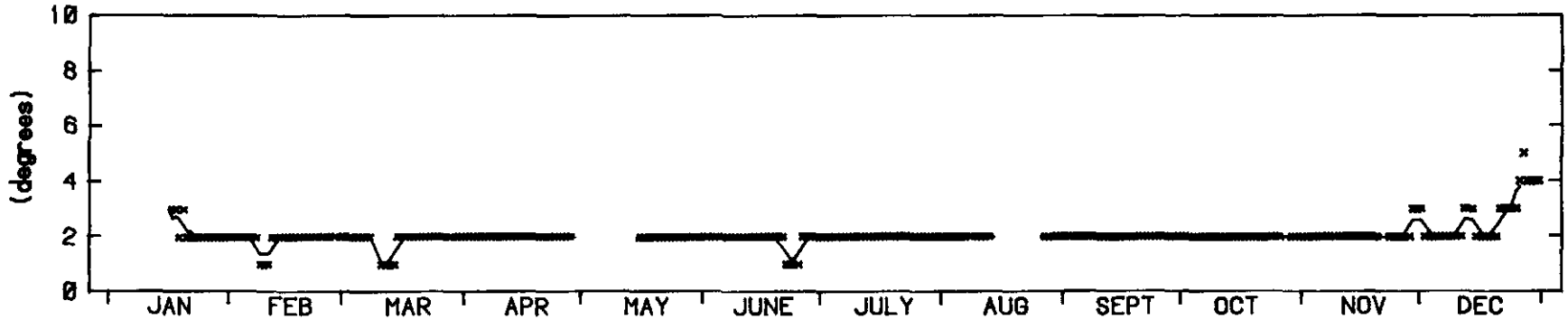
1602



DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1977

xxxx Indicates Distance to Fixed Contour : 309 Observations
— Indicates Distance to Vegetation Line : 309 Observations

Fixed Contour Level is approx 1.9 m above A.H.D.

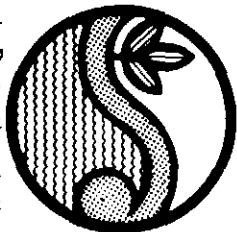


FORESHORE SLOPE - 1977

Five Day Moving Average

No. of Observations : 309

Figure 20
C 07.1



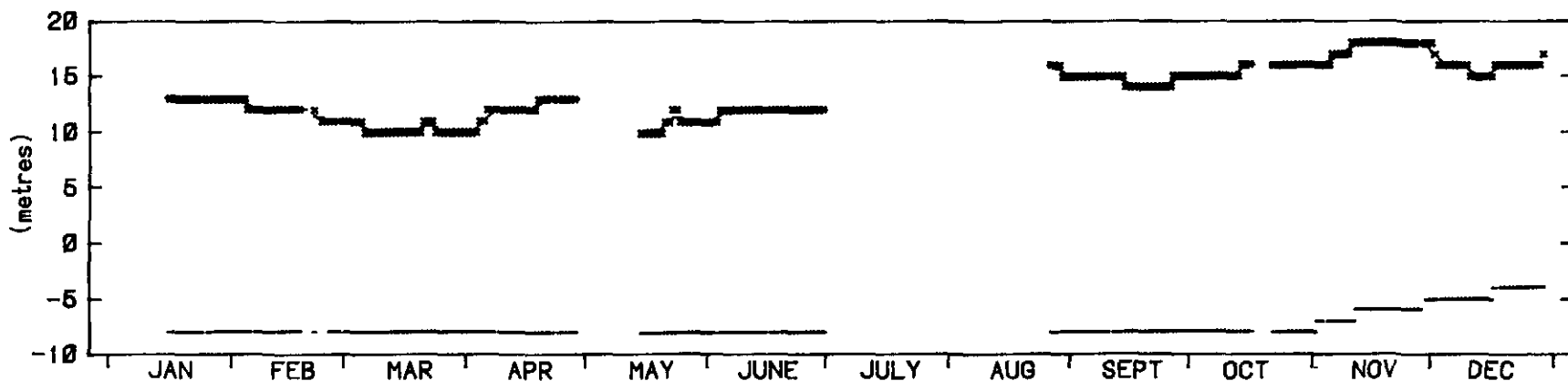
BEACH PROFILE PARAMETERS - 1978

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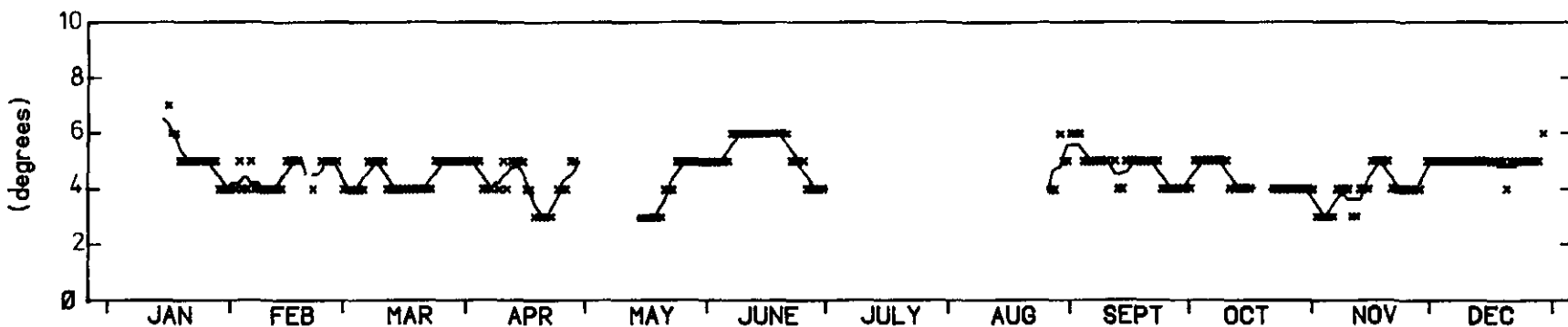
LAMMERMOOR BEACH

1602



DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1978

xxxx Indicates Distance to Fixed Contour : 260 Observations
 — Indicates Distance to Vegetation Line : 256 Observations
 Fixed Contour Level is approx 1.9 m above A.H.D.



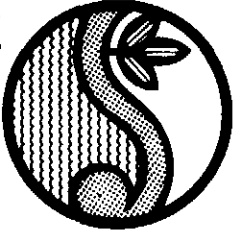
FORESHORE SLOPE - 1978

Five Day Moving Average

No. of Observations : 259

Figure 21
C 07.1

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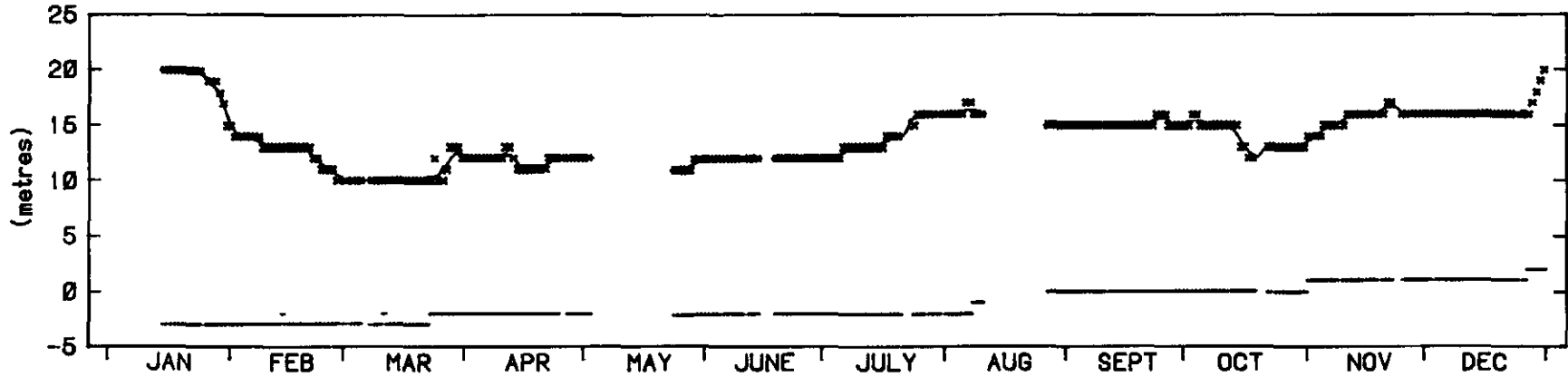
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Programme Engineering

LIVINGSTONE SHIRE

LAMMERMOOR BEACH

1602

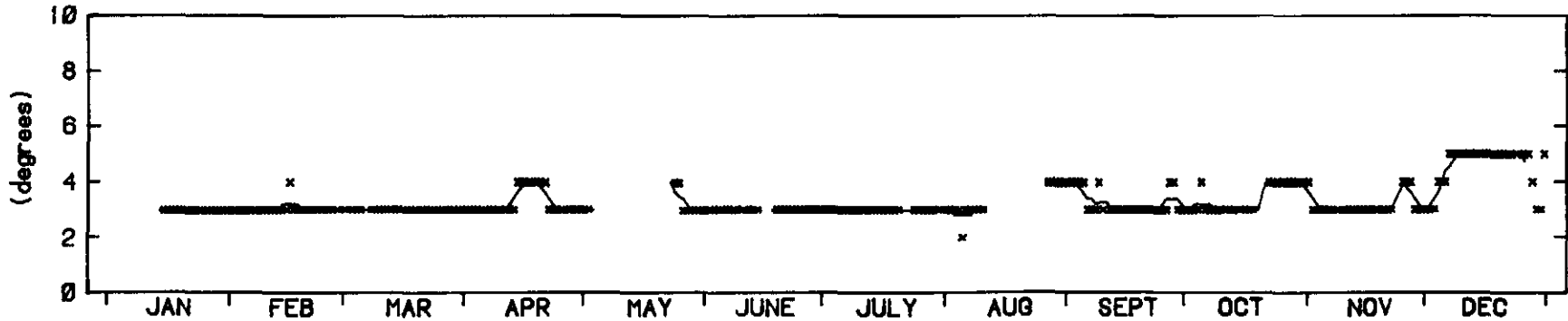
BEACH PROFILE PARAMETERS - 1979



DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1979

xxxx Indicates Distance to Fixed Contour : 291 Observations
— Indicates Distance to Vegetation Line : 289 Observations

Fixed Contour Level is approx 1.9 m above A.H.D.



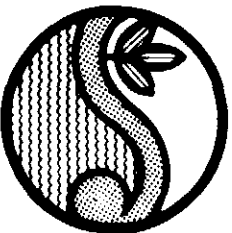
FORESHORE SLOPE - 1979

Five Day Moving Average

No. of Observations : 291

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Figure 22
C 07.1



BEACH PROFILE PARAMETERS - 1980

S. R. Hampson, Government Printer, Queensland

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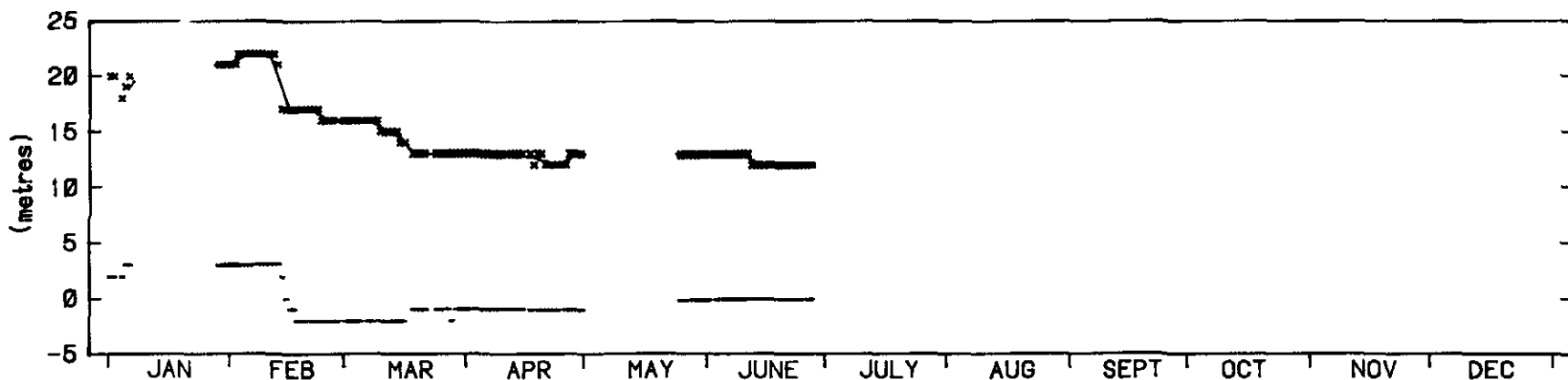
Figure 23
C 07.1

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LIVINGSTONE SHIRE

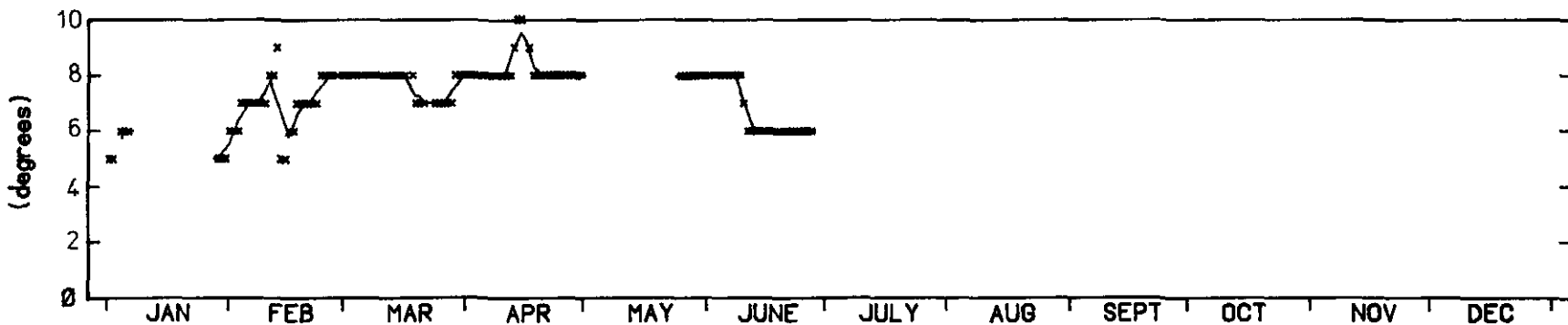
LAMMERMOOR BEACH

1602



DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1980

xxxxx Indicates Distance to Fixed Contour :125 Observations
 — Indicates Distance to Vegetation Line :125 Observations
 Fixed Contour Level is approx 1.9 m above A.H.D.



FORESHORE SLOPE - 1980

Five Day Moving Average

No. of Observations : 125