

COASTAL OBSERVATION PROGRAMME - ENGINEERING (COPE)

URANGAN - TOWN OF HERVEY BAY

For the Years 1971 to 1974

Beach Protection Authority

November 1984

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ABSTRACT:

This report provides a summary of primary analyses of COPE data on wind, wave and beach processes observed at Urangan in the Town of Hervey Bay in southern Queensland. The data were recorded by volunteer observers Stephen Brand and Julie Yuke of the Hervey Bay State High School, during the period October 1971 to December 1974. The recordings were made daily during the three 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, (Report C 01.1).

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

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

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

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

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

Coastal Observation Programme - Engineering (COPE), Lammermoor Beach - Livingstone Shire, (Report C 07.1).

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).

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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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 1971 to 1974 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

Urangan is located within the town of Hervey Bay and is 35 kilometres north-east of Maryborough in southern Queensland. It is situated 17 kilometres north of the mouth of the Mary River and lies in the lee of Fraser Island. The location of the Urangan COPE station is shown in Figure 1.

2.2 Observers

This station has been manned by Mr. Stephen Brand, and Miss Julie Yuke during the period October 1971 to December 1974. Mr. Brand and Miss Yuke were residents of Urangan.

2.3 Observed Parameters

The observers at this station usually recorded at 7.00 a.m. daily during the three year period 1971 to 1974.

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 at the station each month.

2.4 Tidal Information

Tidal information is presented below. Datum is Low Water Datum.

M.H.W.S. : 3.1 metres
 M.H.W.N. : 2.5 metres
 M.S.L. : 1.87 metres
 M.L.W.N. : 1.2 metres
 M.L.W.S. : 0.6 metres.

2.5 Description of the Beach

The beach of the Urangan station is presently experiencing a serious erosion problem which has necessitated in the construction of a rock sea wall. It exhibits the following characteristics.

- Typical beach slopes: foreshore slope is in the range 1 in 11 to 1 in 20 (3° - 5°).
- Beach width: typically 2 to 16 metres from base of rock sea wall.
- D50 sand size: 0.24 mm averaged over three years.
- Adjoining Landform: secondary beach ridge with a prominent erosion scarp.
- Vegetation: White cypress - Moreton Bay ash (*Callitris collumellaris* - *Eucalyptus tessellaris*) open forest is the main vegetation on the secondary ridge. Scattered Horsetail she-oak (*Casuarina equisetifolia* var. *incana*) occur along the edge of the scarp. Ground cover vegetation has been selectively cleared.

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 the Town of Hervey Bay 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 October 1971 to December 1974 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, when the average breaker wave height is less than 0.1 metre a calm is recorded.

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 observers 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 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 14 to 21.

TABLE 1

Monthly and Annual

Mean Wave Height/Mean Wave Period and Wave Type/Wave Direction

OBSERVATIONS

Urangan

Year 1971

Month	Number of Observations		Mean Wave Period (secs)	Mean Wave Height (secs)	Number of Observations - Wave Type/Wave Direction								
	Wave Period and Wave Height	Calm			Wave Type				Wave Direction				
					SP	PL	Surge	SP/PL	1	2	3	4	5
January													
February													
March													
April													
May													
June													
July													
August													
September													
October	16	1	4.0	0.29	11	5	—	—	1	8	5	2	—
November	24	—	4.2	0.26	11	13	—	—	—	14	9	—	1
December	26	—	4.3	0.25	12	14	—	—	—	9	14	3	—
WHOLE YEAR	66	1	4.2	0.27	34	32	0	0	1	31	28	5	1

TABLE 2

Monthly and Annual

Mean Wave Height/Mean Wave Period and Wave Type/Wave Direction

OBSERVATIONS

Urangan

Year 1972

Month	Number of Observations		Mean Wave Period (secs)	Mean Wave Height (secs)	Number of Observations - Wave Type/Wave Direction								
	Wave Period and Wave Height	Calm			Wave Type				Wave Direction				
					SP	PL	Surge	SP/PL	1	2	3	4	5
January	24	—	4.6	0.26	10	14	—	—	—	10	12	2	—
February	21	—	6.2	0.25	11	10	—	—	—	9	9	3	—
March	21	1	5.5	0.17	7	14	—	—	—	10	10	1	—
April	19	—	4.7	0.16	10	9	—	—	1	8	6	4	—
May	20	—	6.4	0.22	10	10	—	—	—	9	11	—	—
June	20	—	6.0	0.22	14	6	—	—	—	13	7	—	—
July	24	1	6.1	0.15	12	12	—	—	—	15	9	—	—
August	11	—	4.0	0.21	10	1	—	—	—	7	4	—	—
September	16	1	5.3	0.24	6	10	—	—	—	7	9	—	—
October	18	—	4.8	0.31	10	8	—	—	—	8	10	—	—
November	19	2	4.9	0.31	7	12	—	—	—	8	9	2	—
December	31	—	4.3	0.30	23	8	—	—	1	14	14	2	—
WHOLE YEAR	244	5	5.3	0.24	130	114	0	0	2	118	110	14	0

TABLE 3

Monthly and Annual

Mean Wave Height/Mean Wave Period and Wave Type/Wave Direction

OBSERVATIONS

Urangan

Year 1973

Month	Number of Observations		Mean Wave Period (secs)	Mean Wave Height (secs)	Number of Observations - Wave Type/Wave Direction									
	Wave Period and Wave Height	Calm			Wave Type				Wave Direction					
					SP	PL	Surge	SP/PL	1	2	3	4	5	
January	31	—	5.3	0.21	31	—	—	—	—	1	18	5	5	2
February	27	—	5.6	0.32	18	9	—	—	—	3	10	2	8	4
March	27	—	6.6	0.25	20	7	—	—	—	—	15	7	2	3
April	27	—	7.1	0.30	20	7	—	—	—	2	17	4	4	—
May	27	—	5.6	0.24	23	4	—	—	—	—	21	6	—	—
June	22	—	6.0	0.25	16	6	—	—	—	—	15	7	—	—
July	23	—	6.3	0.29	14	9	—	—	—	1	15	7	—	—
August	15	—	4.3	0.33	6	9	—	—	—	—	10	5	—	—
September	21	—	5.7	0.23	21	—	—	—	—	—	14	7	—	—
October	21	—	4.8	0.28	16	5	—	—	—	1	14	4	2	—
November	26	—	5.3	0.37	14	12	—	—	—	—	13	13	—	—
December	—	—	—	—	—	—	—	—	—	—	—	—	—	—
WHOLE YEAR	267	0	5.7	0.28	199	68	0	0	—	8	162	67	21	9

TABLE 4

Monthly and Annual

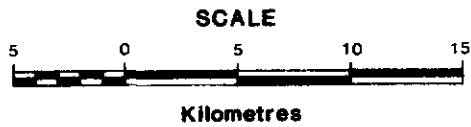
Mean Wave Height/Mean Wave Period and Wave Type/Wave Direction

OBSERVATIONS

Urangan

Year 1974

Month	Number of Observations		Mean Wave Period (secs)	Mean Wave Height (secs)	Number of Observations - Wave Type/Wave Direction								
	Wave Period and Wave Height	Calm			Wave Type				Wave Direction				
					SP	PL	Surge	SP/PL	1	2	3	4	5
January													
February													
March	17	—	8.1	0.58	5	12	—	—	—	6	4	7	—
April	21	—	5.7	0.26	3	18	—	—	—	5	11	5	—
May	19	1	4.7	0.18	6	11	—	2	—	13	6	—	—
June	10	1	6.3	0.17	3	6	—	1	1	2	7	—	—
July	10	1	4.5	0.23	1	8	—	1	—	7	3	—	—
August	9	—	5.3	0.18	3	6	—	—	—	5	4	—	—
September	8	—	4.4	0.31	2	6	—	—	—	2	6	—	—
October	9	—	4.3	0.17	4	4	—	1	—	4	5	—	—
November	12	—	5.8	0.38	2	10	—	—	—	8	4	—	—
December	7	1	4.5	0.40	3	3	—	1	—	3	4	—	—
WHOLE YEAR	122	4	5.4	0.29	32	84	0	6	1	55	54	12	0



HERVEY BAY

Woodgate

Burrum R.

URANGAN COPE STATION

Point Vernon

Urangan

WOODY Is.

FRASER

ISLAND

GREAT
SANDY
STRAIT

State Highway

MARY RIVER

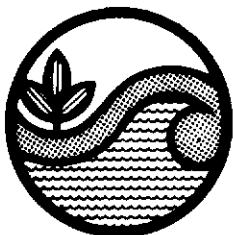
MARYBOROUGH

South

Pacific

Eurong

Ocean



Beach Protection Authority

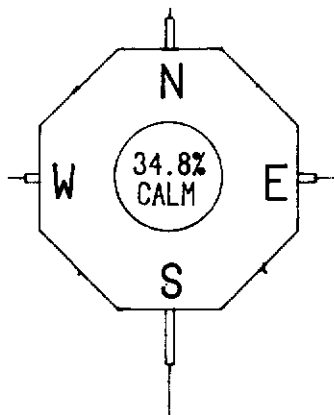
LOCALITY PLAN

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Figure 1

C 12.1

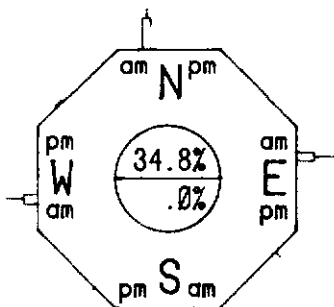
ALL OBSERVATIONS



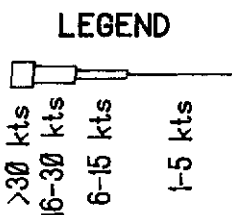
Total No. of Observations : 761

MORNING - AFTERNOON OBSERVATIONS

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

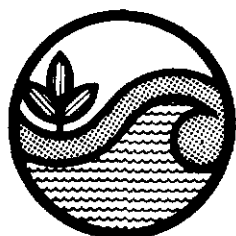


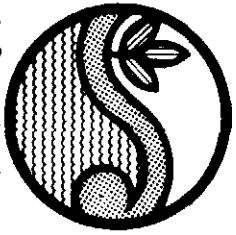
No. of Morning Observations : 761
 No. of Afternoon Observations : 0



SCALE
 Mean Time :- Morning Obs : 0652 hrs
 Mean Time :- Afternoon Obs : 0000 hrs
 Percentage

WIND DATA - OCT 1971 to DEC 1974





WAVE HEIGHT % EXCEEDANCE

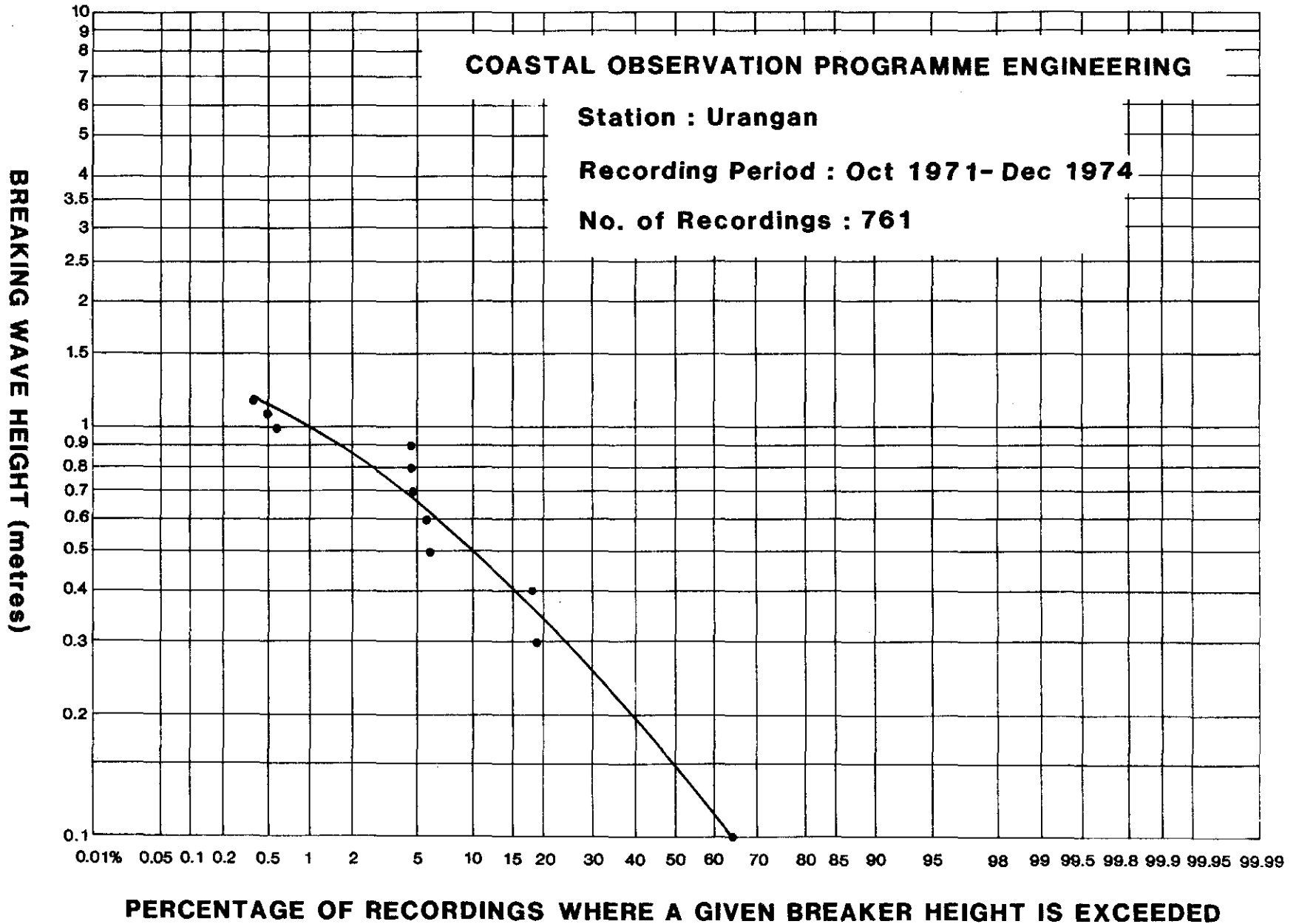
ALL DATA

COPE

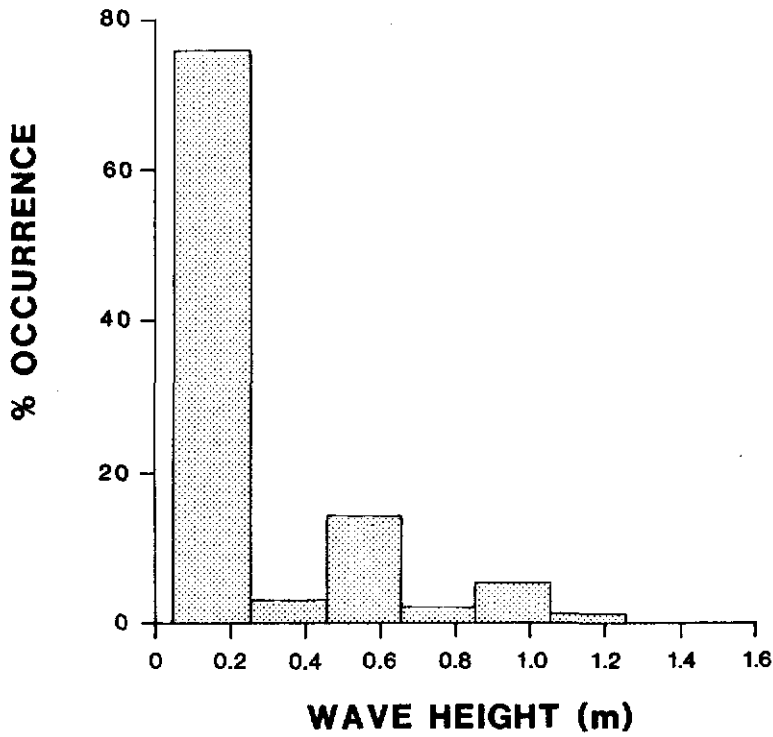
Urangan

Figure 3

C 12.1

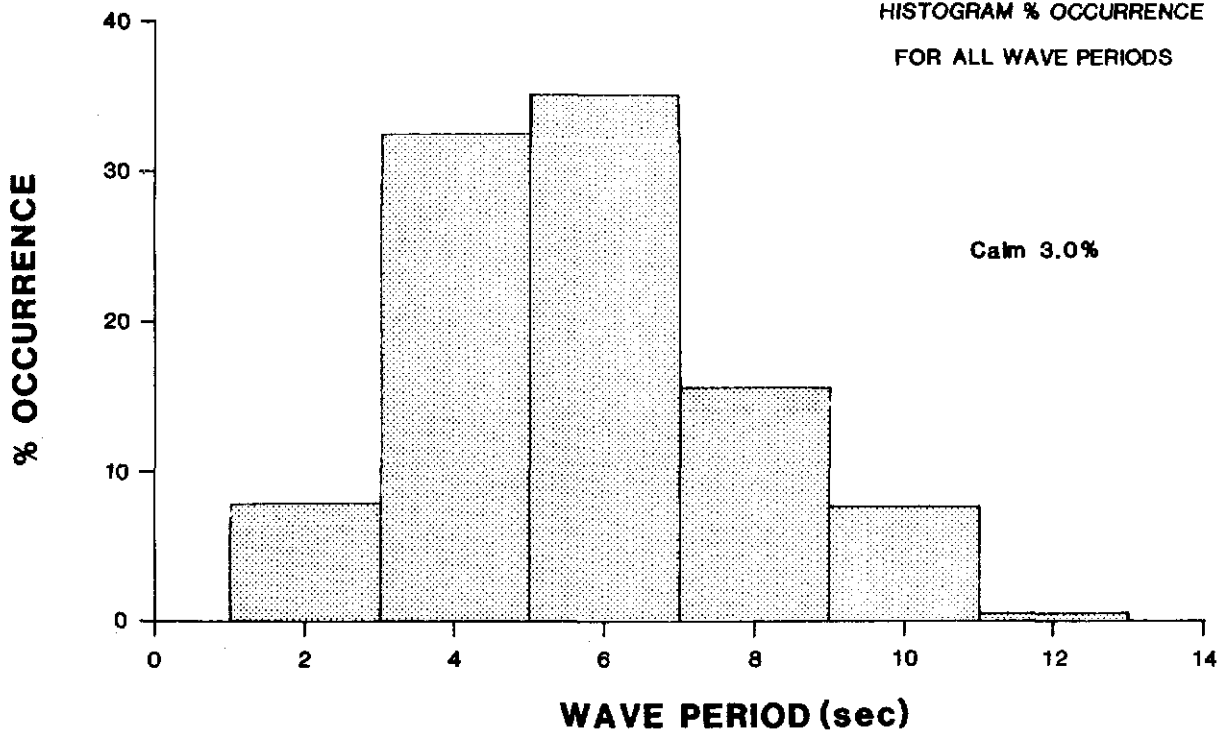


HISTOGRAM % OCCURRENCE
FOR ALL WAVE HEIGHTS

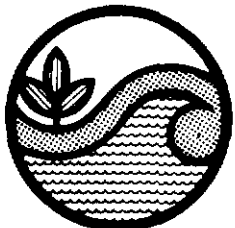


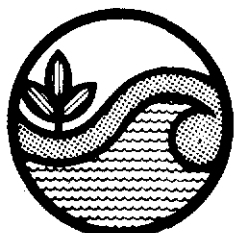
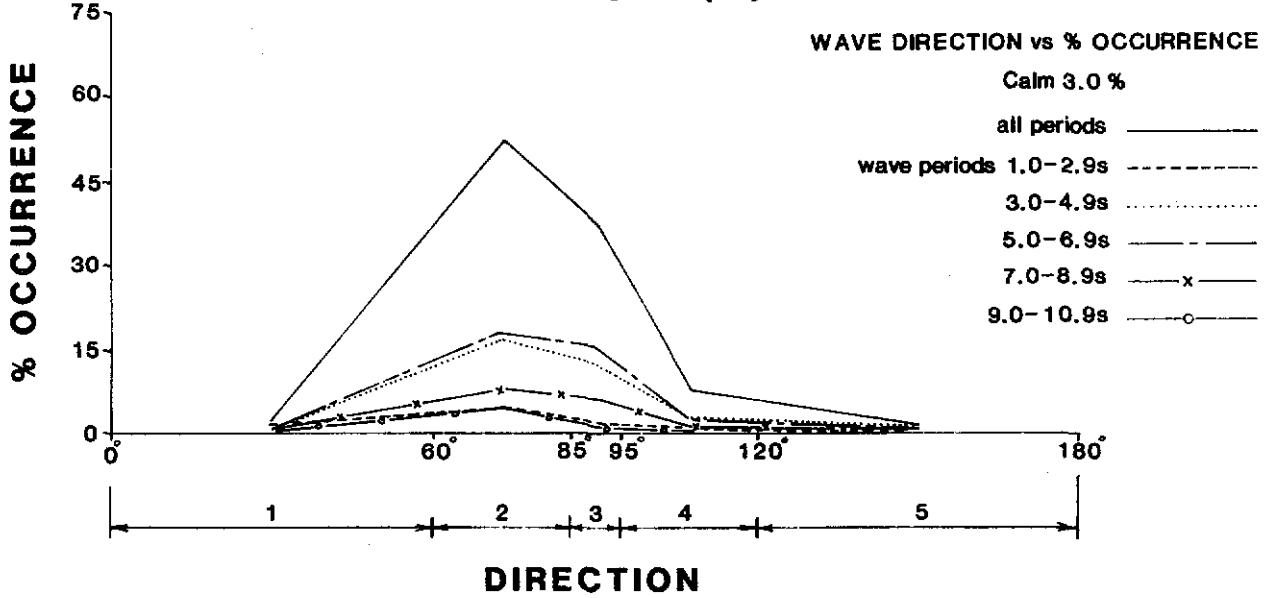
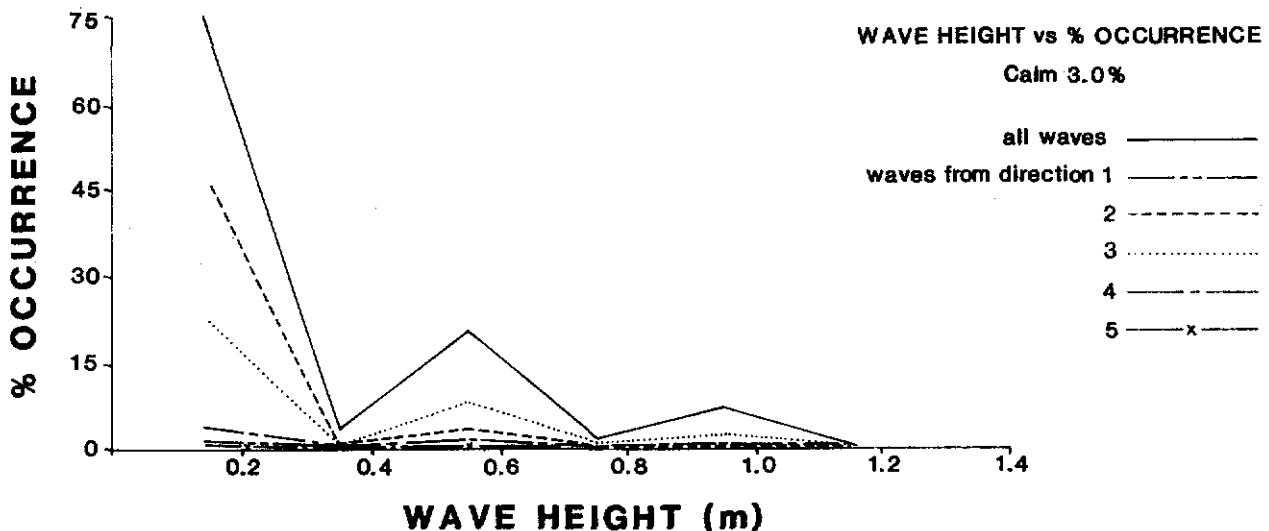
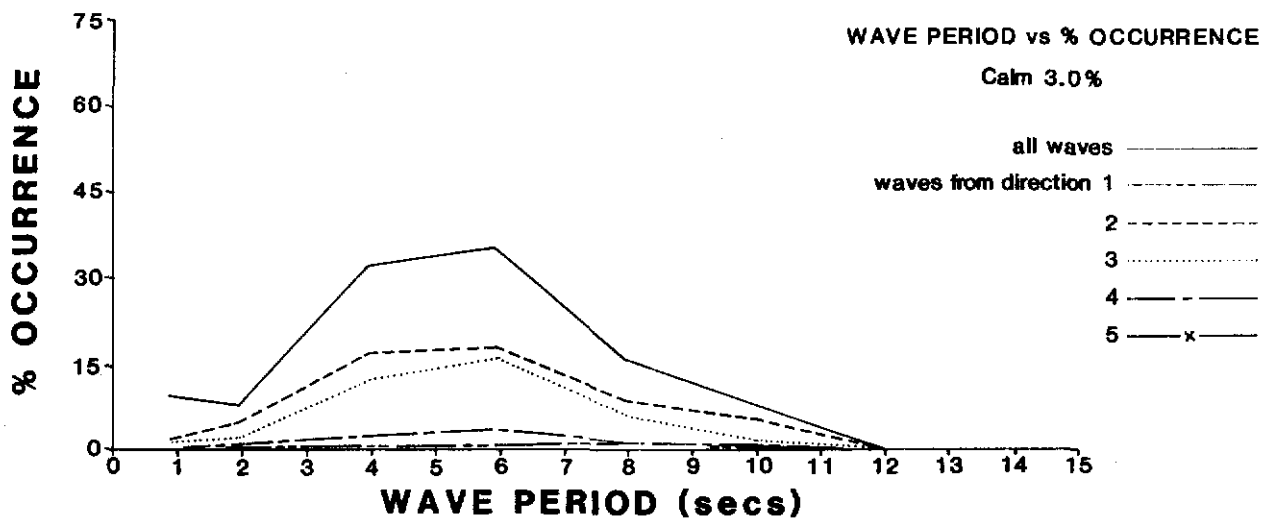
Calm 3.0%

HISTOGRAM % OCCURRENCE
FOR ALL WAVE PERIODS

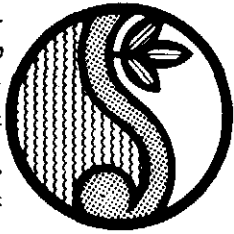


Calm 3.0%





WAVE DIRECTION ANALYSIS
ALL DATA



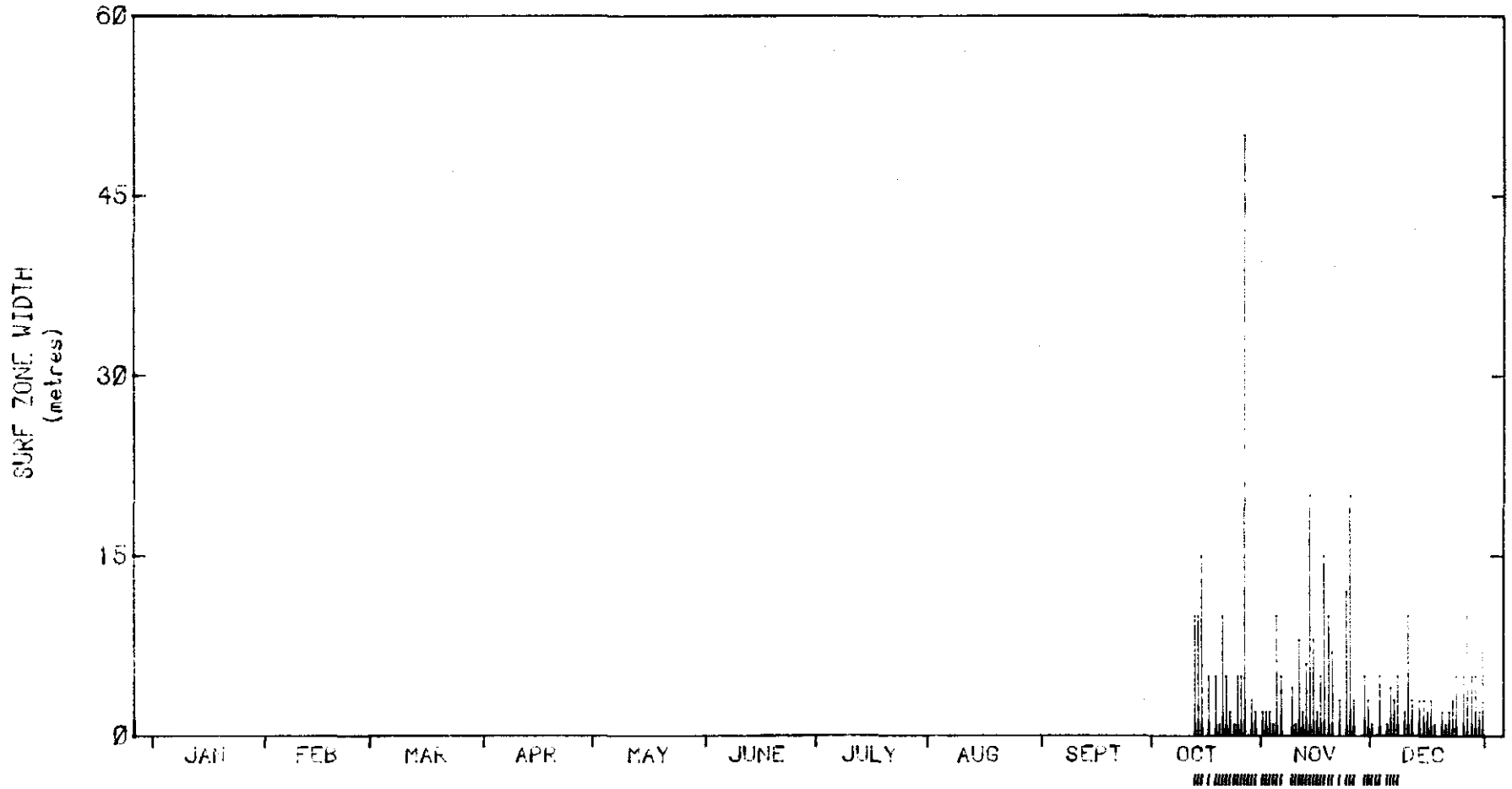
SURF ZONE WIDTH - MORNING 1971

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TOWN OF HERVEY BAY

1004



SURF ZONE WIDTH SUMMARY - 1971

No. of Observations : 67

MORNING OBSERVATIONS

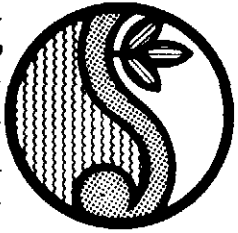
Mean Surf Zone Width = 5.6 m

■ Indicates Offshore Bar Present

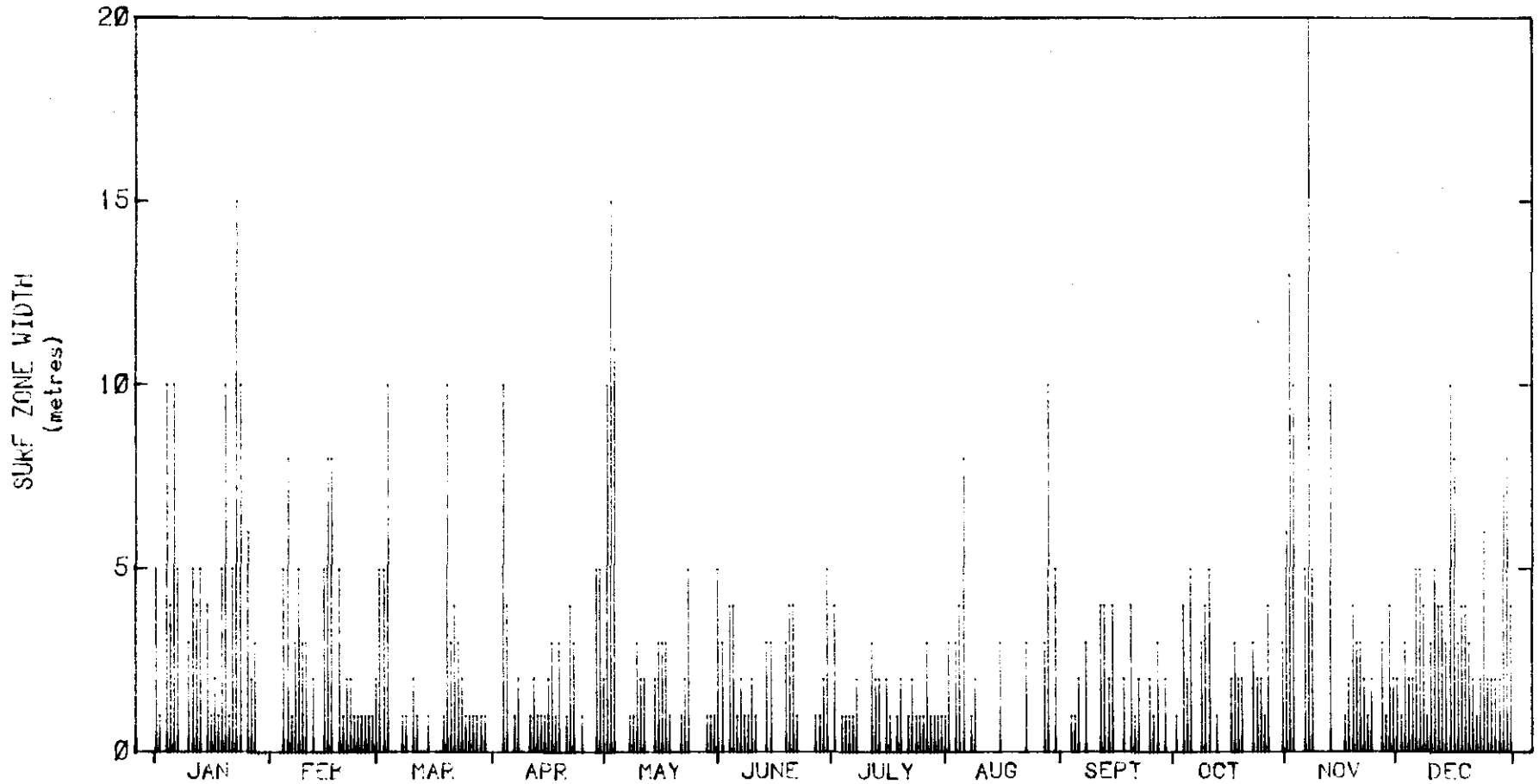
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Figure 6

C 12.1



SURF ZONE WIDTH - MORNING 1972



SURF ZONE WIDTH SUMMARY - 1972

No. of Observations : 265

MORNING OBSERVATIONS

Mean Surf Zone Width = 3.0 m

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Figure 7

C 12.1



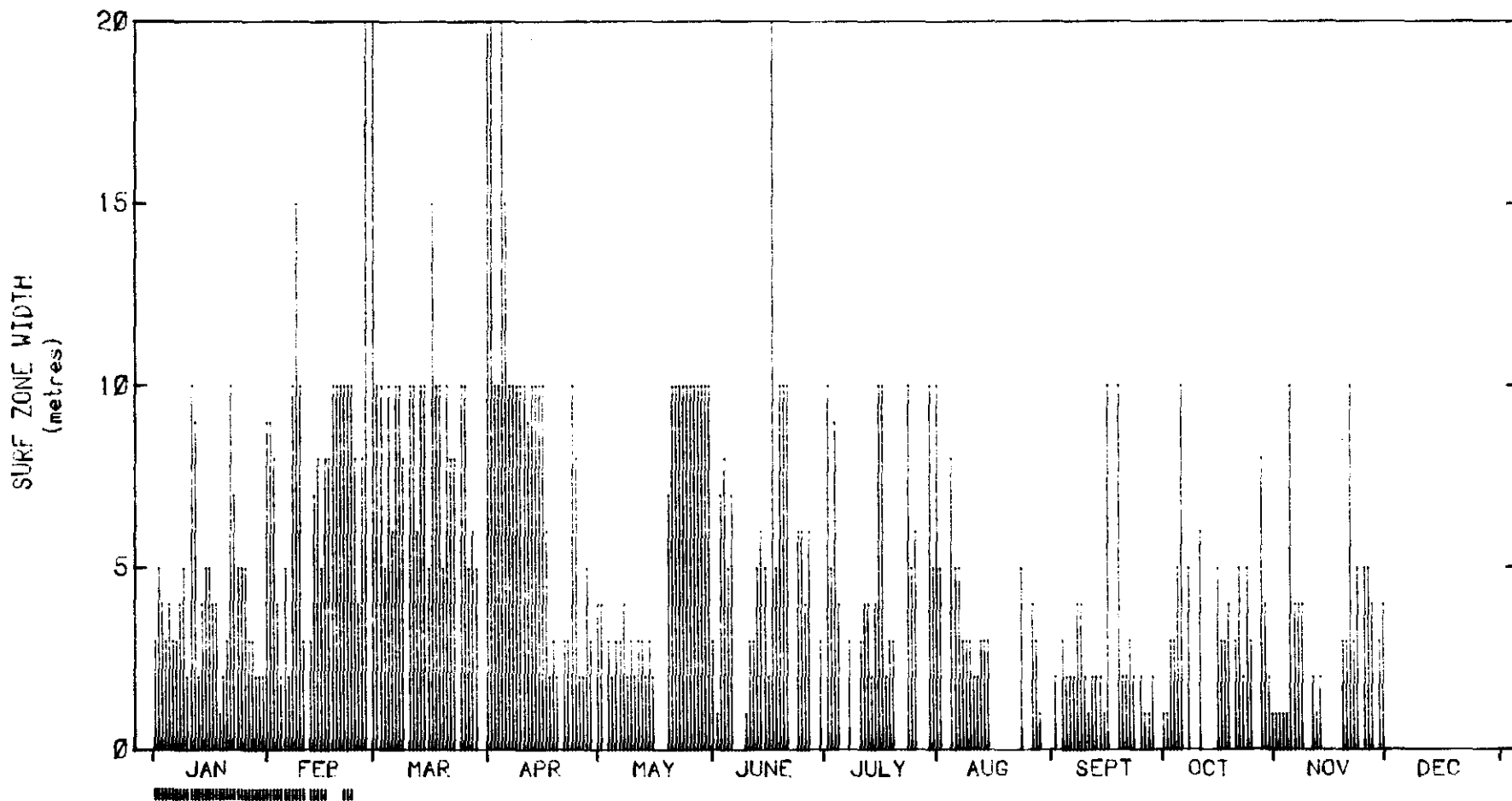
SURF ZONE WIDTH - MORNING 1973

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TOWN OF HERVEY BAY

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SURF ZONE WIDTH SUMMARY - 1973

No. of Observations : 280

MORNING OBSERVATIONS

Mean Surf Zone Width = 5.5 m

■ Indicates Offshore Bar Present

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Urangan

Figure 8

C 12.1



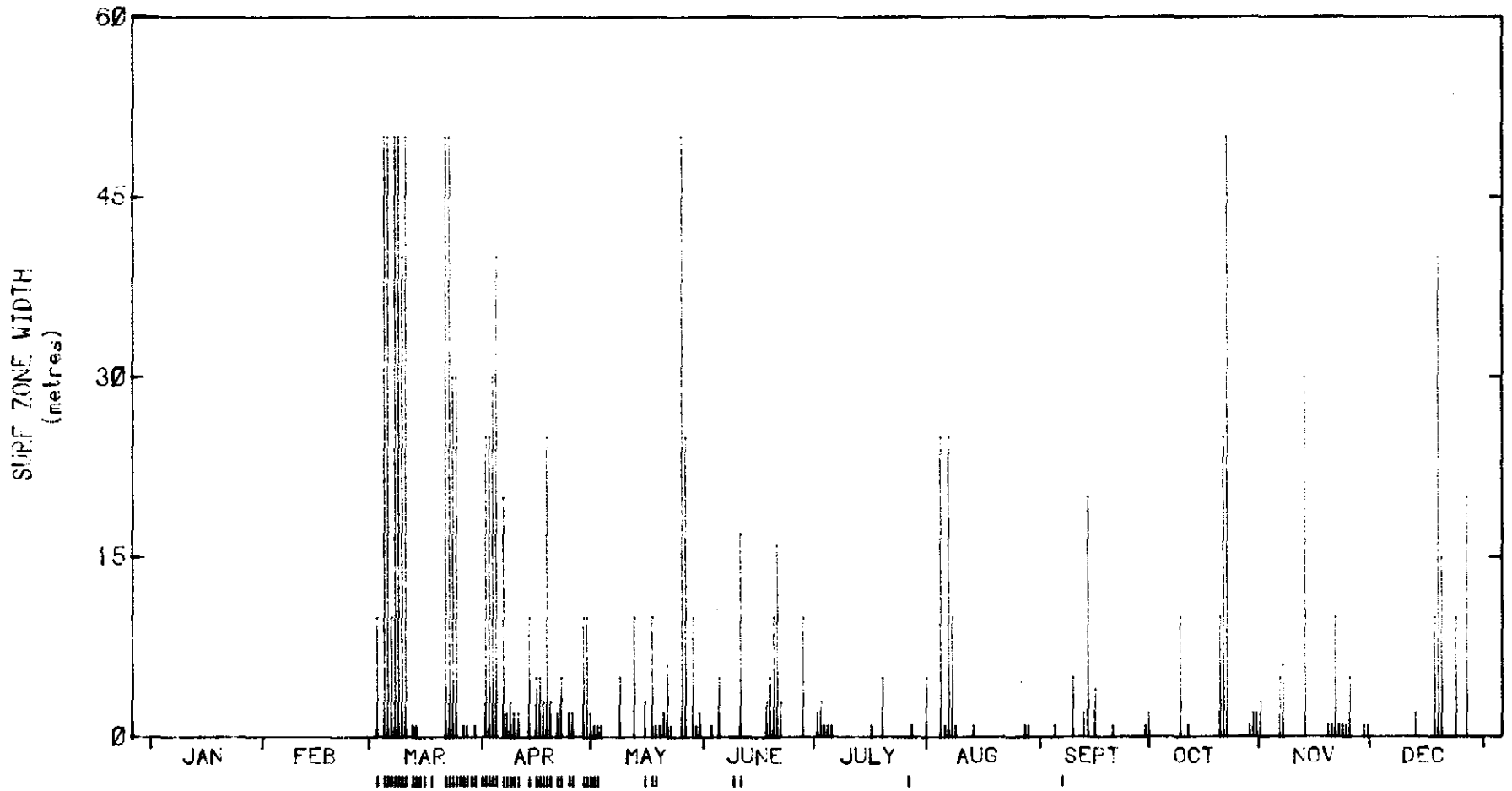
SURF ZONE WIDTH - MORNING 1974

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SURF ZONE WIDTH SUMMARY - 1974

No. of Observations : 164

MORNING OBSERVATIONS

Mean Surf Zone Width = 7.9 m.

▬ Indicates Offshore Bar Present

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Figure 9

C 12.1



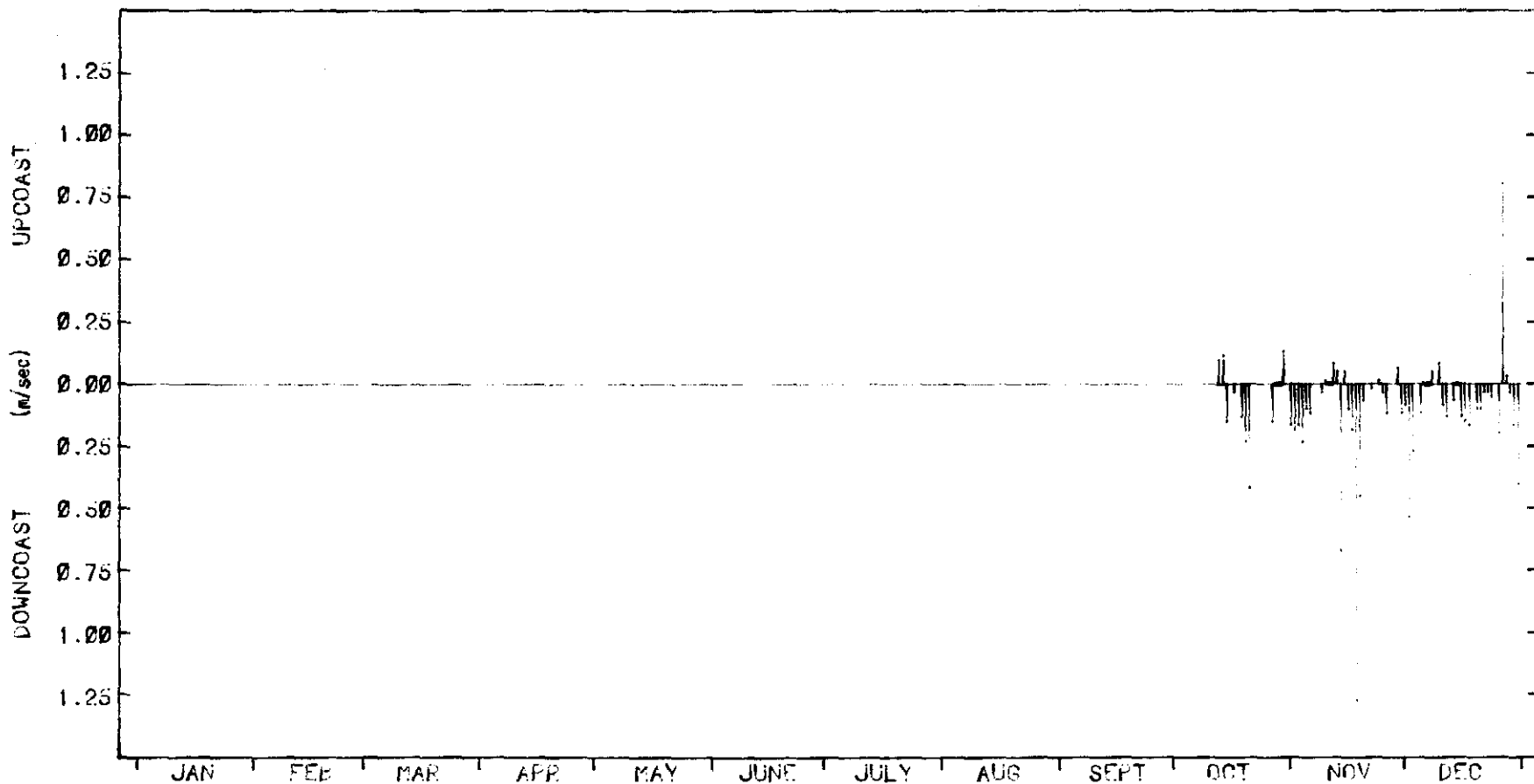
LITTORAL CURRENTS - MORNING 1971

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TOWN OF HERVEY BAY

URANGAN

1984



LITTORAL CURRENT SUMMARY - 1971

Mean Vel = -.105 m/sec (down)

Mean Upcoast Vel = 0.123 m/sec

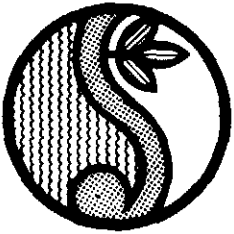
Mean Downcoast Vel = 0.130 m/sec

MORNING OBSERVATIONS - (61 recordings)

COPE
Urangan

Figure 10

C 12.1



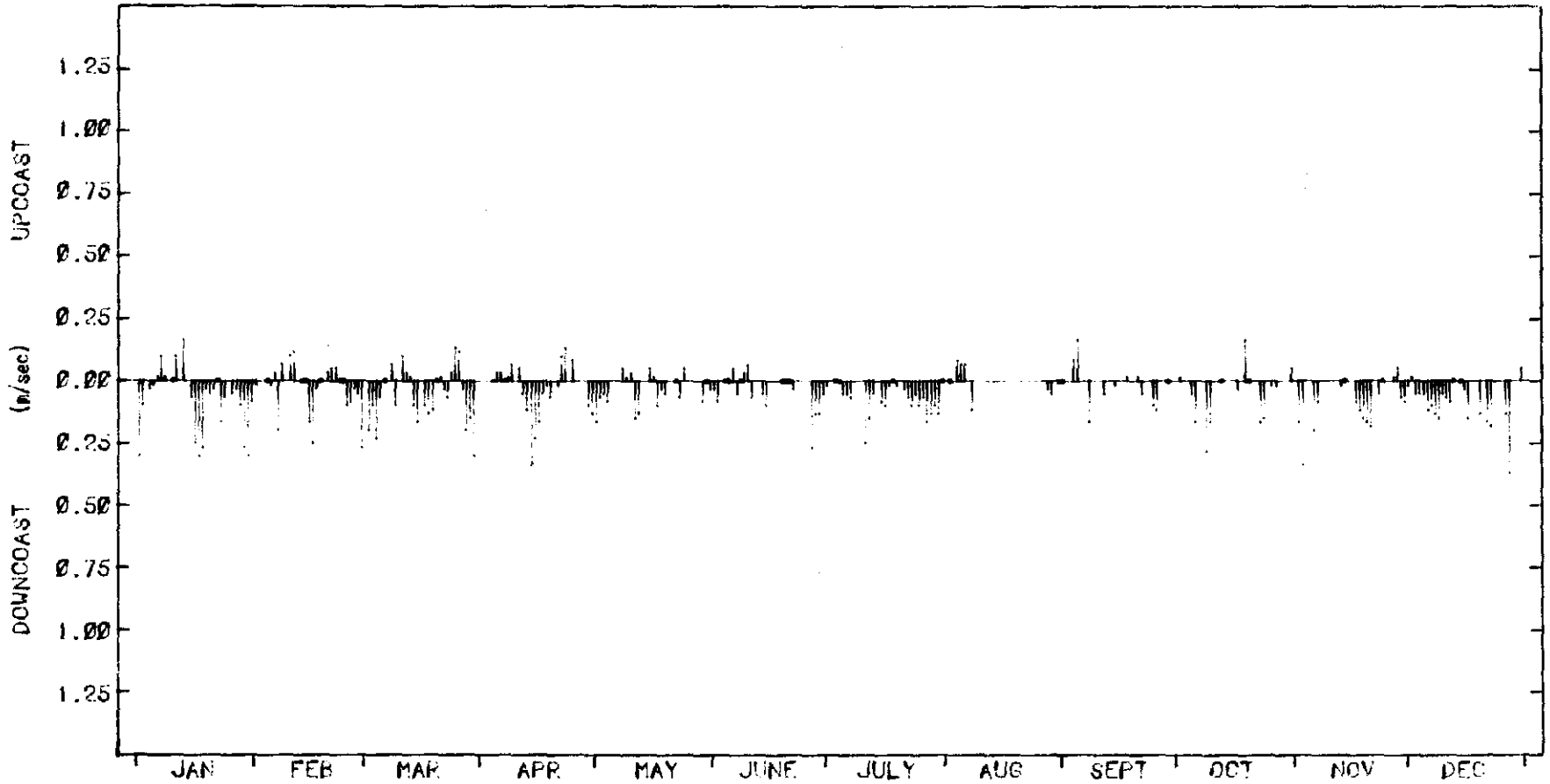
LITTORAL CURRENTS - MORNING 1972

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LITTORAL CURRENT SUMMARY - 1972

Mean Vel = -0.057 m/sec (down)

Mean Upcoast Vel = 0.261 m/sec

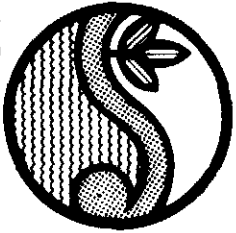
Mean Downcoast Vel = 0.193 m/sec

MORNING OBSERVATIONS - (235 recordings)

COPE
Urangan

Figure 11

C 12.1



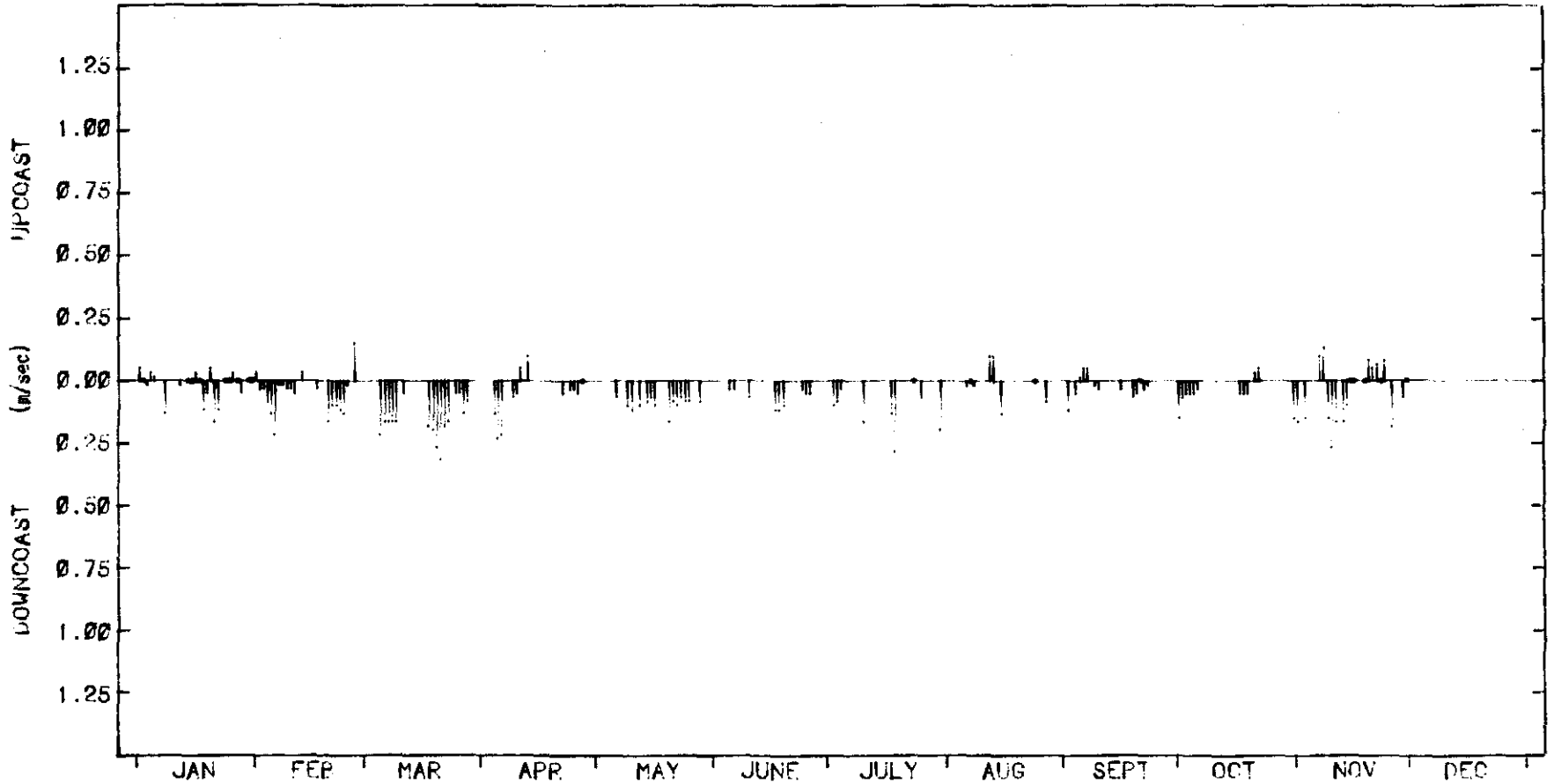
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LITTORAL CURRENT SUMMARY - 1973

Mean Vel = -.062 m/sec (down)

Mean Upcoast Vel = 0.062 m/sec

Mean Downcoast Vel = 0.003 m/sec

MORNING OBSERVATIONS - (156 recordings)

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Urangan

Figure 12

C 12.1



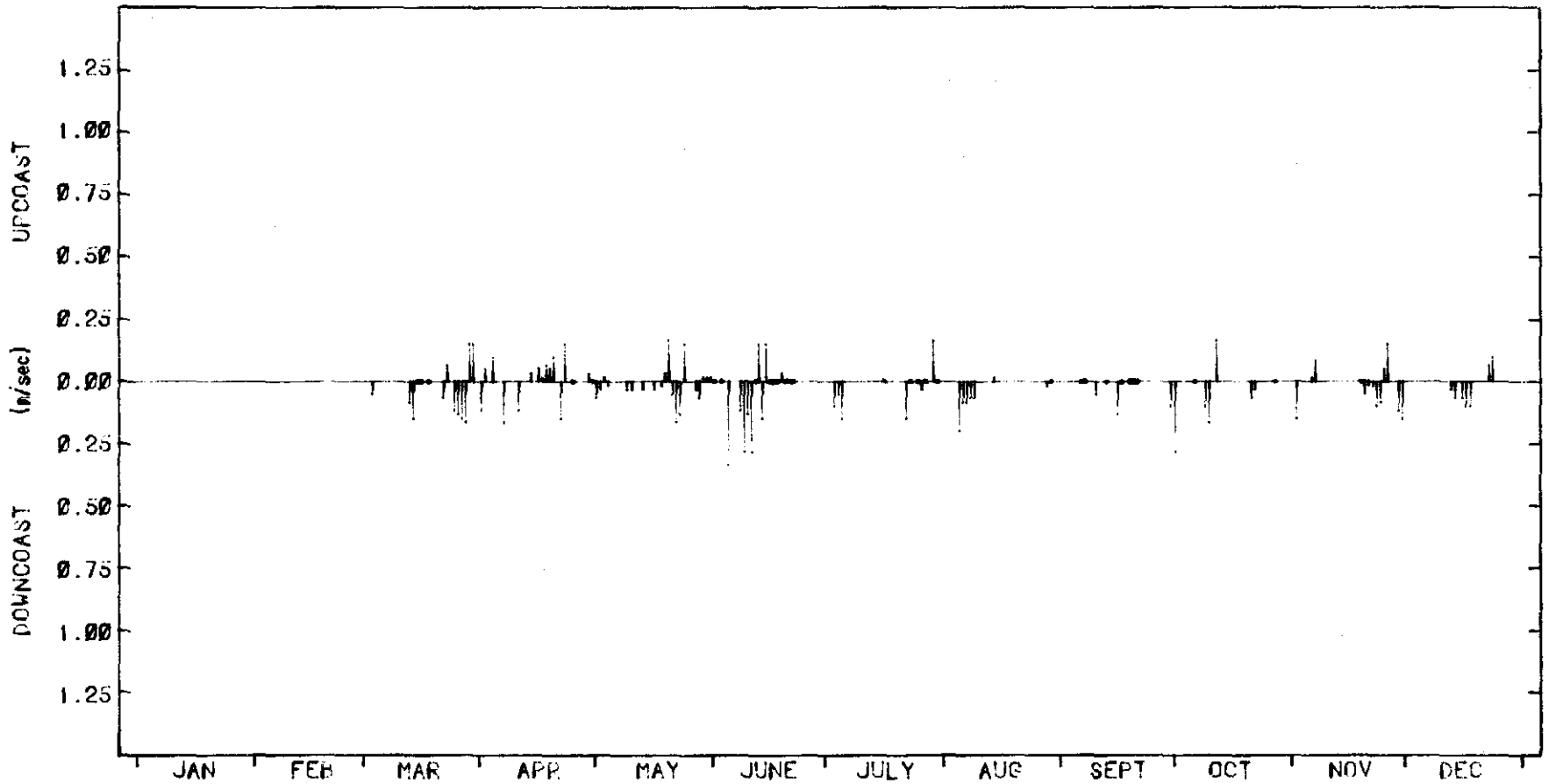
LITTORAL CURRENTS - MORNING 1974

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LITTORAL CURRENT SUMMARY - 1974

Mean Vel = -0.031 m/sec (down)

Mean Upcoast Vel = 0.081 m/sec

Mean Downcoast Vel = 0.103 m/sec

MORNING OBSERVATIONS - (125 recordings)

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Figure 13

C 12.1



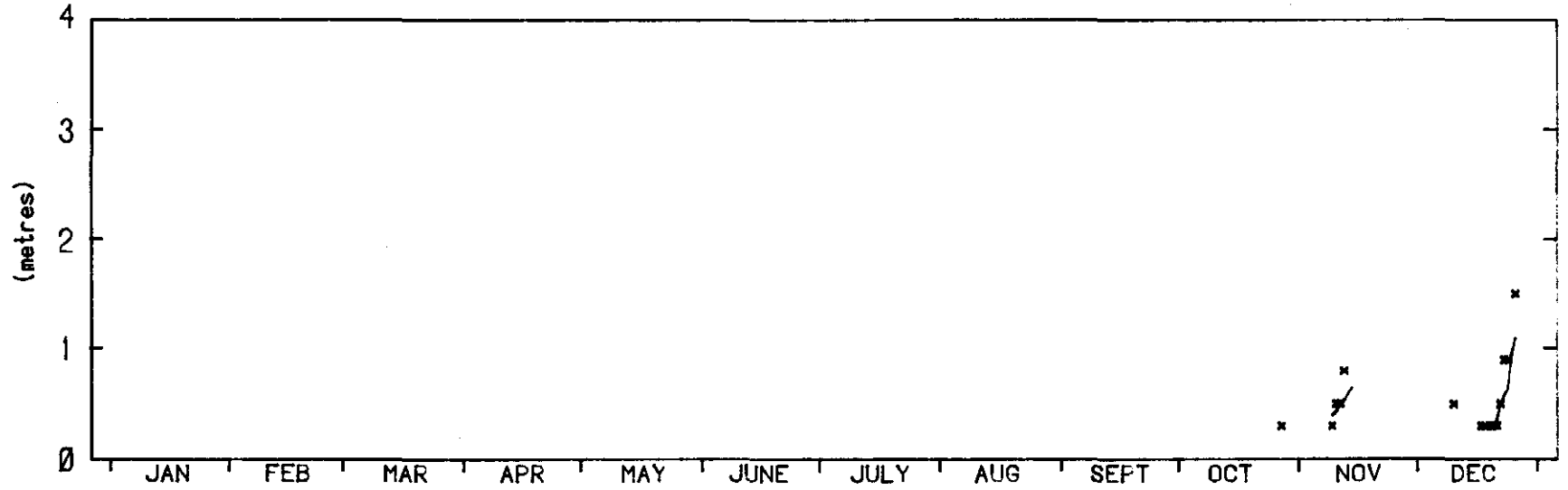
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BERM CREST ELEVATION - 1971



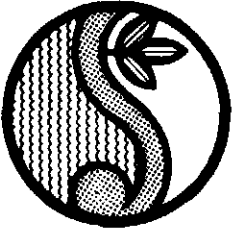
BERM CREST ELEVATION - 1971

No. of Observations : 14

~ Indicates Five Day Moving Average

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Figure 14
0 12.1



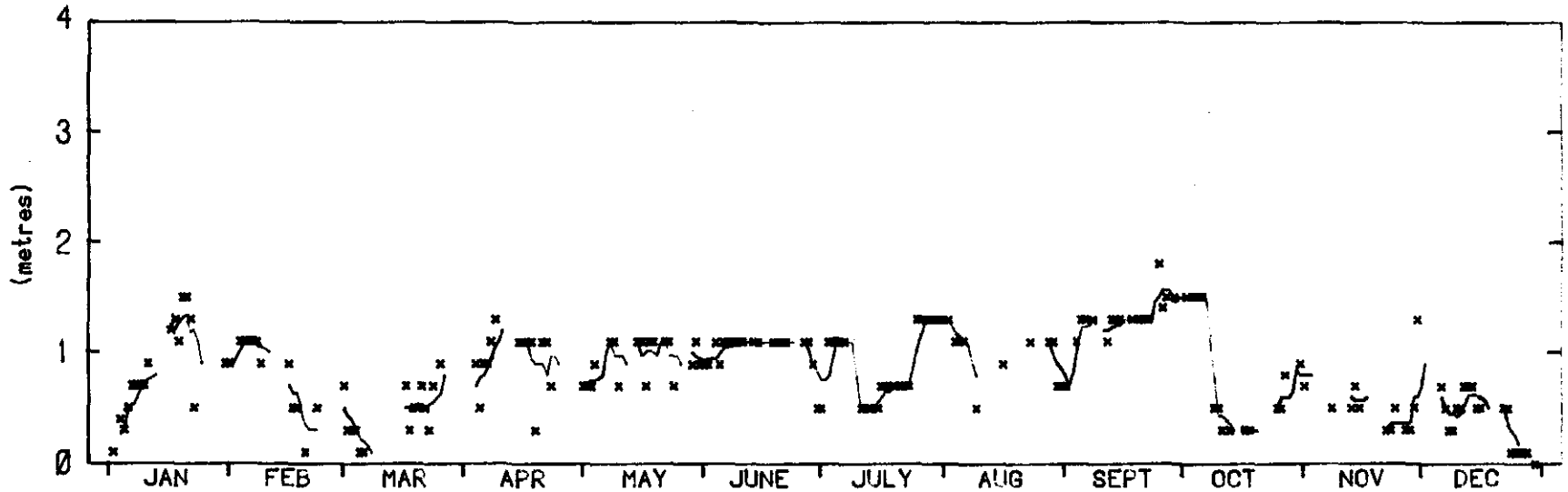
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BERM CREST ELEVATION - 1972



BERM CREST ELEVATION - 1972

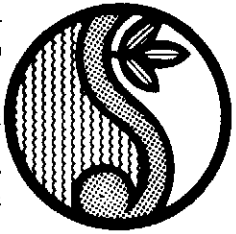
No. of Observations : 193

— Indicates Five Day Moving Average

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Figure 15

C 12.1



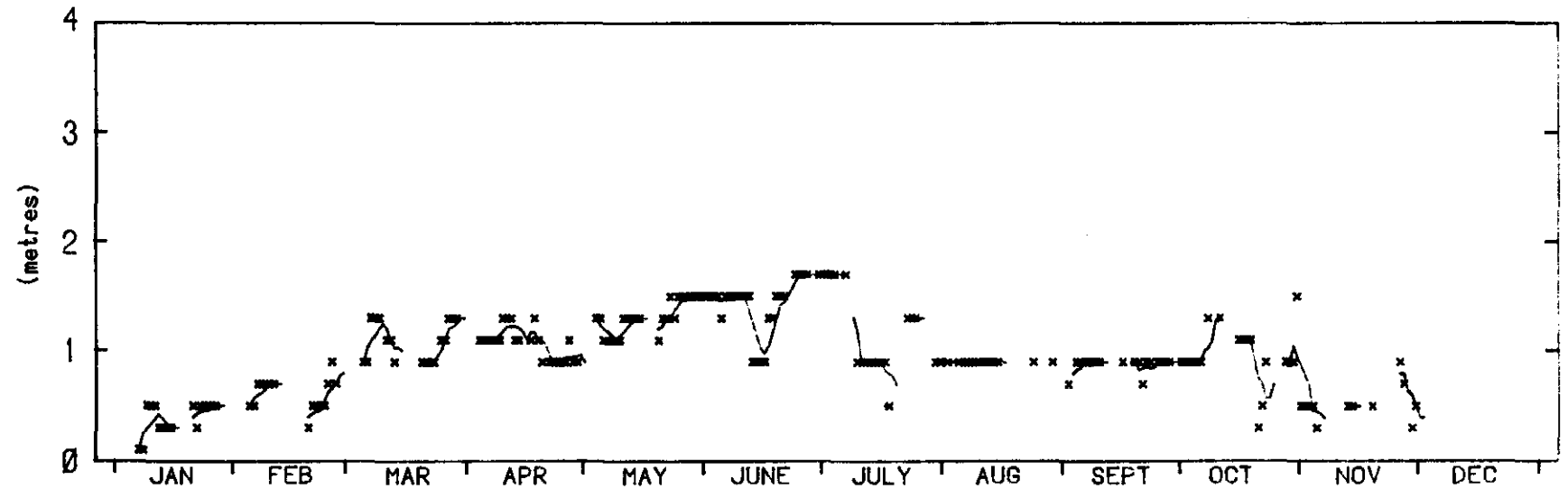
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BERM CREST ELEVATION - 1973



BERM CREST ELEVATION - 1973

No. of Observations : 203

Indicates Five Day Moving Average

Figure 16
C 12.1

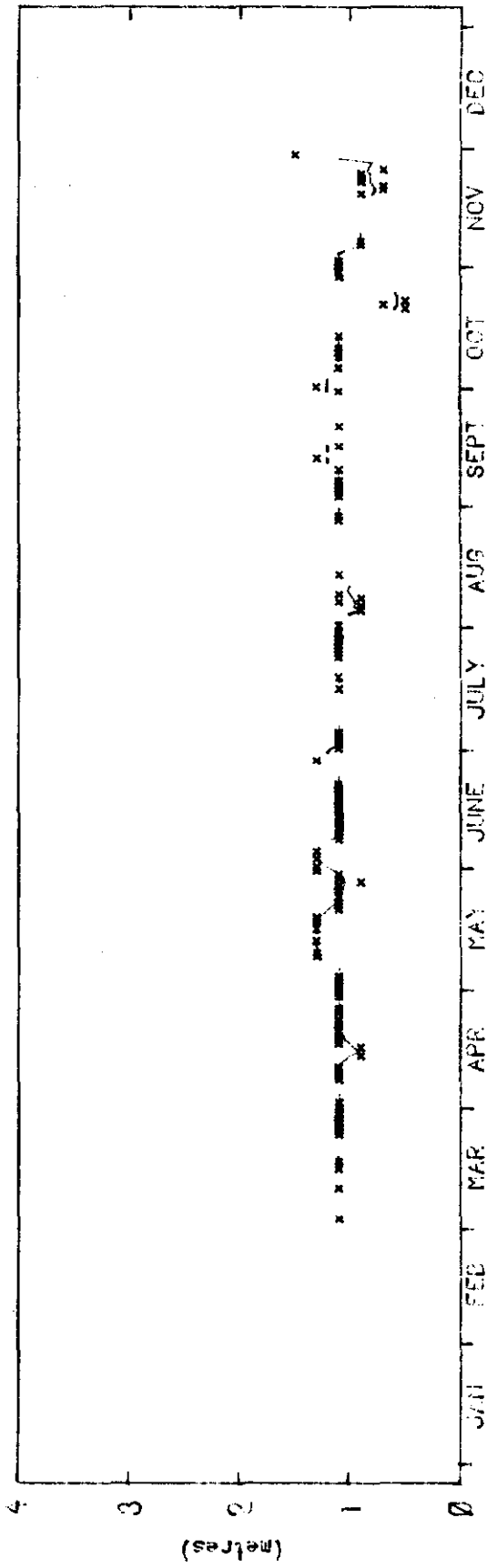
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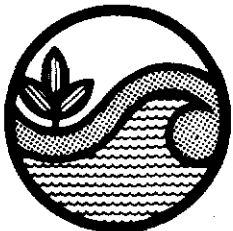
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BERM CREST ELEVATION - 1974

No. of Observations : 123

— Indicates Five Day Moving Average



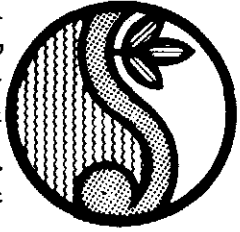
Beach Protection Authority

BERM CREST ELEVATION - 1974

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Figure 17

C 12.1



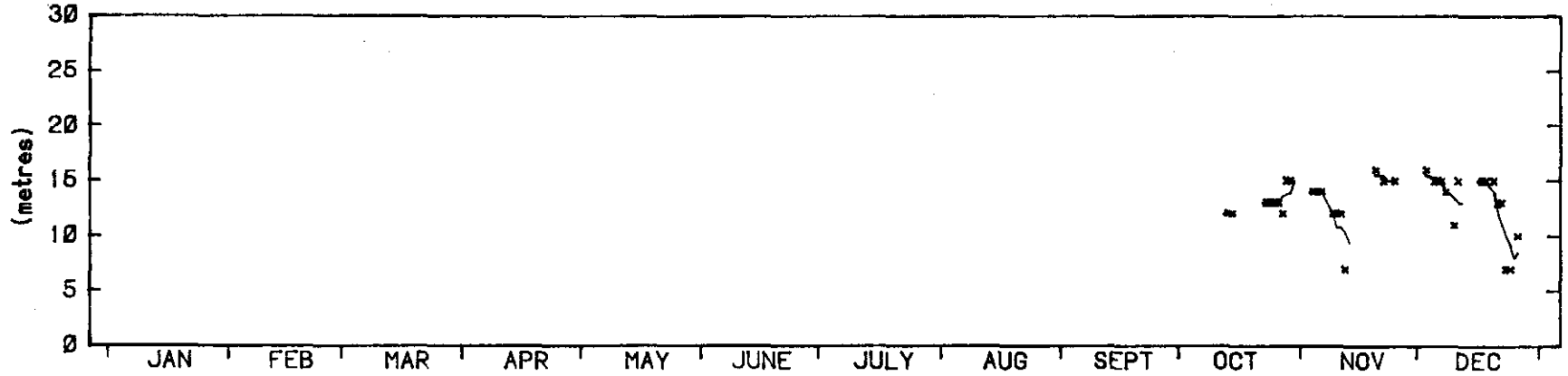
BEACH PROFILE PARAMETERS - 1971

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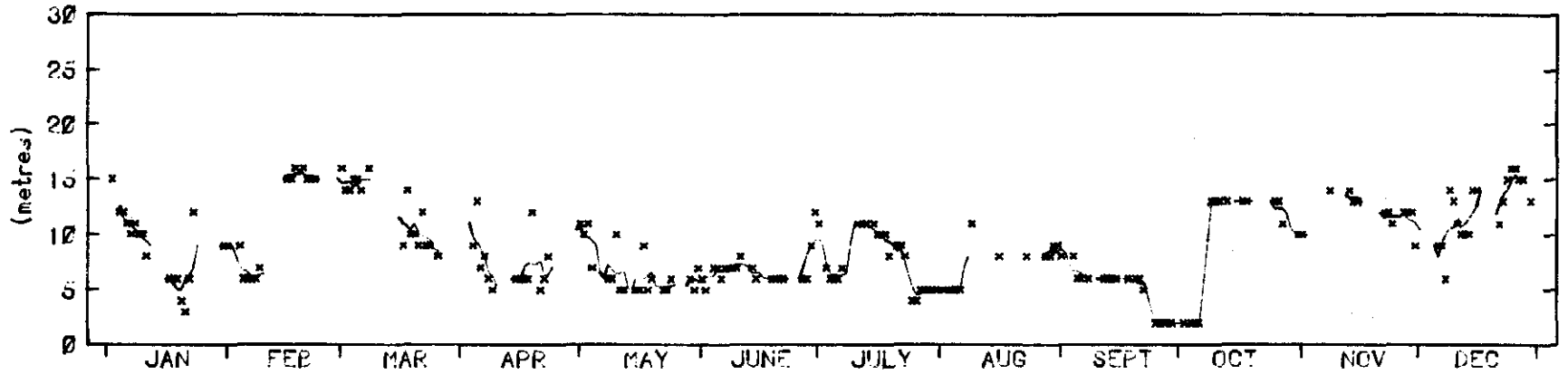
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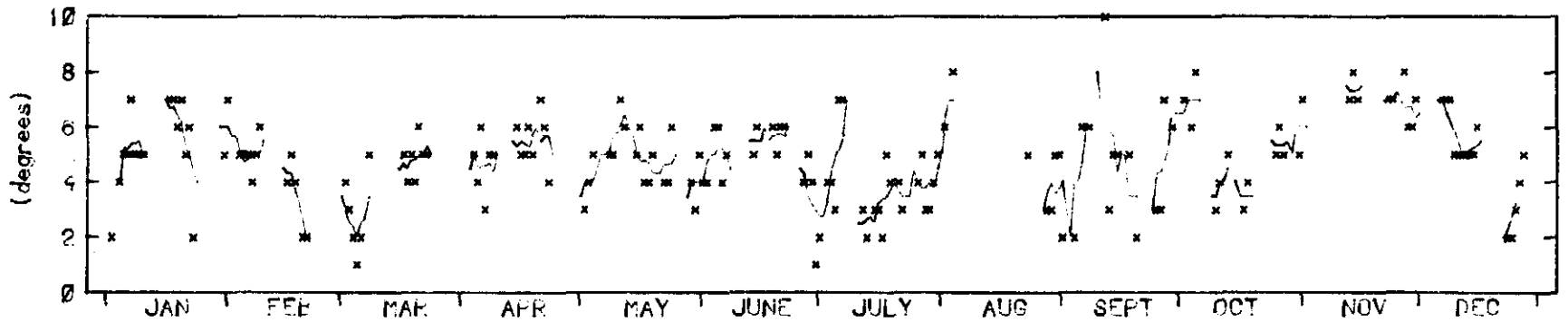
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BEACH PROFILE PARAMETERS - 1972



DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1972

— Indicates Distance to Fixed Contour : 108 Observations Fixed Contour Level is approx .9 m. above AHD



FORESHORE SLOPE - 1972

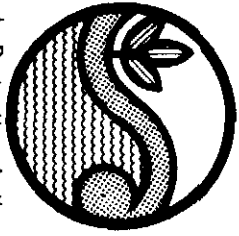
— Five Day Moving Average

No. of Observations : 168

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Figure 19

C 12.1



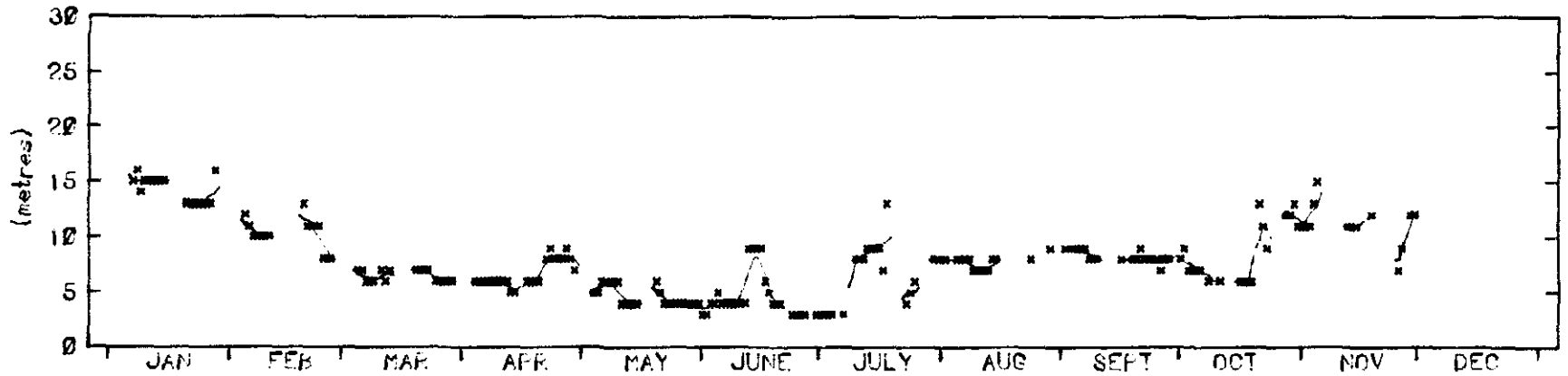
BEACH PROFILE PARAMETERS - 1973

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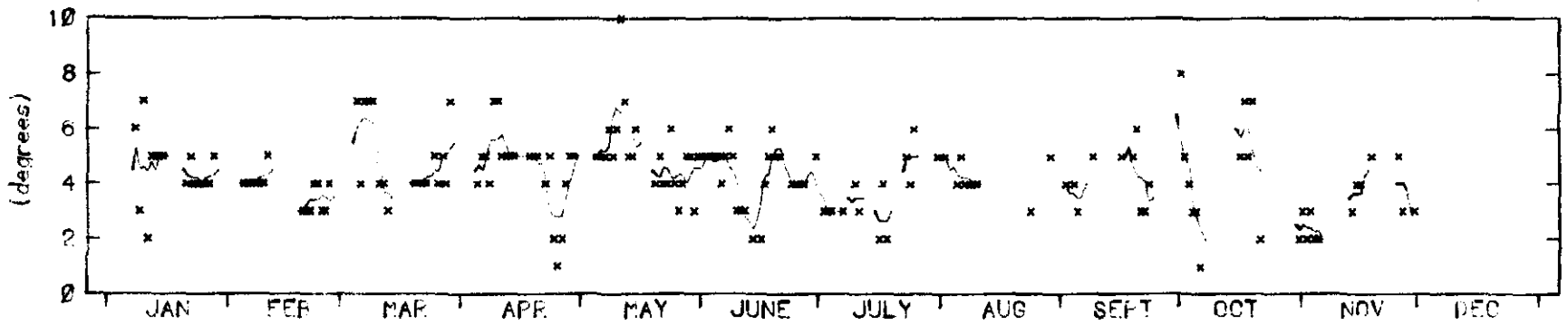
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DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1973

— Indicates Distance to Fixed Contour : 205 Observations Fixed Contour Level is approx .3 m. above A.H.L.



FORESHORE SLOPE - 1973

— Five Day Moving Average

No. of Observations : 172

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Figure 20

C 12.1



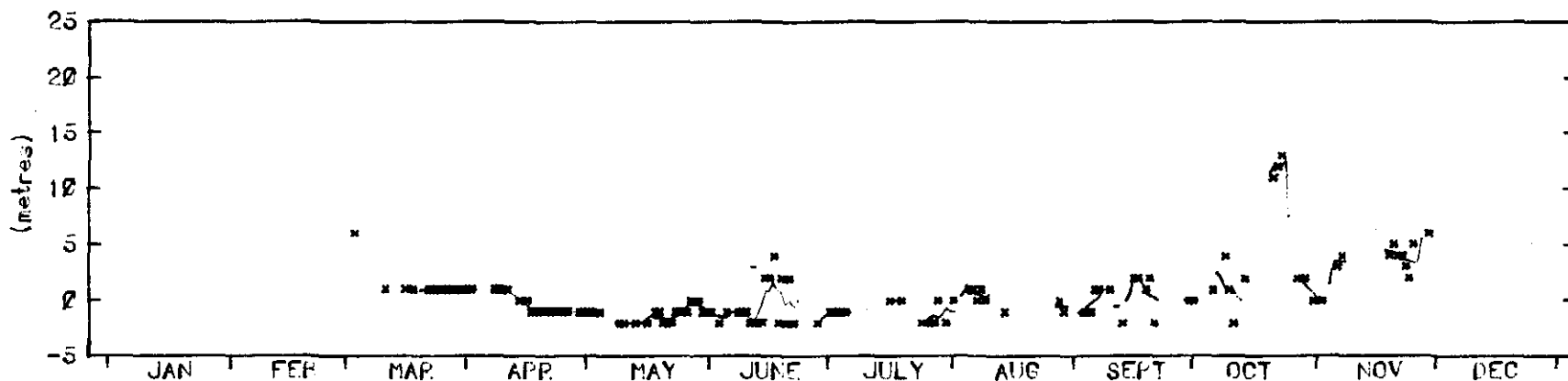
BEACH PROFILE PARAMETERS - 1974

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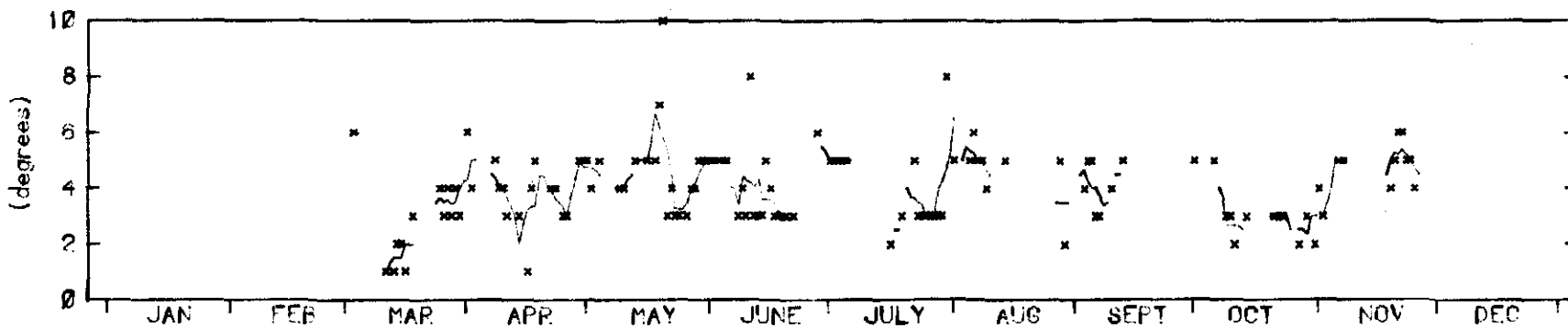
URANGAN

1974



DISTANCE TO FIXED CONTOUR AND VEGETATION LINE - 1974

xxxx Indicates Distance to Fixed Contour : 128 Observations Fixed Contour Level is approx 3 m. above AHD
— Indicates Distance to Vegetation Line : 1 Observations



FORESHORE SLOPE - 1974

— Five Day Moving Average

No. of Observations : 122

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Figure 21
C 12.1