



**Beach Protection
Authority
Queensland**

WAVE DATA RECORDING PROGRAMME

HAY POINT REGION

**Department of
Environment and Heritage**

WAVE DATA RECORDING PROGRAMME

HAY POINT REGION

REPORT NO. W13.1

Beach Protection Authority

December 1990

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DOCUMENTATION PAGE

REPORT NO.:- W13.1

TITLE:- Report - Wave Data Recording Programme
- Hay Point Region

DATE:- December 1990

TYPE OF REPORT:- Technical Memorandum

PREPARED BY:- Division of Coastal Protection of the Department of Environment
and Heritage on behalf of the Beach Protection Authority

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DISTRIBUTION:- Public Distribution

ABSTRACT:-

This report provides summaries of primary analysis of wave data recorded in 14 metres of water offshore from Hay Point in Central Queensland. Data was recorded using Datawell "Waverider" buoy, and covers the period 22 March 1977 to 25 May 1987. The data was divided into seasonal groupings for analysis and no estimations of wave directional data have been provided.

Installation of the Hay Point "Waverider" buoy and recording station was at the request of the Harbours Corporation of Queensland for use as part of the contract supervision during the construction of the Hay Point Tug Harbour.

OTHERS AVAILABLE IN THIS SERIES:-

Wave Data Recording Programme, Cairns Region (Report No. W01.1)
Wave Data Recording Programme, Cairns Region (Report No. W01.2)
Wave Data Recording Programme, Mackay Region (Report No. W02.1)
Wave Data Recording Programme, Mackay Region (Report No. W02.2)
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WAVE DATA RECORDING PROGRAMME

HAY POINT REGION

REPORT NO. W13.1

1.0 INTRODUCTION

The Harbours Corporation of Queensland as part of the contract supervision for construction of the breakwater for the Hay Point Tug Harbour commissioned the Beach Protection Authority to record and analyse wave data offshore from Hay Point. Data was collected between 22 March 1977 and 25 May 1987 at which time the station was closed.

This report summarises the primary analysis of wave data collected in the Hay Point region. In addition, brief details of the recording equipment, the method of handling raw data and the type of analysis employed are provided.

2.0 RECORDING EQUIPMENT

All wave recording installations operated by the Authority employ the "Waverider" system developed by Datawell b.v. of the Netherlands.

This installation comprised a Waverider 6000 series buoy transmitting to a shore based WAREP Mark II receiver which in turn was coupled to an ANMA analogue recording unit.

This system utilised a buoy mounted accelerometer to follow the water surface movements and transmitted a frequency modulated analogue signal of these water level movements to a shore based receiver (WAREP). The WAREP receiver provided a paper chart of the recording and relayed the analogue signal to the ANMA analogue recorder.

3.0 WAVE RECORDING AND ANALYSIS PROCEDURES

In general, between 22 March 1977 and 24 November 1981, 2 recordings of water levels each of 20 minutes duration were made each day with the timing of the recordings set at 0300 hours and 1500 hours respectively.

During cyclonic events or other period of severe wave action, the recording frequency can be increased to 4 times daily.

From 25 November 1981 to 25 May 1987, there were 4 recordings per day each of 20 minutes duration at 0300 hours, 0900 hours, 1500 hours and 2100 hours.

Digitization of the analogue data tapes was carried out at the Brisbane office and the digital records held on 9 track digital tapes. In this process, the analogue tapes produced in the field were sampled electronically at half second intervals and this information together with necessary administration information was transferred to the digital tape by a digitizer which was specifically developed for this purpose.

Routine and spectral analysis of digital wave data was performed to obtain the following parameters:

- | | |
|--|--|
| 1. Energy Density Spectrum | A representation of the distribution of wave energy over the component wave frequencies. |
| 2. Significant Wave Height (Hsig) | The average of the highest one third of waves in the record. |
| 3. Root Mean Square Wave Height (Hrms) | The root mean square of the wave heights from the record. |
| 4. Maximum Wave Height (Hmax) | The highest individual wave in the record (zero upward crossing). |
| 5. Peak Energy Period (Tp) | The wave period corresponding to the peak of the energy density spectrum. |
| 6. Significant Period (Tsig) | The average period of the highest one third of waves in the record. |
| 7. Zero Crossing Period (Tz) | The average period of all waves in the record based on upward zero crossings. |
| 8. Crest Period (Tc) | The average period of all the waves in the record based on successive crests. |

These parameters are the basis for the summary plots and tables attached to this report.

4.0 DATA LOSSES

Data losses can be divided into three categories - losses due to recording equipment failure, losses during routine processing and losses as a result of spurious data produced by twisted accelerometer cables within the Waverider buoy.

Losses in the first two categories are usually non-recoverable. Data produced when accelerometer cables are twisted, however, are generally recoverable. The twisting of the cables causes a low frequency component to be added to the analogue wave data at the recording stage. When analysis is carried out, the component is easily detected and may be eliminated during data editing following the completion of routine processing and spectral analysis of data.

Details of data losses in the Hay Point Region are included in Summary Sheet 1, "Details of Wave Recorder Installation".

5.0 WAVE CLIMATE

5.1 General

The wave climate presented in this report is based on statistical analyses of the parameters obtained from the recorded wave data.

Programs developed by the Authority provide statistical information on percentage of time occurrence and exceedance for wave heights and periods. The results of these analyses are presented in Table 1, 2 and 3 and Figures 2, 3 and 4. In addition, similar analyses are carried out on the relationships between the various wave parameters and these are presented in Figure 5.

5.2 Wave Persistence

Wave height persistence is the duration for which any given wave height is exceeded in any single event. Persistence information has been calculated from the recorded data by linearly interpolating the times of exceedance of various wave heights. Wave height persistence data is presented in Figure 6.

5.3 Return Intervals

The percentage of time of exceedance data for various wave heights (Figure 2) is combined with the persistence data (Figure 6) to determine the average wave height recurrence intervals.

The technique used to calculate the return intervals presented in Figure 8 is given below:-

$$\begin{aligned} \text{No. of hours per year of exceedance of a} \\ \text{given wave height} \end{aligned} \quad H = \frac{P_e \times 8760 \text{ hrs}}{100} \\ = 87.6 P_e \text{ hrs}$$

where P_e is the percentage of time of exceedance from Figure 2.

$$\begin{aligned} \text{Average No. of events per year in which H} \\ \text{is exceeded} \end{aligned} \quad = \frac{87.6 P_e}{P}$$

where P is the average persistence (hours) of events of exceedance of the given wave height (H).

However, of this number of events, a certain percentage P_n will persist for at least the specified duration.

$$\begin{aligned} \text{i.e. No. of events per year in which H is} \\ \text{exceeded for at least the specified duration} \end{aligned} \quad = \frac{87.6 P_e \times P_n}{P \times 100} \\ = \frac{0.876 P_e \times P_n}{P}$$

where P_n may be determined from Figure 6.

By inverting this, the average return interval of the occurrence of an event in which H is exceeded for the given duration is given by -

$$\begin{aligned} \text{Return Interval} \end{aligned} \quad = \frac{1}{\text{Ave. No. of occurrences} \\ \text{per year}} \\ = \frac{P}{0.876 P_e \times P_n}$$

It should be noted that the data presented in Figure 8 are for the average wave height recurrence interval and include all exceedance events of the given wave height without regard to duration of the event. In these calculations, Pn was taken as 100 percent.

6.0 DATA PRESENTATION

No attempt has been made to interpret the recorded data for design purposes or to apply corrections for refraction, diffraction and shoaling to obtain equivalent deep water waves. Before any use is made of this data, it is therefore necessary to note the exact location of the buoy and the water depth in which the buoy was moored. This data is shown on Summary Sheet 1, "Details of the Wave Recorder Installation". The data herein presented does not include any information on wave directions. The "Waverider" recording system which is utilised by the Authority is designed to record vertical movements of the water surface only and any wave directions must be assigned to the individual wave records by other means.

Wherever major meteorological events such as cyclones have occurred during the recording period, these were noted and are summarised together with the maximum wave height recorded and any other relevant comments in Summary Sheet 2, "Major Meteorological Events".

In addition to the above Summary Sheets, the following tables and figures are presented to complete this report.

- | | |
|-----------|--|
| Table 1: | Wave Statistics; Wave Period (T_p)/Wave Height (H_{sig}) Occurrences, All Data, All Directions. |
| Table 2: | Wave Statistics; Wave Period (T_p)/Wave Height (H_{sig}) Occurrences, Summer Data, All Directions. |
| Table 3: | Wave Statistics; Wave Period (T_p)/Wave Height (H_{sig}) Occurrences, Winter Data, All Directions. |
| Figure 1: | Locality Map. |
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| Figure 5: | Wave Parameter Relationships. |
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| Figure 8: | Wave Height (H_{sig}) Recurrence Intervals. |

The above tables refer to data recorded in Summer and Winter. For the purposes of analysis, Summer has been taken as the period from 1 November to 30 April in the following year. Winter covers the period 1 May to 31 October in any one year.

SUMMARY SHEET 1

DETAILS OF WAVE RECORDER INSTALLATION

Region:- Hay Point Region

Buoy Location:-

Co-ordinates:- 149° 22'50" East 21° 18'50" South.

Description:- 8.5km East South East of Highwater Islet (see Figure 1).

Water Depth at Buoy:- 14 metres relative to Australian Height Datum.

Location of Recording Station:- Harbour Master's Residence, Hay Point.

Period of Data Collection:- 22 March 1977 to 25 May 1987.

Normal Recording Interval:-

Two twenty minute records daily at 0300 hours and 1500 hours EST between 23 March 1977 to 24 November 1981.

Four twenty minute records daily at 0300 hours, 0900 hours, 1500 hours and 2100 hours EST between 25 November 1981 to 25 May 1987.

Total No. of Records Analysed:- 10,024

Number of Records Lost Due to:-

Rejected Records During Analysis	35
Field Equipment Failure	940
Damaged Accelerometer Cables	16

SUMMARY SHEET 2

MAJOR METEOROLOGICAL EVENTS

Meteorological Event	*Central Pressure (mb)	Date	*Estimated Position of Cyclone Relative to Buoy (km)	Maximum Hsig Recorded (metres)	Maximum Hmax Recorded (metres)	Tp (secs)
High Pressure System over Great Australian Bight	1032	10/4/77		1.77	2.82	5.69
Low Pressure System over Mackay, Central Queensland	1000	1/2/78		2.59	4.52	6.57
High Pressure System over Tasman Sea	1028	10/10/78		1.98	4.21	6.00
Cyclone Gordon	1000	12/1/79	150 N	2.23	3.99	6.60
High Pressure System over Tasman Sea	1023	29/1/79		1.76	2.75	6.15
High Pressure System over Tasman Sea and Low Pressure System over Coral Sea	1026 and 1002	6/2/79		2.26	3.93	6.37
Cyclone Kerry	965	23/2/79	700 NE	1.94	3.99	6.23
Cyclone Kerry	995	5/3/79	80 N	2.15	3.40	7.23
High Pressure System over Tasman Sea	1026	28/12/79		1.67	3.05	5.30
Cyclone Paul	996	7/1/80	20 SW	1.86	2.92	6.06
Cyclone Ruth	990	12/2/80	270 E	2.14	3.06	6.26

SUMMARY SHEET 2

MAJOR METEOROLOGICAL EVENTS

Meteorological Event	*Central Pressure (mb)	Date	*Estimated Position of Cyclone Relative to Buoy (km)	Maximum Hsig Recorded (metres)	Maximum Hmax Recorded (metres)	Tp (secs)
Cyclone Freda	990	27/2/81	300 NE	2.07	3.51	6.39
High Pressure System over New South Wales	1024	6/10/81		1.62	3.06	5.63
Cyclone Abigail	984	27/1/82	700 E	1.72	2.90	6.16
High Pressure System over New South Wales	1024	6/2/82		1.76	2.94	5.93
High Pressure System over Tasman Sea	1028	12/11/82		1.75	3.67	5.66
Cyclone Elinor	999	2/3/83	100 SE	1.99	3.21	9.96
High Pressure System over South Australia	1032	11/5/83		1.75	2.93	5.66
High Pressure System over Canberra	1028	26/9/83		1.69	2.85	5.95
Low Pressure System over Coral Sea and High Pressure System over Tasman Sea	1004 and 1020	2/2/84		1.95	3.12	6.22
High Pressure System over South Australia	1032	28/4/84		1.69	2.85	5.78

SUMMARY SHEET 2

MAJOR METEOROLOGICAL EVENTS

Meteorological Event	*Central Pressure (mb)	Date	*Estimated Position of Cyclone Relative to Buoy (km)	Maximum Hsig Recorded (metres)	Maximum Hmax Recorded (metres)	Tp (secs)
High Pressure System over Tasman Sea	1024	17/11/84		1.70	2.55	5.80
Cyclone Pierre	985	21/2/85	70 NE	1.92	3.51	5.91
Cyclone Vernon	993	23/1/86	300 N	1.65	2.48	5.69
Cyclone Winifred	965	1/2/86	400 NW	1.70	2.80	5.63
High Pressure System over Tasman Sea	1028	3/12/86		1.81	3.23	5.55
High Pressure System over Tasman Sea	1028	10/3/87		1.73	2.62	5.69
High Pressure System over Tasman Sea	1028	5/4/87		1.64	2.43	5.48
High Pressure System over New South Wales	1024	12/4/87		1.71	3.01	5.67
High Pressure System over Tasman Sea	1032	22/4/87		2.02	3.08	6.21
High Pressure System over Tasmania	1036	7/5/87		2.01	3.72	6.17

Highest Significant Wave Height (Hsig) recorded was 2.59m on 1 February 1978 due to a Low Pressure System over Mackay.

Highest Maximum Wave Height (Hmax) recorded was 4.52m on 1 February 1978 due to a Low Pressure System over Mackay.

Meteorological information obtained from the "Monthly Weather Review" published by Bureau of Meteorology.

* Central pressure and position of cyclone at time of maximum wave conditions.

Note: Only meteorological events which caused Hsig values in excess of 1.6m have been noted.

[PRZ-026]

TABLE 1
WAVE STATISTICS
WAVE PERIOD/WAVE HEIGHT OCCURRENCES
ALL DATA, ALL DIRECTIONS

Significant Wave Height (metres)	Peak Energy Wave Period (Seconds)								Totals
	0 - 2.99	3 - 4.99	5 - 6.99	7 - 8.99	9 - 10.99	11 - 12.99	13 - 14.99	> 14.99	
0.00 - 0.10	3.00	*	*	1.00	0.88	2.50	1.00	*	8.38
0.11 - 0.20	86.75	51.25	9.00	24.87	38.38	27.25	8.00	1.75	247.25
0.21 - 0.30	192.50	190.62	13.63	17.88	34.25	26.75	7.00	3.50	486.13
0.31 - 0.40	126.38	323.50	6.88	5.38	14.25	10.00	1.75	*	488.14
0.41 - 0.50	52.75	368.88	4.75	4.00	3.25	5.50	0.25	*	439.38
0.51 - 0.60	7.00	346.00	7.75	1.75	2.50	0.50	*	*	365.50
0.61 - 0.70	0.50	290.00	10.25	1.00	*	0.50	0.25	*	302.50
0.71 - 0.80	*	228.12	5.38	*	0.50	0.50	0.25	*	234.75
0.81 - 0.90	*	194.25	11.75	*	0.25	0.50	*	*	206.75
0.91 - 1.00	*	133.25	27.25	0.50	*	*	0.25	*	161.25
1.01 - 1.10	*	85.50	35.50	*	0.37	*	*	*	121.37
1.11 - 1.20	*	51.75	59.50	*	*	*	*	*	111.25
1.21 - 1.30	*	11.88	54.24	*	0.50	*	*	*	66.62
1.31 - 1.40	*	2.25	42.75	*	*	*	*	*	45.00
1.41 - 1.50	*	*	29.50	*	*	*	*	*	29.50
1.51 - 1.60	*	*	17.50	*	*	*	*	*	17.50
1.61 - 1.70	*	*	14.00	*	*	*	*	*	14.00
1.71 - 1.80	*	*	7.00	*	*	*	*	*	7.00
1.81 - 1.90	*	*	2.75	*	*	*	*	*	2.75
1.91 - 2.00	*	*	2.25	*	0.25	*	*	*	2.50
2.01 - 2.10	*	*	1.00	*	*	*	*	*	1.00
2.11 - 2.20	*	*	1.00	0.25	*	*	*	*	1.25
2.21 - 2.30	*	*	1.00	*	*	*	*	*	1.00
2.31 - 2.40	*	*	*	*	*	*	*	*	0.00
2.41 - 2.50	*	*	*	*	*	*	*	*	0.00
2.51 - 2.60	*	*	0.50	*	*	*	*	*	0.50
2.61 - 2.70	*	*	*	*	*	*	*	*	0.00
TOTALS	468.88	2277.25	365.13	56.63	95.38	74.00	18.75	5.25	3361.27

Values in the above table are durations in days and have been rounded to the second decimal place.

TABLE 2
WAVE STATISTICS
WAVE PERIOD/WAVE HEIGHT OCCURRENCES
SUMMER DATA, ALL DIRECTIONS

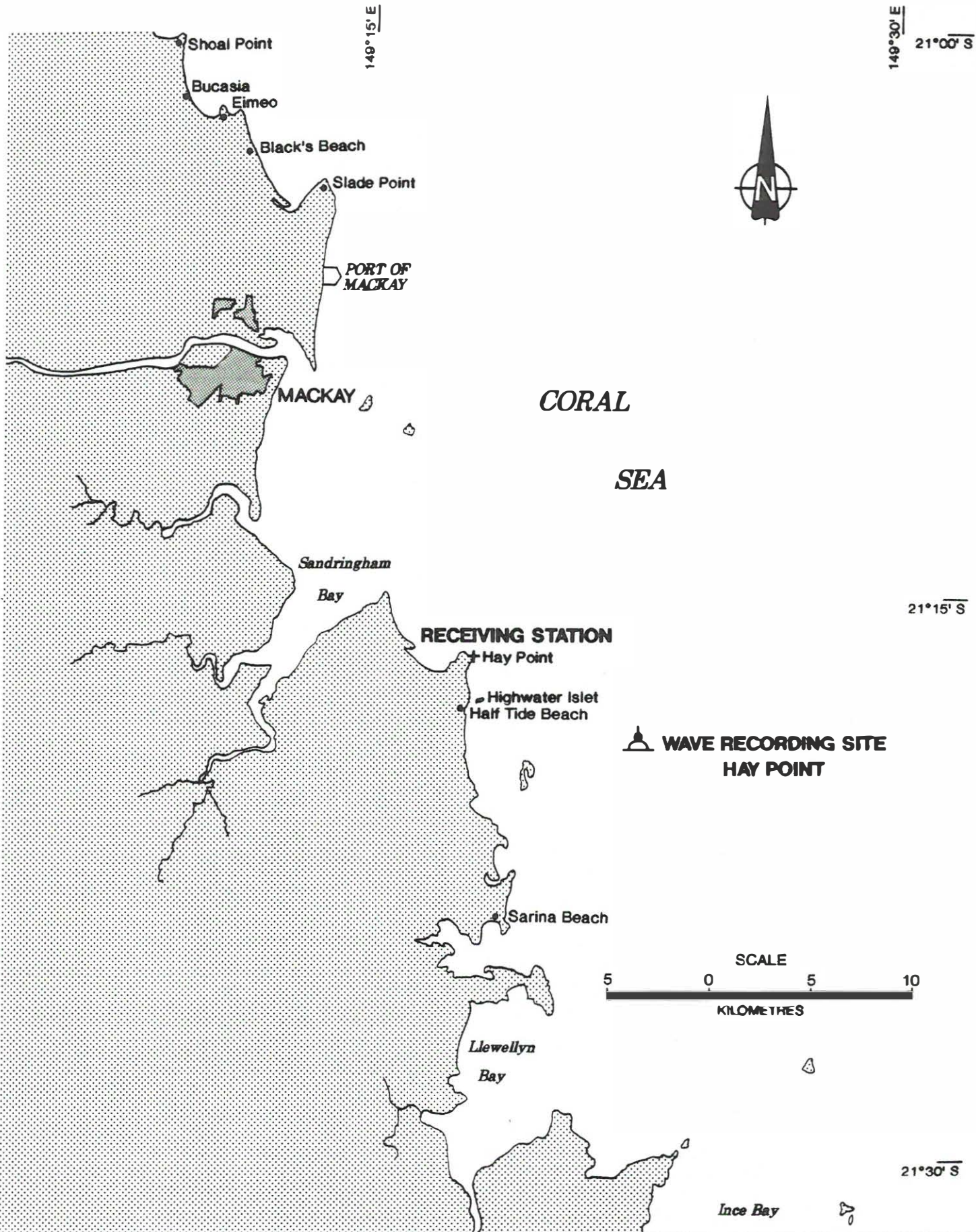
Significant Wave Height (metres)	Peak Energy Wave Period (Seconds)								Totals
	0 - 2.99	3 - 4.99	5 - 6.99	7 - 8.99	9 - 10.99	11 - 12.99	13 - 14.99	> 14.99	
0.00 - 0.10	0.50	*	*	*	*	*	*	*	0.50
0.11 - 0.20	21.63	15.25	1.50	7.00	9.75	5.25	3.50	0.50	64.38
0.21 - 0.30	86.50	90.50	3.13	10.63	16.25	6.50	1.50	*	215.01
0.31 - 0.40	65.38	151.88	3.63	3.13	6.25	3.75	0.50	*	234.52
0.41 - 0.50	20.00	175.63	1.50	2.75	1.75	4.00	*	*	205.63
0.51 - 0.60	1.75	167.88	3.00	1.75	1.50	0.50	*	*	176.38
0.61 - 0.70	*	148.25	4.50	0.25	*	0.50	*	*	153.50
0.71 - 0.80	*	122.00	1.75	*	0.50	0.50	*	*	124.75
0.81 - 0.90	*	117.88	4.75	*	0.25	0.50	*	*	123.38
0.91 - 1.00	*	84.75	11.50	0.50	*	*	*	*	96.75
1.01 - 1.10	*	54.00	20.75	*	0.38	*	*	*	75.13
1.11 - 1.20	*	31.25	36.13	*	*	*	*	*	67.38
1.21 - 1.30	*	7.00	39.50	*	0.50	*	*	*	47.00
1.31 - 1.40	*	1.25	30.00	*	*	*	*	*	31.25
1.41 - 1.50	*	*	20.00	*	*	*	*	*	20.00
1.51 - 1.60	*	*	14.00	*	*	*	*	*	14.00
1.61 - 1.70	*	*	11.00	*	*	*	*	*	11.00
1.71 - 1.80	*	*	6.50	*	*	*	*	*	6.50
1.81 - 1.90	*	*	2.50	*	*	*	*	*	2.50
1.91 - 2.00	*	*	1.75	*	0.25	*	*	*	2.00
2.01 - 2.10	*	*	0.75	*	*	*	*	*	0.75
2.11 - 2.20	*	*	1.00	0.25	*	*	*	*	1.25
2.21 - 2.30	*	*	1.00	*	*	*	*	*	1.00
2.31 - 2.40	*	*	*	*	*	*	*	*	0.00
2.41 - 2.50	*	*	*	*	*	*	*	*	0.00
2.51 - 2.60	*	*	0.50	*	*	*	*	*	0.50
2.61 - 2.70	*	*	*	*	*	*	*	*	0.00
2.71 - 2.80	*	*	*	*	*	*	*	*	0.00
TOTALS	195.75	1167.52	220.63	26.25	37.38	21.50	5.50	0.50	1675.03

Values in the above table are durations in days and have been rounded to the second decimal place.

TABLE 3
WAVE STATISTICS
WAVE PERIOD/WAVE HEIGHT OCCURRENCES
WINTER DATA, ALL DIRECTIONS

Significant Wave Height (metres)	Peak Energy Wave Period (Seconds)								Totals
	0 - 2.99	3 - 4.99	5 - 6.99	7 - 8.99	9 - 10.99	11 - 12.99	13 - 14.99	> 14.99	
0.00 - 0.10	2.50	*	*	1.00	0.88	2.50	1.00	*	7.88
0.11 - 0.20	65.13	36.00	7.50	17.88	28.63	22.00	4.50	1.25	182.89
0.21 - 0.30	106.00	100.13	10.50	7.25	18.00	20.25	5.50	3.50	271.13
0.31 - 0.40	61.00	171.63	3.25	2.25	8.00	6.25	1.25	*	253.63
0.41 - 0.50	32.75	193.25	3.25	1.25	1.50	1.50	0.25	*	233.75
0.51 - 0.60	5.25	178.13	4.75	*	1.00	*	*	*	189.13
0.61 - 0.70	0.50	141.75	5.75	0.75	*	*	0.25	*	149.00
0.71 - 0.80	*	106.13	3.63	*	*	*	0.25	*	110.00
0.81 - 0.90	*	76.38	7.00	*	*	*	*	*	83.38
0.91 - 1.00	*	48.50	15.75	*	*	*	0.25	*	64.50
1.01 - 1.10	*	31.50	14.75	*	*	*	*	*	46.25
1.11 - 1.20	*	20.50	23.38	*	*	*	*	*	43.88
1.21 - 1.30	*	4.88	14.75	*	*	*	*	*	19.63
1.31 - 1.40	*	1.00	12.75	*	*	*	*	*	13.75
1.41 - 1.50	*	*	9.50	*	*	*	*	*	9.50
1.51 - 1.60	*	*	3.50	*	*	*	*	*	3.50
1.61 - 1.70	*	*	3.00	*	*	*	*	*	3.00
1.71 - 1.80	*	*	0.50	*	*	*	*	*	0.50
1.81 - 1.90	*	*	0.25	*	*	*	*	*	0.25
1.91 - 2.00	*	*	0.50	*	*	*	*	*	0.50
2.01 - 2.10	*	*	0.25	*	*	*	*	*	0.25
2.11 - 2.20	*	*	*	*	*	*	*	*	0.00
2.21 - 2.30	*	*	*	*	*	*	*	*	0.00
2.31 - 2.40	*	*	*	*	*	*	*	*	0.00
TOTALS	273.13	1109.75	144.50	30.38	58.00	52.50	13.25	4.75	1686.26

Values in the above table are durations in days and have been rounded to the second decimal place.

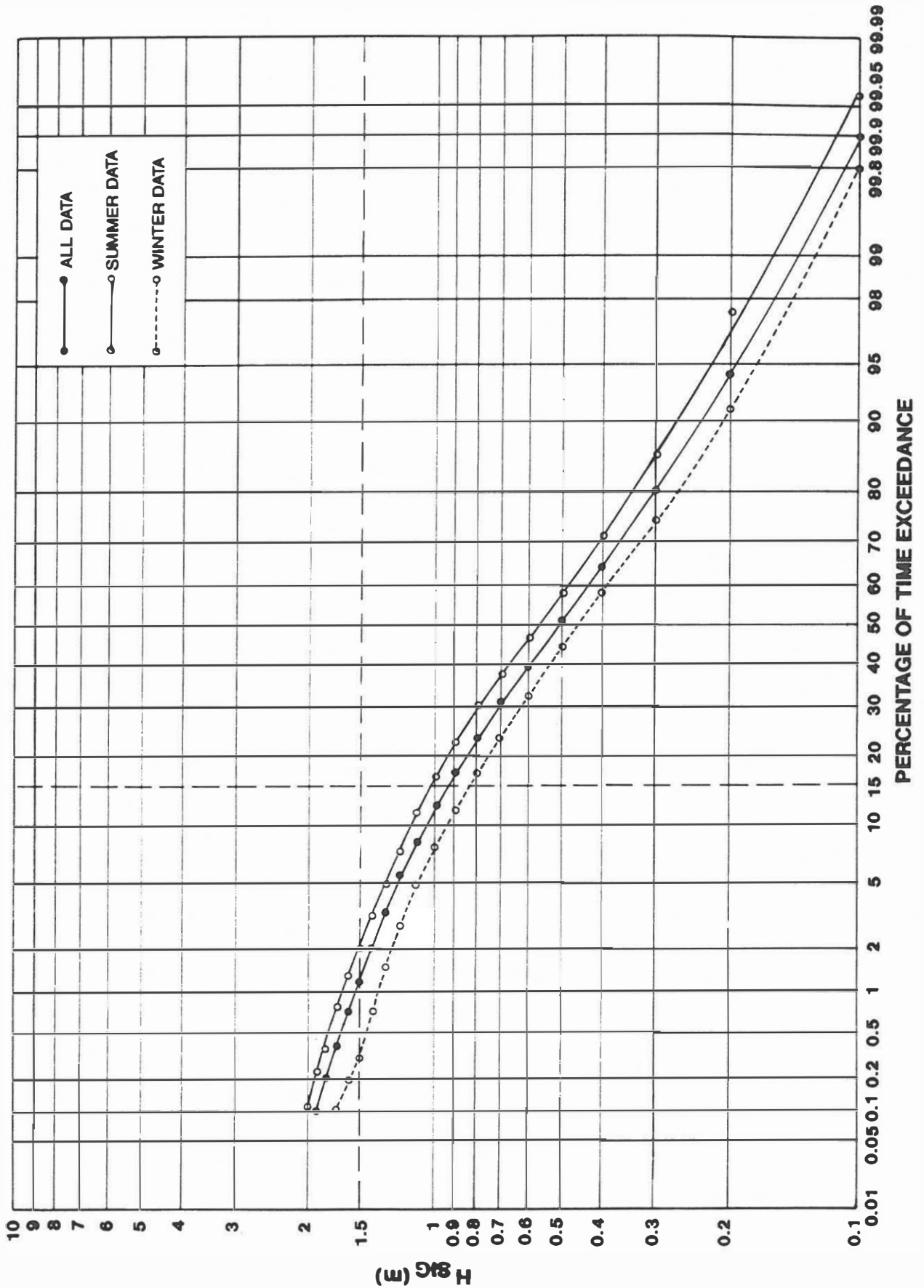


Beach Protection Authority
Queensland

LOCALITY MAP

Wave Data Recording Program
Hay Point Region
W 13.1

Figure
1



**PERCENTAGE (OF TIME) EXCEEDANCE
OF WAVE HEIGHTS (H_{sg}) FOR ALL
WAVE PERIODS**

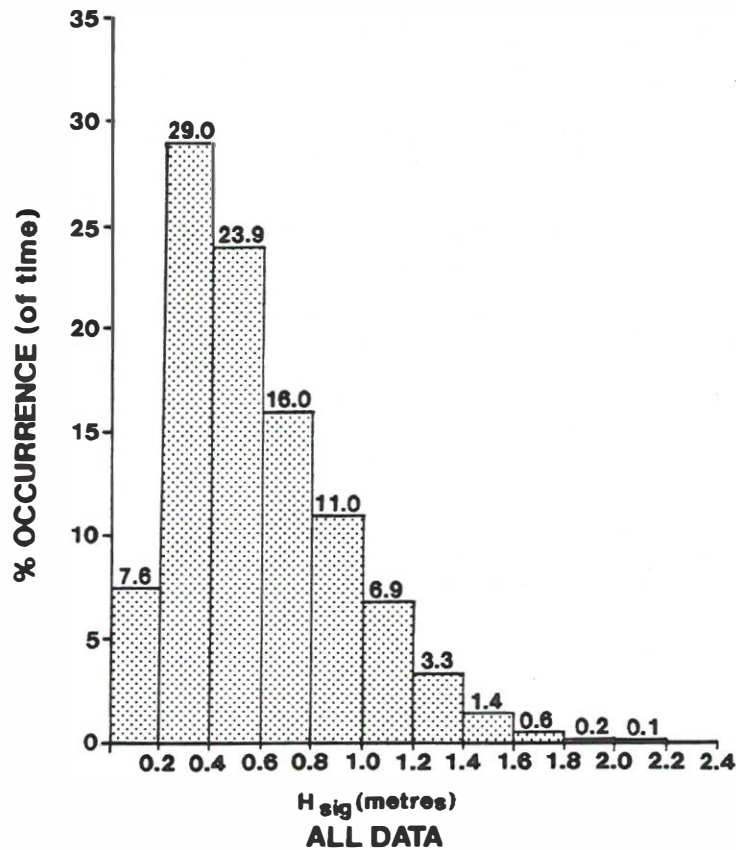
22nd MARCH 1977 to 25th MAY 1987

Wave Data Recording Programme
Hay Point Region
W 13.1

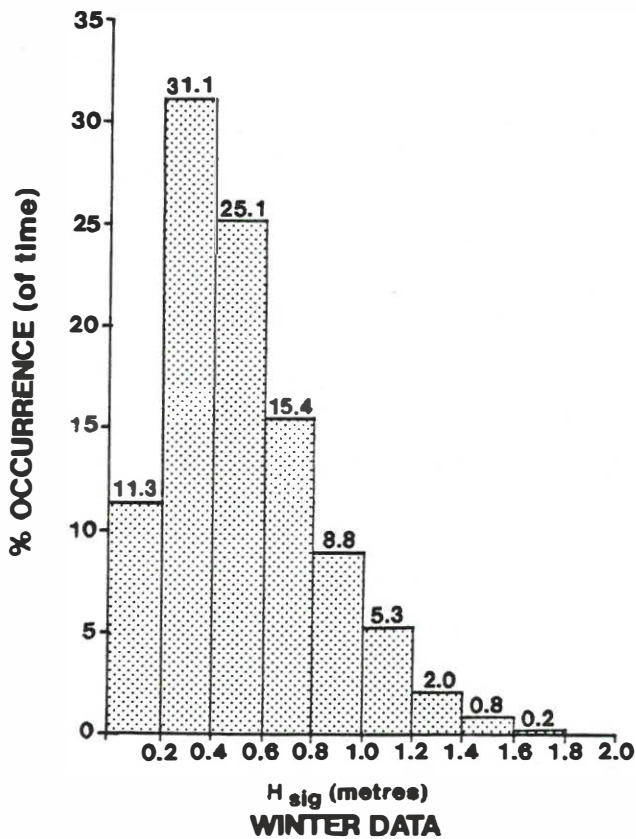
Figure

2

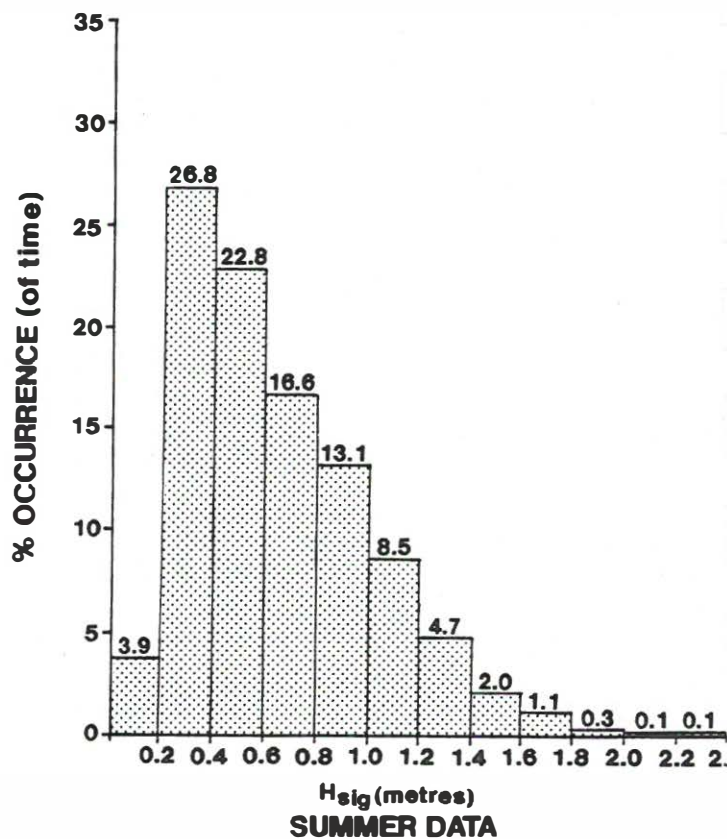




H_{sig} (metres)
ALL DATA



H_{sig} (metres)
WINTER DATA



H_{sig} (metres)
SUMMER DATA



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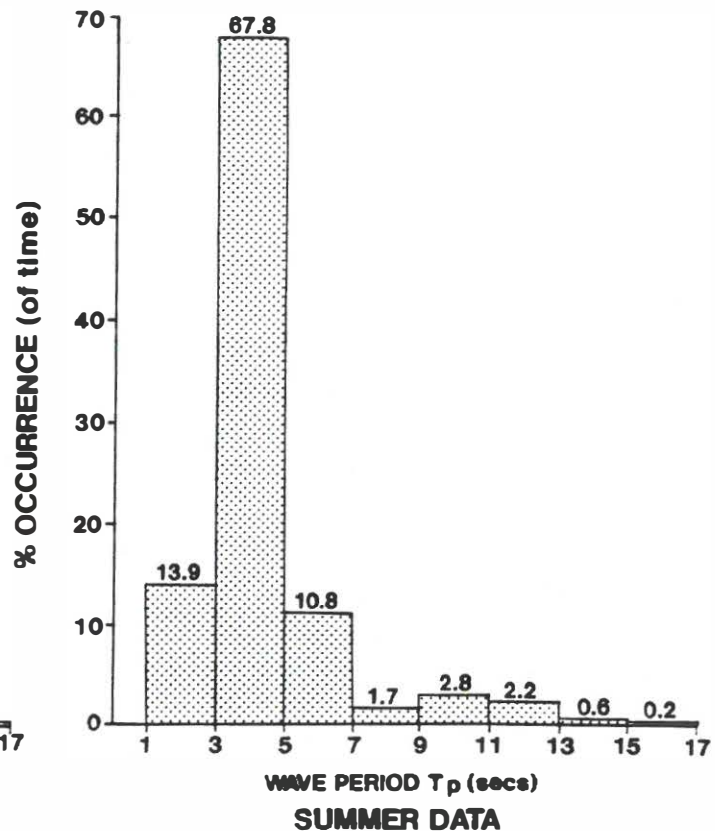
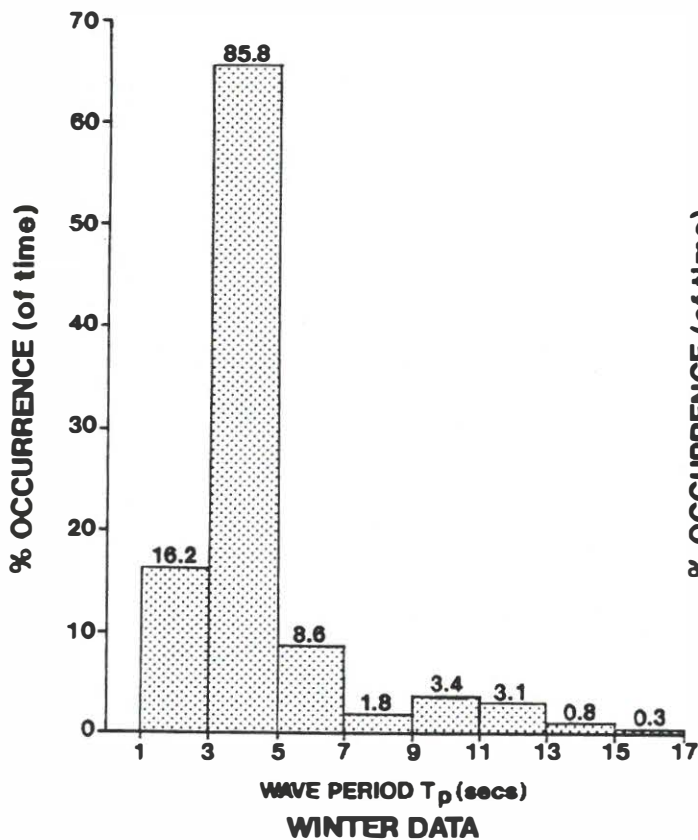
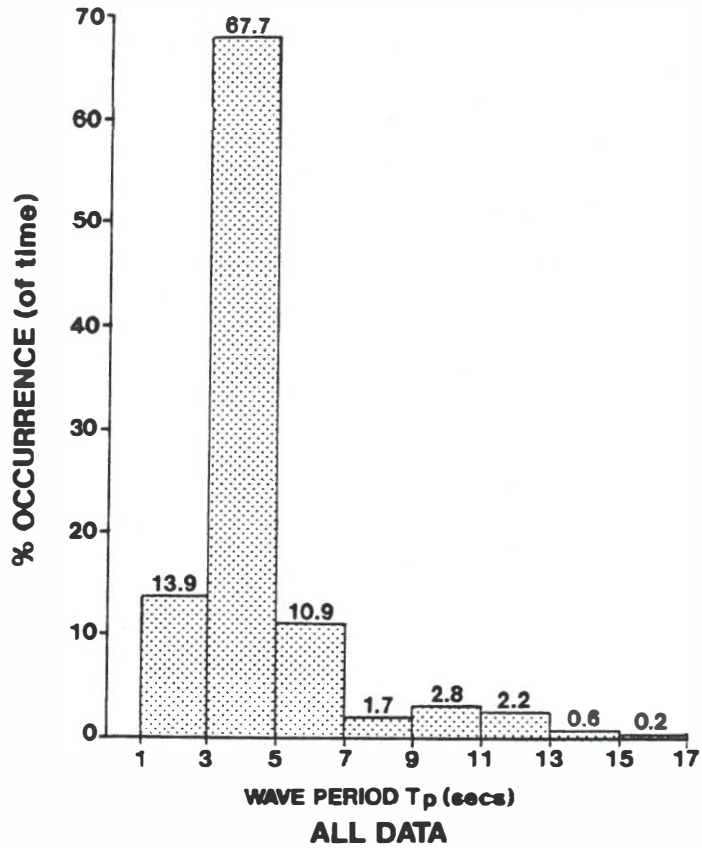
**HISTOGRAM PERCENTAGE (OF TIME)
OCCURRENCE OF WAVE HEIGHTS (H_{sig})
FOR ALL WAVE PERIODS (T_p)**

22nd MARCH 1977 to 25th MAY 1987

Wave Data Recording Programme
Hay Point Region
W 13.1

Figure

3



**HISTOGRAM PERCENTAGE (OF TIME)
OCCURRENCE OF WAVE PERIODS (T_p)
FOR ALL WAVE HEIGHTS (H_{sig})**

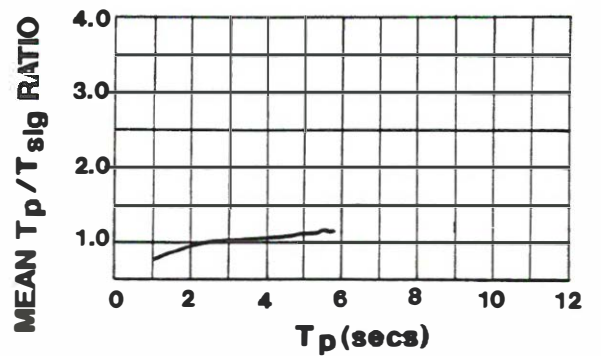
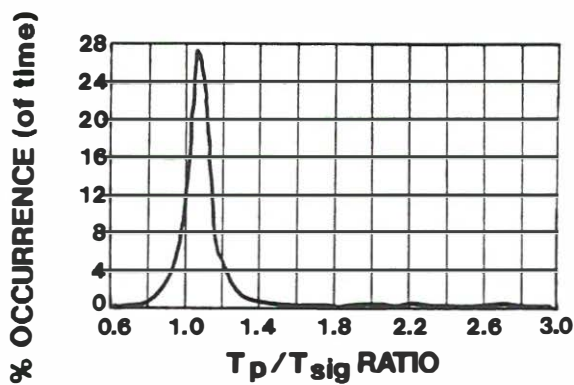
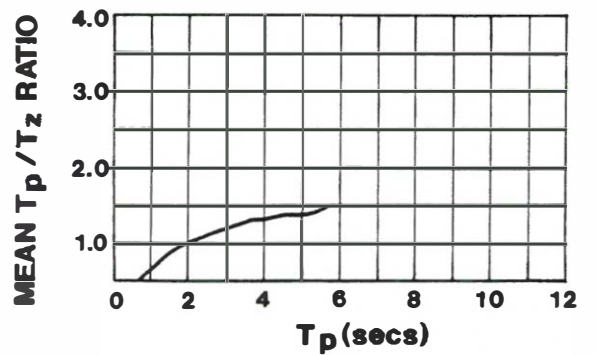
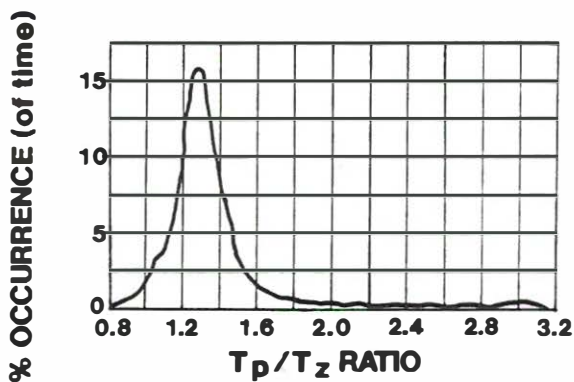
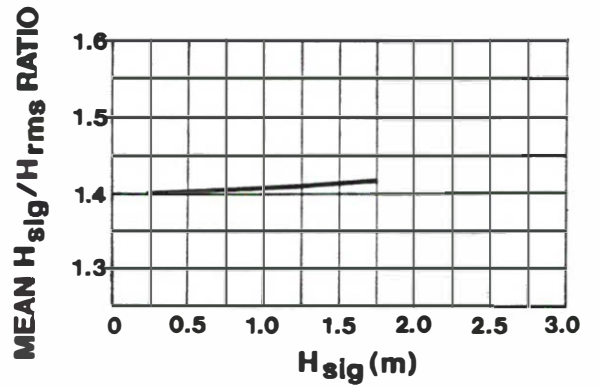
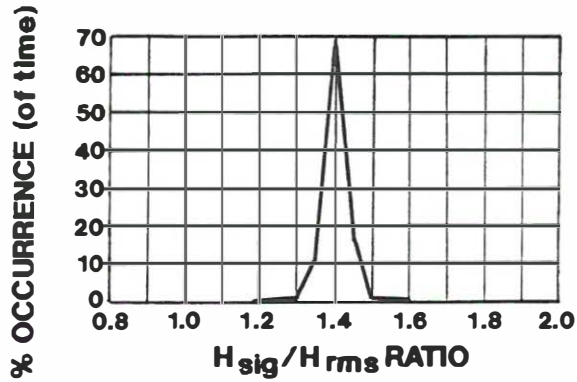
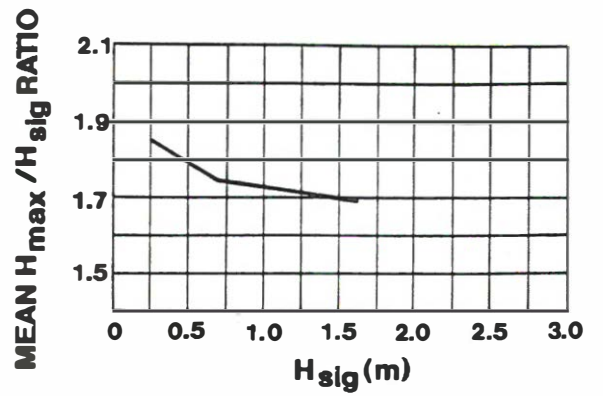
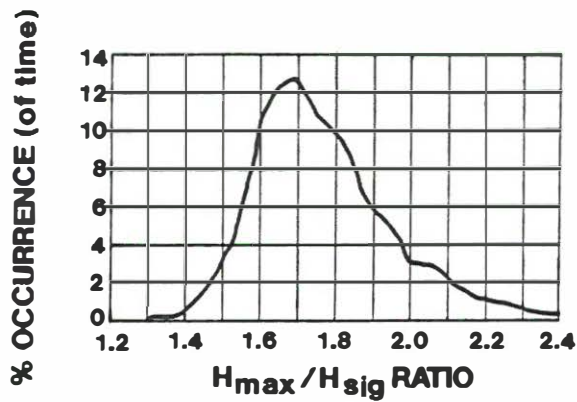
22nd MARCH 1977 to 25th MAY 1987

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Queensland

Wave Data Recording Program
Hay Point Region
W 13.1

Figure

4



WAVE PARAMETER RELATIONSHIPS

22nd MARCH 1977 to 25th MAY 1987

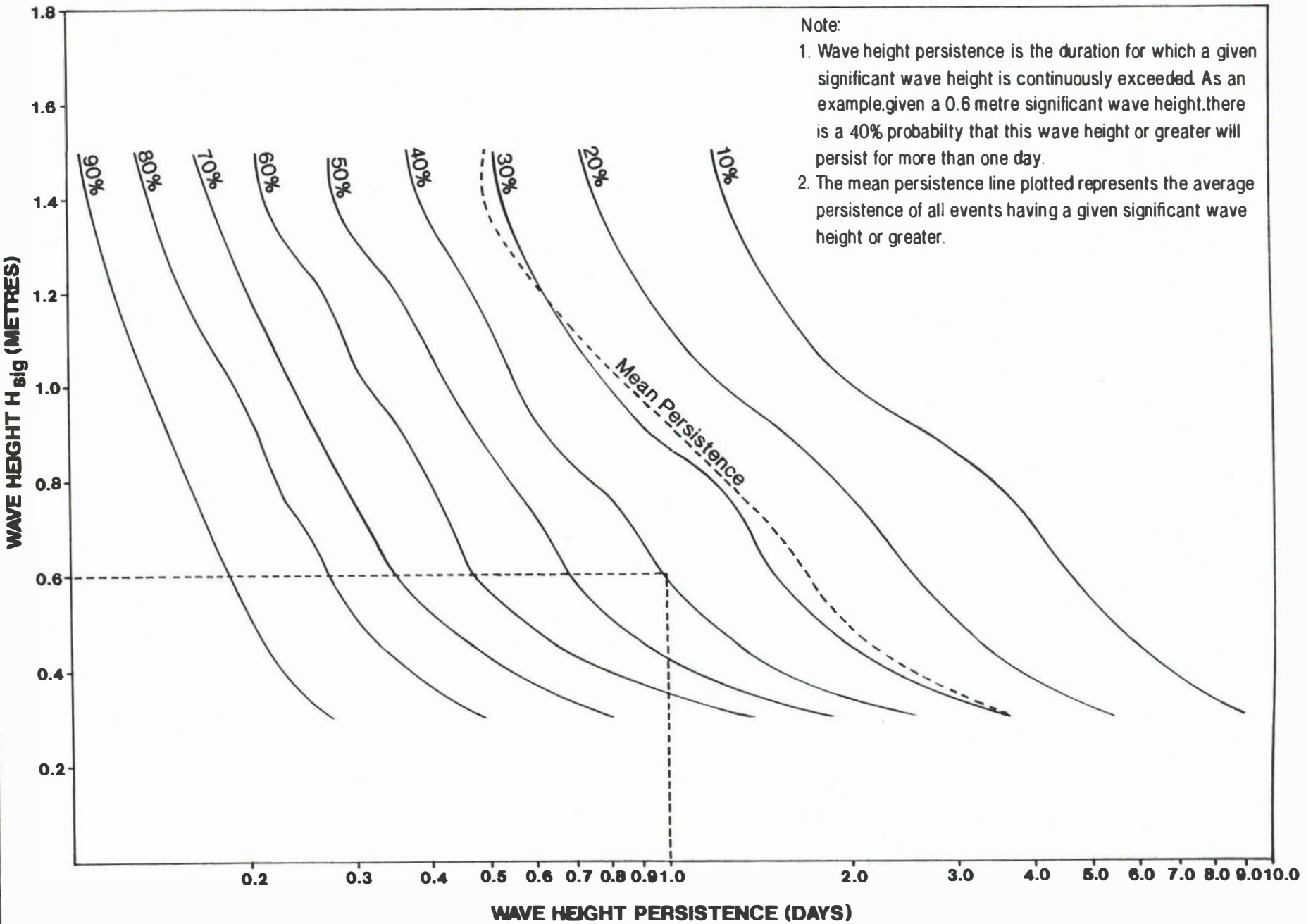
Beach Protection Authority

Wave Data Recording Program
Hay Point Region

W 13.1

Figure

5



AVERAGE DURATION OF EXCEEDANCE OF WAVE HEIGHTS (H_{sig})

22nd MARCH 1977 to 25th MAY 1987

Beach Protection Authority Queensland

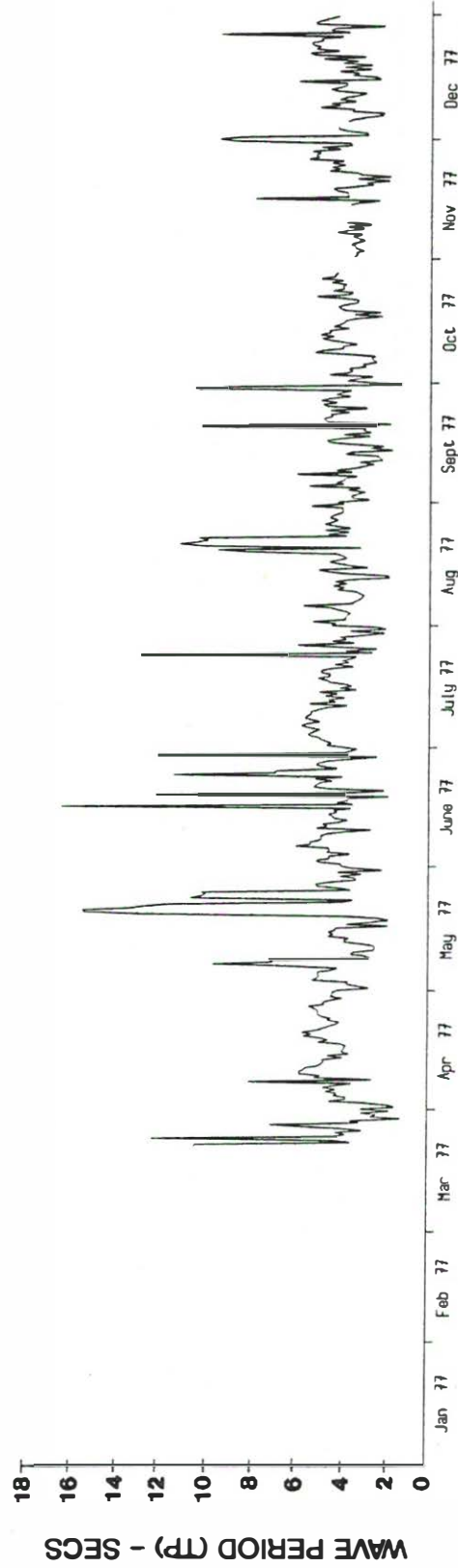
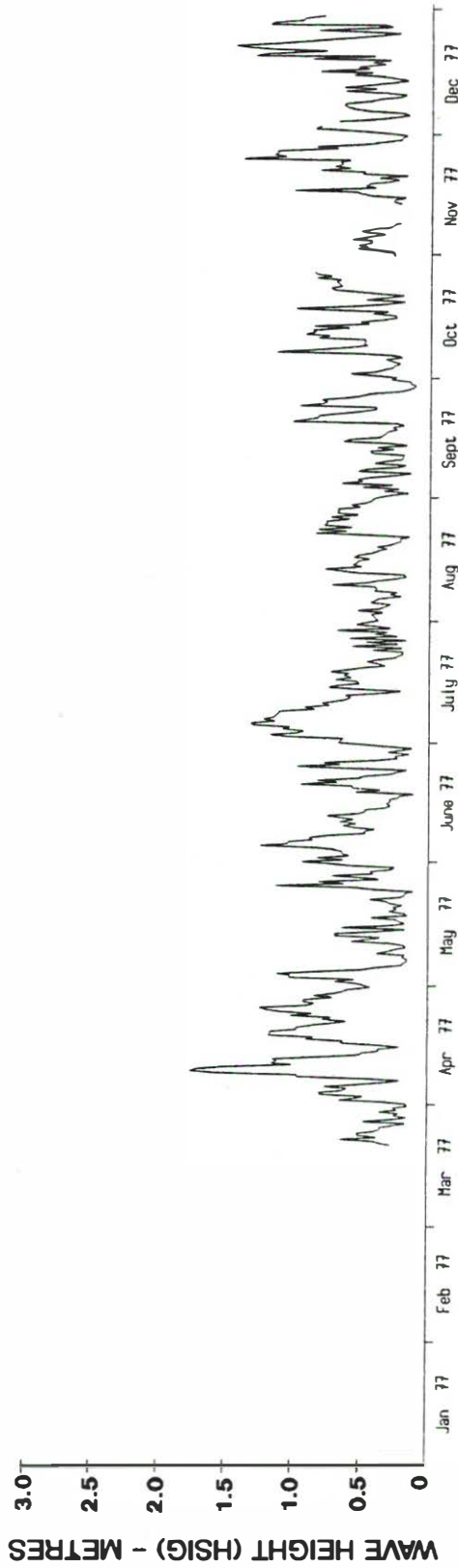


Wave Data Recording Programme
Hay Point Region

W 13.1

Figure





Beach Protection Authority
Queensland

DAILY WAVE RECORDINGS

22nd MARCH 1977 to 25th MAY 1987

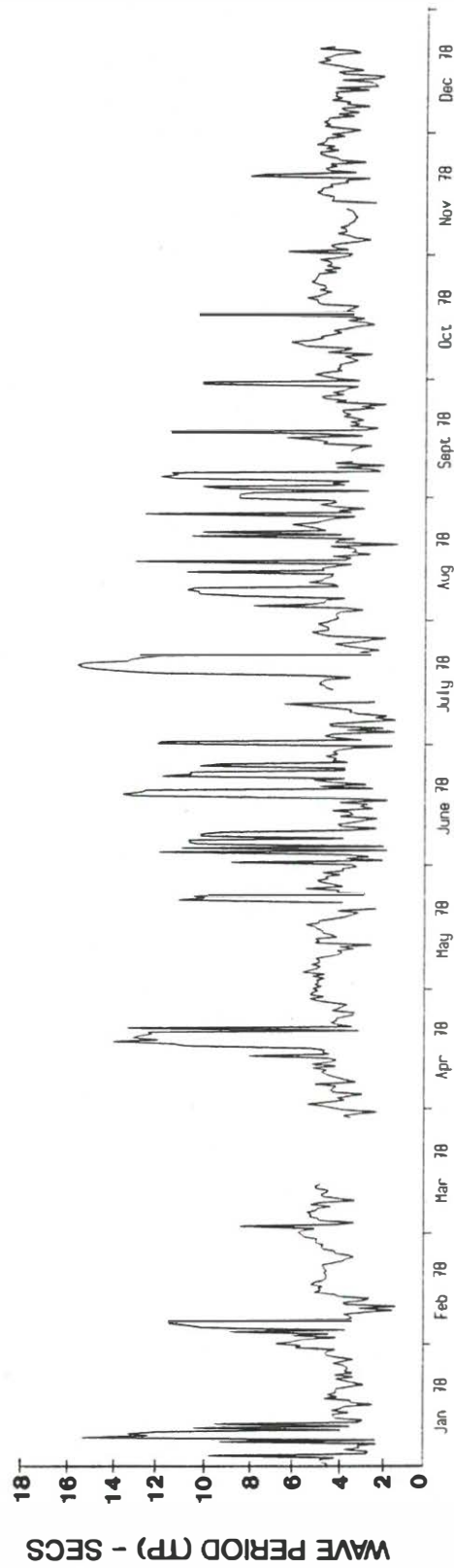
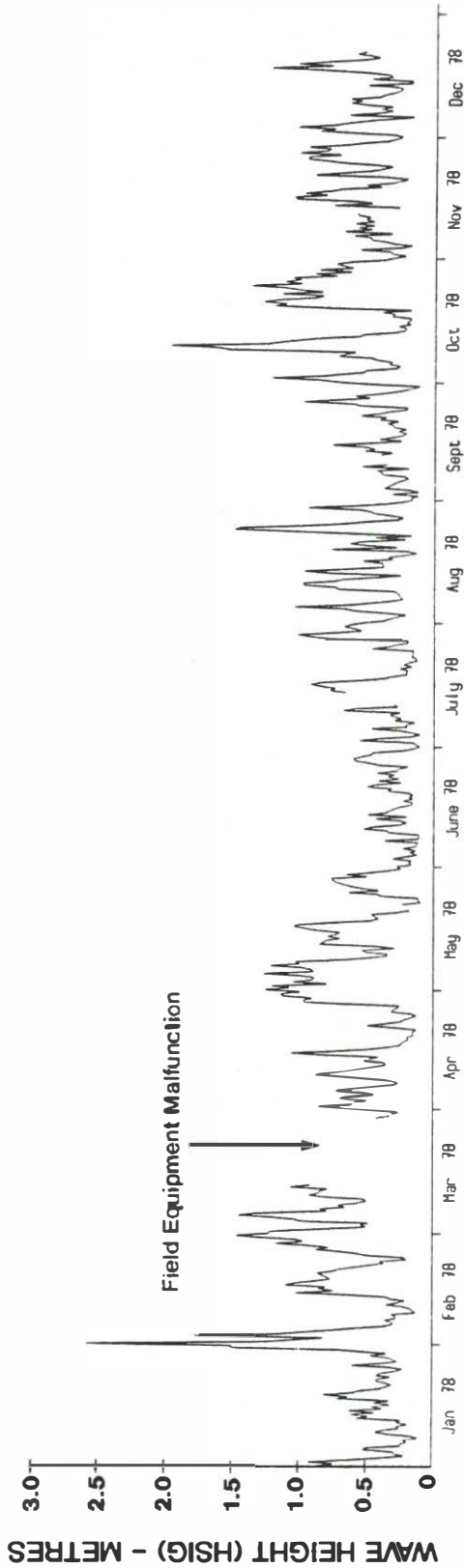
Wave Data Recording Programme
Hay Point Region

W 13.1

Figure

7

Sheet 1 of 11



Beach Protection Authority
Queensland

DAILY WAVE RECORDINGS

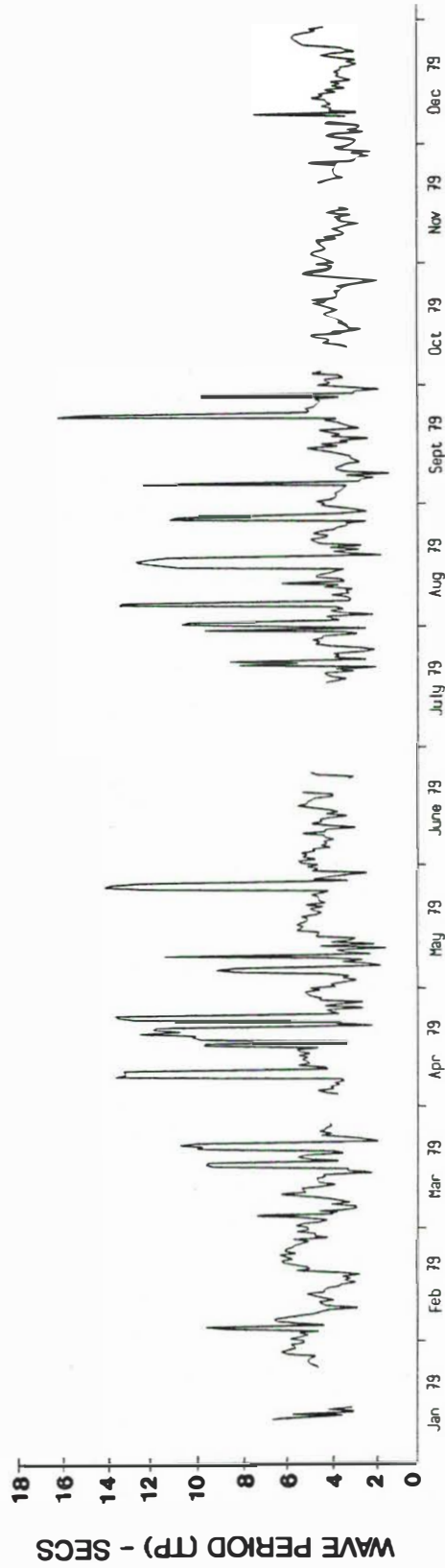
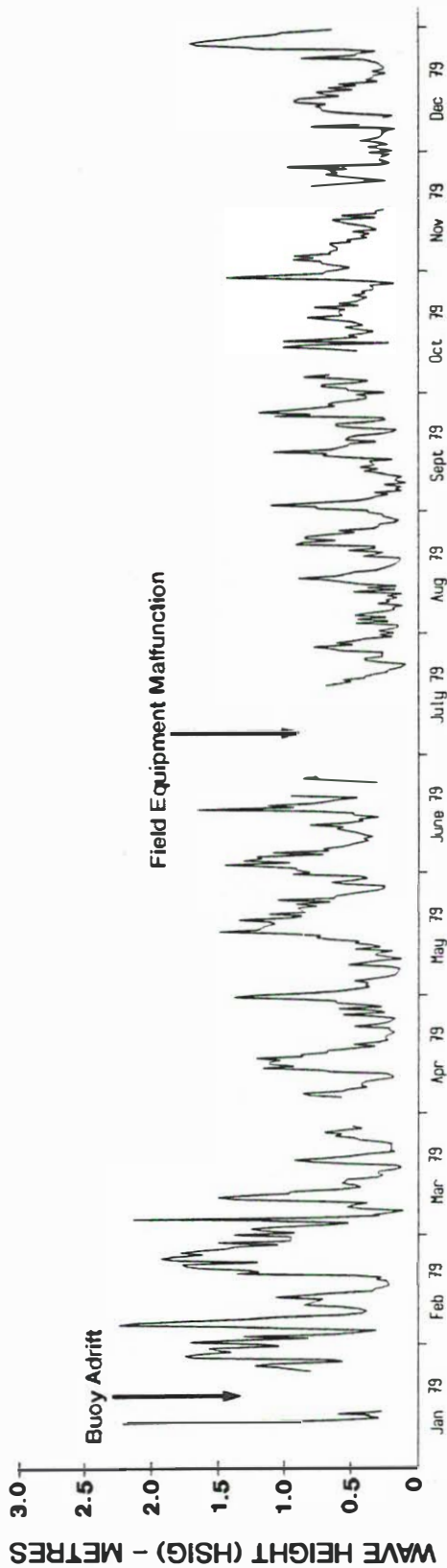
22nd MARCH 1977 to 25th MAY 1987

Wave Data Recording Programme
Hay Point Region
W 13.1

Figure

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Beach Protection Authority
Queensland

DAILY WAVE RECORDINGS

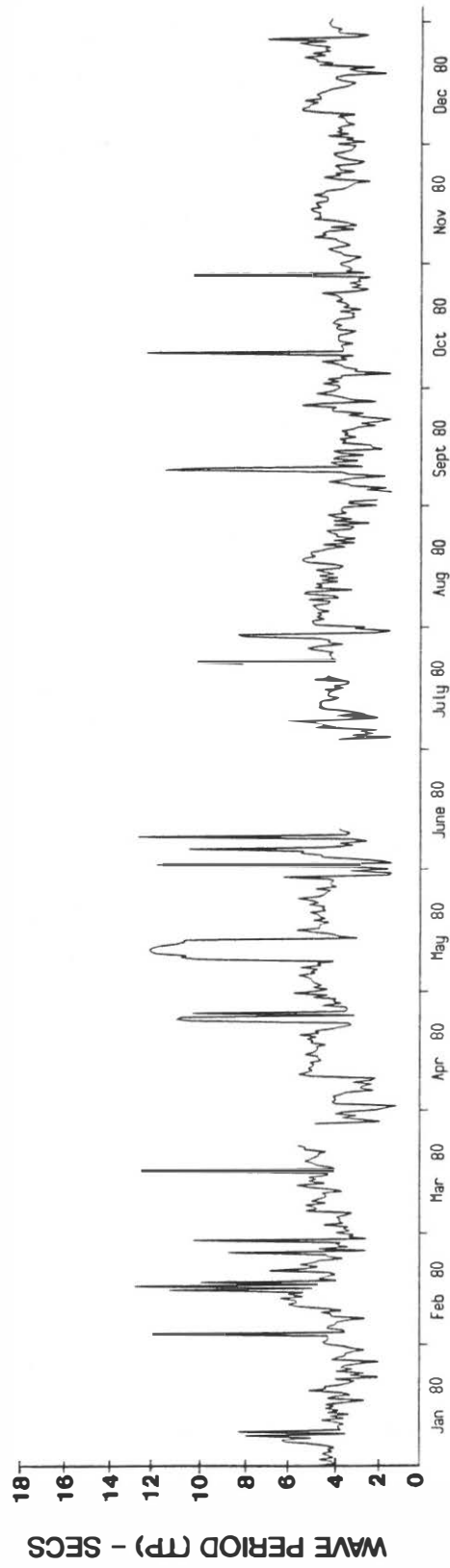
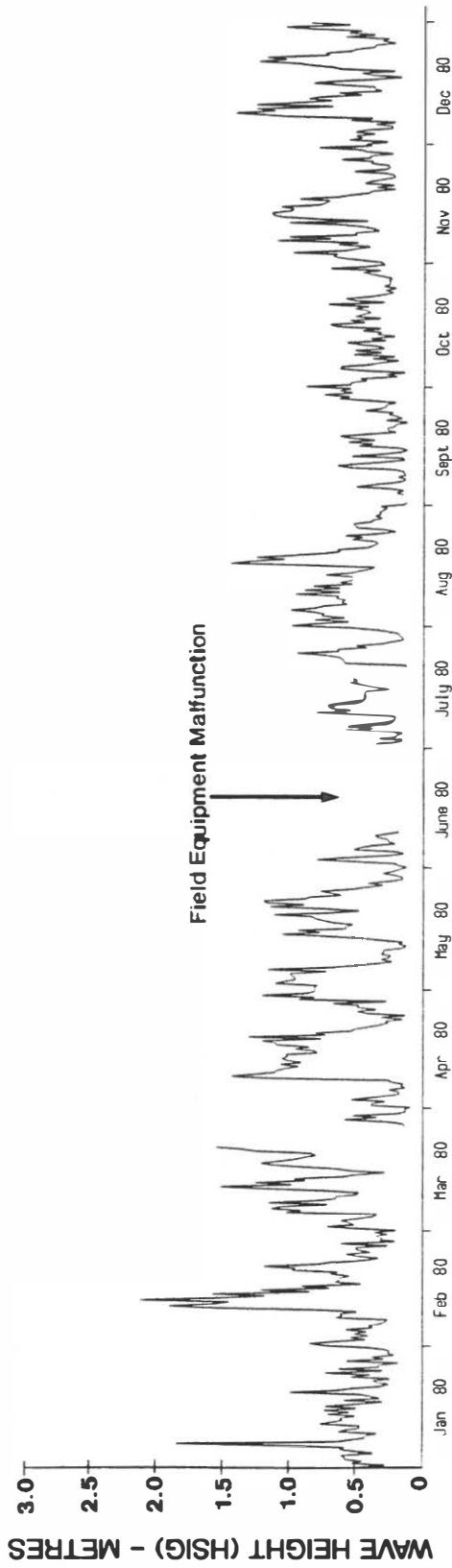
22nd MARCH 1977 to 25th MAY 1987

Wave Data Recording Program
Hay Point Region
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Figure

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Beach Protection Authority
Queensland

DAILY WAVE RECORDINGS

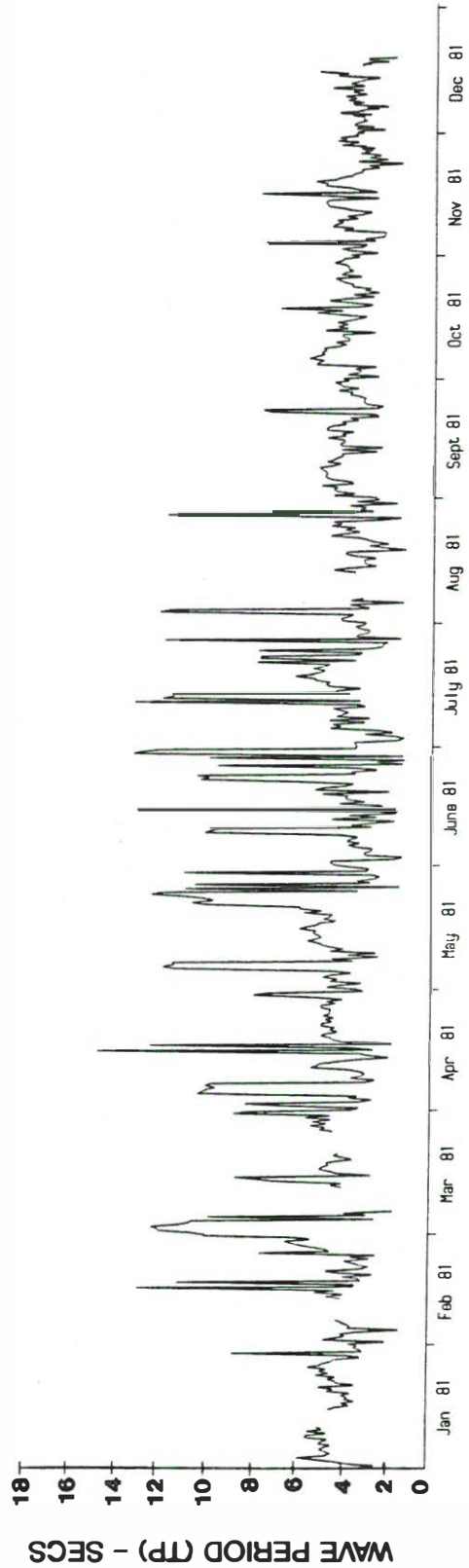
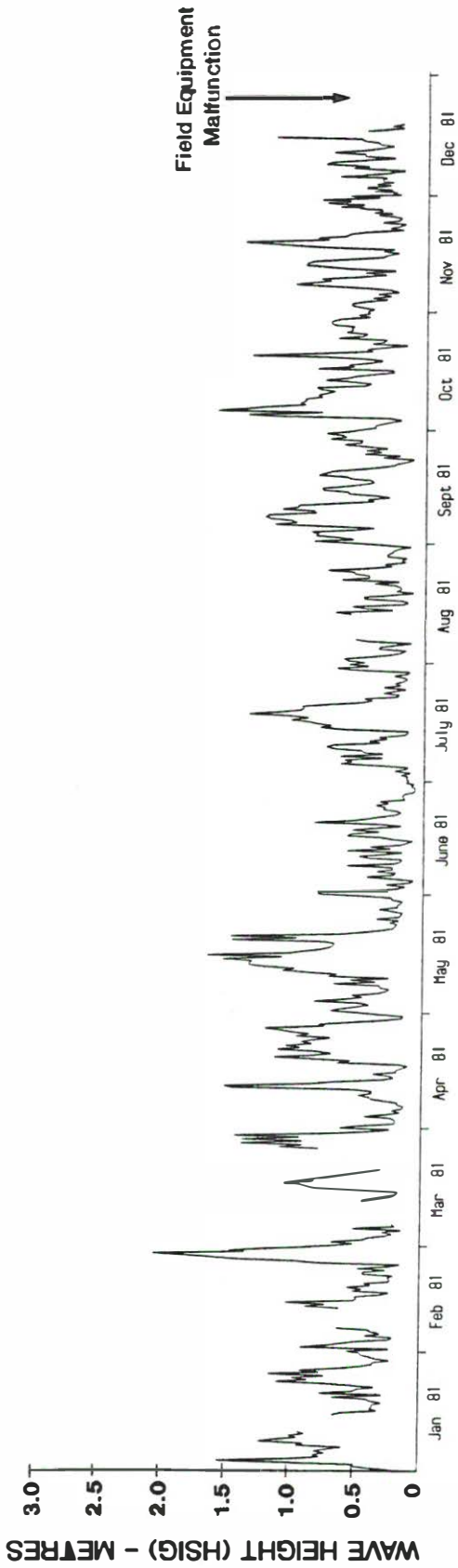
22nd MARCH 1977 to 25th MAY 1987

Wave Data Recording Programme
Hay Point Region
W 13.1

Figure

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Beach Protection Authority
Queensland

DAILY WAVE RECORDINGS

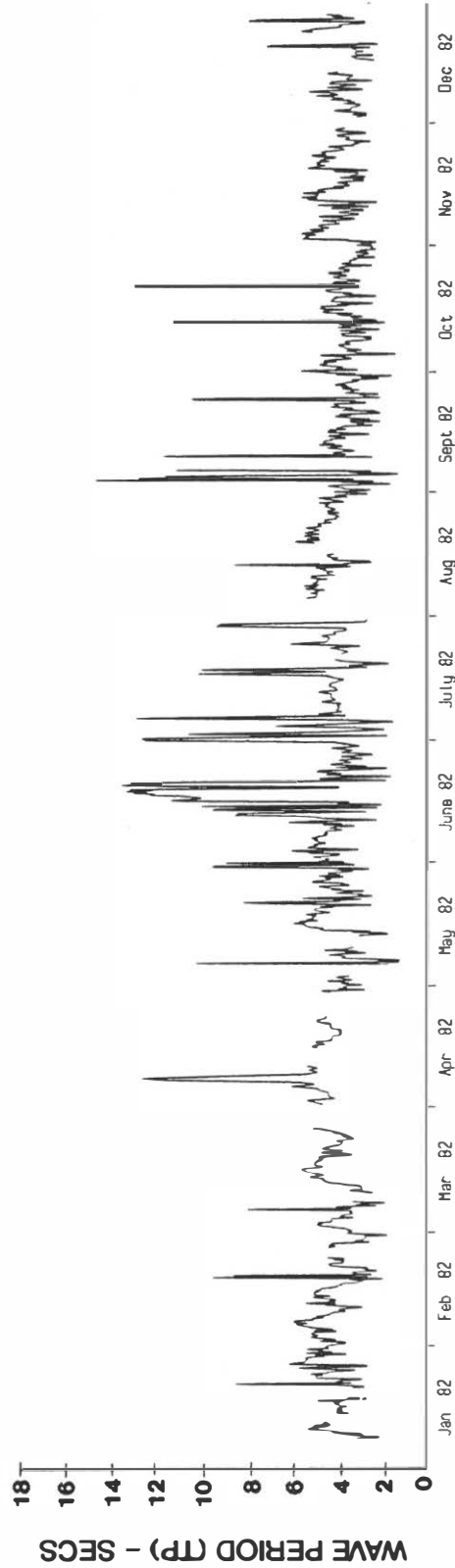
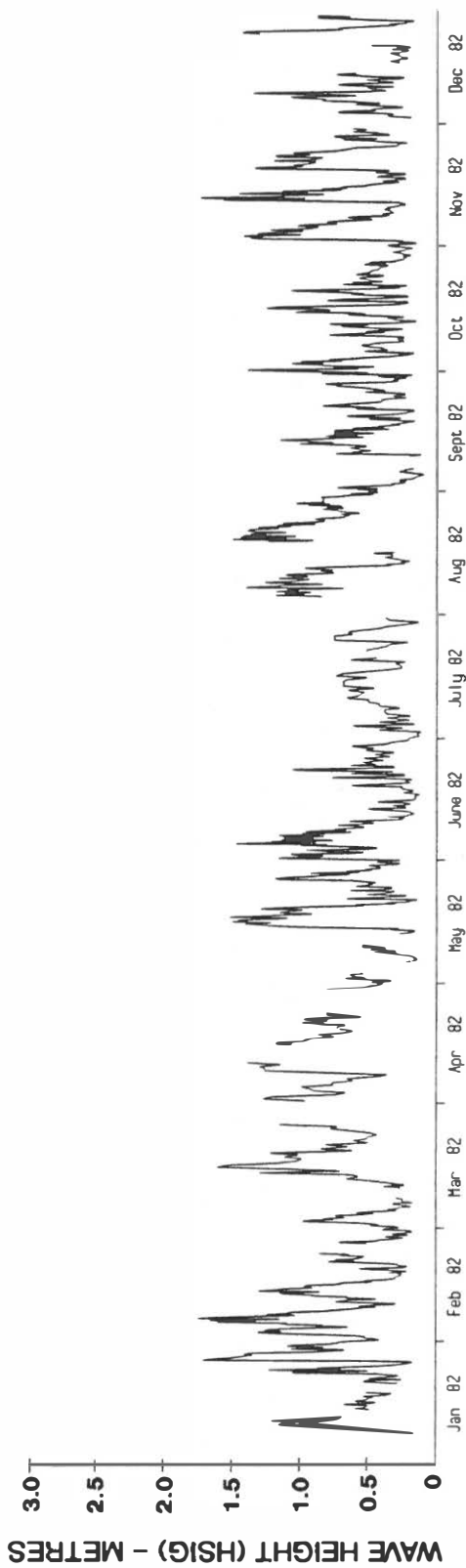
22nd MARCH 1977 to 25th MAY 1987

Wave Data Recording Program
Hay Point Region
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Figure

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Beach Protection Authority
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DAILY WAVE RECORDINGS

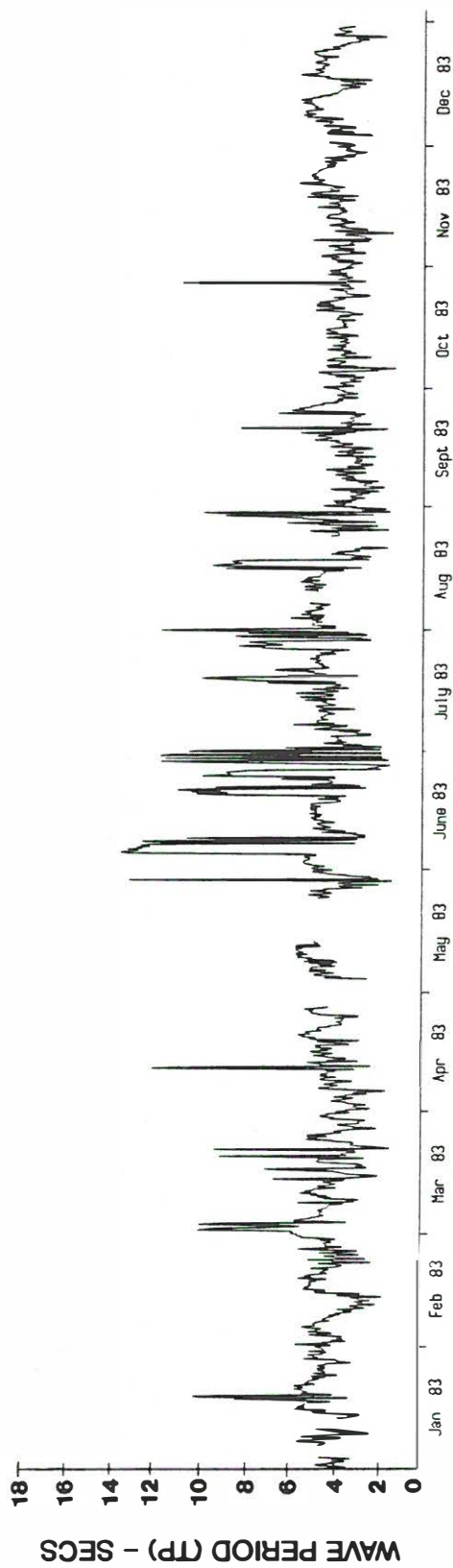
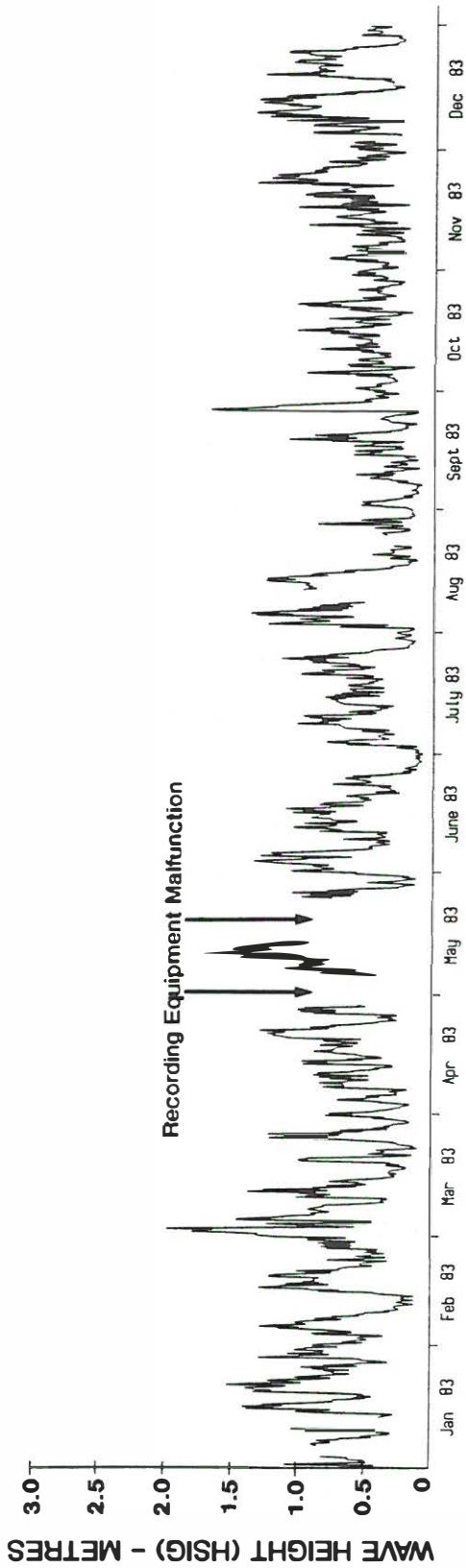
22nd MARCH 1977 to 25th MAY 1987

Wave Data Recording Programme
Hay Point Region
W 13.1

Figure

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Beach Protection Authority
Queensland

DAILY WAVE RECORDINGS

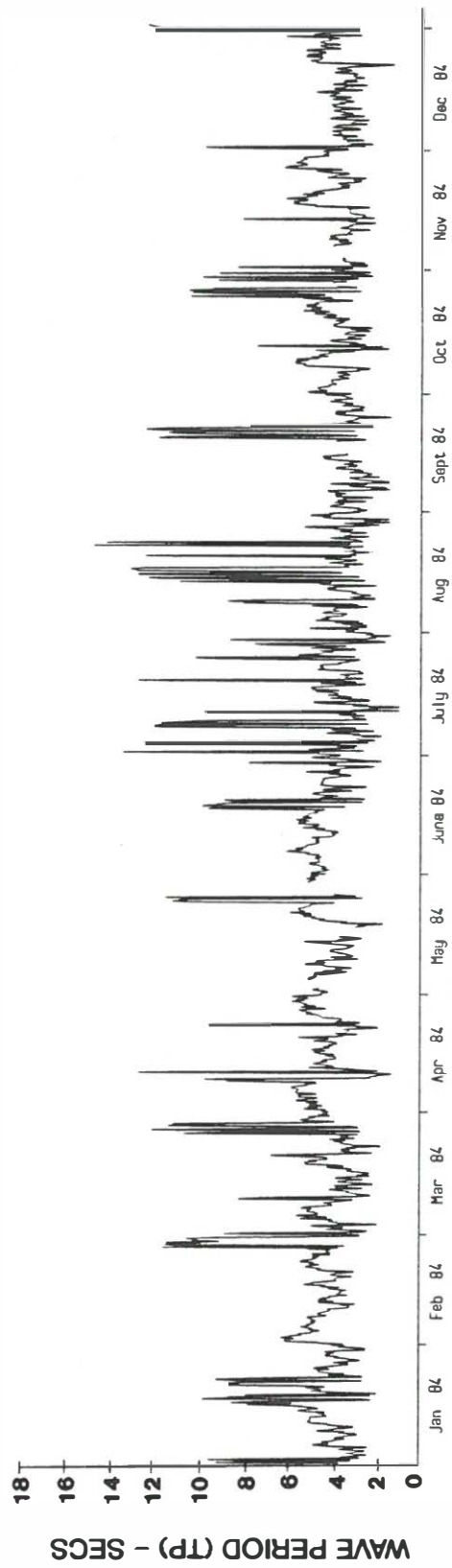
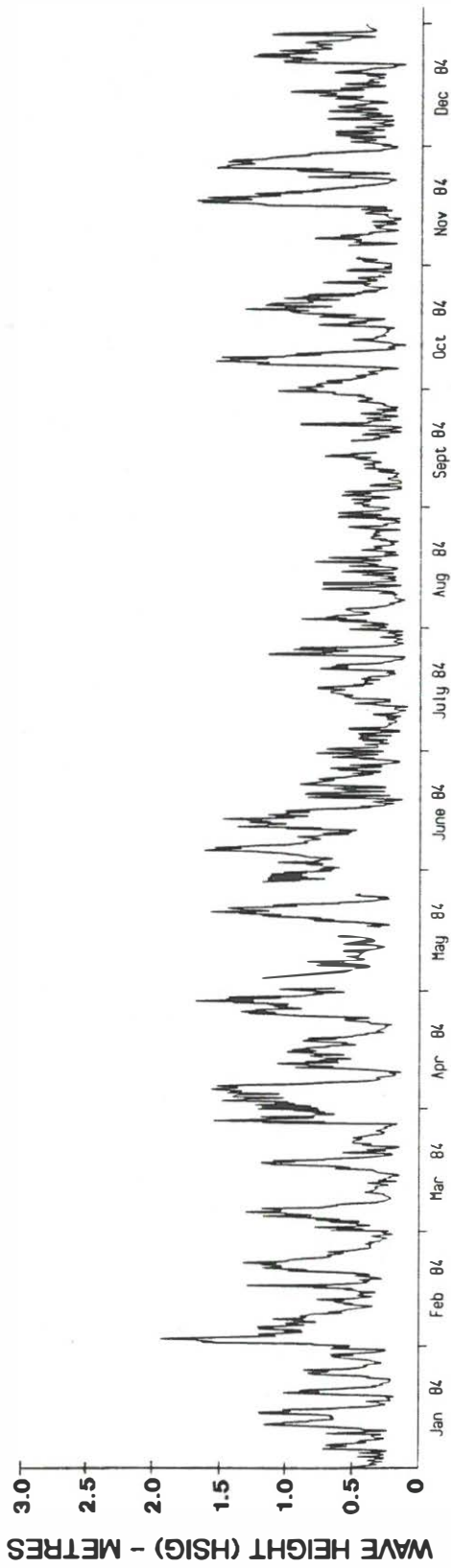
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Wave Data Recording Program
Hay Point Region
W 13.1

Figure

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DAILY WAVE RECORDINGS

22nd MARCH 1977 to 25th MAY 1987

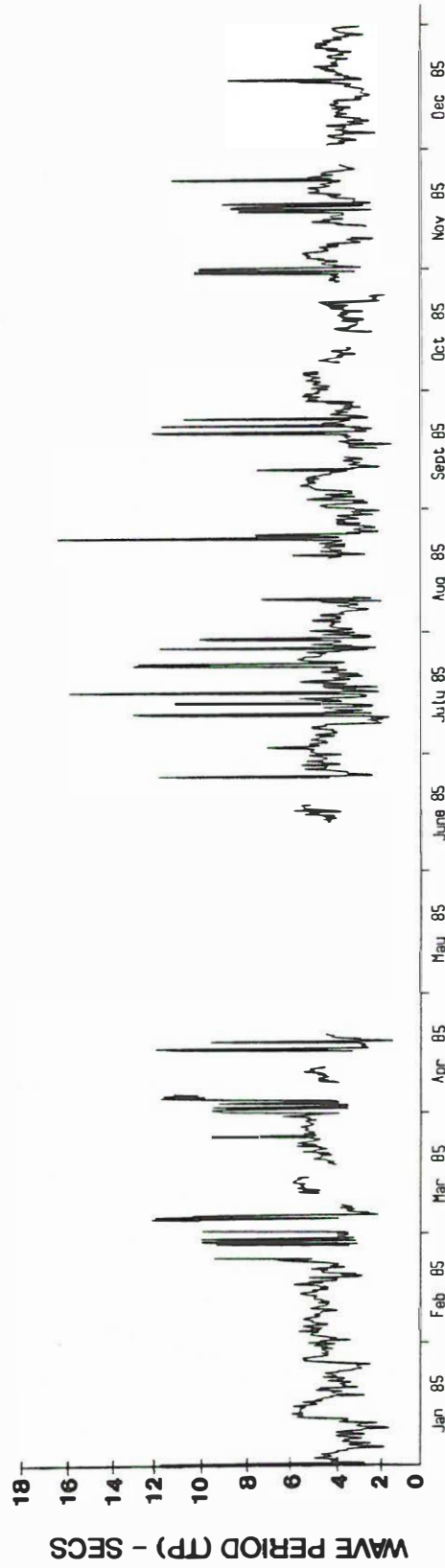
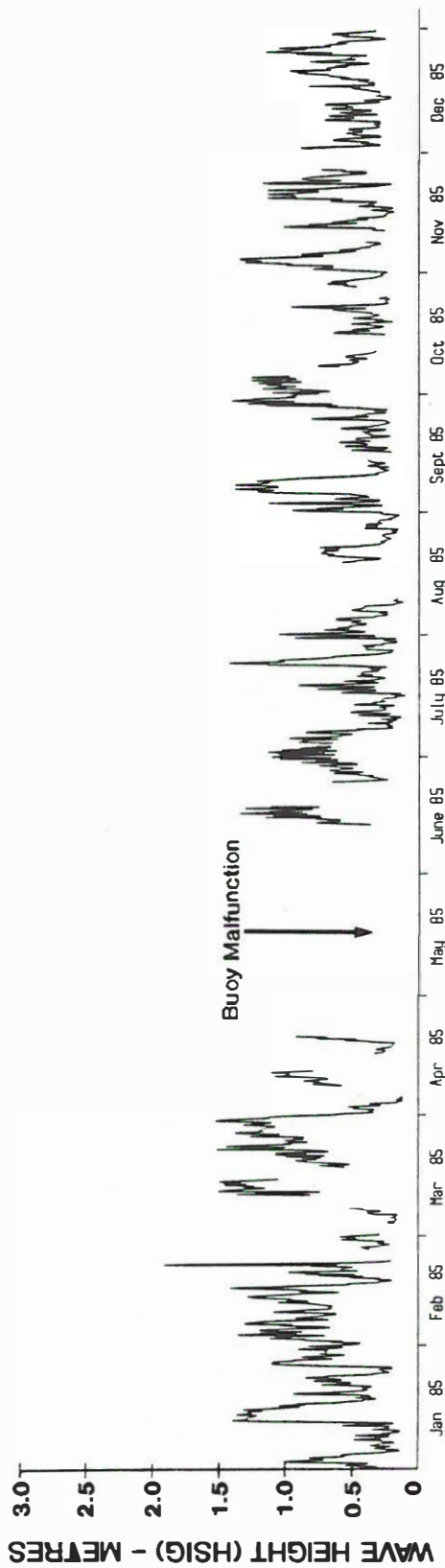
Wave Data Recording Programme
Hay Point Region

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Figure

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DAILY WAVE RECORDINGS

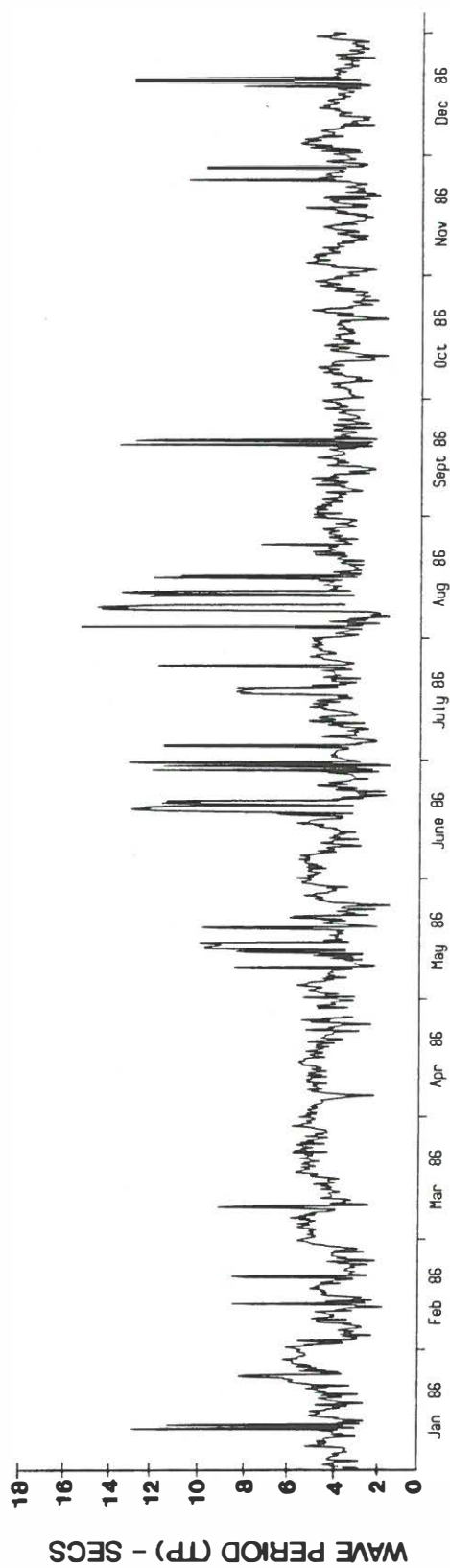
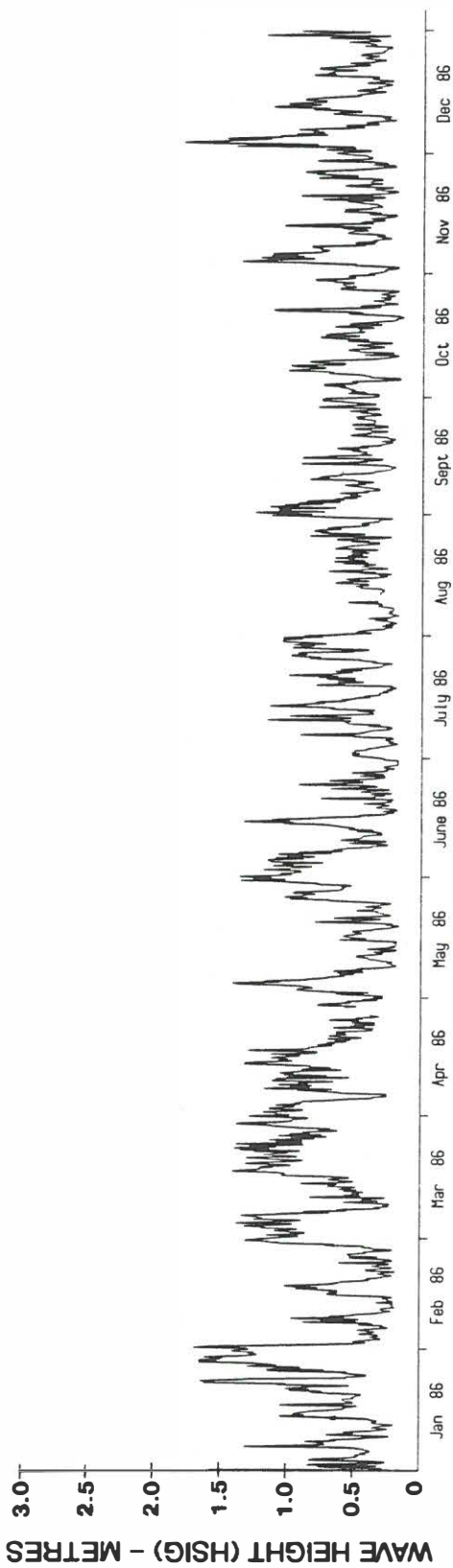
22nd MARCH 1977 to 25th MAY 1987

Wave Data Recording Programme
Hay Point Region
W 13.1

Figure

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DAILY WAVE RECORDINGS

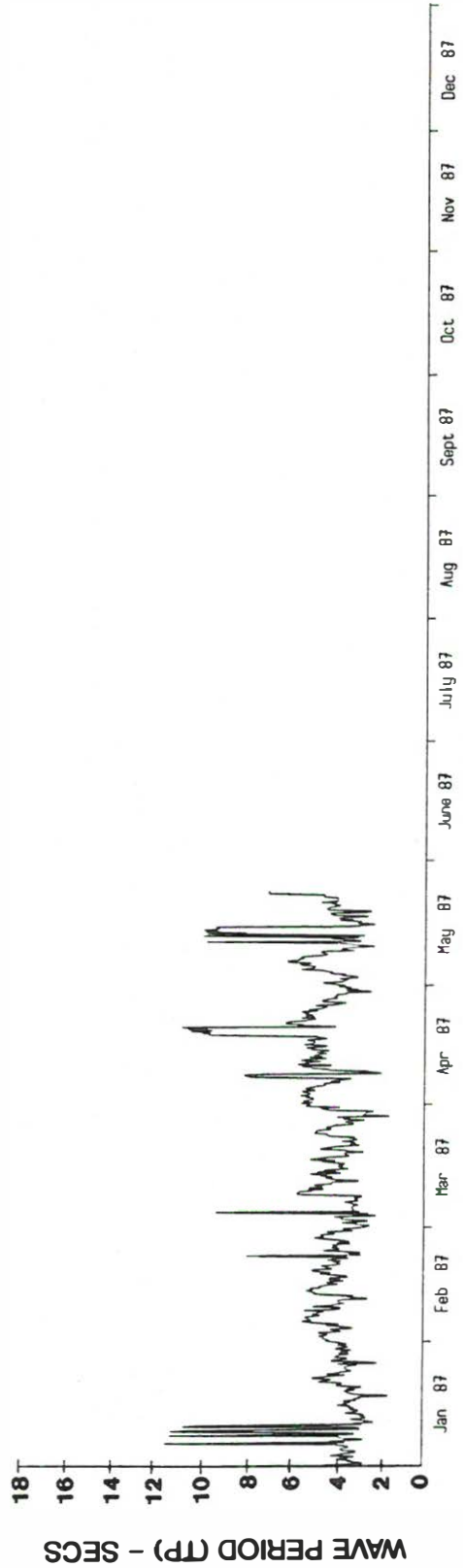
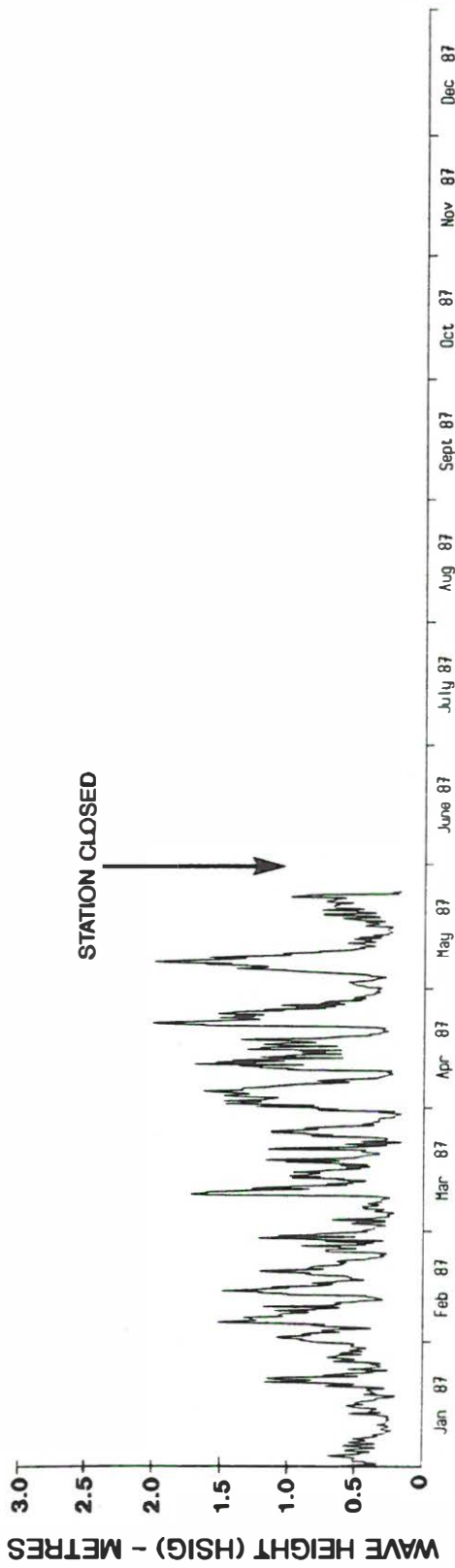
22nd MARCH 1977 to 25th MAY 1987

Wave Data Recording Programme
Hay Point Region
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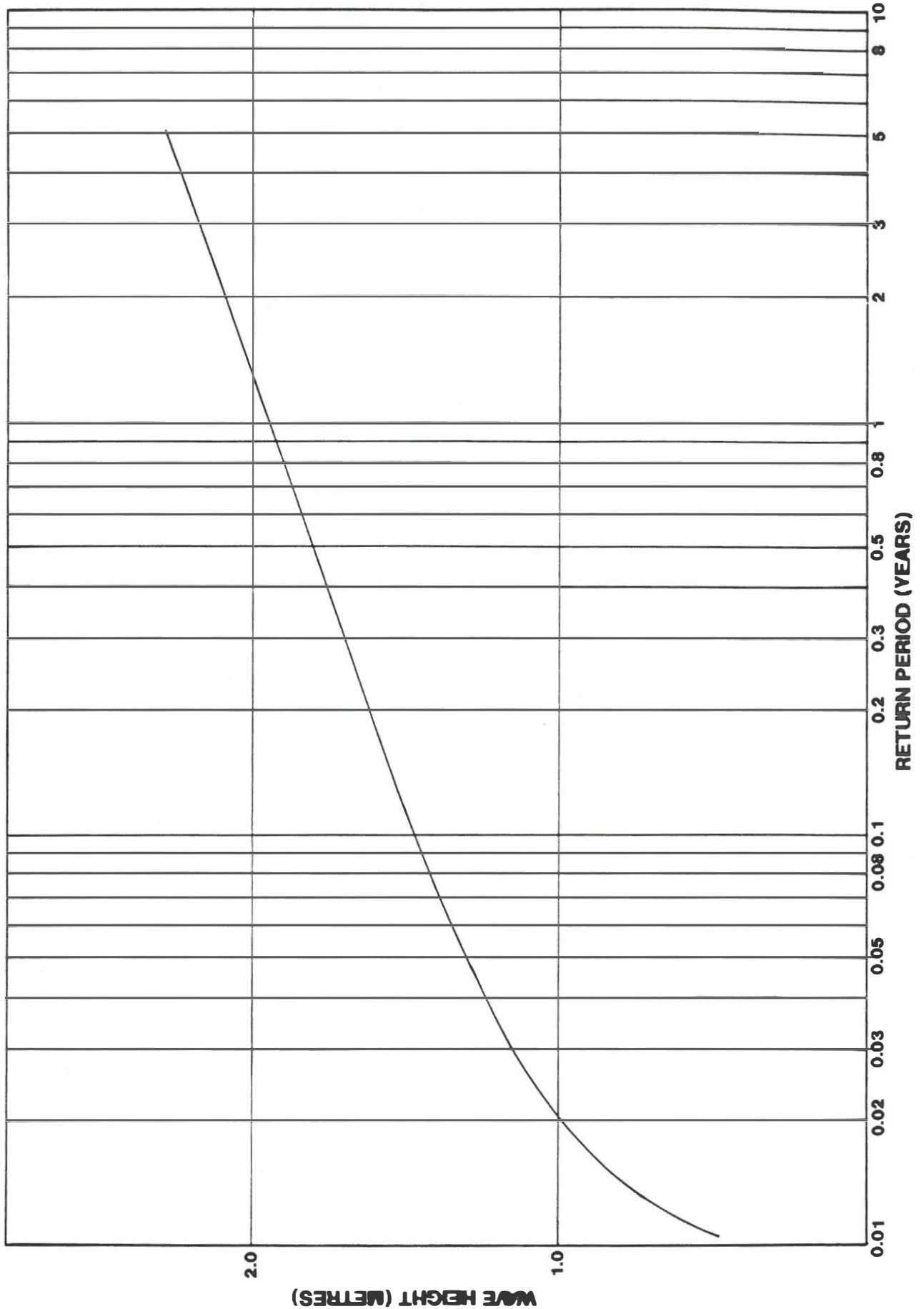
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DAILY WAVE RECORDINGS

22nd MARCH 1977 to 25th MAY 1987

Wave Data Recording Programme
Hay Point Region
W 13.1

Figure
7
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Beach Protection Authority
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WAVE HEIGHT (H_{sig}) RECURRENCE INTERVALS

22nd MARCH 1977 to 25th MAY 1987

Wave Data Recording Programme
Hay Point Region

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Figure

8

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A BETTER LIFE

