COASTAL OBSERVATION PROGRAMME - ENGINEERING (COPE)

SURFERS PARADISE – CITY OF GOLD COAST

For the Years 1973 to 1983

Beach Protection Authority

November 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 Surfers Paradise in the City of the Gold Coast on the southern Queensland coast. The data were recorded by volunteer observer Mr. David Bow, during the period October 1973 to the end of October 1983. The recordings were made daily during the ten 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).

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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).

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 mininised 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 ten year period 1973 to 1983 in a useful statistical form. No attempt has been made to interpret the observed data.

If this ten 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

Surfers Paradise is located within the City of Gold Coast and is approximately 73 kilometres south of Brisbane in southern Queensland. It forms part of a 15 kilometre stretch of coastline extending south from the Nerang River Entrance. The location of the Surfers Paradise COPE station is shown in Figure 1.

2.2 Observers

This station has been manned by Mr. David Bow since October 1973. Mr. Bow is a resident of Surfers Paradise.

2.3 Observed Parameters

The observer at this station recorded at 9.00 a.m. and 3.00 p.m. daily during the ten year period 1973 to 1983.

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 Berm
- Berm Elevation
- Distance to Vegetation
- Foreshore Slope
- Longshore Current Speed
- Longshore Current Direction

In addition, a sand sample was collected at the station each month from January 1974 and since June 1975 a profile of the beach has been recorded monthly also.

2.4 Tidal Information

Tidal information for this station as presented below is essentially the same as that for Snapper Rocks off Point Danger. Datum is Low Water Datum.

M.H.W.S. : 1.4 metres
M.H.W.N. : 1.1 metres
M.S.L. : 0.78 metres
M.L.W.N. : 0.4 metres
M.L.W.S. : 0.1 metres

2.5 Description of the Beach

The beach at the Surfers Paradise beach exhibits the following characteristics:

- Typical beach slopes: foreshore slope is in the range 1 in 10 - 1 in 30 (2^{o} - 6^{o}).
- Beach width: typically 15 to 60 metres from the vegetation line.
- D50 sand size: 0.29 mm averaged over nine years.
- Adjoining landform: well developed frontal dune backed by extensive high rise development on the hind dune.
- Vegetation: Beach spinifex (*spinifex hirsutus*) open-grassland on the seaward slope and crest of the frontal dune. Horsetail she-oak (*Casuarina equisetifolia* var. *incana*) low open-forest on the crest and landward slope of the frontal dune.

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 Gold Coast City 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 ten year period October 1973 to October 1983 are presented on the attached figures. The data have been analysed statistically and/or smoothed to reveal long term averages or trends. A brief description of each of the observed parameters is given below with the relevant figure references.

3.2 Wind

The observer recorded the wind speed at the beach using a hand held wind meter at 1.5 metres above beach level. Wind direction is estimated to the nearest compass sector.

A summary of annual wind speed and direction percentage occurences are shown as a wind rose in 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^{O} to 60^{O}
Sector 2 - 60^{O} to 85^{O}
Sector 3 - 85^{O} to 95^{O}
Sector 4 - 95^{O} to 120^{O}
Sector 5 - 120^{O} to 180^{O}

Note: 0^{O} 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 27.

(d) tabulation of the occurrence of various wave heights, periods, types and directions (Tables 1 to 11).

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 28 to Figure 38). Mean upcoast and downcoast components and the overall annual means are also presented.

3.5 Beach Profile Parameters

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

- elevation of berm crest and distance from the reference pole to the seaward edge of the berm.

- 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 39 to 60.

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 61 to 69.

TABLE 1

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

SURFERS PARADISE — YEAR 1973

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	9.4	0.99	100.0	–	–	–	–	–	13.3	63.3	23.4	–	–
NOVEMBER	10.9	1.25	69.6	–	–	30.4	–	1.8	33.9	39.3	25.0	–	–
DECEMBER	9.8	1.12	50.0	–	6.5	43.5	–	–	27.4	56.5	16.1	–	–
WHOLE YEAR	10.1	1.14	67.8	0.0	2.7	29.5	0.0	1.0	30.8	46.2	22.0	0.0	0.0

SP – Spilling
PL – Plunging
SP/PL – Combined spilling and plunging

TABLE 2

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

SURFERS PARADISE — YEAR 1974

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	8.8	1.64	4.8	41.9	17.7	35.5	–	–	25.8	61.3	12.9	–	–
FEBRUARY	9.8	1.87	26.8	7.1	8.9	57.1	–	–	3.6	25.0	71.4	–	–
MARCH	10.5	1.98	9.7	22.6	14.5	53.2	–	–	29.0	14.5	56.5	–	–
APRIL	10.9	1.26	43.1	20.7	–	36.2	–	–	17.2	39.7	43.1	–	–
MAY	9.6	1.19	31.1	3.3	–	65.6	–	–	8.2	47.5	44.3	–	–
JUNE	10.3	1.76	16.7	41.7	10.0	31.7	–	–	5.0	38.3	56.7	–	–
JULY	11.1	0.72	48.4	24.2	–	16.1	11.3	–	29.0	22.7	37.0	–	11.3
AUGUST	11.2	1.34	35.6	16.9	–	44.1	3.4	–	13.8	24.2	58.6	–	3.4
SEPTEMBER	10.9	0.87	71.7	–	–	21.7	6.7	–	26.7	15.0	51.6	–	6.7
OCTOBER	9.6	0.98	70.5	6.6	–	19.7	3.3	3.1	25.8	19.4	48.4	–	3.3
NOVEMBER	9.7	1.47	27.1	47.5	–	25.4	–	–	20.3	28.8	50.9	–	–
DECEMBER	10.1	1.03	36.1	18.0	–	45.9	–	–	32.3	27.4	40.3	–	–
WHOLE YEAR	10.2	1.34	35.1	20.9	4.3	37.6	2.1	0.3	19.9	30.3	47.4	0.0	2.1

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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

SURFERS PARADISE — 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	9.1	1.19	32.3	19.4	-	48.4	-	-	40.3	17.8	41.9	-	-
FEBRUARY	9.6	1.44	26.8	12.5	3.6	57.1	-	-	30.3	14.3	55.4	-	-
MARCH	9.8	1.19	18.0	27.9	-	54.1	-	-	26.2	19.7	54.1	-	-
APRIL	10.2	1.57	3.3	71.7	16.7	8.3	-	-	1.6	31.7	66.7	-	-
MAY	11.0	1.26	17.7	43.5	1.6	37.1	-	-	14.8	34.4	50.8	-	-
JUNE	10.5	1.34	3.3	31.7	-	65.0	-	-	15.1	18.3	63.3	3.3	-
JULY	10.7	1.16	27.5	30.0	-	42.5	-	-	17.5	47.5	35.0	-	-
AUGUST	10.6	1.01	24.6	16.4	-	59.0	-	-	25.8	37.1	37.1	-	-
SEPTEMBER	10.0	1.11	30.0	18.3	-	51.7	-	-	36.7	26.6	36.7	-	-
OCTOBER	10.5	1.14	29.5	21.3	-	49.2	-	-	32.3	22.6	45.1	-	-
NOVEMBER	9.6	1.26	30.4	37.5	-	32.1	-	-	26.8	25.0	48.2	-	-
DECEMBER	9.6	1.33	13.1	19.7	-	67.2	-	-	21.0	17.7	61.3	-	-
WHOLE YEAR	10.1	1.25	21.1	29.1	1.9	47.9	0.0	0.0	24.2	25.5	50.0	0.3	0.0

SP — Spilling
PL — Plunging
SP/PL — Combined spilling and plunging

TABLE 4

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

SURFERS PARADISE

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	8.8	1.49	14.5	32.3	-	53.2	-	-	33.9	21.0	45.1	-	-
FEBRUARY	8.6	1.71	13.8	13.8	5.2	67.2	-	-	19.0	46.6	34.4	-	-
MARCH	9.4	1.88	-	21.3	1.6	77.0	-	-	6.6	11.4	82.0	-	-
APRIL	9.4	1.51	5.2	13.8	-	81.0	-	-	3.4	25.9	70.7	-	-
MAY	9.3	1.27	16.4	23.0	-	60.7	-	-	-	45.2	54.8	-	-
JUNE	10.0	1.11	13.8	34.5	-	51.7	-	-	12.1	29.3	58.6	-	-
JULY	10.0	1.24	3.2	14.5	-	82.3	-	-	4.8	29.0	66.2	-	-
AUGUST	10.3	1.27	21.3	27.9	-	50.8	-	-	8.2	47.5	44.3	-	-
SEPTEMBER	9.8	1.34	16.7	30.0	-	53.3	-	-	15.0	45.0	40.0	-	-
OCTOBER	9.4	1.11	26.7	43.3	-	30.0	-	-	24.2	56.5	19.3	-	-
NOVEMBER	8.5	1.07	21.8	56.4	-	21.8	-	-	30.9	65.5	3.6	-	-
DECEMBER	7.7	0.79	27.9	54.1	-	18.0	-	-	29.0	41.9	29.1	-	-
WHOLE YEAR	9.3	1.32	15.0	30.3	0.6	54.1	0.0	0.0	15.5	38.6	45.9	0.0	0.0

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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

SURFERS PARADISE — 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	9.3	1.30	-	79.0	-	21.0	-	-	9.7	54.8	35.5	-	-
FEBRUARY	9.1	1.28	5.4	62.5	-	32.1	-	-	-	53.6	46.4	-	-
MARCH	8.8	1.29	3.2	69.4	-	27.4	-	-	6.5	64.5	29.0	-	-
APRIL	9.1	0.93	3.4	49.2	-	47.5	-	-	1.7	37.3	61.0	-	-
MAY	9.7	1.00	6.8	61.0	1.7	30.5	-	-	15.3	50.8	33.9	-	-
JUNE	10.2	1.10	1.7	76.7	-	18.3	3.3	-	1.7	46.7	45.0	3.3	3.3
JULY	10.0	1.25	-	67.7	-	25.8	6.5	-	-	43.5	50.0	-	6.5
AUGUST	9.9	1.12	16.1	51.6	-	29.0	3.2	-	16.2	51.6	29.0	-	3.2
SEPTEMBER	9.3	0.67	21.7	40.0	-	38.3	-	-	26.7	36.7	36.6	-	-
OCTOBER	8.4	0.59	5.5	65.5	-	29.1	-	-	28.1	47.4	24.5	-	-
NOVEMBER	8.0	0.93	-	85.0	-	15.0	-	-	23.3	41.7	35.0	-	-
DECEMBER	8.4	0.82	-	76.7	-	23.3	-	-	31.7	38.3	26.7	3.3	-
WHOLE YEAR	9.2	1.03	5.4	65.4	0.1	28.0	1.1	0.0	17.2	47.1	34.4	0.2	1.1

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

SURFERS PARADISE — 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	8.5	1.22	1.6	88.7	-	9.7	-	-	17.7	66.1	16.2	-	-
FEBRUARY	8.2	1.03	5.6	53.7	-	40.7	-	-	16.7	27.8	55.5	-	-
MARCH	9.3	1.39	-	91.7	-	8.3	-	-	10.0	45.0	45.0	-	-
APRIL	9.9	1.27	-	79.3	-	20.7	-	-	5.2	31.0	63.8	-	-
MAY	9.9	1.30	-	96.6	-	3.4	-	-	1.7	66.1	32.2	-	-
JUNE	10.1	1.45	-	93.2	-	5.1	1.7	-	5.1	40.0	53.2	-	1.7
JULY	8.7	1.12	3.4	89.8	-	5.1	1.7	-	25.4	28.8	44.1	-	1.7
AUGUST	9.4	1.55	-	100.0	-	-	-	-	11.1	18.5	68.5	1.9	-
SEPTEMBER	8.7	1.32	-	86.0	-	14.0	-	-	21.0	42.2	36.8	-	-
OCTOBER	8.4	1.43	-	93.1	-	6.9	-	-	32.8	25.9	41.3	-	-
NOVEMBER	8.4	1.46	-	97.3	-	2.7	-	-	27.0	16.2	56.8	-	-
DECEMBER	8.4	1.36	-	90.5	-	9.5	-	-	23.8	31.0	45.2	-	-
WHOLE YEAR	9.0	1.32	0.9	88.2	0.0	10.6	0.3	0.0	14.4	39.2	46.0	0.1	0.3

SP — Spilling
PL — Plunging
SP/PL — Combined spilling and plunging

TABLE 7

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

SURFERS PARADISE — 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	8.8	1.62	-	98.4	-	1.6	-	-	17.7	38.7	43.6	-	-
FEBRUARY	8.8	1.62	-	92.9	-	7.1	-	-	23.2	21.4	55.4	-	-
MARCH	9.6	1.37	-	77.5	-	22.5	-	-	10.0	15.0	75.0	-	-
APRIL	9.9	1.51	-	87.5	-	12.5	-	-	35.7	26.7	37.6	-	-
MAY	9.5	1.52	-	100.0	-	-	-	-	32.3	27.4	40.3	-	-
JUNE	9.6	1.66	-	98.3	-	1.7	-	-	11.7	28.3	60.0	-	-
JULY	10.0	1.59	3.3	83.6	1.6	11.5	-	-	18.0	34.5	47.5	-	-
AUGUST	9.1	1.18	-	92.9	-	7.1	-	-	19.6	26.8	53.6	-	-
SEPTEMBER	8.7	1.02	-	94.0	-	4.0	2.0	-	28.0	18.0	52.0	-	2.0
OCTOBER	9.1	1.21	3.3	76.7	-	20.0	-	-	36.7	23.3	40.0	-	-
NOVEMBER	8.4	1.16	-	95.0	-	5.0	-	-	53.3	30.0	16.7	-	-
DECEMBER	8.5	1.32	-	100.0	-	-	-	-	41.0	29.5	29.5	-	-
WHOLE YEAR	9.2	1.41	0.5	92.5	0.2	6.6	0.2	0.0	24.6	27.4	47.8	0.0	0.2

SP — Spilling
PL — Plunging
SP/PL — Combined spilling and plunging

TABLE 8

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

SURFERS PARADISE — YEAR 1980

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	8.3	1.51	1.6	91.9	-	6.5	-	-	50.0	21.0	29.0	-	-
FEBRUARY	8.5	2.23	-	100.0	-	-	-	-	13.8	19.0	67.2	-	-
MARCH	9.6	1.70	-	95.2	-	4.8	-	-	25.8	37.1	37.1	-	-
APRIL	9.5	1.91	-	96.4	-	3.6	-	-	7.2	23.2	69.6	-	-
MAY	8.4	1.89	-	100.0	-	-	-	-	11.3	40.3	48.4	-	-
JUNE	9.4	1.49	-	96.6	-	-	3.4	-	15.6	24.1	56.9	-	3.4
JULY	9.2	1.30	-	100.0	-	-	-	-	8.7	32.1	59.0	-	-
AUGUST	8.5	1.33	-	100.0	-	-	-	-	23.7	33.9	42.4	-	-
SEPTEMBER	8.4	1.12	-	100.0	-	-	-	-	47.5	23.7	28.8	-	-
OCTOBER	8.2	1.34	-	96.7	-	3.3	-	-	37.7	18.0	44.3	-	-
NOVEMBER	7.7	1.20	-	100.0	-	-	-	-	57.6	5.0	37.4	-	-
DECEMBER	8.1	1.52	-	90.3	4.8	4.8	-	-	37.1	27.4	35.5	-	-
WHOLE YEAR	8.6	1.54	0.1	97.2	0.4	2.0	0.3	0.0	27.7	25.5	46.5	0.0	0.3

SP — Spilling
PL — Plunging
SP/PL — Combined spilling and plunging

TABLE 9

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

SURFERS PARADISE — YEAR 1981

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	8.3	1.52	-	96.7	-	3.3	-	-	-	100.0	-	-	-
FEBRUARY	-	-	-	-	-	-	-	-	-	-	-	-	-
MARCH	8.5	1.36	-	100.0	-	-	-	-	-	100.0	-	-	-
APRIL	9.0	1.17	-	100.0	-	-	-	-	-	82.8	17.2	-	-
MAY	9.0	1.20	-	100.0	-	-	-	-	11.3	27.4	59.7	1.6	-
JUNE	9.2	0.79	-	100.0	-	-	-	-	13.3	36.7	50.0	-	-
JULY	9.8	1.22	-	100.0	-	-	-	-	17.7	29.0	53.2	-	-
AUGUST	9.3	1.16	-	100.0	-	-	-	-	13.2	28.3	58.5	-	-
SEPTEMBER	8.7	1.19	1.7	98.3	-	-	-	-	22.2	24.1	53.7	-	-
OCTOBER	8.3	1.37	-	100.0	-	-	-	-	18.0	50.8	31.1	-	-
NOVEMBER	8.0	1.42	-	100.0	-	-	-	-	3.9	31.4	64.7	-	-
DECEMBER	8.8	1.43	-	100.0	-	-	-	-	25.0	40.0	35.0	-	-
WHOLE YEAR	8.9	1.25	0.2	99.5	0.0	0.3	0.0	0.0	12.2	47.1	40.5	0.2	0.0

SP — Spilling
PL — Plunging
SP/PL — Combined spilling and plunging

TABLE 10

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

SURFERS PARADISE — YEAR 1982

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	8.6	1.61	-	100.0	-	-	-	-	5.0	33.3	61.7	-	-
FEBRUARY	-	-	-	-	-	-	-	-	-	-	-	-	-
MARCH	8.9	1.65	-	100.0	-	-	-	-	-	70.6	29.4	-	-
APRIL	9.0	1.31	-	100.0	-	-	-	-	8.6	43.1	48.3	-	-
MAY	8.9	12.9	-	100.0	-	-	-	-	4.9	54.1	41.0	-	-
JUNE	9.8	1.47	-	100.0	-	-	-	-	-	24.1	75.9	-	-
JULY	9.2	1.13	-	100.0	-	-	-	-	-	25.8	74.2	-	-
AUGUST	9.4	1.29	-	100.0	-	-	-	-	1.7	60.3	37.9	-	-
SEPTEMBER	9.6	1.11	-	100.0	-	-	-	-	20.0	28.3	51.7	-	-
OCTOBER	8.6	1.05	1.6	80.6	-	17.7	-	-	25.8	22.6	51.6	-	-
NOVEMBER	8.9	1.29	-	93.3	-	6.7	-	-	35.0	25.0	40.0	-	-
DECEMBER	8.6	1.08	-	93.5	-	6.5	-	-	35.5	29.0	35.5	-	-
WHOLE YEAR	9.0	1.28	0.2	96.8	0.0	3.0	0.0	0.0	13.2	36.5	50.3	0.0	0.0

SP — Spilling
PL — Plunging
SP/PL — Combined spilling and plunging

TABLE 11

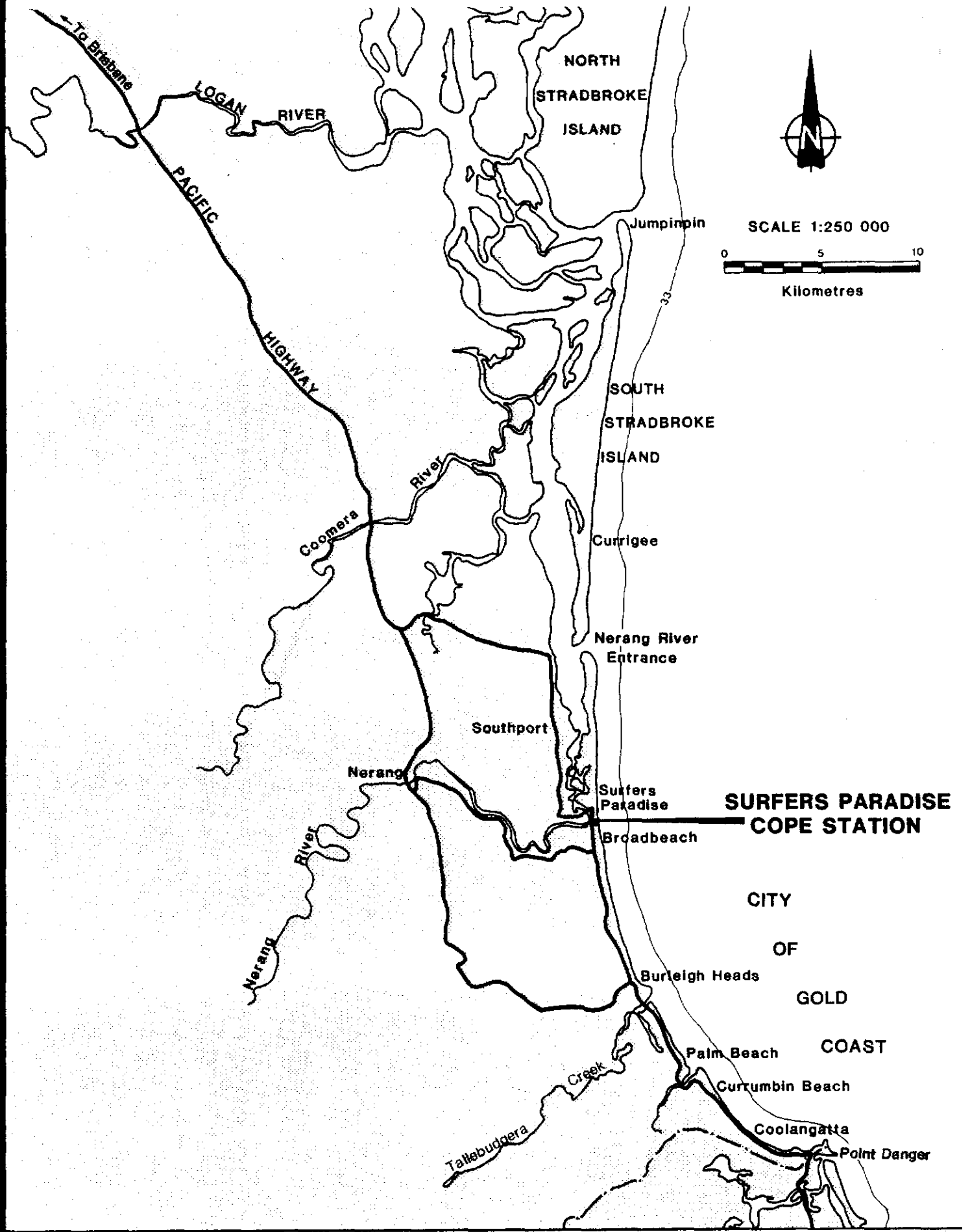
MONTHLY AND ANNUAL
MEAN WAVE HEIGHT/MEAN WAVE PERIOD AND WAVE TYPE/WAVE DIRECTION
OCCURRENCES

SURFERS PARADISE

YEAR 1983

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	8.2	1.60	-	100.0	-	-	-	-	14.5	50.0	35.5	-	-
FEBRUARY	7.4	1.29	-	100.0	-	-	-	-	20.0	22.5	57.5	-	-
MARCH	9.1	1.52	-	91.9	-	8.1	-	-	-	48.4	51.6	-	-
APRIL	9.1	1.32	-	100.0	-	-	-	-	-	28.8	71.2	-	-
MAY	8.1	1.34	-	98.3	-	-	1.7	-	3.3	60.7	34.3	-	1.7
JUNE	8.4	1.31	-	100.0	-	-	-	-	-	15.3	84.7	-	-
JULY	8.2	1.20	-	100.0	-	-	-	-	3.2	27.4	69.4	-	-
AUGUST	8.3	1.03	-	89.7	-	10.3	-	-	1.7	36.2	62.1	-	-
SEPTEMBER	8.1	1.02	-	96.6	-	3.4	-	-	39.0	35.6	25.4	-	-
OCTOBER	8.9	1.22	-	96.7	-	3.3	-	-	13.3	20.0	66.7	-	-
NOVEMBER	-	-	-	-	-	-	-	-	-	-	-	-	-
DECEMBER	-	-	-	-	-	-	-	-	-	-	-	-	-
WHOLE YEAR	8.4	1.28	0.0	97.2	0.0	2.6	0.2	0.0	9.1	35.1	55.6	0.0	0.2

SP — Spilling
PL — Plunging
SP/PL — Combined spilling and plunging



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LOCALITY PLAN

COPE

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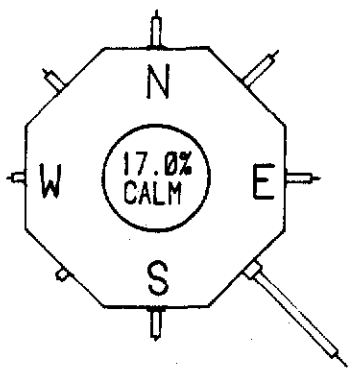
Figure 1

C 10.1

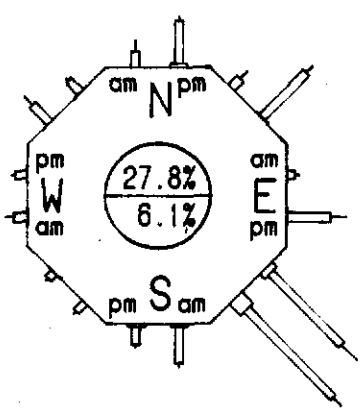
GOLD COAST CITY SURFERS PARADISE 0104

ALL OBSERVATIONS



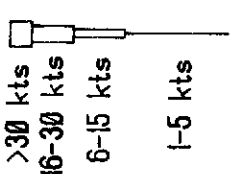
Total No. of Observations : 6848

MORNING - AFTERNOON OBSERVATIONS



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

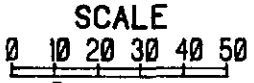
LEGEND



No. of Morning Observations : 3427
No. of Afternoon Observations : 3421

Mean Time :- Morning Obs : 0900 hrs
Mean Time :- Afternoon Obs : 1500 hrs

SCALE



WIND DATA - OCT 1973 to OCT 1983

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WIND DATA

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Figure 2
C 10.1

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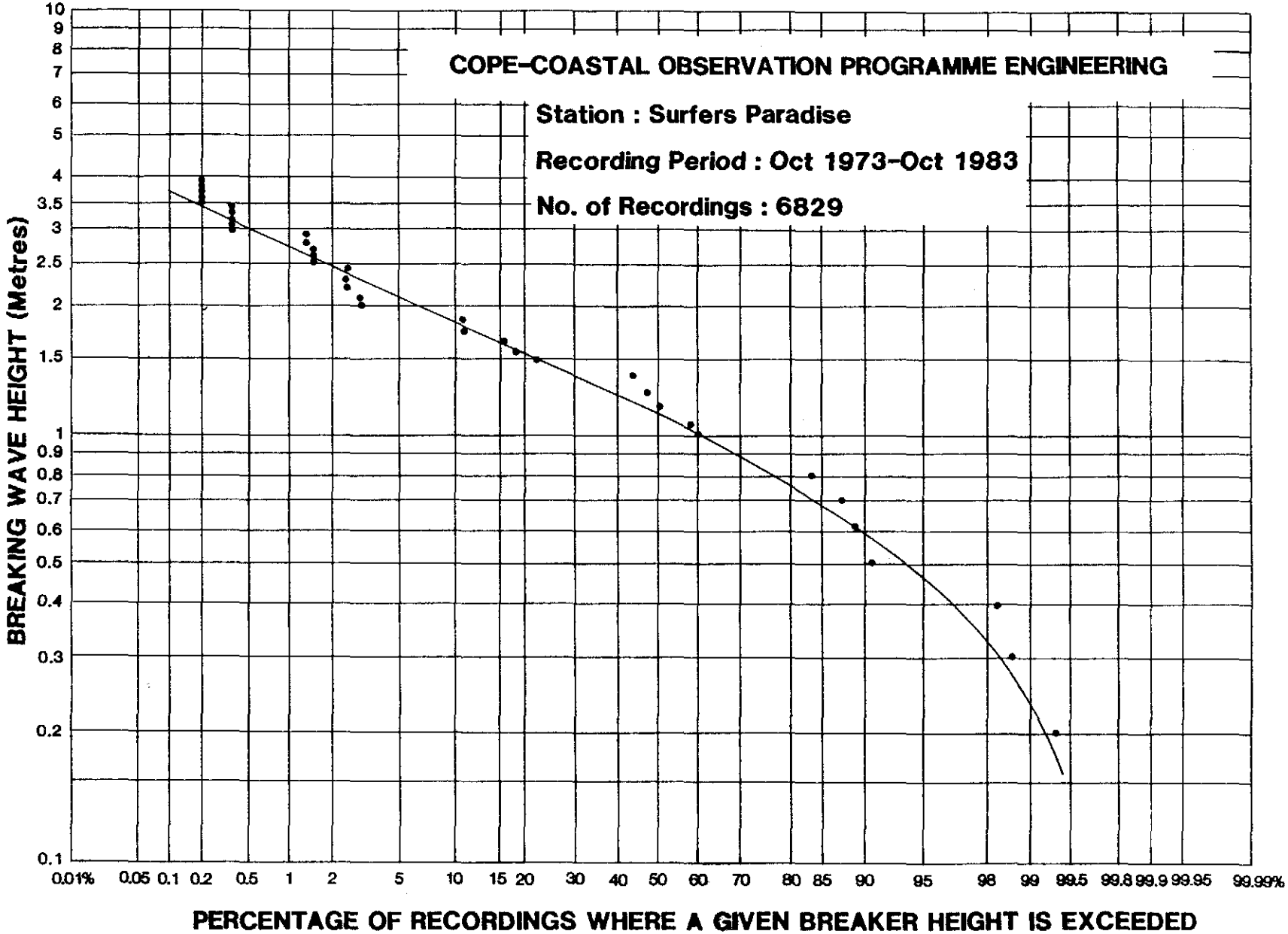
WAVE HEIGHT % EXCEEDANCE

ALL DATA



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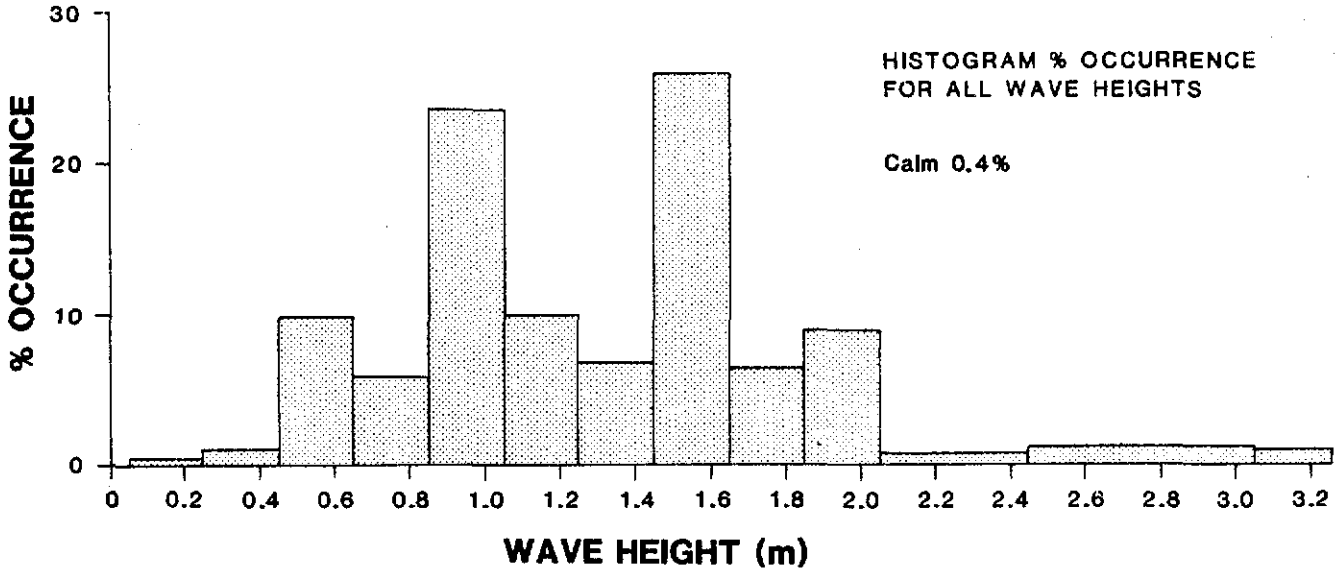
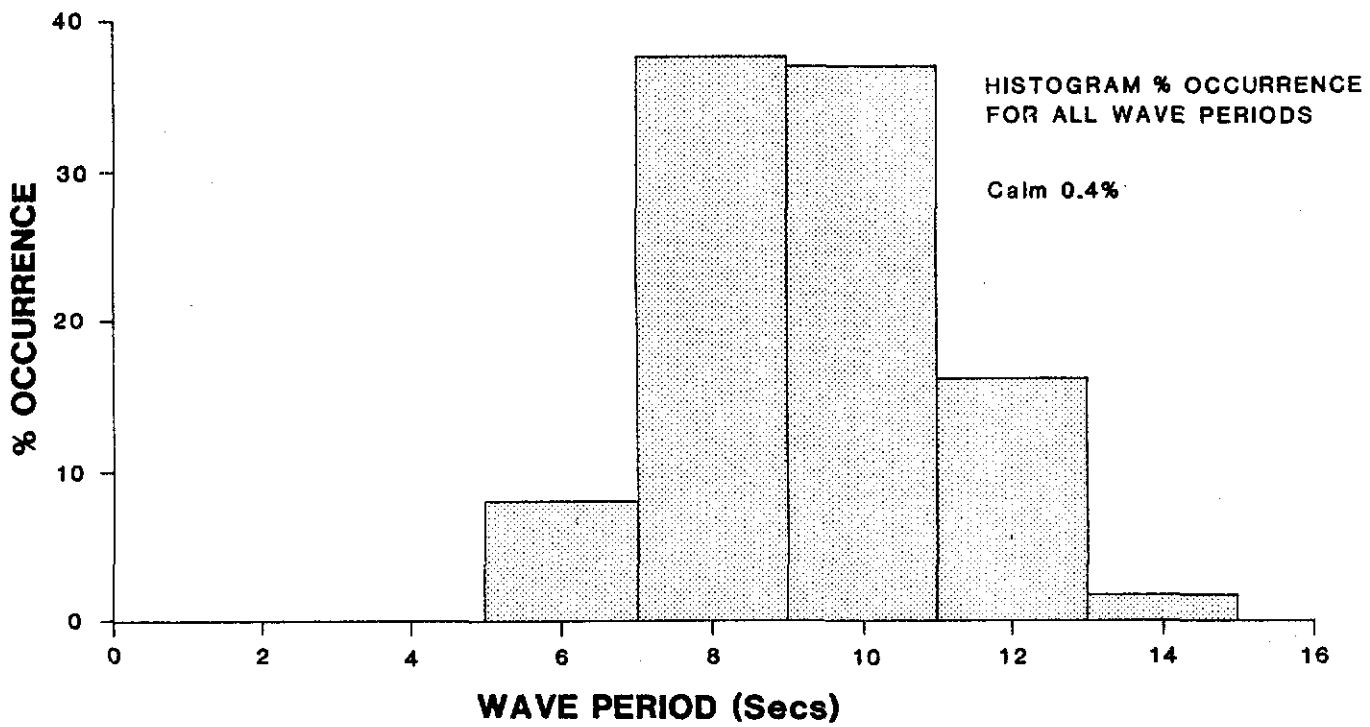
Surfers Paradise

FIGURE 3

C 10. 1





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WAVE HEIGHT AND PERIOD % OCCURRENCE

ALL DATA

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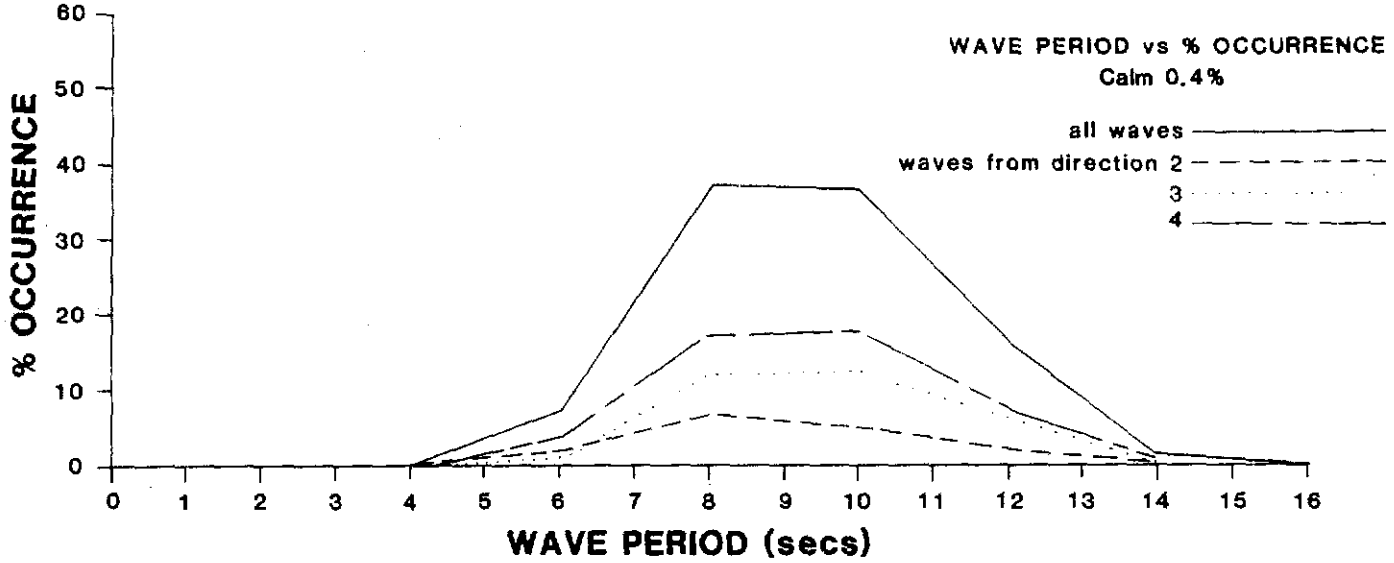
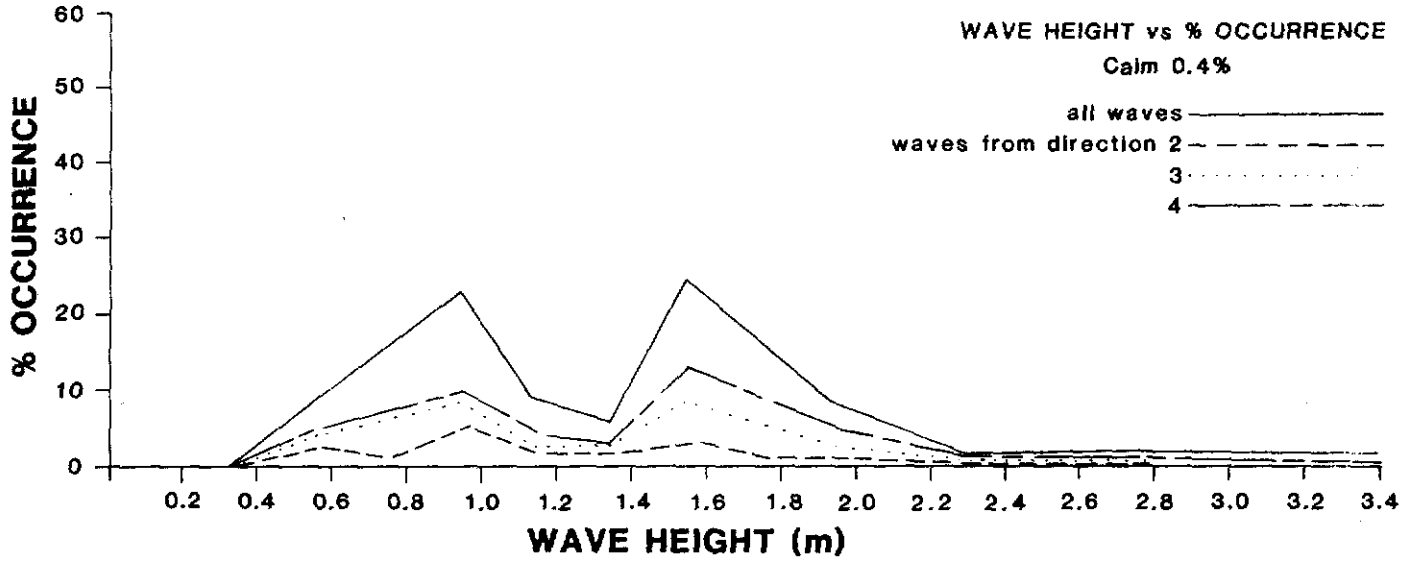
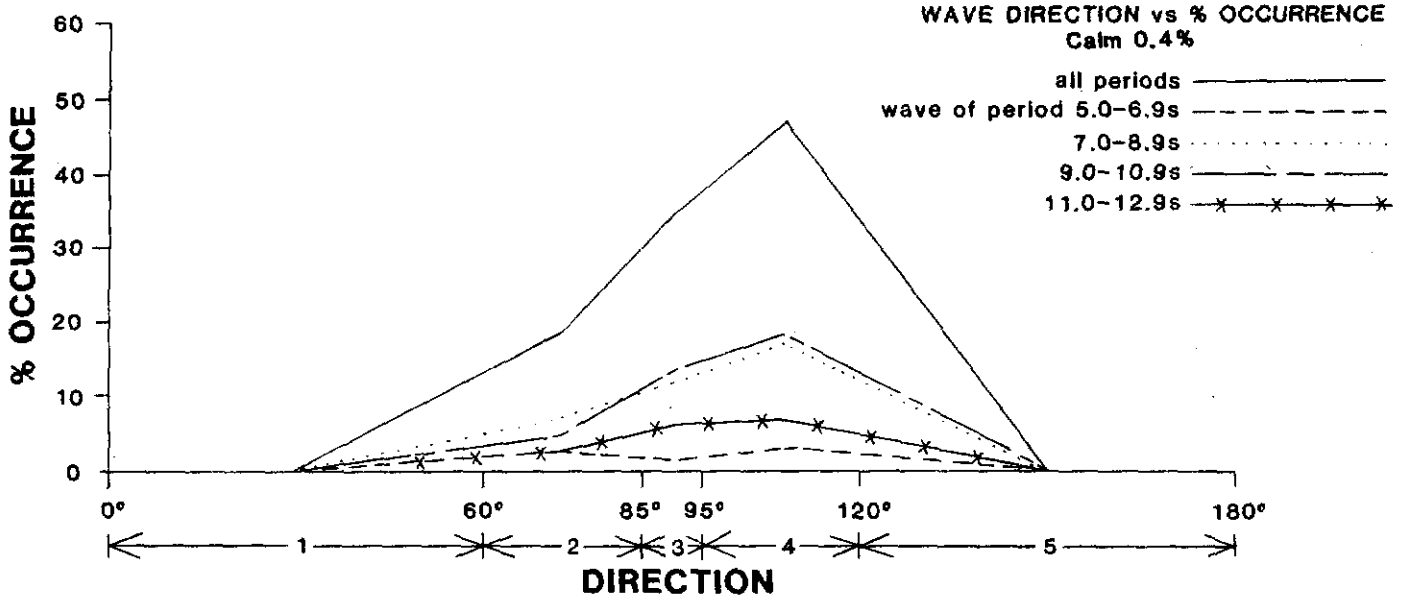
FIGURE 4

C 10. 1







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WAVE DIRECTION ANALYSIS

ALL DATA

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FIGURE 5

C 10. 1

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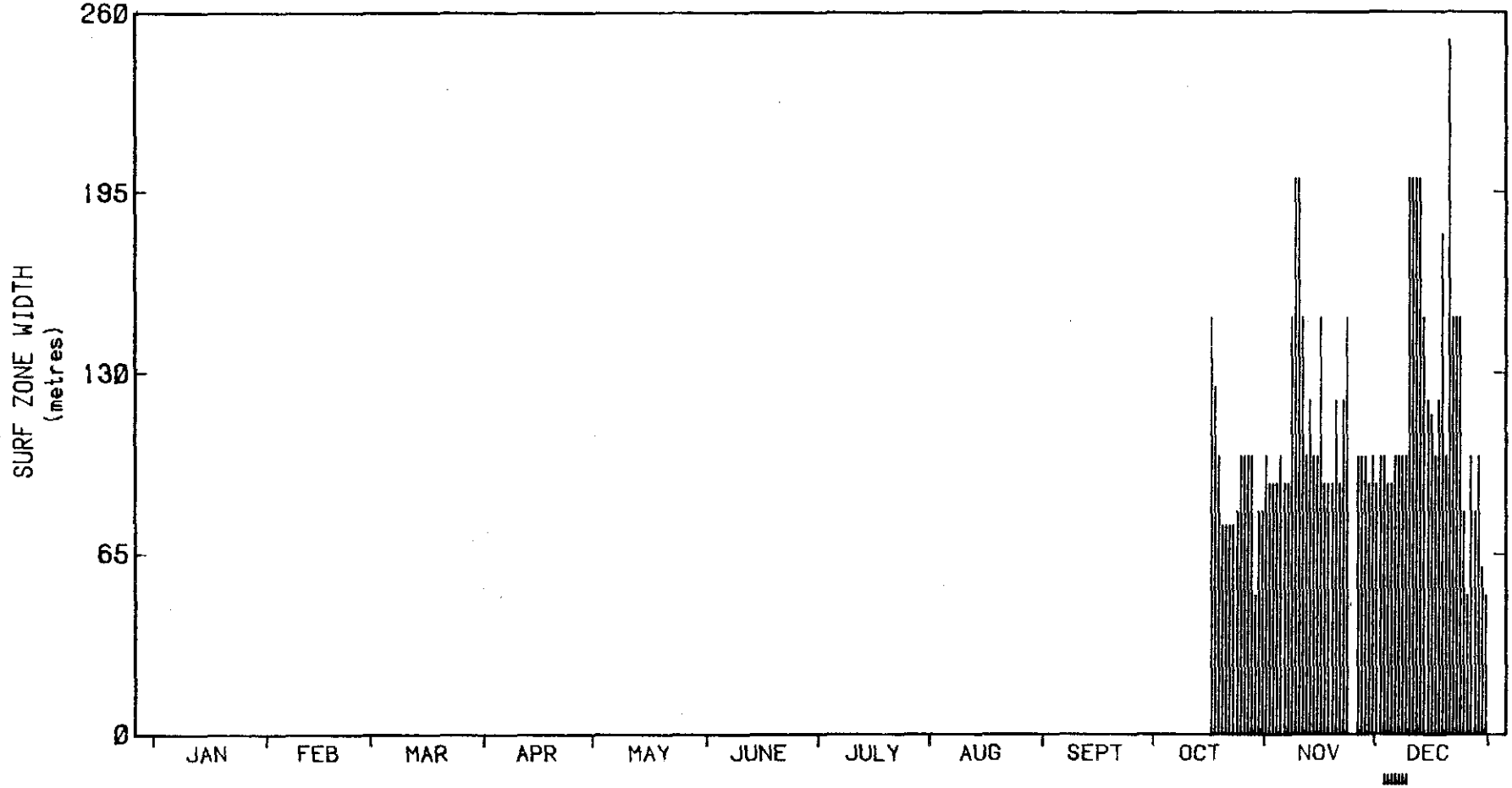
COPE - Coastal Observation Programme Engineering

SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH SUMMARY - 1973

No. of Observations : 74 MORNING OBSERVATIONS Mean Surf Zone Width = 112.2 m

▥ Indicates Offshore Bar Present

SURF ZONE WIDTH - MORNING 1973

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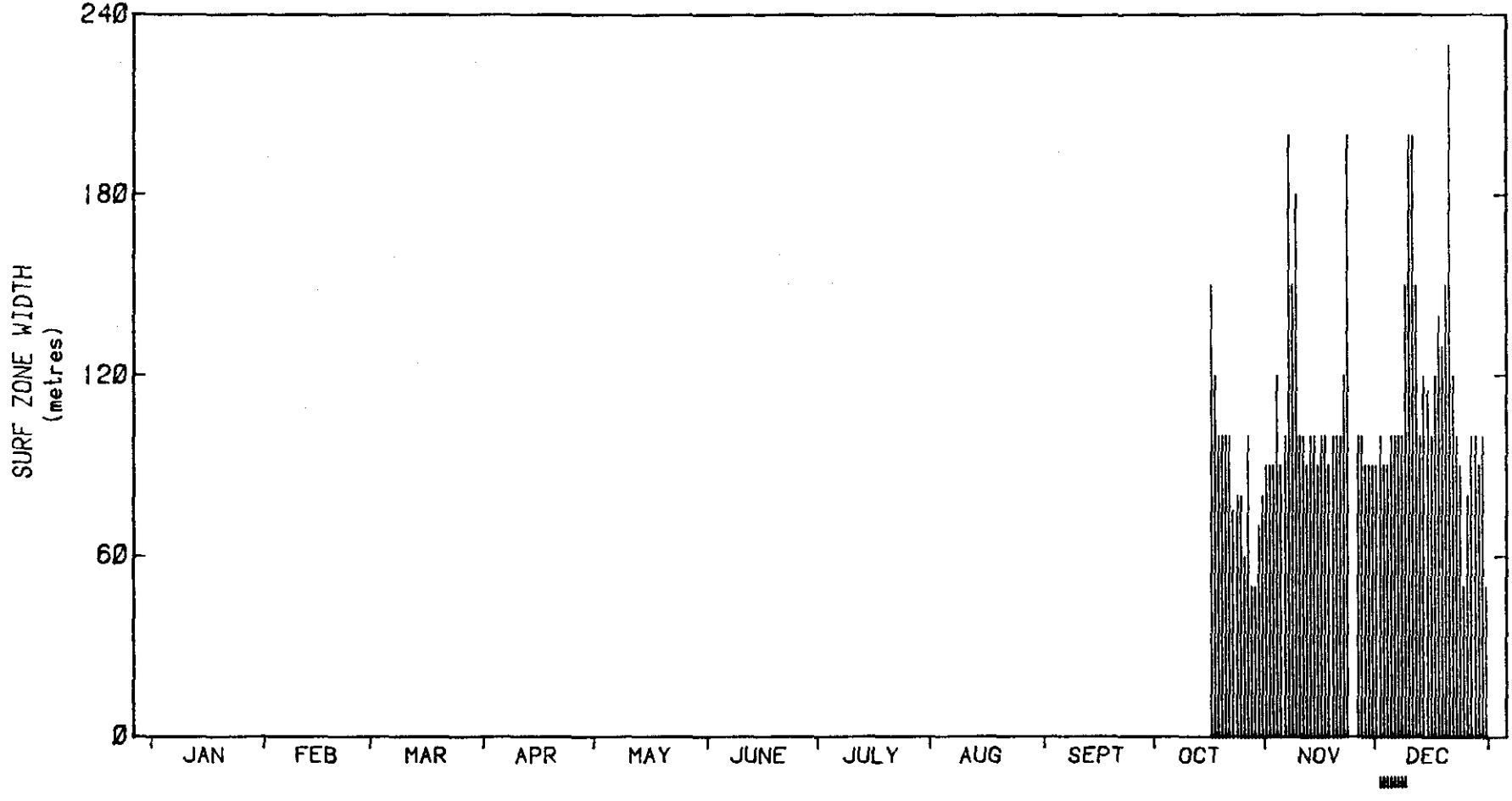
Figure 6
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH SUMMARY - 1973

No. of Observations : 74 AFTERNOON OBSERVATIONS Mean Surf Zone Width = 107.3 m

■ Indicates Offshore Bar Present

SURF ZONE WIDTH - AFTERNOON 1973

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Figure 7
C 10.1

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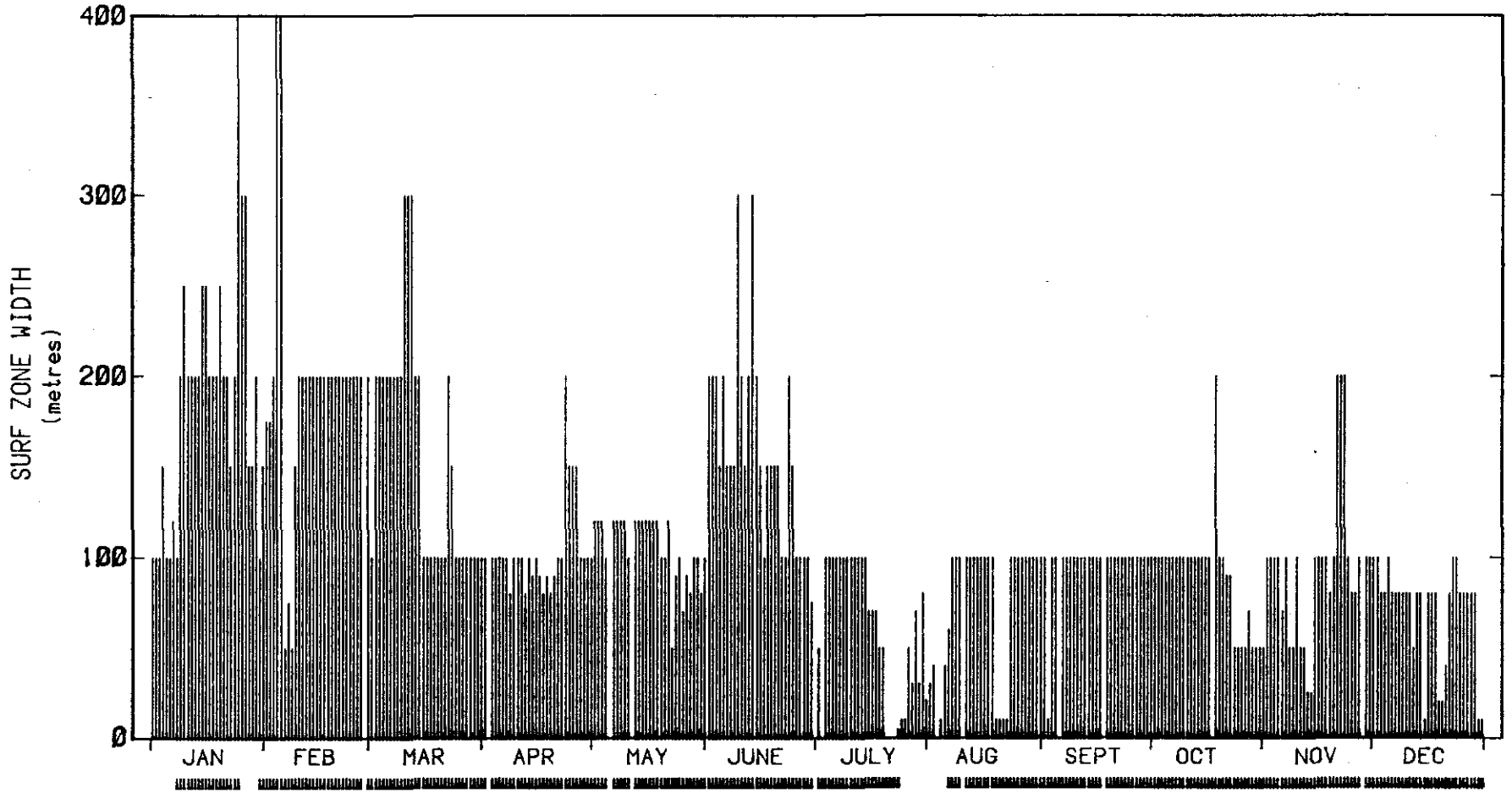
COPE - Coastal Observation Programme Engineering

SURFERS PARADISE

GOLD COAST CITY

0104



SURF ZONE WIDTH SUMMARY - 1974

No. of Observations : 362

MORNING OBSERVATIONS

Mean Surf Zone Width = 114.4 m

■ Indicates Offshore Bar Present

SURF ZONE WIDTH - MORNING 1974

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Surfers Paradise

Figure 8
C 10.1

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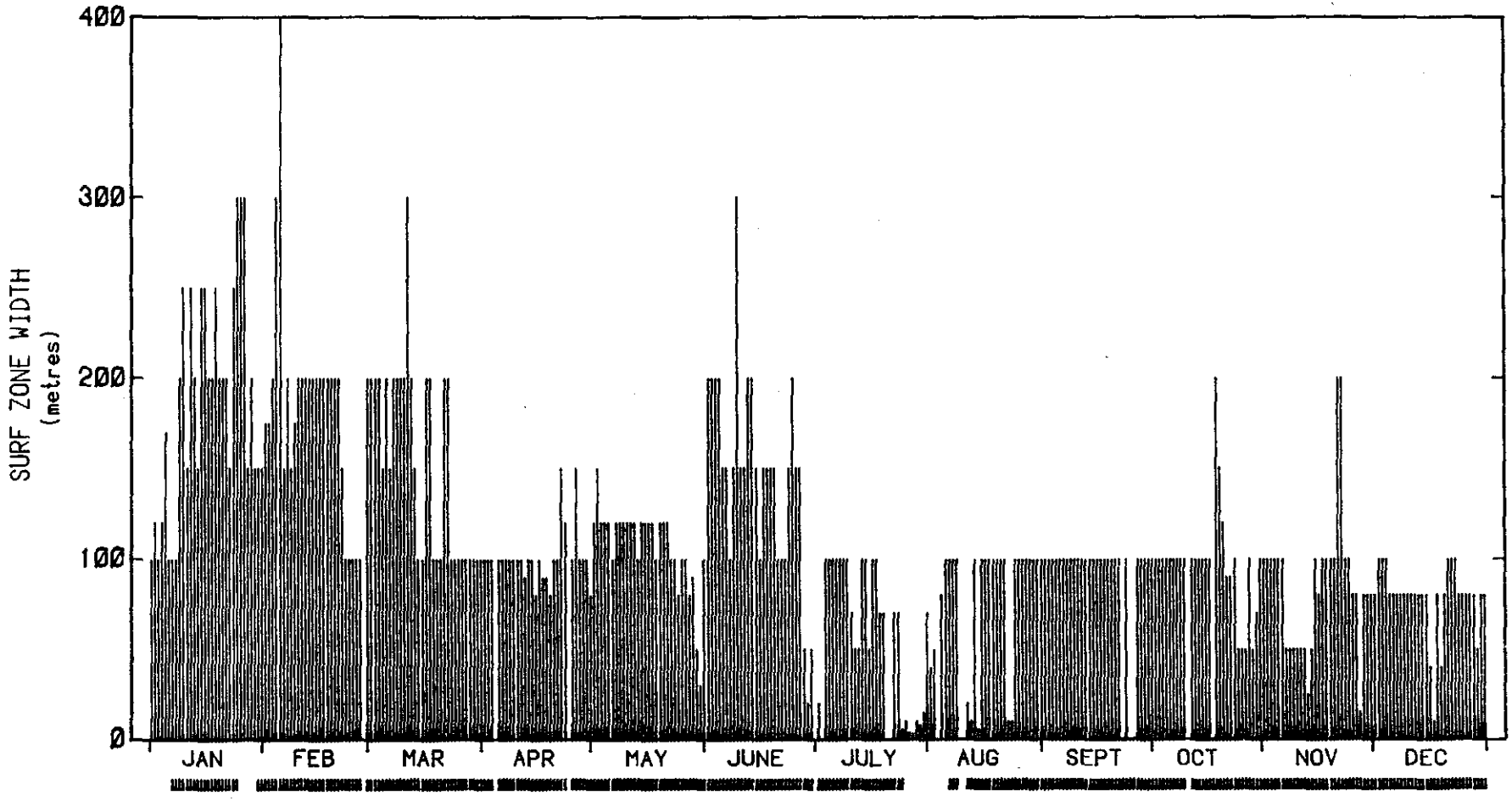
SURFERS PARADISE

GOLD COAST CITY

0104



SURF ZONE WIDTH SUMMARY - 1974

No. of Observations : 361

AFTERNOON OBSERVATIONS

Mean Surf Zone Width = 112.7 m

■ Indicates Offshore Bar Present

SURF ZONE WIDTH - AFTERNOON 1974

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Figure 9
C 10.1

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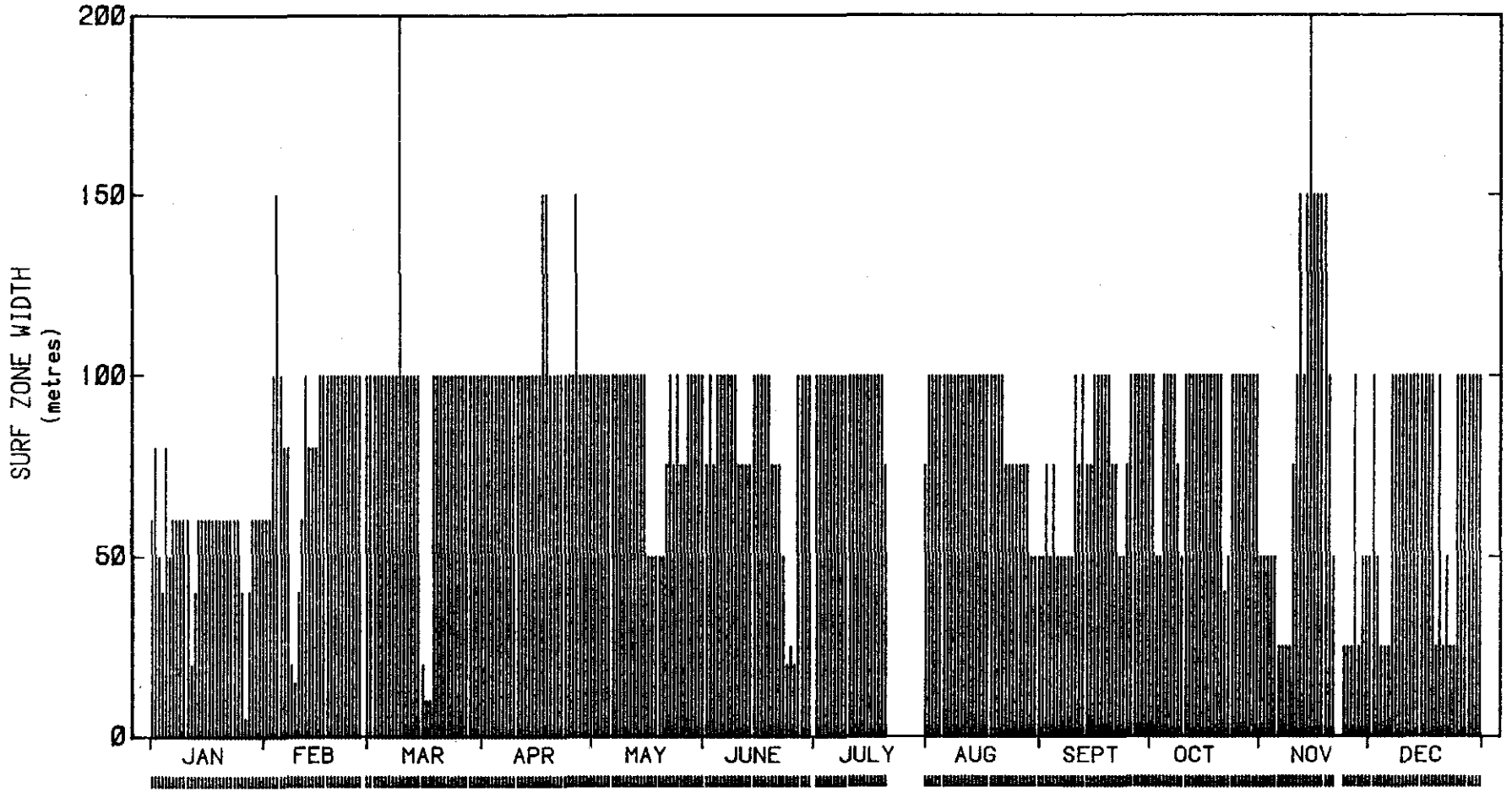
COPE - Coastal Observation Programme Engineering

SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH SUMMARY - 1975

No. of Observations : 352 MORNING OBSERVATIONS Mean Surf Zone Width = 84.9 m

■ Indicates Offshore Bar Present

SURF ZONE WIDTH - MORNING 1975

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Figure 10
C 10.1

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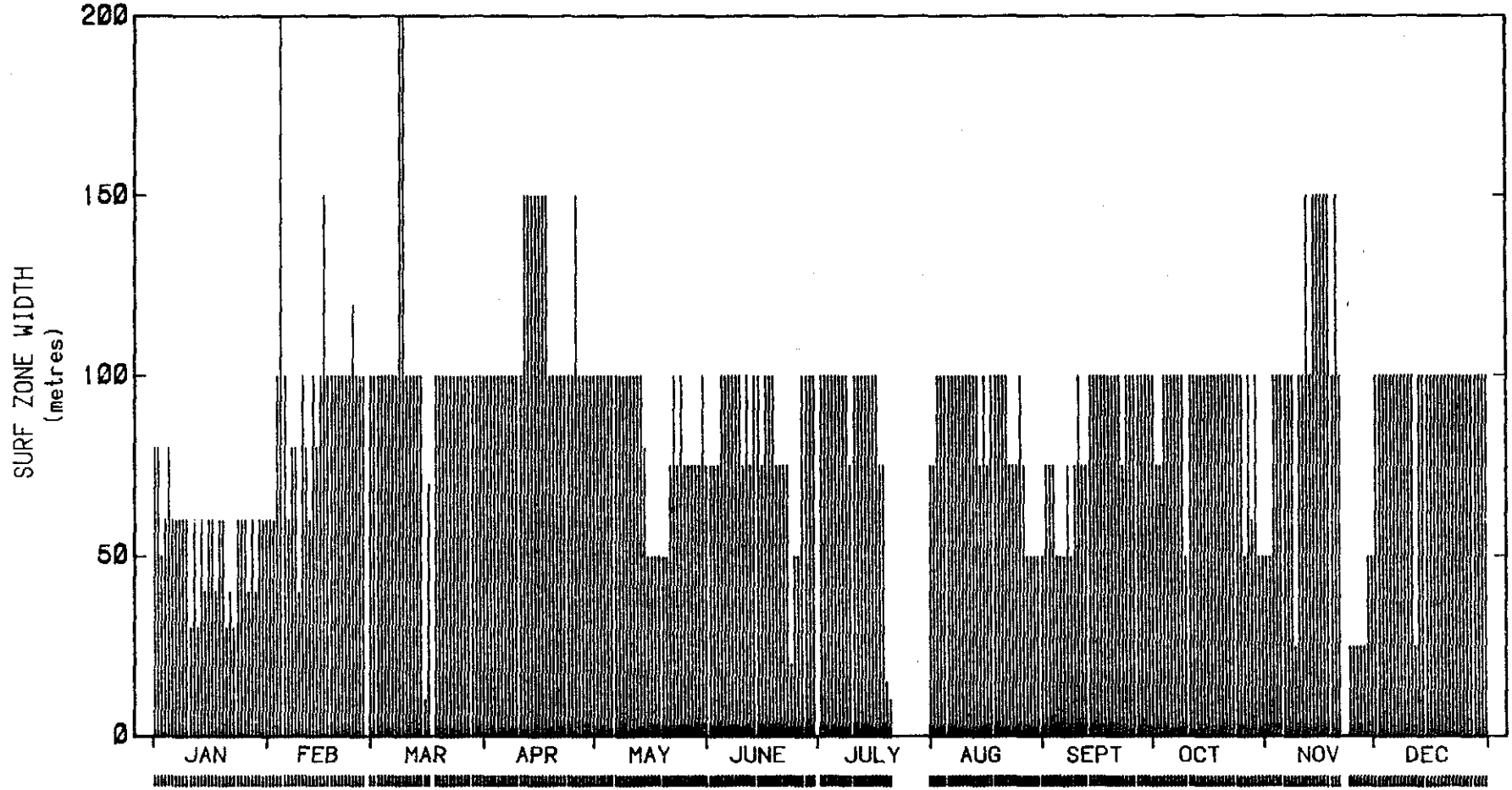
SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH SUMMARY - 1975

No. of Observations : 351 AFTERNOON OBSERVATIONS Mean Surf Zone Width = 89.1 m

■ Indicates Offshore Bar Present

SURF ZONE WIDTH - AFTERNOON 1975

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Figure 11
C 10.1

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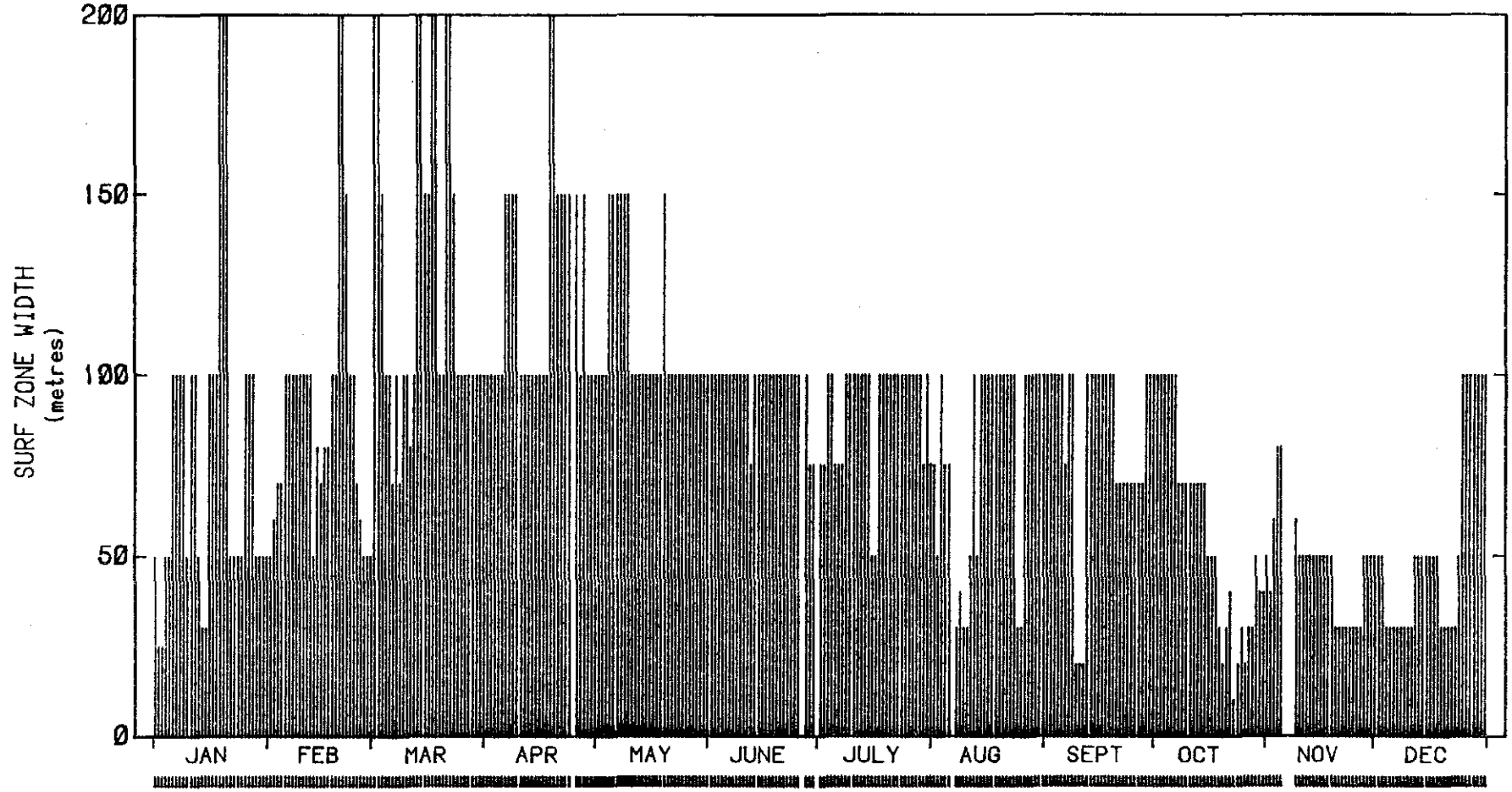
SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH SUMMARY - 1976

No. of Observations : 360 MORNING OBSERVATIONS Mean Surf Zone Width = 87.1 m

■ Indicates Offshore Bar Present

SURF ZONE WIDTH - MORNING 1976

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Figure 12
C 10.1

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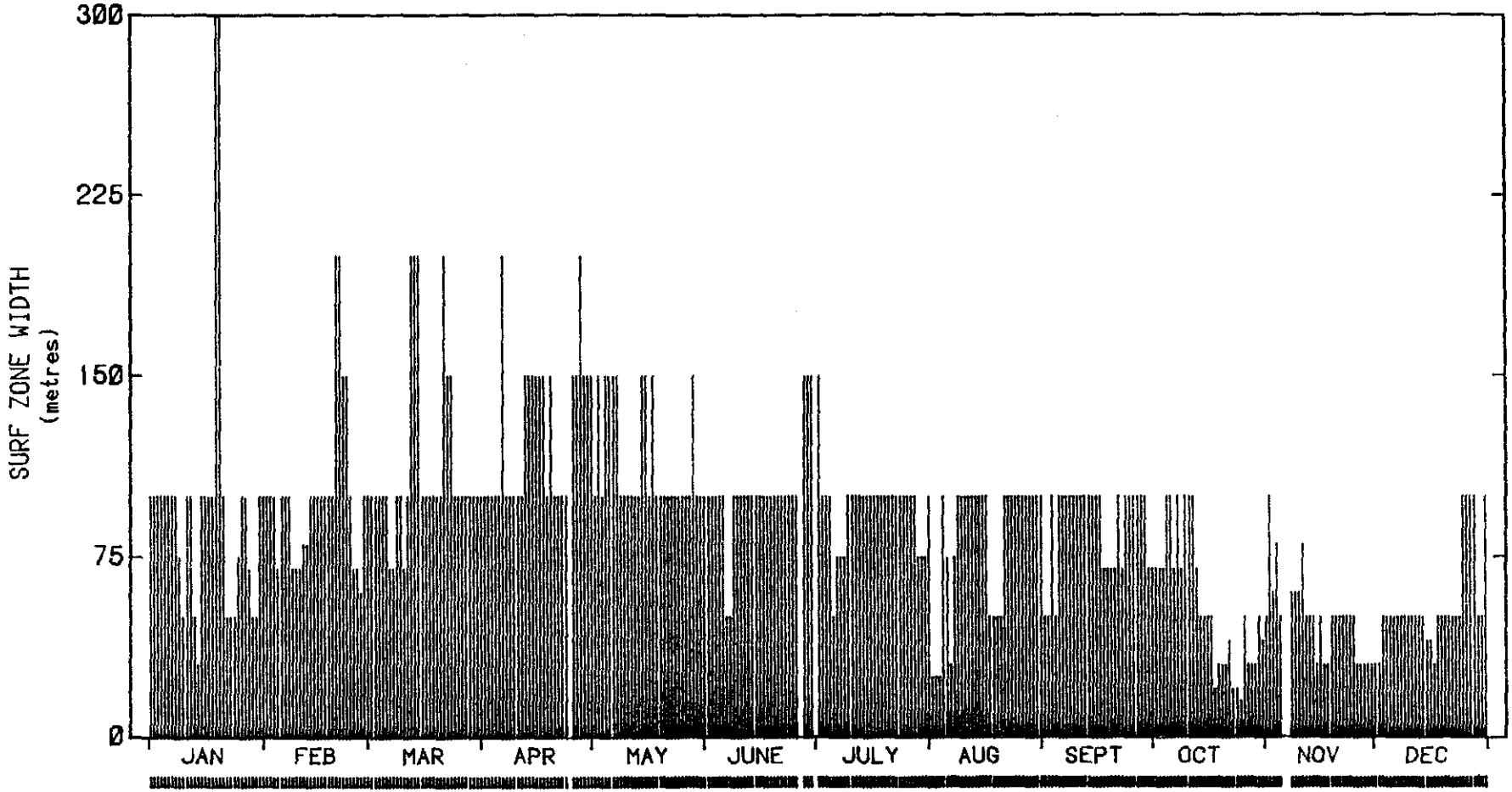
SURFERS PARADISE

GOLD COAST CITY

0104



SURF ZONE WIDTH SUMMARY - 1976

No. of Observations : 362

AFTERNOON OBSERVATIONS

Mean Surf Zone Width = 90.2 m

■ Indicates Offshore Bar Present

SURF ZONE WIDTH - AFTERNOON 1976

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Surfers Paradise

Figure 13
C 10.1

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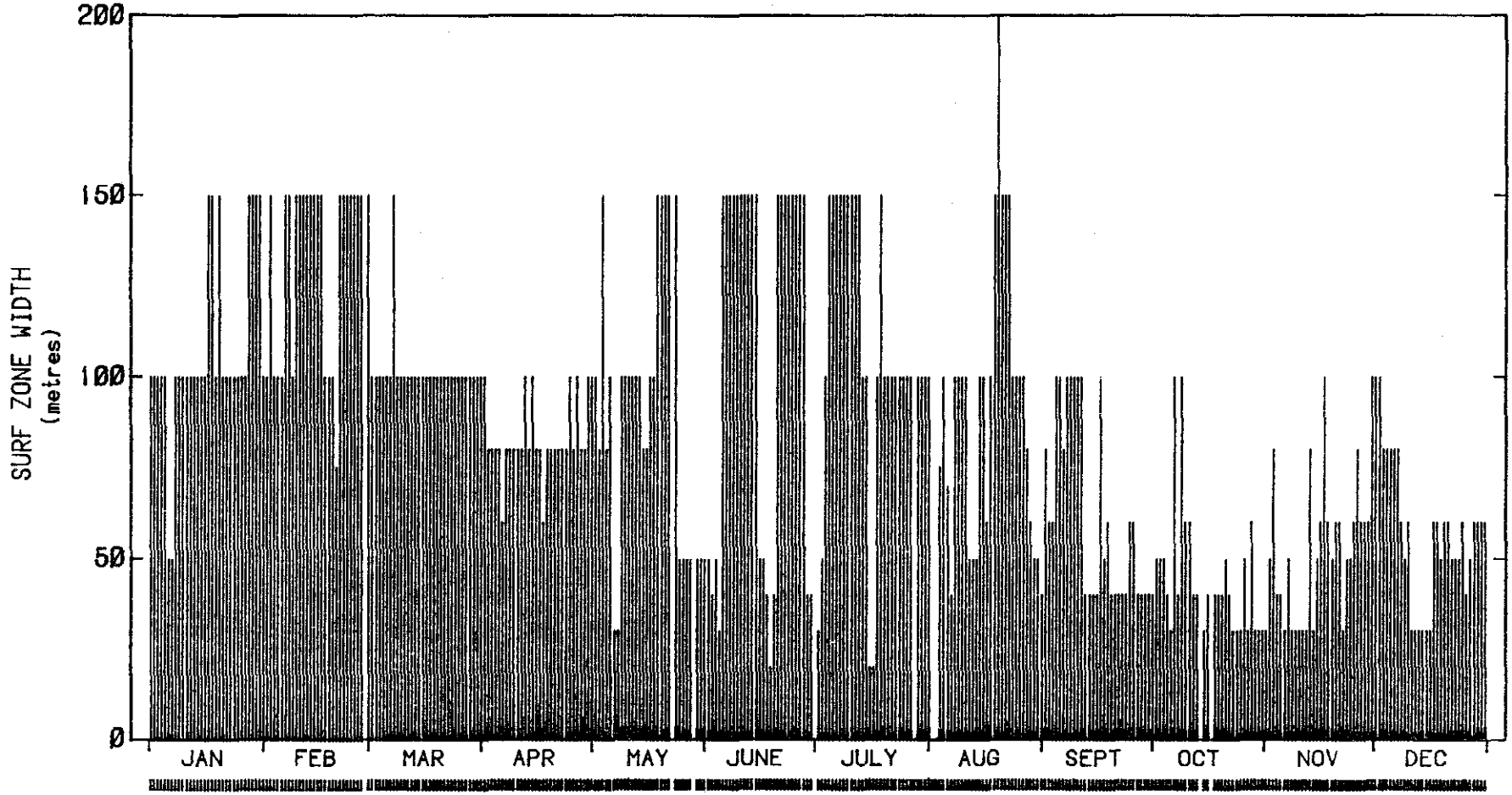
SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH - MORNING 1977

SURF ZONE WIDTH SUMMARY - 1977

No. of Observations : 361 MORNING OBSERVATIONS Mean Surf Zone Width = 85.9 m

■ Indicates Offshore Bar Present

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Figure 14
C 10.1

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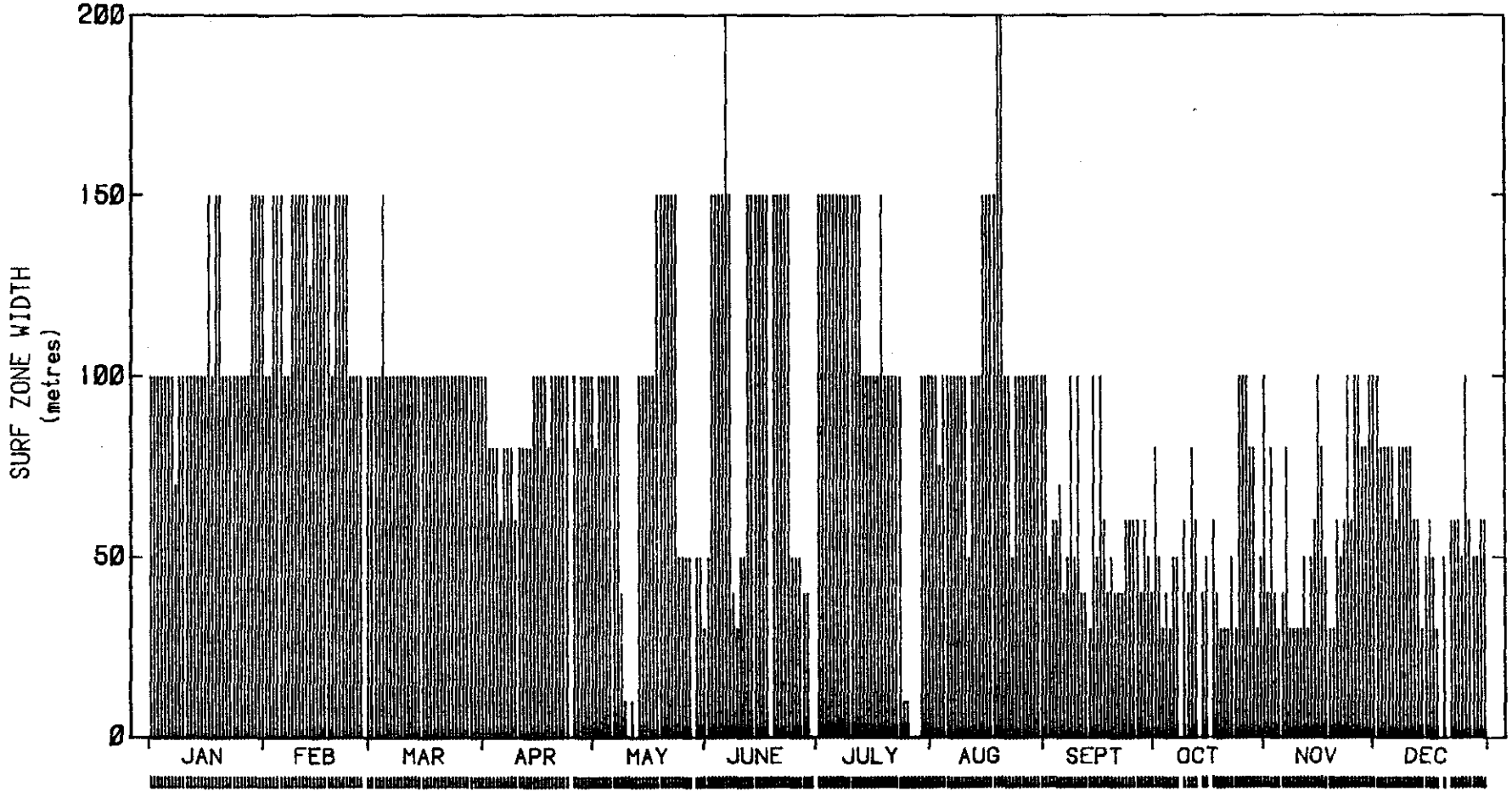
COPE - Coastal Observation Programme Engineering

SURFERS PARADISE

GOLD COAST CITY

Ø104



SURF ZONE WIDTH - AFTERNOON 1977

SURF ZONE WIDTH SUMMARY - 1977

No. of Observations : 358

AFTERNOON OBSERVATIONS

Mean Surf Zone Width = 89.7 m

■ Indicates Offshore Bar Present

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Figure 15
C 10.1

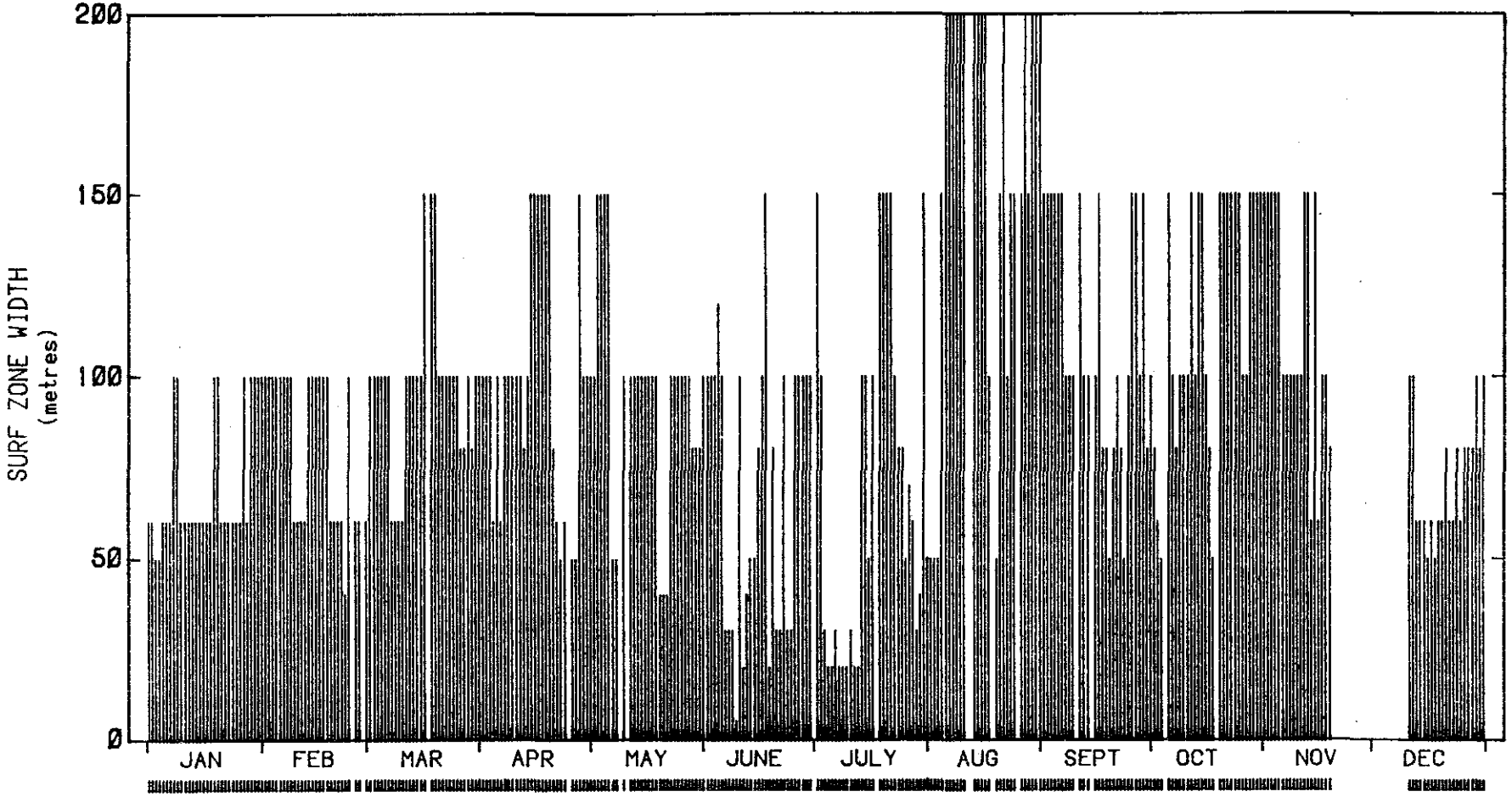
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

SURFERS PARADISE

GOLD COAST CITY

0104



SURF ZONE WIDTH - MORNING 1978

SURF ZONE WIDTH SUMMARY - 1978

No. of Observations : 330

MORNING OBSERVATIONS

Mean Surf Zone Width = 96.2 m

■ Indicates Offshore Bar Present

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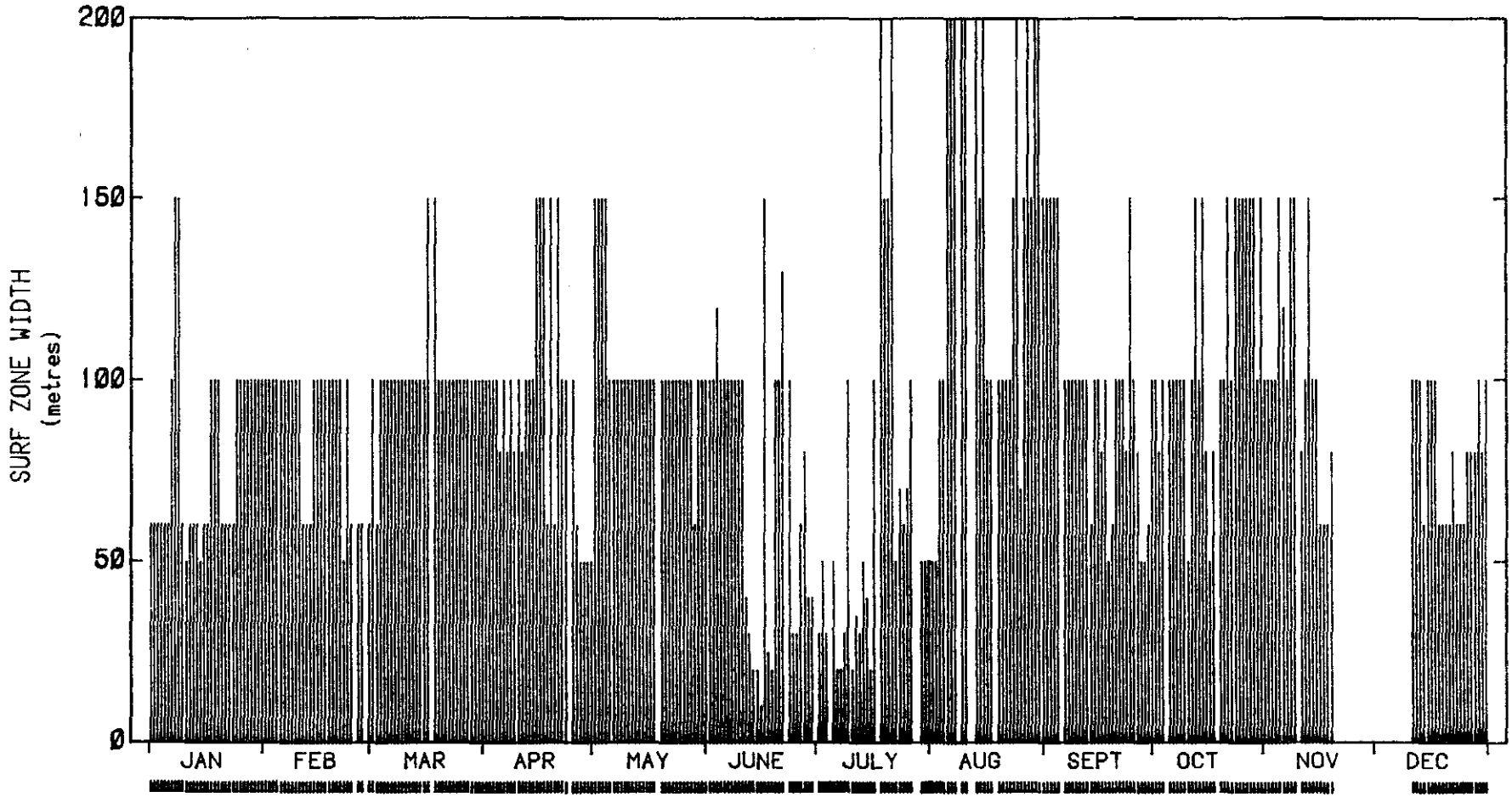
Figure 16
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH SUMMARY - 1978

No. of Observations : 328 AFTERNOON OBSERVATIONS Mean Surf Zone Width = 95.2 m

■ Indicates Offshore Bar Present

SURF ZONE WIDTH - AFTERNOON 1978

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Figure 17
C 10.1

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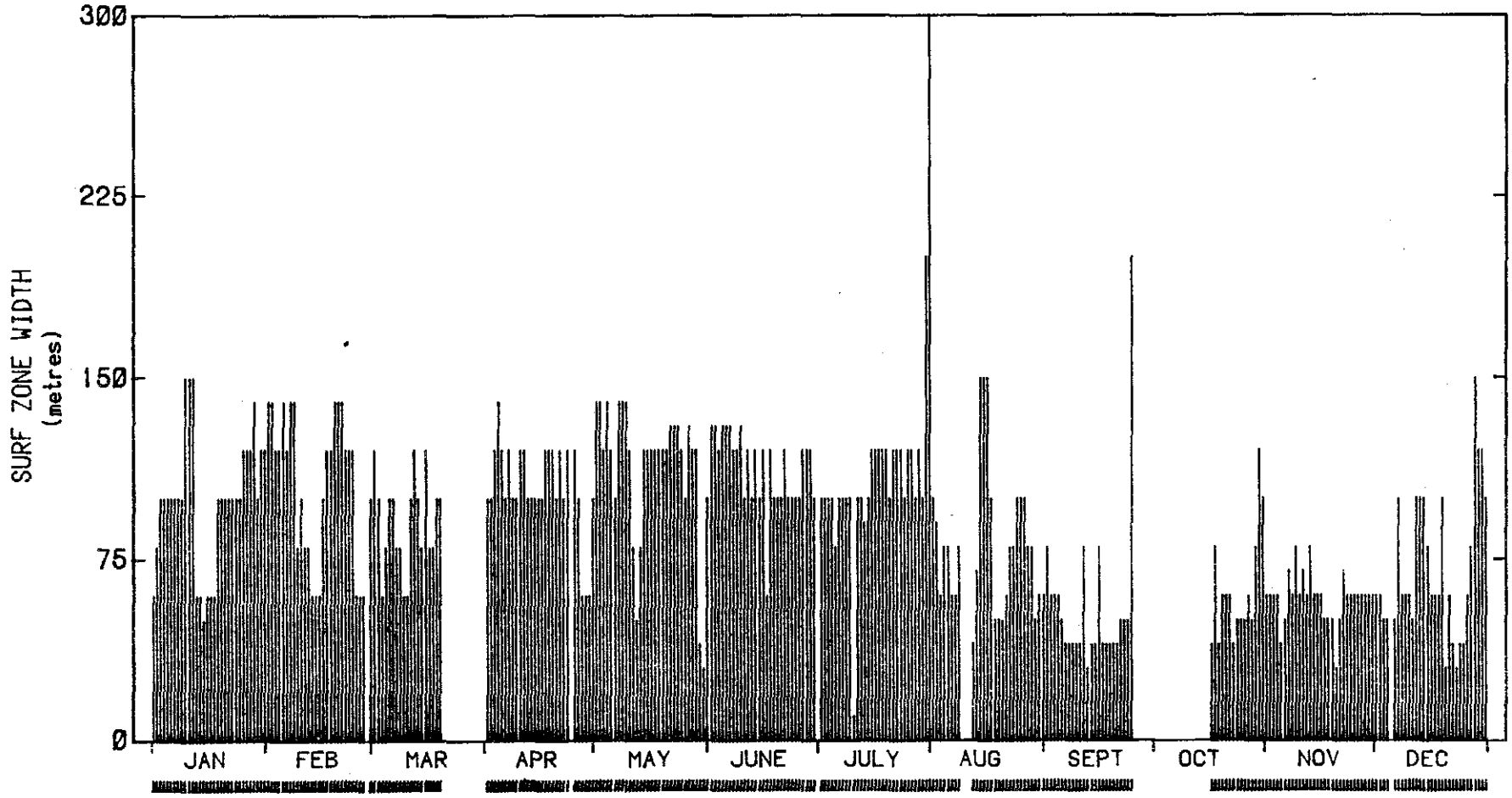
COPE - Coastal Observation Programme Engineering

SURFERS PARADISE

GOLD COAST CITY

0104



SURF ZONE WIDTH SUMMARY - 1979

No. of Observations : 328

MORNING OBSERVATIONS

Mean Surf Zone Width = 91.5 m

■ Indicates Offshore Bar Present

SURF ZONE WIDTH - MORNING 1979

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Figure 18
C 10.1

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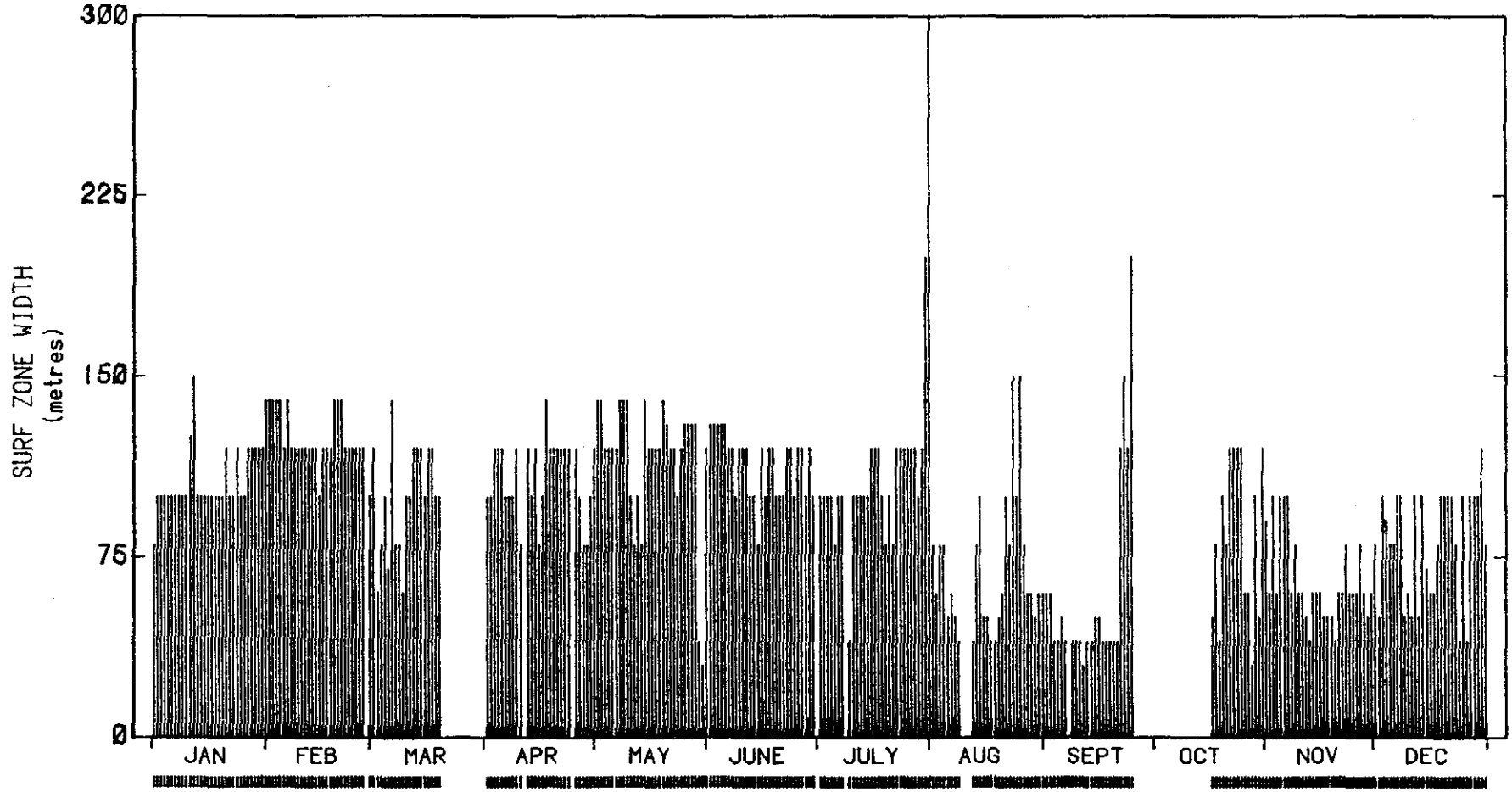
COPE - Coastal Observation Programme Engineering

SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH SUMMARY - 1979

No. of Observations : 326 AFTERNOON OBSERVATIONS Mean Surf Zone Width = 96.7 m

■ Indicates Offshore Bar Present

SURF ZONE WIDTH - AFTERNOON 1979

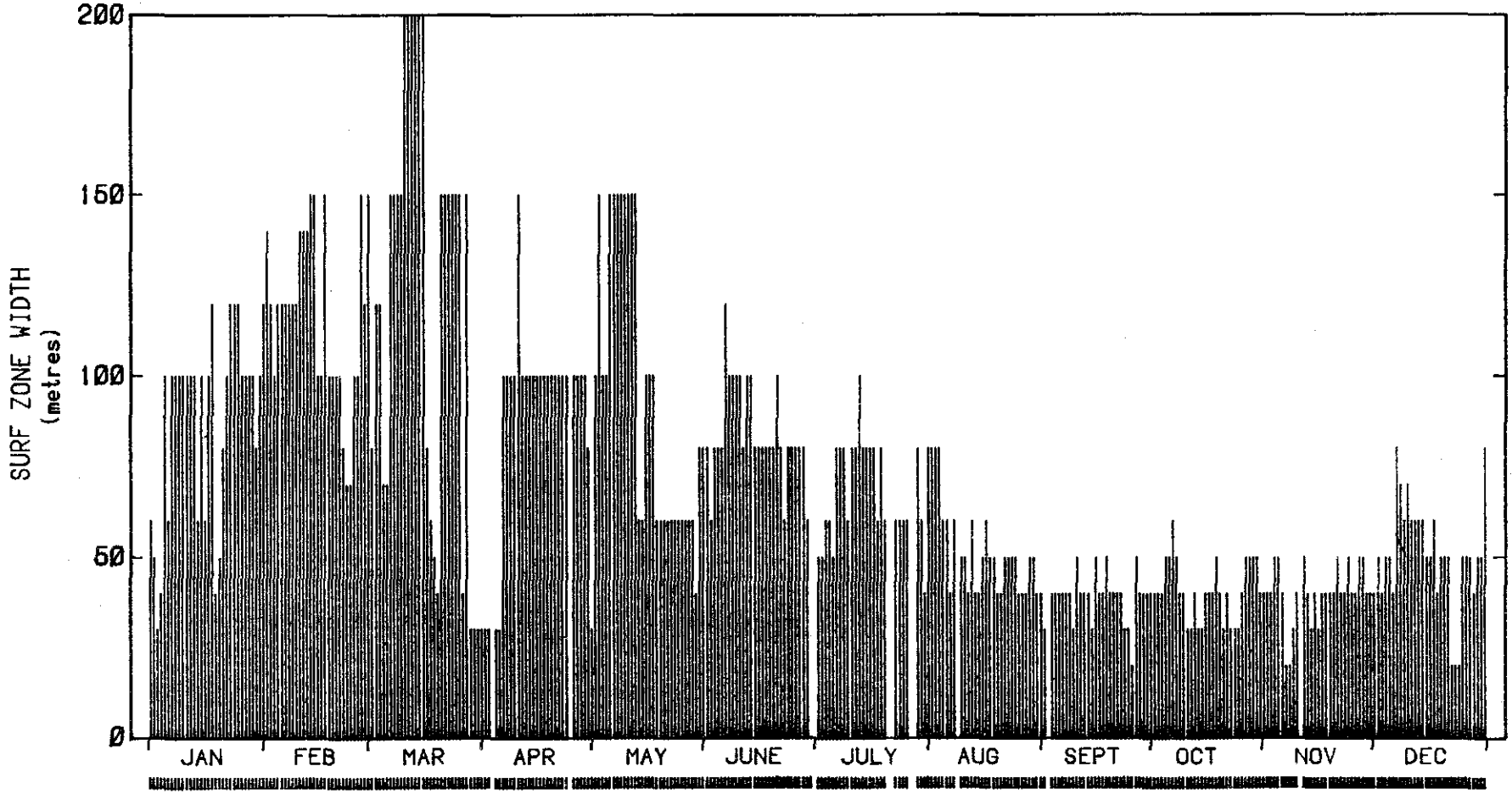
COPE
Surfers Paradise

Figure 19
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH - MORNING 1980

SURF ZONE WIDTH SUMMARY - 1980

No. of Observations : 358 MORNING OBSERVATIONS Mean Surf Zone Width = 73.4 m

■ Indicates Offshore Bar Present

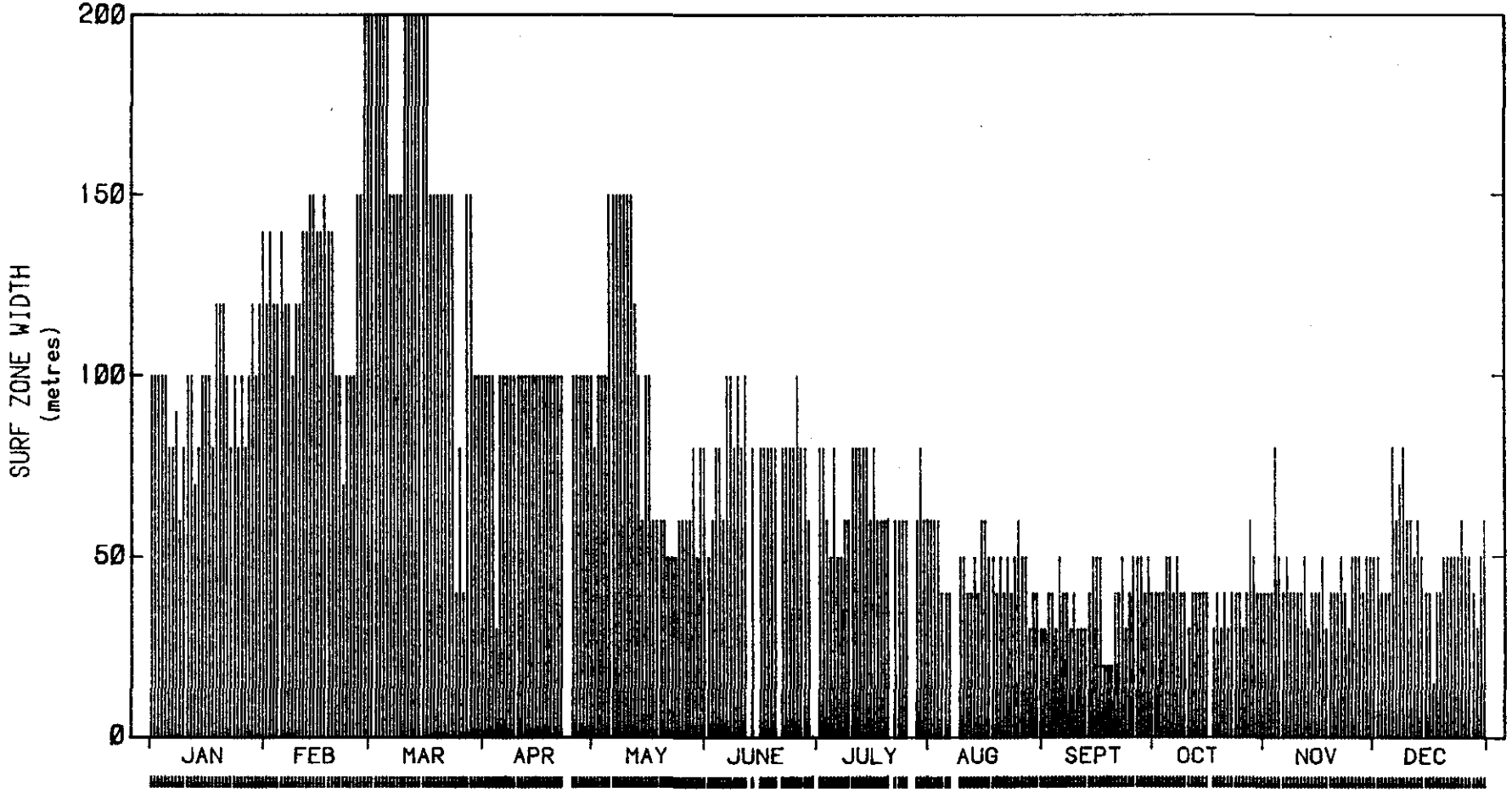
COPE
Surfers Paradise

Figure 20
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH SUMMARY - 1980

No. of Observations : 356 AFTERNOON OBSERVATIONS Mean Surf Zone Width = 78.0 m

■ Indicates Offshore Bar Present

SURF ZONE WIDTH - AFTERNOON 1980

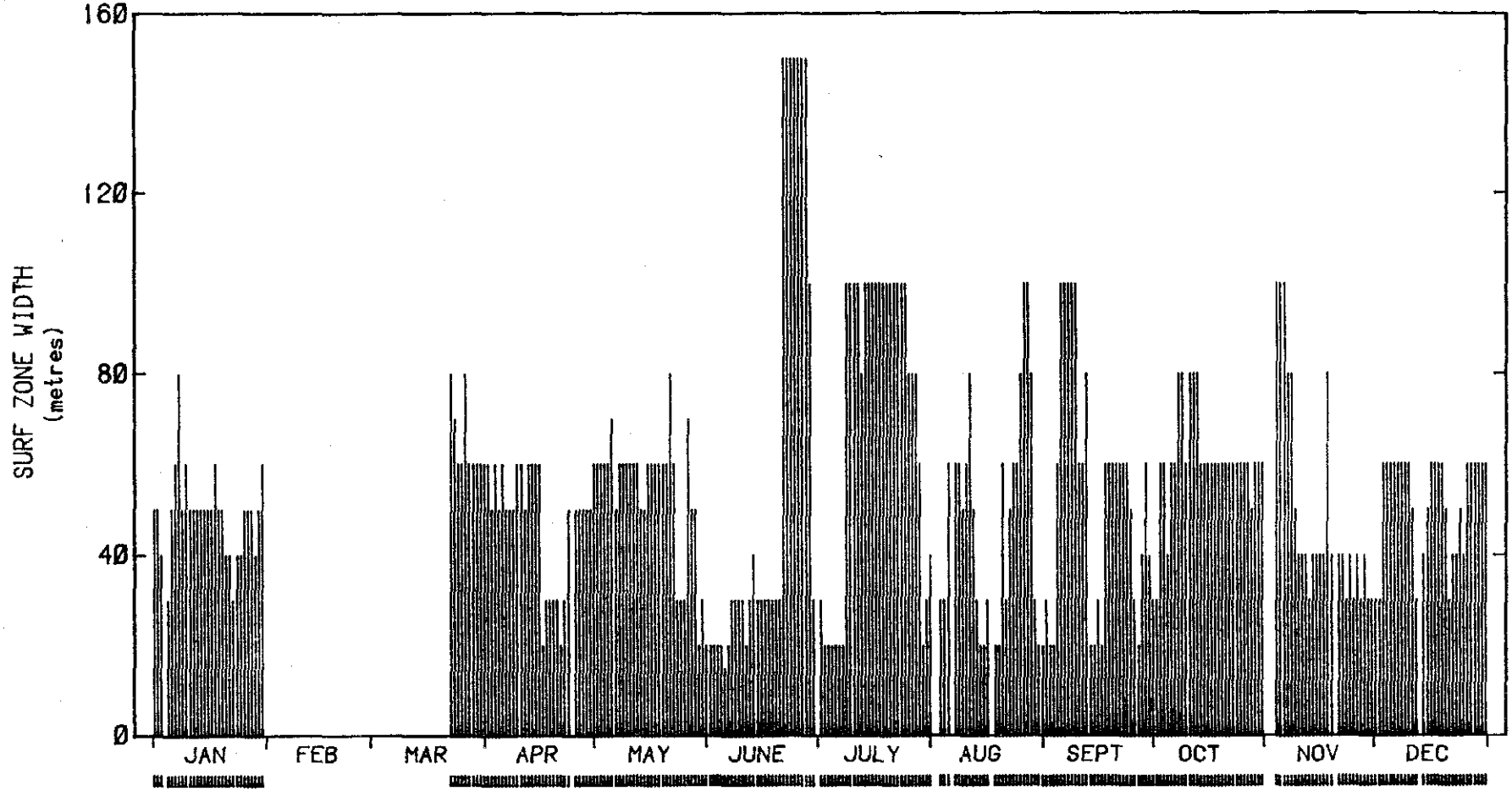
COPE
Surfers Paradise

Figure 21
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH - MORNING 1981

SURF ZONE WIDTH SUMMARY - 1981

No. of Observations : 303 MORNING OBSERVATIONS Mean Surf Zone Width = 55.1 m

■ Indicates Offshore Bar Present

COPE
Surfers Paradise

Figure 22
C 10.1

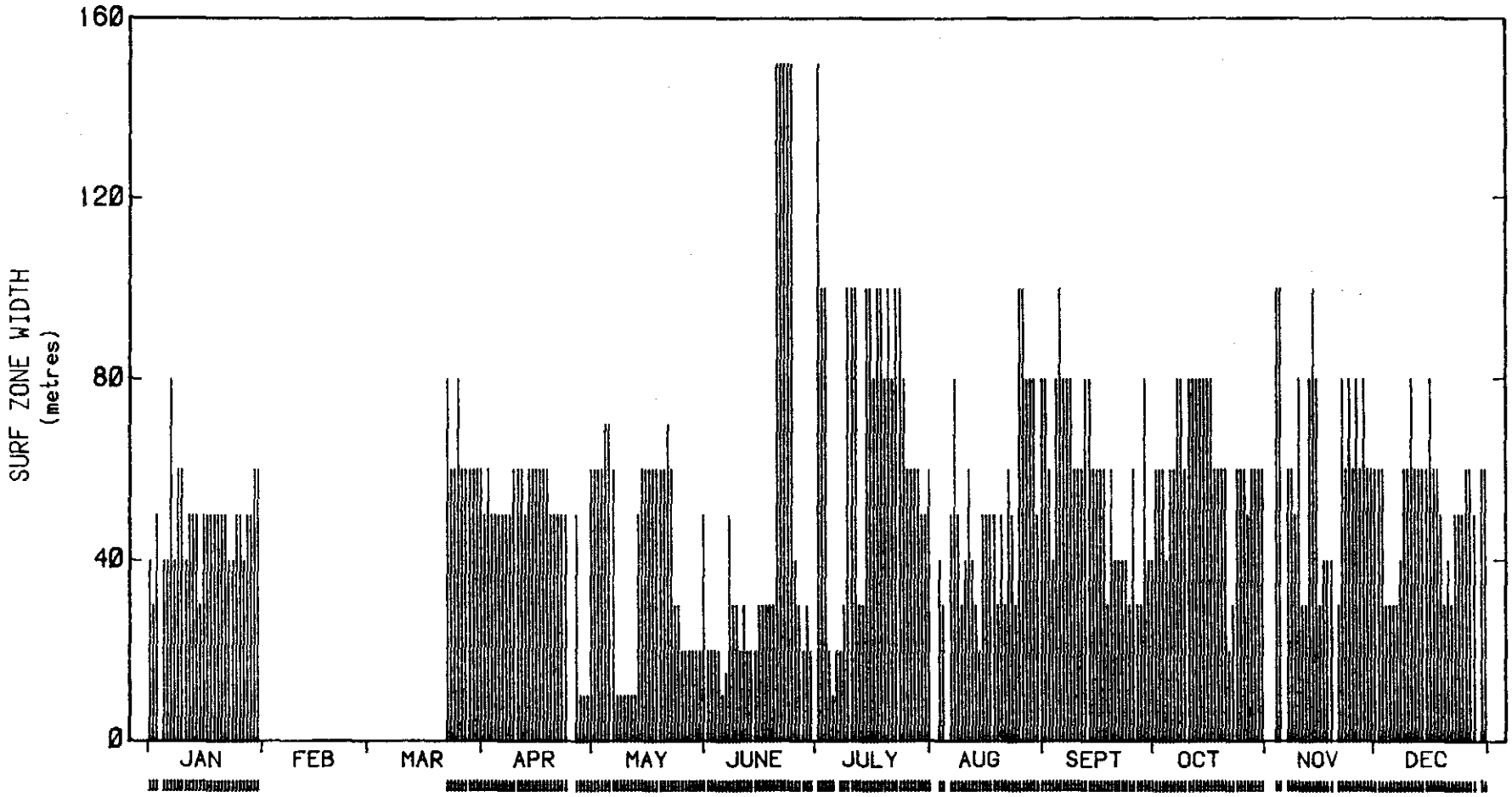
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

SURFERS PARADISE

GOLD COAST CITY

0104



SURF ZONE WIDTH - AFTERNOON 1981

SURF ZONE WIDTH SUMMARY - 1981

No. of Observations : 302

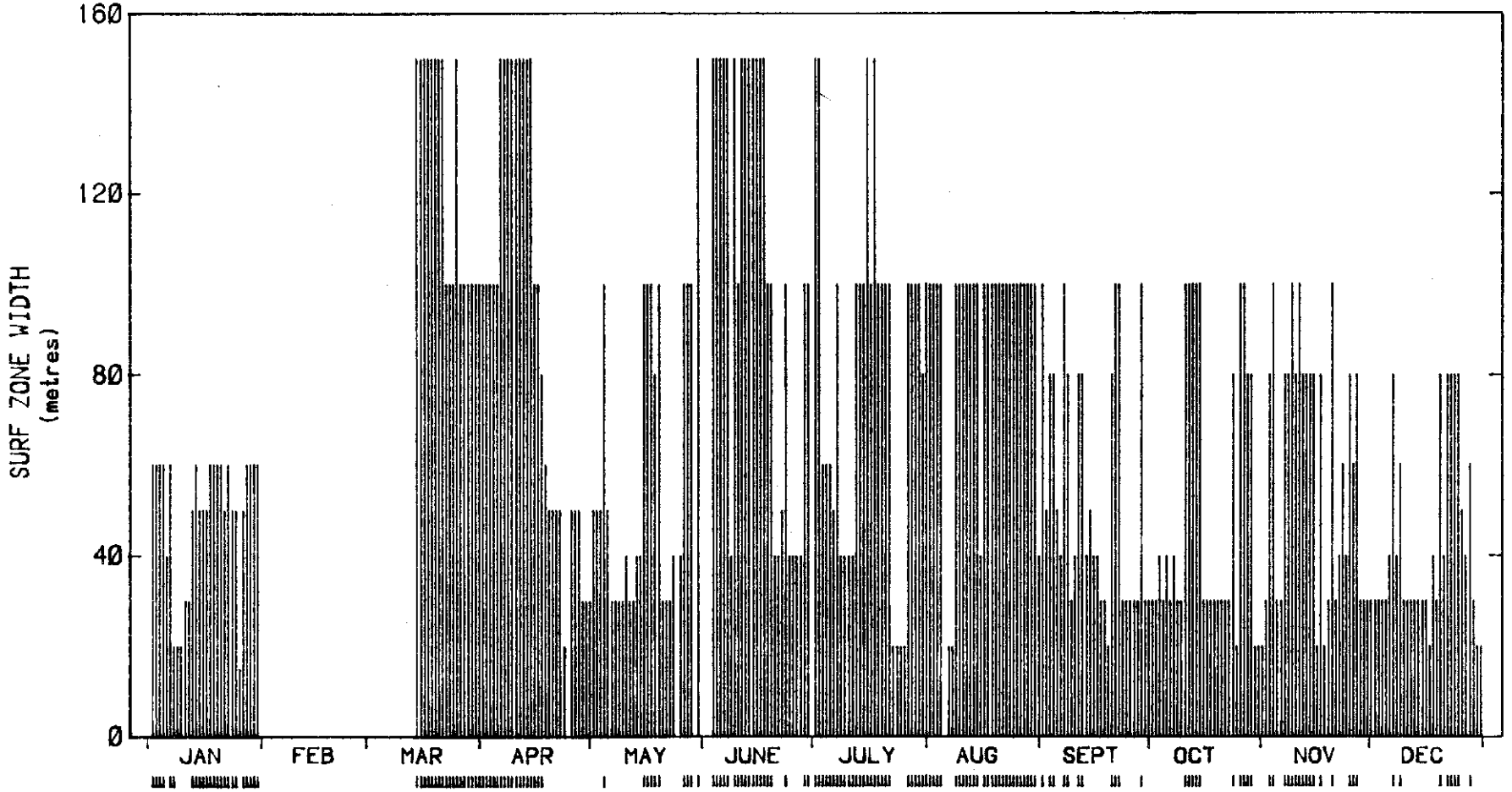
AFTERNOON OBSERVATIONS

Mean Surf Zone Width = 55.0 m

■ Indicates Offshore Bar Present

COPE
Surfers Paradise

Figure 23
C 10.1



SURF ZONE WIDTH SUMMARY - 1982

No. of Observations : 316

MORNING OBSERVATIONS

Mean Surf Zone Width = 71.8 m

▪ Indicates Offshore Bar Present

Beach Protection Authority

SURF ZONE WIDTH - MORNING 1982

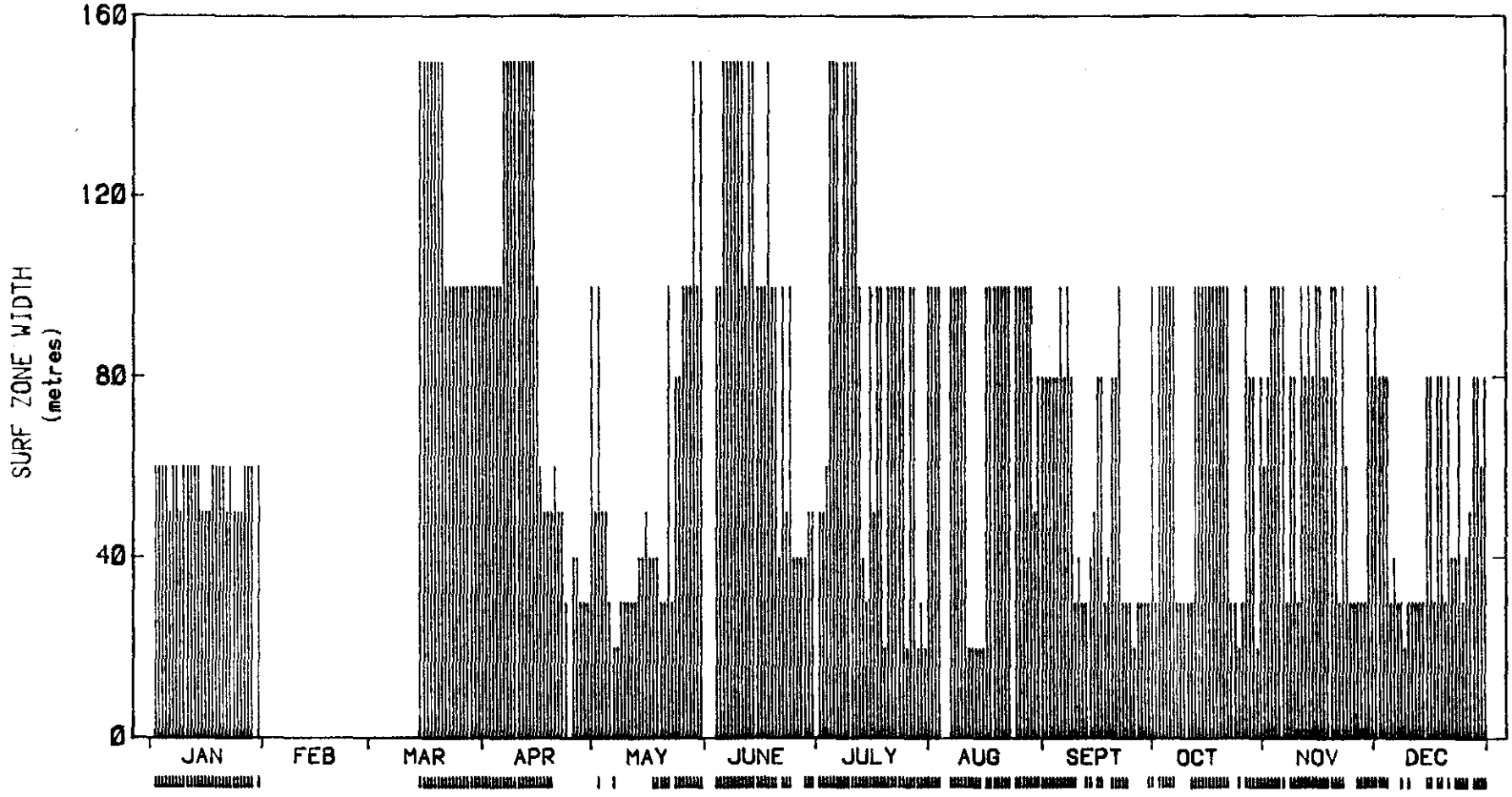
COPE
Surfers Paradise

Figure 24
c 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH - AFTERNOON 1982

SURF ZONE WIDTH SUMMARY - 1982

No. of Observations : 315 AFTERNOON OBSERVATIONS Mean Surf Zone Width = 75.6 m

▪ Indicates Offshore Bar Present

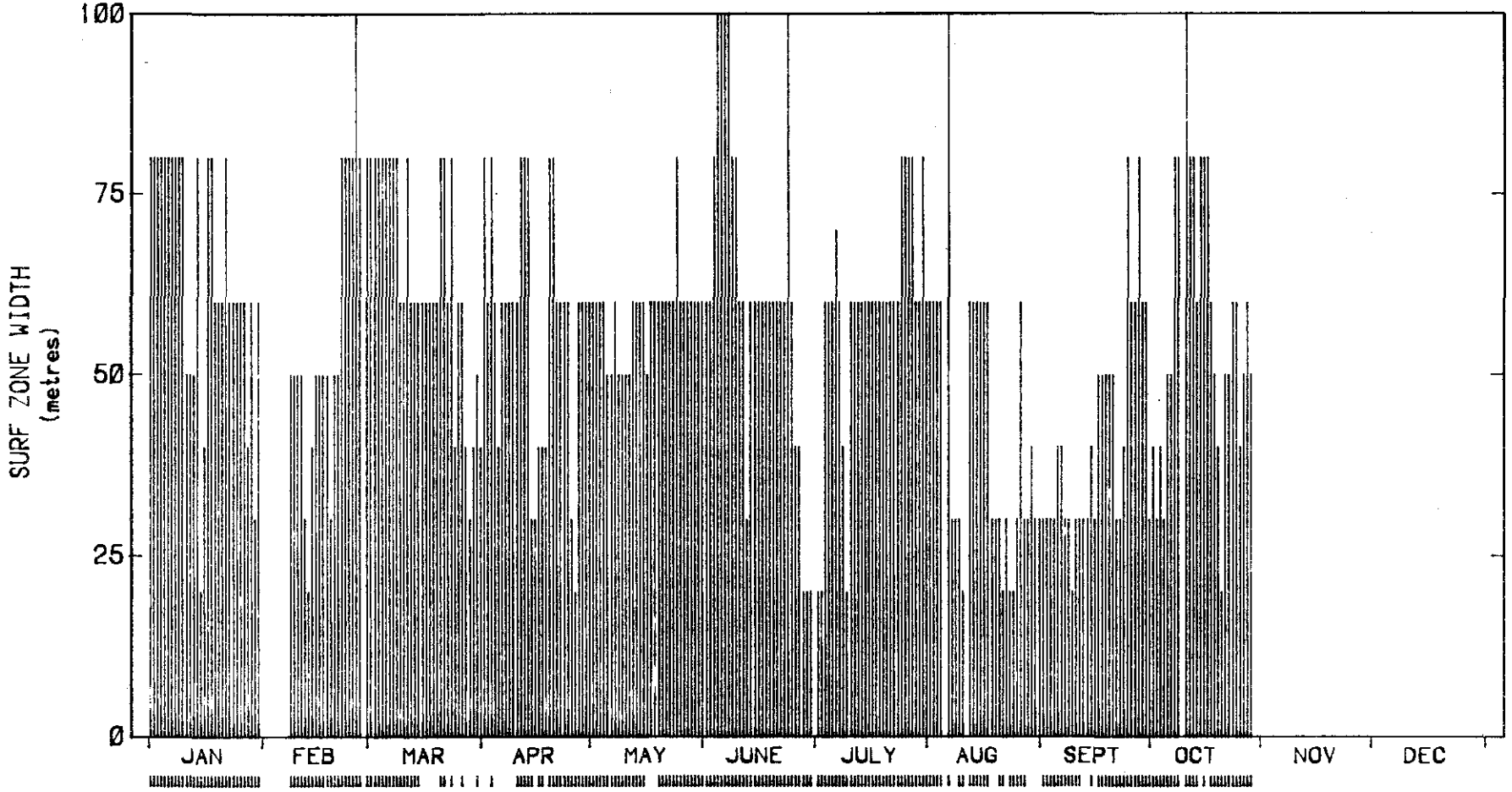
COPE
Surfers Paradise

Figure 25
c 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

SURFERS PARADISE GOLD COAST CITY 0104



SURF ZONE WIDTH - MORNING 1983

SURF ZONE WIDTH SUMMARY - 1983

No. of Observations : 293 MORNING OBSERVATIONS Mean Surf Zone Width = 57.2 m

m Indicates Offshore Bar Present

COPE
Surfers Paradise

Figure 26
c 10.1

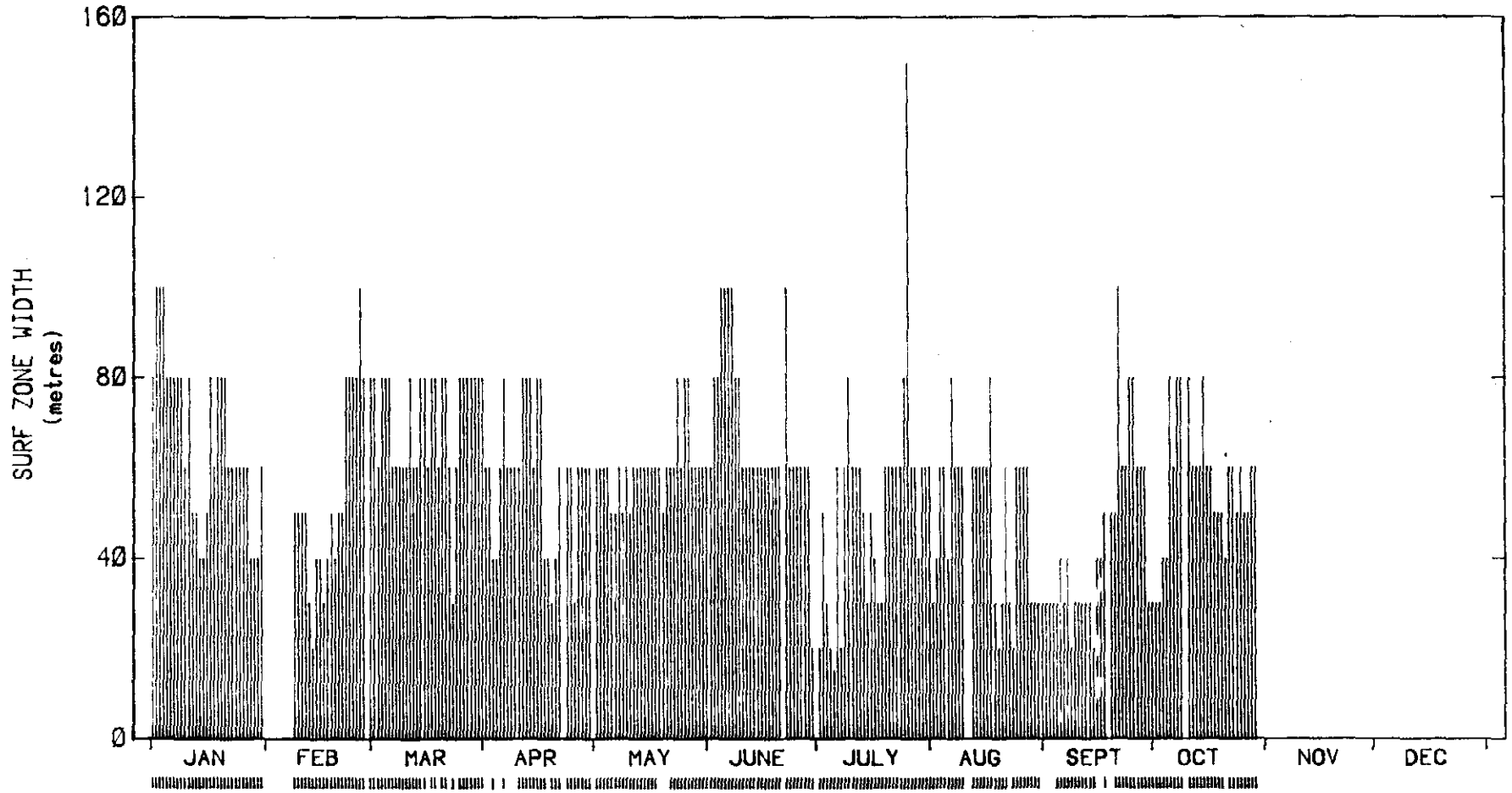
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

SURFERS PARADISE

GOLD COAST CITY

0104



SURF ZONE WIDTH SUMMARY - 1983

No. of Observations : 289

AFTERNOON OBSERVATIONS

Mean Surf Zone Width = 59.1 m

m Indicates Offshore Bar Present

SURF ZONE WIDTH - AFTERNOON 1983

COPE
Surfers Paradise

Figure 27
c 10.1.

VALUES OF LONGSHORE CURRENTS

WERE NOT RECORDED

Beach Protection Authority

LITTORAL CURRENTS - MORNING 1973

COPE
Surfers Paradise

Figure 28
C 10.1

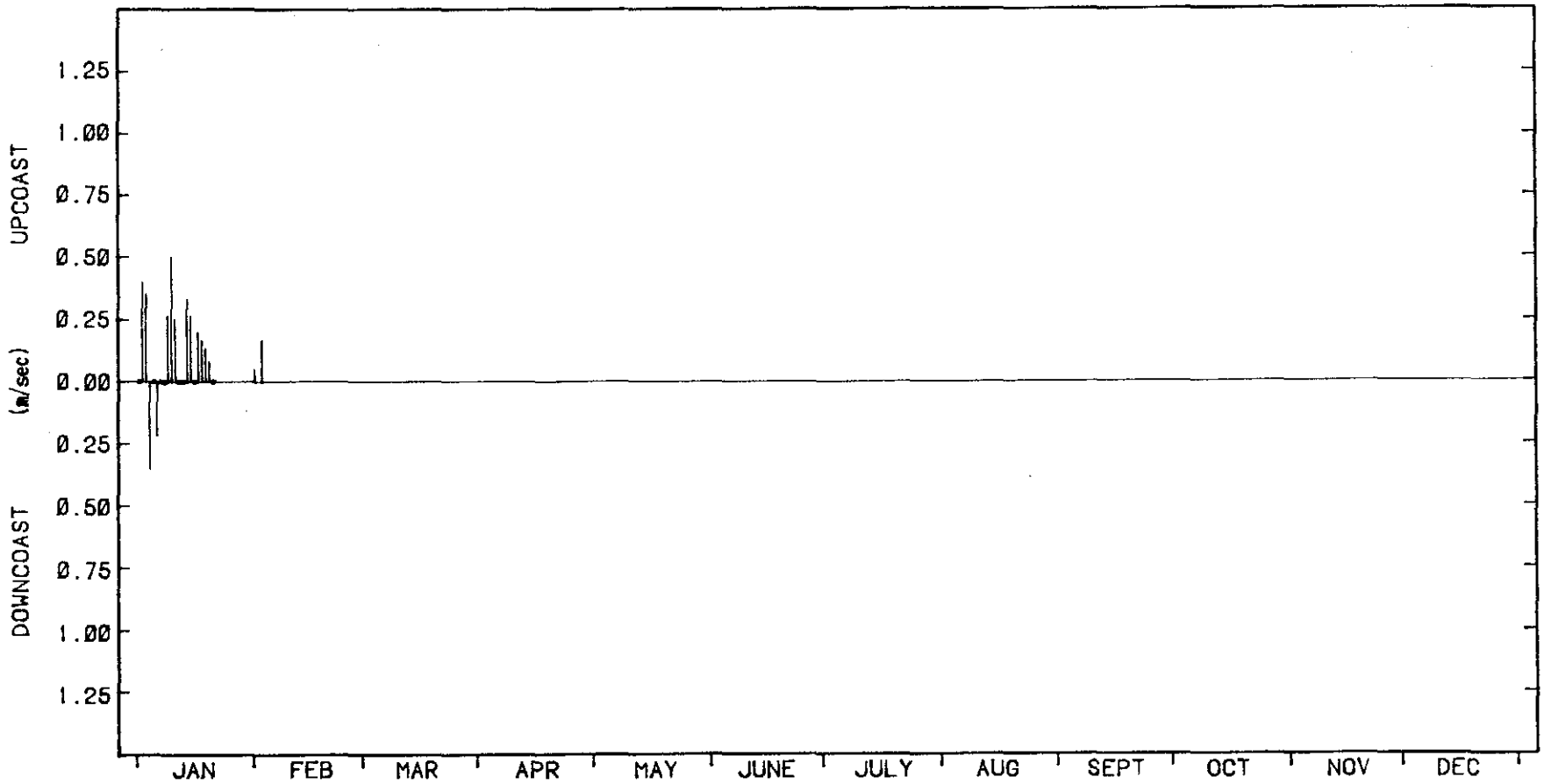
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

SURFERS PARADISE

Ø104



LITTORAL CURRENT SUMMARY - 1974

Mean Vel = Ø.113 m/sec (up) Mean Upcoast Vel = Ø.244 m/sec Mean Downcoast Vel = Ø.283 m/sec

MORNING OBSERVATIONS - (23 recordings)

LITTORAL CURRENTS - MORNING 1974

COPE
Surfers Paradise

Figure 29
C 10.1

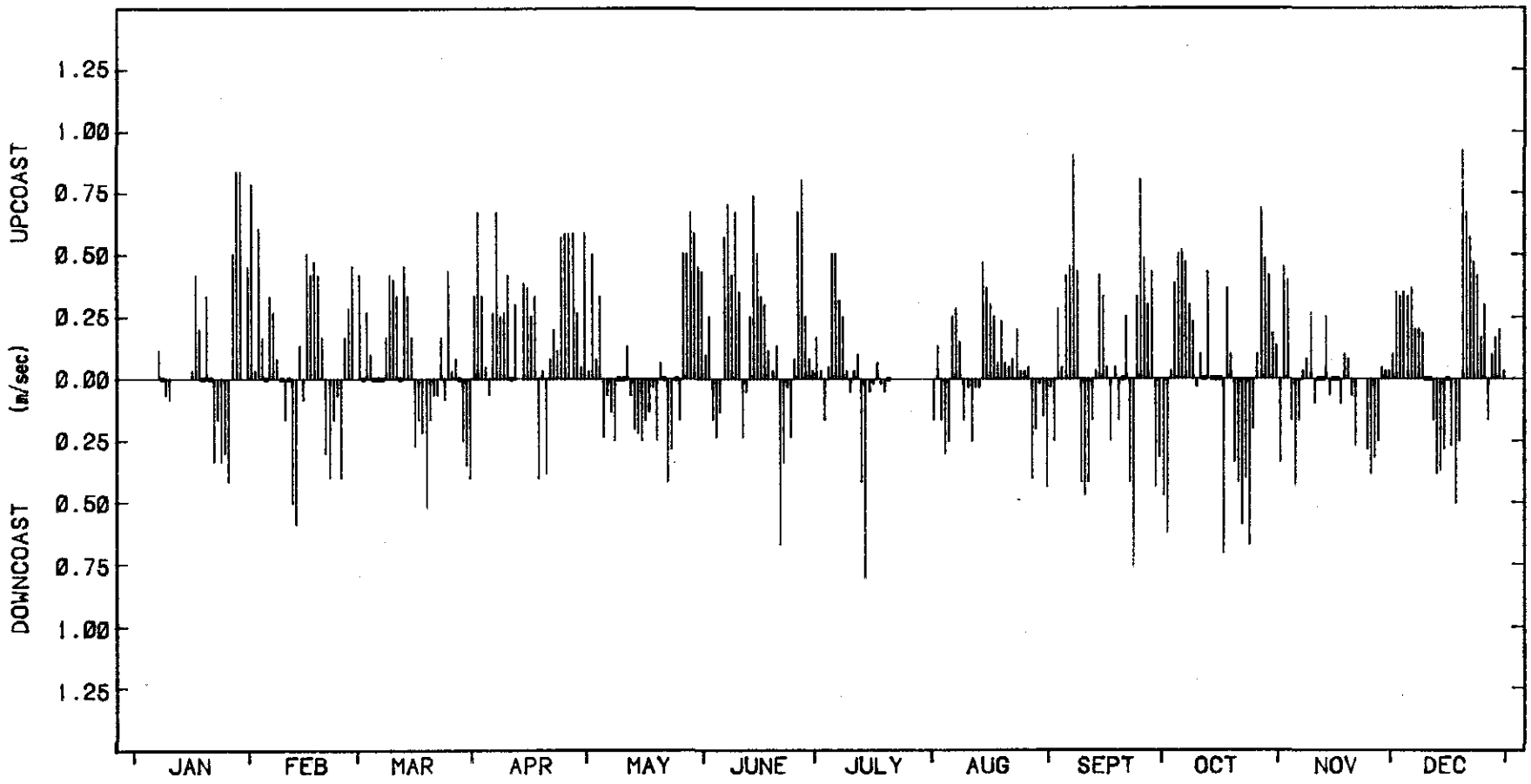
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

SURFERS PARADISE

0104



LITTORAL CURRENT SUMMARY - 1975

Mean Vel = 0.079 m/sec (up) Mean Upcoast Vel = 0.303 m/sec Mean Downcoast Vel = 0.258 m/sec

MORNING OBSERVATIONS - (339 recordings)

LITTORAL CURRENTS - MORNING 1975

COPE
Surfers Paradise

Figure 30
C 10.1

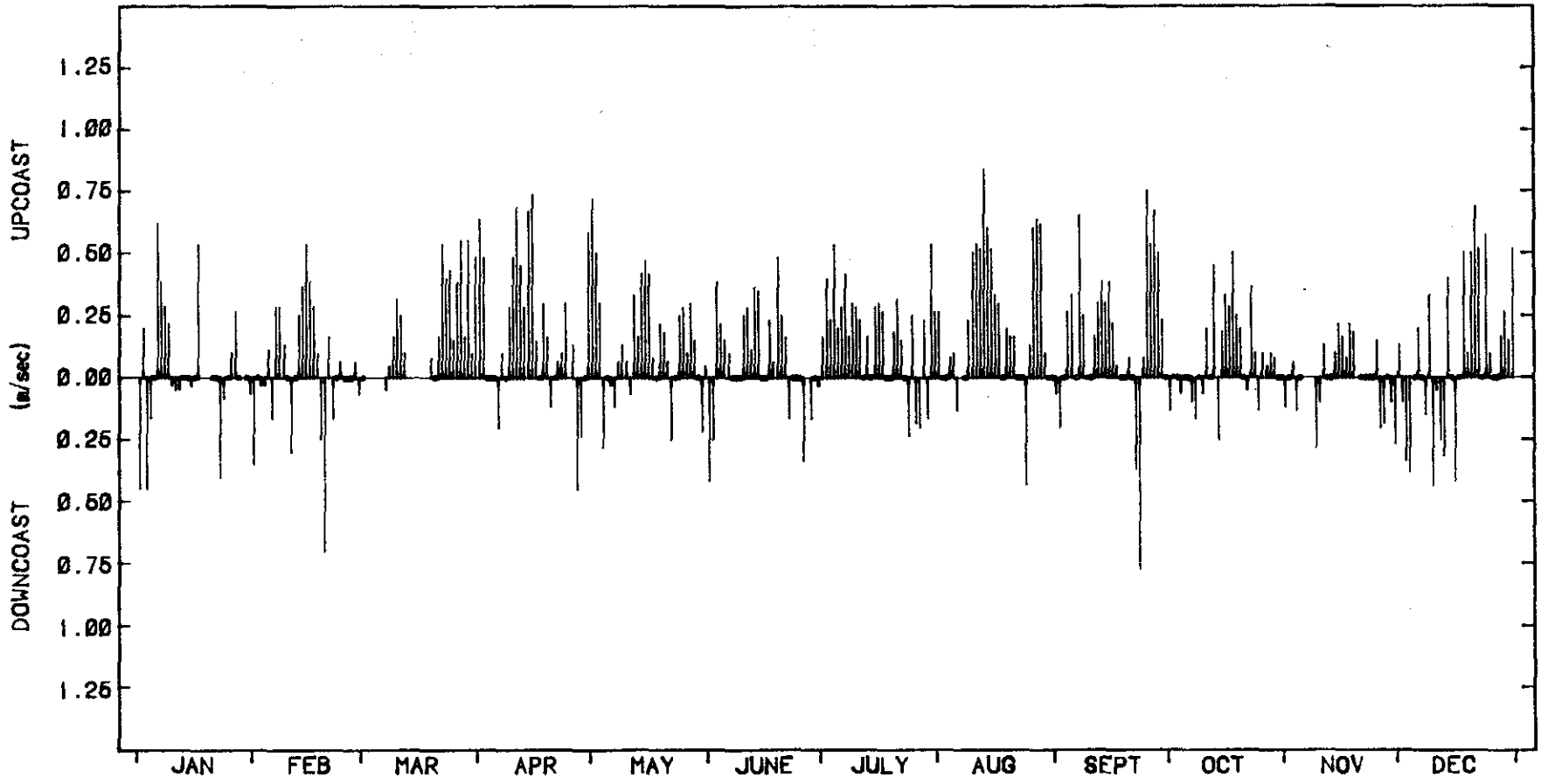
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

SURFERS PARADISE

0104



LITTORAL CURRENT SUMMARY - 1976

Mean Vel = 0.118 m/sec (up)

Mean Upcoast Vel = 0.292 m/sec

Mean Downcoast Vel = 0.208 m/sec

MORNING OBSERVATIONS - (344 recordings)

LITTORAL CURRENTS - MORNING 1976

COPE
Surfers Paradise

Figure 31
C 10.1

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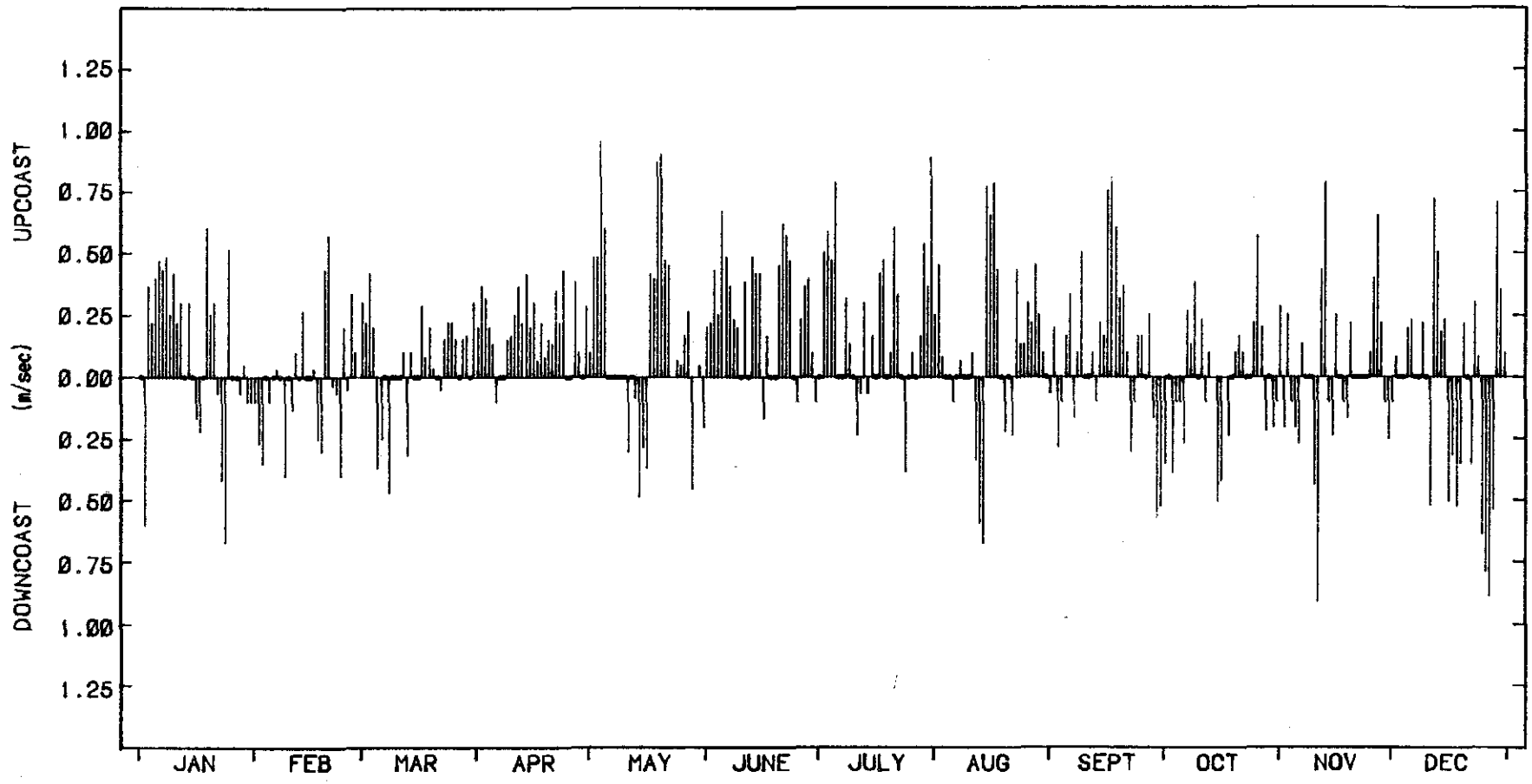
COPE - Coastal Observation Programme Engineering

GOLD COAST CITY SURFERS PARADISE 0104



LITTORAL CURRENT SUMMARY - 1977

Mean Vel = 0.095 m/sec (up) Mean Upcoast Vel = 0.312 m/sec Mean Downcoast Vel = 0.279 m/sec

MORNING OBSERVATIONS - (361 recordings)

LITTORAL CURRENTS - MORNING 1977

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Surfers Paradise

Figure 32
C 10.1

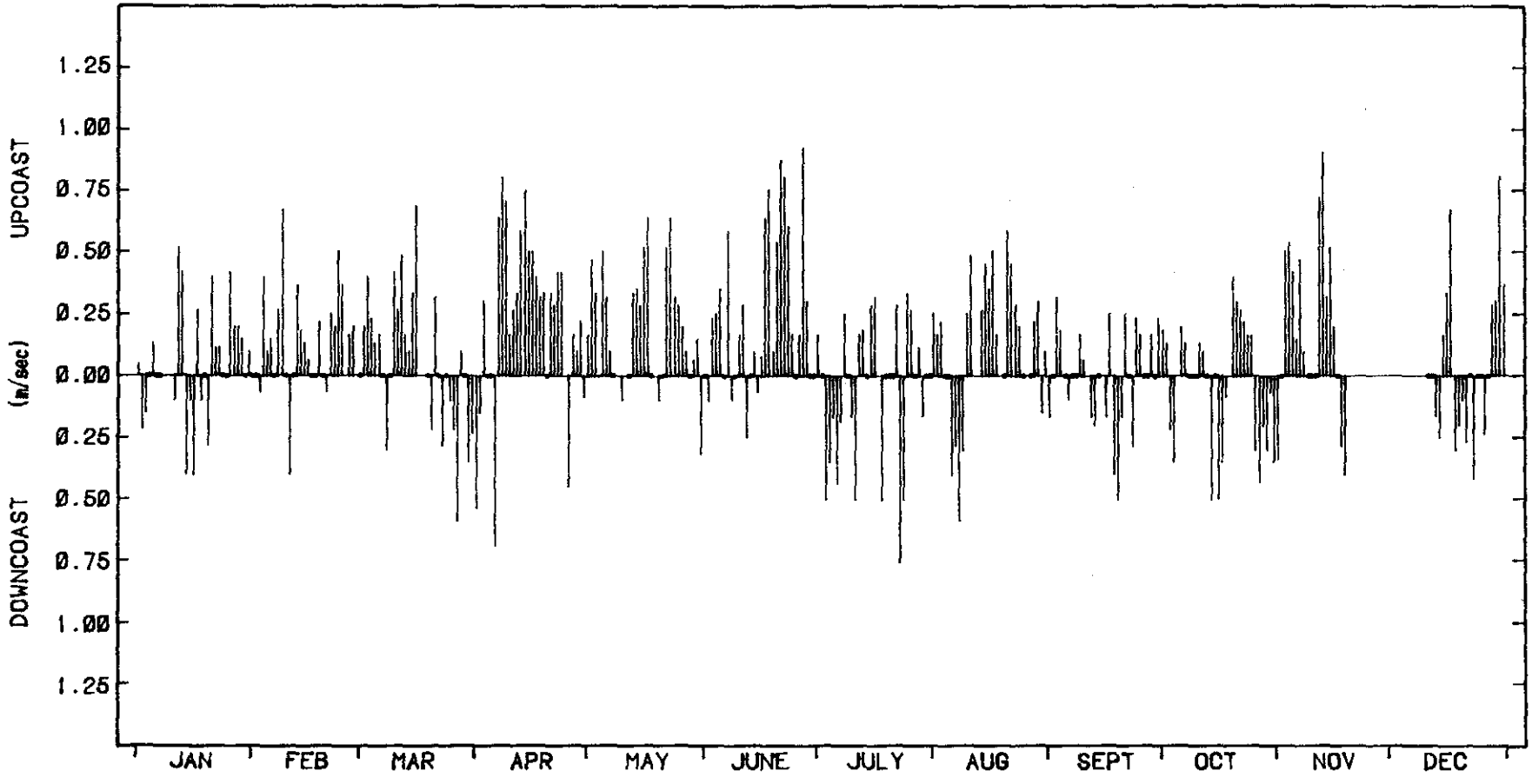
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

SURFERS PARADISE

0104



LITTORAL CURRENTS - MORNING 1978

LITTORAL CURRENT SUMMARY - 1978

Mean Vel = 0.097 m/sec (up) Mean Upcoast Vel = 0.316 m/sec Mean Downcoast Vel = 0.281 m/sec

MORNING OBSERVATIONS - (325 recordings)

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Figure 33
C 10.1

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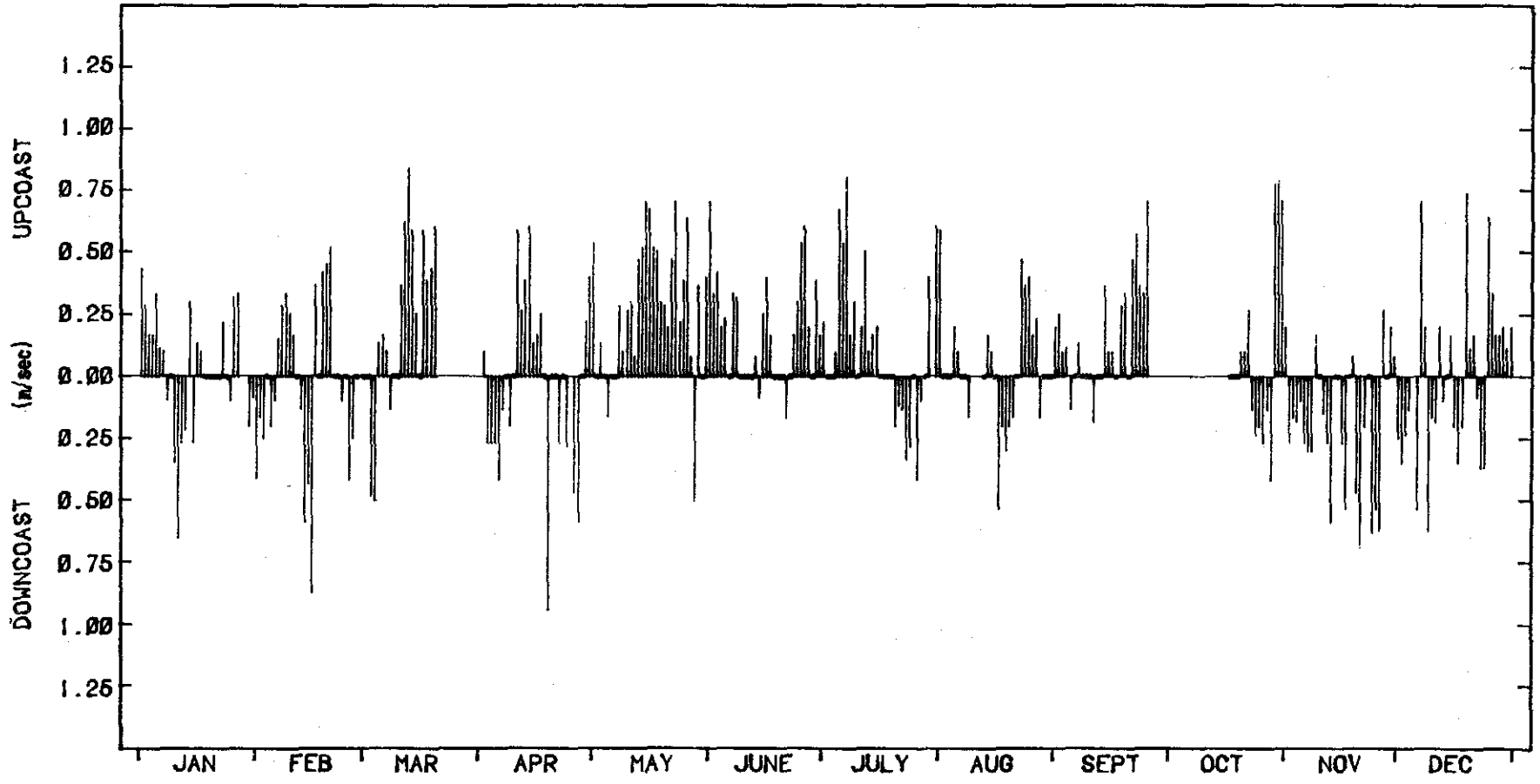
COPE - Coastal Observation Programme Engineering

GOLD COAST CITY SURFERS PARADISE Ø104



LITTORAL CURRENTS - MORNING 1979

LITTORAL CURRENT SUMMARY - 1979

Mean Vel = Ø.Ø65 m/sec (up) Mean Upcoast Vel = Ø.324 m/sec Mean Downcoast Vel = Ø.297 m/sec

MORNING OBSERVATIONS - (324 recordings)

COPE
Surfers Paradise

Figure 34
C 10.1

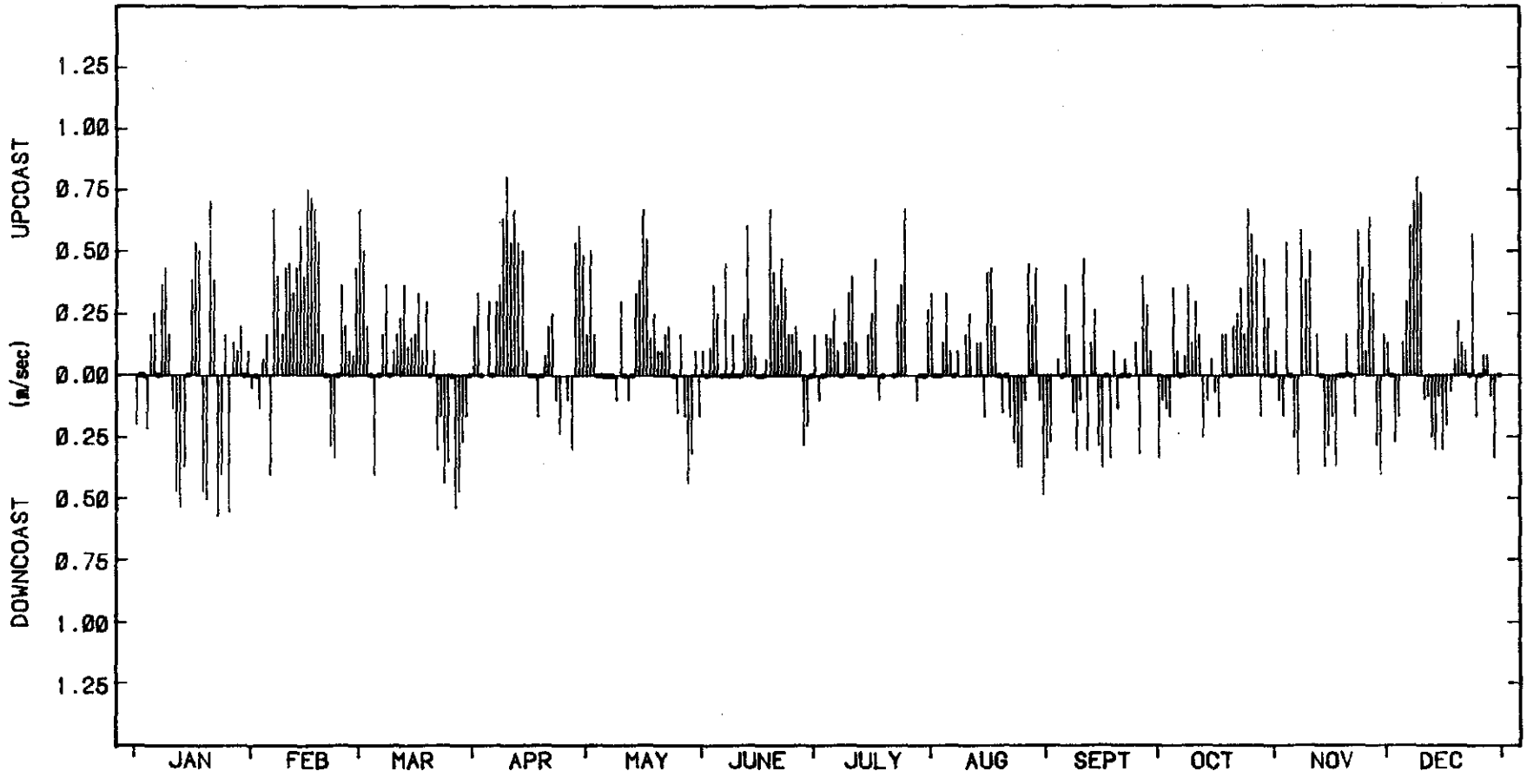
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

SURFERS PARADISE

0104



LITTORAL CURRENT SUMMARY - 1980

Mean Vel = 0.101 m/sec (up) Mean Upcoast Vel = 0.304 m/sec Mean Downcoast Vel = 0.249 m/sec

MORNING OBSERVATIONS - (354 recordings)

LITTORAL CURRENTS - MORNING 1980

COPE
Surfers Paradise

Figure 35
C 10.1

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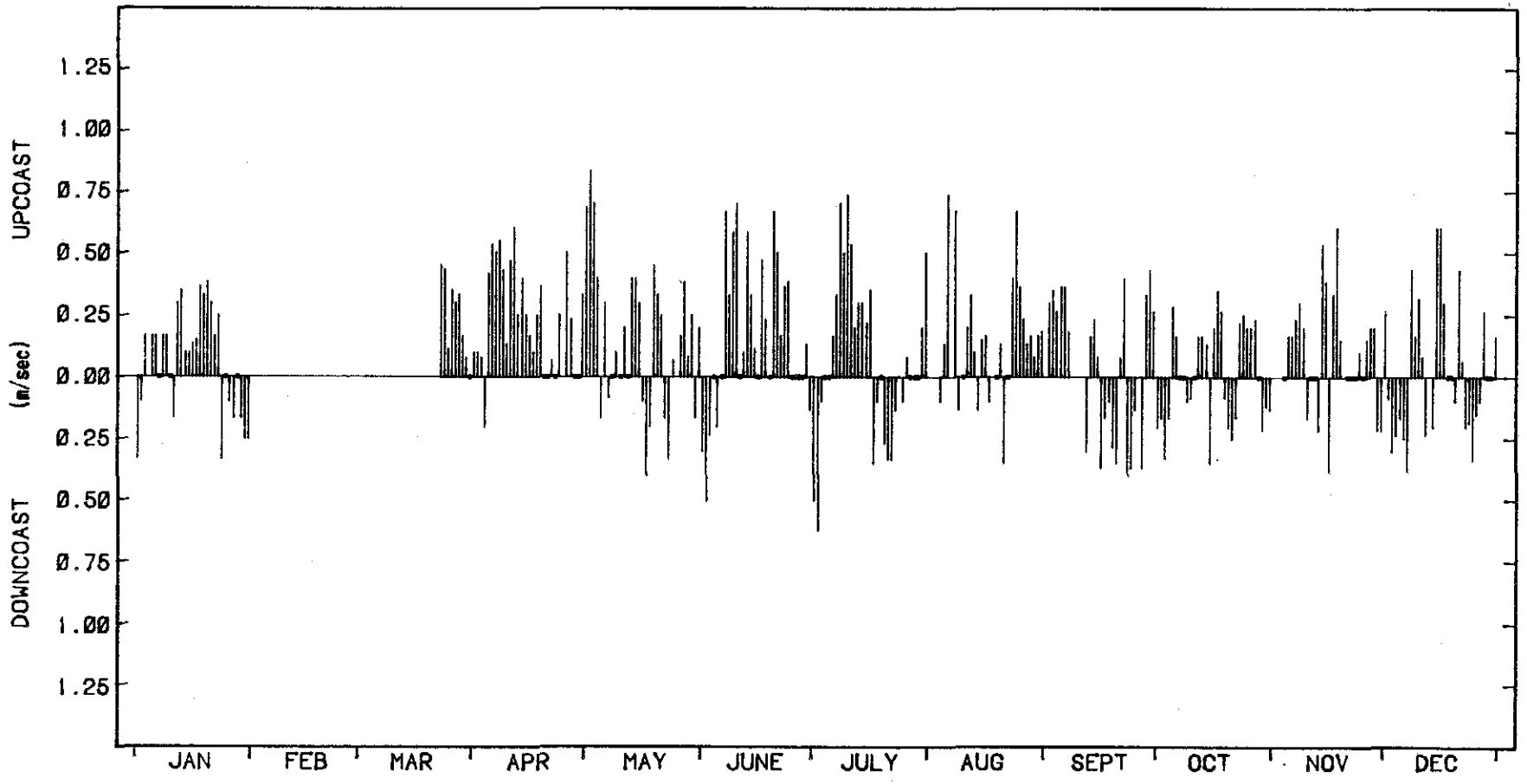
GOLD COAST CITY

SURFERS PARADISE

Ø104



LITTORAL CURRENT SUMMARY - 1981

Mean Vel = Ø.1Ø8 m/sec (up) Mean Upcoast Vel = Ø.297 m/sec Mean Downcoast Vel = Ø.225 m/sec

MORNING OBSERVATIONS - (296 recordings)

LITTORAL CURRENTS - MORNING 1981

COPE
Surfers Paradise

Figure 36
C 10.1

Beach Protection Authority

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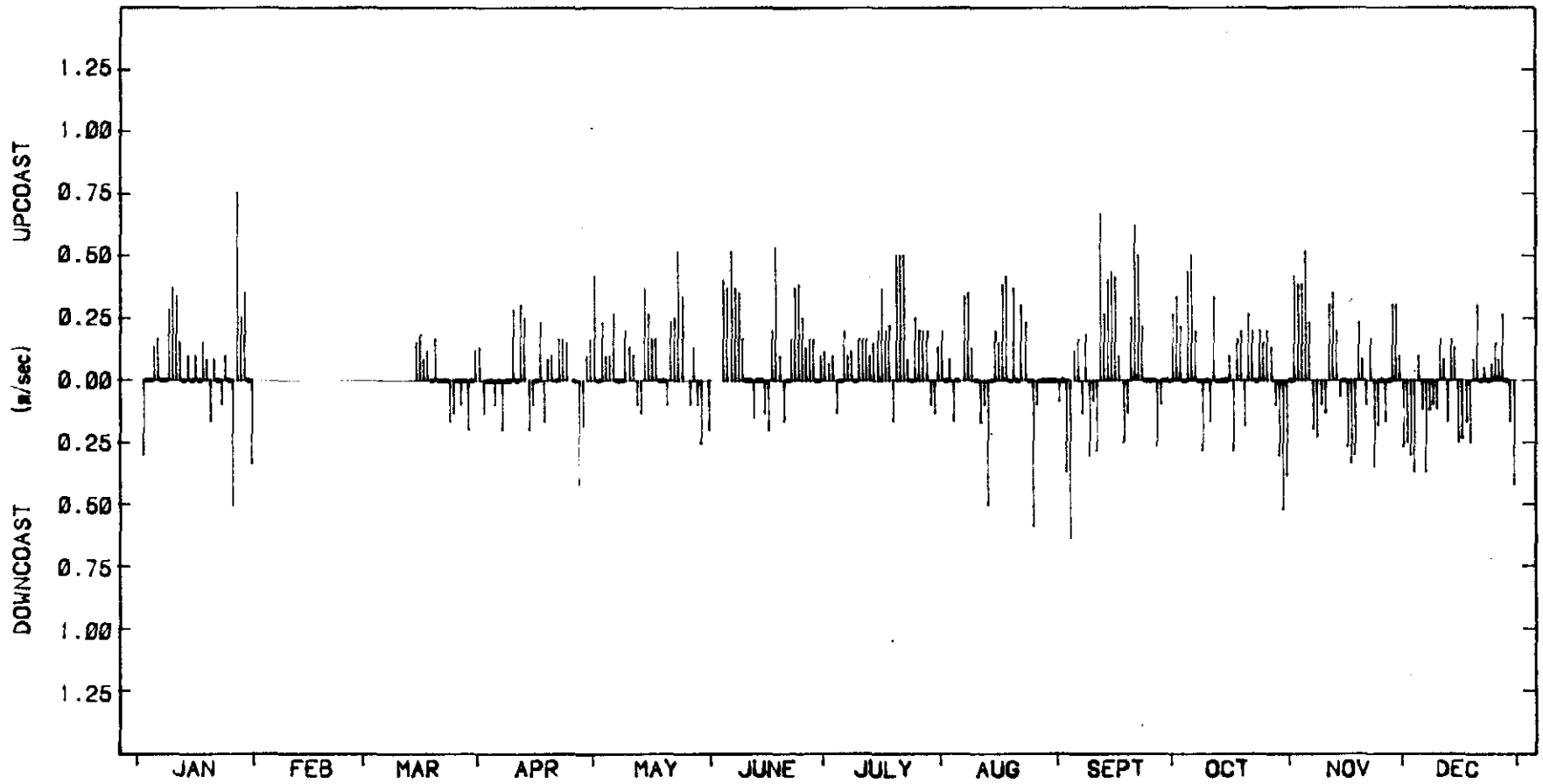
GOLD COAST CITY

SURFERS PARADISE

Ø104



LITTORAL CURRENT SUMMARY - 1982

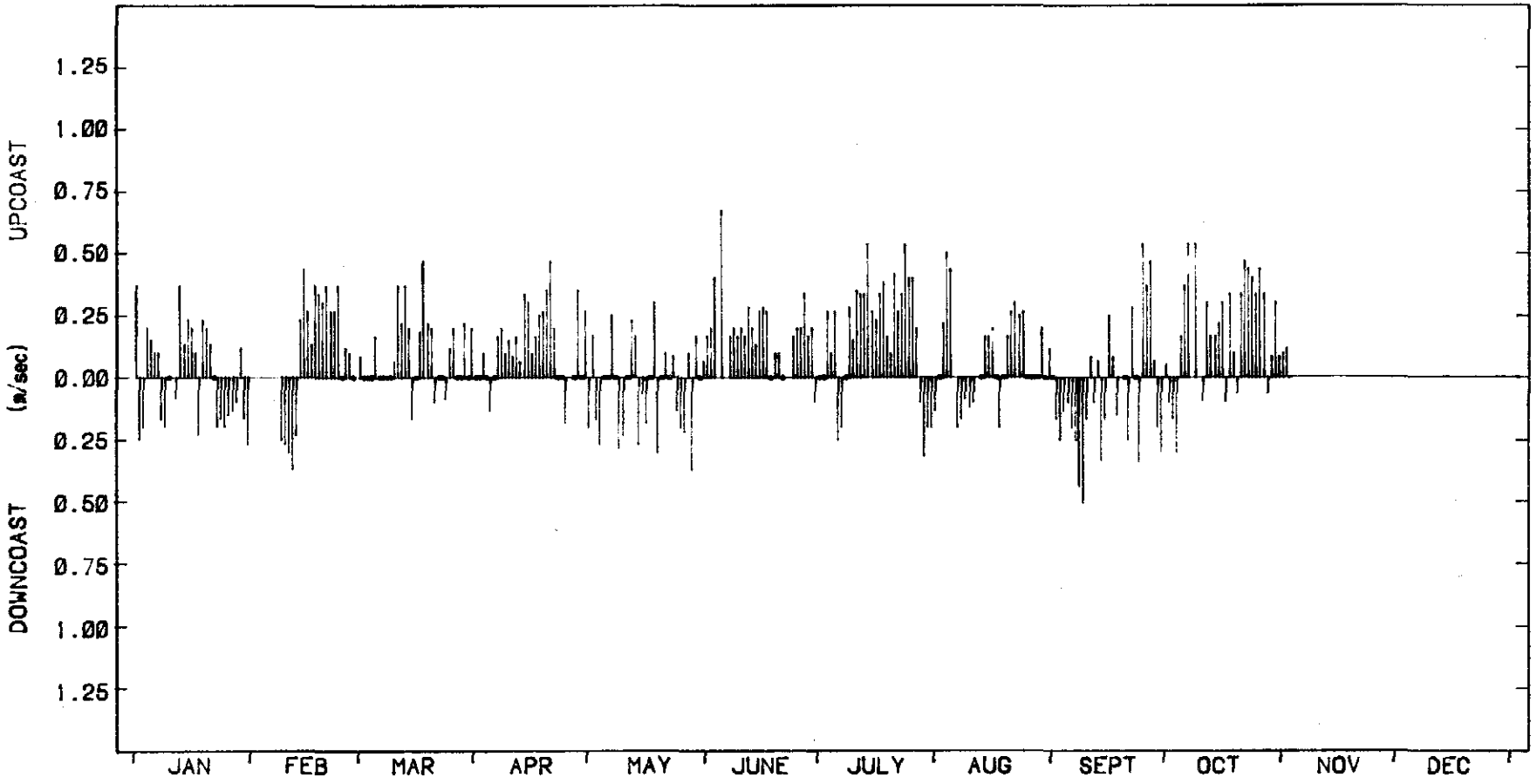
Mean Vel = Ø.Ø6Ø m/sec (up) Mean Upcoast Vel = Ø.235 m/sec Mean Downcoast Vel = Ø.214 m/sec

MORNING OBSERVATIONS - (315 recordings)

LITTORAL CURRENTS - MORNING 1982

COPE
Surfers Paradise

Figure 37
C 10.1



LITTORAL CURRENT SUMMARY - 1983

Mean Vel = Ø.Ø77 m/sec (up) Mean Upcoast Vel = Ø.242 m/sec Mean Downcoast Vel = Ø.2Ø4 m/sec

MORNING OBSERVATIONS - (345 recordings)

Beach Protection Authority

LITTORAL CURRENTS - MORNING 1983

COPE
Surfers Paradise

Figure 38
C 1Ø.1

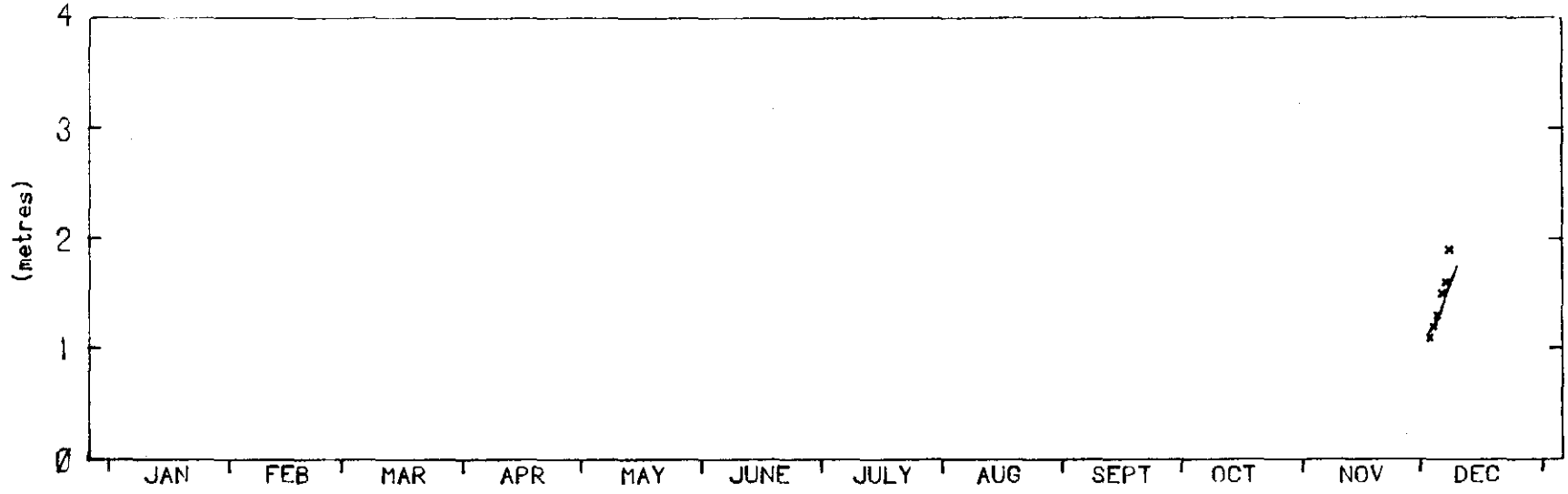
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

SURFERS PARADISE

Ø1Ø4



BERM CREST ELEVATION - 1973

No. of Observations : 6

Indicates Five Day Moving Average

BERM CREST ELEVATION - 1973

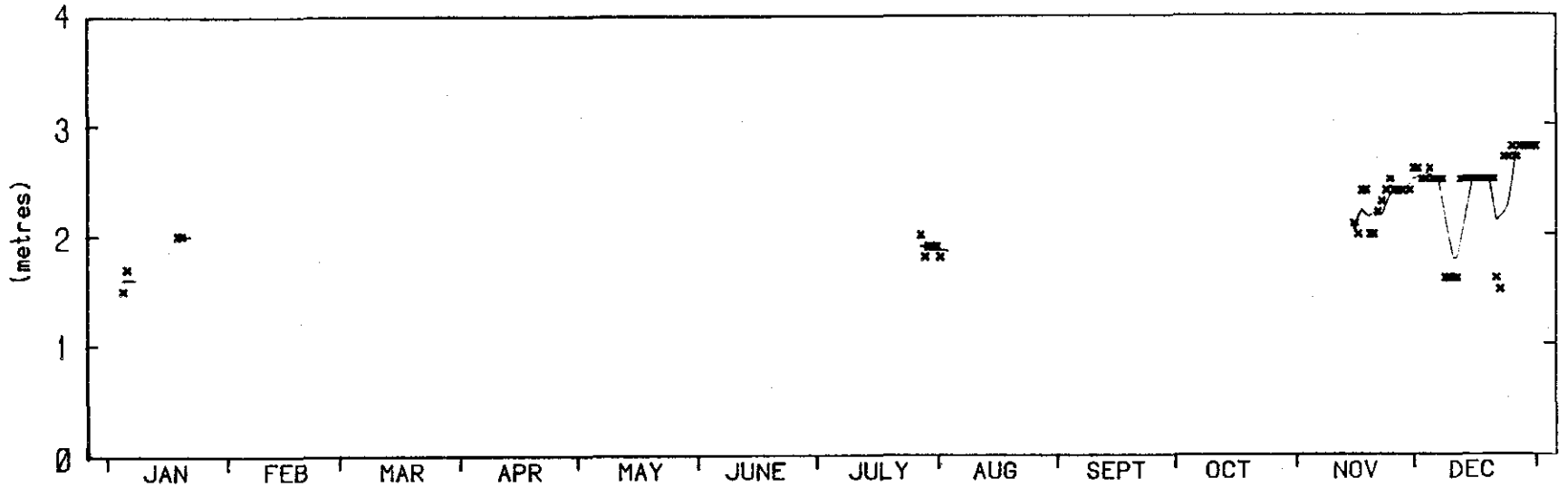
COPE
Surfers Paradise

Figure 39
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY SURFERS PARADISE 0104



BERM CREST ELEVATION - 1974

No. of Observations : 56

Indicates Five Day Moving Average

BERM CREST ELEVATION - 1974

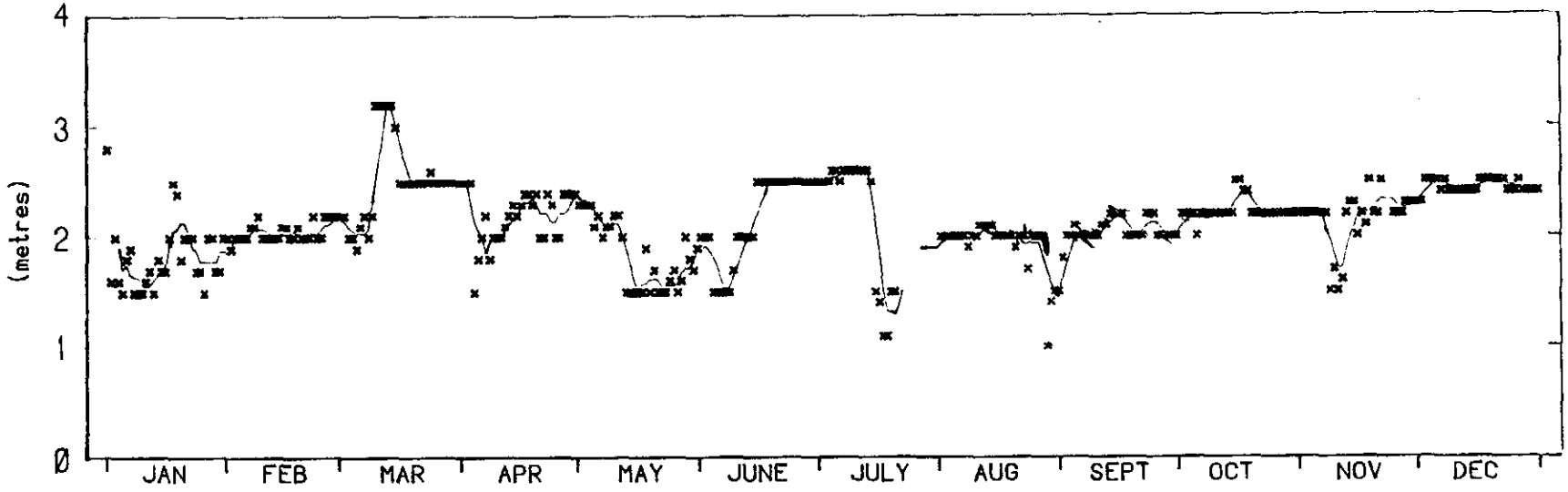
COPE
Surfers Paradise

Figure 40
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY **SURFERS PARADISE** **Ø104**



BERM CREST ELEVATION - 1975

No. of Observations : 352

Indicates Five Day Moving Average

BERM CREST ELEVATION - 1975

COPE
Surfers Paradise

Figure 41
C 10.1

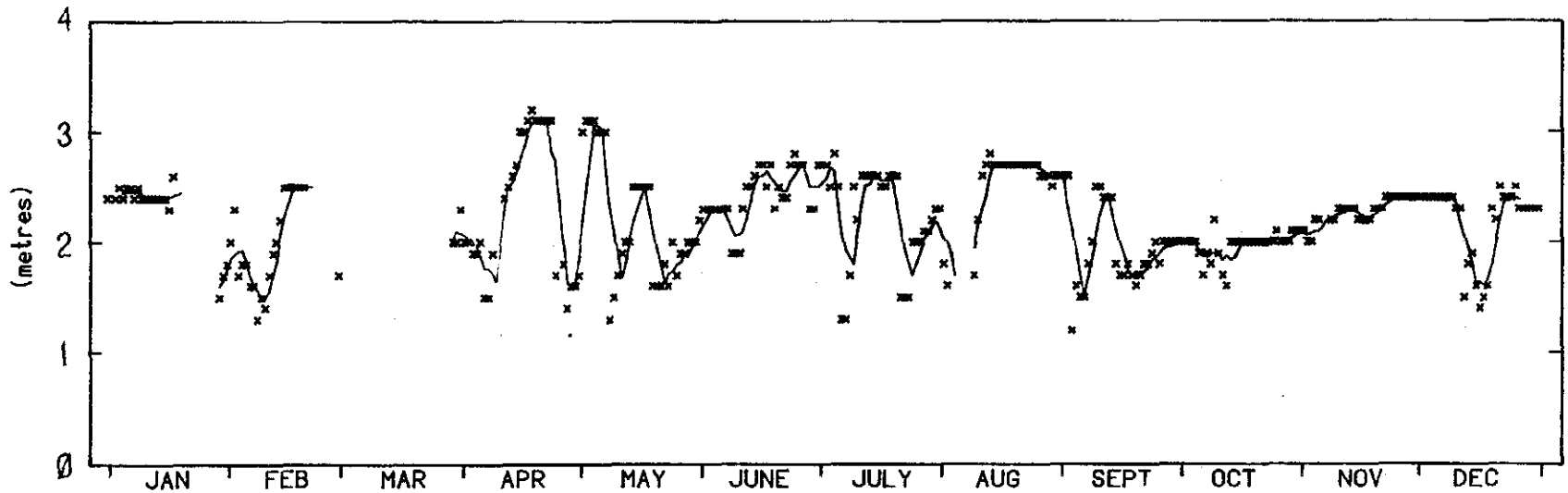
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

SURFERS PARADISE

Ø1Ø4



BERM CREST ELEVATION - 1976

No. of Observations : 3Ø7

Indicates Five Day Moving Average

BERM CREST ELEVATION - 1976

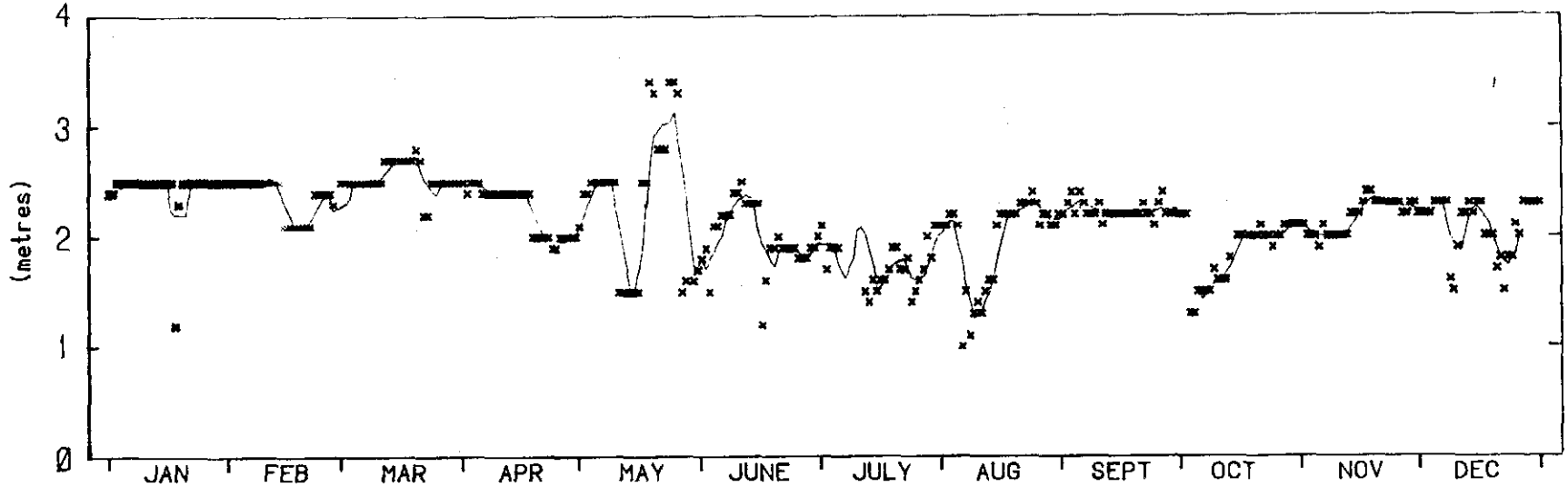
COPE
Surfers Paradise

Figure 42
C 1Ø.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY SURFERS PARADISE Ø1Ø4



BERM CREST ELEVATION - 1977

No. of Observations : 356

Indicates Five Day Moving Average

BERM CREST ELEVATION - 1977

COPE
Surfers Paradise

Figure 43
C 10.1

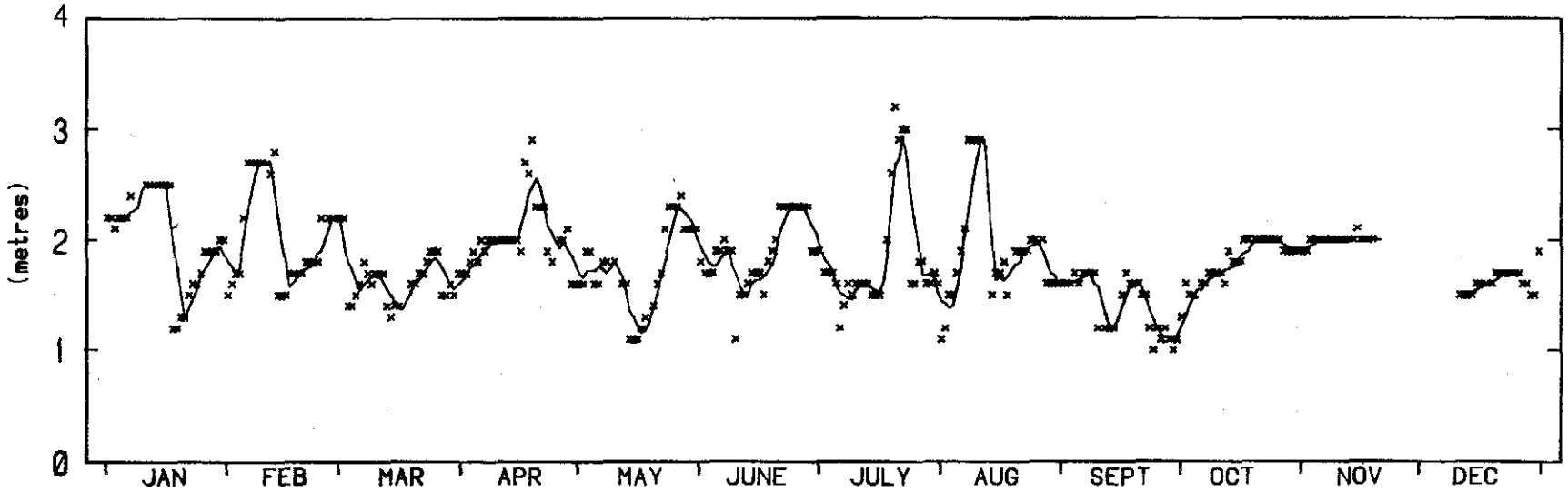
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

SURFERS PARADISE

Ø1Ø4



BERM CREST ELEVATION - 1978

No. of Observations : 325

Indicates Five Day Moving Average

BERM CREST ELEVATION - 1978

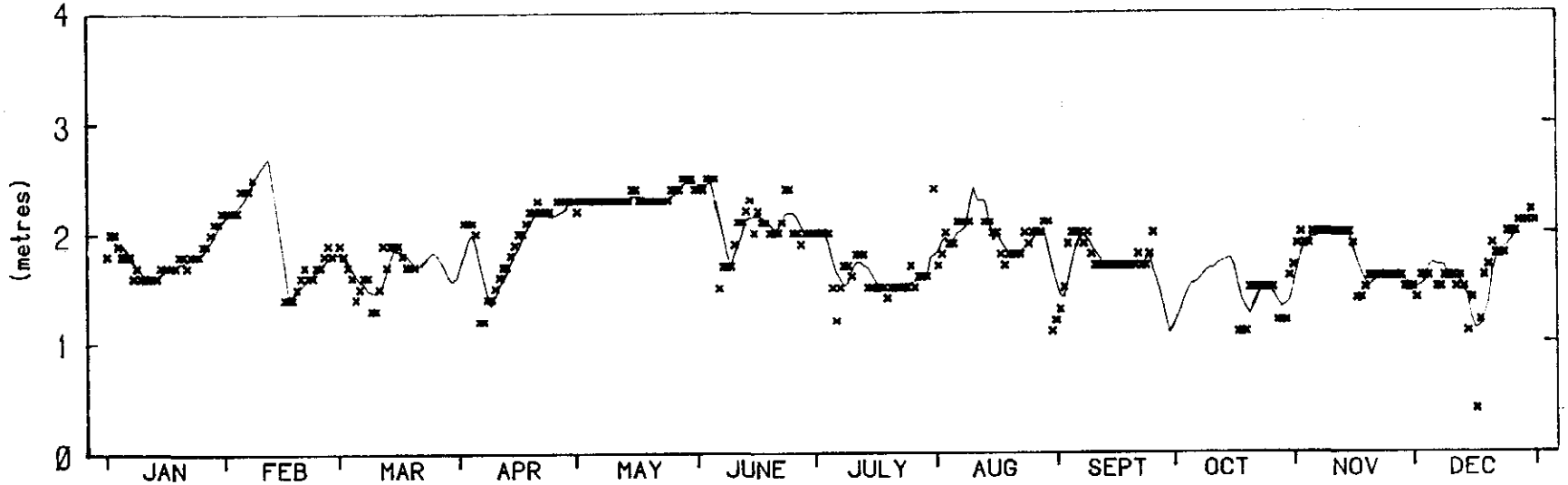
COPE
Surfers Paradise

Figure 44
c 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY SURFERS PARADISE 0104



BERM CREST ELEVATION - 1979

No. of Observations : 319

Indicates Five Day Moving Average

BERM CREST ELEVATION - 1979

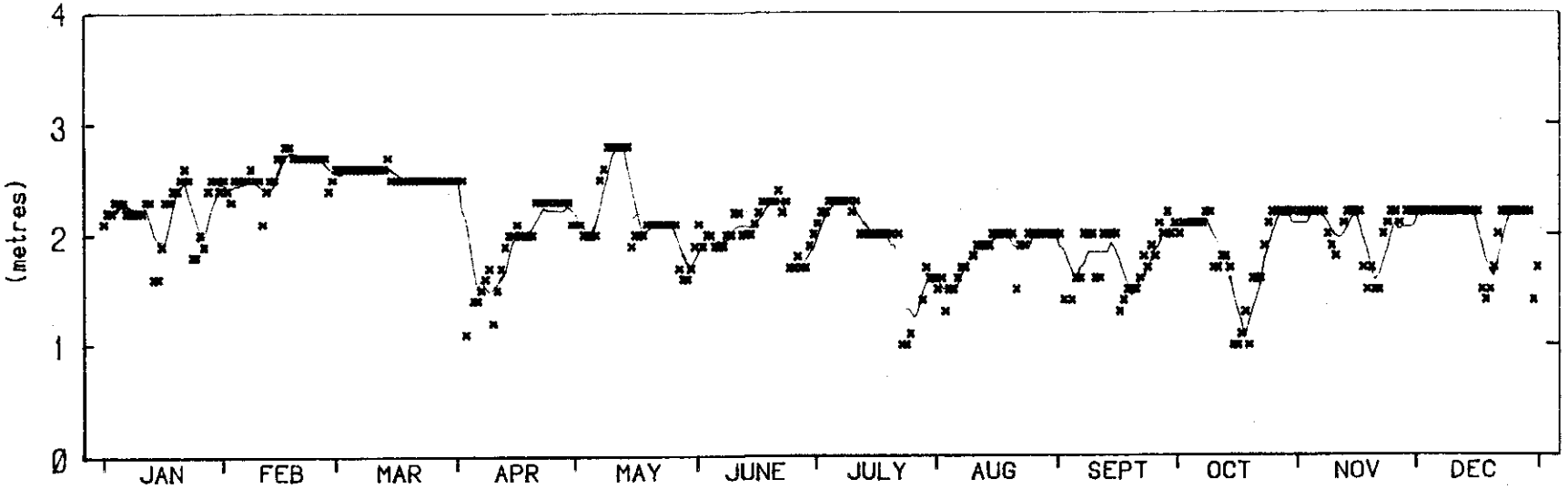
COPE
Surfers Paradise

Figure 45
C 10.1

Beach Protection Authority

COPE - Coastal Observation
Programme Engineering

GOLD COAST CITY SURFERS PARADISE 0104



BERM CREST ELEVATION - 1980

No. of Observations : 356

Indicates Five Day Moving Average

BERM CREST ELEVATION - 1980

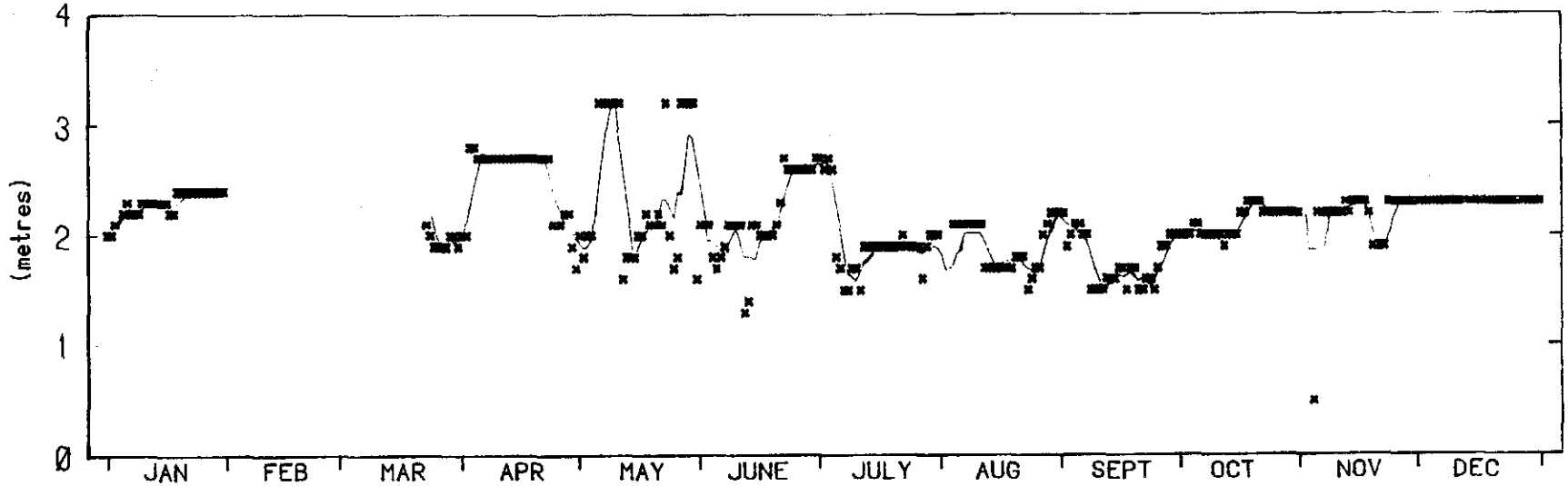
COPE
Surfers Paradise

Figure 46
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY SURFERS PARADISE Ø104



BERM CREST ELEVATION - 1981

No. of Observations : 302

Indicates Day Moving Average

BERM CREST ELEVATION - 1981

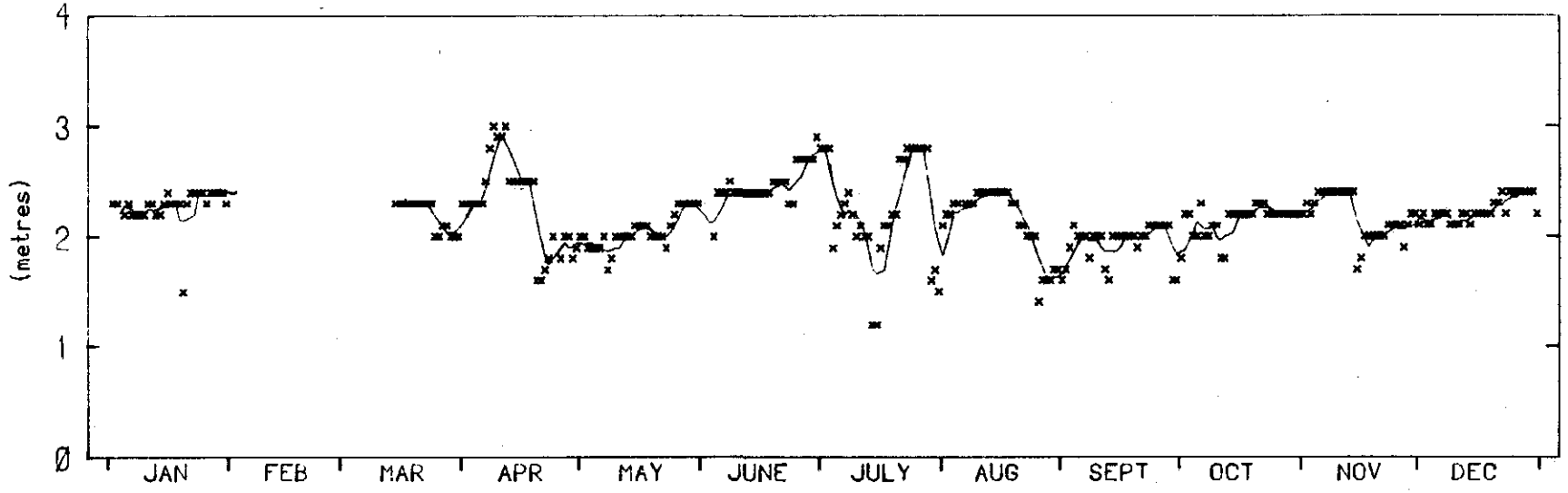
COPE
Surfers Paradise

Figure 47
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY SURFERS PARADISE Ø1Ø4



BERM CREST ELEVATION - 1982

No. of Observations : 316

Indicates Day Moving Average

BERM CREST ELEVATION - 1982

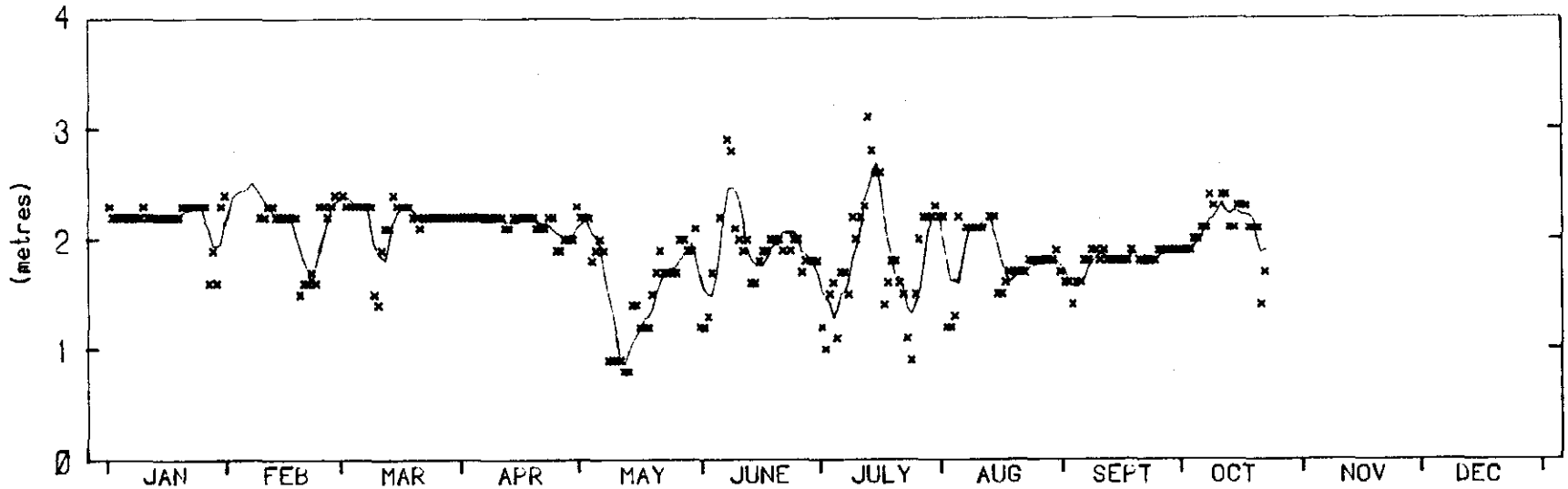
COPE
Surfers Paradise

Figure 48
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY SURFERS PARADISE 0104



BERM CREST ELEVATION - 1983

No. of Observations : 280

Indicates Five Day Moving Average

BERM CREST ELEVATION - 1983

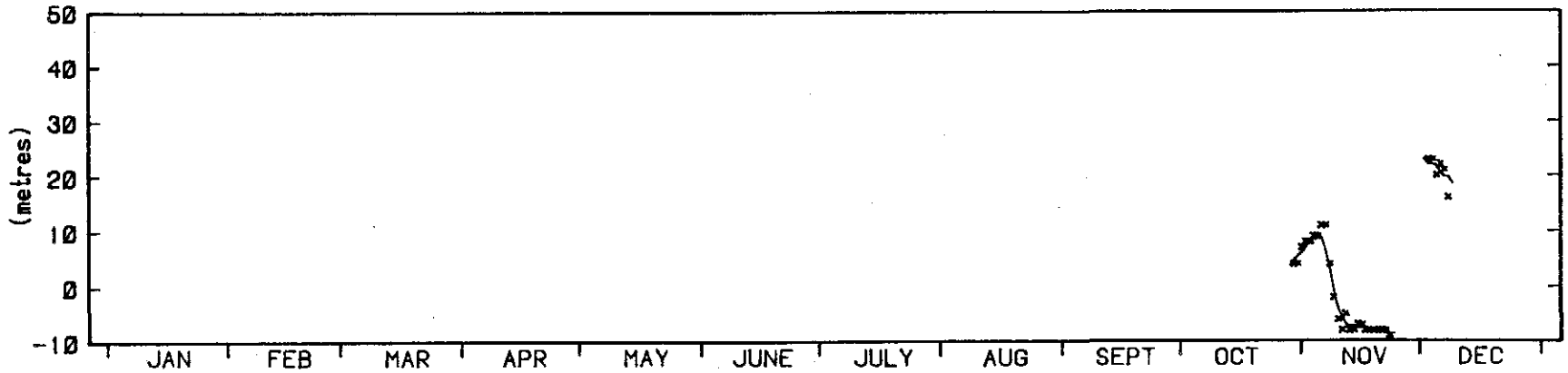
COPE
Surfers Paradise

Figure 49
C 10.1

Beach Protection Authority

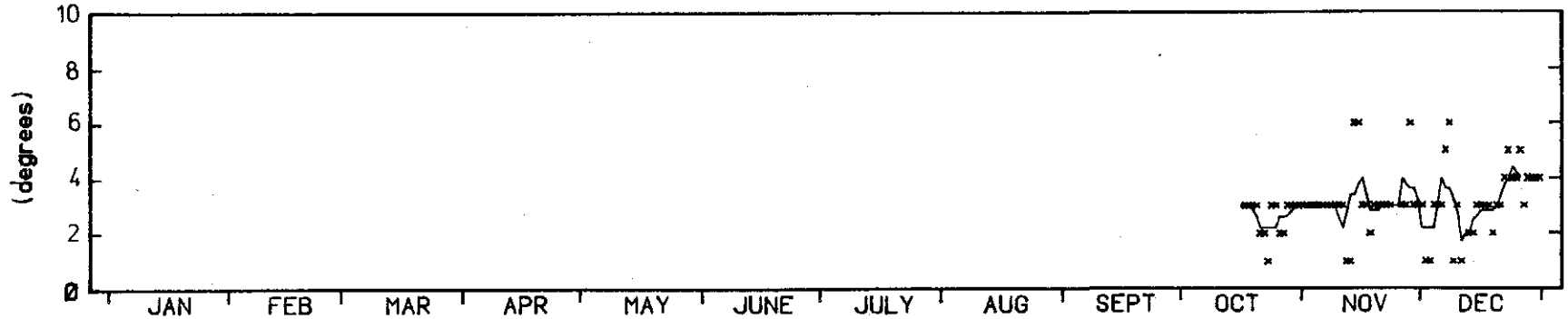
COPE - Coastal Observation Programme Engineering

GOLD COAST CITY SURFERS PARADISE 0104



DISTANCE TO BERM AND VEGETATION LINE - 1973

xxxxx Indicates Distance to Berm : 31 Observations



FORESHORE SLOPE - 1973

Five Day Moving Average

No. of Observations : 73

BEACH PROFILE PARAMETERS - 1973

COPE
Surfers Paradise

Figure 50
C 10.1

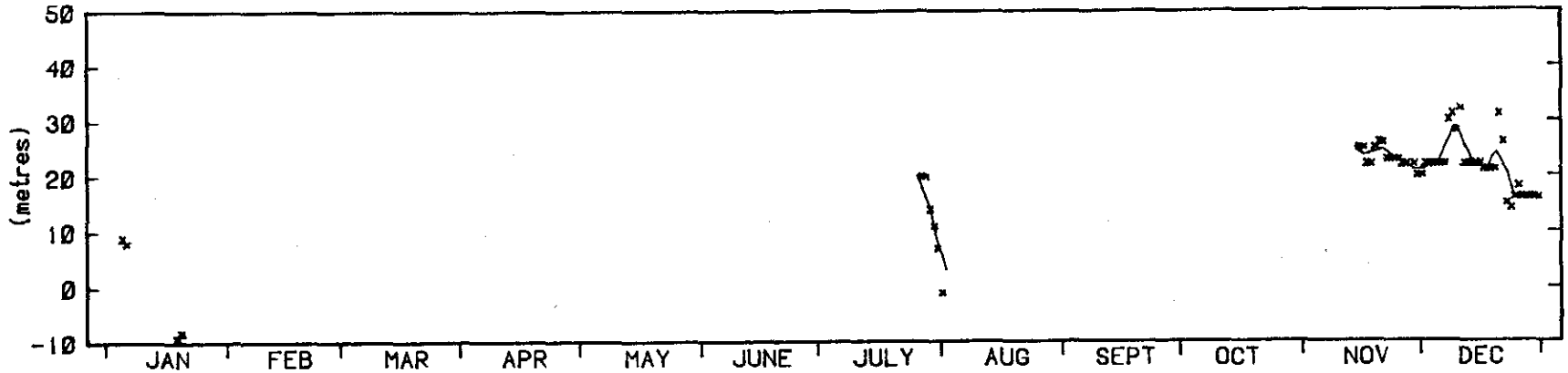
Beach Protection Authority

COPE - Coastal Observation
Programme Engineering

GOLD COAST CITY

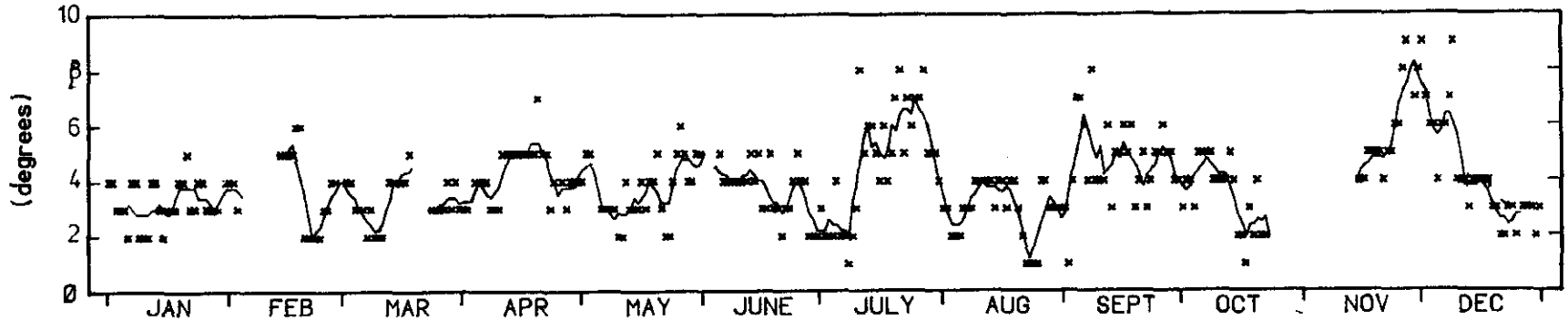
SURFERS PARADISE

0104



DISTANCE TO BERM AND VEGETATION LINE - 1974

xxxxx Indicates Distance to Berm : 56 Observations



FORESHORE SLOPE - 1974

Five Day Moving Average

No. of Observations : 310

BEACH PROFILE PARAMETERS - 1974

COPE
Surfers Paradise

Figure 51
C 10.1

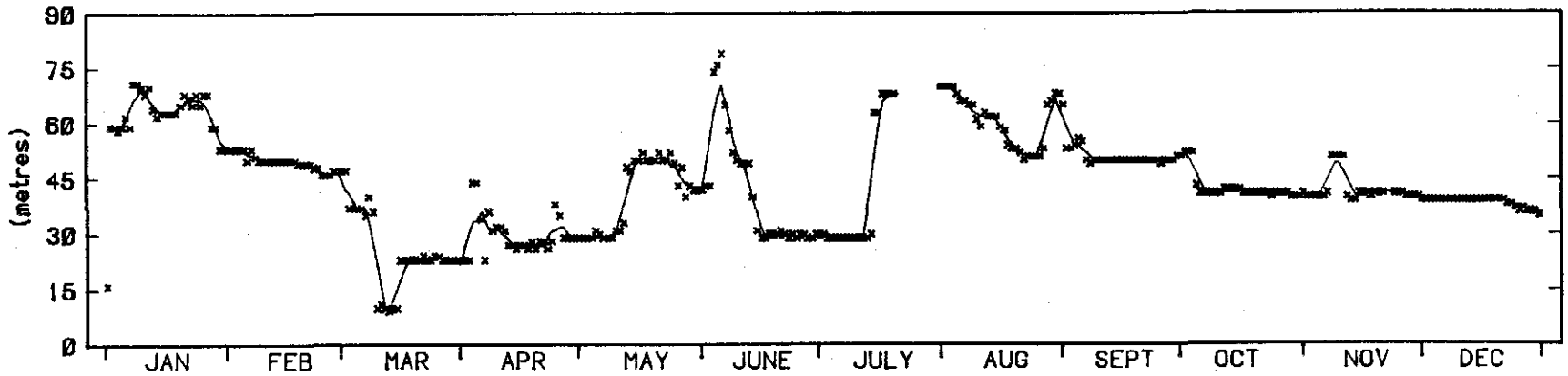
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

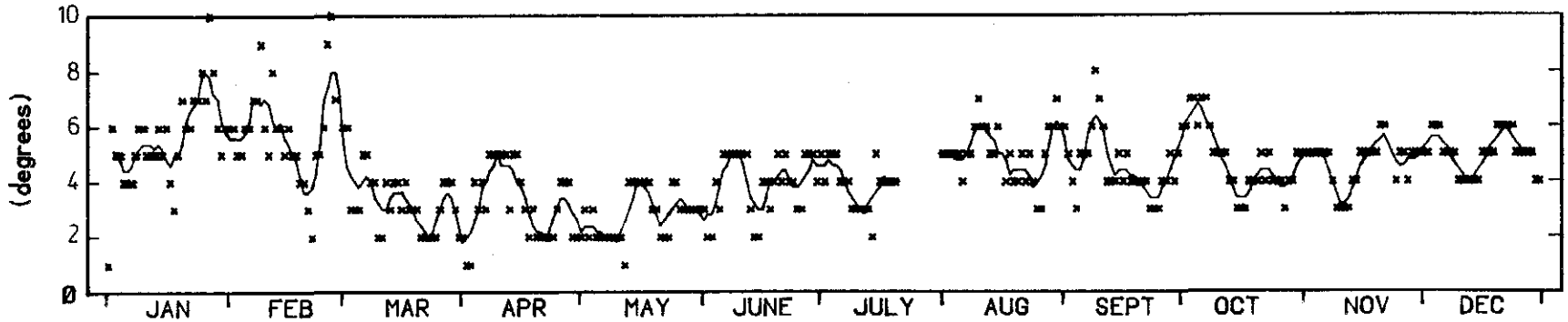
SURFERS PARADISE

0104



DISTANCE TO BERM AND VEGETATION LINE - 1975

xxxx Indicates Distance to Berm : 352 Observations



FORESHORE SLOPE - 1975

Five Day Moving Average

No. of Observations : 351

BEACH PROFILE PARAMETERS - 1975

COPE
Surfers Paradise

Figure 52
C 10.1

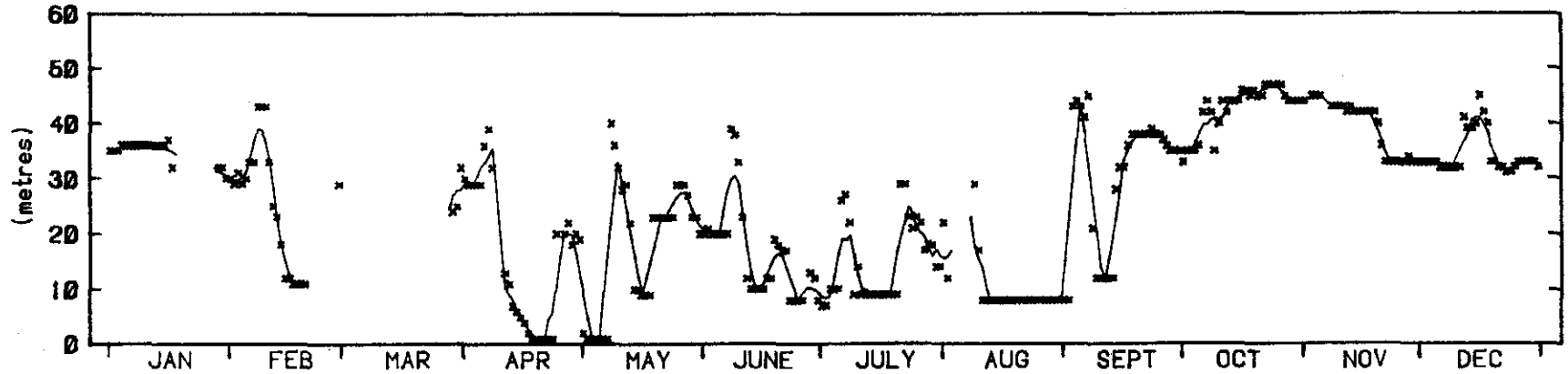
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

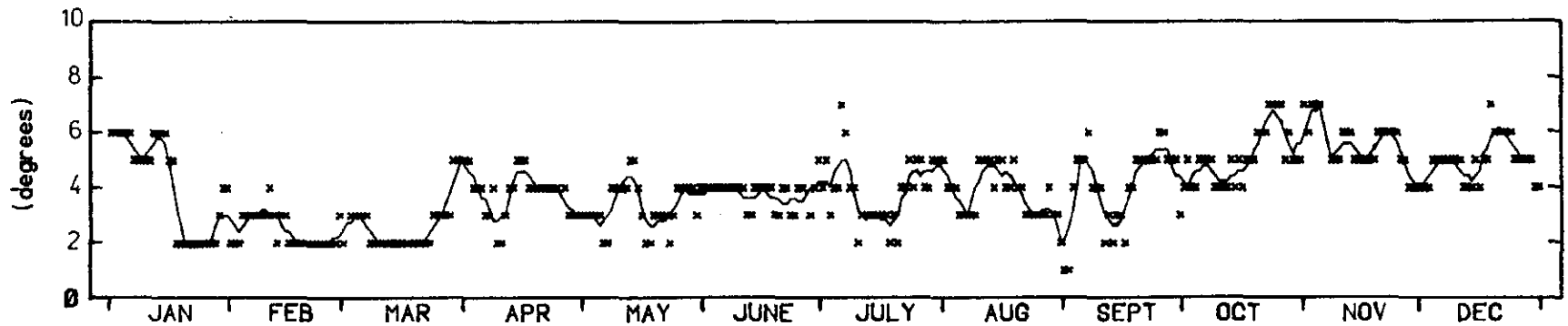
SURFERS PARADISE

0104



DISTANCE TO BERM AND VEGETATION LINE - 1976

Indicates Distance to Berm : 306 Observations



FORESHORE SLOPE - 1976

Five Day Moving Average

No. of Observations : 361

BEACH PROFILE PARAMETERS - 1976

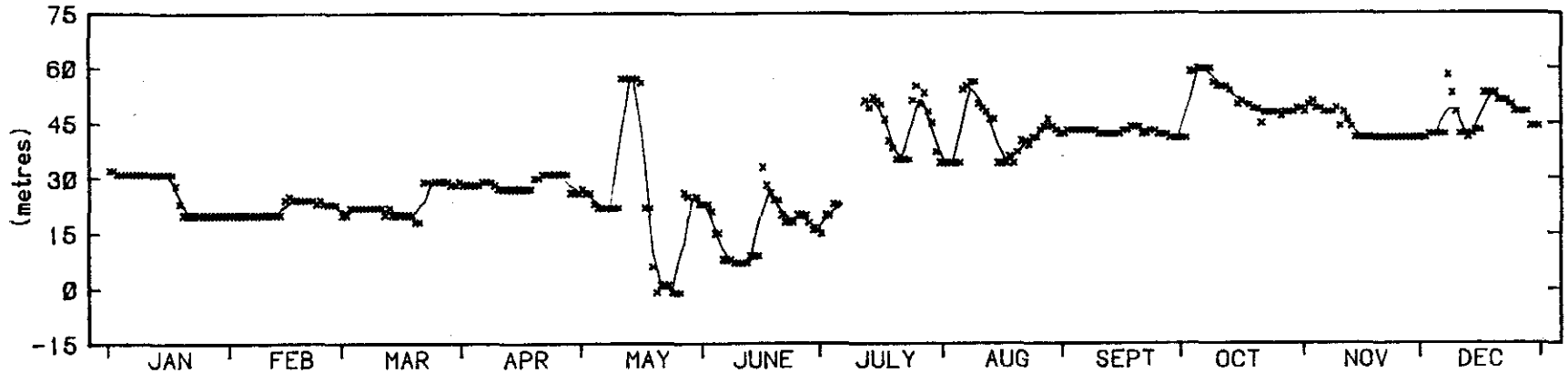
COPE
Surfers Paradise

Figure 53
C 10.1

Beach Protection Authority

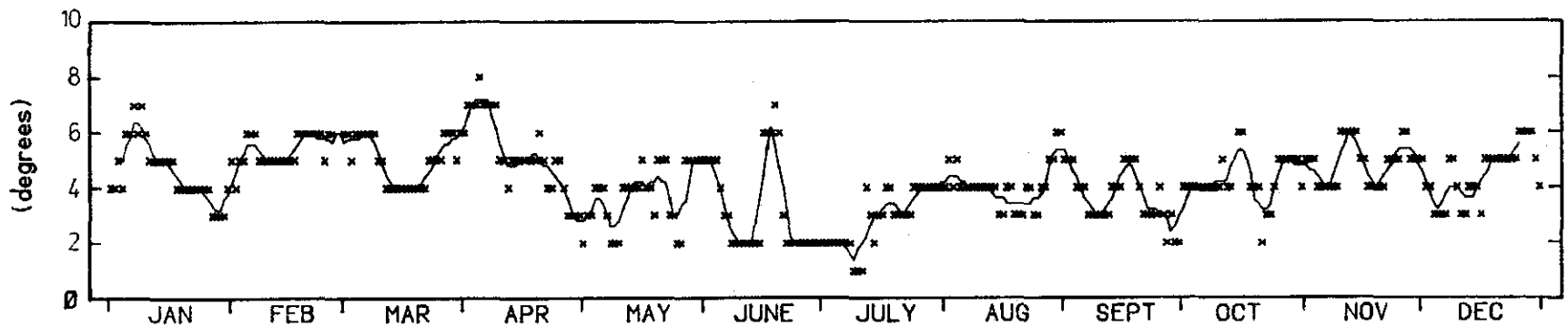
COPE - Coastal Observation Programme Engineering

GOLD COAST CITY SURFERS PARADISE 0104



DISTANCE TO BERM AND VEGETATION LINE - 1977

xxxx Indicates Distance to Berm : 355 Observations



FORESHORE SLOPE - 1977

Five Day Moving Average

No. of Observations : 338

BEACH PROFILE PARAMETERS - 1977

COPE
Surfers Paradise

Figure 54
C 10.1

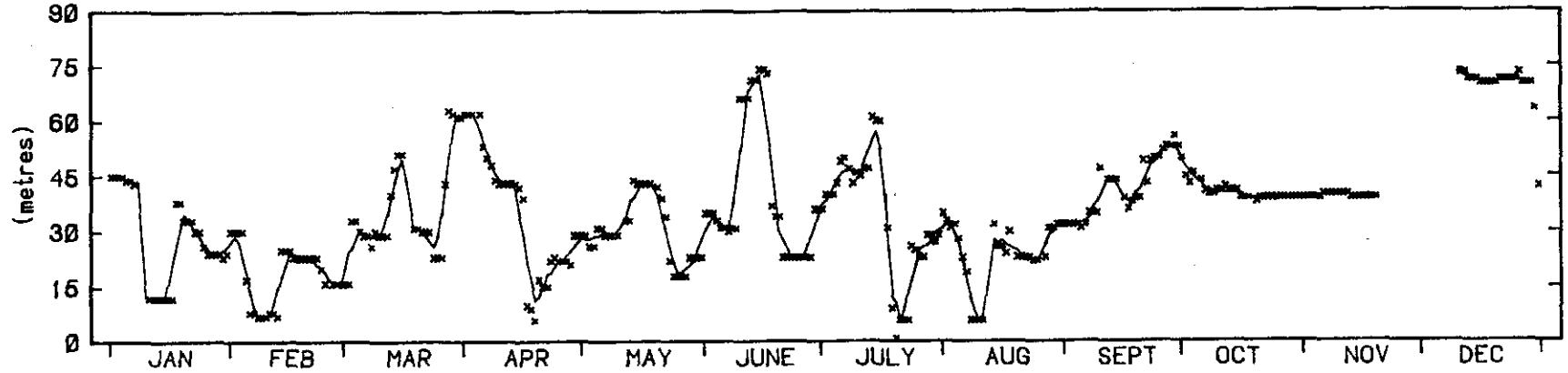
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

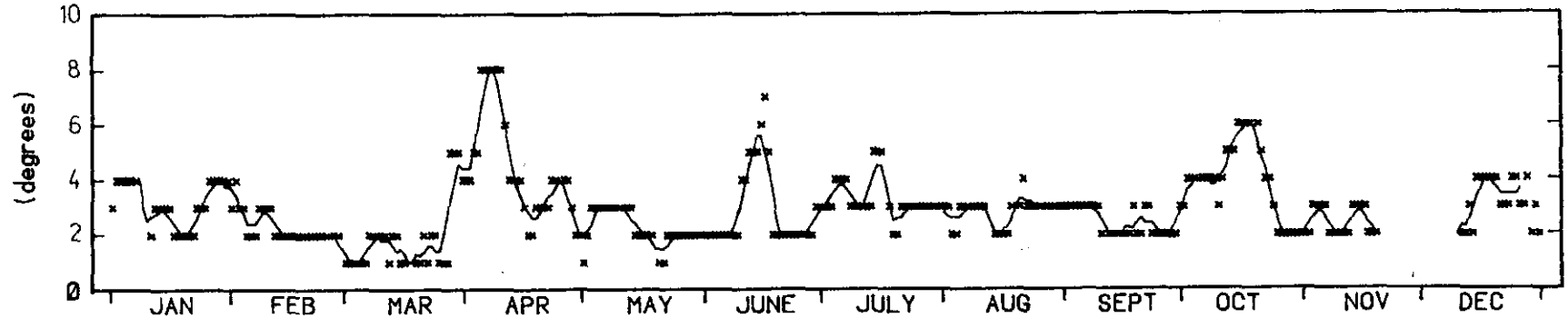
SURFERS PARADISE

Ø104



DISTANCE TO BERM AND VEGETATION LINE - 1978

xxxxx Indicates Distance to Berm : 324 Observations



FORESHORE SLOPE - 1978

Five Day Moving Average

No. of Observations : 324

BEACH PROFILE PARAMETERS - 1978

COPE
Surfers Paradise

Figure 55
C 10.1

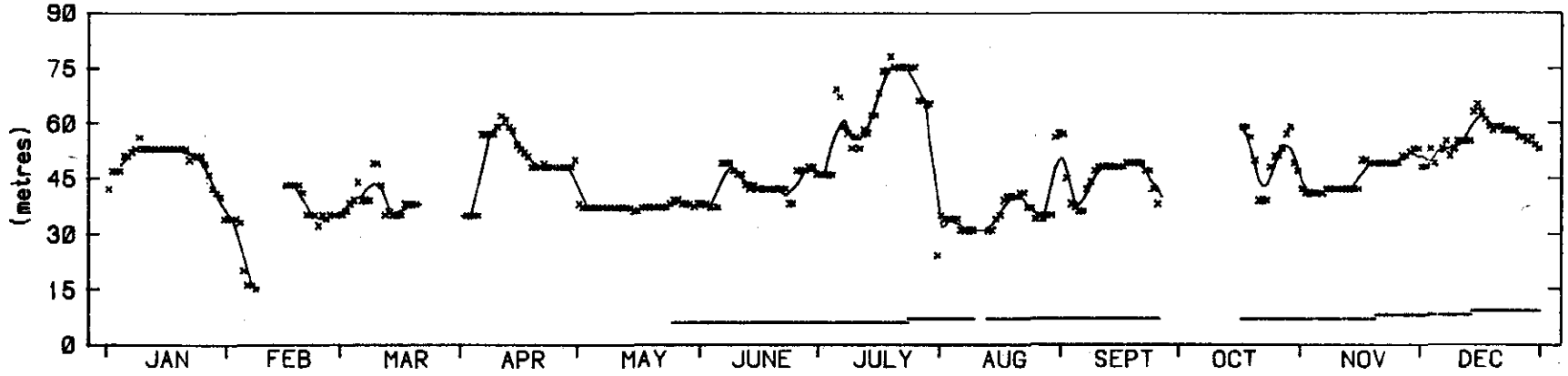
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

SURFERS PARADISE

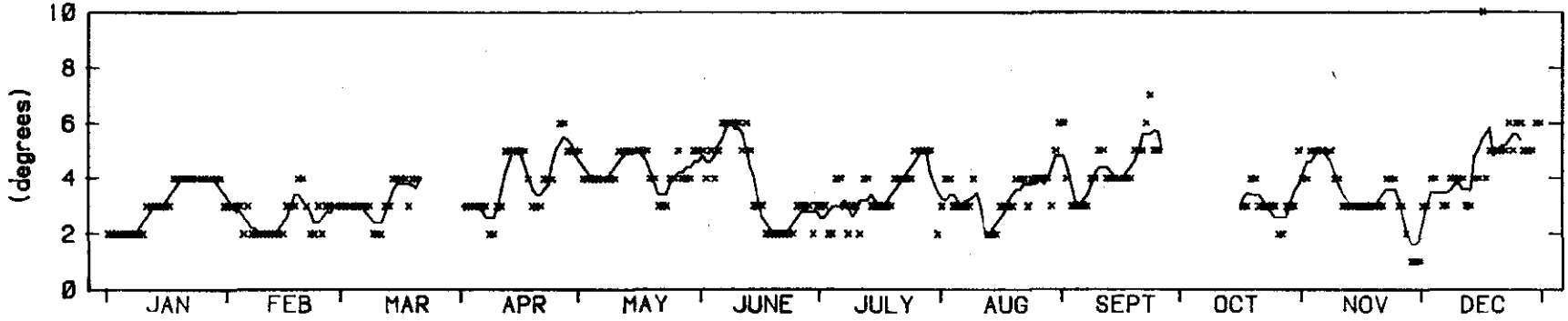
0104



DISTANCE TO BERM AND VEGETATION LINE - 1979

xxxxx Indicates Distance to Berm : 319 Observations

— Indicates Distance to Vegetation Line : 196 Observations



FORESHORE SLOPE - 1979

Five Day Moving Average

No. of Observations : 326

BEACH PROFILE PARAMETERS - 1979

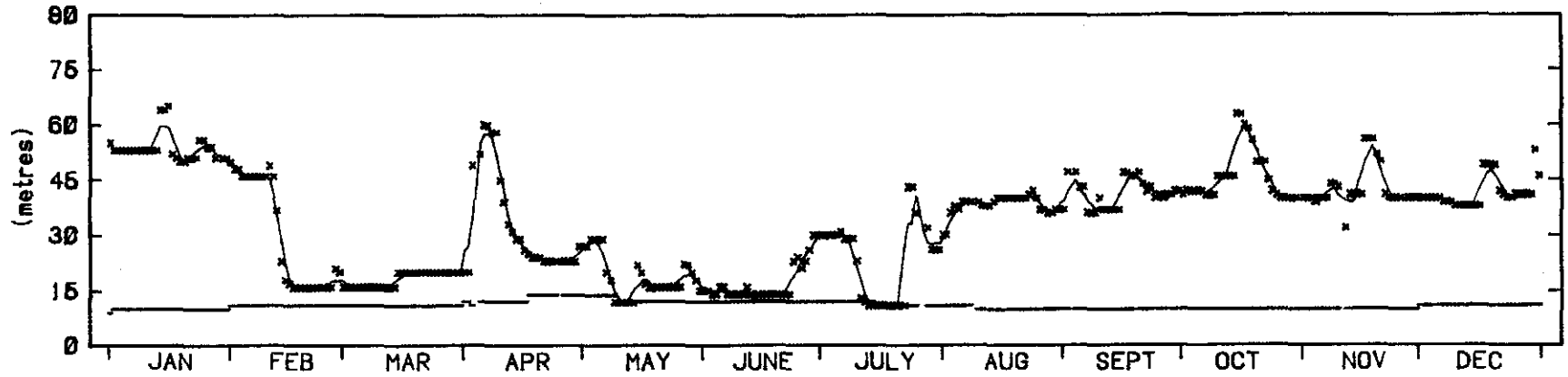
COPE
Surfers Paradise

Figure 56
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

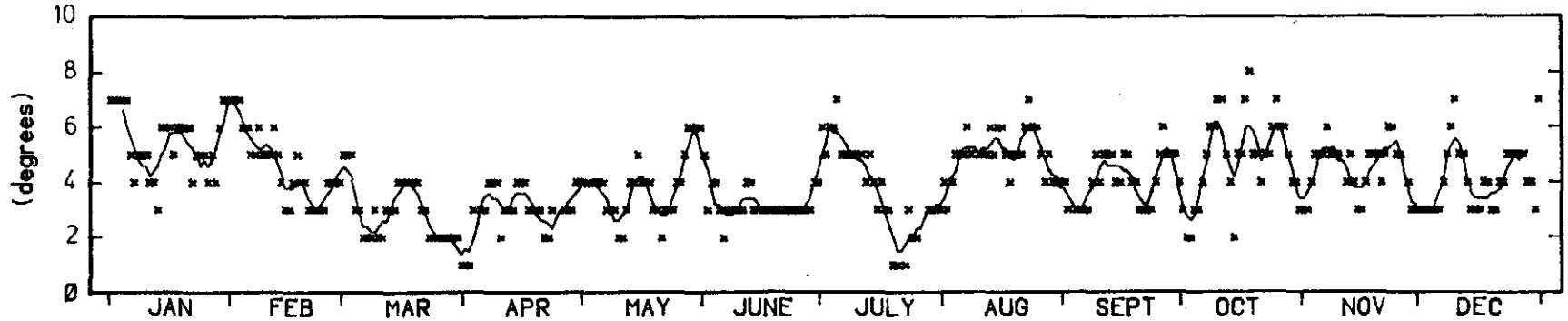
GOLD COAST CITY SURFERS PARADISE 0104



DISTANCE TO BERM AND VEGETATION LINE - 1980

xxxxx Indicates Distance to Berm : 355 Observations

---- Indicates Distance to Vegetation Line : 358 Observations



FORESHORE SLOPE - 1980

Five Day Moving Average

No. of Observations : 356

BEACH PROFILE PARAMETERS - 1980

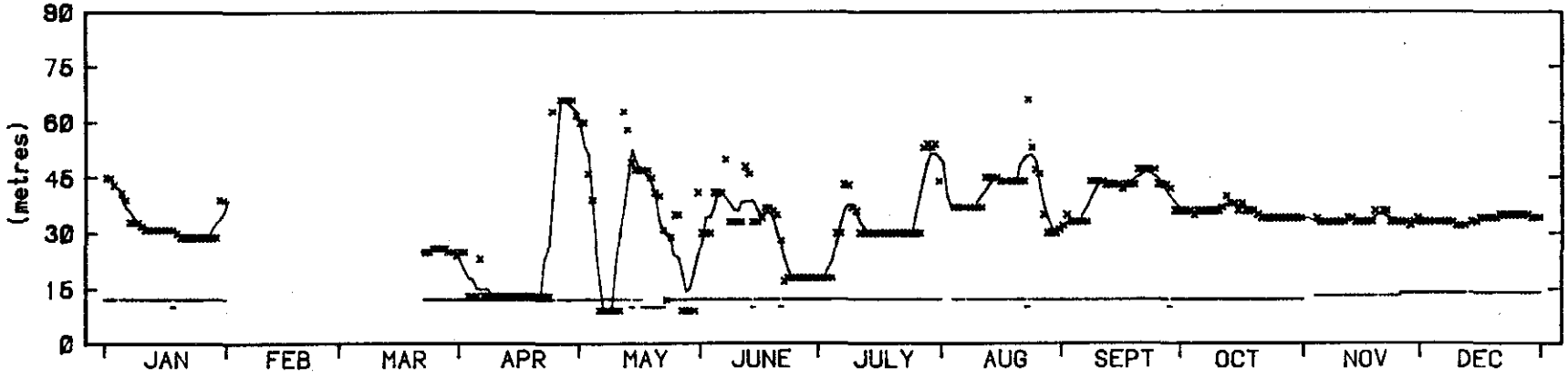
COPE Surfers Paradise

Figure 57
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

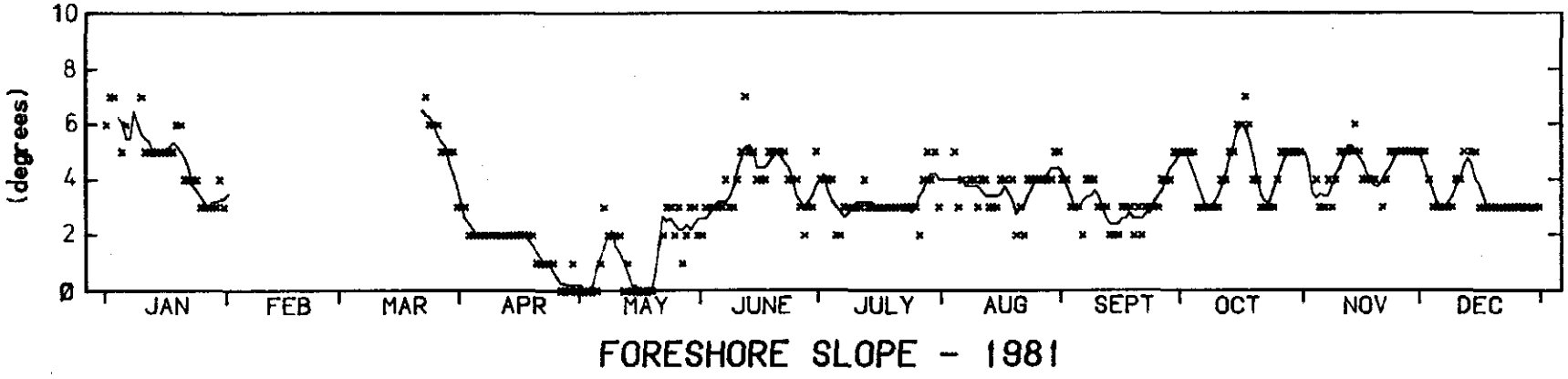
GOLD COAST CITY SURFERS PARADISE 0104



DISTANCE TO BERM AND VEGETATION LINE - 1981

xxxxx Indicates Distance to Berm : 301 Observations

— Indicates Distance to Vegetation Line : 303 Observations



FORESHORE SLOPE - 1981

Five Day Moving Average

No. of Observations : 297

BEACH PROFILE PARAMETERS - 1981

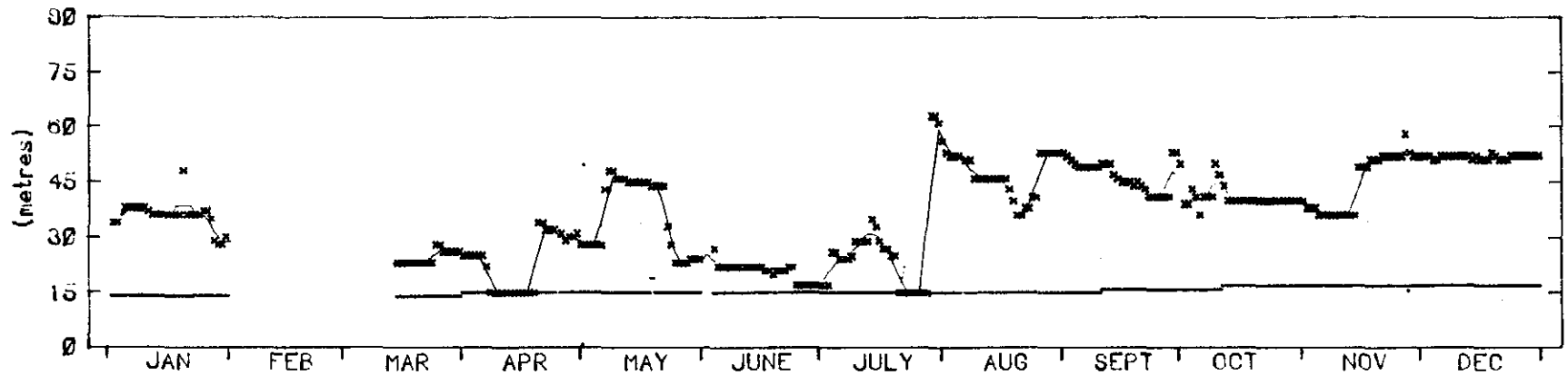
COPE
Surfers Paradise

Figure 58
C 10.1

Beach Protection Authority

COPE - Coastal Observation Programme Engineering

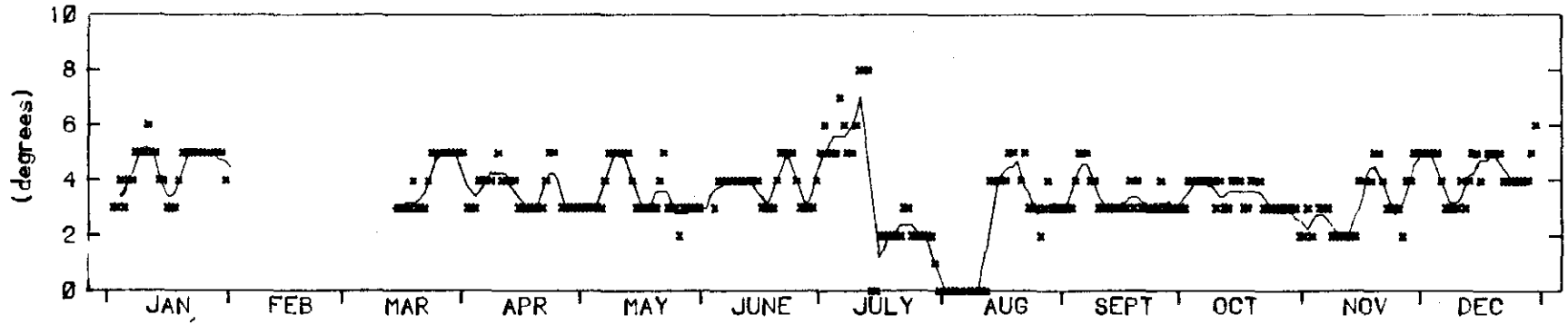
GOLD COAST CITY SURFERS PARADISE 0104



DISTANCE TO BERM AND VEGETATION LINE - 1982

xxxxx Indicates Distance to Berm : 316 Observations

— Indicates Distance to Vegetation Line : 317 Observations



FORESHORE SLOPE - 1982

Five Day Moving Average

No. of Observations : 309

BEACH PROFILE PARAMETERS - 1982

COPE
Surfers Paradise

Figure 59
C 10.1

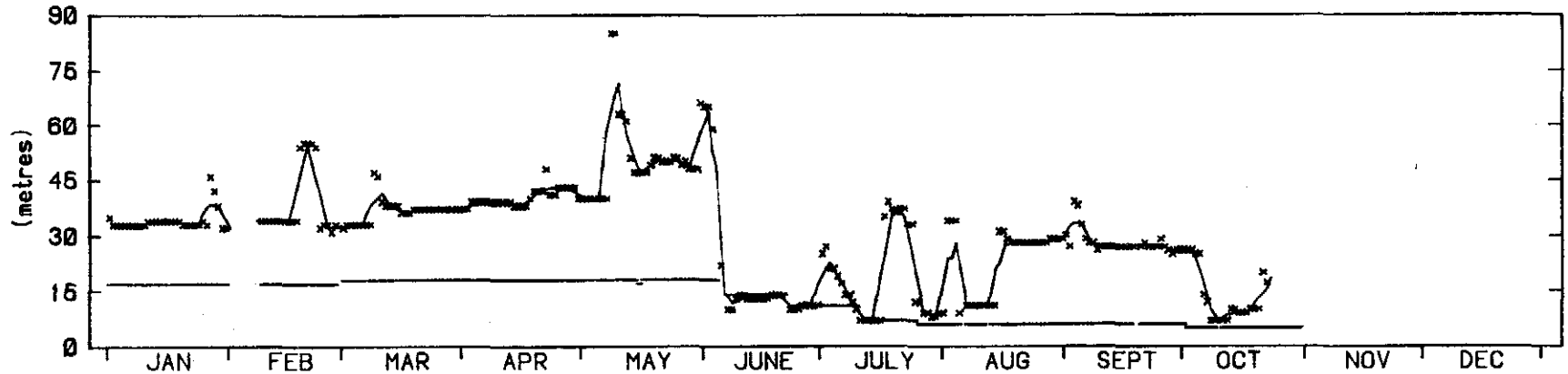
Beach Protection Authority

COPE - Coastal Observation Programme Engineering

GOLD COAST CITY

SURFERS PARADISE

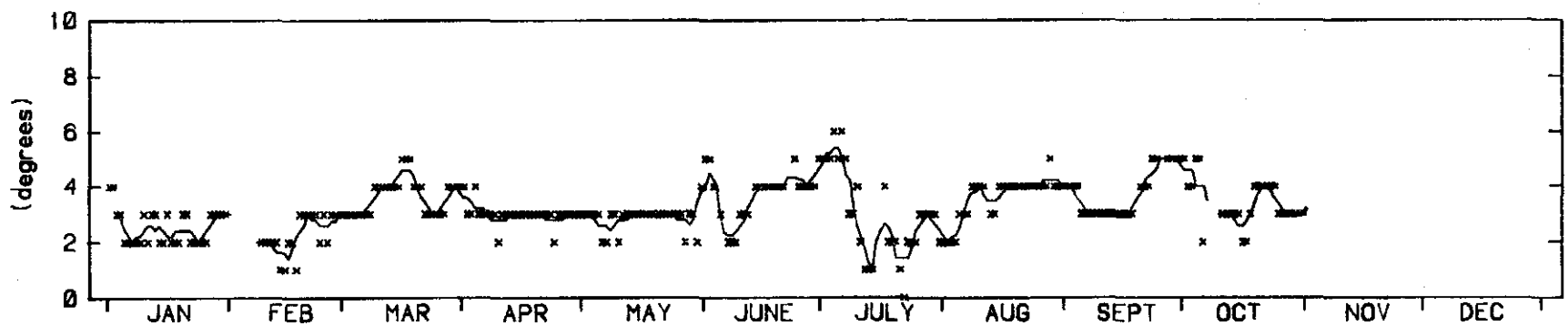
0104



DISTANCE TO BERM AND VEGETATION LINE - 1983

xxxxx Indicates Distance to Berm : 280 Observations

— Indicates Distance to Vegetation Line : 289 Observations



FORESHORE SLOPE - 1983

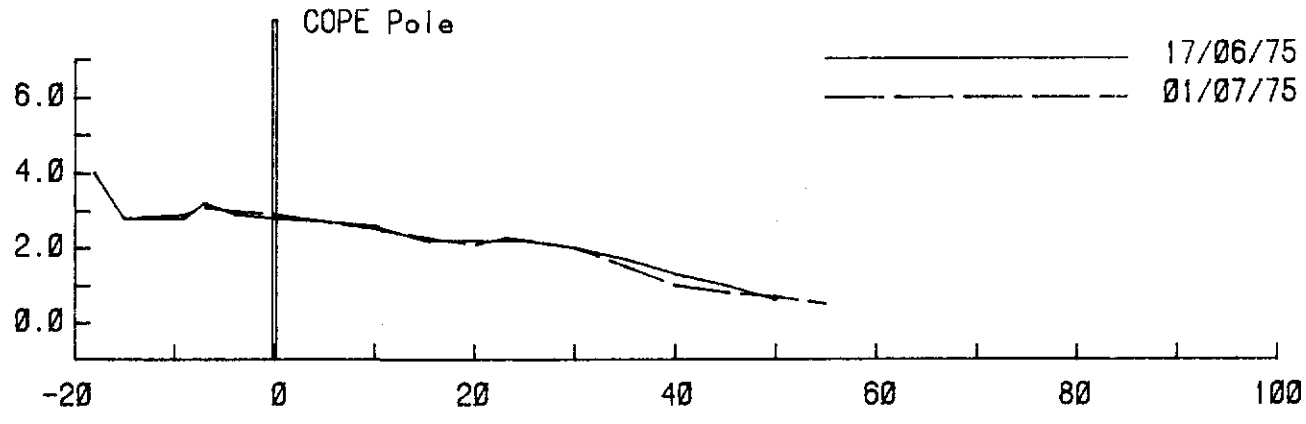
Five Day Moving Average

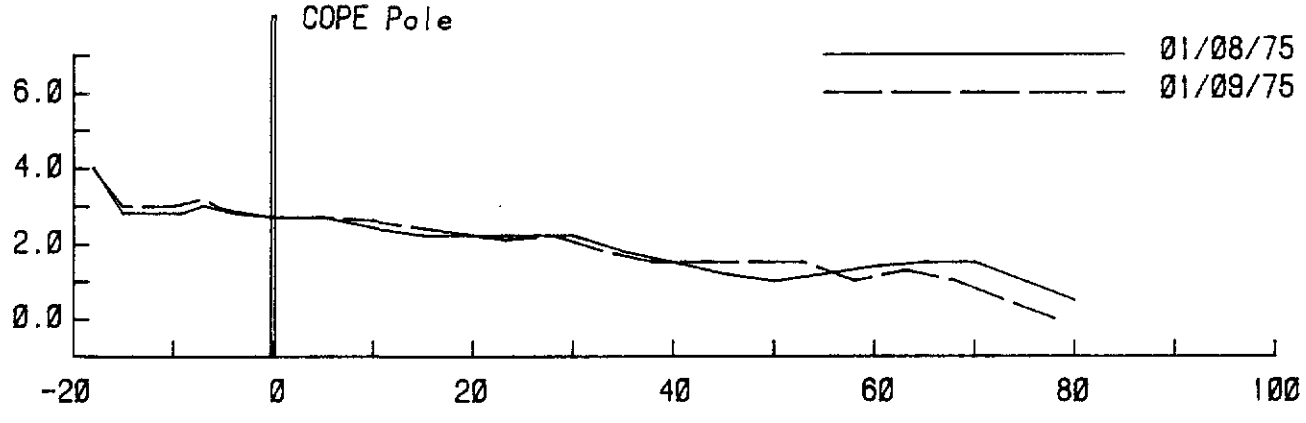
No. of Observations : 279

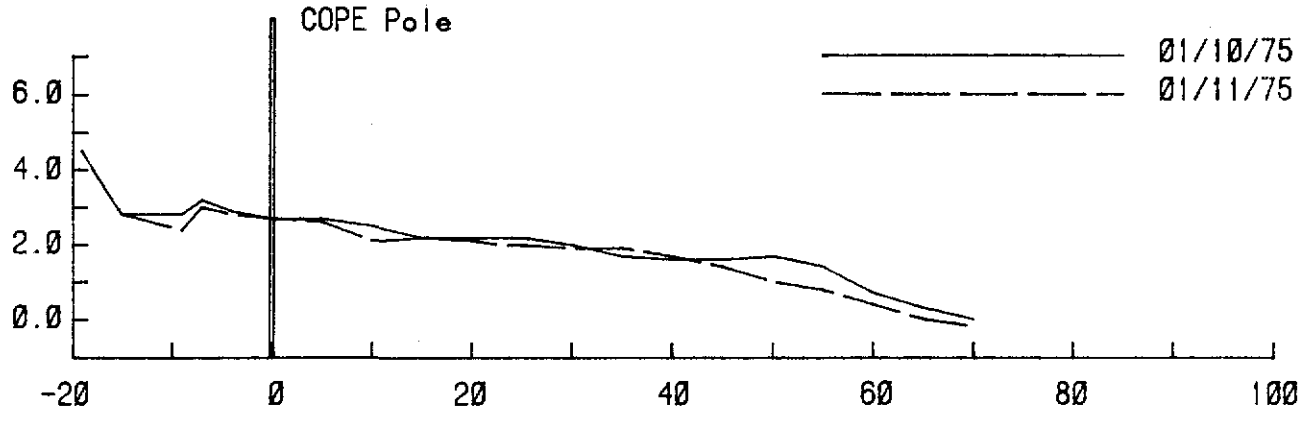
BEACH PROFILE PARAMETERS - 1983

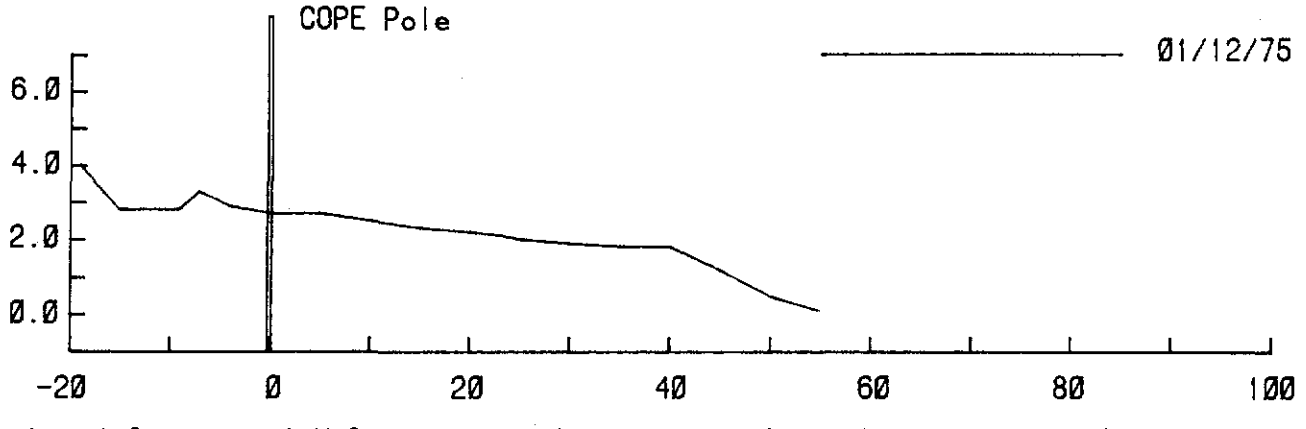
COPE
Surfers Paradise

Figure 60
C 10.1









Level Datum is A.H.D.

Distances and Levels are measured in Metres

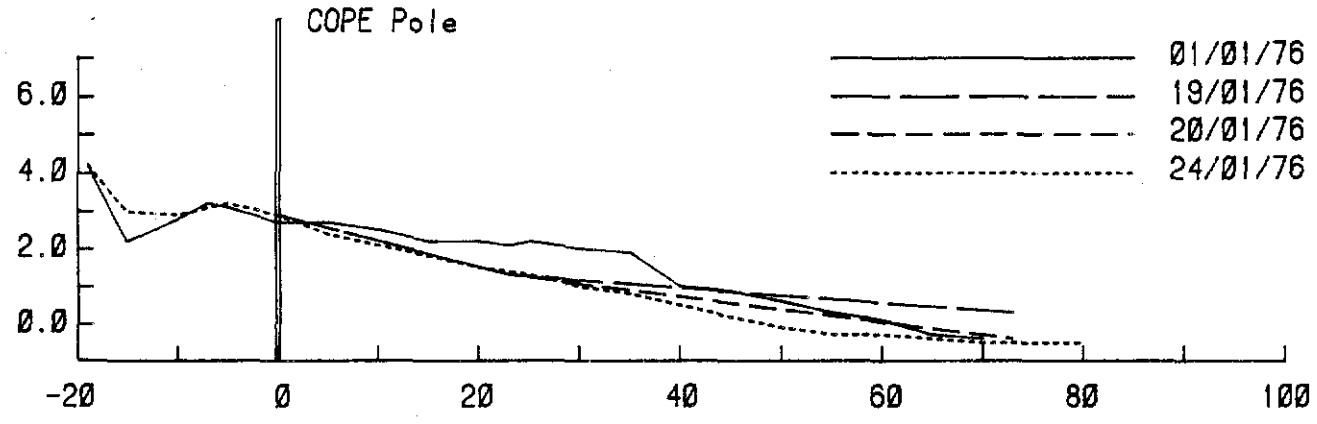
Beach Protection Authority

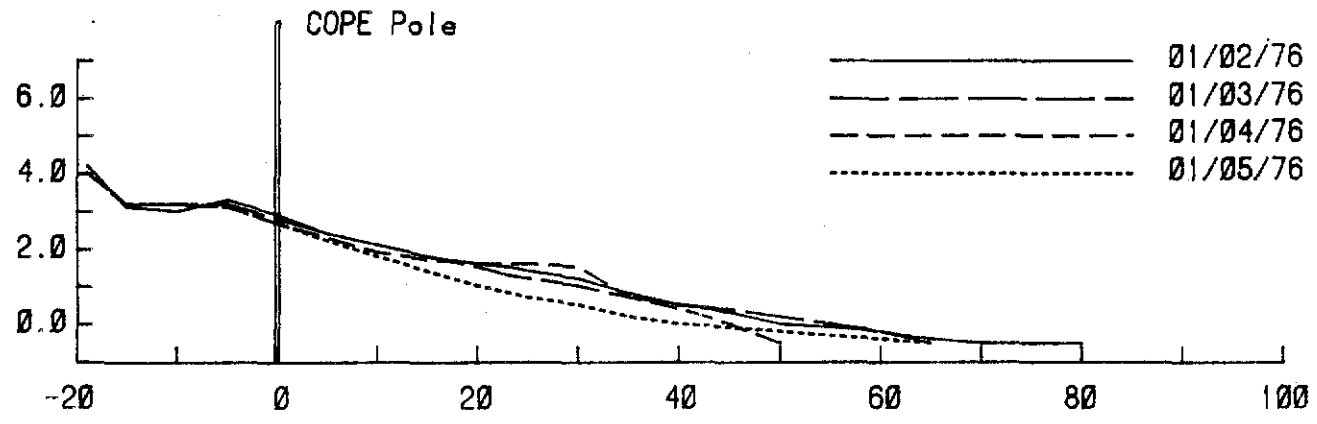
MONTHLY BEACH PROFILES

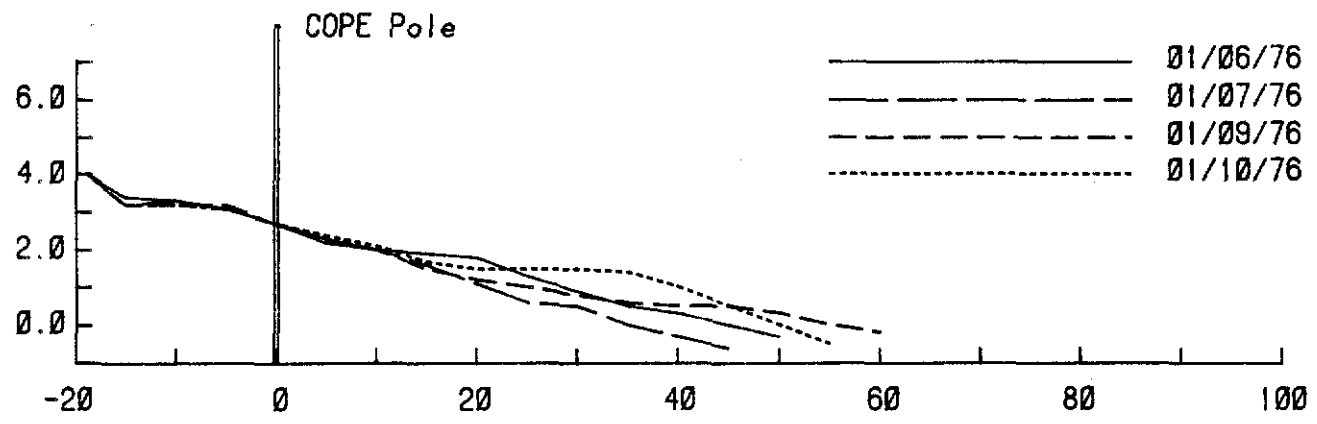
1975

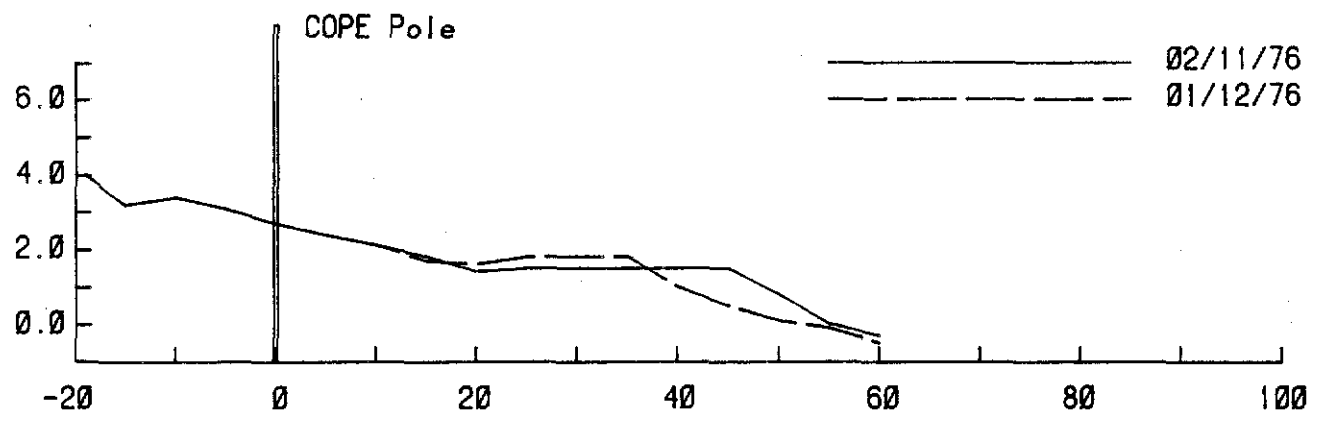
COPE
Surfers Paradise

Figure 61
C 10.1









Level Datum is A.H.D. Distances and Levels are measured in Metres

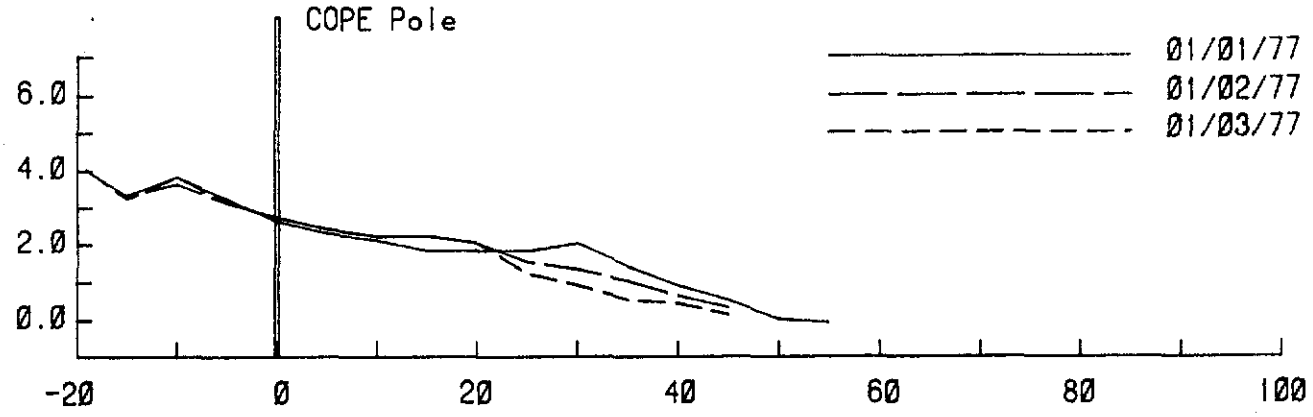
Beach Protection Authority

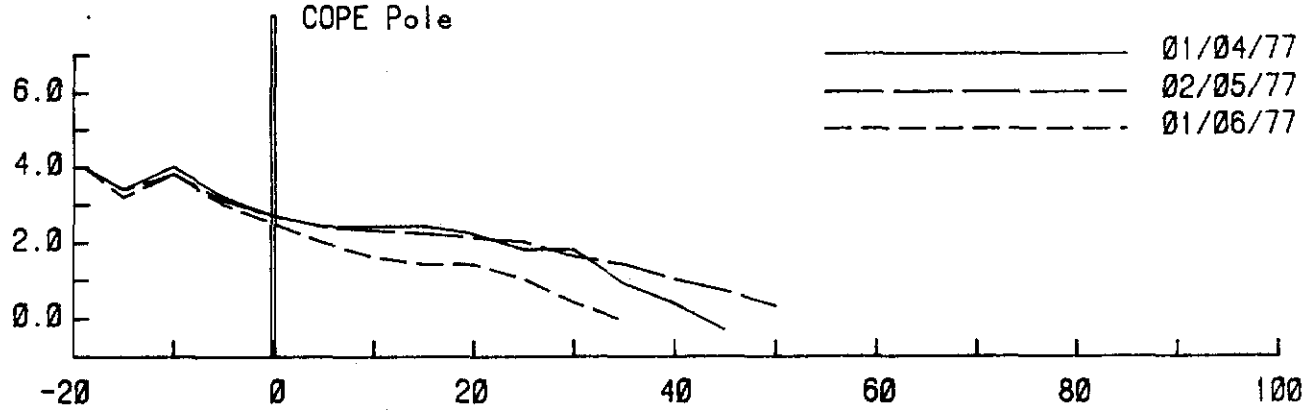
MONTHLY BEACH PROFILES

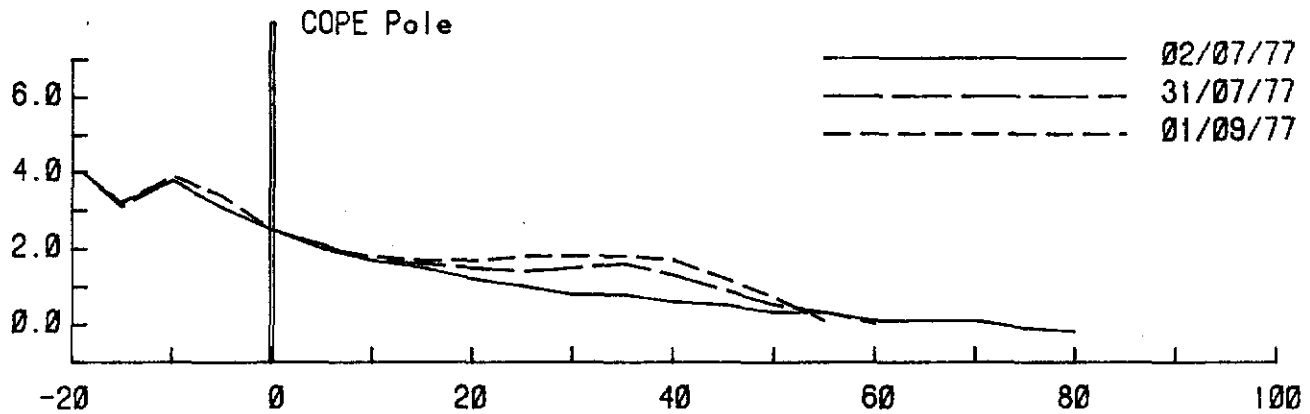
1976

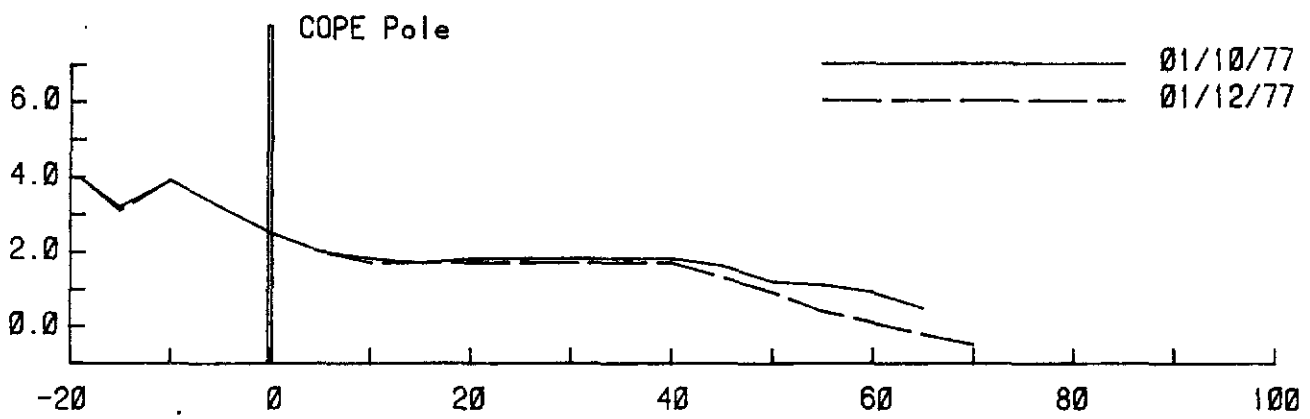
COPE
Surfers Paradise

Figure 62
C 10.1









Level Datum is A.H.D.

Distances and Levels are measured in Metres

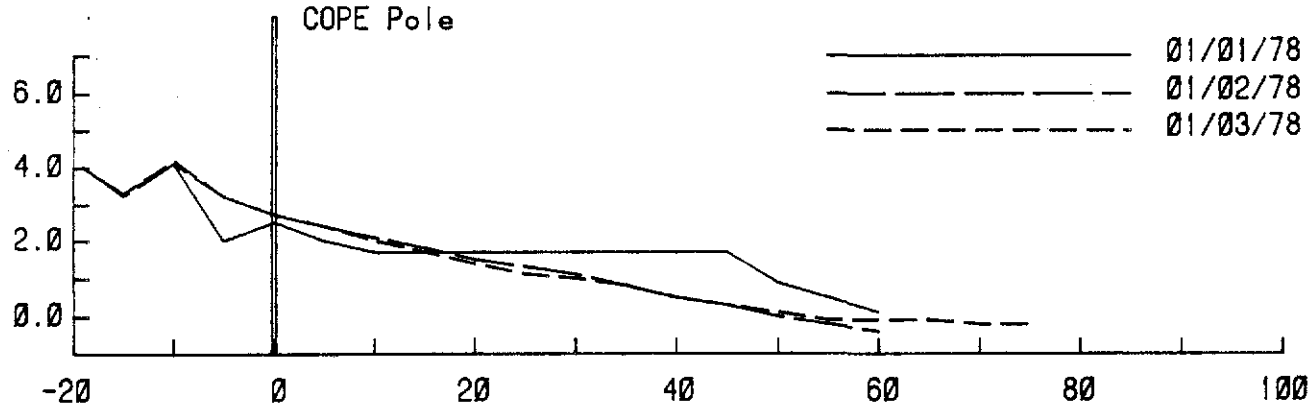
Beach Protection Authority

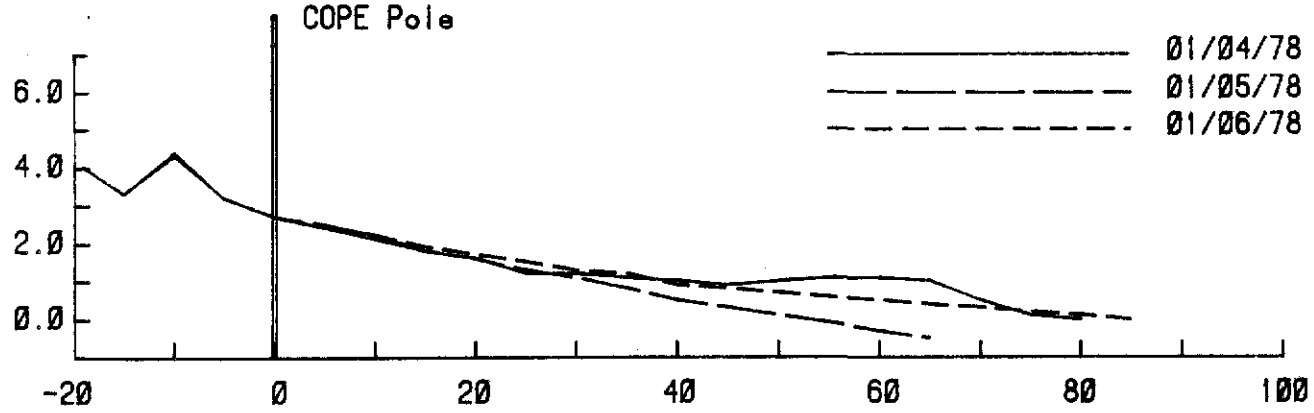
COPE
Surfers Paradise

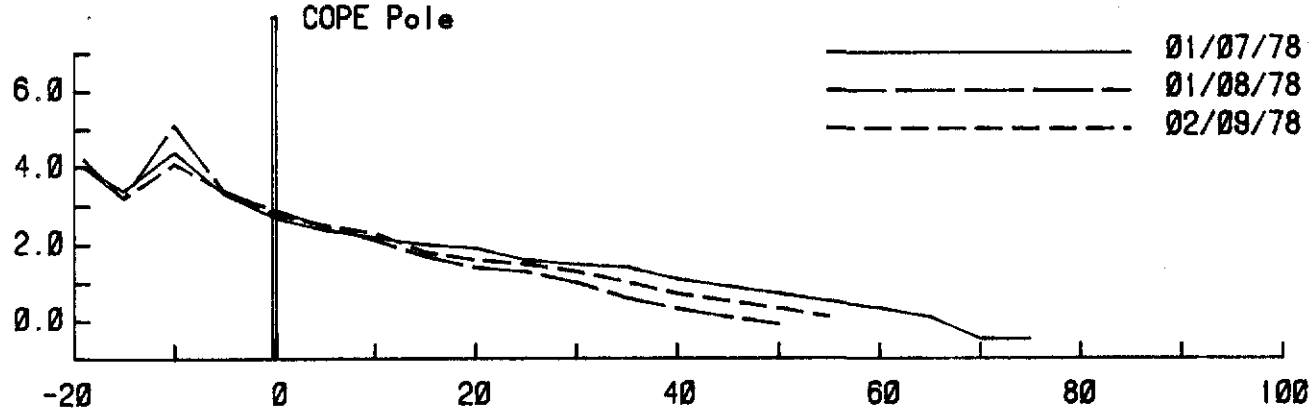
MONTHLY BEACH PROFILES

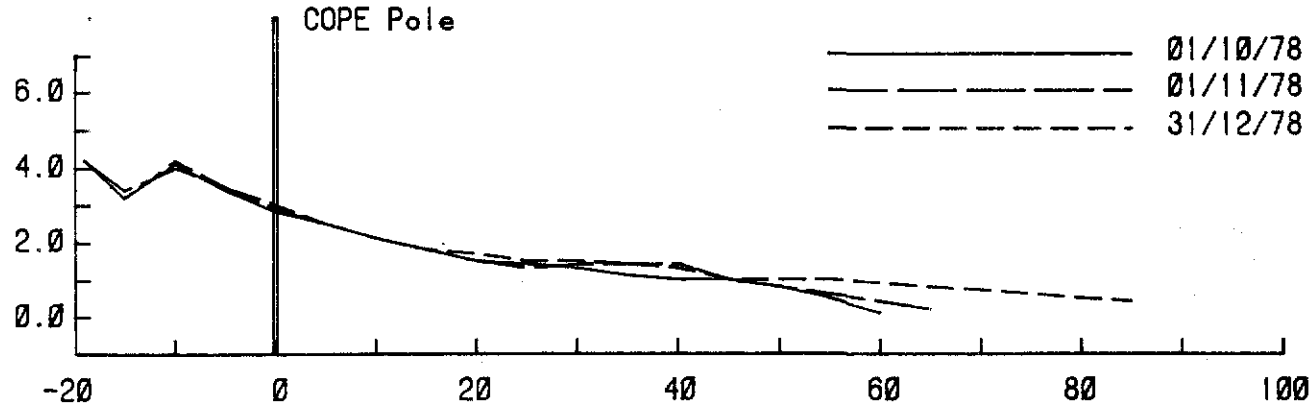
1977

Figure 63
C 10.1









Level Datum is A.H.D. Distances and Levels are measured in Metres

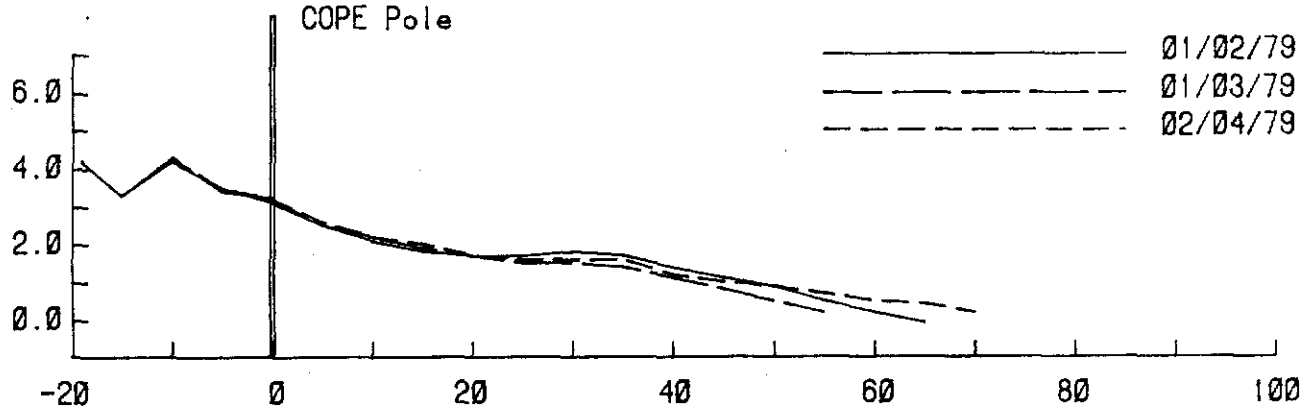
Beach Protection Authority

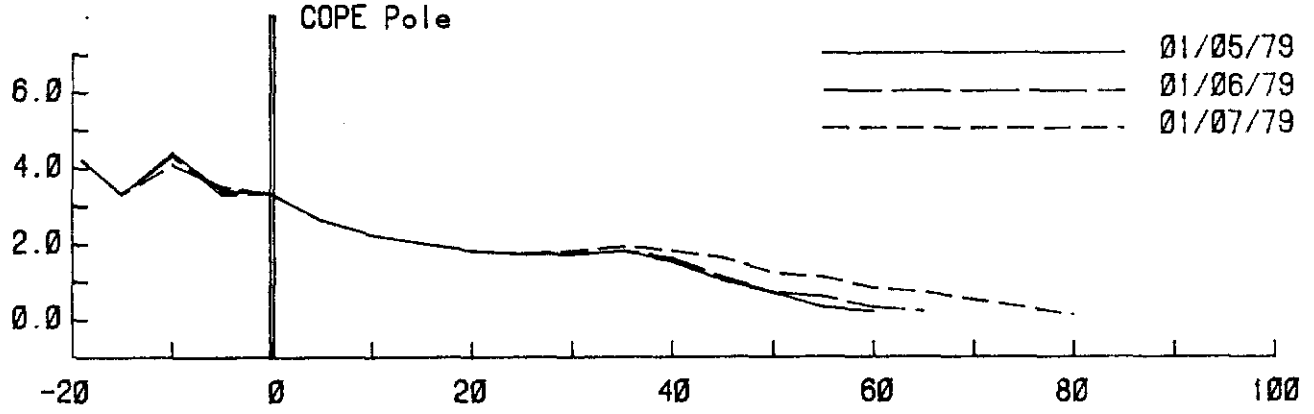
MONTHLY BEACH PROFILES

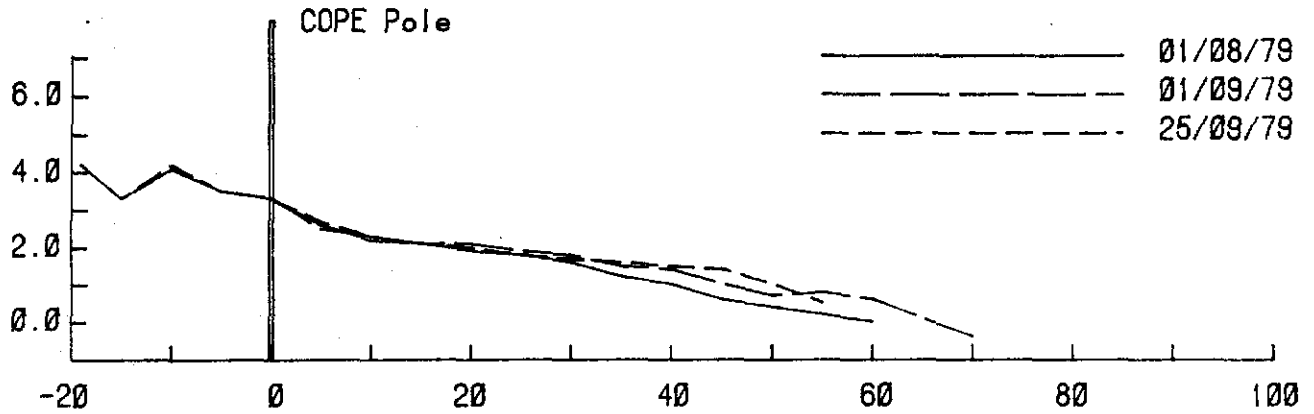
1978

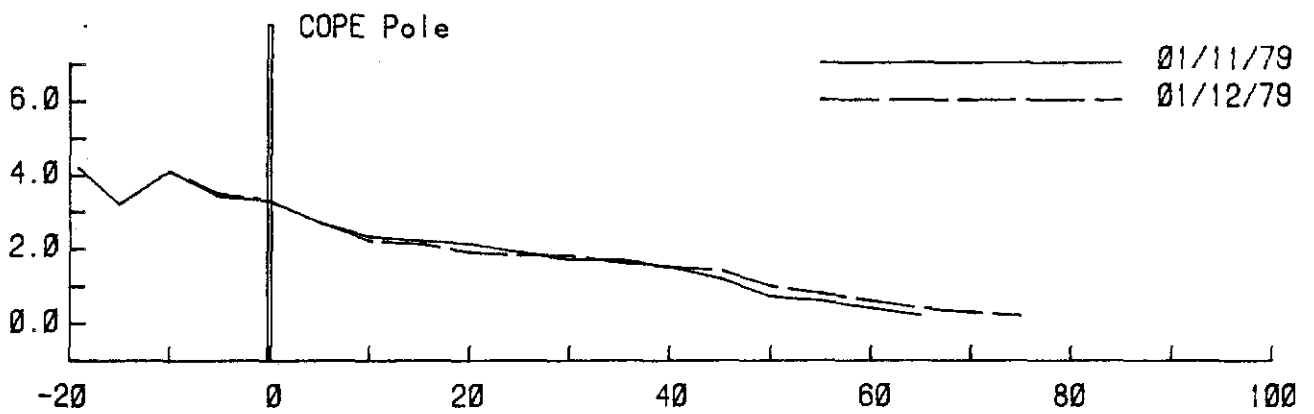
COPE
Surfers Paradise

Figure 64
C 10.1









Level Datum is A.H.D. Distances and Levels are measured in Metres

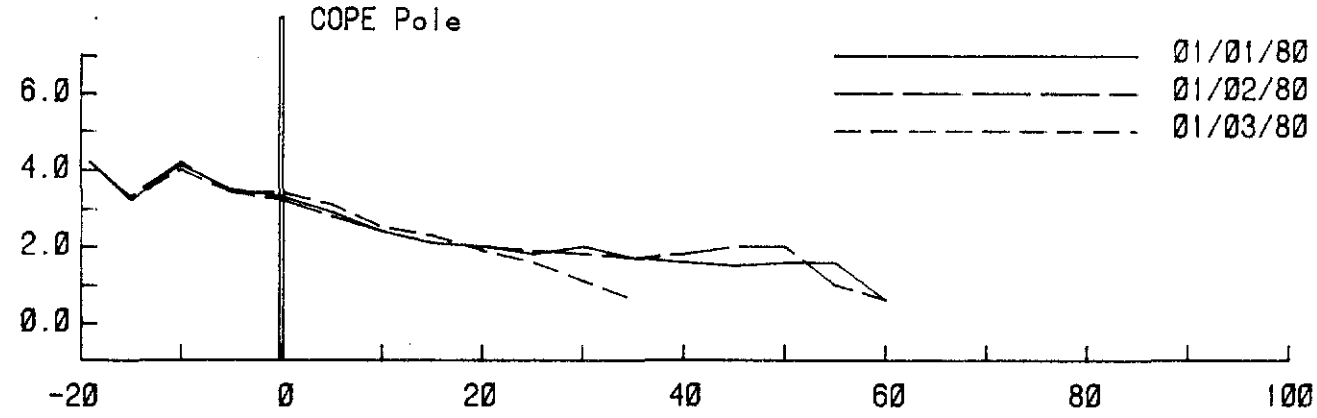
Beach Protection Authority

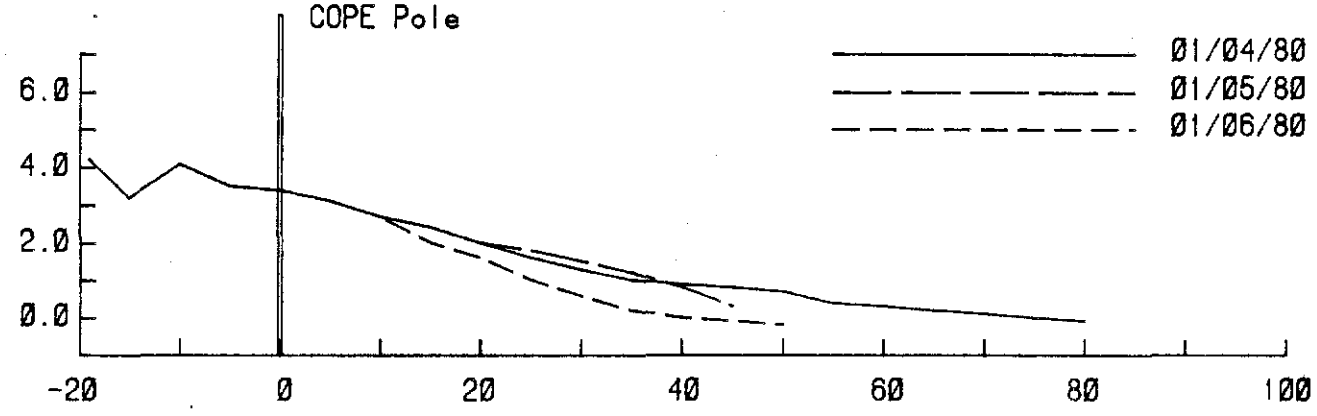
COPE
Surfers Paradise

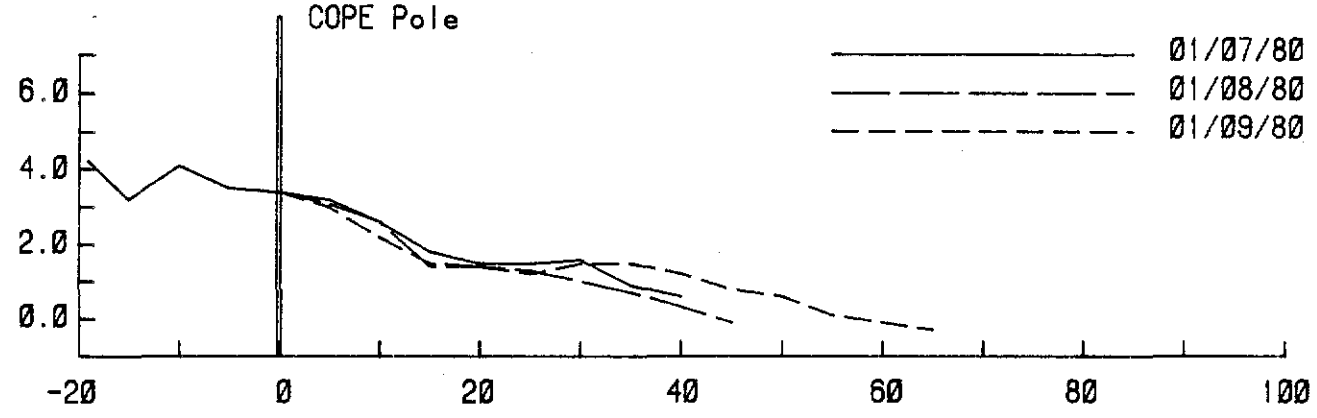
MONTHLY BEACH PROFILES

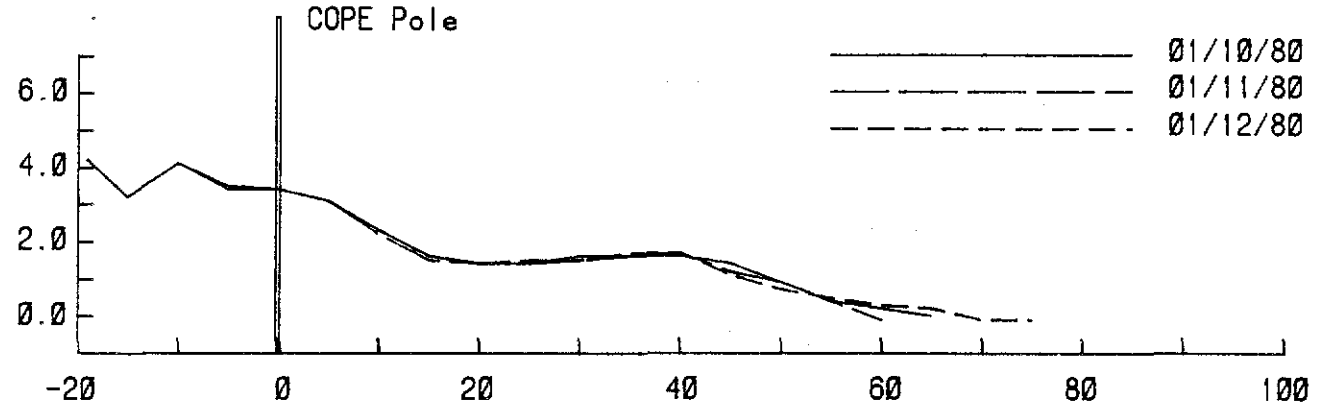
1979

Figure 65
C 10.1









Level Datum is A.H.D. Distances and Levels are measured in Metres

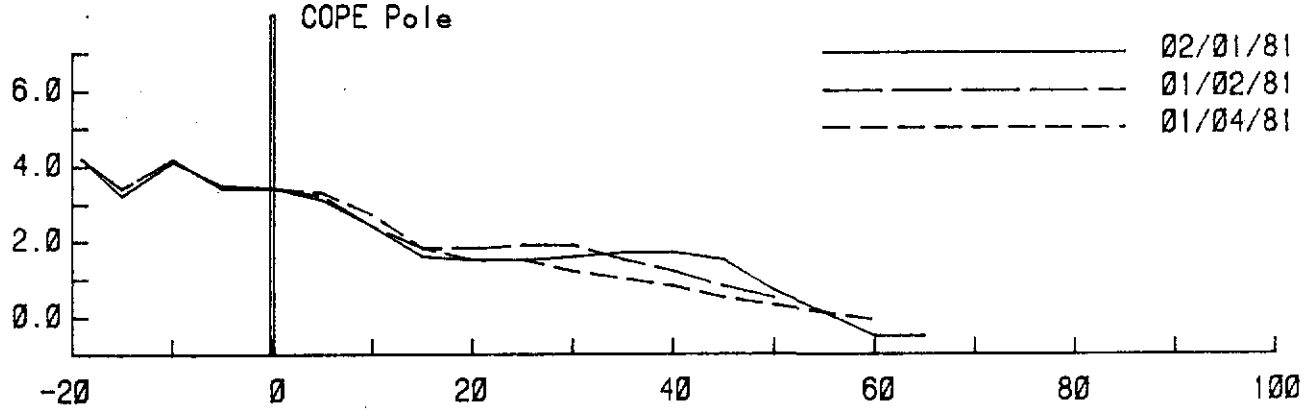
Beach Protection Authority

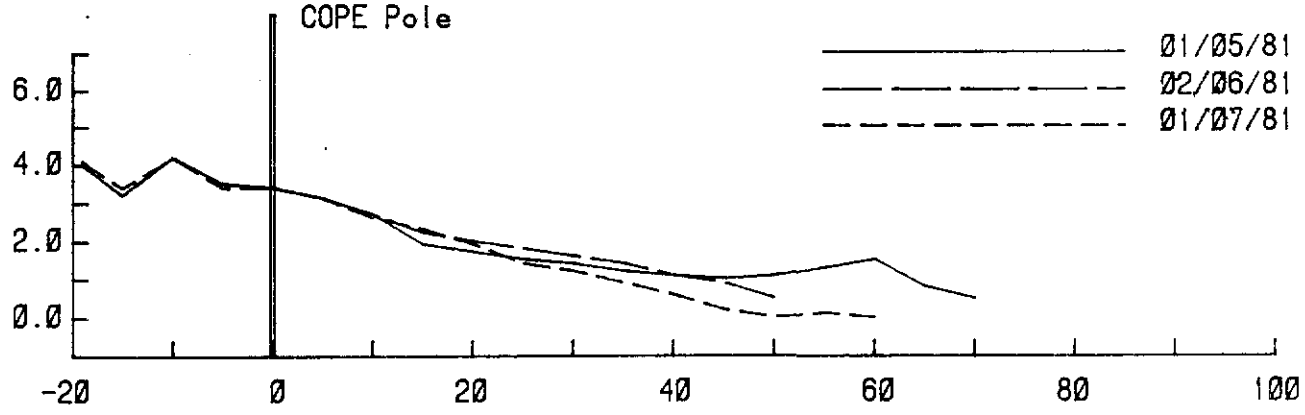
MONTHLY BEACH PROFILES

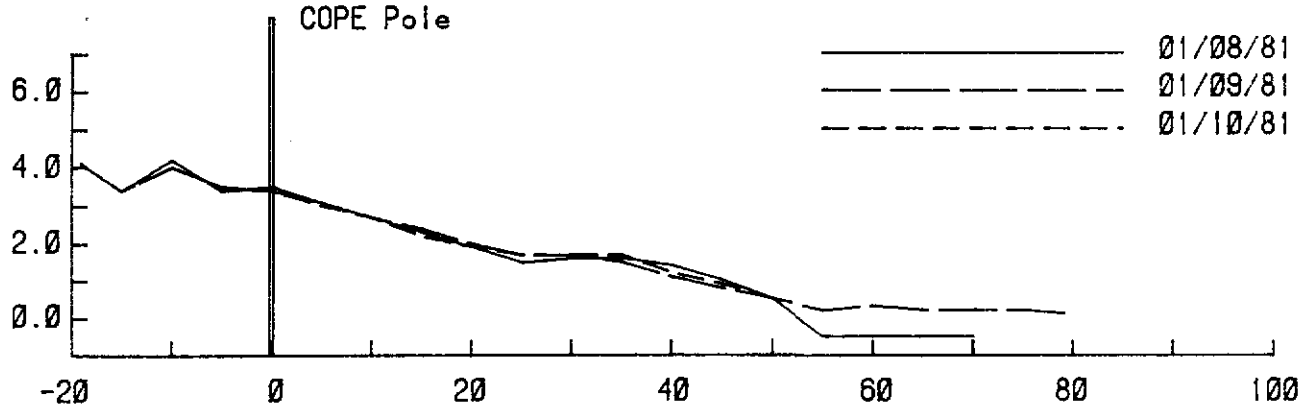
1980

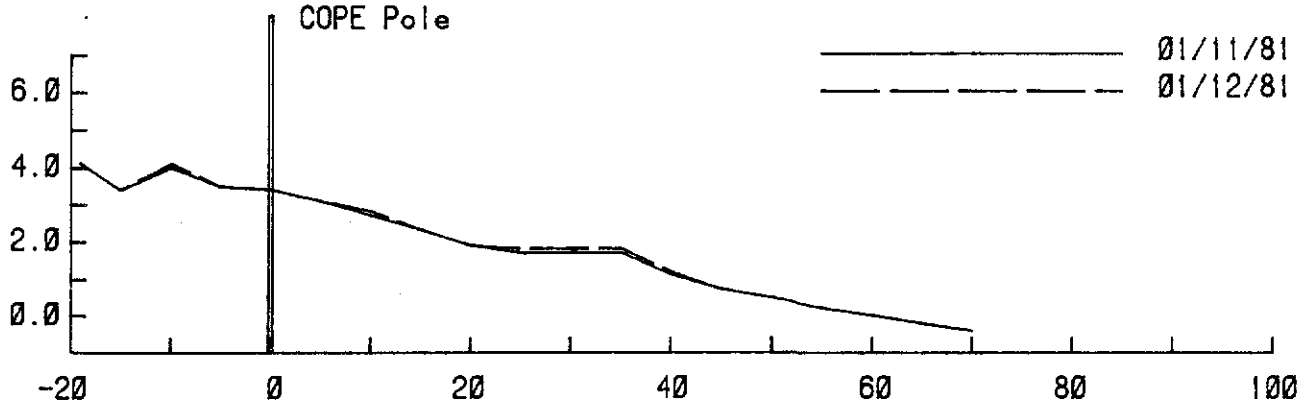
COPE
Surfers Paradise

Figure 66
C 10.1









Level Datum is A.H.D.

Distances and Levels are measured in Metres

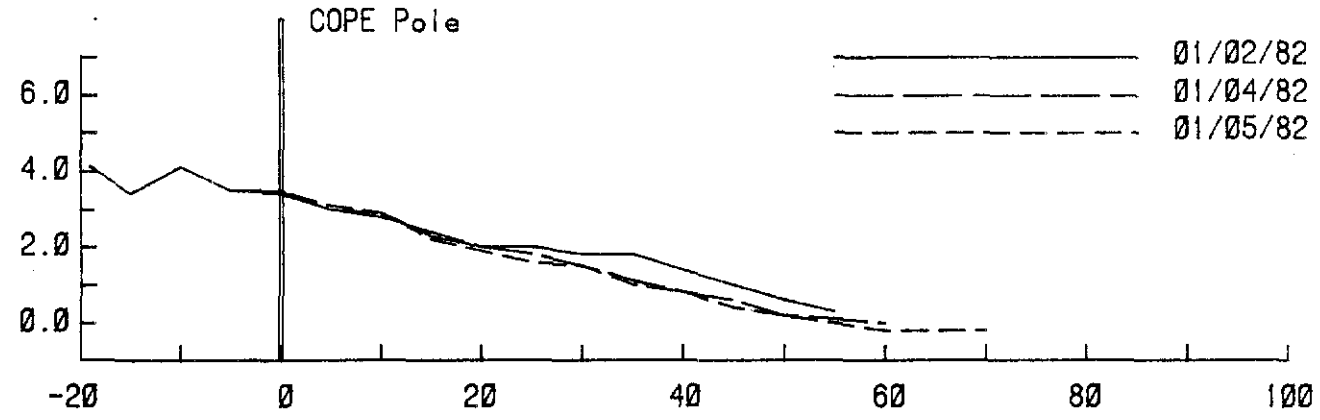
Beach Protection Authority

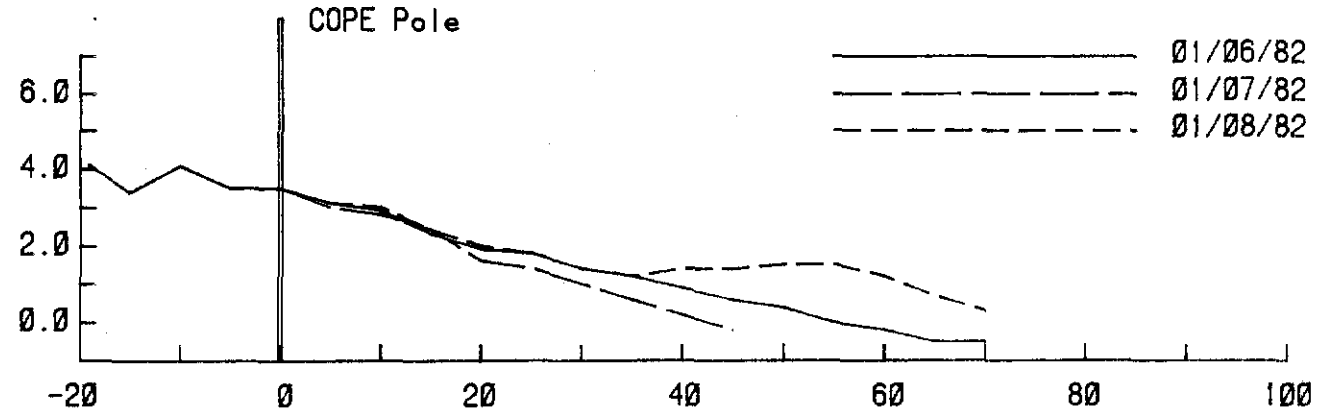
COPE
Surfers Paradise

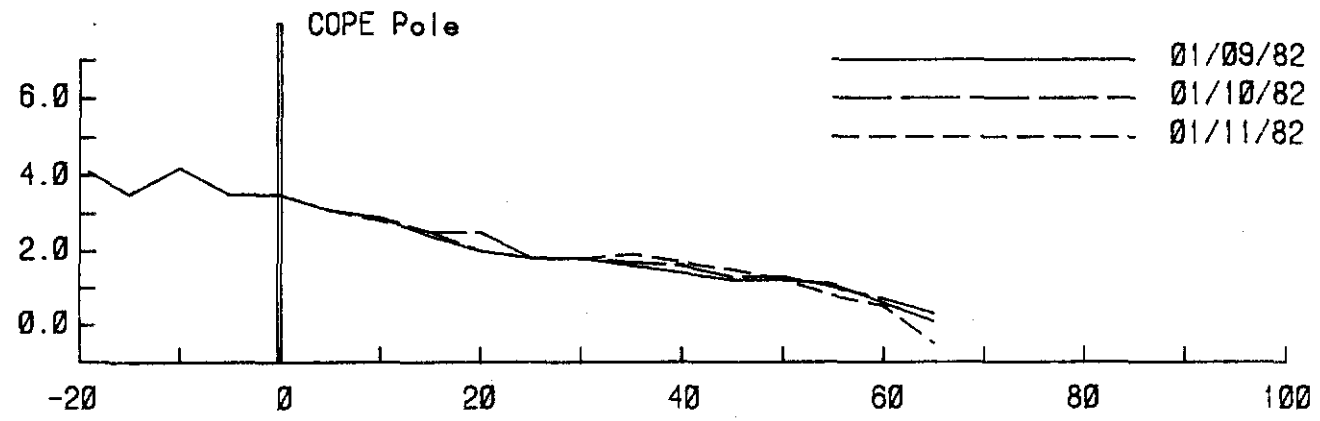
MONTHLY BEACH PROFILES

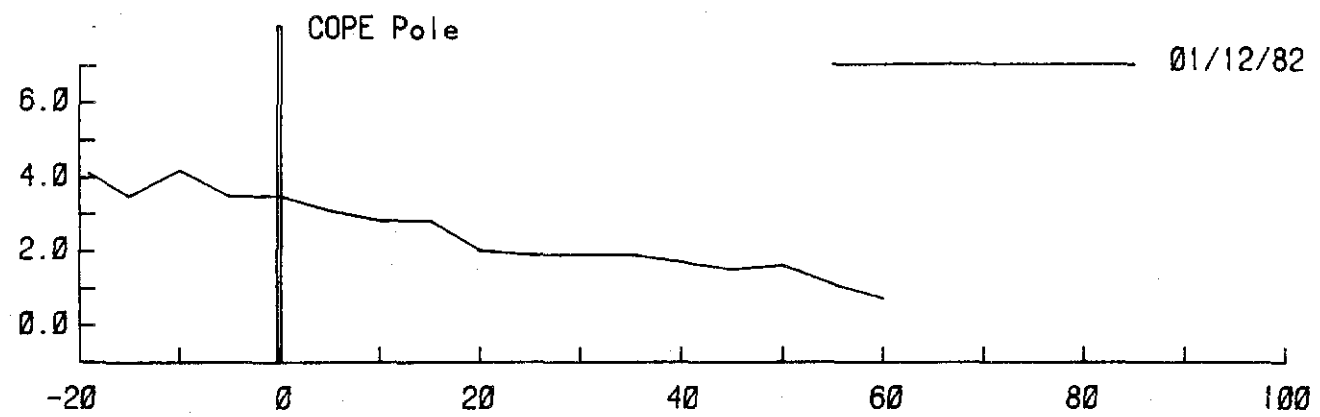
1981

Figure 67
C 10.1









Level Datum is A.H.D. Distances and Levels are measured in Metres

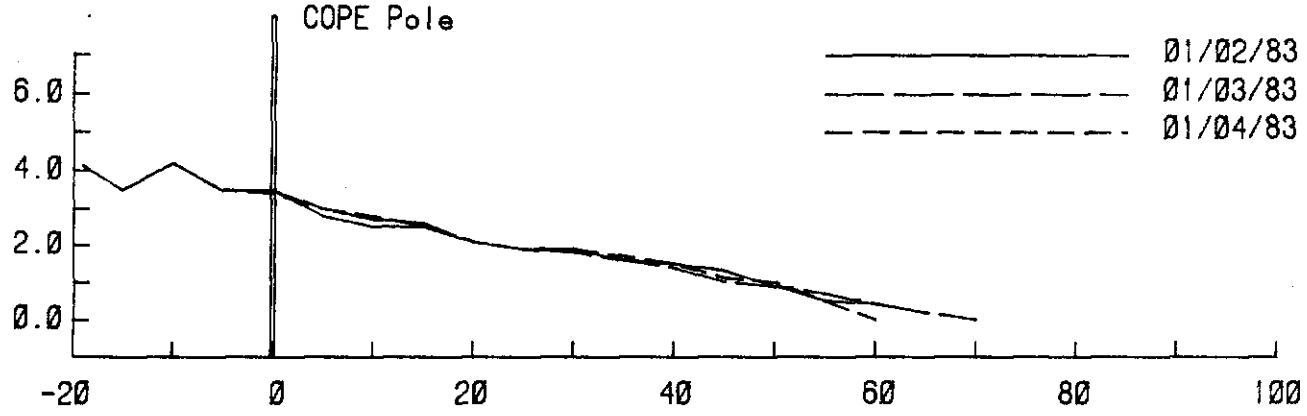
Beach Protection Authority

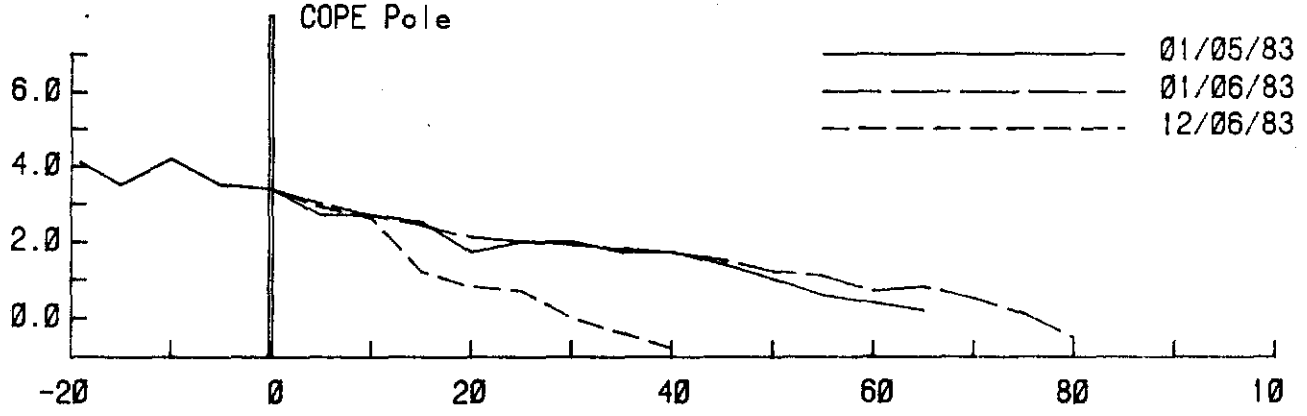
COPE
Surfers Paradise

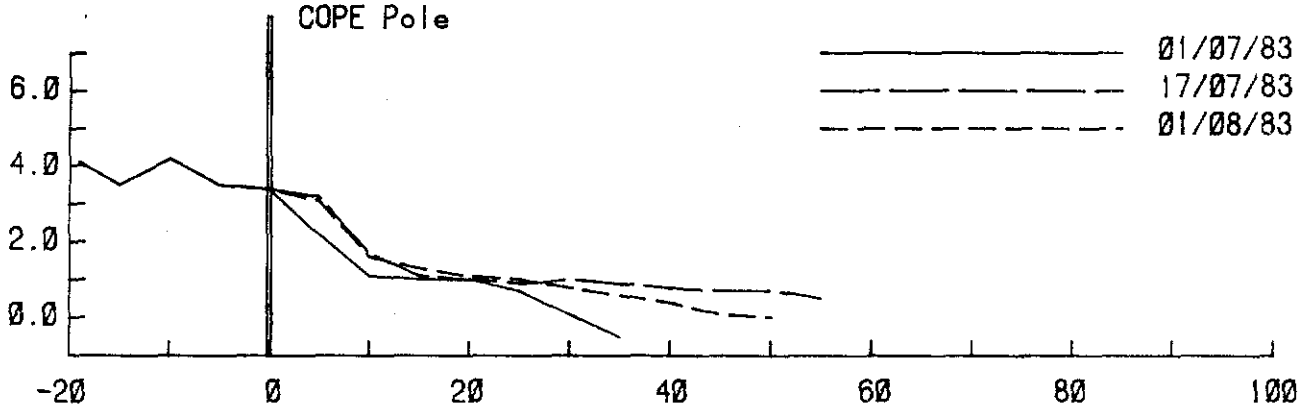
MONTHLY BEACH PROFILES

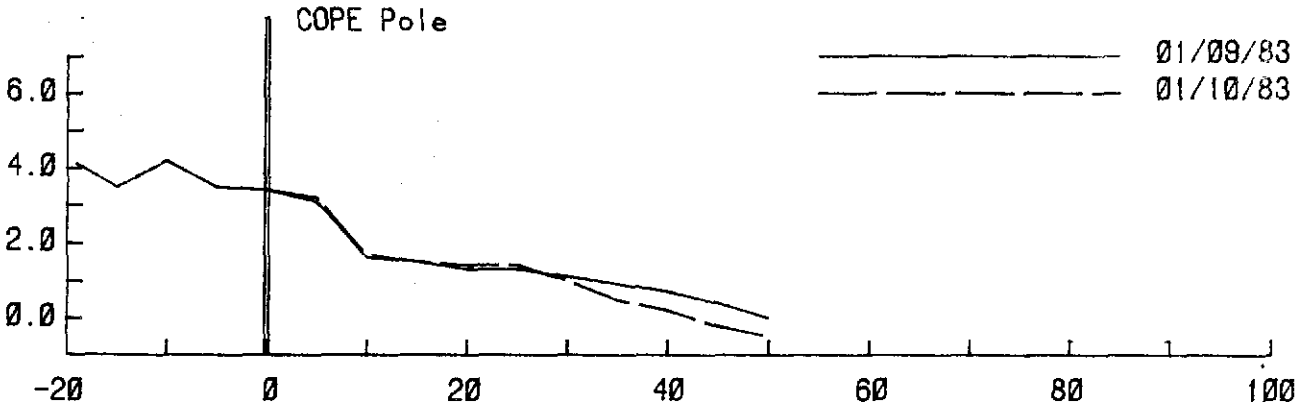
1982

Figure 68
C 10.1









Level Datum is A.H.D. Distances and Levels are measured in Metres

Beach Protection Authority

COPE
Surfers Paradise

MONTHLY BEACH PROFILES

1983

Figure 69
C 10.1